



NORWEGIAN SURGICAL SOCIETY

Surgery in Norway

A Comprehensive Review at the 100-year Jubilee of
The Norwegian Surgical Society
1911–2011

Internet-version - corrected according to suggestions from the members
of the Norwegian Surgical Societies, who received a printed “working” version in 2011.

Editors: Jon Haffner, Tom Gerner and Arnt Jakobsen

Preface

The Norwegian Surgical Society was founded on the First of August in 1911. The main reason was discontent with the surgeons' wages and working conditions, but in 1924 the focus changed to the scientific aspects of surgery, and membership was opened to surgeons in training. Since then the Society has had annual meetings with free presentations, and debates about surgical methods, education, specialisation, leadership, and working conditions. The social aspect has also been important, an annual dinner has been arranged since 1925.

In 2006 the Society was renamed The Norwegian Surgical Association, with the chairmen of the other surgical societies as board members.

The history of the Society was reviewed in a lecture by professor Ragnvald Ingebrigtsen at the 50-year jubilee in 1961, and again in a booklet at the 75-year jubilee in 1986. Both were published in Norwegian.

The Society, now Association, celebrates its 100-year anniversary this year, and we have reviewed the entire history of surgery in Norway, and present it in English to make it internationally available.

The present book is written by leading surgeons in the different specialties, and all the manuscripts have been reviewed and commented on by other prominent surgeons to ensure objectivity.

The initial manuscript was printed and distributed to all members of the surgical societies in Norway (totally 2250) in 2011 for corrections and comments. The present Internet edition has been corrected according to the comments received, and an extra chapter on former Chairmen and Boards of The Norwegian Surgical Society/ Association has been added.

The initial manuscript was printed and distributed to all members of the surgical societies in Norway (totally 2250) in 2011 for corrections and comments. The present Internet edition has been corrected according to the comments received, and an extra chapter on former Chairmen and Boards of The Norwegian Surgical Society/Association has been added.

We would like to thank Jon Haffner, Tom Gerner and Arnt Jakobsen for the work they have done in collecting and editing all this information, and the authors and commentators for their contributions.

Oslo on the First of August 2011

Olaug Villanger (leader)
Torill Morken (General Surgery)
Tonje Berglund (Vascular Surgery)
Rolv-Ole Lindsetmo (Gastrointestinal Surgery)
Ketil Holen (Orthopedic Surgery)
Rune Haaverstad (Thoracic Surgery)

Kari Erichsen (Surgeons in training)
Christian Beisland (Urology)
Tomm Müller (Neurosurgery)
Thomas Sjøberg (Plastic Surgery)
Hans Skari (Pediatric Surgery)
Anne Irene Hagen (Breast and Endocrine Surgery)

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Introduction

Reality differs from person to person. Our concept of what has happened depends on where we observe various incidents from, at what time, and who we are. The records we pass on depend not only on that, but also on the time and circumstances when they are recalled, how accurately they are remembered and presented, and how they are received and recorded.

History is usually written by historians, who view the past as trained and professional observers, but they have to base their description on what participants in past history have recorded.

The Norwegian Surgical Society was founded in 1911. At the 75th Anniversary in 1986 the Society published a “jubilee-book” in Norwegian edited by Hans K Dahl. I was Chairman of the Society at that time, and collected manuscripts in English from some of the most prominent members of the surgical community. The intention was to produce a book in English about Surgery in Norway. Various circumstances delayed the project, and the manuscripts were handed over to Kristian Kristiansen, who used them in a review of Norwegian surgery with Øivind Larsen as co-author. It was published as a supplement to The European Journal of Surgery in 1991.

The manuscripts from 1986 were safely stored, and in 2008 I suggested to the Board of the Norwegian Surgical Society that they should be printed with updates, in a review of surgery in Norway at the Society’s Centenary in 2011. I offered to edit this review. This was accepted, and I asked first Tom Gerner, and later Arnt Jakobsen to be assistant editors. We started the work on this book in January 2009.

The idea of the book is that the history of surgery in Norway should be written by surgeons, for surgeons, in a language surgeons both nationally and internationally understand.

The manuscripts from 1986 are presented almost without editing, with the exception of adding subheadings. Updates for the last 25 years have been written by surgeons who have been important actors in the development of Norwegian surgery. All manuscripts have been reviewed by other prominent surgeons, and revised and supplemented according to their comments.

The finished complete document has been sent to all the 2250 members of the surgical societies in Norway, with a request for corrections and missing information. The text has been corrected accordingly in this Internet edition.

The manuscripts are presented according to the specialist structure in Norway, and short chapters have been added about the specialist organisations for each branch of surgery. In addition a list of all names mentioned in the text, with abbreviated biographical information, is presented at the end of the book.

The book is written in “Scandinavian English” i.e. English as written and spoken by Norwegian surgeons in publications, and at meetings and congresses. Arnt Jakobsen, graduate of Aberdeen University and I (Glasgow University), have revised the language in all chapters. We have used the American spelling of some latin words, like orthopedic and pediatric, but otherwise Commonwealth English.

Tom Gerner, Arnt Jakobsen and I would like to thank the Executive Committee of The Norwegian Surgical Association for entrusting us with this task, and all the authors and commentators for their engagement. We also owe Øivind Larsen, Arne Østerud and Leiv Hove thanks for providing several of the illustrations, and Charlotte Haug, editor of the Journal of the Norwegian Medical Association, and her collaborators in Tidsskriftet, especially Ole Morten Vindorum, and Emma Dalby, a special thank for help in the final stages of the work on this book. All illus-

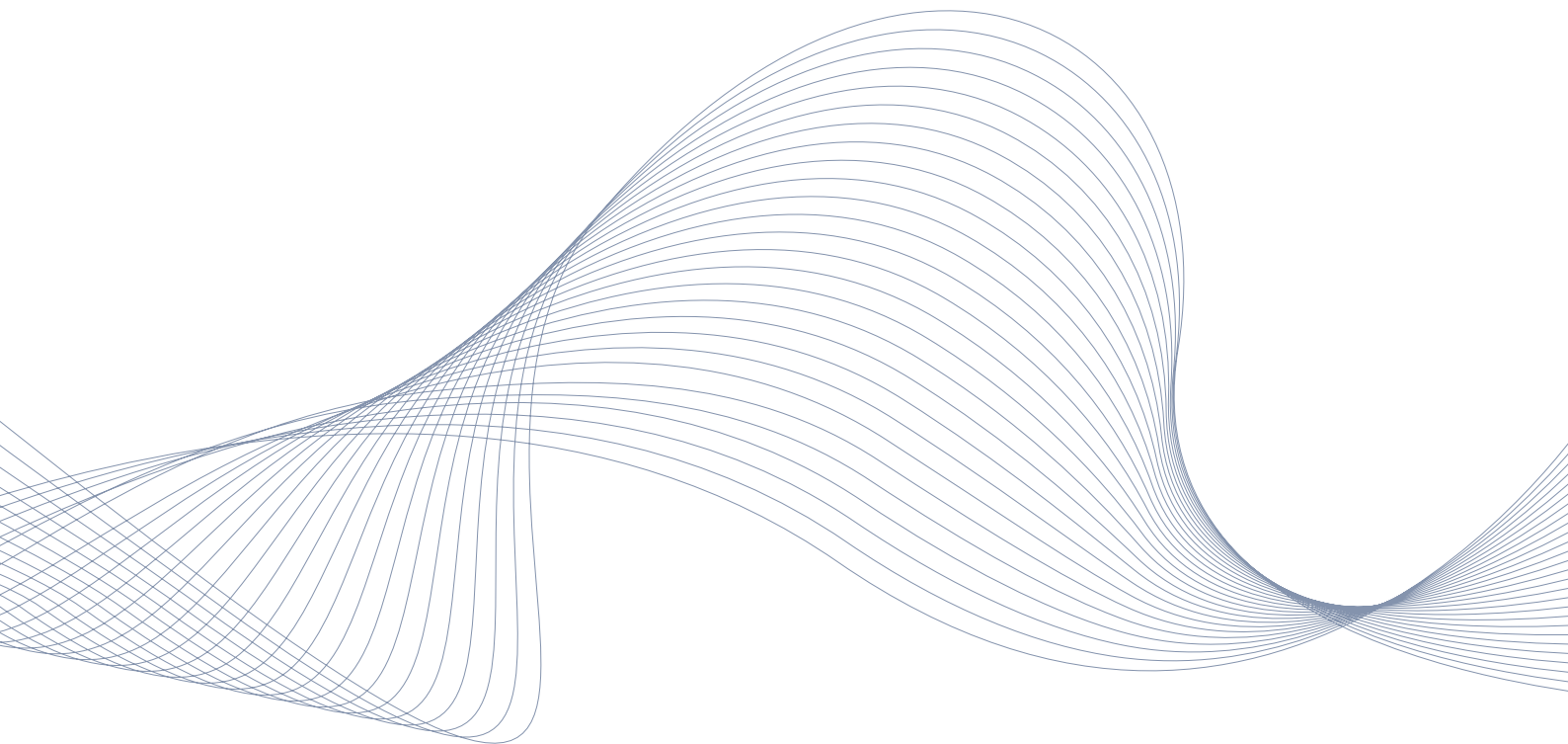
trations have been supplied by the owners. We are grateful for all the help we have received with this. Regrettably we have failed to find the names of all the portrait painters and photographers.

We hope the readers will find the book both informative and enjoyable.

Jon Haffner
Chief Editor

Presentation of Editors and Authors

For hospital names, see Chapter 60.



Editors



Jon Haffner

Chief editor, author Chapters 1, 2, 4, 5A, 35 (1986), and 60, co-author 3, 10, 36.

Born 1940. MBChB Glasgow 1964. ECFMG 1964. PhD Oslo 1973. MHA Oslo 1992. Specialist in general and gastrointestinal surgery. Surgical training Ullevål and Rikshospitalet. Consultant Ullevål 1984–94. Consultant Drammen 1994–2004. Head Surgical Department 1994–97, and Surgical Clinic 1997–2004. Medical director (sjeflege) 2004–07. Temporary head of Surgical Departments Sandnessjøen 1976, DNR 1986 and Mo i Rana 1988. Medical director Health Region South 2005. Professor of Propedeutic Medicine Faculty of Dentistry Oslo 2004–07. Founding member Scandinavian Association for Gastrointestinal Motility 1987, and European Forum of Medical Associations in Europe and WHO 1989. Chair Norwegian Surgical Society 1983–86, honorary member 1995. President in The Norwegian Medical Association 1988–91. Secretary General Nordic Surgical Society 1992–98.



Tom Gerner

Assistant editor and author Chapter 3, co-author 2, 5A, and 60.

Born 1945. MD Oslo 1969. PhD Oslo 1979. Specialist in general, gastrointestinal, and breast and endocrine surgery. Surgical training Haukeland, Lillehammer and Ullevål. Consultant Ullevål 1987–90. Consultant and head Surgical Department Lillehammer 1990–2004. Chair cooperative organisation plans for surgical departments in Oppland and later Sykehuset Innlandet. Head research Sykehuset Innlandet 2004–06. Consultant and head Surgical Department Bærum 2006–08. Head research Surgical Clinic, Vestre Viken 2008–2012. Chair Norwegian Surgical Society 1987–89, chair of the Society's Annual General Meeting 1992–2007, honorary member 2009. Chair Specialty Committee General Surgery 1991–97.



Arnt Jakobsen

Assistant editor and author Chapter 15, co-author 60.

Born 1938. MBChB Aberdeen 1963. ECFMG 1964. PhD Oslo 1973. Specialist in general and vascular surgery. Surgical training Aker and Rikshospitalet (RH). Consultant transplantation surgery Surgical Department B RH 1978–1994. Medical director (sjeflege) RH 1994–2005. Founding member, and board member of European Society for Organ Transplantation 1986–1992. Norwegian representative Council of Europe's Committee on Organ Transplantation 1990–2004. Chair ScandiTransplant 2004–10. From 1990 to 2008 auditor for the Norwegian Surgical Society, honorary member 2011.

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Christian Beisland

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Pål Benum

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Born 1935. MD Bergen 1961. PhD Oslo 1974. Specialist orthopedic surgery. Surgical training Oslo Municipal Emergency Center, Ullevål, Kronprinsesse Märthas Institute (KMI), Sophies Minde (SMOH) and Kantonsspital St. Gallen Switzerland. Consultant Trondheim 1976–2005. Head Department of Orthopedics 1985–2005. Associate professor 1976–82, professor 1982–2005. Chair Norwegian Orthopaedic Association 1976–79. President Nordic Orthopaedic Federation 1984–86 Founding member European Hip Society. Honorary member Norwegian Surgical Society, Norwegian Orthopaedic Association, and Nordic Orthopaedic Federation. Knight, First Class, The Royal Norwegian Order of St. Olav.



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Odd Geiran

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Jon Anton Johnson

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Johan Pillgram-Larsen

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Astor Reigstad

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Born 1937. Bergen Technical School 1955. Stockholm Technical Institute 1957. MD Oslo 1967. PhD Oslo 1977. Specialist in general and orthopedic surgery. Surgical training Ullevål, Kronprinsesse Märthas Institutt (KMI), Rikshospitalet. Head State Centre for Orthopedics Dpt KMI 1983–1994, Head Orthopedic Department Rikshospitalet 1995–1996. Consultant hand surgery Rikshospitalet 1997–2007. Chair Norwegian Society for Surgery of the Hand 1983–85. Honorary member Norwegian Orthopaedic Association and Norwegian Society for Surgery of the Hand.



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Arne R Rosseland

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Arne Rugtveit

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Sten Sander

Author Chapter 23 in 1986.

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Gunnar Schistad

Author Chapter 34.

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Leidulf Segadal

Author Chapter 29.

Born 1940. MD Bergen 1965. PhD Bergen 1991. Specialist in general and thoracic surgery. Surgical training Haukeland, UniversitätsSpital Zürich. Consultant Haukeland 1979, head Unit for Cardiac Surgery 1997–2006. Professor Institute for Surgical Sciences 1993–2010.



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Surgery in Norway

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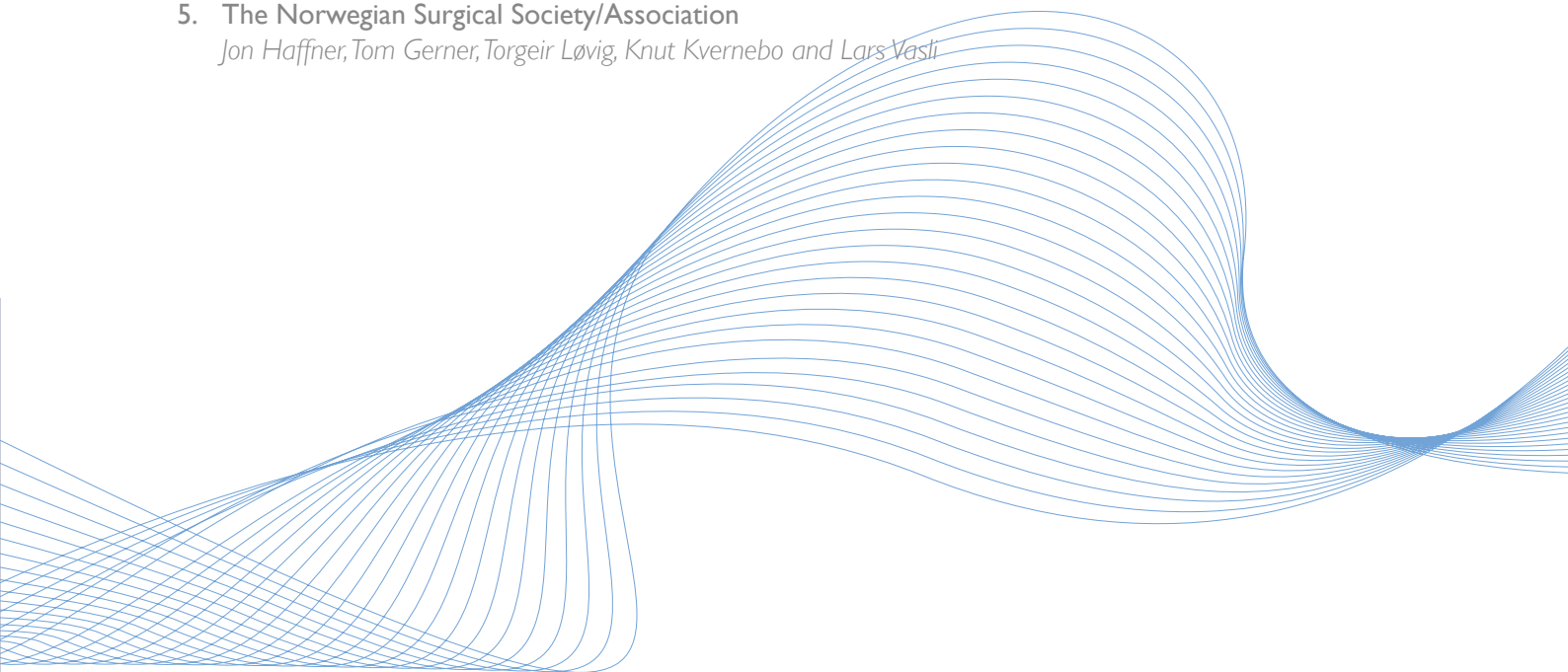
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1. Surgery in Norway before 1900

Jon Haffner

Norway was united under one king in 872. The country had a common king with Denmark and a common central administration in Copenhagen from 1380 until 1814 when it claimed independence. A parliament – Stortinget – was elected, a new Constitution was worked out, and one of the Danish princes was invited to become king. Before this could be effected, later in the same year, Norway had to submit to Swedish rule as part of the Napoleonic war. The Union with Sweden lasted until 1905, with a common king and a central administration in Stockholm. Norway was allowed to keep its Constitution and Stortinget continued to function as a national parliament.

The University in Copenhagen was founded in 1479 and functioned as a joint university for Denmark and Norway until the University of Oslo was founded in 1811. The Medical Faculty in Oslo was established in 1814.

Medical and Surgical Treatment prior to 1000 A.D.

The first written information about folk medicine in Norway is found in Edda, a collection of poems from 800–1000 A.D. They contain information about every day life, and advice about diet, hygiene and treatment of common illnesses. The contents of the poems, and the treatment advocated, show that information must have been gained both from Greek and Roman medicine, and from Germany and The British Isles. Surgical treatment was limited to treatment of wounds. Cauterisation was used in the treat-

ment of both wounds and infections. Herbal remedies may also have been used, but written (in "runer" – the ancient written signs which were thought to have magic power) or spoken magic words, as well as "healing hands", were thought to be of much greater importance.

Cauterisation is referred to both in the sagas, and in the laws from around 1000 A.D. In addition it is mentioned in the saga of Olav Tryggvason, king of Norway 995–1000 A.D., that infected wounds were commonly excised to promote healing. This became common treatment towards the end of the 19th century, but must have been quite unusual in Europe around 1000 A.D.

The depth of wounds in the abdomen was judged by the taste of the blood from the wound, and by giving the wounded raw onions or strongly smelling herbs to eat, and smelling the wound to diagnose intestinal perforation

Remunerations for infliction of wounds were given according to depth, fragments of bone, penetrating wounds, and need for cauterisation.

From ancient times a clear distinction has been made between "wound-doctors" (læknir) and medical doctors. The main qualification for being a "wound-doctor" appears to be "good hands" i.e. hands which could heal (læknishendr), and which by putting a finger in the wound could diagnose depth and severity. It was commonly thought

that kings and royalty had the power to stop bleeding and cure diseases by "healing hands".

1000–1500 A.D.

The introduction of Christianity around 1000 A.D. led to the introduction of the "monastery-medicine", which at that time was common to most of Europe. It was practiced at first by travelling monks, later from established monasteries. But at The Council of Tours in 1163, and again in The 4th Lateran Council in 1215, the Catholic Church forbade the monks to provide surgical treatment. As a result all surgery was left to laymen.

During this period the art of writing was introduced, and the sagas were written in Iceland from 1050 – 1350 A.D., providing a rich source of information about life both in Iceland and Norway.

Travelling to southern Europe increased, not only by adventurers who sought employment in Rome and Istanbul (Byzantium), but also by royal and clerical envoys travelling to the Pope in Rome. Several of the travellers must have visited Salerno in Italy, which was the main centre of medicine in Europe from around 1100 A.D. A handbook for pilgrims from Iceland around 1150 A.D., describes Salerno as the city with the best doctors.

One Norwegian "wound-doctor" who probably visited Salerno was Ravn Sveinbjørnsson. A third generation doctor, he studied to be a priest, but never practiced as such. He learnt Latin, travelled widely in Europe several times, and returned to Norway to practice surgery. He is the first Norwegian surgeon known to have carried out "stone-cutting" i.e. the incision of urethra for calculi. He is also believed to have had a strong influence on medical legislation in Norway and Iceland at that time. The changes in medical legislation, from primitive un-anatomical evaluation of wounds, to anatomical evaluation, are in accordance with the teachings of the Salerno school, and this is probably mainly his work.

Ravn Sveinbjørnsson died in 1213, and his saga was written after his death. Both this and other sagas describe surgical treatment which is similar to that of the Salerno school. Wounds were sutured with silk or linen, or cauterised with glowing iron. Abscesses were opened

by cauterisation or incision. Deep wounds and abscesses cleansed with warm water, dressed with herbs and packed with cloth. Dislocations and fractures were treated by manipulation and "bone-setting", and mal-united fractures dressed with hot poultices and re-fractured to gain alignment. Blood letting and cauterisation were used as general remedies against a variety of medical and psychiatric diseases.

Most of this treatment can be found in books employed at the Salerno school, notably *Liber Pantegni* by Constantinus Africanus (died 1087), *Chirurgia Rogerii* from around 1170, and *Cirolgia* by an unknown author from around 1150. Medical books were also written in Scandinavia, their contents were mainly translations of medical books from Southern Europe.

Some of these books are available in nearly complete manuscript, one Danish by Henrik Harpestreng from around 1300 A.D., three Icelandic from 1400–1500 A.D., one Norwegian-Icelandic by Torleif Bjørnson from around 1500, one Danish by Christiern Pedersen from 1533, and one Swedish by Henrik Smid from 1535. Only fragments of books written in Norwegian have been found. With Christianity came the knowledge of Latin, and the import of medical books in Latin.

The barber-surgeons ("bartskjæerner"):

There were hardly any doctors in Norway at that time. The doctors who attended the kings were generally foreign, and medical treatment was otherwise given by monks, priests, or self-taught male and female "healers". Most common were the "barber-surgeons" who treated wounds, cauterised, let blood and gave enemas. They had generally learnt their trade by apprenticeship to older barber-surgeons.

Legislation regulating the fees for the barber-surgeons was introduced in 1282, and a loose association of barber surgeons appear to have existed in Bergen in 1440.

The first record of a surgical operation is from 1248 when a barber-surgeon named Vilhjalmar in Bergen treated a patient with cleft palate while King Håkon IV was present. The time of this operation is interesting, operations for cleft palate had been carried out in Southern Europe

prior to 600 A.D., but seem to have been out of common use until it was re-introduced around 1300 A.D.

Hospitals

Hospitals have existed in Norway since 1164. The first one was in a cloister at Halsnøy south of Bergen. A church hospital was also founded in Nidarosdomen in Trondheim towards the end of the 11th century. The first town to have its own hospital was Bergen, where two hospitals for leprous patients were founded in 1248 and 1276. Several of the other towns in Norway built hospitals in the next centuries, but they were mainly for the treatment of lepers and provided no surgical treatment.

1500–1800 A.D.

“Academic” doctors i.e. doctors trained at a university, were still few and far between in this period. The first universities in Scandinavia were founded before 1500, Uppsala in Sweden in 1477, and Copenhagen in Denmark in 1479, but most of the academic doctors in Norway were still foreign and/ or had received their training at universities in Germany (Heidelberg, Rostock), Austria (Vienna), Switzerland (Basel) or France (Paris). As a rule they did not provide surgical treatment.

Some priests also provided medical treatment, with little or no medical training. They based their treatment on medical books. In the early part of this period the priests were generally the only persons with any kind of academic training, and most of them did a lot of good work as medical educators, at the same time as they functioned as priests. This combined function of the priests was most common in rural districts.

The barber-surgeons continued to provide most of the surgical treatment until the first academic education of surgeons started in Copenhagen in 1736 by foundation of a “Theatrum Anatomico-Chirurgicum”, which was extended to a full-scale academic institution, The Royal Surgical Academy (*Academia Chirurgorum Regia*) in 1785.

A Barber Surgeons Company was legally recognised in 1597 in Bergen, which at that time had nine barber surgeons. The founding document, a Royal Charter, is still kept in Bergen Museum. The legal rights of the members of the Company were reinforced by later legislation, the

last time in 1768. The Company was given the responsibility for the training of its members, to ensure the quality of their competence. Training frequently started at the age of 14 or 15, was well structured and controlled, and also comprised at least three years training in foreign countries.

There was quite a competition for patients both with the academic doctors, and with legally unrecognised barber-surgeons and travelling “healers”. A Danish-Norwegian regulation dating back to 1619 prohibited others than doctors from giving internal treatment, with exception of drinks for the treatment of wounds and syphilis. The academic doctors generally had a higher social status, at least until the foundation of “The Theatrum Anatomico-Chirurgicum”, and the competition between the doctors and surgeons frequently ended in court. Most commonly the cases concerned the way amputations were carried out (often wrongly by medical doctors), or fractures treated, but also in some cases more unusual procedures at that time as for example breast amputation for cancer. Occasionally details of surgical interest are given, as in a case against a barber surgeon who in 1751 had carried out an amputation “without ligating the artery according to the method with needle”, and whose tourniquet had broken. Fortunately the tourniquet was of a type recommended by the National Director of Surgery!

As was to be expected, surgeons were also taken to court for having treated patients for “medical” diseases, which the academic doctors thought they were solely entitled to handle.

A Danish-Norwegian investigation carried out in 1720 showed that there were nine surgeons in Bergen, two in Oslo (then a small town called “Christiania”), and generally one in most other towns. They were generally described as competent at their work. Some had received their education at foreign universities, but most were trained locally by senior barber-surgeons. They treated both minor surgical conditions and most common ailments.

After 1619 senior barber surgeons were employed as “district surgeons” (“*amtskirurger*”) with a legal right to sell their practice. In addition to the medical work they were later required to report to the Government on the health situation in the population they served. They were in fact the forerunners of the publicly employed district doctors.

Army surgeons ("feltskjærer") are first mentioned in 1536, and seem to have been much required both in war and peace, since people "could hardly live a day or an hour without fighting". At first they were generally barber-surgeons partly employed as army doctors, later foreigners were hired as need arose, but from 1683 surgeons appear to have been permanently employed by the military regiments. In 1644–45, during the war with Sweden ("Hannibalsfeiden"), there were 28 registered army surgeons in Norway.

The Chief Medical Officer, Henrich Bonsack, was appointed by the Medical Faculty of Copenhagen to examine the Norwegian applicants for "candidatus chirurgia" in 1708. From 1736 this was done by the head of the Theatrum Anatomico-Chirurgicum, Simon Cruger, and from 1771 onwards army surgeons had to pass "examen chirurgicum" to get permanent employment.

Just as barber surgeons became military surgeons, quite a few military surgeons settled down in various parts of Norway and started surgical practices.

Naval surgeons were employed on large ships. This is specifically mentioned in 1673 on a ship carrying 120 men.

Executioners were frequently used to treat surgical ailments, just as in other countries in Europe. Most of them had no surgical training, but were self-taught.

Ophthalmic surgeons ("okulister") are mentioned as early as 1569. They were nearly all foreigners who settled in Norway to treat patients with cataract.

Other people, among them travelling "experts" also provided medical and surgical treatments of various kinds; stone-cutting, blood-letting, healing by magic, etc.

1800–1900 A.D.

Norway got its modern constitution in 1814, and separated from Denmark, only to come under Swedish rule (which lasted until 1905) the same year.

The population of Norway was only 750 000 in 1769, which was the first time it was recorded. One million inhabitants was reached in 1825, and 2.2 million inhabitants in 1894.

The number of doctors was also quite small at the beginning of the nineteenth century, 99 (1 per 5634 inhabitants) when it was first registered in 1816, 120 in 1827, 910 in 1894 (1 per 2400 inhabitants).

The University in Oslo (originally "Det Kongelige Fredriks Universitet") was founded in 1811, and officially opened in 1813, the Medical Faculty in 1814. The start of training in medicine and surgery at the university has probably been the most important single incidence in the development of a national tradition in surgery in Norway.

The first surgeon who was appointed professor was Michael Skjelderup (1769–1852). He was appointed in June 1813. A Norwegian by birth, he had been denied public education because of a severe stutter, but had learnt German (a prerequisite for acceptance at The Surgical Academy in Copenhagen) working for a practicing surgeon in his home town Holmestrand. He started his training in the Academy in Copenhagen in 1789 and graduated in 1794. Skjelderup continued working in Copenhagen, and became a teacher first at The Surgical Academy, later at the University where he had been accepted as a fully qualified doctor. He took his PhD in 1803, and also worked for a period up to 1808 as military surgeon. Skjelderup was appointed extraordinary professor at the University of Copenhagen in 1805, professor of Medicine and Head of Surgery in The Military and Civilian Hospital in Christiania (Oslo) in 1813. He moved to Christiania and started teaching Anatomy and Physiology in 1814, and also served several years as Chief Surgeon for The Army in Norway.

The first professor of surgery was Magnus Andreas Thulstrup (1769–1844). He was Danish by birth, had completed his surgical education with top marks at the The Royal Surgical Academy in Copenhagen in 1791, and was appointed Surgeon for The Norwegian Hunting Regiment in 1797. He studied military medicine in Germany and France and practiced surgery in Oslo until his death in 1844. Thulstrup was appointed professor of surgery and obstetrics in June 1814, and Chief Medical Officer of the Army in 1818. He was also surgeon for King Carl Johan of Sweden and Norway, and was the most prominent doctor in Norway at his time, and a member of the highest social circles. He appears to have been a very competent surgeon, but his activities were naturally limited by the lack of general anesthesia.



Fig I-1. Michael Skjelderup. The first surgeon who was appointed professor in Norway. Portrait in Medicinsk Selskab in Oslo. Courtesy Ø. Larsen and UiB, Section for Photo and Visual Presentation



Fig I-2. Magnus Andreas Thulstrup. The first professor of surgery in Oslo. Portrait in Medicinsk Selskab in Oslo. Courtesy UiB, Section for Photo and Visual Presentation



Fig I-3. Frans Christian Faye. The surgeon who introduced ether in Norway. Portrait in Medicinsk Selskab in Oslo. Courtesy RH, Section for Photo and Visual Presentation



Fig I-4. Alexander Malthe (1845–1928). Famous surgeon in Oslo. Established fund for surgeons which still exists. Portrait by Henrik Lund. Courtesy Ø. Larsen

Modern surgery may be said to have started with the introduction of ether in 1846 by Frans Christian Faye, and chloroform in 1848 by Christen Heiberg. Of almost equal importance was the introduction of antiseptic treatment of wounds according to Lister in 1870 by Julius Nicolaysen, and the aseptic method in 1883 by Hjalmar Schiøtz.

Some of the more important achievements in this period may be mentioned:

The first blood-transfusion was performed by Christian Egeberg in 1836 on a patient who bled profusely after an incision in the perineum. Egeberg was one of the best known surgeons in private practice at that time. In 1844 he suggested that puerperal pulmonary embolism may stem from venous thrombosis, but he never received international credit for this. He also suggested that gastrostomy might be used in the treatment of patients with oesophageal strictures, but never performed this operation. It was carried out with a lethal result by the French surgeon Sedillot in 1849, and with the same result for the first time in Norway in 1874 by Johan Hjort.

Oophorectomy was performed in 1843 by Egeberg and in 1845 by Heiberg. Both lost their patient, the first success-

ful oophorectomy was carried out by Julius Nicolaysen in 1866.

Caesarian section was done for the first time in 1843 by Lars Backer, a practicing surgeon in Holmestrand – a small town south of Oslo.

Tracheostomy was done for the first time in 1848 by Wilhelm Boeck.

Resection of the elbow was done by Heiberg in 1862, resection of the pylorus in 1881, and gastroenterostomy in 1889 by Julius Nicolaysen.

Appendectomy "à froid" (in a free interval), was done in 1889 by Alexander Malthe, a practicing surgeon in Oslo. He did a gastric resection for hour-glass deformity of the stomach due to gastric ulcer in 1897, and was the first to employ cocaine as a local anesthetic. He was also the first to do a resection of the maxilla in local anesthesia in 1885. Working in his own private clinic, Malthe became a very wealthy man, and donated large sums to medical research.

Appendectomy for acute appendicitis was first performed two years later (1891) by Kristian Jervell, also a practicing



Fig I-5. The essence of surgery, the patient, the surgeon and his assisting nurse. O Lied operating assisted by J Hald 1930. Courtesy Surgical Dept, Drammen

surgeon with a private clinic, otherwise better known for his urological operations.

Surgical treatment of gallstones was started in 1880–85 by Hagbarth Strøm, who eventually died of septicaemia due to acute cholecystitis!

Excision of infected wounds was described in 1892 by Fredrik Ramm at Aker Hospital in Oslo, who also introduced castration for prostatic hyperplasia before 1897.

Prostatectomy was performed for the first time in 1905 by Kristian Jervell.

Surgical Societies

The first surgical society in Norway was The Surgical Society in Oslo (Den kirurgiske forening i Christiania), which was founded in 1894.

Nordic (Denmark, Finland, Iceland, Norway and Sweden) meetings for those engaged in "the natural sciences" (naturforskermøter) were instituted in Gothenburg after an initiative taken by a Norwegian Surgeon; C.A. Egeberg. A surgical section soon developed at these meetings, and it was therefore decided to found a separate Nordic Surgical Society in 1892.

Medical Journals

The first medical journal in Norway, Eyr, was started in 1826 by Michael Skjelderup and Fredrik Holst. It was only published eleven years i.e. until 1837, but was succeeded in 1840 by The Norwegian Magazin for the Medical Sciences (Norsk Magazin for lægevidenskaben), which later became a part of the Nordic Medical Journal (Nordisk Medicin). The Journal for Practical Medicine (Tidsskrift for praktisk medicin) was introduced in 1881, and became from 1888 the official journal of The Norwegian Medical Association (Tidsskrift for den norske lægeforening).

There has not been a separate journal for surgery in Norwegian, and the first Scandinavian journal published in English, Acta Chirurgica Scandinavica was started in 1919/20.

Hospitals and Clinics before 1900

As stated above the first hospital in Norway was established in 1164, but as in most of Europe Norwegian hos-

pitals were almost entirely reserved for treatment of poor people with chronic, mental and or venereal disease.

Hospitals had been built in many towns towards the end of the 18th century, in 1815 there were fourteen county hospitals (amtssygehus) with a total of 500 beds, but they provided very little surgical treatment. According to Johan Nicolaysen, professor Thulstrup carried out a few operations in the military hospital in Oslo the first part of the 19th century.

When the University of Oslo was founded, medicine had to be taught in the old Oslo City Hospital (Christiania Bys Civile Sygehus) which had a total of 40 beds, in the Military Hospital (25 beds) and in the county hospital for the surrounding county (Akershus Amts Sygehus – 60 beds).

The building of a national hospital, Rikshospitalet, with 100 beds, which was officially opened in 1826, was a great improvement, and this hospital has remained the most important teaching hospital in Norway since then. The Surgical Department ("Chirurgen") was completed in 1842, this increased the total number of beds to 112. Sixty were surgical.

Rikshospitalet has been expanded several times since, to 248 beds (61 in the surgical department) in 1854, 264 in 1883, and 500 in 1900. It was moved to a new site in 1883.

There were other hospitals in Oslo at that time, and increasing demand for hospital treatment due to improved diagnosis and therapy made it necessary to build new hospitals. The major municipal hospital Ullevål was opened in 1887, but not completed until 1902. Aker Hospital (then located just outside Oslo, now a municipal hospital) was founded in 1820. It was moved and closed several times until the present hospital was built from 1893 onwards.

Most of surgical treatments were carried out in the patients homes. One of the most famous Norwegian surgeons at that time; Alexander Malthe, presented in 1887 written instructions for the equipment of rooms which were to be used for operations in private houses. In 1881 a total of 1991 operations were recorded in the entire country, 471 in hospital, 1520 outside hospitals.

Bergen Hospital, built in 1754, was divided into a medical and a surgical department in 1894. The present main hospital in Bergen, Haukeland, was not opened until 1912.

In Trondheim there was a hospital (Trondhjem hospital) which had been in continuous function from it was founded in 1277. The municipal hospital was completed in 1904.

Other towns in Norway which had hospitals in the 19th century were: Stavanger from around 1270 (St Peters Hospital), but the present hospital was built in 1893, Skien

from 1774, Drammen from 1786, Halden from 1787, Fredrikstad from 1795, Bodø from 1795.

The first private clinic in Oslo (then Christiania) was opened in the 1870ies by professor Julius Nicolaysen. Other private clinics were established in Oslo soon after (Dialektisæanstaltens sygehus, Malthe's, Strøm's and Jervell's) and in Bergen from 1884 (Bergen private klinikk).

In 1853 there were 14 old county hospitals, 12 new hospitals and Rikshospitalet with a total of 879 hospital beds in the entire country. In 1900 this had increased to 2400 beds divided between 55 hospitals and clinics.

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2. Hospital Structure and the Number of Surgeons

Jon Haffner and Tom Gerner

Hospital Structure after 1900

The increase in surgical possibilities was accompanied by an increase in the number and size of hospitals. These generally focused on surgical treatment and were run by surgeons, but as they also treated a few other patients, they were generally called “mixed” hospitals. During the period 1920–30, 104 such hospitals were built. As a result of the introduction of X-ray examinations, and improved medical treatment, the organisation of hospitals changed in the thirties to “three department hospitals”, a surgical department, a medical department and a radiology department. Transport to the hospital; the first ambulance services, were also established.

Building and running hospitals were left to local communities, towns, charities, religious and private institutions. Up to 1969 when the first “Hospital Law” was passed there were no general rules for who should be responsible for the hospitals. In 1930, 71 per cent of the hospitals were owned by various local authorities, 21 per cent were private institutions, and 8 per cent by the State.

During the 30ies, work started on national plans for the hospital development, but this work was interrupted by the war and the occupation 1940–45, and it was not until 1948 that county-based plans for hospital development were produced. It was decided that each of the 19 counties (fylker) should establish a “central hospital”. The hospital structure would then correspond with the three-layer politi-

cal system; state, county and local community. The vastly improved possibilities for medical treatment, and the increasing cost and specialisation of hospital departments also made it desirable to have a three-layer hospital structure.

But as the counties were poorly developed as political, economic and administrative units, the hospital structure changed slowly and gradually until the Hospital Law took effect in 1970. The counties then had ownership of 63 per cent of hospital beds, private ownership had fallen to 8 per cent. During the seventies there was a development towards fewer, larger and more specialised hospitals; in 1965 there were 101 general hospitals with an average of 187 beds in Norway, in 1980 the number of hospitals was reduced to 85, but the average number of beds had increased to 231.

In 1974 the process with regional hospitals, which had started after World War II, was cemented by a decision in the Norwegian Parliament to establish 5 health regions. In 1980 the 5 regional hospitals had a total of 5 014 beds, there were 12 central hospitals with a total of 5 288 beds, and 68 local hospitals.

In the country as a whole, the number of hospital beds increased up to 1970, but has been markedly reduced since then. The number of beds relative to the population is drastically reduced even compared to the first registration in 1930 (table 2-1). The greatest reduction in hospital



Fig 2-1. One of the first ambulances at Ullevål. Courtesy Medical Museum, Ullevål

beds has been in surgical specialties and psychiatry. The number of surgical beds per 100 000 inhabitants was reduced from 181 in 1970 to 74 in 2010!

The change to fewer hospitals has mainly been motivated by economy; a wish to reduce cost by reducing the number of small hospitals with expensive emergency and “on call” services. But increasing focus on quality has also been used to justify the change; the importance of sufficient volume to establish and maintain the quality for each type of treatment has been emphasised by the surgeons in the larger hospitals.

The dramatic reduction in beds from the early nineties within the hospitals is mainly attributed to the development of minimal access methods and improved anaesthesia, which promoted day surgery as the option of choice in several common surgical conditions.

Up to the seventies the prestige of the heads of the surgical departments was often linked to the size of the department in surgical beds, now it is more common to compare number of surgeons in different departments.

The changes in somatic hospital beds in Norway are presented in table 2-1.

Table 2-1. Hospital beds in general hospitals and clinics

	1930	1950	1969	1970	1990	2000	2010
Inhabitants	2 814 194	3 278 546	3 835 486	3 874 133	4 247 546	4 478 497	4 858 199
Beds in general hospitals and clinics	11 490	16 093	26 157	19 492	14 552	13 585	11 233
Per 100 000 inhabitants	408	490	677	501*	342	303	231
Surgical beds**				7 044	5 024	4 090	3 607
Per 100 000 inhabitants				181	123	91	74

* From 1970 only certified hospitals are included

** Gynecology, obstetrics, ENT and ophthalmology not included

In 1993 the development of regional health plans became compulsory, in 1999 regional cooperation through regional health boards became mandatory, and in 2002 the State assumed ownership of all the public hospitals. At present there are 4 health regions in Norway, and the discussion continues about how state ownership should be organised.

The takeover of ownership was to a great extent motivated by a wish to coordinate the function and management of the hospitals, and to control the economic development. This process had so far been going on in a small scale. In Oslo urology and vascular surgery were moved from Ullevål to Aker in the 90ies. The orthopedic hospitals Kronprinsesse Märtha's Institutt (founded 1957, taken over by the State in 1965) and Sophies Minde Hospital (founded in 1927) merged with Rikshospitalet, and joint orthopedic departments were established after the hospital moved to its new location in 2002.

With the health regions, attempts to coordinate functions have resulted in major alterations elsewhere in the country, associated with demanding challenges. When the services in two hospitals are united, and some specialties are centralised in one, the remainder in the other, both lose the complete spectre. This may seem rational politically and economically, but have so far led to fragmentation of well-functioning units which had been built up over a lot of years, with devastating effects on the engagement of the employees in the hospitals affected. One example is the coordination in the former Health Region East, now part

of the joint South-East. All the hospitals in the counties Hedmark and Oppland were united into one hospital organisation. The surgical specialties were to some degree centralised in an attempt to improve quality. However, the scattered allocations of the specialties, often in conflict with medical advices, have led to confusion about which hospital should be chosen in emergency situations, and problems with undue transportations between the hospitals.

Reorganising is now going on in all regions. The largest is Oslo University Hospital, founded in 2009 by merging the university hospitals Ullevål, Aker, Rikshospitalet and Radiumhospitalet. The process with reorganising the surgical services continues.

Hospital Finance

The hospitals in Norway were initially financed by pay per day in hospital beds. At the outset the cost was calculated by each individual hospital, but from 1940 prices were regulated and made common for all hospitals. In 1947 prices were differentiated in three categories, according to the cost of running the hospital, in 1967 the classification was changed to 7 categories.

From 1909 this cost per day in hospital beds was refunded by compulsory national health insurance systems. The price regulations introduced in 1940 were insufficient to cover the cost of running the hospital, and as a result the owners had to cover an increasing part. In 1959 only 75 per cent was refunded, in 1965 this was reduced to 65 per

cent. In 1970, after the Hospital Law had been effectuated, refund was increased to 75 per cent, the county was supposed to finance the rest from its ordinary budget. In 1977 refunding was reduced to 50 per cent.

The system was completely changed in 1980; the counties were given a yearly amount (global budget) from the national health and social insurance system. The intention was that this should cover all costs which were refundable from the national insurance system. As a result each county had to develop a hospital budget and pay the costs from the amount received, and other income. But cost control was impossible to achieve, budget deficits were the rule rather than the exception.

In 1997 the system was supplemented with additional subsidies, which were related directly to the work done in the hospitals according to the diagnosis and treatment each patient received (DRG= Diagnose Related Groups).

Combinations between annual grants and varying percentages for production as measured by DRG have been tried since then, but cost control has so far been impossible to achieve; nearly all hospitals have deficits which have to be covered by the State as loans, every year.

Since the regional health boards became mandatory in 1999 the system has been changed twice. In 2001 the borders of the regions and their names were altered as the result of the new law, and in 2007 the two regions in the south of Norway were united in one. The different regions have divided and to some extent united their hospitals into corporations.

The regional health system has allowed the different regions to develop separate systems for hospital cooperation, and their economies have shown different levels of budget deficiency. A main challenge to obtain cost control is to promote sensible cooperation between hospitals, and if necessary unite, to treat large patient groups in a more rational way.

Private Hospitals

The need for hospitals raised and funded by private means was obvious already at the end of the nineteenth century. In 1893 The Coastal Hospital in Hagavik outside Bergen

was established, financed by private and public funds and promoted by Herman Gerhard Gade. This institution was originally a hospital for tuberculosis, and gradually developed into one of the leading hospitals of this kind in Europe. After World War II the activity gradually changed towards orthopedic surgery, and from the early seventies the hospital has been established as an important specialised institution for elective orthopedic surgery. A corresponding development had previously found place in Stavern, where The Coastal Hospital was an important contributor to elective orthopedic surgery for patients in the south-eastern part of the country. From the 60ies the hospital was gradually developed as an important institution for rehabilitation.

In Oslo the ideally funded institutions Diakonhjemmets Hospital and Lovisenberg Hospital were established in 1893/1894 to face the need for qualified nurse education along with the need for hospital patient care. Menighetssøsterhjemmet was established in 1916 as an offspring from Lovisenberg to increase the capacity, and these two institutions were fused in 1993. Diakonhjemmet as well as Lovisenberg early developed surgical activities, and are today established institutions for specialised surgery, refunded by the compulsory national health insurance system according to contract settlements. A corresponding development took place with Diakonishospitalet in Bergen. These hospitals provide today important assets to cover the need for surgical treatment in the two cities.

The Red Cross Clinic in the Western part of Oslo was founded in 1917 and run by Oslo Red Cross as a private hospital with refunding from the municipality of Oslo until 1991. It was closed when the refunding agreement was stopped, but reopened in 1992 with government approval as a private hospital under new ownership. Since then it has been run as a privately owned hospital with general surgical and orthopedic activity, with partial financial support from the health insurance system.

The Feiring Clinic, located about 80 km North of Oslo, is owned by the National Society for Heart and Lung patients. It was originally built as a convention centre, but was converted to a specialised hospital for investigation and treatment of patients with coronary disease in 1989. From 2001 a separate rehabilitation department

was established. About 1000 operations, 1500–2000 percutaneous coronary interventions and more than 4000 angiographies have been performed annually, financed by the health insurance system through contract settlement.

In 1985 Jens Moe started a new private hospital without public refunding, based on patients payment. This small hospital, called Ring (later Volvat) Medical Centre, provided several medical specialist services on an outpatient or day-care basis, with 10 hospital beds. It was in fact an expansion of an already existing medical centre in the western part of Oslo.

At that time there were no private hospitals in Norway without contract with the health authorities, and government approval was necessary for new establishments. Moe wanted to start a regular hospital with 40 beds in Asker. His plans were approved by the conservative government in 1985, but the succeeding labour government withdrew the approval. Moe lost a court case against the government, and the hospital never became a reality.

The Ring concept turned out to be a success and was an obvious inspiration for a forthcoming wide range of applications for private hospital settlements. Clinic 8 had received permission to have three hospital beds in 1986, but was denied expansion in 1989. Establishment of small private clinics has been allowed since the early 1990ies, and there are now a number of these in Norway, mainly for elective surgery patients, but the public hospitals still cover 98% of the need for hospital beds. The financial conditions vary; some clinics are refunded according to contract settlements with the health regions, while others are based entirely on patients' payment.

Surgical Influence

At the beginning of the 20th century, Norwegian hospitals were dominated by surgeons. As surgical work increased, so did the number of surgical beds and the size of the surgical departments, and this development continued well into the 1970ies.

Subspecialisation led to sectioning of surgical departments. The process started early in the 1970ies with Haukeland as a pioneer hospital, followed by the other University hospitals.

In the second part of the 70ties sectioning of surgical departments had been established as a model of choice also for the central and biggest county hospital. Subspecialisation and sectioning stimulated scientific development and quality improvement. In parallel with upcoming industrial interests in medical technology, surgical activity became more expensive and with a higher impact on hospital budgets than before. This development made better economy control necessary, and finally led to the establishment of DRG as a base for financial support.

There is no doubt that the establishment of the subspecialties improved the quality of diagnostic procedures and treatment. However, as the doctors became more specialised, their general competence faded. The on call duties that previously could be laid on one person had to be split to secure subspecialty competence. The economical challenge that followed, has led to heavy debates with hospital administrators about the necessity of subspecialty qualification at on call duty. As time has passed the pressure has increased, and it has become more and more important that doctors emphasise that quality must be maintained.

Introduction of minimal access surgery and better anesthesiological methods well suited for ambulatory work, has reduced the need for surgical hospital beds. A large part of the surgical work is now carried out in the outpatient departments and as a result the surgical departments have become smaller.

The influence of each surgeon and especially the heads of the surgical departments has also been severely reduced from the position in the 70ies and 80ies. As a result of altered regulations for working hours, and altered job structure in the departments, the number of surgeons has increased, and the importance of each surgeon has been correspondingly reduced. In addition it is becoming more and more common that the hospital authorities employ professional managers, often with no medical background, to run the surgical departments.

The result of those changes is that doctors in general have lost influence in running the hospitals, and surgeons have no more influence than other medical specialists.



Fig 2-2. The number of surgeons and surgical personnel increased rapidly. Courtesy Medical Museum, Ullevål

The Numbers of Surgeons

In 1720 there were only four university educated doctors in Norway, and 30 “barber-surgeons”. After the establishment of “Theatrum anatomico-chirurgicum” in Copenhagen in 1736 the number of surgeons in Norway increased gradually up to 68 in 1776. Thirty of these had passed the university examinations in Copenhagen. The Theatrum anatomico-chirurgicum was converted to an academic institution (Det Kongelige Kirurgiske Academie) in 1785, without any marked increase in surgeons in Norway.

The first official registry of authorised doctors in Norway in 1816 contains 100 names. Four of these were town surgeons (“Stadschirurg”) and eleven county surgeons (“amtskirurger”). In addition there were 27 military surgeons (without recognised exams), who had remained in the country after the war with Sweden in 1808.

The University in Oslo was founded in 1811, but the post-graduate training of surgeons was not organised by the University although it almost exclusively took place in the university surgical departments at Rikshospitalet in Oslo. At least three years training as a junior surgeon (“reservelæge”) was required.

The establishment of The University had little or no effect on the number of surgeons, which only increased very slowly. During the period 1800–1908 only 38 doctors with university education trained as surgeons in Norway.

After the introduction in Norway of anesthesia in 1848, antiseptic treatment of wounds in 1870 and the aseptic method of operations in 1887, the volume of surgical treatment increased, as did the number of surgeons, but

it was not until 1918 that the requirements for “specialists of surgery” were formalised. Prior to 1919 only 18 surgeons were officially recognised as specialists. The increase since 1920 is shown in Table 2-2. The population has nearly doubled, but the number of doctors is nearly 15 times that in 1920, and the number of surgeons has increased 82 times!

Initially nearly all medical doctors were male, but this has changed radically. The majority of medical students

are now female, and the proportion has reached 40% of medical graduates. Surgery is still male-dominated, only 10% of authorised specialists in surgery are women.

The increasing number of surgeons and the increasing volume and diversification of surgery led to the formalised separate surgical specialties. The number of authorised surgeons in each specialty reflects not only the surgical specialisation, but also the volume of each type of surgery (see table 2-3).

Table 2-2. The increases in population, number of doctors and authorised specialists

	1920	1930	1950	1991	2011
Inhabitants	2 589 463	2 799 763	3 249 954	4 249 830	4 920 305
Doctors	1 346	1 770	3 330	13 826	22 295
% female			10	24	44
Inhabitants/doctor	1 969	1 591	985	309	221
Specialists in general surgery	18	71	178	878	1 639
% female			2	2	15
Inhabitants/ surgeon	147 237	39 663	18 261	4 837	3 002

Table 2-3. Authorised surgical specialists and subspecialists

	1920	1930	1950	1991	2011
General surgery	18	71	178	878	1 639
Pediatric surgery				19	31
Gastrointestinal surgery				80	284
Vascular surgery				68	154
Thoracic surgery			1	57	121
Urology				85	260
Breast and endocrine surgery					44
Orthopedic surgery			10	186	869
Plastic surgery			2	57	180
Neurosurgery				38	94
Faciomaxillary surgery			14	27	40

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3. Surgical Specialisation

Tom Gerner, Jon Haffner and Torgeir Løvig

The specialist structure in Norway was established in 1918. Surgery was divided into separate specialties, general surgery, orthopedic treatment, gynecology and obstetrics, ophthalmology, and ear, nose and throat disease (ENT).

After 1945 surgery became divided into several new main specialties, urology, thoracic surgery, pediatric surgery and general surgery. After 1977 only general surgery was kept on as a main specialty and all other specialties in surgery became subspecialties. Corresponding to the development of surgical subspecialties, separate societies have been established, and they are now all subsidiaries of the Norwegian Medical Association (NMA). The present surgical specialties and societies in Norway are presented in Table 3-1.

From 1918 to 1982 the decisions concerning specialty structure, specialist rules, approval of specialists etc., were taken by The Norwegian Medical Association. When the Act related to medical practitioners was set into effect March 1982, the formal responsibility for the post graduate education of doctors was given to the Ministry of Health. Since then the decisions taken by the NMA concerning these matters have been recommendations to the health authorities.

The Ministry of Health has had the authority to certify medical specialists, but the education and evaluation of the candidates has been delegated to the NMA. The delegation is now withdrawn, and from first of October 2011 the Ministry itself will certify medical specialists directly.

Up till now, when The Norwegian Surgical Society and the other specialist societies have wanted to alter the Specialist Regulations, they have had to suggest this to the NMA, and it had to be accepted by the Annual General Meeting of the NMA before it could be proposed to the Ministry of Health. Questions regarding specialty educations have generally been raised at the Annual General Meetings or by the Board/ Executive Committees of the specialist societies, and prepared for discussion in NMA by specialist committees, appointed by NMA after nomination from the specialist societies.

The Specialist Regulations

Specialisation starts following authorisation as a doctor, which requires a university degree in medicine, and in addition one years hospital pre-registration residency and half a year as a pre-registration assistant in general practice.

The requirements for recognition as a specialist are based on four main modalities, on the job training, operative experience, participation in the department's educational programmes, and participation in external theoretical courses.

Certification as a specialist demands declaration from the head of the surgical department of satisfactory participation in the clinical work and the department's educational programme. The candidates in surgery have to document the required number of operations and surgical assistance,

Table 3-1. The surgical specialties and specialist societies in Norway (1)

1918 Surgery, from 1965 General Surgery , – Norwegian Surgical Society 1911
Subspecialties:
1945 Orthopedic Surgery – Norwegian Orthopaedic Society 1947
1948 Urology – Norwegian Association of Urology 1962
1950 Thoracic Surgery – Norwegian Soc. of Thoracic and Cardiovascular Surgery 1981
1963 Pediatric Surgery – Norwegian Society of Paediatric Surgery 1973
1979 Gastrointestinal Surgery – Norwegian Society of Digestive Surgery 1996
1986 Peripheral Vascular Surgery – Norwegian Association of Vascular Surgery 1990
2008 Breast and Endocrine Surgery – Norwegian Soc. of Breast and Endocrine Surgery 2008
1918 Orthopedic treatment (until 1949)
1932 Orthopedics as separate specialty
1945 Orthopedic Surgery – Norwegian Orthopaedic Society 1947
Subspecialty of General Surgery 1977–1997
Not formally registered subspecialties:
Rheumatic Surgery – Norwegian Society of Rheumatic Surgery 1973
Hand Surgery – Norwegian Society of Hand Surgery 1979
1936 Maxillofacial Surgery – Norwegian Society of Maxillofacial Surgery 1959
1948 Plastic Surgery – Norwegian Society for Plastic and Reconstructive Surgery 1954
Not formally registered subspecialty:
Cosmetic Surgery – Norwegian Association of Aesthetic Surgery 1984
1953 Neurosurgery – Norwegian Society for Neurosurgery 1965



Fig 3-1. Surgical specialisation was reflected in refinements in surgical instruments. Courtesy Medical Museum, Ullevål.

Table 3-2. Chairmen of The Specialty Committee for General Surgery

1930	Niels Backer-Grøndahl	1970	Johan Hertzberg
1937	Ragnvald Ingebrigtsen	1974	Eilert Støren
1950	Georg Lützow-Holm	1986	Jens Aamold
1954	Ivar Alvik	1991	Tom Gerner
1958	Alexander Brekke	1998	Torgeir Løvig
1962	Ingjald Schjøth-Iversen	2010	Marius Langballe Dalin
1966	Carl Fredrik Jenssen	2011	Torill Morken

and a set number of surgically relevant specialist courses, some of them compulsory, some with examinations. Most of these courses are organised by the NMA in cooperation with the specialist societies and universities. There is no general examination for the specialist candidates.

Surgical training is achieved at work as junior surgeons (residents) in hospital departments authorised for surgical teaching. Employment in most junior posts is until now limited in time to keep them open for new applicants, but in some smaller hospital employment is without a time limit. The training posts are now commonly referred to as LIS (=doctors in specialisation). Generally 4–6 years on the job training in the chosen specialty has been required for all specialties in Norway, and in addition one year supplementary training in another relevant specialty.

In 1948 hospitals in Norway were divided into three groups according to educational value in surgical specialist training, university or major hospital departments, other departments where employment counted full time, and departments where employment only counted for one or two years. All departments providing surgical specialist training had to document an educational programme.

In 1965 the Specialist-regulations were revised at a General Assembly of the NMA in Bodø. In addition to the hospital work the candidates had to document participating in postgraduate courses approved by The Specialty Committee for surgery. At first only two courses were compulsory for general surgery, one in surgical patophysi-

ology and one in operative treatment of fractures, today eleven courses are compulsory. The remainder was left to the candidate's choice. It was also decided that specialist exams should be established. From 1975 the candidates had to document a set number of performed operations and assistances.

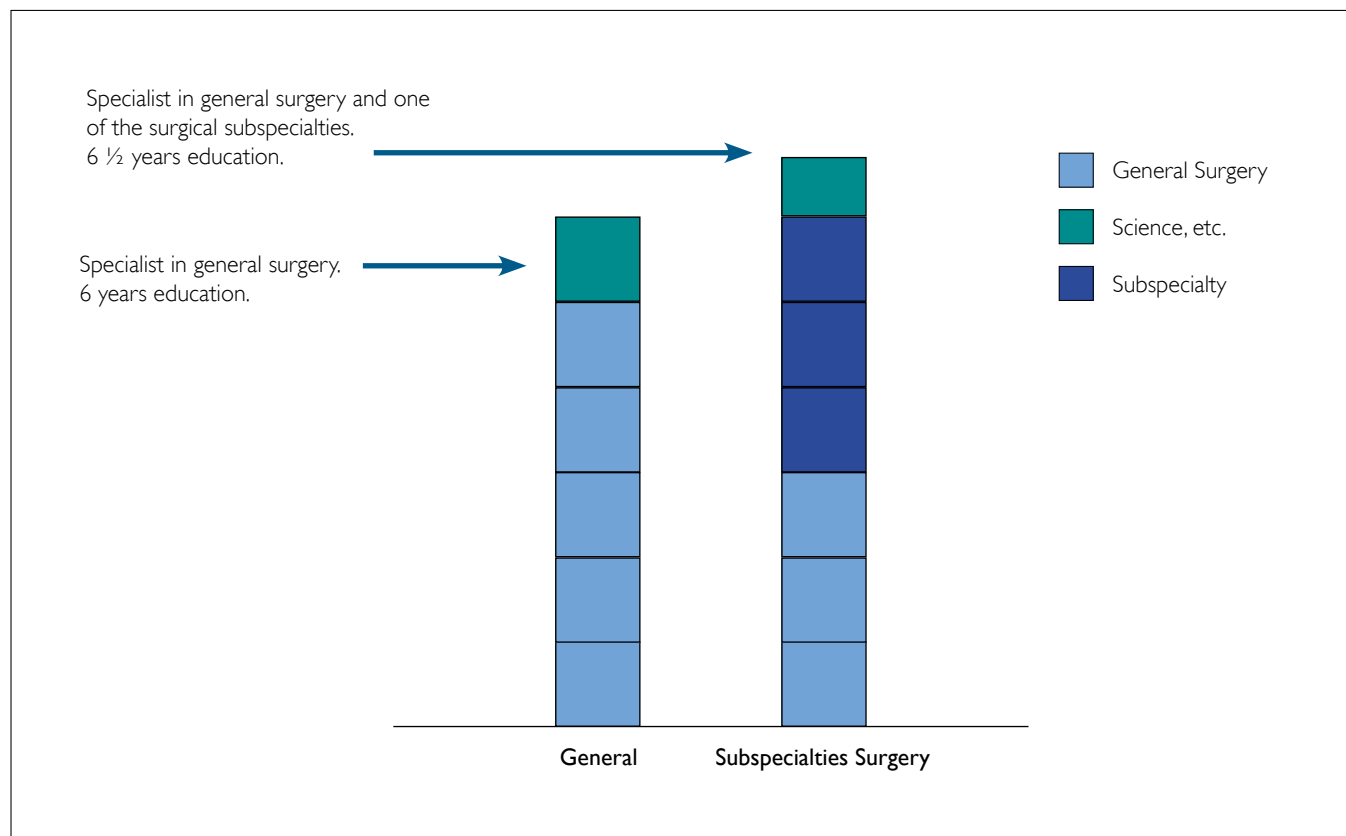
General Surgery and the Subspecialties

In 1977 the specialist regulations for general surgery and the subspecialties were revised again. The subspecialties still had to be based on full specialisation in general surgery (3). Orthopedic surgery, urology, thoracic and vascular surgery, pediatric surgery and gastroenterological surgery were all subspecialties with general surgery as the basic specialty. The educational model for general surgery was five years surgical training and one year in alternative duty. For subspecialty an additional three years in the chosen subspecialty was required, of which one year might be included from the training in general surgery, hence the combined education could be completed in 8 years. The reason for this new educational model was, in addition to encourage and approve subspecialisation, to secure competence in general surgery for all hospitals with 24 hours on call service.

In 1997 the Minister of Health accepted that orthopedic surgery should again be a main specialty, as it had been from 1945 to 1977. As a consequence, surgical departments with emergency duty must have both orthopedic and general surgeons on call, which turned out to be a difficult challenge for the smaller hospitals. In 1997 the

Fig 3-2: The actual model for education in general surgery and the subspecialties.

Accepted by the Ministry of Health October 2010



common model for surgical specialisation was changed in such a way that candidates could complete combined specialisation in 7 years, compared to 8 years previously.

It had been suggested in 1987, by a committee appointed by the Norwegian Surgical Society, chaired by Tom Gerner, and in 1996 by a committee appointed by the Directorate of Health, chaired by Jon Haffner (2), that the subspecialties should be changed to main specialties, but apart from orthopedics, the surgical specialist model remained unchanged. The question was raised again at the General Assembly of NMA in Molde in 2003, with the same result.

In 2008 a committee appointed jointly by The Norwegian Surgical Society and the Specialty Committee, led by Torgeir Løvig, presented a modified model, with general surgery as a platform for subspecialties, where training in general surgery is mainly concentrated on emergency and

on call surgery. As in the General Assembly of NMA in Molde in 2003, this model was chosen with reference to the special geography in Norway with sparse populations and long distances to referral hospitals. The model was accepted in the General Assembly of The NMA in Bodø in 2009, and approved by the Ministry of Health in October 2010. The new model reduced hospital training from 7 to 6 ½ years for a combined specialty in general surgery and one of the subspecialties. The modified model is shown in Fig 1.

Discrepancy between Junior Educational Employments and Senior Positions

After World War II the number of hospital posts increased rapidly, as there was a need for more hospital work and a shortage of specialists. The number of junior posts had to be regulated to a maximum of two per consultant, and employment was time limited, generally to four

years, to ensure that the capacity for training should be maintained. After several years of this policy, there were many surgeons with specialist authorisation in junior posts, and during the 70ies it became clear that unless changes were made most surgeons would need to work in time limited junior engagement until they were in their mid 50ies!

The problem was raised by the Association for Junior Hospital Doctors in 1951, but without result. In 1976, Morten Ræder and Jon Haffner raised the problem again, and in 1977 the Norwegian Surgical Society passed a resolution asking NMA to start negotiations to change the proportions of time limited (training) and permanent (specialist) posts. These negotiations went on for years, and the resulting changes were not completed until the mid 1990ies.

Specialist Examinations

In spite of the intention from the Bodø-meeting in 1965, specialist examinations had still not been introduced in any specialty when Eilert Støren (4), then chairman of the specialty committee, started work to introduce it in general surgery for quality improvement. A trial examination was arranged in 1984. It was a great success, with 60 voluntary candidates, but has not resulted in any permanent arrangement.

Union Europeenne Des Medecins Specialistes (UEMS) Section of Surgery has established European exams in different parts of surgery, but so far the exams have not got an official status in the European countries. The first UEMS examination in general surgery was in November 2010. It is almost impossible to harmonise education of



Fig 3-3. Eilert Støren. Chairman of The Specialty Committee for General Surgery 1974–86. Courtesy Sverre Støren

general surgeons in Europe because of great differences in the level of specialisation in the European countries.

EU and Specialist Employment

Since Norway signed the EEA (European Economic Agreement) in 1992, citizens of EU (European Union) countries with certification as specialists are also accepted equal to Norwegian specialists. Initially documentation of sufficient knowledge of Norwegian language was demanded, but lately it has been left to the employer to assess the language skills of the prospective candidates.

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4. The University Clinics and Professors of Surgery

Jon Haffner

The University of Oslo¹

Oslo Hospital was established in 1290. A new “Civilian Hospital” was built just after 1800, and gradually increased in size to 40 hospital beds in 1809. Oslo Military Hospital was built in 1807. At that time there was also a small municipal hospital for the poor in Mangelgården (Prinds Christian Augusts Minde). When the university was established in 1811, the existing facilities had to be used for medical teaching when that started in 1814.

The first university clinic, Rikshospitalet, was opened in 1826. Since then several other hospitals have also become teaching hospitals; Ullevål, Aker, Radiumhospitalet, Sophies Minde Hospital, Kronprinsesse Märthas Institutt, Oslo Sanitetsforenings Revmatismesykehus, and lastly outside Oslo; Sentralsykehuset i Akershus.

All these hospitals started as separate entities. The hospitals in Oslo have gradually merged into one unit, Oslo University Hospital. Administratively this was completed in January 2009. Sentralsykehuset i Akershus was renamed in 2002 to Akershus University Hospital (Ahus), and has been maintained as a separate unit.

Rikshospitalet – RH

Locations

In 1814 it was decided to build a university hospital, but Rikshospitalet was not officially opened until 1826, and even then it was not completely finished. The new hospital was built at the location of Oslo Military Hospital in Akersgaten, and contained 100 beds at the opening. It was finally completed in 1842. The municipal hospital in Oslo was then closed and patients from the city were transferred to Rikshospitalet. In 1854 it contained 108 medical beds, 61 surgical and 79 in the dermatology department (also venereal diseases).

In 1883 the hospital moved to a new location in Pilestredet. The site was large enough to allow expansion and new buildings, and strategically close to the university buildings in the centre of town.

The hospital remained in Pilestredet until it was moved to completely new buildings at the present location at Gaustad in 2000.

Organisation of The Surgical Departments

In 1873 the surgical department was divided in two departments A and B, and since then they have gradu-

1) Oslo was called Christiania from 1624 to 1924, also spelled Kristiania from 1878 to 1924. It has been the country's capital since 1814.

ally specialised, Department A has taken care of cardiac, thoracic, vascular and urological surgery, Department B, gastrointestinal surgery, endocrine surgery, organ transplantation, and pediatric surgery.

In addition to the specialisation of the two main surgical departments, separate departments have been established for neurosurgery (1950) and experimental surgery (1962 – see chapter. 11). A department for plastic surgery was also established in separate buildings near by in Werge-landsveien in 1953, it was later moved to Pilestredet.

In 1995 the orthopedic hospitals, Sophies Mindes Hospital-SMH, and Kronprinsesse Märthas Institutt, – KMI, and Oslo Sanitetsforenings Revmatismesykehus – OSR were administratively joined with Rikshospitalet.

In 1989 Hjertesenteret (The Cardiac Surgery Centre) opened on 4th floor of The Maternity Unit in Rikshospitalet. It was moved to OSR in 2003.

Radiumhospitalet became a part of Rikshospitalet in 2005, and in 2009 Ullevål and Aker were also included in a joint Oslo University Hospital.

Table 4-1. Rikshospitalet – RH – Milestones

1814	Decision to build a general national hospital in Akersgaten
1824	The first patients were admitted to Rikshospitalet – RH
1826	Official opening
1827	The Maternity Unit was opened
1842	Official completion of RH
1844	Obstetrics and gynecology split off as separate unit
1872	Decision to build a new hospital in Pilestredet
1873	The surgical department was divided into Depts A and B
1883	The hospital moved to Pilestredet
1988	Decision to build a new hospital at Gaustad
1989	The Cardiac Surgery Centre was opened on the top floor of Kvinneklínikken at RH
1995	Rikshospitalet, OSR, KMI og SMH merged into one hospital*
2000	The Rikshospitalet and OSR moved to new buildings at Gaustad
2002	SMH and KMI moved into the new Rikshospitalet at Gaustad
2003	The Oslo Heart Centre was moved to the old OSR
2005	Radiumhospitalet was joined with RH
2009	The university clinics in the city of Oslo were united as Oslo University Hospital
2010	The Oslo Heart Centre was moved to RH

* See below for description of the different hospitals

The organisation of the surgical and other activities have been changed with the addition of the other hospitals. In the present Oslo University Hospital the surgical activity is organised according to specialty/ subspecialty, irrespective of hospital location. The departments for the same surgical specialty in the different hospitals are united under a common leadership. The developments in the organisation of Rikshospitalet are summarised in table 4-1.

Professors

The professors of surgery at Oslo University have steadily increased from a single one at the official opening of the University in 1813, to a great number in 2010. A major increase occurred in 1985 when all associate professors were made full professors.

When the Medical Faculty at the University of Oslo opened in 1814, three professors had been appointed, the two surgeons Michael Skjelderup and Magnus Andreas Thulstrup, (potraits in Chapter 1) and the physician Nils Berner Sørensen. This reflects the status and importance of the two specialties (surgery and internal medicine) at that time.

Professor Skjelderup assumed the administrative responsibility for the Faculty, and should give lectures in anatomy, physiology, surgery and obstetrics. He established the first Institute of Anatomy at Mangelgården in 1815. Sørensen (internal medicine) and Thulstrup (surgery) started teaching and assumed responsibility for treatment in the Civilian hospital (40 beds), and the Military Hospital (25 beds) in 1815. Only three students were enrolled for medicine when the university opened (Johan Keyser, Jens Knoph and Sigvard Emil Petersen).

When Rikshospitalet opened in 1826, Sørensen and Thulstrup became the first heads of departments in the hospital. Christen Heiberg was assistant physician (reserve-læge). He was appointed associate professor in surgery and ophthalmology in 1828, and head of surgery and professor in 1836. Heiberg was a brilliant surgeon and teacher with special interest in ophthalmology. He had done an open operation for cataract in 1825 while working in Bergen. He started giving special lectures in ophthalmology in 1829, but continued his surgical activities. He did an oophorectomy with lethal result in 1845, elbow resection in 1862, and introduced chloroform anesthesia in Norway in 1848.



Fig 4-1. Christen Heiberg. Professor of surgery 1936–70. Portrait in Medicinsk Selskab in Oslo. Courtesy RH, Section for Photo and Visual Presentation



Fig 4-2. Julius Nicolaysen. First professor Surgical Dept A, Rikshospitalet 1873–1909. Portrait in Medicinsk Selskab in Oslo. Courtesy RH, Section for Photo and Visual Presentation



Fig 4-3 Johan Martin Holst. Professor Surgical Dept A. Portrait by Henrik Sørensen in Medicinsk Selskab in Oslo. Courtesy RH, Section for Photo and Visual Presentation



Fig 4-4. Johan Hjort. First professor Surgical Dept B. Rikshospitalet. Courtesy RH, Section for Photo and Visual Presentation



Fig 4-5. Professor Hagbart Strøm teaching in the Surgical Theatre. Courtesy RH, Section for Photo and Visual Presentation

Thulstrup continued as professor of surgery, gynecology and obstetrics until 1836. He was succeeded by Christen Heiberg. Frans Christian Faye was appointed professor of obstetrics, gynecology and childrens disease, and head of the Maternity Unit (Fødselsstiftelsen), in 1850. He retired in 1876. This clinic had been built in 1827, and had from the start been run as a part of Rikshospitalet. A new building was completed in 1837, and expanded in 1849 and 1852. In 1853 it had 22 maternity beds.

Julius Nicolaysen was appointed head of surgery in 1872. The next year the surgical dept was divided into Surgical Departments A and B.

Professors in Surgical Dept A at Rikshospitalet

Julius Nicolaysen continued as head of Surgical Dept A. He was a great teacher and a surgical innovator, and introduced aseptic treatment of wounds in 1870. He did a resection of the pylorus in 1881 and gastroenterostomy in 1889. Julius Nicolaysen was succeeded by his son Johan in 1909, followed by Johan Martin Holst 1930–52, Leif Efskind 1952–74, Karl Victor Hall 1974–87. Tor Frøysaker was head 1987–94, Jan Svennevig 1994–2010. Odd Geiran was also appointed professor in 1995.

Professors in Surgical Department B at Rikshospitalet

Johan Hjort was the first head of Surgical Dept B. He did the first gastrostomy in 1874.

Hagbart Strøm was professor from 1896. He did the first larynx extirpation in 1890, and gastric resection in 1896. He was a pioneer in gall bladder surgery. Strøm was succeeded by Peter Nicolay Bull 1912–28, Ragnvald Ingebrigtsen 1928–54, Christian Bruusgaard 1954–60, Bjarne Fretheim 1960–77, Audun Flatmark 1977–92. Odd Søreide was head 1993–2000, Anstein Bergan 2000–2007.

From 1985 professors were appointed in the various surgical specialties and subspecialties, concomitant with the alteration of the title associate professor to professor. A complete list of the professors of surgery at Rikshospitalet is presented in Table 4-2.

Radiumhospitalet – DNR

(The Norwegian Radium Hospital)

Radiumhospitalet was opened in 1932, as a hospital for patients with malignant disease who require irradiation or treatment with radioactive isotopes. Initially the surgical department focused on malignant melanomas and breast cancer, but through the years it has gained an important position in the treatment of advanced abdominal cancers, where radiation prior to operation, or during operation, is indicated. It is also a reference hospital for thyroid carcinoma, and soft tissue tumours.

Table 4-2. Professors of Surgery at Rikshospitalet

1814–44	Michael Skjelderup - surgery and obstetrics
1814–36	Magnus Andreas Thulstrup - surgery and obstetrics
1836–70	Christen Heiberg - surgery and ophthalmology
1850–76	Frans Christian Faye - surgery and obstetrics
1851–75	Carl Wilhelm Boeck - dermatology, fractures and luxations
1870–72	Julius Nicolaysen
Surgical Department A	
1873–1909	Julius Nicolaysen
1909–30	Johan Nicolaysen
1930–52	Johan Martin Holst
1952–74	Leif Efskind
1974–87	Karl Victor Hall
1987–1994	Tor Frøysaker
1995–	Odd Geiran
Surgical Department B	
1873–1901	Johan Storm Aubert Hjort
1896–1912	Hagbarth Strøm
1912–28	Peter Nicolay Bull
1928–54	Ragnvald Ingebrigtsen
1954–60	Christian Bruusgaard
1960–77	Bjarne Fretheim
1977–92	Audun Flatmark
1993–2000	Odd Søreide
Cardiothoracic Surgery	
1989–2010	Jan L Svennevig
1998–	Harald Lindberg
Gastrointestinal Surgery	
1985–2008	Anstein Bergan
2009–	Ivar Gladhaug
Urology	
1985–96	Bjørn Klevmark
1996–	Hans Erik Hedlund
Pediatric Surgery	
1985–86	Ola Knutrud
1986–95	Roald Bjordal
2000–	Ragnhild Emblem
Transplantation Surgery	
2001–05	Bjørn Inge Brekke
2010–	Aksel Foss
General Surgery	
1997–2002	Eilif Dahl
The Institute for Surgical Research	
1969–1991	Egil Amundsen
1991–	Ansgar Aasen
2003–	Håvard Attramadal
The Intervention Centre	
1999–	Erik Fosse
Dept of Neurosurgery	
1950–62	Gunnar Røvik
1962–80	Tormod Hauge
1980–81	Nicolaus Zwetnow (1981–99 experim)
1983–97	Helge Nornes
1991–	Trygve Lundar
1999–	Karl Fredrik Lindegård
2008–	Jon Berg-Johnsen
2010–	Per Kristian Eide
Dept of Plastic Surgery	
1985–89	Gunnar Eskeland
1990–2009	Frank Åbyholm

Since the start, there has been close cooperation with the surgical departments at Rikshospitalet, and also with the orthopedic hospitals in treatment of soft tissue tumours.

Table 4-3 Radiumhospitalet (DNR) – Milestones

1916	Decision to build DNR
1932	DNR is opened at Montebello
1958	Expansion of DNR
1970	Decision to expand DNR again
1977	Expansion of DNR completed
2006	New building for irradiation treatment
2010	New buildings for research
Professor of Surgery: 1988– Karl Erik Giercksky.	

Sophies Minde Hospital – SMH (Sophie's Memorial Hospital)

In 1892 Agnes and Nanna Fleischer started a school for the disabled, and the next year a Society for the Support of the Disabled was started, with King Oscar II as a board member. The king donated a fund, named after his queen Sophie, to run a centre for treatment of the disabled. The centre was opened in 1902. A special clinic was established in 1912, and a shoemaker service was established in 1914. The activity increased, a building site was bought, and all activities moved to Trondheimsveien in 1927.

The design and production of equipment for the disabled, as well as the shoemaker services, have increased, and was separated from the hospital as an independent organisation. Production of equipment was moved to Hamar, and the Orthopedic services were moved to Aker Hospital in 2004.

The Hospital as such was established in 1927, and the first surgeon, Ivar Alvik was employed in 1949. He developed the institution into a modern orthopedic hospital with workshops and a laboratory for biomechanics. After presentation of his thesis on tuberculosis of the spine at Oslo University in 1949, he was appointed lecturer, and after further studies, partly at the New York Orthopedic Hospital, professor in 1959.

The hospital was formally joined with Rikshospitalet in 1995, and all hospital activities were transferred to Rikshospitalet in 2002.

Table 4-4. Sophies Minde – Milestones

1927	Opening of outpatient clinic for orthopedics in Trondheimsveien 132
1949	Ivar Alvik is employed as orthopedic surgeon, and lecturer of orthopedic surgery
1959	Alvik is appointed professor
1995	Joined with Rikshospitalet
2002	All orthopedic surgery moved to Rikshospitalet

Professors of orthopedics	
1959–73	Ivar Alvik
1973–84	Magne Foss Hauge
1984–97	Ingjald Bjerkreim
1986–2007	Paul Lereim
1997–	Olav Reikerås
1999–	Terje Terjesen (pediatric orthopedics)

Oslo Sanitetsforenings Revmatismesykehus – OSR

This was the first hospital in Scandinavia for patients with rheumatic disorders. It was built in Akersbakken in 1938 by Norske kvinners Sanitetsforening (The Norwegian Women's Public Health Association). The first doctors employed, Andreas Tanberg (head 1938–1963) and Erik Kåss (head from 1963) were rheumatologists. The two surgeons Gunnar Røvig and Herman Gade jr were employed part time in 1940, and Henrich Nissen-Lie was engaged part time from 1949 to 1965. The first full time surgeon, Jan Pahle was engaged in 1966. Kåss and Pahle deserve much credit for the development of the care and treatment for patients with rheumatic disease in Norway. OSR became a teaching hospital in 1962, and Kåss became professor of rheumatology in 1966. The hospital was joined with Rikshospitalet in 1959, and all activity was moved to the new hospital at Gaustad in 2000.

Table 4-5. Oslo Sanitetsforenings Revmatismesykehus – Milestones

1938	Opening of the hospital in Akersbakken
1962	Established as a university clinic
1966	First surgeon, Jan Pahle, was engaged this year
1995	Joined with Rikshospitalet
2000	Moved to new location of Rikshospitalet at Gaustad

**Kronprinsesse Märthas Institutt – KMI
(Crownprincess Märtha’s Institute)**

This hospital was financed by The Norwegian Society for Treatment of Poliomyelitis. The building in Trondheimsveien 132, at the same location as Sophies Minde Hospital, was started in 1954, and was completed in 1957. Associate professor Henrich Nissen-Lie, who then worked at surgical Department II at Ullevål was engaged as the first surgeon. From the start he emphasised his interest in hand surgery, and the hospital has been of great importance for the development of hand surgery and re-implantation in Norway, in addition to other orthopedic activities.

Ownership was taken over by the State in 1965. The hospital was joined with Rikshospitalet in 1995, and all activities were transferred to Rikshospitalet in 2002.

Table 4-6. Kronprinsesse Märthas Institutt – Milestones

1957	Opening of the hospital
1965	Transfer to State ownership
1995	Joined with RH
2002	All activity transferred to RH

Ullevål Hospital

After closure of the municipal hospital and transfer of patients from Oslo to Rikshospitalet in 1842, the hospital capacity in Oslo soon became insufficient and a new municipal hospital; Kroghstøtten sykehus, had to be built. It was completed in 1859. From 1870 Herman Gjør arranged clinical teaching for medical students without remuneration. When he retired he received special acknowledgement from the University.

The hospital capacity at Kroghstøtten soon became insufficient for patients from the entire city, and in 1884 it was decided to build a completely new hospital in Kirkeveien at Ullevål. A large area was purchased, and the first part of the hospital was opened in 1887. It was built according to the “pavilion” principle, primarily as an epidemic hospital, but it soon became a general hospital. Since the beginning building and rebuilding has been a more or less continuous process, and the hospital has become one of the largest in Europe. In 1960 it had 1771 hospital beds. Since then the number of beds have been reduced, but new facilities have been added

The first surgical block was completed in 1902. The surgical department increased in size to 300 beds, and was divided into Surgical Departments II and III in 1919.

Since the hospital opened in 1887, epidemic medicine had been taught to medical students at the University, but the hospital was not formally included in the university programmes until 1917. Teaching in surgery did not start till 1919, when the two heads of surgery at departments II and III, Sophus Widerøe and Hjalmar Schilling, were appointed lecturers at the University.

The two departments gradually specialised from the early 1930ies, and before all the surgical departments were joined in one clinic in 1982, surgical Department II provided mainly gastrointestinal surgery, orthopedics and pediatric surgery, and surgical pathophysiology, Department III cardio-thoracic, vascular and orthopedic surgery, and renal transplantation.

By then, separate departments had been established for facio-maxillary surgery in 1932 (Dept XII), neurosurgery in 1955 (Dept XIV) and urology in 1965 (Dept V).

A separate and independent unit for experimental research: Anders Jahres Institutt for Eksperimentell Medisinsk Forskning, was established in 1955. Fredrik Kiil, a specialist in internal medicine, became the first leader of the institute (see chapter 10).

There was also a close link with The Municipal Emergency Centre where surgeons from Department III did elective orthopdic surgery in the hospital unit, mainly hip implants.

Oslo Legevakt – Oslo Municipal Emergency Centre
Oslo Legevakt was established as an independent unit at Kroghstøtten sykehus in Storgaten in 1900. The old buildings were demolished, and a new centre built in 1959, with establishment of a surgical department, mainly for elective orthopedic procedures.

In 1982 the responsibility for the emergency services was transferred to the various parts of the city, but the main centre in Storgaten was maintained.

Table 4-7. Professors of Surgery at Ullevål Hospital

Surgical Department II		Surgical Department III	
1950–56	Christian Rosing Bull	1950–65	Carl Semb
1957–59	Johan Hertzberg	1965–79	Frank Bergan
1959–72	Christian Bruusgaard	1967–91	Steffen Birkeland
1972–83	Snorre Aune		
1982	All surgical departments in one clinic		
1983–2000	Jan Stadaas – general surgery		
Orthopedics			
1983–94	Antti Alho	1987–88	Olav Reikerås (-expt orthopedics)
1996–	Lars Engebretsen	1990–	Arne Ekeland
1998–	Lars Nordsletten		
2003–	Jan Erik Madsen		
Gastrointestinal Surgery		Cardiothoracic Surgery	
1984–98	Kaare Solheim	1994–	Knut Kvernebo
1998–	Trond Buanes	2005–	Theis Tønnessen
2000–	Egil Johnson	2003–	Ingvar Jarle Vaage
Urology		Breast and Endocrine Surgery	
1985–2006	Kjell Tveter	2007–2010	Rolf Kåresen
Department of Neurosurgery		Surgical Pathophysiology	
1961–78	Kristian Kristiansen	1965–82	Ole Jacob Malm
1978–87	Ragnar Nesbakken	1982–2008	Morten Ræder
1994–2000	Bjørn Magnæs	1992–	Arnfinn Ilebekk
2004–	Eirik Helseth	2009–	Ole M Sejersted
		Maxillofacial Surgery	
		1995–	Per Skjelbred

In addition to being a centre for emergency medicine, the Centre also housed a surgical department for elective orthopedic surgery, mainly hip and hand operations.

Table 4-8. Professors of Surgery at Oslo Municipal Emergency Centre

1966–76	Arnt Jakobsen Sr
1976–91	Gunnar Støren
1994–96	Eilif Dahl

Aker

Aker, also a main municipal hospital, was originally built as a community hospital for Aker, which was then a separate community bordering to the city of Oslo. The community hospital was moved to the present site at Sinsen, and opened in 1895. The first expansion was completed in 1914. Axel Christensen was employed as head of surgery the same year, and was a driving force in the expansion and development of the hospital until he died in 1943.

Building and rebuilding have been continuous since the start, but Aker did not become a teaching hospital until 1948. The first professor of surgery, Hans Fredrik Harbitz, was appointed in 1950. He was succeeded in 1970 by Sverre Vasli. Under Vasli's leadership the Surgical Clinic was divided into 4 units, orthopedics, urology, gastrointestinal surgery, and thoracic and vascular surgery. In addition a special unit for vascular research, Sirkulasjonsfysiologisk avdeling, was established in 1979 under the leadership of the physiologist Einar Stranden.

In 1993 it was decided to coordinate the specialist functions in Oslo, and Aker became the centre for vascular and urological surgery.

In 2000 the urological department at Ullevål, and the section at Lovisenberg, were moved to Aker creating the largest urological unit in Norway, called Oslo Urological University Clinic (OUU). In 2006 all urological activities at Ullevål were moved to Aker, and the process was completed in 2007 when all vascular surgery followed.

But as part of the reorganisation in the newly established Oslo University Hospital in 2009, the surgical activities at Aker will probably be moved to Rikshospitalet and Ul-

levål, and the continued existence of Aker is uncertain.

Table 4-9. Professors of Surgery at Aker

1950–70	Hans Fredrik Harbitz
1970–89	Sverre Vasli
2008–	Jørgen J Jørgensen
Thoracic and Vascular Surgery	
1992–	Andries Kroese
Gastrointestinal Surgery	
1985–	Ivar Liavåg
1991–	Knut Nygaard
2001–03	Arne R Rosseland
2009–	Arild Nesbakken
Urology	
1985–99	Sten Sander
2001–10	Steinar Karlsen
2005–	Lars Magne Eri
Orthopedics	
1998–	Knut Strømsøe
Vascular Research	
1979–	Einar Stranden

Sentralsykehuset i Akershus (SiA) – (The Central Hospital in the County of Akershus) in 2002 re-named Akershus universitetssykehus – Ahus (Akershus University Clinic).

Akershus had no county hospital until 1946, when it purchased the hospital that the Swedish Red Cross had established at Midtstuen after the war. Previous to that, local hospital services were provided at Aker, Bærum and Stensby (Eidsvoll) Hospitals. More advanced services had been bought in Rikshospitalet. The hospital at Midtstuen was obviously too small to meet the needs of the rapidly increasing population in Akershus County, and it was decided to build a completely new hospital.

The hospital was officially opened at the present site at Nordbyhagen, Lørenskog, in 1961, and expanded in 1978.

The hospital at Lillestrøm established around 1920, became part of SiA in 1964 and Stensby (Eidsvoll) Hospital which was established in 1911, was joined with SiA in 1966. The population increased even more than expected,

and it was decided to demolish parts of the existing building and build a completely new hospital. The present buildings were completed in 2008.

In 2009 all the teaching hospitals in Oslo were united as one organisation; The Oslo University Hospital, but as Ahus is located outside Oslo, it has kept its status as a separate organisation under the University of Oslo, Stensby sjukehus and Ski sykehus included.

SiA was a teaching hospital from 1967 to 1987, providing clinical training for medical students who had taken their pre-clinical training in foreign countries due to insufficient capacity at the Norwegian universities (The Aker-Lørenskog plan).

In 1999 it was decided by the Norwegian Parliament that it should be re-established as a university hospital, and teaching and research were resumed in 2001 as part of the curriculum at the University of Oslo.

Arne Bakka was head of the surgical department at that time. Under his leadership it was reorganised and divided in 2006 into six departments: urology, thoracic and vascular surgery, gastrointestinal surgery (also with a section of breast and endocrine surgery), and independent departments for surgical outpatients (poliklinikk), day surgery and the traditional in house operation theatres' department (OT).

Table 4-10. Professors of Surgery at Sentralsykehuset i Akershus – SiA/Ahus

1969–2001	Nils N Helsingen
1975–84	Kaare Solheim
2003–	Arne Bakka
2003–	Ola Røkke
2007–	Tom Øresland

University of Bergen

University Hospitals

The surgical activity at the University of Bergen is based at Haukeland Hospital, Haraldsplass Diakonale sykehus, Legevakten, Kysthospitalet i Hagevik (orthopedic surgery) and Stavanger University Hospital.

Haukeland Hospital

The first public hospital in Bergen was built in 1754. It soon became too small, and a new hospital was built in 1779. This was still functioning when the present University hospital: Haukeland, was opened in 1912. The municipal hospital services were transferred to the new buildings.

Haukeland was fairly large, with 250 beds when it opened. The head of surgery at the municipal hospital Jørgen Aall Sandberg became director of the new hospital in addition to continuing as head of surgery. Since then building and rebuilding has been a continuous process at the same location.

A completely new hospital was built, and when it was completed in 1983, it was the largest hospital in the country.

Haraldsplass Diakonale sykehus

A hospital was built by the deaconesses at a different site in 1906, but moved to the present site in 1939, and a major expansion was built in 1967. It was run as a private hospital until 1970, when it became part of the municipal surgical service, with a complete surgical department including rheumatic and plastic surgery.

When the Regional Health Plan was effected in 2002, Haraldsplass was established as an independent company, with a contract with Health Region West.

Legevakten (The Emergency Clinic)

Legevakten in Bergen was first established in 1917 at Allehelgensgaten as a station for persons in need at the Central Police station. In 1941 it was converted to a municipal emergency centre. In 1959 it was moved to Engen, and in 1982 to a yet another location.

Legevakten became a part of Haukeland in 1956, but coordination as part of the Surgical Clinic did not take place before 1989.

Kysthospitalet i Hagevik

The Coastal Hospital at Hagevik was originally founded in 1893 for treatment of patients with tuberculous bone and joint disease. The patients were mainly children. An increasing number of orthopedic patients were treated during the first part of the 20th century, and when the University in Bergen opened in 1946, The Coastal Hospital was well established as an orthopedic hospital. This development was mainly due to the activities of the director and head of surgery for 50 years Hermann G Gade, who retired in 1946. Hermann Thrap-Meyer succeeded as director and head of surgery. His successor from 1953 to 1979 was Otto Henrik Brinchmann-Hansen, and Einar Sudmann from 1979. Since the health reform in 2002, The Coastal Hospital has been a part of Health Trust Bergen, and the orthopedic department has become part of the dept for orthopedic rehabilitation at Haukeland University Hospital.

In 1973 the institution was changed to a hospital for elective orthopedics, in 1976 the ownership was transferred to the County of Hordaland, and in 2002 it was joined with Haukeland Hospital, as part of the new national hospital re-organisation, and became a part of a joint orthopedic department.

Organisation and Professors

The University in Bergen was opened in 1946. The first students were taught by Niels Backer-Grøndahl, surgeon and Sandberg's successor as director of Haukeland.

Herman Gade jr was appointed as the first professor of surgery in 1948, after an open competition comprising a lecture and a clinical test with his main opponent Christian Bruusgård who later became professor in Oslo.

In 1961 the surgical department was divided, Gade continued as professor in Surgical Dept A, Kristian Stray as professor in Surgical Dept B (appointed in 1960). When they retired there was an interim period during which Thorolf Gjersvik led Dept A, and Carl W Janssen jr Dept B.

In 1970 Peter Heimann was appointed professor. The two surgical departments were united in 1971, but separate sections were created for the various surgical specialties and subspecialties. The surgical clinic in Bergen was the first in the country to be completely sectioned in: gastrointestinal, endocrinology, urology, vascular and thoracic surgery, pediatric surgery, and orthopedics and traumatology. Sven Olerud was employed a professor of orthopedics, but left Bergen after a very short period.

A special department for experimental surgery was established in 1972 under the leadership of Knut Svanes.

At Haraldsplass teaching in rheumatology and rheumatic surgery was established in the early 1970ies. The first professor, Arne Skarstein, was appointed in 1995, and it may be fair to say that the hospital has been a university clinic since then, as 5 lecturers were appointed the next year.

Both the head of the department prior to 1989, Willy Haukeland, and Leiv Hove had taught students at Legevakten, but formally the first position as lecturer was established in 1990 when Knut Fjeldsgaard was appointed.

Teaching at Hagevik started in 1948, with small groups of students from the university. The activity continued and the research activities at the hospital increased.

Einar Sudmann, who succeeded Brinchmann-Hansen as head of surgery in 1979 was appointed associate professor and in 1985 professor at the University of Bergen.

Decentralised teaching of medical students from the University was established in Stavanger in 1998 with Jon Arne Søreide as professor from 1999, in and Haugesund in 1998 with Kåre Bakkevold (gastrointestinal surgery) and Emil Mohr (orthopedic surgery) as part time university teachers, and in 1999 in Førde with Roberto Bergamaschi as professor.

Cooperation has also been established with other universities, Little Rock in USA, and Reykjavik, Iceland. A list of the professors of surgery at Bergen University is presented in Table 4-11.

Stavanger University Hospital

The first hospital in Stavanger, Magnus Lagabøters Hospital, later called Stavanger Hospital, was built in 1272. and a new hospital, Den kombinerede Indretning, in 1872–74. A public county hospital, “Amtssjukehuset på St Peders Gjerde” was built in 1843, and functioned until a new county hospital, Rogaland Sjukehus, was opened on Våland in 1927. A new municipal hospital, Stavanger Sykehus was completed in 1927. It was joined with the county hospital in 1976 into Rogaland Central Hospital, which has expanded gradually. It is now the fourth largest university hospital in Norway.

Teaching of medical students from Bergen University started with a pilot project in 1998. Ordinary teaching commenced in 1999. The teachers in surgery were Per Øgreid, Hartvig Kørner, Karl Søndena and Jon Arne Søreide.

Haugesund Hospital

The first hospital in Haugesund, Vårsildavgiftsfondets sykehus was opened in 1889. A new hospital, Haugesund Hospital was completed in 1924, but until 1945 only one of the four floors were in use! A private Hospital, St. Franciskus' Hospital (built by St. Franciskus Xavierus Sisters – a female Catholic Congregation founded in Norway in 1901) was opened in 1926, and continued until 1970.

The first medical students from Bergen University came to Haugesund in 1998, as part of the pilot project with Stavanger. Ordinary teaching of medical students was established in 2000 Kåre Bakkevold and Emil Mohr as surgical teachers.

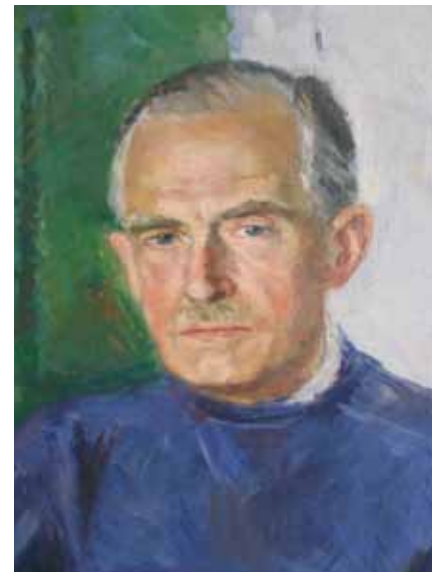


Fig 4-6. Niels Backer-Grøndahl. First teacher of students in Bergen. Portrait by Margrethe Koch Photo Gørill Skaale Johansen. Courtesy UiB, Section for Photo and Visual Presentation



Fig 4-7. Herman Gade. First professor of surgery University in Bergen. Courtesy UiB

Table 4-11. Professors of Surgery at Haukeland Hospital

Herman G Gade	1948–1967		
Kristian Stray	1961–1970		
Peter Heimann	1970–1978		
Orthopedic Surgery			
Sven Olerud	1974–1975	Svein Haukaas (Haraldsplass)	1997–2010
Antti Alho	1978–1983	Jens Høstmark	2008–
Norvald Langeland	1984–1990		
Einar Sudmann (Hagavik)	1985–1999		
Anders Mølster	1994–2007	Vascular Surgery	
Lars Birger Engesæter	1998–	Arne Trippestad	1985–1998
Leiv M. Hove	1998–	Torbjørn Jonung	2002–
Leif Ivar Havelin	2004–	Steinar Aune	2006–
Ove Furnes	2007–	Elin Laxdal (Reykjavik)	2008–
Eirik Solheim (Haraldsplass)	2009–		
		Cardiothoracic Surgery	
		Leidulf Segadal	1993–2010
Gastrointestinal Surgery		Lodve Stangeland	2006–2011
Bo Arnesjø	1980–1989	Rune Haaverstad	2007–
Knut Svanes	1985–2001		
Jan Frederik Halvorsen	1989–2002	Endocrine Surgery	
Arne Skarstein	1990–2005	Jan Erik Varhaug	1991–
Odd Søreide	1990–1993	Michael Brauchkoff	2008–
Asgaut Viste	1997 –		
Åke Andren–Sandberg	1998–2001	Plastic Surgery	
Jon Arne Søreide (Stavanger)	1999–	Børje Sundell	1983–1984
		Frank Åbyholm	1985–1990
Roberto Bergamaschi (Førde)	1999–2006		
Odd Søreide	2003–2004	Neurosurgery	
Karl Søndena	2005	Erik–Olaf Backlund	1983–1994
Martin Hauer Jensen (Little Rock)	2008–	Knut Wester	1989–2010
Frank Pfeffer	2009–	Paal Henning Pedersen	2001–
Kjell Øvrebø	2008–	Morten Lund–Johansen	2006–
Kjetil Søreide	2012–		
		Experimental Surgery	
Urology		Jon Lekven	1985–2011
Per Åge Høisæter	1989–2000	Ketil Grong	1993–
August Bakke	1995–		
Lars Dæhlin	1996–2007	Maritime Medicine	
		Eilif Dahl	2008–

Trondheim – The Norwegian University of Science and Technology – NTNU

The first hospital in Norway, Trondhjems Hospital was established in 1277. It is still in existence, but functions mainly as a nursing home and social centre.

The present university was formed in 1996 when The Medical Faculty was merged with the Norwegian Institute of Technology (NTH) founded in 1910, the College of Arts and Sciences, the Museum of Natural History and Archeology and the Trondheim Conservatory of Music.

The University has since 1993 had a complete medical school, but clinical teaching started in 1975 when Sentralsykehuset became a university clinic.

The University Clinics in Trondheim are located in St Olavs Hospital (previously The Regional Hospital in Trondheim, Sentralsykehuset, Trondhjem sykehus), St Elisabeths Hospital, Røros Hospital and Orkdal Hospital.

Location

St. Olavs Hospital was originally built at the present site, Øya, and opened in 1902 under the name of Trondhjem sykehus. The hospital changed name to Sentralsykehuset in Trondheim in 1950. The first part of the new building (Sentralklokken) containing 300 beds was added in 1959. The building was completed in 1972. It is now demolished.

The county had gradually increased its ownership. This was completed in 1964. Due to the changed organisation of Norwegian hospital services, the hospital became a Regional Hospital in 1974.

In 1975 the hospital became a University Clinic. In 2002, again as part of organisational changes, the State assumed ownership, and the name was changed to St. Olavs Hospital. It had been decided to build a completely new hospital at the same site, and the first part of the new hospital was opened in 2006.

In 1982 ownership was assumed of St Elisabeth Hospital, established in 1887 and run by the St Elisabeth sisters, the Catholic Church. The hospital was changed to a cardiac hospital linked to the University under the leadership of Olaf Levang.

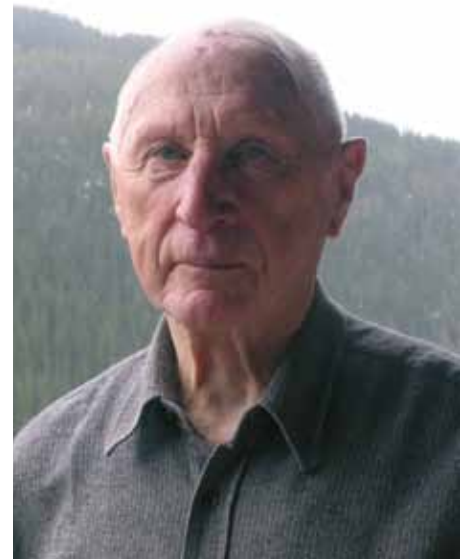


Fig 4-8. Axel Sanderud. Photo Tor Arne Sæther. Courtesy Pål Benum

Orkdal Hospital was built in 1908, and run by Orkdal Sanitetsforening until it became part of the county of Sør-Trøndelag in 1969. It was sold to the Health Region Midt-Norge in 2004, and joined to St. Olavs Hospital

Røros was founded as a mining centre for copper in 1646, and the hospital there was established soon after. The hospital services were first taken over by the county, until it became part of Health Region Midt-Norge in 2004, and joined to St. Olavs Hospital. Presently it is run mainly as a day-care hospital for orthopedic patients in addition to other activities.

Organisation and professors

The University in Trondheim was established in 1910 for engineering and architecture, the medical faculty opened in 1975. In 1996 all the academic institutions in Trondheim were united in one joint university. Axel Sanderud was the first professor of surgery.

In 1982 the surgical department was divided into separate sections, led by newly appointed professors. The orthopedic section became a separate department in 1995.

A list of the professors of surgery at Trondheim University is presented below.

Table 4-12. Professors of Surgery at Trondheim Regional Hospital

1975–81	Aksel Sanderud
1985–	Inggard Lereim (chir minor and traumatology)
Orthopedics	
1975–82	Per Edvardsen
1982–2005	Pål Benum
1989–95	Terje Terjesen
1994–	Vilhjalmur Finsen
1994–	Helge Rønningen
2008–	Arild Aamodt
Gastrointestinal Surgery	
1982–2004	Helge Myrvold
1995–	Jon Erik Grønbech
2007–	Arne Wibe
Cardiothoracic and Vascular Surgery	
1982–2009	Hans Olav Myhre
1982–2002	Olaf W Levang
1995–	Lars Norgren
2005–	Ola D Sæther
2005–2007	Rune Haaverstad
2005–	Alexander Wahba
Pediatric Surgery	
1985–2000	Torbjørn Kufas
Neurosurgery	
1989–	Geirmund Unsgård
2006–	Øystein Petter Nygaard
Plastic Surgery	
1995–2002	Frøde Samdal
Experimental Surgery	
1999–	Duan Chen

Tromsø University

The University Hospitals

Surgical activity has been one of the main functions of the hospital in Tromsø at least since 1895. The change to increased surgical activity after the introduction of aseptic techniques and anesthesia, has been credited to the two surgeons Frederik Ramm and Kristian Igelsund.

The hospital was located in Grønnegate in the centre of Tromsø until to 1922, when a new Troms and Tromsø Hospital was completed just outside the town centre. The new hospital was jointly owned by the Municipality of Tromsø and Troms County until 1964, when the county was given complete responsibility as part of the altered hospital organisation in the country. The name was then changed to Sentralsykehuset i Tromsø. It became a university hospital in 1975.

In 1991 hospital was moved to new buildings in Breivika.

St Elisabeths Hospital, previously a maternity home, had been joined with the hospital in 1964.

The Coastal Hospital in Tromsø, founded as a hospital for tuberculous patients, had become part of Sentralsykehuset in 1971, as a department for pulmonary medicine.

When the hospitals were regionalised, the name was changed to The Regional Hospital in Tromsø (RiTØ), and when the State took over ownership in 2002, it was changed again to The University Hospital of North Norway (UNN).

The hospitals in Narvik and Harstad were joined in a trust with UNN in 2009, as part of the reorganisation of the hospitals in Health Region North.

The UNN is also responsible for **Longyearbyen Hospital** on Svalbard.

Organisation and Professors

The University in Tromsø opened in 1972, but the decision to establish a university in Tromsø was taken by The Norwegian Parliament in 1968, and an Interim Board had been in function since 1969. It is the northernmost university in the world situated at 70 degrees North.

Table 4-13. Professors at Tromsø Regional Hospital

Gastrointestinal Surgery	
Jon Anton Johnson	1971–87
Karl Erik Giercksky	1983–86
Arthur Revhaug	1988–
Barthold Vonen	2000–
Jørn Kjæve	2000–
Øivind Irtun	2005–
Cardiothoracic Surgery	
Dag Sørlie	1987–
Jarle Vaage	1989–92
Mons Lie	1991–97
Truls Myrmel	2000–
Rolf Busund	2010–
Urology	
Truls Erik Bjørklund Johansen	1995–2000
Plastic Surgery	
Rolf Nordstrøm	1991–97
Orthopedics	
Olav Reikerås	1985–99
Oddmund Johansen	2004–
Neurosurgery	
Jens Hugo Trumpy	1994–97
Bertil Romner	1999–
Rune Hennig	1999–
Tor Ingebrigtsen	2006–
Breast and Endocrine Surgery	
Jan Erik Varhaug	2010–



Fig 4-9. Jon Anton Johnson. First professor of surgery in Tromsø. Portrait by Ole Nestvik. Courtesy UNN



Fig 4-10. Dag Sørlie. Professor of cardiac surgery in Tromsø. Photo: Finn Giæver

The first professor of surgery was Jon Anton Johnson. He had been head of the surgical department in Tromsø since 1967, and was academically qualified.

The medical curriculum (“The professional study in medicine”) was officially established in 1978, the same year as the first part of the new university buildings were completed.

Since the start it has cooperated with several of the hospital in the counties Nordland, Troms and Finnmark in clinical teaching of medical students.

A list of the professors of surgery at Tromsø University is presented in Table 4-13.

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5. The Norwegian Surgical Society/Association

Jon Haffner, Tom Gerner, Torgeir Løvig,
Knut Kvernebo and Lars Vasli

The Foundation

The Norwegian Surgical Society¹ was founded on the 1st of August 1911.

Prior to this, Norwegian surgeons had met at the Scandinavian meetings for natural scientists (started 1839) and in The Nordic Surgical Society, which was founded in 1892, and nationally in The Surgical Society in Kristiania (Oslo), which was founded in 1894.

It was Otto Borchgrevink, chief surgeon at Diakonhjemmet Hospital in Oslo, who suggested that a national society for surgeons should be founded at a meeting of The Surgical Society in Kristiania. At this particular meeting 35 surgeons from all over Norway were gathered in Oslo on their way to The Nordic Surgical Society's meeting in Stockholm.

The main reasons for the foundation of a national surgical society were the increasing discontent with the salaries and working conditions of surgeons in Norway, and the need for a national society that could represent surgeons professionally, scientifically and otherwise.

Membership

Membership of The Society was originally open only to fully qualified surgeons, but this was soon changed, and since 1924 surgeons in training have been invited to join The Society. As The Norwegian Surgical Society is also a member organisation of The Norwegian Medical Association, all members have to be individual members of NMA.

In 2010 The Society had 1.135 members. In addition there are approximately 950 members in the orthopedic, neurosurgery and plastic surgical societies. Approximately 10% of all medical doctors in Norway are surgeons.

The Annual Meeting

Otto Borchgrevink was chairman of The Society from 1911 until 1924. During this period the main activity was directed towards improvement of salaries and working conditions for surgeons.

There were no general meetings of The Society until 1918. It was then decided to meet every second year, at

1) The name in English was changed to The Norwegian Surgical Association in 2006

the same time as The Norwegian Medical Association. Even after this agreement had been reached, there was little activity in The Society until 1924, when it was decided to have annual meetings, and the second chairman Axel Christensen shifted the emphasis of the meetings towards scientific presentation and demonstration. Since then the scientific activity has been the main feature of The Norwegian Surgical Society.

Since 1925 the Annual Meeting has been held in the last full week in October (Bededagsmøtet). The location has changed many times, mainly due to the increasing number of participants. Since 1992 it has been arranged at one of the main conference hotels in Oslo, Holmenkollen Park Hotel, where suitable accommodation is available for participants from other parts of the country. The Norwegian Orthopaedic Society decided to have separate meetings at a different conference hotel in Oslo in 2006, and has continued this practice since then. In 2008 they were joined by the neurosurgeons.

The meeting comprises one full week, with courses, symposia and free presentations as well as annual general meetings for The Norwegian Surgical Society and the other surgical societies. Young surgeons use this arena for getting to know about surgical activities in Norway, meet colleagues and to get advice on how to build a professional career.

An exhibition of surgical instruments, and other products of general interest to surgeons, is arranged at the same time and place as the annual meeting. This is a tradition that dates back to 1930. Since the meeting moved to Holmenkollen, around 70 companies have been represented every year in the Exhibition Hall. This has made the meeting an economic success, and is a base for further activity for The Society.

The Annual Dinner has been arranged since 1924. Up to 1966 it was only for members of the Society and its invited guests, but since then participation of spouses has been welcomed. Primarily a banquet, it was changed to an informal dinner in 1998, and this has been a great success.



Fig 5-1 The first Chairman of the Society, Otto Borchgrevink

Meetings in The Spring

From 1946 to 1980 The Society also hosted spring meetings in other parts of the country, arranged by the local surgeons. These meetings were mainly devoted to scientific presentations, but as spouses and family members also were invited, and provided with a special programme for visitors to the various towns, these meetings were also socially important. Owing to the increasing number of international meetings, the number of participants in spring meetings gradually diminished, and the last spring meeting was arranged in Tromsø in 1980.

Organisational Structure

Throughout the last 100 years we have seen a tremendous expansion in surgical skills and a corresponding development in technical equipment. The changes have made it necessary to establish surgical subspecialties and to reorganise the hospital services correspondingly.

From the start of the specialist system in Norway, orthopedics has been a separate specialty. Originally it was called Orthopaedic Treatment, and the purely surgical specialty was not established until 1945.

In 1936 maxillofacial surgery became a separate surgical specialty. Then followed plastic surgery in 1948, and neurosurgery in 1953.

General surgery is still the main specialty, but with additional training the specialists may also become subspecialists in urology (from 1948), thoracic surgery (1950), pediatric surgery (1963), surgical gastroenterology (1977), vascular surgery (1986), or breast and endocrine surgery (2006).

Each of the new surgical specialties and subspecialties has established its society (see Table 5-1: The Surgical specialties and specialist societies in Norway, in Chapter 3). This made it increasingly necessary to alter the structure of The Society, and a major change was made in 1997, when it was changed into an Association for all the surgical societies, and in addition continued to be the specialist society for general surgeons.

Organisation as Part of The Norwegian Medical Association – NMA

When The Society was founded, it was independent of the Norwegian Medical Association, which had been founded in 1886. But as only NMA is a recognised trade union, all negotiations with the government has to be carried out by that organisation, whether it is a question of wages and working conditions, surgical education, specialty structure or specialist authorisation.

It was therefore both reasonable and necessary for The Society to become a member organisation of NMA, and this was formalised when NMA changed its laws in 1951, and included all the specialist societies as part of The Association.

The NMA was reorganised in 2006, and the member organisations are now grouped as specialist organisations, trade union organisations, or geographical sections. The Society is part of NMA as the specialist organisation for general surgeons. Most surgeons in Norway are also members of one of the subspecialty societies, which are also member organisations of NMA on the same terms as The Society. In addition nearly all surgeons are members of one of the trade union organisations in NMA, The Association for Hospital Consultants, The Junior Hospital

Doctors Association or The Association for Specialists in Private Practice. They are also registered as members of one of the geographical sections of NMA. Representatives elected jointly by the Society and several other specialist societies represent the Society in The National Assembly of NMA. Collection of membership fees is coordinated by NMA, who also subsidises The Society, and provides secretarial assistance.

NMA was founded in 1886. Up to World War II surgeons were little engaged in the leadership, out of 23 presidents only two were surgeons; Fredrik Jervell 1916–18, and Olaf Tandberg 1929–30. But as the importance of NMA increased, so has surgical engagement, out of 17 presidents since 1945, five have been specialists in surgery, Johan Haffner 1954–57, Kaare Schancke 1958–61, Bengt-Lasse Lund 1983–87, Jon Haffner 1988–91, and Torunn Janbu 2006–2011.

The Constitution

The constitutions (laws and by-laws) of the Society was first passed in 1918, and have been altered several times since. The last major revisions were done in 1997 when The Norwegian Surgical Society was changed to an association in 2004, when the representation of the other surgical societies in the Board was changed, and again in 2006. Changes were then necessary to adapt to the reorganisation of NMA, and at the same time the change to Association was completed with alteration of the name of Norwegian Surgical Society to Norwegian Surgical Association.

The Board

The Board handles matters of general surgical interest; economic, professional and scientific, and generally manages The Society's affairs from one Annual General Meeting to the next. Originally it consisted of three members, but it was gradually expanded to seven, two of which should be in training to become specialists. Each of the members of the Board had special tasks: Chairman, Vice-Chairman, General Secretary, Secretary for Surgical Science (the annual meeting and abstracts), and Treasurer.

When The Norwegian Surgical Society changed its structure in 1997 this was changed. Only the chairman and two other members are elected to The Board directly from

The Norwegian Surgical Society's assembly. Initially the other members of The Committee were appointed from each of the specialty and subspecialty societies. From 2004 the chairpersons of the subspecialty organisations are their representatives. Thus The Society has changed character to an association, which is mainly engaged in issues that are of common interests for all surgical specialties.

Chairmen of The Norwegian Surgical Society

The Chairmen function as representatives and spokesmen for The Society, as leader of the Board. The position is honorary, but remuneration was introduced to the Chairman and members of The Board in 2007. Since 1983 a special chairman for The General Assembly has been elected at The Assembly.

Table 5-1. Chairmen of The Norwegian Surgical Society

1911	Otto Johan Borchgrevink	1969	Rolf Lied
1924	Einar Axel Christensen	1971	Hans K Dahl
1931	Olaf Tandberg	1973	Sverre Vasli
1934	Kristjar Skajaa	1975	Finn Sandvig
1935	Knud Nicolaysen	1977	Jan Stadaas
1937	Alexander Brekke	1979	Hans Rostad
1941	Carl Boye Semb	1981	Jens Aamold
1948	Fin Serck-Hanssen	1983	Jon Haffner
1949	Hans Fredrik Harbitz	1987	Tom Gerner
1951	Ingjald Schjøth-Iversen	1990	Arne R Rosseland
1953	Erling Hjort	1992	Hans Olav Beisland
1955	Arne Arnesen	1994	Torgeir Løvig
1957	Herman Døhlen	1998	Knut Kvernebo
1959	Christian Bruusgaard	2002	Hans-Petter Næss
1962	Johan Wilhelm Otnes	2004	Lars Vasli
1964	Einar Schie	2006	Tom Glomsaker
1967	Kaare Liavaag	2010	Olaug Villanger

Secretaries/treasurers

From 1911–51 a member of the Society was elected as secretary/ treasurer, without being a Board member. Their names are presented in the additional chapter at the end of the book.



Fig 5-2 The Second Chairman, Axel Christensen, founder of the Scientific Meetings. Courtesy Else Carlsen

Honorary Members

The Society awards Honorary Membership to members or foreign surgeons as a reward for outstanding performance for Norwegian surgery and/ or The Society. The Board general nominates candidates, but The General Assembly formally elects them.

Table 5-2. Honorary Members of The Society

1924	Otto Johan Borchgrevink	1980	Erling Hjort
1946	Marius Nygaard Smith-Petersen, USA	1983	Johan Hertzberg
	Peter Nicolay Bull	1985	Hans K Dahl
1954	Anders Westerborn, Sweden	1986	Karl Viktor Hall
	Gösta Bohmansson, Sweden		Jon Anton Johnson
	John Hellström, Sweden	1987	Sverre Vasli
	Erling Dahl Iversen, Denmark	1991	Kaare Solheim
	Otto Mikkelsen, Denmark	1992	Knut Bie
	Niels Backer-Grøndahl		Audun Flatmark
	Alexander Brekke		Nils Helsing
	Nils Aars Nicolaysen	1995	Arne Haukebø
	Johan Martin Holst		Jon Haffner
1961	Einar Ljunggren, Sweden	1996	Pål Benum
	Helge Wulff, Sweden	1997	Karl Fredrik Kordt
	Oscar Schubert, Sweden	1999	Gunnar Eskeland
	Erik Husfeldt, Denmark		Einar Sudmann
	Rainer Inberg, Finland	2000	Han Olav Myhre
	Johan Cappelen Frimann-Dahl		Helge Nornes
	Ragnvald Ingebrigtsen	2002	Torgeir Løvig
	Carl Boye Semb		Arne R Rosseland
	Arne Arnesen	2008	Rolf Kåresen
1965	Sir Charles Illingworth		Jan Erik Varhaug
	Arthur W Mackey	2009	Hans Rostad
	Andrew Kay		Jan Svennevig
1971	Leif Efskind		Tom Gerner
	Kaare Liavaag	2010	Sigvald Refsum
	Ole Jacob Malm	2011	Gunnar Sødal
	Ivar Alvik		Arnt Jakobsen
	Einar Schie		Lars Vasli

Finances

From 1951 to 1984 The Chairman handled the finances of The Society, and did the bookkeeping. Ulf Slungaard was appointed treasurer in 1985. He was succeeded by Fin Resch in 1986, and from 1989 to the reorganisation of The Society in 1998 by Lars Vasli. Since 1983 a special sub-committee has been appointed annually to prepare the programme and edit the abstracts of the annual scientific meeting. This committee is chaired by the Secretary for Scientific Matters and contains representatives from the other Norwegian surgical societies.

Since 1998, the financial affairs and the arrangement of The Annual Meeting have been handled and professionalised by a company run by Lars Vasli.

The Specialty Committee

A permanent committee on surgical education and granting of the specialty of general surgery acts as advisory committee to The Norwegian Medical Association and The Norwegian Ministry of Health.

Table 5-3. Chairmen of The Specialty Committee.

1930	Niels Backer-Grøndahl
1937	Ragnvald Ingebrigtsen
1950	Georg Lützow-Holm
1954	Ivar Alvik
1958	Alexander Brekke
1962	Ingjald Schjøth-Iversen
1966	Carl Fredrik Jenssen
1970	Johan Hertzberg
1974	Eilert Støren
1986	Jens Aamold
1991	Tom Gerner
1998	Torgeir Løvig
2010	Marius Langballe Dalin
2011	Torill Morken

The members of the committee are nominated by The Society, but formally appointed by the Norwegian Medical Association.

Other Committees

In 1997 a permanent sub-committee was established for endoscopy (The Norwegian Thoraco-Laparoscopic Forum), with Arne R Rosselandt as chairman. He has continued as chairman since.

In 1999 it was decided to try to establish an Advanced Trauma Life Support – ATLS – course in Norway. A sub-committee led by Asgaut Viste did the initial work. The next year a permanent sub-committee for traumatology, (Traumeutvalget) was established, with Odd Grenager as the first chairman. He was succeeded by Olav Røise in 2002 and Tina Gaarder in 2007. Arranging the ATLS courses has been part of The Traumatology Committee's work.

The Society has contributed to appointment of committees to run courses for surgeons in training in cooperation with the Specialty Committee, the Norwegian Medical Association and the Universities. Postgraduate courses are also regularly organised through permanent sub-committees of The Nordic Surgical Society.

International Representation

At the Annual General Meeting in 1986 it was decided that The Society should apply for joint membership in the Nordic Surgical Society. Up to then membership in the Nordic Surgical Society had been individual in Norway. At that time the organisation arranged a scientific congress every second year. The Nordic member organisation alternated as hosts, and decided on location for the congress. The last congress of the organisation in Norway was arranged in Tromsø in 1997 with the local department of surgery as host, Jan Due as President and Jon Haffner Secretary General.

The future of The Nordic Surgical Society is uncertain. There is considerable Nordic cooperation in research, and in postgraduate training, but the scientific congresses are now arranged as part of the annual meetings in the national societies, on rotation.

In 1982 Norway, Denmark, Finland, Iceland and Sweden agreed to have a common labour market. As a result of this, these countries automatically accept each others

specialist certifications. In 1984 The Norwegian Surgical Society took contact with the surgical specialist societies in the other Nordic countries to try to work out common Nordic specialist regulations. Jon Haffner, Eilert Støren and Tom Gerner represented Norway in this process. In the end it was agreed that each country would have to keep its own rules, but it was recommended that a common “on call competence for specialists” be established, based on at least seven years work as an active surgeon in a department with a large volume of acute surgery. The recommendation was not accepted by The Norwegian Medical Association and therefore had to be abandoned.

Up to 1987 The Society was a member of the International Federation of Surgical Colleges, and in fact a former president of the Norwegian Surgical Society, professor Carl Semb, was a founding member of the College. Haffner participated in the College Board meetings over a period of two years, and reported back to the Society. The College’s main activity was to provide aid to establish surgical activities in developing countries, and since this was far more efficiently done by other international organisations, it was decided to terminate the membership in 1986.

Since 1997, after a visit by surgeons from The British College of Surgeons to the annual meeting, there have been several informal common meetings about surgical education. Knut Kvernebo has been especially active in this work.

Since 1984 The Norwegian Society has been represented by the chairman and/or by specially appointed representatives in Eurosurgery and later in UEMS. These organisations have worked to harmonise the education of specialists in Europe. The representatives in UEMS since 2002 have been Hans Petter Næss, Torgeir Løvig and Tom Glomsaker. The different fields of surgery in Europe have been reorganised into a federation since 2005, the same model as The Norwegian Surgical Society chose in 1997.

The Court of Arms

The court of arms of The Norwegian Surgical Society consists of a map of Norway and a surgical scalpel with the name of the society in Norwegian (Norsk Kirurgisk Forening) and the year the society was founded (1911)



Fig 5-3. “Kirurgen” number 1, 1997 and number 1, 2009

encircling the symbol. It was designed by Haffner based on idea from Liv Slungaard, daughter of Ulf Slungaard, and introduced at the 75-year jubilee in 1986.

The Norwegian Surgical Journal, “Kirurgen”

The journal “Kirurgen” (Fig 3) was started in 1997. Initially the Board used the journal for information, and to stimulate discussions within The Society. One to two issues were published a year until 2007, after which the publication frequency increased to four issues. Articles on research, development of surgical techniques and introduction of surgical procedures in Norwegian hospitals have been added. Kirsten Krogh-Sørensen was editor in 2000, she was succeeded by Lars Vasli in 2002, Bård Røsok in 2006, and Hans Skari in 2010. Since 1997 a co-editor has been appointed for minimally invasive surgery. The present leader of the Norwegian Surgical Association Olaug Villanger had the position from 2007–2010, and Andres Debes has had it from 2011.

A separate Internet version of the journal was established in 2000 (www.Kirurgen.no). The Internet edition has had a separate editor since 2007: Jon Helge Angelsen, and from 2010 Bård Røsok.

Other Publications

Vitenskapelige Forhandlinger (programme and abstracts from the scientific proceedings) has been published separately since 1970 (see next page: Scientific Activity).

Since 1985 the **Annual Reports** from the Board and the other permanent committees have been presented in a special booklet that is sent to all members of The Society along with *Vitenskapelige Forhandlinger*.

In 1979 NMA published a “**General Plan for Surgery in Norway**”, as the surgical part of a complete review of the Health Services. Kaare Solheim was the chairman for the committee that produced the report.

“**Guidelines for physicians serving as legal experts**” were issued in 1994 in cooperation with the national societies for anesthesiologists, pediatricians and gynaecologist.

Members of the board have also participated in a committee appointed by the NMA defining and publishing “**Standard for Intensive Care Medicine**” (NMA 1997). Among other topics the publication clarify tasks and responsibilities of involved professionals, and recommends how to organise and chair ICUs in Norway.

The Society regularly arranges debates on structure and leadership in surgery. Leading international colleagues have often been participating. A summary of these debates and a seminar arranged by the Board two pamphlets were printed in 2000.

“**Management of Surgical Activity**”. This pamphlet expresses The Society’s views on the tasks and responsibilities of a chairman of a surgical unit.

“**Clinical Leadership**” focused on how to run a unit, including a review of rules and regulations.

The Scientific Activity

Reports of the scientific proceedings are available back to 1925. Initially, the programme and abstracts were presented in *Nordisk Medicin* (A joint Nordic medical journal, written in the Scandinavian languages 1939–1998). In the seventies they were printed separately and sent to the members after the meeting. Since Jon Haffner reorganised the scientific meeting and the book of abstracts in 1980, a complete programme for the surgical week including all

abstracts of the free presentations has been printed and distributed to all members one or two weeks in advance of the annual meeting (*Vitenskapelige Forhandlinger*).

The scientific activity has expanded since 1924, and especially in the eighties and nineties. The structure of the meeting was altered in 1980, with increased focus on free presentations (seven minutes for presentation, five minutes for discussion), and gradually the subspecialty organisations have taken care of targeted symposiums and the arrangement of free lectures. The overall activity, reflected by the amount of free lectures, has increased from one year to another, and the scientific quality has improved.

The development of the free presentations from 1980 to 2007 (when The Orthopaedic Society decided to have a separate meeting) is shown in Table 5–4. The total number increased from 140 to 433. The increase was greatest in orthopedics and surgical gastroenterology, but was seen in nearly all the surgical specialties and subspecialties.

The number and increased quality of the abstract have been reflected in an increasing size in the annual book of abstracts (Fig 2.) In 2009, there were only 245 free presentations, as the orthopedic surgeons and the neurosurgeons did not participate in the common meeting.

Employment and Working Conditions

Discontent with surgeons pay and working conditions were the main reasons for the foundation, and have been main issues for The Society, but all negotiations have been carried out through the framework of NMA.

The Number of Hospital Posts

During the seventies there was an obvious discrepancy between time limited (training) and permanent (specialist) employments. In 1977 The Society passed a resolution asking The Norwegian Medical Association to start negotiations to change the proportions of time limited (training) and permanent (specialist) posts. The negotiations went on for years, and changes were not completed until the mid 1990ies (see also chapter: Surgical specialisation).

Wages and Working Hours

Working hours in hospital departments have changed dramatically during the last 100 years. A registration in the

early 1930ies showed that junior hospital doctors worked on average 58.7 hours a week, and in addition they spent many hours a week “resting” in the hospitals when they were “on call”.

In 1936 a new law was passed to reduce maximum working hours per week and maximum hours overtime. The law was formally applied in Norwegian hospitals from 1939. In most hospitals it has not been possible to practice this, and NMA has negotiated national exemptions for doctors, allowing them to work 10–15 hours a week more than the general maximum.

Up to 1940 each individual surgeon negotiated his wages and working conditions with the hospital. Since 1946 there have been regular negotiations between The Government and NMA about wages and working conditions, and since 1950 special additions to the ordinary wages have been given for on call duties. There are now no special conditions for surgeons compared with other hospital doctors.

In 1993 new regulations were again passed, but NMA again negotiated special exemptions for doctors. The latest development dates back to a EU ruling in 2001, reducing doctors' maximum weekly working hours to 58 from August 2004, and 48 hours from 2009. Moreover, working hours were defined as “Hours in the service of the employer”, this meant that every resting hour “on call” were counted in full, and not as previously in Norway as 1/3 if on call in a hospital, and 1/4 if at home.

The working conditions from EU have now been adopted in Norway; and the registration of working hours has become more exact.

Leadership in Surgical Hospital Units

When the hospitals were divided into separate departments for different medical specialties, it was taken for granted that the head of the department should be one of the specialists. As the units grew in size with more employees of different kinds and economic responsibility was transferred from hospital to departments, this view was questioned with increasing frequency by the hospital authorities.

Surgical units are now run not only by surgeons, but also by other medical specialists, nurses and economists, since the administrative duties have become so time consuming that they are difficult to combine with ordinary surgical activities. The change has not occurred without struggle, NMA, The Society and the other specialist societies have protested, and pointed out that if the head of the department is not a surgical specialist, a surgeon in the staff has to take medical responsibility, and there will then in fact be two leaders in such hospital units.

International cooperation in Training of Surgeons

The framework for training of surgeons has changed considerably over the last two decades. Surgery and surgeons have changed, and society and patients have higher expectations than ever of the skills of the surgeon and results of surgery. One dilemma is that on one hand an increasing documentation shows that “practice makes perfect” and that numbers of performed operations are important for improving skills, but on the other hand working hours are reduced. In addition there are increasing demands on young surgeons to spend time on information and documentation.

The British have had a systematic approach to create a more efficient system of education by creating “Schools of Surgery”. The Norwegian Surgical Society has been working to get recognition for a similar strategy in Norway.

The capacity for developing professional courses is limited, and The Norwegian Surgical Society has therefore used its network with international sister organisations with an aim to adapt international training courses:

- The American College of Surgeons has since 1978 arranged “Advanced Trauma Life Support, ATLS”, a course concept that teaches a systematic, concise approach to the early care of the trauma patient. This course provides a common language that can save lives in critical situations. The Society has adapted this course in Norway. The first course was held in 2004 with support from The Norwegian Air Ambulance Foundation and in cooperation with the Norwegian Society of Anesthesiology. Up to now more than 40 courses have been held and more than 600 surgeons and anesthesiologists have participated.
- A “Basic surgical skills course” has been developed by the Royal College of Surgeons of England. The aim is

Table 5-4. Free Presentations, Symposia and Courses at The Annual Meeting

Subspecialty / Specialty	1980	1985	1990	1995	2000	2005	2010
Gastrointestinal surgery	33	39	44	55	61	97	79
Thoracic – Pulmonary	6	8	3	2	6	8	7
Thoracic – Cardiac	1	7	16	17	9	18	16
Vascular	14	21	17	26	28	25	21
Urological	26	30	33	40	34	37	51
B + E: Endocrine	2	2	2	2	5	2	9
B + E: Breast	6	9	3	4	8	10	8
Experimental*	2		10		8		
Miscellaneous*		5	6	11	2	19	
Orthopedic	41	39	51	88	113	148	
Neurosurgery		7	9	19	20	27	
Plastic	9	8	15	12	9	37	35
Maxillofacial			4	3	6	5	14
Total no of presentations	140	175	213	279	309	433	
* A few other may have been included in the presentations from the most relevant branch of surgery							
Symposia/ Debates	1		4	19	18	21	
Postgraduate courses	2		2	7	2	6	



Fig 5-4. Scientific Proceedings (Vitenskapelige Forhandlinger) from 1971–2009



Fig5-5. The present leader of the Association, Olaug Villanger. Photo Bård Røsok. Courtesy RH, Section for Photo and Visual Presentation

to instil core surgical skills at the very start of a surgeon's training by teaching the correct basic techniques used in surgery such as handling instruments, tying knots, wound management, drainage of abscess and handling a variety of tissues including skin, bowel, arteries and tendon. The Society introduced this course concept to Norway in 2008 in cooperation with Ullevål (responsible Jorunn Skattum/Tina Gaarder), and it is the plan to expand the number of courses to all four.

Quality Assurance

The Society has always been engaged in the quality of surgery, in many respects.

Since the early seventies most surgical departments have developed written guidelines for treatment, and this is now legally required.

National Guidelines for Treatment have been established for most types of cancer. The Society has been engaged in this work to varying degrees during the last 30 years.

In 1986, an investigation by questionnaire carried out by The Society confirmed that nearly all surgical chiefs felt that they did not have the necessary competence to be responsible for gynecology and obstetrics, nor the competence to be on call for emergencies related to that specialty. A delegation was sent to the Director of Health, and he supported The Society's request, that no surgeons should be given the responsibility for obstetrics. Regrettably this has been difficult to ensure, as it has meant that the maternity services in several small hospitals have had to be closed, which has been a politically difficult process.

The same year Steffen Birkeland concluded the important task carried out on behalf of the Society, of adapting the International Codes of Disease (ICD9) to suit Norwegian hospital services, which facilitated comparison of practices in different hospitals.

Around 1990, Quality Assurance became a hot topic, both internationally and in Norway.

NMA started a separate fund for Quality improvements, and in 1993 The Directorate of Health produced a report

on volume and quality written by a committee headed by the oncologist Stener Kvinnsland. Two surgeons: Odd Søreide and Torbjørn Kufaaas were members of the committee. The report concluded that there was a clear relationship between the number of patients treated and the results obtained; increasing volume gave increasing quality. But this started a heated discussion about what should be included in the volume, and whether the results should be applied to hospital departments or individual surgeons. The discussion continues even today.

National quality registers have been established in a lot of surgical subspecialties during the last twenty years, many of them initiated by dedicated surgical leaders in cooperation with their respective societies and the Department of Health.

The Department of Health introduced National Criteria for Hospital Quality in 2003. Most of the indicators reflect criteria of structure and process, and very few tell anything about results of medical treatment. To have a complete quality system we must in addition to National

Quality Indicators focus on structure and process, and have a national medical quality register with accept among medical doctors, which can come up with the results of medical care. Endeavour towards quality measuring is an important challenge for The Norwegian Surgical Society.

In 2009 a symposium on “Safe Surgery” was arranged at the annual meeting. This procedure, which is part of WHO’s work to improve the quality of surgery, will probably be implemented in all Norwegian hospitals in the near future.

An important aim for The Society is to secure the quality of surgical services in Norway, which can only be developed through focus on education and scientific work in an organisation led by the surgeons themselves. The Society wants to serve as a tool for the Norwegian population for implementing safe and cost-effective surgery.

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General Surgery

– What remains in the Main Specialty?

6. **General Surgery in Norway 1900–1986**
Jon Anton Johnson
7. **Traumatology**
Johan Pillgram-Larsen
8. **Surgical Oncology**
Karl-Erik Giercksky
9. **The Intervention Centre at Oslo University Hospital**
Erik Fosse



6. General Surgery in Norway 1900–1986

Jon Anton Johnson 1986 (edited by Jon Haffner 2010)

Operative and other instrumental therapeutic activity through most of the previous century comprised lipomas, atheromas, minor plastic surgery, herniotomies and operations for hydrocele, ovarian cysts, embryotomy for lacking progress, limb-amputations, some ophthalmological and oto-rhinological procedures and a considerable clientele with acute or chronic, often severe soft tissue infections and osteomyelitis. Luxations and fractures were treated with closed methods. In 1847, five hundred patients were admitted in the Department of Surgery at Rikshospitalet. Twentyfive operations were performed, and 13 of the admitted patients died. In 1870 144 operations were done, including an amputation for a limb sarcoma. Thirty-five patients died.

Surgery in Norway from 1900 to 1940

At the beginning of this century smaller specialties were separated at the largest hospitals, but were still, in sparsely populated territories, taken care of by the general surgeon, and the Medical Officer of Health, who at that time often possessed considerable surgical skill.

The spectrum of general surgery gradually included appendectomies, radical operations for hernia, enterostomies and intestinal resections in stages for obstruction. Colorectal cancer was treated with resection and amputation, respectively. The low anterior resection for rectal cancer was gaining attention. Cholecystotomy was replaced by

cholecystectomy. Gastrojejunostomy and gradually gastric resections were taken in use for peptic ulcer and cancer. In 1919 Axel Christensen presented a case of total gastrectomy for cancer.

Urinary stones were removed by operation and Freyer's suprapubic enucleation of prostatic adenoma in two stages replaced permanent drainage of the bladder with catheter. In the 30ies the first urologist in Norway, Stein F Holst, introduced the transurethral resection of the prostate.

Ulfred Lied, Drammen Hospital, got international reputation for his operative treatment of goiter and thyreotoxicosis ten years before the introduction of preoperative iodine treatment (Nordic Congress of Surgery, Copenhagen 1913).

Surgery of the tendons with suture of ruptures, plastic procedures and transpositions got started. Shaft fractures were reduced operatively and fixed with Lane's plate. The three-winged nail was introduced by the Norwegian-American surgeon Marius Smith-Petersen in 1925, and a cannulated model by the Swedish surgeon Sven Johanson in 1932. This was the start of modern operative treatment of fractures of the neck of the femur.

The internists' pneumothorax for pulmonary tuberculosis got a surgical supplement in total extra fascial thoracoplasty, which was practiced in Norway during World

War I by Peter Bull, and for a greater part performed in local anesthesia at the sanatoria for tuberculosis. In the early 1930ies Johan C Holst at Rikshospitalet, and Carl B Semb at Ullevål, changed the method into selective extrapleural (1930) or extra fascial (1933) apicolysis with a thoracoplasty over the collapsed top of the lung. The treatment was performed and followed systematically and led to the publication of extensive valuable series. Holst and Leif Efskind also practiced segmental pulmonary resections of tubercular foci. Semb and Ragnar Ingebrigtsen, Rikshospitalet, independently started operative treatment of lumbar disk herniation.

Semb and Kristian Kristiansen prepared the ground for operative treatment of severe cranio-vertebral injuries and Ingebrigtsen started elective cranio-cerebral surgery. Bone tuberculosis was mainly treated conservatively with attempts to improve the general health of the patients, and immobilisation, in smaller hospitals around the country.

Surgery after World War II

Just before, during and after World War II, antibiotics, transfusions of blood and plasma and modern anesthesiology (Otto Mollestad, Rikshospitalet, Ivar Lund, Ullevål) came into regular use. The significance of pneumonia was reduced, and the life threatening and disabling pyogenic soft tissue infections, and acute and chronic cases of osteomyelitis almost disappeared. The high mortality of appendicitis dropped. Forces were released and the ground prepared for innovations.

Semb and co-workers extended the field of operative fracture treatment. Semb demanded correct timing of the operation, anatomic access and gentle handling of the tissues, exact operative reduction, firm internal fixation and early active exercises, including fractured joints, but without weight bearing. Semb made Ullevål a centre for the treatment of coxarthrosis with Smith-Petersen's vitallium mould-arthroplasty. The treatment was carried through and followed up with Semb's characteristic consistency. The alternative method was arthrodesis of the hip joint with Ivar Alvik, Sophies Minde in front.

In the 1950ies acute and re-constructive hand surgery received increased attention. Later rheumasurgery was established at Oslo Sanitetsforenings Revmatismehospital

(OSR) (Jan Pahle) and gradually taken up by the orthopedic surgeons throughout the country. After a less successful interregnum with Judet's hip prosthesis, the mould-arthroplasty and the arthrodesis was replaced by the so called total hip prosthesis, which radically shortened the period of convalescence. Treatment of fractures, which had been part of the field of general surgery, was transferred to the orthopedic surgeons, who enthusiastically accepted new sophisticated improved methods of internal fixations from the Continent. This led to rougher operative indications, and neglect of soft tissues, with significant ill effects, which restored the respect for Semb's principles. In the later years Hoffman's device for external immobilisation of unstable fractures and comminuted fractures of the limb with severe soft tissue damage, has been much used in Norway.

The first 10 to 15 years after the war, anti-tubercular drugs in combination with surgical treatment contributed to the cure of tubercular manifestations in the bones, lungs, and urinary tract. Semb developed a technique for segmental resection of the kidney and made Ullevål a centre also for treatment of renal tuberculosis. Norwegian radiology kept up with the development of angiography and vascular surgery, and vascular surgery was started at Ullevål (Semb, Frank Bergan, Sverre Vasli) and Rikshospitalet (Leiv Efskind, Karl Victor Hall), and regulations were outlined for the establishment of vascular surgery all over the country.

The internist Fredrik Kiil, at Ullevål, was a pioneer in the development of hemodialysis which was organised at Ullevål, Rikshospitalet, and Haukeland, around 1960.

A few years later the first kidney transplantations were done at Ullevål, and in 1969 at Rikshospitalet. Audun Flatmark made the first move towards a Nordic and North European donor organisation in order to organise the supply of tissue-compatible necro-kidneys, simultaneous with the foundation of The Laboratory for Tissue Typing at Rikshospitalet under the management of Erik Thorsby. Rikshospitalet now (in 1985) transplants approximately 100 kidneys yearly. The transplantation activity has grown parallel with the service of hemodialysis in the country. Almost 100% of all chronically dialysed patients are offered transplantation. Flatmark has on a large scale carried out operative treatment of kidney stones and other renal conditions on extirpated and preserved

kidneys with subsequent autotransplantation. He has also taken up transplantation of the liver and the pancreas. In the 1950ies Flatmark's predecessor Bjarne Fretheim prepared the ground for a neonatal surgical unit, which has been developed further to international reputation by Ola Knutrud.

Gastric resections, usually *ad modum* Billroth II, dominated the surgical treatment of peptic ulcer the first 25 years after the war. From the end of the 1960ies vagotomy gained ground. Proximal gastric vagotomy is at present (1985) the most used operative method for duodenal and pyloric ulcer, and Billroth I resection for gastric ulcer, although proximal gastric vagotomy, in combination with ulcer excision, is now gaining ground also for gastric ulcer. The introduction of histamine-inhibitors has limited the surgical treatment of peptic ulcer, particularly in duodenum and the pyloric region.

In the 1950ies Johan Hertzberg published a series of patients with pancreatic cancer treated at Ullevål after Whipple's method with removal of the pancreatic head and duodenum, with good primary results which attracted international attention. Simultaneous with repeated discussions of the justification of resectional treatment for periampullary cancers, the operative mortality and morbidity decreased to acceptable levels, and the increased occurrence of pancreatitis in Norway has also stimulated the interest in pancreatic surgery.

Resectional treatment for colonic diverticulitis has been used increasingly, with two stages in the acute state. Proctocolectomy with ileostomy for ulcerative colitis was started in the 1950ies and has gradually become common. Kock's continent ileostomy has not been much used in Norway. In the later years Rikshospitalet and Tromsø have adopted continent ileo-anal anastomosis with encouraging results.

Hepatic resections are now (1985) done for traumatic rupture, primary tumours and metastases in connection with second-look operations for colorectal cancer. Resectional treatment for oesophageal cancer through separate abdominal and thoracic incisions with gastroesophagostomy, is used for cure and for palliation. In 1977 Karl-Erik Giercksky, Tromsø, launched short term chemo-therapeutic prophylaxis in abdominal operations, and organised a nationwide test of the method, which

documented a drastic fall in the rate of wound sepsis, particularly after colonic procedures.

Gastroenteroscopy with flexible fiberoptic instruments was introduced in Norway by the internist Johannes Myren at Ullevål, during the 1960ies. The method had originally mostly diagnostic value, but has got therapeutic significance with time, and will after all means be developed further, also for recording physiological parameters in the gastrointestinal tract. This innovation has contributed greatly to closer cooperation between internal medicine and surgery in Norway.

After the decline of pulmonary tuberculosis during the 1950ies, the increasing occurrence of bronchial cancer became the main field of the pulmonary surgeons. Open heart surgery was started in the 1960ies at Rikshospitalet (Efskind, Hall), somewhat later at Ullevål. After the break-through of operations for coronary failure, open-heart surgery was established also in Bergen, Tromsø and Trondheim. Rikshospitalet has started heart transplantation (Tor Frøysaker, 1983) and is the centre for organ transplantation in Norway.

Surgical Specialisation

Gradually general surgery peeled off lesser fields which were established as independent specialties. Ophthalmology at Rikshospitalet got its own management in 1873, its own ward in the department of surgery in 1887, and a separate department in a new building in 1915. A similar development occurred for ear-nose-and-throat.

Gynecology and obstetrics was split off into separate departments at the largest hospitals, with their own heads of departments, and to some extent separate units were also established in smaller and medium sized hospitals, where they gradually developed full autonomy. The separation of plastic surgery, neurosurgery and neonatal surgery came later. The remaining general surgery has to an increasing degree, mainly been a basis for further subspecialisations.

The first subspecialty was urology. After an interlude as a separate field, the orthopedic surgery was brought back to general surgery as a subspecialty in 1977. The thoracic surgery comprises two "profiles", one for heart, lungs and vessels, one for lungs and vessels.

After the establishment of gastrointestinal surgery as a subspecialty in 1978 it is natural to regard the general surgery as an instrument against professional fragmentation, and a basis for further training towards a subspecialty, providing competence for general on-call duty, and possibly other professional profiles. At least five years residency, including two years at a university clinic and a documented amount of operative experience is required for the general specialty. Subspecialties require an additional three years with further documented operative experience which, with few exceptions, can only be gained in the university hospitals.

The ordinary surgical emergency team in the larger hospitals consists of two residents on duty for the whole department and one consultant on call for each subspecialty. The general surgeons and the subspecialists take care of parts of the plastic surgery, neurosurgery and neonatal surgery in places where these specialties are still not established.

Hospital Structure

Like the central hospitals, the other institutions around the country developed from small wards into “mixed hospitals” with surgery, internal medicine and radiology. Further differentiation occurred in the 1930ies. It accelerated after World War II and has progressed to our days. The national hospital structure has changed from independent hospitals, through a period based on the counties (fylker), with one central and several local hospitals in each county, into a regional system with five largely self-supporting health regions with a regional hospital as centre, university clinic and professional source of power.

Medical Laboratories

The establishment of medical laboratories has been of particular significance for the development and differentiation of surgery. The most important have been: the laboratories for immune haematology with blood banks, The Laboratory of Tissue Typing at Rikshospitalet, The Institute of Respiratory Physiology (and the professorship of surgical pathophysiology for Ole Jacob Malm at Ullevål, both on the initiative of Semb in the 1950ies), The Laboratory of Biomechanics of Sophies Minde, the hormone laboratories at Aker and Haukeland, and the

physical medical units. The inclusion of oncological units in the regional hospitals outside Oslo represents a unique opportunity for Norway to combine pharmacological and radiological cancer treatment with advanced diagnostics and surgery.

Surgical Research

Surgical research has developed from occasional casuistic communications, along systematic preparations of more or less prospective clinical series, and sporadic experimental works from departments of pathology, mainly at the university hospitals in Oslo. The establishment of the para-surgical functions mentioned above stimulated surgical research. In the 1950ies came The Institute for Experimental Medical Research at Ullevål on the initiative of Semb with economic support from Anders Jahre (a very wealthy ship owner). In the 1960ies Efskind and Fretheim initiated The Institute of Surgical Research at Rikshospitalet, which under the management of Egil Amundsen since 1966, has offered scientific working conditions, and supervision to a great number of surgeons, and contributed to an academic elevation of Norwegian surgery. Later corresponding laboratories and activities have been established at the University Clinics in Bergen in 1972 and Tromsø in 1979.

Norwegian Surgery as I see it in 1986

Even if the specialisation, the scientific activities and the supporting professions have kept Norwegian surgery reasonably up to date, the picture nevertheless shows disturbing features which were not present in earlier years. Until World War II the surgeon in charge was a dominating professional and administrative figure in Norwegian hospitals. He ruled his department with low expenses and great efficiency. In spite of gradual loss of influence after World War II he maintained a fair administrative drive through the 1960ies. However the overwhelming extension of personnel, the protective laws of employees, and the rigid rules of professional associations loosened the surgeons grip of the departments in the 1970ies. The reluctance of nurses to fight difficulties with professional flexibility, and the demonstrative independence of the anesthesiologists, a boomerang effect of earlier surgical condescension, have disturbed the co-ordination of the surgical anesthesiological complex. The results are high

expenses, failing efficiency, and growing waiting lists. The management of departments of surgery has become a grey, frustrating and unattractive job. There is only one solution to the problem. The surgeon has to go wholeheartedly into management, demand authority to execute superior coordination of the total complex, and bring the department of surgery out of the mess.

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7. Traumatology

Johan Pillgram-Larsen

The Evolution of Traumatology

Traumatology was traditionally fracture treatment. Today traumatology comprises the total care of the injured from the site of the accident through admission, diagnostics, operation, intensive care and rehabilitation. The complexity of injuries and the pathophysiological disturbances necessitates the participation of many different specialists. Traumatology is now the arena for multidisciplinary cooperation, between different surgical specialties and between surgery and other professions.

Traumatology is not a separate medical specialty in Norway. Operative repair is frequently necessary in treatment of the injured. General surgery is therefore the basic specialty in the treatment of trauma patients in our country.

The Initial Treatment

The initial treatment focuses on oxygen transport by keeping a free airway, keeping up the hemoglobin value and securing adequate circulation. Anesthesiologists have therefore become essential partners in initial trauma care. Stopping bleeding normally requires the participation of surgeons. Several surgeons have been pushing for better trauma care at the place of accident. It has been a development with trial and errors. The doctor-staffed ambulances improved survival in cardiac patients. The concept of moving the hospital out to the patient was not so successful in trauma, where only the most needed stabilisation should be undertaken before rapid transport to a surgical facility.

Non-Operative Treatment

Injuries and ongoing bleeding can be estimated by CT and angiography, the development can be followed by repeated examinations.

Haemostasis was for a long time the realm of surgery alone. But interventional radiology has revolutionised traumatology. Almost all named arteries can now be reached percutaneously and most bleedings can be embolised. The surgeon's task is clinical monitoring and open revision if embolisation fails. This leads to a decrease in operations, and the training and routines suffer, not only for the surgeon, but also for the surgical team.

An example is traumatic rupture of the thoracic aorta. It was common wisdom that this had to be repaired as soon as possible after admission to prevent free rupture and exsanguination. It was a challenging, lifesaving operation. Now blood pressure is kept low, and the patient is stentgrafted the next morning. The surgeon assists with vascular access. A risky operation, with high morbidity that was a heavy burden on the intensive care resources, has become a subcutaneous intervention.

The parenchymal organs, when bleeding, were traditionally operated upon and sutured. It is now known that they may be left un-operated if the patient is stable; only unstable patients with ongoing hemorrhage need to be operated. This is independent of the extent of the injury

and the amount of blood in the abdomen seen on CT. Many surgeons remember attempts to suture a ruptured liver, with ghastly blood loss and “mors in tabula” in the end; the “wet clog cases”. It has been a revelation to see that these cases can be packed with operative removal of the packing after two days, combined with repair of concomitant intestinal injuries. Extraperitoneal packing of pelvic bleeding that cannot be controlled by compression has been advocated by Olav Røise, and the method was evaluated by Anna Tötterman in 2007.

The non-operative treatment of parenchymal injuries followed organ preserving surgery. Spleen salvaging procedures, particularly in children, were introduced in the 1970ies to prevent post-splenectomy sepsis. Kaare Solheim was a strong advocate for such procedures. Some surgeons still oppose this, and non-operative treatment. To lose a patient because of a ruptured spleen that easily can be taken out, is unforgivable. The monitoring of these patients must be thorough and done by experienced surgeons who can intervene in time. This approach, combined with repeated CT examinations has made non-operative treatment safe. Christine Gaarder and Pål Aksel Næss have introduced updated protocols for the treatment of liver- and spleen injuries based on their own research.

Diagnostic Delay

The CT-machines, which are now found in all hospitals, were introduced in Norway in the 1980ies. CT has high

accuracy in diagnosing injuries, but also represents a danger. The scanning itself is quick, but the time spent in the CT-lab, with suboptimal monitoring and inadequate treatment possibilities, is considerable. Only the stable patient should undergo CT. It is controversial whether smaller hospitals should do CT to diagnose injuries they do not have the capacity to treat. The CT may save transports, but may as well cause delay in the treatment.

It is well documented that if surgery is delayed more than two hours from the accident, the mortality will increase. NATO has adjusted the recommendations for time spent before surgery, based on the experiences in the wars in Afghanistan and Iraq. A medic should treat the patient within 15 minutes. Adequate transport with a physician or advanced rescuer, should be on the site within an hour. That will in most cases mean a helicopter. The patients should be in a forward surgical unit ready for operation within two hours.

But two hours pass quickly. Solheim and Pillgram-Larsen emphasised this in 1991 in cases with suspected traumatic aortic rupture. This injury can be suspected from a chest x-ray, and also the mechanism of injury. CT is time wasted when you are not able to treat and have to send the patient.

The new radiological techniques are partly taking over procedures done by the surgeon, but do not alleviate the



Fig 7-1 From the 1980ies, aggressive haemostatic emergency surgery in the trauma bay. Photo Johan Pillgram-Larsen

need for clinical judgment and surgical decision-making. This necessitates understanding of the advantages and of the limitations of the imaging and therapeutic procedures both by surgeons, anesthesiologists and radiologists.

The pathophysiological changes will still threaten the patient as time passes after injury. The surgeons have, to the best interest of their patients, left parts of the treatment based on the pathophysiology in trauma to anesthesiologists. As consequence, most surgeons have lost some knowledge related to this part of the treatment. Common trauma rounds, trauma meetings and trauma courses are important to convey a common understanding.

Quality Assurance in Trauma

The first step in monitoring results in trauma care is registration of outcome. Outcome must be related to risk factors. The severity of the trauma is the basis.

Olav Bø presented his doctoral thesis “Road casualties” in 1972. This work is valuable for planning prophylactic measures. Bø graded the severity of injuries by the length of the hospital stay and the length of the sick leave. This was common at that time, but is useless for prognostics.

Børge Ytterstad in Harstad has administered an extensive trauma registry since 1985. It has served as a basis for trauma preventive interventions locally with documented decrease in injuries. This work has gained international approval through WHO (1).

In 1971 The Association for Automotive Medicine in USA developed the Abbreviated Injury Score (AIS) for individual injuries, and the Injury Severity Score (ISS) for the overall anatomical injury severity. This was done on request from American traffic police. It has become “the language of trauma” and has been revised repeatedly. It has been combined with the grading of the physiological status of the patient,



Fig 7-2 In the 1990ies, a shift in trauma paradigm, embolisation of acute traumatic haemorrhage in the radiology department. Photo Johan Pillgram-Larsen

the Revised Trauma Score, and is the basis for modern prognostics, the TRISS-methodology (Trauma Injury Severity Score), which can compute the probability of survival. Due to different patient populations and to different ways of recording physiological data, the method has its shortcomings. Comparisons between different countries may not give the correct conclusions. But the method is more useful than mere assumptions. When used uniformly it can monitor the quality in a hospital or a region over time.

Inggard Lereim was the first professor in traumatology in Norway, in Trondheim. He has done extensive works on the epidemic of trauma, particularly on traffic accidents and their prevention. He utilised in his registry the modern systems of prognostics with trauma grading. He mentored Ylva Sahlin, who presented the first modern doctoral thesis in traumatology in Norway, focusing on injury severity registration as a basis for the evaluation of interventions.

A small trauma registry containing severely injured patients admitted to Ullevål was administered by Pillgram-Larsen in the 1990ies and was the basis for prognostic studies. From 2001 this has been reactivated by the trauma anesthesiologists Nils Oddvar Skaga and Torsten Eken. Two trauma nurses run a comprehensive registry that supports several in-depth studies.

In 2005 Kari Schröder Hansen presented her thesis, an epidemiological work on trauma in Haukeland. She has been active in establishing Haukeland as a trauma center after modern principles and a basis for the BEST-courses and ATLS courses in Bergen.

Later, in 2007, Gaarder defended her thesis on education and protocols in abdominal trauma. She is now the director of the Trauma Department at Ullevål.



Fig 7-3 A modern trauma admitting area for three patients, Ullevål 1995. Photo Johan Pillgram-Larsen

Trauma Education

Formalised education started out as technical courses. Later pathophysiology and a systematic approach has become the educational aim. In modern traumatology the surgeon initially “treats the physiology, not the anatomy”. American influence has been very important in this respect.

Course in Fracture Treatment, “Vossa-Course”

In 1970 Arne Haukebø started a national practical course in operative fracture treatment on an initiative from Johan Hertzberg. From 1972 it was arranged in Voss under the leadership of Hans K Dahl, Arne Haukebø and Einar Sudmann. At that time, general surgeons provided acute fracture treatment in most hospitals, and orthopedic surgery was incorporated in the departments of general surgery. In the Vossa-course the participants trained on cadaver bones. The course was popular among all surgeons interested in trauma, and it was a compulsory part of specialist education in general surgery from 1972 to 2008.

It is now a compulsory basic course for the orthopedic surgeons in training, but open for general surgeons.

The Course in Pre- Per- and Postoperative Treatment, “PPP-kurset”

To prepare surgeons in pathophysiology Ole Jacob Malm initiated a course in pre- per- and postoperative treatment in 1969. Steffen Birkeland led the course from 1973 to 1983, Morten Ræder from 1984 to 2009 and now Egil Johnson. This course is important for all types of surgery and for trauma care. It is compulsory for surgeons, but open for candidates to all medical specialties.

ATLS (Advanced Trauma Life Support)

This course concept, developed by the American College of Surgeons in 1980, is training in systematic examination and prioritising to support the patient’s life functions. It is tailored for the small hospital and the lone doctor with few resources. It was arranged for the first time in Bergen

in 2004. The course is designed for all doctors that meet the trauma patient. The ATLS-organisation demands that the concept must be followed strictly, and that a national surgical association must be responsible for the course. The Norwegian Surgical Society has accepted this responsibility. The Norwegian Air Ambulance Company supports the course with the administrative work. Røise is the first national director in Norway.

Long before the ATLS-course was introduced in Norway, at the beginning of the 1990ies, Solheim and Pillgram-Larsen had arranged theoretical courses in initial trauma care (Ullevål Trauma Course). The principles of ATLS were emphasised, but without the formal, American structure. These courses were open to both nurses and doctors.

The nurses now have their own trauma courses, among them Advanced Trauma Care for Nurses, ATCN (available in Sweden) and Trauma Nursing Care Course (TNCC). These courses contain the same theoretical elements as the ATLS-course and give doctors and nurses a common basis for the teamwork around the injured patient.

BEST (Better Systematic Treatment of Traumatised Patients)

The BEST-courses developed from 1997 in the surgical and anesthesiology milieu in Bergen (Schröder Hansen, Guttorm Brattebø) and several small hospitals (2). Of these the two most engaged were Voss (Johannes Brattebø) and Hammerfest (Torben Wisborg). The BEST-courses are based on ATLS, but stresses team training. It uses a model with moulage¹ and training of the actual team in their own hospital setting. Video filming is used with debriefing after the sessions. This has developed into a non-profit organisation where most of the country's hospitals participate. National symposia are arranged with actual case discussion. BEST also arranges practical sessions with operative training on anaesthetised pigs for trauma teams coming from small hospitals, bringing their own instruments. This "Damage Control Course" is managed by Kari Schröder Hansen, Bergen, Per Einar Uggen, Trondheim og Svein Are Osbakk, Tromsø.

DSTC (Definitive Surgical Trauma Care)

ATLS is single man training. But what do you do when

you have established the priorities, and stabilised the patient as well as possible? Then surgery is needed and here another international course concept takes over. DSTC is owned by IATSIC, The International Association for Trauma and Surgical Intensive Care. It is the continuation of ATLS, a sort of advanced ATLS for surgeons. The course has theoretical and practical sessions. Norwegian instructors (Erik Fosse, Pillgram-Larsen) participated in the earliest courses in Sweden organised in Linköping by the Swedish professor Sten Lennquist. Later similar courses with an international faculty were arranged in Ullevål. This has developed into formalised DSTC-courses in Norway with Gaarder as the manager.

The War Surgery Course

Carl Fredrik Tidemann held the rank of major in the US Army. He went to Viet Nam during the war there, to study modern military medical services.

The Viet Nam War led to a shift in traumatology, both in pre-hospital service and in surgery. Rapid transport to surgery was the main issue. Helicopters were used extensively. The experiences from this war founded modern traumatology. Because of the large numbers of surgeons needed, even those who later became academic surgeons in USA had war experience. Trauma systems with specialised medics, trauma surgeons, and trauma centers evolved.

On Tidemann's initiative the War Surgery Course was started in the Norwegian Army's Medical Service in 1976, first at Camp Lahaugmoen, later it moved to Camp Sessvollmoen with the establishment of the joint medical services for all military branches in 2003. The course includes operative training on anaesthetised pigs with inflicted gunshot wounds.

The course was initially arranged for medical personnel mobilised in the reserve armed forces. The operations were done in hospital tents. This had its charm, but could be exhaustingly hot in sunny May, the traditional time for the course. At Camp Sessvollmoen there is a new surgery building with all veterinary facilities, a large operating room, a ballistics room, and training rooms for moulages. Civilian doctors take part, and from 2003 the course has been compulsory for the specialty in general surgery.

1) Moulage is the art of applying mock injuries for the purpose of training Emergency Response Teams and other medical and military personnel

Teamwork is stressed; military medics give first aid at the shooting range. All this is meant to compensate for the lack of experience with war injuries in Norway.

On the Job Training

Many hospitals have weekly trauma meetings where cases are discussed. In Ullevål a number of trauma admissions are video-taped and discussed with the team before the tape is erased. This is purely for educational purpose and not considered a part of patient documentation. This approach markedly shortens the learning curve for the trauma teams.

Organisational Development

All hospitals receiving emergencies also used to treat trauma patients. With the realisation that there is need for more than an able surgeon to make an efficient trauma system, all the large hospitals have become referral centers for trauma in their regions. As the largest hospital in the country, Ullevål has become the largest trauma center. The patient volume has given this hospital an opportunity for developing traumatology. This has been the result of a natural development, not centrally planned.

The progress has not been restricted to Ullevål, however. Enthusiasts in Tromsø, Trondheim, Bergen, and Stavanger have made also these hospitals into de facto trauma centers, with trauma teams composed of people on call in the different departments. The teams are activated when certain risk factors of severe injury are present. Trauma teams are now implemented in most hospitals. The BEST programme has been instrumental in this.

Military Surgeons since World War II.

Hippocrates is supposed to have said, and many after him, that he who wants to learn surgery should follow an army. This has also been of importance in Norway, and in this context it is natural to name some of the surgeons who have been of major importance for military surgery, and consequently traumatology, in Norway since World War II (3).

Several surgeons took part in the campaign in 1940. Experiences were made which later led to the formation of the Military Medical Services in London during the war.

Johan Holst (1892–1953), professor, Rikshospitalet, Surgery Department A, participated in the war in Finland from November 1939 to March 1940. He commanded the medical services during the campaign in 1940. He became Surgeon General in London in 1940 and 41–45.

Gunnar Johnson (1895–1957), the head of Oslo City Emergency Centre, had served in the Spanish civil war, the war in Finland, and the Norwegian campaign. He was Surgeon General in 1941.

Einar Schie (1902–77) was surgeon during the battle for Narvik. He left a valuable report on organisation and medical logistics in war.

Carl Semb (1895–1971) was professor and head of Surgical Department III in Ullevål. He participated in establishing a military medical service with the police troops in Sweden during the war. His parachute jump over Kau-tokeino in 1945 to help out after a mass casualty from an accident with a mine, is quite famous among surgeons. It was his first and only jump. He served as Surgeon General 1945–47. He was a surgeon with a large repertoire and also with great engagement in traumatology.

From 1951 to 1953 Norwegian surgeons were stationed at a forward field hospital in Korea organised by the Red Cross and The Defense Medical Services. This was a tent based, so called MASH (Mobile Army Surgical Hospital). It was a complete operative surgical hospital in a war zone. It was tied to a division in the American 8th Army. This endeavor produced Norwegian health care workers with war surgery experience, as for example Atle Berg, Bernhard Paus and Jan Pahle.

Later war surgical experience has been achieved in service with UN and The Red Cross. Military field hospitals have been in service in Gaza 1956–67, Congo 1960–63, Lebanon 1978–86, Iraq and later Kuwait 1991, Bosnia 2003–2006 and Afghanistan 2005– till now, and in Chad 2009–2010.

Trond Kluge (1935–85), professor in thoracic surgery in Tromsø, had wide experience from several of these missions. He was Surgeon General 1979–84.

Carl Fredrik Tidemann, general surgeon, the Army's chief



Fig 7-4 Kaare Solheim. Portrait by Hans Sæle. Courtesy Ullevål Hospital

consultant in surgery from 1975 and Surgeon General 1984–92, established a good relationship with leading trauma surgeons in the USA. On his initiative young surgeons were sent to major trauma centers in USA. The hope was that they should be available for the mobilisation army and act as lecturers and instructors.

Leif Rosen, vascular surgeon at Aker, was Surgeon General 2000–2009. He further strengthened the contacts with American trauma centers, particularly among the circles in The American Association for the Surgery of Trauma (AAST), the organisation behind The Journal of Trauma. Leif Rosen modernised the War Surgery Course together with Pillgram-Larsen to focus on teamwork and hemorrhagic emergency procedures. Rosen laid the basis for modern war surgery medicine in Norway. Tidemann and Pillgram-Larsen are honorary fellows of the AAST.

Some Achievements in Traumatology in Norway

In 1885 Axel Hermansen Cappelen (1858–1919) sutured a stab wound in the heart. He was the first in the world to operate on the beating heart (4). Regrettably the patient died from infection.

Carl Semb and co-workers extended the field of operative fracture treatment. Semb demanded correct timing of the operation, anatomic access and gentle handling of the

tissues, exact operative reduction, firm internal fixation and early active exercises, including fractured joints, but without weight bearing.

Kristian Kristiansen, professor of neurosurgery, was a pioneer in organisation of the treatment of head injuries. He showed in 1950 how modern examination methods and operative techniques could save lives and reduce sequelae. This was long before the age of CT.

Semb and Kristiansen prepared the ground for operative treatment of severe cranio-cerebral injuries. CT led to a new paradigm in trauma. It is now hardly justifiable to operate a brain injury without CT diagnosis.

Solheim was always interested in trauma, and when he worked as professor at Ullevål he was actively engaged in the organisation of traumatology in the hospital and frequently forwarded information about what he learned during his numerous visits to USA. He wrote more articles on trauma in the Journal of the Norwegian Medical Association than any other author. He urged hospital administrators and doctors to remember the need for knowledge in trauma treatment in all of Norway's small and large hospitals.

Antti Alho, professor of orthopedics at Haukeland and later at Ullevål, systematised the work in orthopedic trauma that had been started by Dahl and Haukebø. Alho had an inter-



Fig. 7-5 Modern acute traumatology, not a surgical one man show, a team approach. Photo Johan Pillgram-Larsen

est in disaster medicine and wrote a textbook on the subject with Tidemann and Peter Heimann as co-authors. In co-operation with Pål Benum and Norvald Langeland he also wrote a textbook on trauma surgery for medical students.

Birkeland realised that the American trauma center experiences ought to be implemented in Norway. His trauma committee in Ullevål was the first step. Through a careful and patient work he managed to get all different departments to agree on common guidelines for the initial trauma treatment. The term “The multi traumatised patients” was coined. There should be no sorting of patients on the street. All trauma patients in through the same door, a systematic first evaluation, similar resuscitative measures, and then the different specialists were to take over. In high-energy trauma, always look for a hidden injury, consider your trauma patient “multi traumatised” till proven otherwise.

The trauma-oriented anesthesiologists at Ullevål, Ivar Lund and Andreas Skulberg, supported Birkeland’s work, and as a medical student Jens Moe started up the manned ambulance in 1967. This service proved beneficial in cardiac arrests, but as stated above the concept of bringing the hospital out to the trauma patient has proven to be erroneous. As opposed to in 1968 we today prefer little intravenous fluid pre-hospitally and rapid transport to surgery. But all the same, the doctor staffed ambulance put

focus on traumatology. The routines have been changed. We still send out doctors by car or helicopter to the site of the accident, but this part of traumatology has been taken over by anesthesiologists.

A formalised education for those who were once called “ambulance drivers”, now paramedics, has been organised nationally. The first ambulance school was started in Oslo by Gunnar Støren, of the Oslo City Emergency Center, and Skulberg. They in person roamed the city with the ambulances.

Odd Geiran, later cardiothoracic surgeon and professor at Rikshospitalet, showed several initiatives in trauma organising, such as giving impetus to the creation of the physician manned ambulance. Together with Solheim he wrote the first guidelines for trauma admissions at Ullevål in 1972 with the slogan “First things first”. Later Birkeland’s trauma committee expanded this to a local “Trauma Manual” which has been repeatedly revised and printed since 1989, edited by Jan L Svennevig and Pillgram-Larsen, later Hans Erik Høgevold (5). This booklet was the first on the subject in a Scandinavian language, and gained popularity all over Scandinavia. Svennevig and Pillgram-Larsen served as trauma emissaries in Denmark and Sweden. It was an acknowledged fact that the modernisation of initial trauma care was more advanced in Norway than in the other Nordic countries in the 1980ies. This

was mainly because of the pre-hospital helicopter service and the initiatives from Ullevål.

Fosse, also cardiothoracic surgeon in Ullevål, later professor at the Intervention Centre at Rikshospitalet, took part in the early development in trauma. His doctoral thesis on cascade activation in trauma utilises the prognostics tools based on trauma registration. With his third world war zone experiences he has authored together with Hans Petter Husum the internationally recognised book “War Surgery” in 1995. The book was designed for poor countries, but is valued by many young surgeons in Norway. Fosse participated in the Israeli-Gaza war in 2009, and wrote a book about his experiences together with his co-worker in Gaza, Mads Gilbert, professor in anesthesiology in Tromsø.

Husum, Tromsø, has worked in war zones in the third world. His doctoral thesis, “Tracks of blood”, 2003, is partly on politics, partly personal impressions and partly scientific analyses of mine injuries and their treatment by local bare foot doctors in locally based trauma systems, “The Village University”.

The Future

In 2007, a national committee chaired by Røise delivered a report on how to organise a country-wide trauma system (6). Five trauma centers is suggested, with all other acute

hospitals being staffed to be able to perform damage control surgery before transfer. The levels of necessary competence in the different links in the chain of trauma care have been defined. The ideas have been endorsed by hospital administrators, but await political approval and funding.

Conclusion

Traumatology in Norway has followed in the steps of western medicine with a drift from concentrating on anatomy to an understanding of the importance of pathophysiology and of teamwork around the severely injured patient. This is mirrored in educational programmes and an evolving, national trauma system. As till now mainly enthusiastic individuals have upheld this, but there is a growing understanding of the importance of traumatology in hospital administrations

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8. Surgical Oncology

Karl-Erik Giercksky

Introduction

Surgical oncology is not a defined surgical specialty with a board certification in Norway. It is generally interpreted as experience within multimodal cancer care, or treatment of uncommon cancers.

In spite of its modest number of inhabitants, (4.9 million in 2010) it was decided in 1969 to divide the country into independent regions, recently reduced from five to four, with the intention of establishing more equal access to advanced treatment independent of geography. The possible benefits of this organisation are still debated. There are few exceptions of supraregional centres in the field of surgical oncology. This means that relatively uncommon cancers are treated in 5 centres. The disadvantages of this organising have been counteracted by establishing common treatment protocols and a national cancer register.

In 1951 Norway established a National Cancer Register with mandatory registration of all cases of malignant disease. The combination of this cancer register and the existing register of deaths for the whole population, has made it possible to follow the standard of cancer treatment. During the last 25 years the director, Frøydis Langmark, has developed the National Cancer Register into a large research institution, regularly producing valuable data on screening and treatment effects, together with the general overview of cancer incidence. More detailed registers of certain cancer types (e.g. the rectal cancer

register), and new or standardised staging and treatment procedures, have proven to be useful evaluation tools.

The Evolution and Organisation of Cancer Care

Cancer surgery in Norway has in general been organised according to either organs of tumour origin, or invasion. Such a classification has the advantage that the patients will be treated by surgeons familiar with resection possibilities of the organs involved, postoperative problems, and limits of interventions.

The downsides can be the lack of multimodal possibilities in some hospitals, timing, limits and side-effects of surgery following chemotherapy or radiation, and the organisational problems with procedures involving multiple surgical specialties. A typical example is the dissemination of ovarian cancer to organs outside the pelvis, and the reported survival improvement when all macroscopic tissue is removed.

Since the discovery of radium, and its effects on living cells, ionised radiation has been a part of cancer treatment. A large amount of work has been done to optimise the combination of cancer surgery and radiation, and in many areas of oncology this is still the subject of ongoing studies. Radiation treatment demands complex and expensive installations as well as maintenance, and was introduced

as a national treatment option in 1932 with the foundation of Radiumhospitalet (DNR), a non-governmental, no profit institution, established from funds collected nationwide. The idea of a research-based cancer hospital was established by the director Reidar Eker, and developed further by director Jan Vincent Johannesen, a pathologist of international reknown. A chair in medical oncology was established in 1962, and professor Erik Poppe and his successor professor Herman Høst established Radiumhospitalet as the national centre for medical oncology. Surgery was slowly becoming a more important part of multimodal treatment, and was at in the beginning handled by senior surgeons from Rikshospitalet and Ullevål. The development of multimodal cancer treatment led to the building of a new clinical building in 1976 including a suite of seven surgical theatres. Professor Per Kolstad and his successor professor Claes Trope with their large patients series, achieved international recognition for their development of multimodal treatment of gynecological cancer. The increased demand for surgery within the framework of multimodal treatment led to the establishment of a small surgical department in 1968 with Ivar Brennhovd as head of surgery, and Johan Høie taking care of sarcomas, thoracic cancers and thyroid cancer.

The departments of oncology and gynecology were academic institutions, and from 1988 it was decided that the department of surgery should also have an academic affiliation to the University of Oslo. Karl-Erik Giercksky was appointed chairman and professor. A PhD programme was instituted and an average of one PhD thesis finished each year. The department was extended with a small section with tumour orthopedic surgeons in 1999, led by Gunnar Follerås. They have taken care of bone tumours and soft tissue sarcomas of the extremities, while another group led by Per Helgerud treated intra- and retroperitoneal sarcomas. The development of surgical oncology led to an increasing demand for reconstructive procedures, and a section for plastic and reconstructive surgery was established by Roar Rindal in 1996, succeeded by Hans Petter Gullestad. A consultant in urology was an integrated part of the staff, but again the increased demand led to the establishment of a section for urology led by Sigurd Ous in 1984, succeeded by Håkon Wæhre, and presently Bjørn Brennhovd. The seven positions at the department in 1988 were extended to 21 at the end of the millennium, with three full time researchers and three combined half time researchers and clinicians.



Fig 8-1. The Norwegian Radium Hospital, from the air. Courtesy DNR

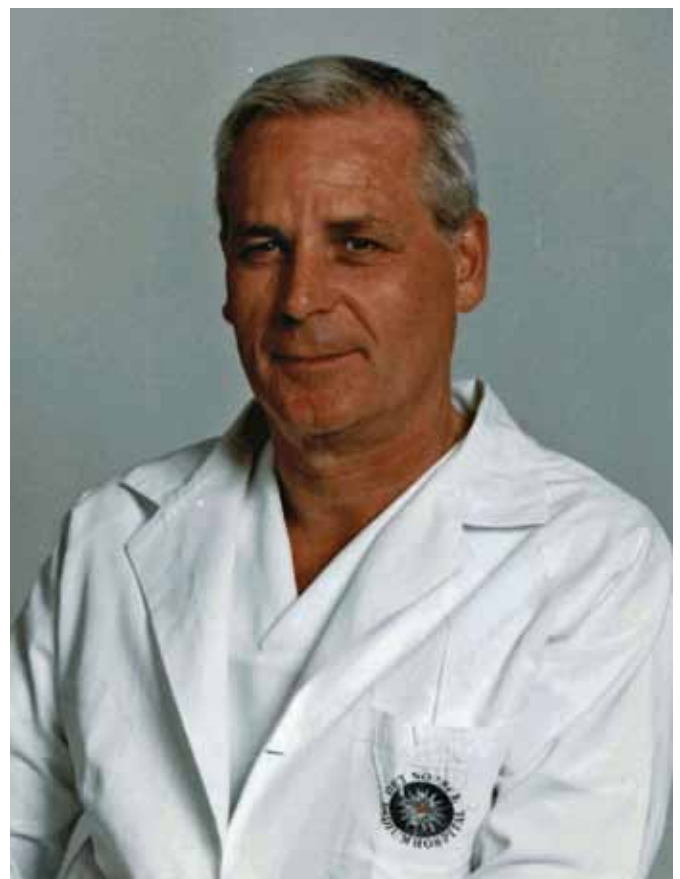


Fig 8-2. The first professor of Surgery at DNR, "Kalle" Giercksky. Courtesy DNR

As the indication for radiation therapy both in curative and palliative care expanded, it was obvious that more such facilities were needed, and today all regional hospitals and three county hospitals in densely populated areas, have modern installations for radiation therapy.

Before the advent of cisplatin in 1975, chemotherapy of solid tumours was almost exclusively limited to discrete cases of palliation. The enthusiasm due to the effect of cisplatin in metastatic testicular cancer, and the belief that chemotherapy would soon replace surgery, gave way to more sombre development of new agents, and a focus on their adjuvant role in multimodal cancer treatment. An excellent example of such multimodal therapy is the reduction in amputations, and the increased survival in treatment of osteosarcomas.

Further development of radiation techniques, chemotherapeutics and antibodies did not diminish the role of surgery in treatment of solid tumours. Radical surgery in the form of a R0 resection was, and still is, the most important factor for survival. Due to this fact, primary solid tumours are generally referred to a hospital with board certified surgeons specialised in surgery of the affected organs (intracranial tumours to departments of neurosurgery, bowel tumours to departments of gastrointestinal surgery and so on). Because general surgery is a rapidly vanishing specialty in Norway, giving way to a growing number of subspecialties, solid tumours are now being treated within an environment of more organ related training. The last step in this process was introduced in 2007 when the surgical subspecialty of Breast and Endocrine Surgery was established nationwide (Chapter 43).

The advantage of this type of subspecialisation is that every patient is being treated within an environment comprised of surgeons familiar with the operative challenges of staging, extent of resection, and at least a certain familiarity with adjuvant treatment and the problems following recurrent disease. This narrow organ-directed focus has been criticised for not seeing the whole of the patients, and of being an insufficient platform for multimodal treatment and research.

Oncology was established as a subspecialty within Internal Medicine in the 1970ies. The oncologists were supposed to co-ordinate the multimodal treatment, and handle the

non-operative side of cancer cases in the county hospitals. With the rapid development of radiotherapy and drug treatment, as well as molecular medicine, this developed into a field with less “Jack of all trades”, but an increasing number of specialised oncologists. The solution to this has been to establish departments of oncology in each regional hospital sufficiently subspecialised to meet the more or less complete demands of non-surgical cancer care. The general organisation of cancer care in Norway today is based on surgical treatment in organ-based sections, working together with a small group of oncologist at the county hospital level, and referral of special cases to regional hospitals. It is obvious that this is no simple task in a country of less than five million people.

Surgery has been the mainstay of therapy for malignant solid tumours for more than a century, and still remains the decisive factor for cure. Advances in surgical treatment of cancer have developed along two main directions. The general progress in anesthesia and peri-operative management has allowed the surgeon to carry out major tumour resection without the previously high mortality and morbidity, and are the prerequisites for the steady advancement of modern surgical oncology. The disappointing observation that radical or even super-radical surgery did not always prevent tumour progress, led to the continuous search for adjuvant treatment, and in the USA, and a number of other countries, the development of surgical oncology as a new surgical specialty, and the development of large cancer clinics. With the development of molecular biology in the 80ies, new tools for diagnosis, prognosis and inheritance of cancer became available, and also a new generation of immune therapy.

Long-term individual registration of tumour development in the population was a decisive factor in verification of inherited genetic mutations. This led to the development of the Comprehensive Cancer Centre (CCC) institutions, consisting of three major pillars; a basic research branch, a cancer register and an advanced multimodal clinical branch. In the USA these three main conditions together with a number of other quality parameters are mandatory for a centre to be classified as CCC, and the EU is now working along the same lines for their adaption of the CCC approval. Radiumhospitalet together with the National Cancer Register fulfills the criteria, and has been accepted as a sister organisation to MD Anderson

Comprehensive Cancer Center and they are working closely with a number of national and international centres. Radiumhospitalet is, however, the only CCC institution in Norway, and most of the cancer treatment in Norway is undertaken in more organ based clinics as discussed above.

Progress in Perioperative Treatment

The general improvements of surgery and anesthesiology in the last part of the 20th century have specifically improved surgical oncology. Thromboembolic disorders are more common among cancer patients than in patients with non-malignant disease. Prolonged perioperative treatment with subcutaneous low molecular heparin, often self-administered, was introduced in orthopedic surgery for non-malignant lesions, and then introduced into major cancer surgery by David Bergquist in 1990ies with demonstration of the same benefits. It is an important example of how the experience within different specialties can inspire each other.

The realisation of the fact that the patient's micro-flora was the main source of postoperative infection following abdominal cancer surgery, was an important milestone that paved the way for a possible prophylaxis. In Norway it was soon established that a preoperative single dose of an antibiotic agent was sufficient, provided it was effective against both gram-negative and anaerobic bacteria. The reduction in postoperative infectious complications makes the combined treatment with chemotherapy and antibodies simpler and easier to plan as demonstrated by Tormod Bjerkeset, Steinar Danielsen og Giercksky in 1978–1988.

An increasing part of cancer-patients scheduled for surgery will have undergone preoperative radiation or chemotherapy, or a combination of both. Such treatment will increase their susceptibility to infectious problems, especially with opportunistic agents such as *Candida* species. Studies from Folkehelsa and Radiumhospitalet have demonstrated that more than half of all patients scheduled for gastrointestinal cancer surgery harbour *Candida* in their stomach before surgery, and that there is a need for antifungal therapy in prolonged cases of postoperative leakage related infections. Whether preoperative prophylaxis is necessary, has not been definitely clarified, but the search for *Candida*, with appropriate growth-methods,

has been demonstrated to be mandatory by Per Sandven and Giercksky.

Weight loss is a common feature in cancer patients and is due to either mechanical problems of the alimentary tract or tumour-induced catabolism. Development of complete parenteral and enteral nutrition was believed to alleviate both of these problems. A large amount of experimental and clinical studies were carried out to try to reverse tumour as well as trauma-induced cachexia, but so far with disappointing results. The important gain has been that we now have techniques to more or less stabilise the nutritional status of the patients, and can carry out the necessary diagnostic procedures, and time the surgical interventions without further weight loss. This is an extremely important part of the treatment of severe postoperative complications and complex gastrointestinal procedures. In large international trials in the last decade where surgeons in Tromsø, Kristoffer Lassen and Arthur Revhaug, played an important role, it was clearly demonstrated that following such procedures the patients can first be given fluids orally, and then solids according to their own preferences, without any parenteral or enteral nutrition except for complimentary intravenous fluid and electrolytes when necessary. This simple and effective regimen for non-complicated gastrointestinal cancer surgery is part of the rapidly expanding concept of "fast track surgery". It should be remembered that parenteral and even enteral nutrition also carry their own risks of complication, and that hospital infections by no means are bygone problems, and that the risk is significantly increased with prolonged hospital stay.

Progress in Diagnostic Procedures

Visualisation and anatomic location of tumours and metastases are of outmost importance for the cancer surgeon. Within the last three decades an exceptionally rapid improvement of different modalities has been achieved, allowing correct preoperative localisation, staging and histological typing of the tumour in almost every cancer patient.

Computer tomography (CT), which is still based on x-ray principles, has evolved into the diagnostic work horse for all kinds of solid tumours and was introduced in Ullevål in 1975. The development of new contrast media and

increased resolution with the advent of 64 slice machines, are further proof that CT will be a mainstay of preoperative diagnosis also in the future. The combination of CT and cytology is a powerful technique for assessment of tumours difficult to locate with ultrasound, and CT based evaluation of chemo-radiation is an important part of multimodal treatment.

Ultrasound (US) guided location and biopsy of tumours has the advantage of not being dependent on ionising radiation, and thus can be repeated without danger of accumulated side-effects, but low resolution and physical barriers to US has prevented it from becoming the central method of tumour visualisation for all organs.

Magnetic resonance imaging (MRI) is by many expected to become the future main tool in visualising tumours. The spectroscopic potential of MRI still awaits introduction in clinical situations, and is more of a research tool, but should this change a new dimension of non-invasive diagnostics will take place. The future of visual methods of tumours is certainly promising.

Ultrasound, computer tomography and magnetic resonance imaging are now available in all Norwegian hospitals where elective cancer surgery is offered to patients.

Positron emission tomography (PET) is based on the detection of radioactive tracers usually involved in general tumour metabolism, but more specific compounds are also available. There are now four PET scanners in Norway (Rikshospitalet, Radiumhospitalet, Haukeland and Ullevål).

Microscopic examination of preoperative biopsies and surgically removed specimens has for a long time been the mainstay of typing, staging, treatment options and prognosis for solid tumours. The ability to give such important information rested on experience and the Department of Pathology at Radiumhospitalet early became a centre of education within tumour pathology and electron microscopy. It soon became obvious that malignant tumours from the same organ without significant differences in morphology, could behave very differently. Today intensive research is carried out in combining morphology with genetic structures of the tumour. We can see the contours of future tumour classifications based on such methods, giving more than a hint of the optimal multimodal type

of treatment for just this tumour. Anne-Lise Børresen Dale and her co-workers at Radiumhospitalet and Ullevål have already published promising data within the field of breast cancer, and it is expected that such knowledge will be available for all common cancers within the foreseeable future.

Demonstration of circulating tumour cells in bone marrow and circulating blood has been amply demonstrated, but the clinical significance of such cells for the development of metastatic tumours has not been completely elucidated. The advent of efficient chemotherapeutic or immunologic agents for many of the common solid tumours has made treatment of such circulating cells an attractive solution to prevent future metastases. The common method for detection of tumour cells in blood and marrow has been based on immunochemical detection of cytokeratin, which is absent in normal blood and marrow cells.

Øystein Fodstad has developed a method based on sorting such cell from normal cells using antibodies to tumour antigen coupled to Ugelstads magnetic beads. Radiumhospitalet together with Ullevål in Gro Wiedsvang's thesis has demonstrated the impaired prognosis in breast cancer patients with circulating tumour cells. Clinical trials, led by Bjørn Naume, with randomised prophylactic treatment to avoid future metastases in such patients are now in progress.

Radical Surgery and the Coming of more Biology Based Surgery

The removal of the whole primary tumour to achieve a R0 resection has been, and still is, a fundamental aspect of cancer surgery. In spite of a reassuring report from the pathologist that a R0 resection indeed has been achieved, local recurrence may occur later, and in some cases even remote metastases. Obviously all tumour tissue has either not been removed, tumour cells have been implanted in the resection field, or the tumour has already shed tumour cells into the lymph and blood circulation, and further extension of the surgical procedure would be of no value. This old, but central problem for cancer surgeons can be attacked with different strategies, and has been a major field for clinical trials. The main strategies can be illustrated by surgical treatment of three well-defined tumours.

Breast cancer is a common disease and the macroscopic removal of the tumour is usually not a challenge to the surgeon. Thus it was natural that the problem of both local recurrence and metastases lead to increased radicality with removal not only of the whole breast, but also of axillary lymph nodes. The necessity of axillary lymph node removal has been questioned, and is presently recommended only in cases with positive sentinel nodes. Ivar Guldvog, Rolf Kåresen and Ellen Schlichting were the central figures in this important reduction of surgical trauma as well as in the introduction of conservative breast cancer surgery. The fine-tuning of the surgical procedure, and the adjuvant therapy, require multidisciplinary groups, and thus treatment of breast cancer in Norway is now restricted to 19 hospitals where this can be offered to patients (Chapter 41).

Pancreatic cancer is probably the solid tumour with the worst prognosis, with not more than five per cent of the patients alive after five years. The biological reasons for this disappointing result have not been clearly defined, but the fact remains that most of the tumours are already disseminated when the disease is diagnosed. The standard surgical treatment has remained one of the variants of the Whipple procedure, which includes the removal of the pancreatic head and part of the body of the pancreas, together with the proximal duodenum and distal common bile duct. Almost all patients develop both local recurrence and multiple organ metastases, and as may be expected, this led to trials of increased radicality and adjuvant treatment. The demonstration of multiple sites of tumour in the pancreas led to the suggestion of replacing the Whipple procedure with total pancreatectomy but to no avail. There is so far no indication of improvement due to an increased radical approach, but this does not mean that patients without signs of dissemination should not undergo a Whipple procedure. The survivors of pancreatic cancer, admittedly few, are among the operated patients and resected patients live longer with less pain than unoperated patients. Pancreatic cancer is a disease where it is difficult to further optimise surgery and is in dire need of an efficient adjuvant treatment. Trond Buanes at Ullevål in 2006 has introduced the vaccine principles of Gustav Gaudernack from Radiumhospitalet in patients with pancreatic cancer with some interesting results (Chapter 38).

Rectal cancer is a common disorder curable by surgery when treated before dissemination, but as many as 30% of

the patients developed local recurrences. In 1982 William Heald and coworkers in the UK demonstrated that lymphatic drainage was contained within the mesorectal fascia and they recommended a total removal of all tissue in this fascia together with the tumour (TME-technique). Norway and Sweden adapted TME as a de facto standard for surgical treatment of rectal cancer in 1994. Erik Carlsen, Frøydis Langmark, Odd Søreide, Johan Wiig and Arne Wibe were instrumental in this important task. Due to the mandatory National Cancer Register in Norway we had the possibilities to follow the results in a prospective way. Within the Cancer Register the special Rectal Cancer Register was established, with the subsequent registration of a number of further details believed to be of importance for rectal cancer. This could for the first time demonstrate on a national level a significant reduction in local recurrence and later also increased survival. The improvement in treatment of rectal cancer following introduction of TME is probably the most significant amelioration within treatment of common solid tumours within the last 25 years, and is an outstanding example of tailoring the surgical resection on sound biological knowledge. The Rectal Cancer Register has been an undisputed success and is now being held up as an example for the establishment of other special registers within the framework of the mandatory National Cancer Register. This will make it possible to evaluate the impact of any new treatment options in a unique prospective way.

Minimally Invasive Surgery (MIS).

It was obvious that the rapid development of endoscopic equipment and skills would not be restricted to diagnostic procedures. Following the internationally acclaimed results of Magne Osnes and Arne R Rosseland in advanced endoscopic diagnosis, laparoscopic treatment of benign gastrointestinal disorders developed rapidly in Norway and Ronald Mårvik and Helge Myhrvold established a center for laparoscopic surgery in Trondheim. Apart from leaving the patients with significantly smaller scars, it was demonstrated that the avoidance of large muscle-cutting incisions reduced the surgical trauma and was followed by a shorter in-hospital time and recovery. The introduction of MIS in the context of tumour surgery was met with many objections, which apart from the loss of tactile response have been more or less rejected. Today the MSI has a place in treatment of tumours within such diversi-

fied fields as abdominal surgery, thoracic surgery, urology and gynecology. Liver and pancreatic tumour surgery were held by many as unsuitable for MIS, but the pioneering work of Bjørn Edwin is now paving the way for MIS also in these fields.

The most extreme type of MIS is probably the use of surgical robots. This was introduced in Norway for prostate cancer surgery by Bjørn Brennhovd and soon replaced traditional endoscopic surgery in this field. The number of robots for treatment of early prostate cancer has increased rapidly in Norway, and the number of open procedures has declined accordingly. The use of robots in gynecologic cancer surgery is rapidly increasing, and also in a number of other types of tumour surgery, but the eventual role of robotic surgery is far from settled. The learning curve for robotic surgery seems to be significantly shorter than expected for surgeons with solid experience from open surgery, probably due to the double camera construction, which presents an overview similar to open surgery.

The expanding role of MIS is creating new problems for the training of surgeons. In all cases of MIS the necessity of conversion to open surgery due to intra-operative problems must be realised, and adequate preparations made. Most of the surgeons carrying out MIS today have a solid training in open surgery, and an acute conversion remains less of a problem. Creating training programmes in the future for taking care of such diverse as MIS and open resection techniques, remains a problem.

Surgical Treatment of Metastatic Disease

Case reports of resection of single liver metastases trickled into the surgical literature in the 70ies, and it seemed likely that this should become the standard treatment in Norway. Work in this field was pioneered by Snorre Aune who treated metastasis of carcinoid metastasis to the liver by arterial ligation in the beginning of the 1970ies. Liver metastases from colorectal cancer could represent a first station dissemination, due to direct transport of cancer cells by the portal vein. The ultimate surgical treatment of liver metastases would be to give the patients a new liver. Due to the limited numbers of livers available for a rather common situation, and the problem of immunosuppression in disseminated state of cancer, liver transplantation is unlikely to become a main treatment option for liver

metastases, but to test this possibility a small Norwegian trial is now carried out by Aksel Foss et al at Rikshospitalet.

The possibilities for surgery for metastatic disease are heavily dependent on the type of primary tumours. Liver resections for metastases from breast cancers and melanomas have not been a success, and have largely been abandoned, while liver resections for a number of other solid tumours are carried out as more or less parts of experimental protocols. The importance of the type of primary tumour and an efficient chemotherapy is demonstrated in testicular cancer, where all metastatic disease is surgically removed, including brain lesions, under cover of chemotherapy leading to a cure rate of this disease of more than 90%.

Some tumours disseminate within a certain compartment for a certain time before a general dissemination can be demonstrated. The prototype of such tumours is the rather rare pseudomyxoma peritonei originating in the appendix, and when untreated will cover and compress the entire peritoneal surface, but usually not develop distant metastases. Removal of the entire peritoneal surface, and intraoperative hyperthermia intraabdominal chemotherapy (HIPEC) can cure the patient, or significantly delay the development of the disease. Radiumhospitalet has since 1995 been part of an international network for such treatment. The experience from pseudomyxoma has led to the idea that other tumours localised only in the abdominal cavity could benefit from the same treatment, and candidates among many would be mesothelioma, ovarian cancer, and localised and limited carcinomatosis from colorectal cancer. Radiumhospitalet has been appointed a national centre and has extended its offer of HIPEC to mesothelioma and colorectal cancer besides pseudomyxoma (Giercksky, Stein Gunnar Larsen, Wiig).

Palliative Cancer Surgery

Following surgery for solid tumours it should not be forgotten that as many as between one half and one third of the patients will later be evaluated for a palliative procedure. In contrast to curative cancer surgery the lack of well designed completed studies is a matter of concern regarding the scientific basis for most palliative procedures. A nationwide survey and a thorough evaluation of the

international literature led by Giercksky and was carried out in Norway and published in 2003.

Screening and Surgical Oncology

Detection of malignant tumours before dissemination increases the chance for surgical cure. The prerequisites for a screening are a suitable screening test, and an efficient treatment more effective if carried out in the asymptomatic stage of the tumour. Breast cancer screening has been introduced in Norway in 1996 with Steinar Ø. Thoresen at the National Cancer Register, and some enthusiastic breast surgeons as the driving forces. The first positive reports have been followed by a serious controversy about the total values of such screening by international statisticians in the Cochrane network. One positive effect of the screening that cannot be criticised, is its positive effect on the organising and development of preoperative diagnosis and surgical treatment of breast cancer. This has culminated in the mandatory organisation of multidisciplinary breast diagnostic centres and a specialty of breast and endocrine surgery for hospitals offering treatment for breast cancer. This is certainly no small feat carried out by a number of enthusiasts of whom Jan Erik Varhaug and Kåresen stand out. The prominent work of Varhaug within both clinical and molecular aspects of thyroid cancer further demonstrated the importance of endocrine surgery as a specialty.

Colorectal cancer, prostate cancer and lung cancer are among the screening projects likely to be seen in future trials. Colonoscopy, which is likely to be able to both diagnose and remove premalignant polyps, as demonstrated by Geir Hoff and Jostein Sauar has opened up the discussion of a large scale national study. The procedure is not simple, and different fecal tests either for occult blood, or more specific for tumour DNA are being discussed. Which of these strategies is going to end up in large scale screening are not decided, but the recent development at Radiumhospitalet by Ragnhild A. Lothe of a potential fecal DNA test, makes

it more likely that we in the near future will see a combined colonoscopy and fecal testing to validate the two methods.

The Future of Surgical Oncology

The impact of molecular biology on oncology can hardly be overestimated, but so far the principle of early detection and removal is unlikely to vanish. As stated above surgery has been the mainstay of therapy for malignant solid tumours for more than a century, and still remains the decisive factor for cure. Better diagnostic procedures based on invasive methods will appear, and an increased number of early cancers will be treated with less mutilating surgery. Improved diagnostics and increased screening will reduce the number of patients with advanced disease, but are unlikely to remove them altogether.

Will the progress of tumour biology ever remove cancer as an obstacle to human health? The best comparison is likely to be the evolution of infectious diseases. With the advent of efficient antibiotics, general immunotherapy and specific vaccines, the end of infectious diseases as a major health problem seemed to be near. Nothing could be more wrong. Microorganisms including parasites, bacteria and virus are becoming increasingly resistant, and new and dangerous forms are appearing with increasing frequency. The main reason for this is a rapid mutation due to pressure from changes in lifestyle and the use of antimicrobial agents. The molecular basis of cancer is the same, mutations leading to an unstable genome with rapidly development of more mutations, due to the same environment pressure as in infectious disease. The chance of eradication of cancer is slim. It is far more likely that taking care of cancer patients will be a continuous task, and even in future treatment regimens, surgical oncology will still play a central role.

Acknowledgements

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9. The Intervention Centre at Oslo University Hospital

Erik Fosse

Up to the end of the 20th century there was a clear division between medical and open surgical treatment in hospitals. The two approaches to patient treatment represent two different philosophies. By the end of the century this division became more blurred as new image guided techniques for intervention emerged. The first modern radiology guided interventions were performed during the 1950ies. The development of computer technology and imaging modalities during the following years led to a vast variety of image guided and minimal invasive treatment options by the end of the 20th century. Videoscopic surgery was introduced in Norway during the 1980ies and 1990ies and we still see new indications for this technique. During the same period a number of new radiology guided procedures were introduced in radiology and cardiology departments.

In a master thesis in health administration 1991 the radiologist Frode Lærum and the surgeon Arvid Stordahl suggested that the introduction of new, technology-dependent methods should be organised in designated departments. They claimed that the existing division in departments of internal medicine, surgical and laboratory medicine departments were inappropriate when the treatments required interdisciplinary expertise. Organ specific or disease specific organisation was also inappropriate, as integration of advanced imaging modalities in an OR setting could be beneficial for a number of different conditions.

During the 1990ies new buildings for Rikshospitalet were planned at Gaustad close to the university campus of Oslo. The national health authorities requested that the new hospital should include new concepts. When the hospital proposed to establish an intervention centre for testing and introduction of image guided treatment, the proposal was supported by the Ministry of Health. In 1995, the Norwegian Parliament granted funds to build a centre with a new, interdisciplinary organisation at Rikshospitalet, first at the old location in the centre of Oslo and later in the new hospital buildings at Gaustad.

The Intervention Centre was established as a research and development department in 1996. The cardiothoracic surgeon Erik Fosse was initially employed as a project manager and later as director of the Centre. The department aimed at being a common toolbox for all medical disciplines to facilitate the development of new technology-based and minimally invasive treatment methods.

The Intervention Centre represented a break with the traditional hospital department model in two areas – organisation and role.

Structure of the Intervention Centre

The Intervention Centre was and is multidisciplinary and interdisciplinary organised. This was a completely new



Fig 9-1. The Interventional Signa SP 0.5T MR magnet being hoisted in through the roof of the temporary barracks housing the Intervention Centre at Rikshospitalet in the spring 1996. Courtesy Intervention Centre Oslo Univ Hosp

concept in Norway in 1996. The Centre's organisation was an experiment where the technology was the key, while the employees came from different environments and had different background. It was controversial that one and the same department did accommodate doctors, nurses, radiographers and technologists with different specialisation and from a variety of disciplines. Since the leader of the Centre was a cardiothoracic surgeon, the gastrointestinal surgeon Bjørn Edwin was employed to be responsible for the development of laparoscopic procedures and the radiologist Finn Lilleås for the development of MRI-guided interventional procedures. The Centre was employing its own anesthesiologists and anesthesia nurses, its own operation theatre nurses and radiographers. Professor Tor Inge Tønnessen was in charge of the Anesthesiology R&D work. Civil engineers, physicists and mathematicians were employed at the Centre for developing and integrating advanced technology in the operating rooms in a safe way. The staff of the Centre was supposed to be small as the real developmental work should be performed by the staff from the clinical department (1).

Although controversial, there was surprisingly little resistance to the model in the academic environments. The Department of Anesthesiology pointed out that according to a general Norwegian Medical Association principle, all

anesthesiology personnel should be organised in departments of anesthesiology to ensure the professional association. However, at the same time the scientific community accepted the participation in an organisational experiment, and the interdisciplinary organisation model has never been a conflict area in the hospital. Later interdisciplinary organisation became more common also in other more traditional departments.

Role of the Intervention Centre

Hospitals differ from industrial companies in the way they develop new methods or products. In the industry it is common to differ sharply between development and production, while in the hospitals development takes place continuously during the routine treatment without any sharp distinction between experimental and routine work. Image guided surgery and catheter-based techniques were introduced in many Norwegian hospitals without any real acknowledgment of the experimental character of the work. New methods were established without formal protocols, or prior written consent from patients. In a system where the production and development go hand in hand, it is not always easy for the actors to distinguish between routine work and developmental work.



Fig 9-2. Beating heart coronary surgery performed by Erik Fosse and Tom Hol in the first generation hybrid suite 1997. The vein graft is being harvested endoscopically. Note the image enhancer blocking the communication between the anesthesiologist and the surgeon. Courtesy Intervention Centre Oslo Univ Hosp

This practice was in conflict with the patients' and the authorities' demands for predictability, standardised management and cost control. The need for a clearer distinction between routine and experimental treatment was one of the main arguments for establishing the Intervention Centre.

The Centre thus became a facility where specialists from different clinical disciplines could come and develop and train on new procedures before adapting them in the routine clinical setting. In order to determine the benefits and risks of new procedures routines for clinical follow up were established early. A number of new methods were developed and published, and some of them provided the basis for PhD degrees. Soon the Centre also implemented studies of the impact of the new methods on the patients' quality of life. In 2000 a partnership with the Norwegian school of Management and the Department of Health Management and Health Economics at the University of Oslo was established to study the impact of new methods on hospital organisation and economics. The first prospective economic cost-utility study was initiated in 2005 in connection with an investigation of minimally invasive organ harvesting by the kidney transplant, based on a PhD thesis by Marit Helen Andersen (2).

From 1996 to 2000, the Intervention Centre was located in a barrack in the park at Rikshospitalet in Pilestredet. In the provisional building two advanced operating rooms were built. In one OR X-ray equipment for angiogra-



Fig 9-3. Runar Lundblad performing coronary surgery in an animal model with the Zeus robot 1998. Courtesy Intervention Centre Oslo Univ Hosp

phy was installed while at the same time the room was equipped to carry out all operations that were performed in the hospital. This outfit facilitated intraoperative angiography during cardiac surgery, and allowed so called hybrid procedures where minimally invasive coronary surgery could be combined with percutaneous coronary intervention.

Beating heart coronary surgery was established under the supervision of Fosse with Marius Barstad, Runar Lundblad, Kjell Arne Rein and Per Snorre Lingaas at the Department of Cardiothoracic Surgery. As beating heart surgery was a new, disputed technique, all grafts were controlled by coronary angiography on table, and a randomised trial was started in 1999 (3).

The pediatric cardiologist Per Bjørnstad performed the first atrial septal defect closures by interventional techniques in Norway using the Amplatz device in 1996. In 2000 he performed the first ventricular septal closures. Edwin performed the first laparoscopic adrenalectomies, refundoplications and nephrectomies in this room.

Interventional bronchoscopy was established in Norway at Aker in the early 1990ies by Gunnar Hansen. In 1998 Hansen transferred to Rikshospitalet and started evolving the method further at the Intervention Centre together with Arve Sundset.



Fig 9-4. Arve Sundset performing interventional bronchoscopy in the third generation angiography hybrid suite 2008. Courtesy Intervention Centre Oslo Univ Hosp

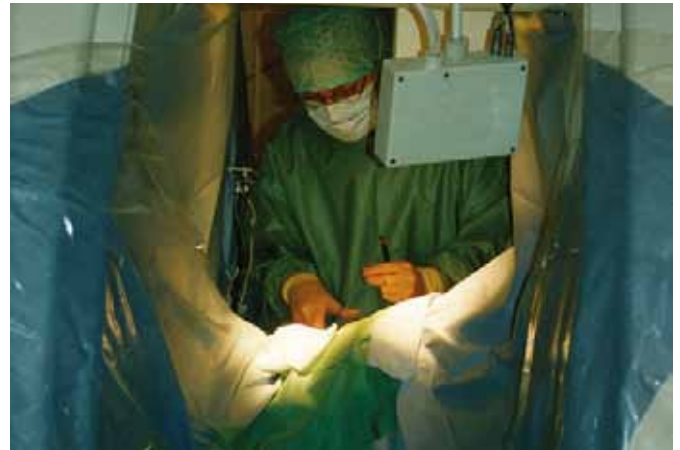


Fig 9-5. Henry Hirschberg performing craniotomy in the open MR. Note the narrow gap between the two magnetic coils. Courtesy Intervention Centre Oslo Univ Hosp

In the early 1990ies General Electric developed a 0.5 T open MR consisting of two vertically posed magnets (double donut). The surgeon could stand in the gap between the two magnets and perform surgery. This Signa 0.5 T magnet was installed in the second OR of the centre. The neurosurgeon Henry Hirschberg immediately started intracranial surgery for malignant brain tumours in the magnet and he also developed methods for MR guided brain biopsies. Gradually Torstein Meling took over the responsibility for developing neurosurgical procedures at the Intervention Centre, and was instrumental in building up neurosurgical logistics in the hybrid suites. The magnet allowed intraoperative imaging, thereby increasing the completeness of tumour tissue removal (4). However, the limitations to the movements by working in the narrow gap, and the image quality, reduced the clinical benefits of the system and eventually the programme was stopped.

The neurosurgeon Jon Terje Ramm-Pettersen started using the magnet for intraoperative imaging during pituitary gland resections, but he performed the surgery outside the magnet and moved the patient in for imaging. Thus, the open configuration of the MR was not required.

Thermal ablation of malignant disease has been performed for many years, but the outcome varies. The engineer Eigil Samset developed a programme for temperature mapping in the open magnet, making it possible to visually monitor freezing or heating of tissue. Tom Mala

and Lars Frich performed studies on cryoablation and RF ablation in the open magnet with temperature mapping.

The open magnet also facilitated examinations and interventions in patient positions not possible in conventional MR machines. The anesthesiologist Øivind Klaastad developed a completely new technique for brachial plexus block based on MR examinations with various degrees of abduction of the arm (5).

In 2000 the hospital moved to new premises at Gaustad close to the university campus of Oslo. The Intervention Centre was established in a separate building attached to the hospital's common operating area. In the new building the Centre got three large operation theatres. The combined angiography and operating suite and the combined MR and operating suites were rebuilt in the new hospital. A third OR was earmarked laparoscopic and image guided surgery, where also robotic surgery was performed. Under the guidance of Edwin and Arne R Rosseland the gastrointestinal surgeons continued to develop laparoscopic surgery together with surgeons from Ullevål. Laparoscopic prostatectomy, resection of liver and pancreas was established, and the group started several PhD programmes studying the quality and efficacy of the new methods under the supervision of Edwin.

In 2008 Siemens and the Intervention Centre signed an agreement for testing and development of a new robot

based angiographic system specifically designed for hybrid rooms, the Siemens Zeego system. The development of cardiovascular methods continued. Stentgrafting of abdominal aortic aneurysms was started at the Centre already in 1998. These procedures were developed in collaboration between Geir Hafsahl of the Radiology Department and the vascular surgeon Kirsten Krohg Sørensen. After moving into the new buildings at Gaustad they started performing stentgrafting of the thoracic aorta and the number of combined procedures involving surgery and intervention increased. These hybrid procedures evolved into routine procedures, but could not be moved out of the Centre as they required the hybrid room. In 2004 a new building was raised beside the Intervention Centre for expansion of the hybrid rooms.

Interventional techniques for heart valve replacement evolved in the new millennium. The pediatric cardiology group led by Erik Thaulow and Gaute Døhlen implanted the first transcatheter valve in the pulmonary ostium in 2008, and in 2009 the group led by the cardiologists Lars Aaberge and Bjørn Bendz in collaboration with the cardiothoracic surgeons Kjell Arne Rein, Arnt Fiane and Jacob Bergsland performed the first aortic valves first transapically and eventually transfemorally. The catheter based valve replacements demonstrated the need for multidisciplinary teams and hybrid rooms that were optimised for both angiography and surgery.

As the X-ray technology improved, new groups of patients could benefit from being treated in a hybrid environment. X-ray-guided cochlear implantation was started in 2009 by the ENT department under the supervision of Greg Jablonski and Ralph Greisiger.

In 2008, the open MR was replaced by a Phillips Achieva 3T closed magnet. In order to be able to use the magnet intraoperatively, a new OR was built beside the room with the MR. The patient could be transferred from the operating room into the magnet through sliding doors. The Neurosurgical and ENT departments started a joint programme for MRI-guided minimal invasive skull base surgery with Jon Terje Ramm-Pettersen.

As the 3 T MRI could perform functional imaging of the brain, the Institute of Psychology at the University of Oslo became partners in acquisition and research in the new

magnet, and a comprehensive programme for functional brain imaging was established in 2009.

The new magnet made it possible to continue developing MRI guided thermal ablation. Phillips had developed a system for High intensity focused ultrasound integrated in the table of the magnet. This enabled non invasive ablation of tumours. The transmission of energy transcutaneously also made targeted drug release possible. By encapsulating drugs before injection the ultrasound could crush the capsule at a designated location. These projects were coordinated by the new head of the Centre's radiology section Per Kristian Hol, together with Edwin and the physicist Frederic Courivaud.

Publications

During the first 14 years scientists at the Intervention Centre had published 268 scientific papers, 19 PhDs and 54 master degrees.

Expansion and Reorganisation

In 2010 the public hospitals in Oslo were merged into one, Oslo University Hospital. This merger facilitated the collaboration with departments at what was previously Ullevål and Aker hospitals. After the merger, in 2010 the Centre also became responsible for all services in the field of diagnostic physics at Oslo University Hospital and the staff in 2010 comprised 45 employees and nearly 30 research fellows, both in medicine, physics, computer engineering, telecommunication and robotics.

A formalised collaboration was established with the University of Trondheim and the Faculty of Mathematics and Natural Sciences at the University of Oslo. The collaboration comprised dedicated professorships at the Intervention Centre from these units.

Already after the first years it was evident that after their development some of the procedures were difficult to move to other departments, as they required the technology and organisation of the Intervention Centre. Thus, when the Norwegian Parliament in 2004 decided to build a PET centre at Rikshospitalet, it was decided to establish it in a new building adjacent to the Intervention Centre to facilitate expansion of the Centre. In the new building



Fig 9-6. Bjørn Edwin and Olaug Villanger performing laparoscopic pancreatic resection at a specially designed videoscopi room. Note the large screens on the walls. Courtesy Intervention Centre Oslo Univ Hosp



Fig 9-7. Where is the patient? Modern high tech surgery requires so much technical equipment that it may be difficult to find the patient in the operating room! Scene from the first transapical aortic valve replacement in the hybrid suite with the Siemens Zeego system. Photo Erik Fosse. Courtesy Intervention Centre Oslo Univ Hosp

four large operating rooms for the integration of advanced imaging technology were planned. It was proposed to collect all interventional radiology in the same building to streamline operations and link the interventional radiology closer to the operation theatres and surgery, as image guided surgery and intervention was expected to expand.

The experience of the Intervention Centre has shown that the traditional surgery is changing. Future treatment will require advanced imaging technology and will be technol-

ogy dependent. The role of surgeons is changing and the previously clear distinction between surgery and medicine is in the process of being wiped out.

The rapid development of new, technology dependent surgical and interventional procedures, calls for a dedicated organisation for the introduction of the new methods in clinical practice, and a clearer distinction between routine and emerging treatments.

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Experimental Medicine and Surgery

10. The First Institute for Experimental Medical Research in Norway
– IEMR at Ullevål Hospital
Ole M. Sejersted and Jon Haffner

Institutes for Experimental Surgery

Collected by Ansgar O Aasen

11. Experimental Surgical Research at Rikshospitalet in Oslo
Aud S Dalsegg and Ansgar O Aasen
12. Experimental Surgery in Bergen
Jon Lekven
13. Experimental Surgical Research at St Olav's Hospital, Trondheim
Ronald Mårvik, Hans Olav Myhre and Geirmund Unsgård
14. Experimental Surgery in Tromsø
– from Basement Rats to a Modern Large Animal Facility
Arthur Revhaug



An early heart-lung machine. Photo. Courtesy Medical Museum Ullevål Hospital

10. The First Institute for Experimental Medical Research in Norway – IEMR at Ullevål Hospital

Ole M. Sejersted and Jon Haffner

The first institute for experimental medical research in Norway was established at Ullevål Hospital in 1951. It was the result of a determined effort by Carl Semb to establish a laboratory where research could be carried out to provide a better scientific basis for surgery. The institute will celebrate its 60th anniversary in 2011 and publications about its history has been published at its 25th and 50th anniversaries (1, 2).

Or in Semb's own words: *"The medical sciences have previously been based mainly on experience and observations of diseases by simple means. Now problems are solved much more thoroughly and effectively by exact experimental research in well-equipped laboratories. Medicine has become a technical science which requires comprehensive research institutions."* (1). Our translation.

1948–1951 Carl Semb and Anders Jahre

Carl Semb got his medical degree in Oslo in 1920, and defended his PhD thesis at the University in Oslo in 1929. He got a post-graduate scholarship at the University, and travelled widely in 1931 to 35, gaining insight in international surgery. From 1935 to 1965 he was Chief Surgeon at Dept III, Ullevål Hospital, from 1950 to 1965 also Professor of Surgery.

During World War II he was an active member of the resistance from the start in 1940, he founded, organised and

led Sanorg, the medical services in The Armed Forces, and was appointed Chief Medical Officer of The Norwegian Armed Forces.

He returned to his work at Ullevål in 1948, and immediately started work to establish a research laboratory for experimental surgery. The main problem was to get funding. He was fortunate enough to get the needed support from Anders Jahre, a wealthy shipowner, whom he met in 1948.

In 1950 Jahre made his first donation to medicine, which according to a suggestion from Semb, made it possible to establish the Institute for Experimental Medical Research (IEMR) at Ullevål Hospital in 1951. Additional donations from Anders Jahre's friends made it possible to expand, equip and run IEMR.

Over the years from 1953 to 1961 several other donations of unprecedented magnitude made it possible to establish Anders Jahre's Fund for the Promotion of Science. IEMR has received financial support from the Fund from the time it was established. Jahre decided that part of the revenue from the Fund should be used for Nordic Prizes in medicine, a senior prize which now amounts to NOK 1.000.000, and a junior prize of NOK 400.000. This prestigious prize was first awarded to Asbjørn Følling in 1960, and has since then been awarded to a series of outstanding Nordic medical scientists.

Jahre had also, through a separate endowment in 1960, offered to fund a professorship in experimental medical research at the Institute. The offer was accepted by the University, and the position was established in 1961. Fredrik Kiil was chosen for the job.

“Institute for Experimental Medical Research” – IEMR

Semb's intention was that the Institute should be closely linked to the hospital and its clinical activities, especially surgery. This was also very precisely formulated in the Statutes for the Institute, which in §3 states:

“The intention is to run experimental medical research in co-operation with the clinical work in the hospitals departments. The institute shall, as far as possible, assist the hospitals clinical departments in studies of scientific and practical questions. The institute shall provide the doctors in the hospital with a place to work. Other scientists, preferably from the Scandinavian countries, may be given opportunities to work at the institute.” (Our translation).

He wanted a research institute where clinicians could work closely with other scientists, and when necessary develop new technical equipment which might be useful not only in research, but also in clinical work.

Location and Affiliation

In order to fulfil the intentions it was necessary to establish IEMR close to the clinical departments. Semb suggested that the loft above the operating rooms should be used, and again succeeded. The “Loft” as the IEMR was later called by the hospitals doctors, was rebuilt, and later expanded when the 4th floor of the new “Thulstrups fløy” was added. The location suited Semb's wish, the lab was just a flight of stairs away from the surgical departments.

The institute is still located at 4th and 5th floors of the Surgical Building at Ullevål. The 5th floor has been completely renovated and new operating theatres and facilities which made it easier to use pigs as experimental animal, were opened in late 2010. The institute is now formally both a department of the Clinic for Cardiovascular and Pulmonary Disease at the hospital, and a department of the newly established Institute of Clinical Medicine, University of Oslo.

Leadership and Staff

The first Board consisted of the hospital director, Carl Semb, Hans Jacob Ustvedt (professor of internal medicine), Kristian Kristiansen (chief neurosurgeon) and Ole Jacob Malm (pathophysiology). Semb was elected chairman, and served as the leader of the Institute until 1962, when Fredrik Kiil was employed. Semb continued as leader of the Board until 1966, when Kristiansen succeeded him.

Kiil led the Institute with little interference from the Board, the Hospital, or the University, until his retirement in 1991. He was succeeded by Ole M. Sejersted.

The practical administrative work was initially left to Aud Vogt. She was trained as a nurse, but had also worked practically and administratively in hospital laboratories. Aud Vogt continued with the administrative work until she retired in 1985.

The technical staff has been very important from the start. Bjørn Amundsen was employed in 1951. Both Aud Vogt and Amundsen received “Kongens fortjenestemedalje” in gold, in 1985 and 2000 respectively. Bjørn Kristiansen was hired as additional instrument designer in 1957, and a fully qualified civil engineer Severin Leraand in 1958. Leraand's main task was to develop new electronic equipment for the experimental work, and maintenance of electronic equipment.

Animal experiments require special facilities. The initial arrangement with dogs in the hospital area led to strong protests, and the dogs had to be moved away to Trøgstad in 1961, and Nesodden in 1985. Ove Moen deserves special mention as keeper of animals. He was employed at the IEMR from 1963 to 1992. In addition to looking after the dogs he became an expert in animal experiments, and a very helpful, resourceful assistant. In addition his social skills made him a highly valued member of the staff. He was “head hunted” from the Institute for his skills in 1992.

In 2003 the Institute assumed the responsibility for the animal unit in the Pathology Building. This entailed use of rodents and gene modified mice. With support from The Regional Health Authority it was expanded into a modern phenotyping unit that today comprises a prelini-



Fig 10-1. Activity in “Loftet” in 1951. Courtesy Medical Museum Ullevål Hospital

cal MRI (9.4 Tesla), advanced echocardiography, telemetry, and treadmills. Various experimental models have been developed there to investigate cardiac and skeletal muscle function. From January 2011 the unit was merged with Dept of Comparative Medicine at Rikshospitalet, but the phenotyping facilities are still part of the IEMR.

Economy

The first five years the Institute was run solely on donations. In 1956 Semb had to accept that this was too un-

certain, public ownership was necessary, the Institute had to become a fully integrated part of both the University and Ullevål. Financial support from Anders Jahre’s Medical Fund has continued to be important for the Institute, but a large fraction of the funding of the IEMR is now the result of successful competition for public support from the Research Council of Norway and from the Regional Health Authorities. Important support has also been obtained from the Norwegian Council on Cardiovascular Disease and other private foundations.



Fig 10-2. Carl Semb. Potrait by Agnes Hjort. Courtesy IEMR



Fig 10-3. Fredrik Kiil. Courtesy IEMR

Research at the Institute

The research at the Institute initially focused on renal physiology and circulation, and especially scientific and technical problems related to clinical work. Immunology was an important part from 1962 to 1983. After Sejersted took over as professor renal physiology has been abandoned, and molecular and cellular biology of cardiac and skeletal muscle cells has become more and more important. The focus is now on translational research to understand mechanisms of disease.

The institute has kept a small staff of full time scientists in academic or hospital positions, but much of the work has been carried out by young doctors and MSc candidates working for their theses.

Since 1951 a total of 123 PhD theses have been published and defended. The participation of surgeons is diminishing, at the 50th anniversary 1/3 of the theses had been defended by surgeons, since then only 2 out of 24, but altogether 16 were physicians.

In this report we focus on the work done by surgeons. We have found it natural to present this related to the periods of leadership of the Institute, Semb 1951–62, Kiil 1962–1991, and Sejersted from 1991.

Research at IEMR under Carl Semb's leadership 1951–62

Semb's thesis from 1929 centred on breast cancer (3), and most of his scientific work and international publications up to 1951 were about surgical treatments, especially in pulmonary tuberculosis. However, when the Institute started, his main research interests were renal and cardiac physiology. These two fields therefore became dominant for the first years of the Institute.

Renal Physiology

Semb was also a pioneer in renal diseases, he had carried out a successful resection on a single kidney in 1949 with Ole Jacob Malm as assistant.

Studies on the effect of surgical operations on renal physiology started in 1951. Semb operated dogs, while Andreas Kolberg recorded clearance. Kolberg later used these experiments for his dissertation in 1960. Malm, then consultant at the hospital laboratory, carried out studies on renal calcium clearance, and also defended his thesis in 1960.

Knut Høeg participated in Semb's work on tubercular kidneys, and defended his thesis, "The early forms of renal tuberculosis and the function of the resected kidney" in 1962.

Fredrik Kiil, then specialising in internal medicine, was also doing research at the Institute, studying the function of the ureter and renal pelvis by pressure recordings. His results were published in his thesis in 1957. As a result of Semb's studies on failing kidney function, and an increasing interest and engagement in dialysis in the medical department, Kiil started work on an artificial kidney.

An existing American model, Skeggs-Leonard, was purchased to Ullevål, and Kiil and Amundsen started work to improve it. But it was soon realised that major changes had to be made, and they ended up creating a new model, which was successfully tried out in a patient in 1958. Kiil met Belding Scribner, who invented the arterio-venous "Scribner shunt" at a demonstration of the "Kiil kidney" in Copenhagen, and the treatment of patients with failing renal function became a practical reality. Gradually a dialysis unit was established in the Medical Department at Ullevål, based on treatment with the Kiil-kidney.

It was marketed in Norway and all over the world, and became a scientific and clinical success. Regrettably, the invention was not patented.

There was also room for other projects. Steffen Birkeland was provided with working facilities to finish his thesis on blood volume determination in 1970. Kaare Solheim also did some work on his thesis at IEMR.

Several well-known scientists from abroad visited the Institute. The most famous was probably the American surgeon C. Walton Lillehei, inventor of De Wall-Lillehei's heart-lung machine.

Cardiovascular Research – Circulation

Semb was also very interested in research in peripheral circulation, and technical equipment to monitor both cardiac function and circulation during surgery.

The zoophysiological John Krog was engaged in 1954 to lead the work on peripheral circulation. He was at that time employed at the Arctic Health Center in Alaska, and had experience in studies of circulation at low temperatures, which suited Semb, who had started studies on local cooling of kidneys as part of surgical procedures.

The work on cooling was extended to hearts by Krog, and brain by Kristiansen (3). The equipment developed, especially for peripheral circulation, was actively employed also in clinical work, and used by Sverre Vasli and Gunnar Støren.

As part of the studies on cardiac function, and possibly triggered by the interest in artificial organs at that time, it was decided to buy a heart-lung machine.

A group consisting of Birkeland, Semb, his son Gudmund Semb, Krog, Kjell Johansen and the technician Amundsen, started work on the heart-lung machine project in 1954. The equipment was fully operable in 1956. Only the pump had been bought, the rest was developed at the Institute. The machine was used at the Institute, but not employed in clinical work, possibly because of falling interest in artificial organs, and increasing interest in cooling techniques.

Fredrik Kiil 1962–91

Kiil served as Head of the IEMR from 1961 to 1991. He established renal physiology as the major research area at the Institute. Initially he also led the work on cardiac and circulatory physiology, but the responsibility for this was gradually transferred to Arnfinn Ilebekk. Kiil also recruited Morten Harboe to establish a research group in immunology.

Kiil's policy was first of all to carry out high quality research. In addition he wanted to provide young doctors with the opportunity to learn scientific methods and carry out scientific experiments under expert guidance. His leadership, and methods for running the IEMR, with careful recruitment of both seniors and juniors, regular project and literature meetings, and most of all, strict individual follow up and guidance, brought impressive results. True to Semb's ambitions, he established the IEMR as one of the leading research institutes in the world, and many of the doctors who carried out their thesis work at the Institute later became leaders in Norwegian medicine. Kiil brought impulses from his own training in Dallas, and it is fair to say that he introduced professional supervision of research fellows to Norwegian science.

In addition to the experimental work on renal, cardiac and circulatory physiology, Kiil also provided some young cli-

nicians with working facilities and guidance which made it possible for them to finish their thesis in other fields. Among them was Lars Semb, Carl Semb's youngest son, who completed the thesis "Studies on inhibition of gastric secretion" in 1969.

Another surgeon was Snorre Aune who defended his thesis "Peritoneal permeability" in 1970. Aune later led a group that carried out experiments and developed methods which made it possible to perform the first human liver transplantation in Norway in 1971. The group, which consisted of Aune, Gunnar Schistad, Andreas Skulberg, Morten Ræder and Mons Lie, had trained for the procedure at the Institute in cooperation with a group led by Audun Flatmark at Rikshospitalet.

The most notable senior research worker in Kiil's period was Ragnvald Ingebrigtsen, former head of surgery and professor at Rikshospitalet, who carried out experimental work and wrote scientific papers until the age of 93!

The collaboration between the institute and the Dept of Gastrointestinal Surgery was very close for many years. In Kiil's period this resulted in a series of PhD theses.

Ansgar Aasen who later became Head of the Institute for Surgical Research at Rikshospitalet, was mentor for three surgical PhD candidates at the Institute, Tom Erik Ruud, Olav Røise and Frode Næss. Torstein Lyberg mentored Ellen Schlichting who defended her thesis in 1995.

Renal Physiology

Renal physiology was Kiil's main interest, and it was especially in this field he and IEMR achieved international fame. Kiil was interested in several aspects of renal physiology comprising control of renal blood flow, regulation of renin release, and tubular reabsorption. Control of renin release was coupled to autoregulation of renal blood flow, and bicarbonate reabsorption was shown to be the main driver of proximal tubular reabsorption.

His mentoring resulted in a series of dissertations, several of them by surgeons, Einar W Løyning Mons Lie, Morten G Ræder, Jan Johannesen, Øystein Mathisen, Tom Monclair, Øyvind Langård and Pål Aksel Næss.

Arnfinn Ilebekk 1974–2011

Kiil was also the driving force in research in cardiac and vascular physiology, which had been initiated by Semb. The first thesis was defended by Bjørn Bugge-Asperheim in 1974. In cooperation with Leraand and Kiil he developed ultrasound equipment for measurement of cardiac contractions. This has become standard equipment all over the world, but again it was never patented. Gradually through the 80ies Arnfinn Ilebekk took responsibility for this activity, which has resulted in a series of eminent PhD theses and formed the basis for the current activity at the Institute. Ilebekk's main interests have been cardiac mechanics and control of inotropy, and effects of ischemia on cardiac function and metabolism. He has been mentor or co-mentor in a series of dissertations presented by surgeons, including Jon Lekven, Jørgen Thorvaldson, Øystein Vengen, Odd R Geiran, Gunnar Aksnes and Ole Tjomsland.

Two non-surgeons from this period deserve to be mentioned because their work at the IEMR and later has been of crucial importance for cardiac physiology in Norway. Ole Danbolt Mjøs was research fellow at the IEMR 1967–72. He defended his thesis: Effects of Free Fatty Acids on Myocardial Metabolism and Performance in 1972, then worked as research fellow in San Francisco and Edinburgh, before he became associate professor in physiology in Tromsø.

John Kjekshus was a research fellow at IEMR 1963–69 and at the University of California 1969–70. He returned to the IEMR as a University employee (prosektor) 1970–72. From then on he worked in clinical cardiology, combining clinical and experimental research. He presented his thesis: Factors influencing infarct size following coronary artery occlusion in 1975.

Morten Harboe 1962–1983

Morten Harboe was recruited by Kiil because he realised that immunology would be crucial in the development of transplantation surgery, and the work on the artificial kidney had shown that future treatment of patients with failing renal function ought to be renal transplantation rather than dialysis. The first renal transplant in Norway was carried out by Leif Efskind at Rikshospitalet in 1956, but the first successful renal transplantation with a living donor was carried out at Ullevål in 1963 by Richard E



Fig 10-4. Ole Jakob Malm. Courtesy IEMR



Fig 10-5. Morten G. Ræder. Portrait by Rolf Groven. Courtesy IEMR

Wilson from Peter Bent Brigham Hospital with Semb as assistant. The first liver transplantation was carried out by Snorre Aune at Ullevål in 1971.

Through several years Harboe built a strong group with a prominent international position in immunology and leprosy research. His group became more and more independent on the rest of the activity at the IEMR, and he also got engaged in establishing the Leprosy Center in Ethiopia.

Erik Thorsby was one of Harboe's PhD candidates who did his thesis work at the Institute. Thorsby later moved to Rikshospitalet where he established Institute of Transplantation Immunology (ITI) which in 1999 merged with Institute of General and Rheumatological Immunology (IGRI) and is now Institute of Immunology Rikshospitalet. His work has been of critical importance for the development of transplantation programmes in Norway.

Immunology was abandoned at the IEMR when Harboe moved his group to Rikshospitalet and joined IGRI in 1983. Jan Ludvig Svennevig, who later became a cardiothoracic surgeon, did his thesis in Harboe's group, as did Erik Fosse and Oddvar Moen.

Ole Jakob Malm

The first professor of surgical pathophysiology in Norway was Ole Jakob Malm. He had started his surgical training at Aker in 1938, but was forced to flee the country in 1942 due to a leading role in the resistance in World War II. He returned to surgery at Ullevål Hospital in 1945, but immediately started research, which was carried out partly at the IEMR, partly at the Central Laboratory. He left for USA in 1954, where he worked in leading roles in medical research, but returned again to the IEMR in 1961. From 1963 he was consultant in surgical pathophysiology at Surgical Department II at Ullevål. Malm was appointed professor in 1965. He retired in 1982.

Morten G. Ræder 1982–2009

Malm was succeeded by Morten G Ræder, who was then a consultant in gastrointestinal surgery at Surgical Department II at Ullevål, a position he maintained even after he was appointed professor.

Ræder joined the staff of the IEMR in 1982. He has since supervised his own group investigating mechanisms for biliary and pancreatic secretion. Ræder introduced sophisticated techniques for cellular work and live cell imaging

of intracellular pH. He later investigated the toxicity of bilirubin and the mechanisms of intrahepatic cholestasis. This included screening for altered gene expression profiles. Ræder retired in 2009 and was succeeded by Ivar Sjaastad.

Ræder mentored the dissertations of four surgeons: Trond Buanes, Olaug Villanger, Bjørn Atle Bjørnbeth, and Knut Jørgen Labori, one anesthesiologist, Terje Veel, and a professor of statistics, Tom Grotmol.

Petter A. Steen 1982–today

Professor of Anesthesiology, Petter A. Steen, continued the work started by Semb and Kristiansen on postoperative changes and effects of cooling on the central nervous system (4), and has supervised research activity relating to heart and lung resuscitation since 1982. Steen has supervised several anesthesiologists, (more than 15 PhD dissertations) and his group has achieved an excellent international reputation. During a quality-assessment process of clinical research at the University of Oslo some years ago, the leader of the panel uttered after Steen's presentation: "Don't you think your group is the best in the world in this field?"

Steen's group has established a National Competence Center for pre-Hospital Acute Medicine (NAKOS)

Ole M Sejersted 1991–today

Ole M. Sejersted was appointed professor and head of the IEMR in 1991. Since then, the focus has shifted to cardiovascular research in addition to continued activity in biliary and pancreatic research. Cellular and molecular biological techniques were introduced. The Institute now has four research groups headed by Christensen, Sejersted, Ilebekk and Steen. Ivar Sjaastad has been appointed professor, with special responsibility for imaging techniques, including preclinical MRI and echocardiography. In addition Senior Scientist Preben Morth from The Center for Molecular Medicine Norway holds an adjunct position at the IEMR.

Other investigators from Ullevål also use facilities at the Institute for their research. Thus, professor Jarle Vaage has had a laboratory at his disposal for some years and



Fig. 10-6. Professor Ole M. Sejersted.
Courtesy IEMR

professor Theis Tønnessen is collaborating closely with the Institute. Several other groups from various medical departments similarly make use of the facilities at the IEMR.

The IEMR is now a biomedical research institute dedicated to translational research. The emphasis is on the cardiovascular system and skeletal muscle, and pre-hospital acute medicine.

Sejersted and his group have established cellular electrophysiology as a main technique and is combining this with live cell imaging using laser scan microscopy. This gives a tool to investigate the electromechanical coupling of cardiac cells. It has become clear that in failing hearts this coupling is disrupted, mainly because of remodeling of the fine cellular architecture.

Geir Christensen 1993–today

Geir Christensen who took his PhD with Kiil and Ilebekk as mentors was later recruited for a permanent position. He was appointed Director of Research in 1998 and professor in 2003. His group is focusing on pathological growth of the heart and signals that control this process. They have also investigated the role of inflammation in heart failure. Christensen has been a driving force behind introduction of rodent models of disease and an extensive use of genetically modified mice. Especially he initiated a project that resulted in a patented mouse model in

which the key calcium pump in the cardiac cells can be knocked out in adult mice. He has been the main mentor of two PhD candidates who have pursued surgical careers, Tønnessen with Ilebekk as co-mentor, and Per Reidar Woldbæk with Tønnessen as co-mentor.

The Institute has been instrumental in establishing a regional network called Center for Heart Failure Research that comprises 13 research groups. The Center receives funding from the University of Oslo (as a runner-up for a Center of Excellence in 2006) and from the South-Eastern Regional Health Authority, and is currently headed by Christensen. The Center has established a PhD School of Heart Research that now has about 100 enrolled students.

Conclusion

In conclusion it may be said that the activities at the IEMR have corresponded to Sembs intention; *“is to run experimental medical research in cooperation with the clinical work in the hospital’s departments”*.

Carl Semb and Fredrik Kiil were pioneers, they created a model for other research institutions, such as the Institutes for Experimental Surgical Research at Rikshospitalet, and the Universities of Bergen, Trondheim (NTNU) and Tromsø.

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11. Experimental Surgical Research at Rikshospitalet in Oslo

Aud S. Dalsegg and Ansgar O. Aasen

Soon after World War II there were incredible developments in practical surgery throughout the world. Rikshospitalet was, however, one of the few state owned university hospitals in Europe that did not have its own surgical research institute. In 1953 the heads of the two surgery departments at the hospital decided to establish a surgical research laboratory.

Nearly ten years passed before their efforts produced results. In 1962 a generous donation of one million NOK was given by The Norwegian Society for Fighting Cancer to enable the University of Oslo to establish the Institute for Experimental Surgery. Leif Efskind, head at the Department of Surgery A at Rikshospitalet, was temporarily appointed director of the Institute.

A few years later the Norwegian Society for Fighting Cancer also donated a large sum of money for the establishment of the Institute for Surgical Pathophysiology. This institute was connected to the Department of Surgery B at Rikshospitalet and headed by Bjarne Fretheim. Wisely, Efskind and Fretheim decided to combine their resources to establish a single institute, the Institute for Surgical Research. Egil Amundsen, who had trained as a surgeon and a physiologist was appointed leader of the new institute in 1966.

Several competent researchers quickly became connected to the Institute, and Amundsen's open-minded strategy yielded excellent research.

Sten Sander was the first who completed his doctoral thesis at the Institute for Surgical Research in 1969. He questioned the role of oestrogen, a female sex hormone, in the development of breast cancer. Using rats and radioactive labelled hormones, he found that the female hormone oestradiol accumulates in the breast lymph nodes. Today the use of medication that inhibits oestradiol production in the ovaries, is a common treatment strategy used to prevent a relapse of this type of cancer.

After eight years, a total of eight doctoral theses had been published from the Institute by Sten Sander, Egil Ofstad, Kjell Tveter, Arne Trippstad, Olav Unhjem, Bjarne Semb, Arnt Jakobsen, and Ragnar Nesbakken. Anstein B. Bergan became the first amanuensis (assistant professor) at the Institute and went on to perform an extensive experimental study on bilirubin metabolism in cholestatic states.

Orthopedic Research

Experimental orthopedic research also developed in the early years of the institute. In 1974 Pål Benum was the first to conclude his PhD, defending his work on autologous transplantation of apophyseal cartilage to osteochondral defects in 1974. In the following years he was followed by Norvald Langeland, Einar Sudmann, Lars B. Engesæter and Arne Ekeland, who went on to become leading professors in orthopedic surgery.



Fig 11-1. Leif Efskind. Portrait by Agnes Hiort 1966. Courtesy Rikshospitalet



Fig 11-2. Bjarne Fretheim. Portrait by Bjarne Engebret 1967. Courtesy Rikshospitalet

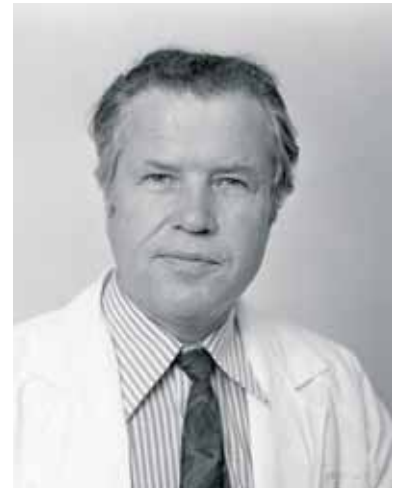


Fig 11-3. Egil Amundsen. Courtesy Institute for Surgical Research, Rikshospitalet

Research on Proteases, Sepsis and ICU Medicine

Early in the 1970ies Amundsen began developing new methods for measuring enzymes. This project was done in close cooperation with Michael J. Gallimore and Ansgar O. Aasen. Working with the chemist Lars Svendsen they quickly laid the groundwork for developing new methods, based on the use of chromogenic substrates, that are today used routinely for the measurement of a variety of proteases. The Institute for Surgical Research has, for several decades, been internationally prominent in this field of research. Using these methods Aasen and his research group developed extensive research activities in surgical intensive care medicine focusing on the problem of increasing numbers of patients with sepsis and organ failure in the ICU. Within a short time the research group published very interesting results and became an internationally recognised leader in this area of research.

During the seventies Johan Høie and Morten Kveim also focused their research on problems in surgical ICU medicine and defended their PhD theses from the Institute on thrombin-induced intravascular coagulation and the acetate ion as a source of base respectively.

Development of the Ultrasound Method

In the 1970ies and 80ies researchers from the Institute made several important medical advances:

The development of the ultrasound method in the institute is a brilliant example of what interdisciplinary co-operation can accomplish. The projects that made up this major medical advancement required the skills and knowledge of doctors and engineers with various backgrounds. Key people from various departments at Rikshospitalet participated in the project. A group that consisted of Karl Victor Hall, Christian Cappelen, Helge Nornes, Egil Amundsen, and Lars Walløe began studies that used ultrasound in blood flow measurement. In addition, Rune Aaslid and Sven Øivind Wille were important as they contributed to an understanding of the principal technology. Jarle Holen, a radiologist who had a background in aeroplane engineering at the Boeing factory in Seattle was also an important contributor to the development of the Doppler apparatus. Doppler ultrasound became an industrial fairy tale for the company Vingmed Sound A/S. The company was founded in 1985 based on it launch of its first echocardiograph machine, the CMF-700, an ultrasound apparatus. The groundwork in medical research at both Rikshospitalet and the Regional Hospital in Trondheim made this development possible. Today, the company is a large exporter of ultrasound equipment and other medical technological equipment and has become a part of General Electric.

A new Heart Valve

In the 1970ies, head of the Surgery Department A, Karl Victor Hall, decided together with Arne Wøien, the man behind Vingmed, to make a Norwegian heart valve; "I'll pay the party", said Wøien, who employed the engineer Bob Kaster who for some time commuted between Norway and The United States. Over 40 dogs were given heart valve implants and were post operatively monitored by nurses on the intensive care unit.

In 1977 the first implant was carried out on a 74 year-old man. It functioned perfectly and ten years later the patient was able to report to the doctors that he was active and in good health. This cardiac valve was then marketed world wide, and 40 years later it is still an internationally leading valve implant of choice.



Fig II-4. The Medtronic-Hall heart valve prosthesis

First Heart Transplant in Norway

Inspired by Christian Barnard's heart transplantation surgery in South Africa in 1967 – the world's first heart transplant, Efskind, Head of Department of Surgery A at Rikshospitalet wanted to do the same in Norway. At the Institute for Surgical Research there was already ongoing studies in this field led by Audun Flatmark, who also started the first national kidney transplant programme at Rikshospitalet in 1969.

The preparation for the first heart transplant was done in secret at the Institute, and in the autumn of 1983 the path was clear and the team led by Tor Frøysaker, received a donor in November that matched a patient on their waiting list.

The transplantation was a success and received much media attention.

In the early 1980ies experimental work was also carried out on pancreatic transplantation by Inge B Brekke. During the same period Arne Bakka carried out his PhD thesis on metallothianin.

A new Chapter at the Institute

Ansgar O. Aasen took over as director of the Institute for Surgical Research after the legendary Egil Amundsen in 1991. He brought vast research activities in surgical infection and intensive care medicine to the Institute. Several

PhD theses were concluded within the next few years, and the research in the institute received great international attention.

Examples of excellent research results during the last two decades are new developments in ultrasound technology, such as Strain and Strain Rate measurements from a project led by Otto A. Smiseth. The results of the project have given doctors a Doppler ultrasound based tool that makes possible the evaluation of blood flow and vitality of damaged cardiac muscle tissue. This technology is used to assess the treatment results of opening constricted blood vessels in the acute treatment of myocardial infarction.

Ola Didrik Saugstad started work at the Institute in the early 1970ies. He discovered that resuscitation with 100% oxygen damaged the lungs in newborn experimental animals. Room air, which contains 21% oxygen, was far better. Several clinical studies on newborn infants confirmed this. Today many hospitals worldwide have stopped using 100% oxygen to resuscitate.

Further examples of excellent research are activities in the field of orthopedic surgery led by Lars Nordsletten on osteoporosis and bone fracture healing, and on articular cartilage transplantation led by Lars Engebretsen. Today articular cartilage transplantation is a clinical treatment alternative, and research in this field has applied the most current molecular biological principles to cultivate

cartilage cells. The research group is now in the process of replacing cartilage cells with mature stem cells. Engebretsen predicts that in a couple years this method of utilising stem cells will be ready to use on humans.

A third example is based on modern computerised technology and mediator research. The interdisciplinary cooperation between two very different fields of research has resulted in a data based system called EWICUM (rapid evaluation of critically ill patients), which is used for monitoring patients on the intensive care unit. The main ideas leading to the EWICUM™ monitoring system came from Aasen and Ola Sveen, Department of Physics, University of Oslo. They have since 1993 collaborated on the use of computers connected directly to advanced analysing equipment.

Early in the 1990ies Smiseth and Aasen took the initiative to establish a molecular biological research team at the Institute for Surgical Research. Håvard Attramadal, who at that time working in a top international team at Duke University in North Carolina, was invited to lead this new research group. Having such excellent competence in this field has strengthened the Institute's role as a collaborator with the clinical departments at the hospital. Attramadal has during few years established a successful and internationally leading group on molecular mechanisms in cardiac insufficiency.

Stem Cell Research

Iver A. Langmoen was already an active researcher with his own laboratory when he at the end of the 1980ies started to work at the Institute. His group was first to demonstrate that it is possible to transform immature progenitor cells from the adult human ventricular zone into functional neurons, i.e. cells with typical neuronal action potentials and the ability to communicate through synapses.

Stem cells from the adult human brain develop into glial cells and neurons – the principle building blocks of the brain (Fig 6). Early on the cell membrane is passive (seen in Fig 6 at day 5 of differentiation). Later they sequentially express K⁺-channels (causing the rectification in the response at D7), small Ca⁺⁺-driven action potential (D10) and then gradually mature Na⁺-driven action potentials (D15-28) (Moe MC et al Brain 2005).



Fig 11-5. Ansgar O. Aasen. Courtesy Institute for Surgical Research, Rikshospitalet

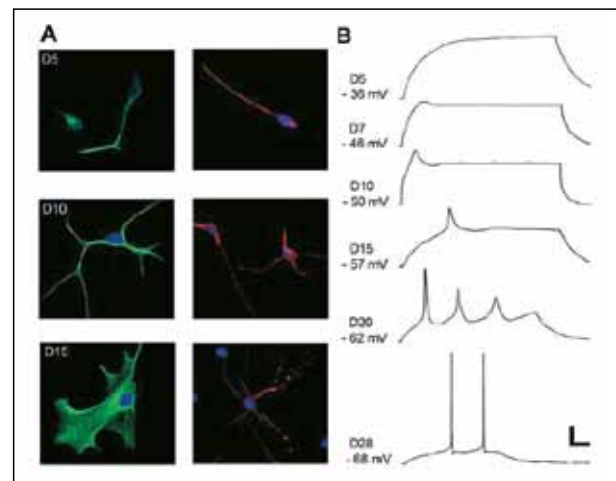


Fig 11-6. Stem cells from the adult human brain
A. Cells differentiating into astrocyte (GFAP+, green) and neurons (MAP2+, red) at day 5, 10 and 15 of differentiation.
B. Cells differentiate into functional neurons over the course of 4 weeks.

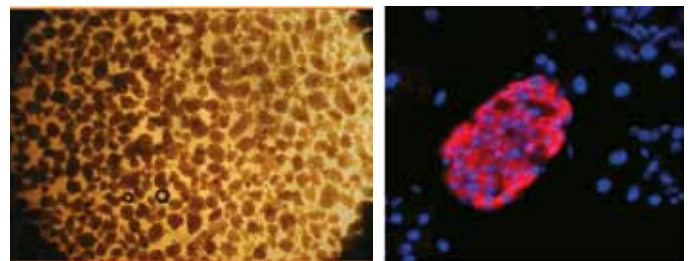


Fig 11-7. Isolated and purified islets from the pancreas (left)
Fig 11-8. Immunofluorescence for insulin (red)
The illustrations are generously provided by Hanne Scholz, PhD

Using rats with a selective lesion of the hippocampus CA1-region (a small part of cerebral grey matter), Håvard Ølstørn and Morten Moe in Langmoens group recently demonstrated that stem cells from the adult human brain are not only able to survive in the rat brain, but also selectively target and migrate to the area with the lesion.

Organ and Cell Transplantation

During the last few years Research Head of Department of Surgery, Pål-Dag Line and the transplantation surgeon, Aksel Foss, have established research groups in the Institute. Line and his co-workers focus on gene activation and immune modulation in organ transplant rejection – studying what occurs early in the process in the endothelium. Various reactions occur after a foreign organ enters the body. The aim is to find a way to increase the body's tolerance for the new organ.

Aksel Foss' research group works on the transplantation of insulin producing cells (islet transplantation) to patients with type 1 diabetes. In this work there is little distance between the research and the patient. The knowledge gained in the laboratory is immediately used to better the patient's situation. Once implanted, the beta cells in these islets begin to make and release insulin. In April 2001, insulin producing cells were transplanted into a 54 year old man with type 1 diabetes by Foss and co-workers – the first Norwegian patient.

High Ambitions

Today, the Institute can look back at more than 45 exciting and demanding years as an institute that has developed greatly through these years. The Institute for Surgical Research's impressive results is seen also in the quantity and quality of their published articles and the impressively



Fig II-9. Doctorial candidates at the Institute for Surgical Research. Courtesy Institute for Surgical Research Rikshospitalet

high number of doctoral dissertations from the Institute. On the average over a period of more than four decades the Institute has had a doctoral dissertation every third or fourth month, and more frequently in recent years.

Since the start in 1966 a total of 146 PhD dissertations have been published, with a maximum of 17 in the year 2001.

From the first day the Institute had the highest ambitions to act as a research institution in the front line internationally, and to serve the hospital to the very best for the patients. Now located in modern locations in Rikshospitalet at Gaustad, the future is met by the Institute with satisfaction and enthusiasm because it has kept up with many of these high aims and have a prominent place in the front line in several fields of research internationally.

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Acknowledgements

The authors and editors would like to thank Morten Ræder for comments to the manuscript.

12. Experimental Surgery in Bergen

Jon Lekven

The first experimental surgical research projects in Bergen can be traced to the early 1960ies when Jon Anton Johnson and Audun Flatmark, then young residents, studied bone healing in rabbits. The experiments were performed in the dark basement of the old hospital from 1919 under rather primitive laboratory conditions. They both defended doctoral theses on this subject and became later leading professors of surgery in Tromsø and Oslo, respectively. The projects performed by the two pioneers did, however, not establish a lasting surgical experimental research activity in Bergen.

It was not until Peter Heimann was called upon as professor of surgery to Haukeland in 1970 that the situation changed completely. Heimann arrived from Gothenburg and had a clear vision for his strategy as a leader. He was convinced that high quality of clinical performance at a university clinic highly depended on experimental training and research in animal models. At the time, he stated the following in an interview: “We have an immediate need of facility for animal experiments at the Department of Surgery in Haukeland Hospital. From my side it was an absolute condition for acceptance of coming to Bergen that facilities for animal experiments were established – and I received confirmation in writing that this was a new initiative with high priority”.



Fig 12-1. Peter Heimann. (Artist: Bjørn Tvedt). Courtesy UiB, Section for Photo and Visual Presentation

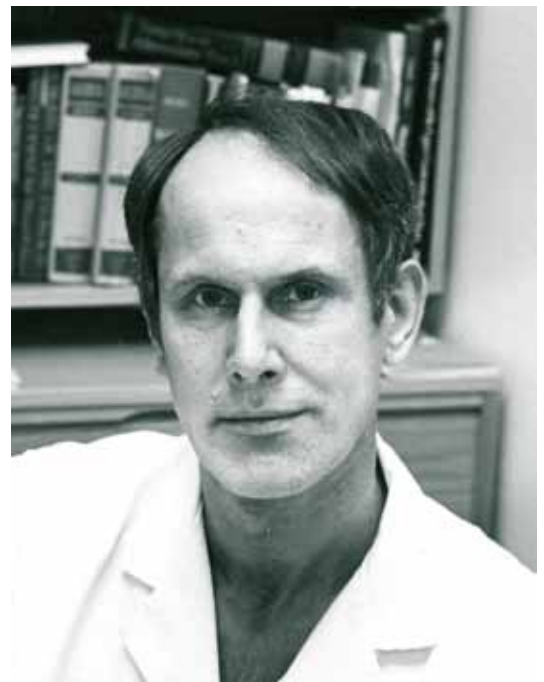


Fig 12-2. Knut Svanes. Private photo.



Fig 12-3. Jon Lekven. Courtesy Haukeland University Hospital.



Fig 12-4. First left ventricular pressure-length loop generated in Norway, 1980. Photo Knut Matre.



Fig 12-5. Ketil Grong. Courtesy Haukeland University Hospital.

With Heimann, a very active time started at the Department of Surgery. Already in 1972 the Surgical Research Laboratory was established, and Knut Svanes was appointed as its first leader. Svanes was trained in both gastrointestinal surgery and pathology, as well as at the University of California, San Diego. During the years he initiated and performed several studies on the mechanisms of gastric ulceration and healing of such injuries. During his supervision five doctoral theses on this subject were concluded and defended. Local ischemia was identified as a central component in the disease mechanism, and the concept 'adaptive cytoprotection' was defined and characterised – highlighting the importance of a minor ischemic episode preceding exposure to an erosive agent in reducing destruction of the gastric mucosa; paradoxically, ischemia turned out to be protective.

In 1977 Peter Heimann recruited Jon Lekven as associate professor of experimental surgery at the Department of Surgery at Haukeland. Lekven had been trained at the University of California, San Francisco and in cardiac surgery at Ullevål and brought several new methods to the Surgical Research Laboratory. He remained leader of the Laboratory until 2009. His main research focus was microcirculation of the myocardium, which was studied with microspheres and ultrasound technology in particular. The studies provided important information on intervention of coronary stenosis and occlusions.

Significant progress was achieved when professor Knut Matre, then a young M.Sc. from Scotland, came on board with ultrasound expertise. His contribution added much to obtain detailed analysis of disturbed myocardial contraction patterns. Altogether eight doctoral theses were completed during the years under Lekven's tutorial. Also professor Leidulf Segadal and Matre made sophisticated analyses of blood flow pattern in the ascending aorta, with and without implanted valve prostheses.

In later years professor Ketil Grong carried the research line further and studied cardioplegia and the phenomenon of preconditioning with a group of research fellows. A central research question to be studied was how an ischemic area also affects neighboring myocardium in terms of disturbed pump function and what could be done to minimise such effects.

The Surgical Research Laboratory was available for all specialties in need of experimental models. One group extended studies by Knut Aukland on the fundamental mechanisms of edema formation, and translated this into several important clinical applications. Professor Paul Husby and a group of research fellows within anesthesiology conducted a long series of studies on the effects of different cardiopulmonary bypass modes on development of edema in various organs, notably the heart, lung and brain – and how to prevent it. Also, the cardiologist Jan Erik

Nordrehaug made extensive studies of various coronary stents implanted in pigs.

Another substantial series of experiments were performed within orthopedics by professor Anders Mølster and research fellows. They studied how the mechanical properties of implants influenced bone healing following experimental fractures in rats. It was demonstrated that an intramedullary implant should preferably have the flexibility to allow some movement at the fracture site, except rotation. Stiff, rigid nails clearly impaired the natural healing process. Also a series of various experimental studies in plastic surgery were performed on skin grafting and tissue banking in the 1980ies.

Altogether 33 doctoral theses on experimental work at the Surgical Research Laboratory have been conducted and 295 papers have been published in international peer-reviewed scientific journals during the years 1970–2010.

Biomaterials

An interesting line of experimental research has its roots back to the late 1980ies when Mølster met with an innovative dentist, Nils Roar Gjerdet, who had expert knowledge of dental biomaterials. They started a series of studies on biomaterials for implantation, like nails, with varying mechanical properties. This fascinating and fruitful coupling of orthopedic and odontological expertise developed into research on exposure to trace elements and biological response to implants where nanoscience techniques were utilised. Cooperation with the National Arthroplasty Registry includes a retrieval bank for similar analysis of implant failures in the clinical setting. The cooperation led to creation of the Laboratory for Biomaterials which was formally established in 2009 when it was made room in the new laboratory building at the Haukeland University Hospital next to the Surgical Research Laboratory.

Facilities

The Surgical Research Laboratory resided in rather primitive physical environments for many years, first in the old hospital building, later in a provisional house, then in the central hospital block. Under these limited conditions, animals larger than cats could not be used. After a two-decade long struggle for acceptable facilities, a new research building – the Vivarium – was finally completed in 1993, which provided modern laboratory and operating rooms for experimental animal studies.

In this new environment the Laboratory was equipped with excellent facilities for surgical research in large animals like dogs and pigs as well as facilities for proper animal care with veterinary support. In 2009 those parts of the Laboratory, which did not include operating rooms, again had to move, now from the central hospital block to the new laboratory building on the hospital campus. In this modern and multidisciplinary research complex, the Laboratory has become an integrated element at the restructured University Hospital. This has provided the Laboratory with broad access to several other research laboratories representing new techniques, notably on cellular and molecular biology, ultrasound and imaging methods. The new setting is very promising for experimental surgical research in Bergen for the years to come.



Fig 12-6. Vivarium 1993. Photo: Statsbygg

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Acknowledgements

The author and editors would like to thank Ansgar Aasen for the primary editing of this manuscript.

13. Experimental Surgical Research at St. Olav's Hospital, Trondheim

Ronald Mårvik, Hans O. Myhre and Geirmund Unsgård

Trondheim has through many years been the main centre for education and research in technology in Norway. It was therefore expected that the establishment of the Faculty of Medicine at the University in Trondheim in 1974 would contribute significantly to research in medical technology in Norway. Experimental research in orthopedic surgery was certainly among the activities that could benefit from cooperation with the departments of technology at NTNU (Norwegian University of Science and Technology). However, during the first years following the establishment of the Faculty of Medicine, development of systems for education of medical students and specialists within the field of orthopedic surgery had to be given priority. Hence, some years passed before the department was able to establish significant experimental research activities. During the 1980ies and 1990ies there was a gradual increase in such activities. Following research during the 1990ies, which led to the development of customised femoral stem prosthesis, the Norwegian Orthopaedic Implant Research Unit was established at the Orthopedic Department in 1998. At this unit, which includes a biomechanical laboratory, orthopedic experimental research is performed in cooperation with various research groups from the Faculty of Engineering, Science and Technology. Pål Benum was the first leader of this unit. In 2006 he was succeeded by Olav A. Foss.

Experimental research activities have so far contributed to a total of ten doctoral theses at the Orthopedic Depart-

ment. Terje Terjesen was the first to present a PhD based on experimental research in 1984. Since then the following researchers have presented a PhD which has been totally or partly based on experimental research: Lars Engbretsen 1990, Torbjørn Grøntvedt 1996, Arild Aamodt 1999, Eivind Witsø 2004, Sébastien Muller 2005, Lars Fosse 2006, Olav O. Foss 2008, Knut B. Lunde 2008, Sune Hansborg Pettersen 2009.

At present five PhD studies based on experimental research are performed at the Norwegian Orthopaedic Implant Research Unit.

Vascular Experimental Surgery

At our unit for experimental surgery, a pig model was established to investigate cerebral haemodynamics and cardiovascular effects of descending thoracic aortic cross-clamping. Three PhD-theses were based on this model. The background was that patients with thoracic- and thoracoabdominal aortic aneurysms were operated by using cross-clamping of the aorta. Later this technique has been supplemented with extracorporeal circulation.

An increase in cerebrospinal fluid pressure has been observed during cross-clamping of the thoracic aorta. In the pig model we measured microcirculation of the spinal cord by laser Doppler flowmetry. Variation in cerebrospinal fluid pressure significantly influenced the microcircu-



Fig I3-I. St. Olav's Hospital 2010 from the air

lation of the cord, and removal of cerebrospinal fluid lead to a significant increase in spinal cord flux. This supports the theory that removal of spinal fluid during cross-clamping of the aorta can increase the perfusion pressure to the cord and thereby also improve its blood supply.

Investigations were also performed to explore the mechanism behind the increased cerebrospinal fluid pressure observed during aortic cross-clamping. The cerebrospinal fluid production was not increased. An investigation using MRI showed that the ventricular volume decreased during cross-clamping, but no cerebral oedema was observed. This supports the theory that there was an increased intracranial blood volume during cross-clamping of the aorta.

Duan Chen coming to St. Olavs Hospital

In 1999, Duan Chen was recruited from the University of Lund, Sweden to become a full professor in Experimental Surgery at the Department of Intra-abdominal Diseases (including Surgery). Since then, he has established an active research group to develop appropriate rodent models for understanding physiology and pathophysiology pertinent to human diseases and surgery, and his research has been continuously supported by the Research Council of Norway and the St. Olavs' Hospital Foundation for Cancer Research.

A series of original research articles (>10) dealing with how the genotype determines the phenotype and how

mutation in a given gene affects development of diseases have been since published in the most prestigious journals in the field.

Since 2006, his group has developed a paradigm of bariatric surgical models with relevant laboratory tests, such as a comprehensive laboratory animal monitoring system. The initial results have been published in the international peer-reviewed journals.

His work has been well recognised internationally, as reflected by the fact that he has been a member of editorial board of American Journal of Physiology (Gastrointestinal and Liver Physiology) since 2003, and many other international engagements.

He is also active in organising international meetings, e.g. International Symposium on Gastrin was held in 2006 at Trondheim and several international distinguished scientists, including Nobel Prize laureate Sir James Black, attended the meeting.

PhD theses made in his group have also been recognised. Björn Stenström was hired as a research fellow by Nobel Prize laureate Barry Marshall, immediately after he defended his thesis in 2006. PhD work in his group includes also translational and clinical research on urinary bladder cancer, thoracic and cardiovascular surgery.

Laparoscopy and 3D Ultrasound

The National Centre for Advanced Laparoscopic Surgery opened in 1996 and has since focused on education and research in the field of advancing laparoscopic surgery. The Centre has together with NTNU and SINTEF developed new tools like a handle displaying tactile information from the tip of the grasper, and new more ergonomic handles. The Centre has also done experimental research within the field of microcirculation during laparoscopy, anti-pacing technology on the vagus nerve in obesity treatment, experiments on NOTES (Natural Orifice Transluminal Endoscopic Surgery) testing two kinds of safe closure of the gastrointestinal wall, tests on electro-medical instruments and the spread of heat, calculating the risk of penetration.

A number of technical and clinical PhD students have been associated with the centre, and more than 50 scientific papers have been published.

The National Centre for 3D Ultrasound

The National Centre for 3D Ultrasound has been a fruitful interdisciplinary research environment between surgeons and clinicians in the fields of laparoscopy, neurosurgery and vascular surgery, together with technological researchers from NTNU and SINTEF. The research activity has involved experimental surgery, and has resulted in more than 60 scientific papers, received 12 awards, and a number of patents. The main focus of the Centre has been

medical and molecular ultrasound, CT and MR imaging used pre-, intra- and post-operatively combined with advanced navigation and multimodal visualisation, and display technology for accurate therapy guidance inside the patient. Based on prototype technology and scientific and clinical studies the Centre has demonstrated solutions for tomorrow's patient treatment.

Experimental Surgery, Neurosurgery

In 1994 Geirmund Unsgård contacted professor Bjørn Angelsen who was a leader of the ultrasound group at SINTEF, in order to improve quality of ultrasound applied during brain surgery in particular during surgical procedures for brain tumors. This was met by great enthusiasm from several of the engineers of Angelsen's research group, and the development of a new concept started in order to establish high quality ultrasound in neurosurgery.

A small ultrasound probe was applied in the cavity after tumour removal in order to detect remaining tumour tissue. This was followed by development of global orientated ultrasound picture covering the whole operation field. During this work the idea was launched to combine ultrasound and navigation to create a three dimensional ultrasound volume with navigation. The idea was patented. Further research in this direction was organised through the competence centre for 3D ultrasound which is a cooperation between NTNU, SINTEF and St. Olavs Hospital.

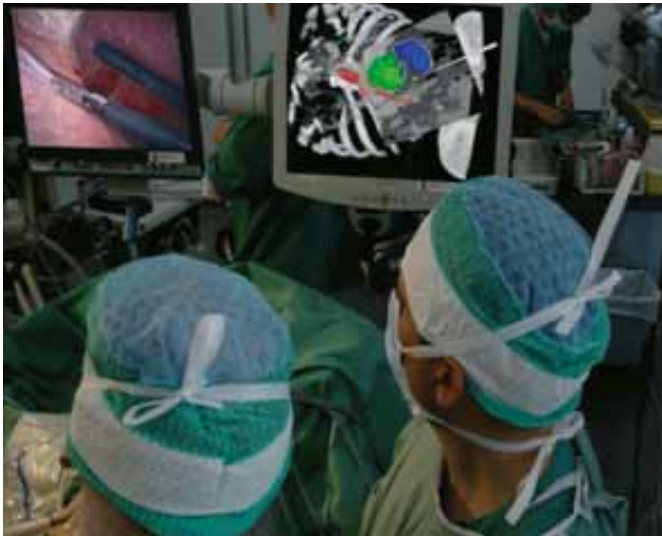


Fig 13-2. 3D ultrasound in use at St. Olav's Hospital



Fig 13-3. Ronald Mårvik, MD, PhD

In 1998, two of the engineers, Åge Grønningsæter and Atle Kleven left the research group and formed a commercial company marketing the ultrasound device named SonoWand. This instrument, based on 3D ultrasound, is produced for intra-operative imaging and navigation. SonoWand is today in use in many countries all over the world. During the years the research group at “Kompetansesenter 3D ultralyd” for neurosurgery has developed greatly with several researchers including both engineers and medical doctors, and having an extensive research activity based on SonoWand and a new ultrasound device, Custus X.

Since 2000 the research group has published 32 articles on navigation and ultrasound guided neurosurgery, 3 PhD theses have been presented from the group, and members of the group have frequently attended congresses and also presented their work in media, nationally and internationally.

Geirmund Unsgård, who has been the leader of the group, has supervised 12 PhD students up to 2011.

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14. Experimental Surgery in Tromsø – from Basement Rats to a Modern Large Animal Facility

Arthur Revhaug

Jon Anton Johnson came to Tromsø as chief surgeon in 1967, and was appointed professor and head of surgery at the University in Tromsø when it was started in 1973. He had a broad clinical background and solid academic interests and experience. In 1969 he started experimental work on Danish hamsters in cooperation with Nils Bjørn Fjeld. They studied pathophysiological consequences of vagotomy. From 1970 Karl-Erik Giercksky and Dag Sørli continued the hamster experiments in the basement of the hospital nurses home. Giercksky and Sørli were later recruited to start their doctoral studies by professor Hans Prydz at the Department of Biochemistry, and professor Johan B. Steen at the Department of Medical Physiology, respectively. They were given scholarships from the Norwegian Research Council and finished their theses in 1977 and 1978.

In 1970, after having visited Cleveland Clinics, USA, Johnson was convinced that modern surgery had to include coronary surgery. He encouraged Per Jynge, by then senior resident, to set up a training/experimental model with extracorporeal circulation and global myocardial ischemia in sheep. It started in a small location past the waiting room of the Pediatric Department. In 1974 Ole Mjøs was appointed professor of Medical Physiology. He had a net of contacts in the field of myocardial ischemia, and Jynge went to Brainbridge at St. Thomas' hospital in London, where he did research on ischemia and cardioplegia. Some of his papers from this period are still cited. He

was recruited to Trondheim (NTNU), but before leaving Tromsø, Jynge set up the Langendorff perfused rat heart model. Both at the Department of Medical Physiology and at the Department of Surgery this model has been extensively used until today.

A Surgical Research Laboratory is Established

Giercksky was appointed Associate professor in 1979, and motivated the surgical residents to set up a surgical experimental laboratory based on a large animal model. Two small rooms in the hospital, were obtained for the purpose, across the hallway in the same pediatric outpatient area as Jynge had worked with the Langendorff preparation. In the fall of 1981 Arthur Revhaug, Ove Kjell Andersen and Tor Ivar Lundgren, set up a large animal model for experimental surgery. Giercksky had convinced them that the task was easy and that with some hard work, experimental protocols could be started soon. The pig was chosen as experimental animal. But the problem was that nobody had worked with the pig as an experimental animal in Tromsø before, there was no supplier, the infrastructure was not in place, and the only large animal model in town was based on dogs in the Department of Medical Physiology.

Giercksky's visions and his ability to get hold of surgical and other instruments, stimulated the residents, and

no obstacle seemed impossible to overcome. Norwegian landrace piglets were obtained from a local farmer on an island some 150 kms outside Tromsø. The piglets had to be kept for several days conditioning them for the experiments, but there was no room for piglets at the Medical Schools animal facility. A stable was established at Holt forsøksgård some 20 min drive from the hospital. Lundgren convinced his wife that the new car they were about to buy, had to be a Mazda station wagon with room for both a self constructed portable gas-anesthesia apparatus and an anesthetised piglet. With this “ambulance” the animals could be anesthetised at Holt and transported under anesthesia through half the city to the hospital, carefully moved into a small children’s bed, covered with blankets and wheeled past the Pediatric Department’s outpatients area into the newly established experimental laboratory. Several hundred animals were transported this way over a period of three years, without any incidents for the animals or the surroundings. The animal’s welfare was always focused on, and given first priority, even though the logistics could be a challenge.

Malignant Hyperthermia – a Problem to be Solved

Halothane combined with other anesthetic drugs, was chosen as the main anesthetic for the experimental model. Eventually, several animals developed malignant hyperthermia syndrome, and the project of establishing a long-term stable anesthesia model using piglets was in a critical phase. When activity started using the pig as an experimental animal, the Porcine Stress Syndrome (PSS) was becoming a major problem in the Norwegian porcine stocks. When exposed to halothane, predisposed animals would react with a typical muscular stiffness within few minutes and develop a full blown malignant hyperthermia syndrome if continued. Those animals could easily be identified and not included in experiments. However, some animals did not react immediately, but some hours into the experimental period.

The problem with a PSS herd became evident. With the knowledge from, and in collaboration with Norsvin/ Norsk Svineavlslag at Hamar, it was clear that a major effort had to be undertaken in order to have a supply of genetically healthy animals. All the farmer’s animals had to be tested with a short exposure to halothane, and a

pedigree set up for the whole herd. The residents tested more than ten adult sows and several hundred of piglets so that the farmer could breed on a healthy stock. As the animals all had to be anesthetised for a period of 3 minutes, a series of test meal and gastrointestinal peptide studies were carried out. The problem with the feminine part of the farmer’s stock was solved, but a supply of healthy semen for insemination had not been solved. There was not established such a delivery support to northern Norway yet. The farmer needed a healthy boar to use in the production of suitable pigs for experimental surgery. With the help of the head of the Norwegian Army Medical Corps and the Norwegian Royal Air Force, a healthy boar was bought at Hamar and transported to Bardufoss Airport, where a farmer could pick up the future of a stress-free stock. This was a success, and helped us until a robust supply of frozen semen was available also for the pig farmers of northern Norway.

Thus, a stable anesthesia large-animal model for surgical research had been established. The technical assistance of Jan Reitan, Eli Berg, Karin Myhr, Elisabeth Rasch, Ole Jørn Østgård and others, was invaluable for this initial achievement. The ideological and financial support from Jon A Johnson and head nurse Jorun Støvne Pettersen likewise.

Studies on Peritonitis and Total Parenteral Nutrition (TPN)

During these early eighties Sven M Almdahl established a peritonitis rat model, and Kenneth Nordstrand a TPN rat model. Both made substantial innovative work with these models, and finished their medical theses under the guidance of Giercksky. The TPN model was later used by Per Erling Dahl for his thesis.

In 1986 Giercksky left for a position as professor at The Radium Hospital and Revhaug succeeded him as responsible for the Surgical Research Laboratory. Revhaug had worked at the Department of Surgery at Brigham and Women’s Hospital and Harvard Medical School in Boston under the guidance of Prof DW Wilmore. This surgical department and surgical laboratory had been built up by the legendary surgeon Francis Moore.

An Academic Surgical Department

When returning to Tromsø, Revhaug was convinced that an academical surgical department needed both an experimental laboratory and a clinical research unit in order to prosper. With the appointment as professor in surgery in 1988, Revhaug was formally given the responsibility for the Surgical Research Laboratory, which now had been established in larger and better facilities in Teoribygget in close relation to the Department of Medical Physiology and the University's Vivarium. Experimental animal research was by now established as a continuous and growing activity with modest, but usable laboratory facilities.

The porcine model was used for endotoxin, and later, live bacteria septic models. Ola Røkke initiated and Rolf Busund further established models of sepsis and plasmapheresis in the pig model. Large volumes of porcine plasma had to be obtained from the slaughter plant of Nord-Norges Salgslag in Målselv. The sepsis and plasmapheresis as well as other apharesis models, were established at the time when the country suffered from an epidemic situation of meningococcal disease and proper knowledge of the different apharesis therapies was sparse.

When the Hospital and the Medical School moved into modern buildings in Breivika in 1991, the Surgical Research Laboratory was equipped with modern operating theatres, proper laboratory rooms in close relation to the very modern animal facility of the Medical School, – a new area began. In this laboratory further refinement of models and experiments were performed under excellent conditions. Advanced models of sepsis, with growth hormone and other metabolic modulations were performed. Metabolic research based on the porcine model, is being continued under the guidance of professor Irtun.

Bioartificial Liver

Human liver surgery is limited in Tromsø. To compensate for this clinical situation Revhaug decided to put effort into experimental liver surgery and studies of liver failure. In 1995 Lars Marius Ytrebø was given the task of establishing a bio-artificial liver based on a hepatoma cell-line. In 1996 a liver failure model was established in order to investigate the effects of bio-artificial livers. Over the years, and with the hard work of Ytrebø and many others, this liver failure model is regarded as one of the best liver

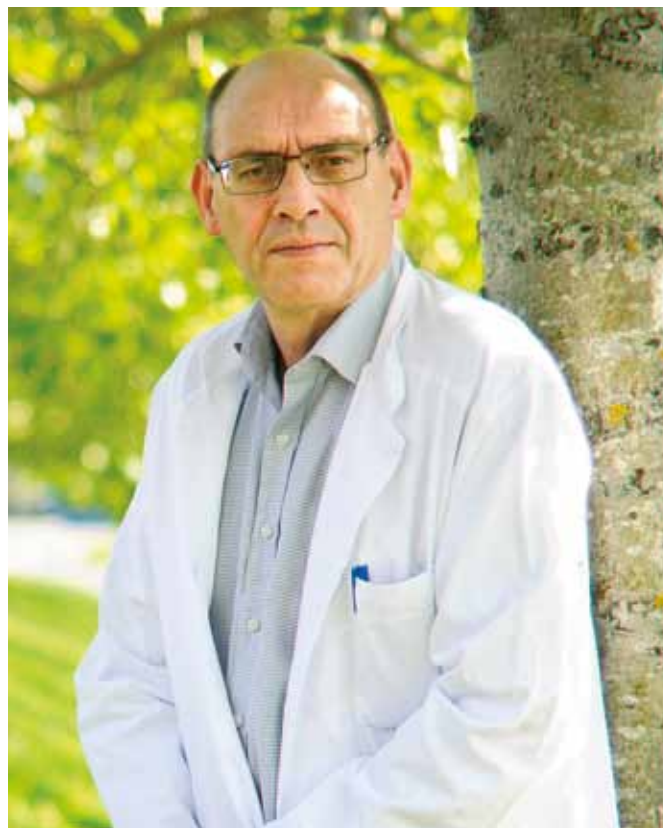


Fig 14-1. Arthur Revhaug

failure models available. Geir Ivar Nedredal continued working on the artificial liver concept. New liver failure models have been developed by Kim Mortensen, based on liver resection techniques, allowing and opening for studies aiming at the understanding of the phenomenon of liver regeneration, using modern genetic and other molecular techniques.

Myocardial Pathophysiology

Following the return of professor Dag Sørle from Chicago in 1985, a series of dog experiments on myocardial pathophysiology were performed in close collaboration with the Department of Medical Physiology during the early 1980ies.

Later, Jarle Vaage and his doctoral candidates, worked extensively with the Langendorff preparation, which was placed in the Department of Anaesthesia adjacent to the Surgical Research Laboratory at the old Teoribygget.

The experimental cardiac surgery in the pig that Sørle had initiated in the Surgical Laboratory together with Øivind Irtun, could expand dramatically with the appointment of Truls Myrmel as professor of cardiovascular surgery in 2000. Advanced experimental cardiac models combined with modern physiological and metabolic methods have been developed to perform studies on cardioplegia, myocardial metabolism and function. This has since been the main focus of the cardiovascular group at the Experimental Surgery Laboratory. Several residents in cardiac surgery have started their academic and surgical development in the laboratory.

The infrastructure and technical support has been relatively stable since the establishment in the new laboratory buildings in Breivika. Many have provided superb contributions to the work in the Laboratory. Engineers Hans Petter Bergseth, Knut Hansen, Janne Bless, Ernst Rolv Albriksen and Harry Jensen have all given invaluable input and work with the electronical and mechanical infrastructure in the laboratory. Ellinor Hareide worked many years in the Laboratory and contributed substantially with analytical work, bacteria cultures as well as almost all other tasks necessary for the running of the Laboratory. For a long time, Hege Hagerup has been a key person in the day to day management of the experiments. Her continuous professional and social input cannot be overestimated for the results obtained over the last period of the laboratory.

The Surgical Research Laboratory is also being used regularly for practical training courses in trauma, laparoscopic and vascular surgery for the different surgical specialty courses.

Receiving a good Evaluation

After the international evaluation of clinical research in Norway in 2003, the North Norwegian Hospital Trust (Helse Nord) decided to support the Surgical Research Laboratory economically for a five-year period. This was done because the Laboratory's results had been evaluated as very good and among the few surgical units in Norway with a high academic standing.

In total 21 PhD theses have been produced based on the work in the Surgical Research Laboratory since 1981. The close relation with the clinical departments and the common vision of this way of working with experimental surgery as an integrated part of the departments, by the heads of the surgical departments at Tromsø University Hospital, has made this possible.

As of 2009, five medical doctors are involved in experimental surgical work at the Laboratory and plans for new laboratories in the new Medical School's Vivarium are in the progress of being realised soon.

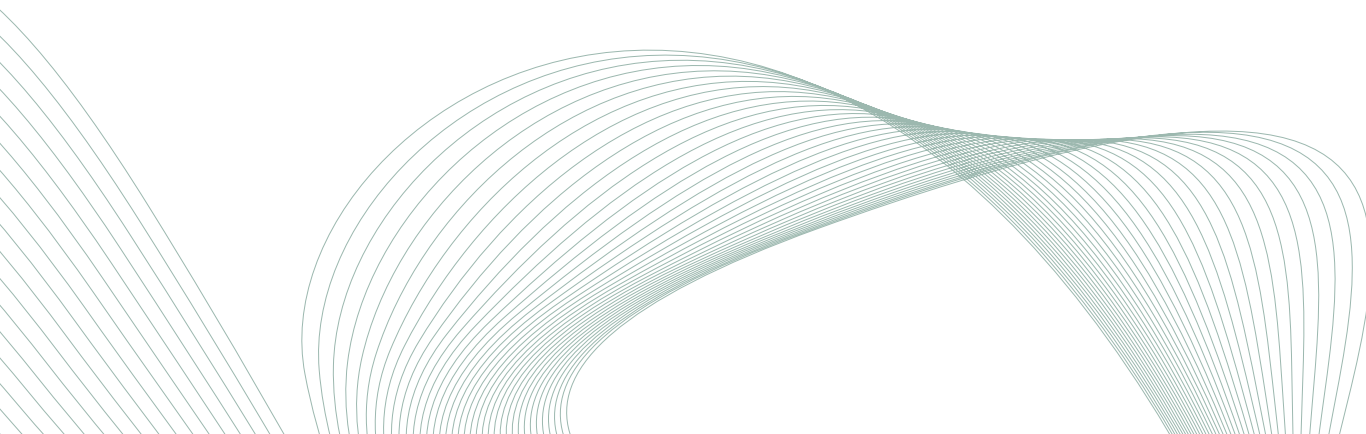
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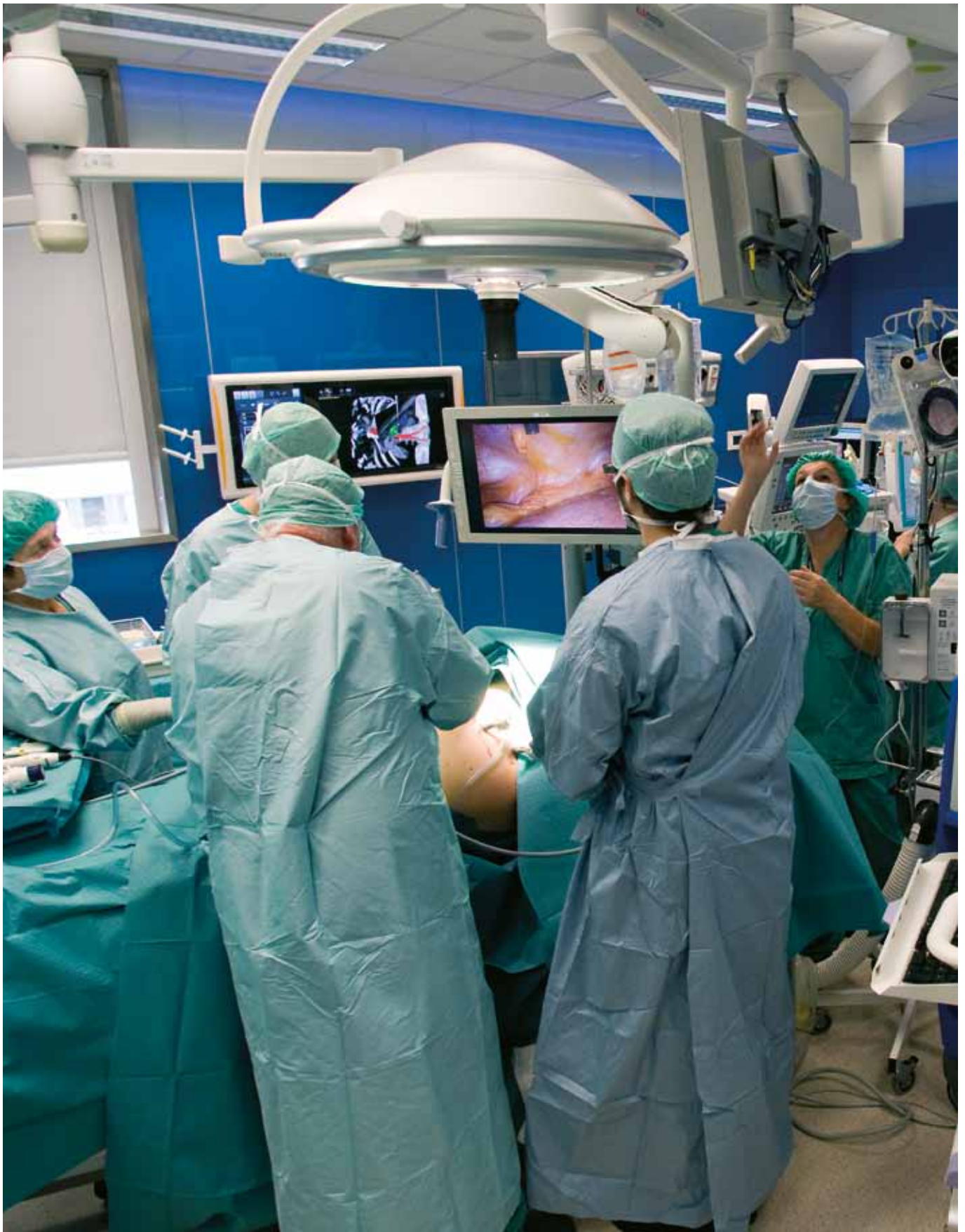
The author and editors would like to thank Ansgar Aasen for the primary editing of this manuscript, and Dag Sørle for comments..

Organ Transplantation in Norway

Collected by Arnt Jakobsen

- 15. **Organ Transplantation in Norway 1956–2010**
Arnt Jakobsen
- 16. **Organ Transplantation in Norway before 1986**
Audun Flatmark
- 17. **Kidney Transplantation 1986–2010**
Dagfinn Albrechtsen and Per Pfeffer
- 18. **Pancreas Transplantation**
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- 19. **Islet Transplantation**
Aksel Foss
- 20. **Liver Transplantation**
Aksel Foss and Anstein Bergan
- 21. **Heart and Lung Transplantation**
Odd Geiran
- 22. **Organ Autotransplantation – Spin off of Organ Transplantation**
Inge B Brekke and Pål-Dag Line





15. Organ Transplantation in Norway 1956–2010

Arnt Jakobsen

The first renal transplant (tx) in Norway and in fact in Scandinavia was performed in 1956 by Leif Efskind at Rikshospitalet in Oslo. The recipient had blood group A and the donor B. The patient was treated with full body irradiation and cortisone. In conjunction with a re-operation on day 30, the patient developed cardiac arrest and died. During the next 5 years Efskind performed another 4 kidney tx all with organs from deceased donors. One of the transplants functioned for some months. During the period 1963–1969, when prednisone and azathioprin became available, he performed another 21 renal transplants, all with organs from deceased donors. The longest surviving graft functioned for 3 years.

The first long term successful renal tx in Norway was performed at Ullevål in 1963 with the assistance of a surgeon, Richard Wilson, from Peter Bent Brigham Hospital in Boston, USA. During the years up to 1983 a total of 142 renal transplants were performed on patients from Oslo at Ullevål, about a third with an organ from a living donor, the rest with organs from deceased donors. The transplant programme at Ullevål was in 1983 amalgamated with the programme at Rikshospitalet.

In 1969 Audun Flatmark, who in 1967 had worked with Thomas Starzl in Denver, Colorado, USA, established a national renal tx programme for patients with end stage renal disease. From eight renal txs in 1969, five with an organ from a living donor and three from deceased

donors, the programme has grown to be the largest single centre for renal tx in Europe with 292 (61 per million population – pmp) renal tx in 2009. More than a third of these were with a kidney from a living donor.

Up to 1983, when multi-organ procurement started, a large number of kidneys had been procured by consultant surgeons at one of the 26 donor hospitals, often without assistance from the transplant team. The transplant team is grateful for their valuable contribution during these years.

Whole organ pancreas tx started in 1983 and in 2009 the unit performed 16 pancreas tx (3.3 pmp) being one of the largest units in Europe. Most of the pancreases have been transplanted together with a renal organ. The first islet cell tx was performed in 2001 and by 2009 nearly 50 patients have undergone islet cell tx.

The first Norwegian and Scandinavian heart tx was performed in 1983 at Rikshospitalet. In 2008 the Transplantation Unit at the Department of Thoracic Surgery performed 39 heart txs (8 pmp), the highest rate in Europe that year.

Successful liver tx in Norway started at Rikshospitalet in 1984 and in 2009, the Transplantation Unit at the Department of Surgery performed 82 liver txs (17 pmp), ranking 6th in Europe.



Fig 15-1. Organ transplants at Rikshospitalet

Lung transplantation started in 1990 and in 2009, a total of 30 lungs (single+double) were transplanted at Rikshospitalet, making the Unit one of the 4 leading units in number pmp in Europe.

In 2009 the Transplantation Units at the Department of Surgery and the Department of Thoracic Surgery at Rikshospitalet performed a total of 441 organ transplants, making Rikshospitalet the largest single centre for organ transplantation in Europe.

Norway has, since the start in 1969, been a member of Scandiatransplant, an organ allocation organisation for organs from deceased donors (DD). Scandiatransplant is owned by transplant centres in Denmark, Finland, Iceland, Norway and Sweden. Over the years the allocation policy of Scandiatransplant has changed from, initially relying only on tissue typing for the exchange of organs, to a more pragmatic policy where only renal organs with full HL-A compatibility are exchanged. Scandiatransplant does not operate an algorithm system for organ allocation, which gives the individual transplant surgeon autonomy in choosing which patient is to be transplanted with an available kidney. The guiding principles have been HLA- and -DR compatibility, waiting time, and selecting the recipient who is considered to have best use (“utility”) of that particular kidney. For hearts, livers and lungs, Scandiatransplant has established a rotation scheme. During the 1970ies about a third of the procured kidneys were

transported to another transplant centre within the organisation often resulting in long ischaemia times. Today, only about 7% of all the kidneys within the Scandiatransplant system are exported. Most of the Norwegian kidneys procured from deceased donors are thus transplanted at Rikshospitalet, resulting in short ischaemia time and primary function of the kidney (no need for dialysis post tx) in more than 90% of cases.

The Norwegian renal tx rate has consistently been among the highest national rates in the world, a greater proportion of Norwegian patients needing tx are in fact transplanted, and the waiting list and the waiting time for tx are by far shorter than in other countries. At the end of 2009, 179 patients or 37 per million population were on the waiting list for a renal tx. With its policy of relying heavily on organs from a living kidney donor (more than one third of all) Norway has avoided the large discrepancy seen in most other countries, between an ever-increasing waiting list and the number of organs made available for transplant. As a result of this policy more than 70% of the total number of patients alive with any form of renal replacement therapy being it a functioning transplant or dialysis, is a transplanted patient. This is the highest rate in the world.

These results translate into substantial health cost savings. Calculations in 2003 estimated the cost of a renal tx to approx. NOK 400.000 (€ 47.000), with 5-year costs for

drugs and follow up to another NOK 400.000. One year on dialysis was estimated to NOK 400.000. After five years, the costs per transplanted patient would be NOK 0,8 mill versus NOK 2 mill for a patient on dialysis. For every 100 patients treated by transplantation instead of dialysis, this adds up to a saving of NOK 120 mill after 5 years, and NOK 30 mill annually thereafter. The “Norwegian model” has indeed demonstrated its effectiveness. It has none the less been difficult for the transplant community to get recognition for these facts from health bureaucrats and politicians.

What is the reason for the success of the Norwegian transplant programme? In my view it boils down to two main factors.

The first one is the medical conviction, organisational talent and personal strength of Flatmark, who established a transplant surgical unit and established strong liaisons with the Norwegian nephrologists. With yearly meetings, building lasting relations, discussing “transplant medicine” as a combined inter-collegial concept, renal transplantation did not just stay a surgical exercise. This concept has been adopted by the other Norwegian transplant specialties.

The second reason is that the transplant community has stood up against all efforts to establish a second unit in Norway. The effect of having only one transplant centre for 4.9 mill inhabitants with all types of organ transplants at the same hospital, has been formidable on all types of advanced medical care, from anesthesiology, general medicine, microbiology, pathology, radiology and even psychiatry.



Fig 15-2. Audun Flatmark. Portrait by Halvdan Ljøsne 1995. Courtesy Rikshospitalet

Acknowledgements

The authors and editors would like to thank Helge Bondevik and Gunnar Sødal for comment to all the chapters on transplantation.

16. Organ Transplantation in Norway before 1986

Audun Flatmark 1986 (slightly revised by Arnt Jakobsen)

The first kidney transplantation (tx) in Norway was performed in August 1956 by Leif Efskind, at Rikshospitalet. After the introduction of the immunosuppressive drugs azathioprine and prednisolone, Efskind performed another 21 further renal tx between 1963 and 1969, all with organs from deceased donors (DD), the longest surviving graft functioned for 3 years.

The first kidney tx from a living donor (LD) – mother to son – was performed at Ullevål in 1963. The graft is still functioning after 23 years. By the end of 1968 a total of 10 renal tx, all with an organ from a LD had been performed at Ullevål.

In 1968, the 5 Nordic countries established a Nordic Expert Committee to create guidelines for the respective governments in order to develop the most rational use of the two treatment modalities (dialysis and tx) for end stage renal disease (ESRD). The Committee made plans for dialysis and transplantation units, and also for tissue typing laboratories. The Expert Committee had advised a uniform policy, all suitable patients should be offered treatment, but as many as possible should have a renal tx. Norway quickly adopted the policy of a renal tx whenever possible, actively searching for willing LDs. This policy has been referred to as the “Norwegian model”.

Scandiatriplant, an organ allocation organisation based on tissue typing, was created in 1969. A central registry of all patients in the 5 Nordic countries in need of a kidney

was set up in Århus, Denmark. Available kidneys from DDs should be given to the best-matched recipients, which meant that 45% of all procured kidneys within the Scandiatransplant area were shipped to another transplant centre.

Dialysis could, in 1969, only be performed at the 2 hospitals performing kidney tx (Rikshospitalet and Ullevål). Future planning was based on two principles: decentralised dialysis treatment, and decentralised diagnostic work-up of all uremic patients, with tx centralised at Rikshospitalet. By 1975 most counties had established a nephrology service including dialysis facilities. The team at Ullevål, Steffen Birkeland, Knut Høeg and Ole Jacob Malm, continued to perform kidney tx for patients from Oslo, while the rest of Norway received a tx at Rikshospitalet. From September 1983 all organ tx in Norway were performed at Rikshospitalet. In 1986, Norway with its 4.5 million inhabitants had 18 nephrological centres and one tx unit. A tissue-typing laboratory with Erik Thorsby as head was established at Rikshospitalet in 1970.

We have always aimed at related donors if available, and approximately 35% has been with LD. All kidneys from DD are procured from heart-beating donors with irreversible brain damage. Norway had, in 1969, no law regulating the transplantation activity, but the Ministry of Health sanctioned irreversible brain damage as a criterion of death. In 1973, The Parliament passed a law based on the same criteria. The law is based on presumed consent. Cerebral angiography with proven cessation of intracranial

circulation is mandatory before the death certificate can be signed. Approximately 50 donors are available in Norway each year, i.e. 11.1 per million inhabitants.

Until 1983 we used azathioprine and prednisolone as immunosuppression. In January 1983, the new drug Cyclosporine A (CyA) was introduced. We are at present (1986) conducting a joint study with Swedish centres to see if CyA alone or in combination with azathioprine (and prednisolone) is the most effective treatment.

In 1985 the number of kidney tx has increased to 40 per million population (pmp) a year. Almost 80% of the total uremic population is offered a renal tx. This has led to a decrease in the dialysis population and a reduction in the waiting list for an organ from a DD. This situation is probably unique, since most countries face an increasing demand to expand costly dialysis facilities while the tx waiting lists are growing rapidly. A total of 1494 kidney tx have been performed from 1969 to 1985, 526 of these were with an organ from a LD. Graft survival at one year is over 90% for LD and 75% for organ from a DD.

From the early seventies an increasing number of diabetics with end stage renal disease (ESRD) have received a kidney tx. The results have improved, but the basic metabolic disease still persists. We performed the first combined simultaneous kidney and pancreas tx in June 1983, and have so far performed 32 combined grafts. Pancreas graft survival at one year is 60%, a result comparable with the

best published, but less than kidney graft survival. One important problem is the diagnosis of pancreas graft rejection, and hence adequate rejection treatment. A few diabetics have received only a pancreas tx. The results were poor. The combined graft approach is thus the preferred tx procedure in diabetics.

The first successful liver tx in the world was performed in 1963. During the period 1970–71, 4 liver txs were performed in Norway. Two were performed at Rikshospitalet. Both recipients had biliary atresia and were less than two years old. Both died within a week of tx. Two liver tx were in the same period performed by Snorre Aune and Gunnar Schistad, Ullevål Hospital. Both were adults, one survived for 24 days when he died of a bleeding peptic ulcer, another for 54 days.

The liver tx programme at Rikshospitalet was restarted in February 1984. Our first patient, aged 9 years, is still alive after 2 ½ years. So far 5 patients have been transplanted, and 3 patients are currently surviving 30, 24 and 9 months after surgery. Children have the best prognosis, but suitable donors in the age group 1–5 years are the main obstacle to any programme.

The first heart tx in Norway, and indeed in Scandinavia, was performed by Tor Frøysaker at Rikshospitalet in November 1983. The recipient – a 20-year old female with cardiomyopathy – is still alive 2 ½ years later. A total of 23 patients have so far undergone heart tx, and 18 of them are alive.

17. Kidney Transplantation 1986–2011

Dagfinn Albrechtsen and Per Pfeffer

Since 1983 all kidney transplantations (tx) in Norway have been performed at Rikshospitalet. Patients with end stage renal disease (ESRD) were treated in local hospitals, and selected and prepared for tx according to national guidelines developed jointly by The Norwegian Nephrology Society and the tx team. Referral was “by paper”, i.e. medical records and X-rays were scrutinised by the tx team, most patients being seen by the team prior to tx only upon arrival for the operation. Kidney donation from healthy family members was recommended, and accounted annually for approx. 40% of all txs performed during the period. Pre-emptive tx (prior to dialysis) was encouraged, and at present accounts for about 20% of all renal txs. After tx and stabilisation of immunosuppressive treatment, patients were referred to their local hospital for further and life-long follow up.

Immunosuppressive treatment to control organ rejection was based on the drug cyclosporine (CyA). The Swedish-Norwegian studies 1983–85 were the second large scale clinical studies of this first specific immunosuppressive drug, and established Rikshospitalet for the next 15 years as a major international study centre of immunosuppressive drugs (notably CyA derivatives, mycophenolate, basiliximab and sirolimus, which were to become mainstay drugs), in addition to drugs controlling opportunistic

infections. Being one of the largest renal tx centres in the world, Rikshospitalet profited by quick learning curves. Very early a secretariat was established for compiling statistics of methods and results, and executing stringent quality control. All 5573 kidney txs (deceased donors (DD) and living donors (LD) performed during 1986–2011 were performed by 18 surgeons¹.

Patients with ESRD usually have multiorgan dysfunction, aggravating the risk of surgery and immunosuppression. The tx team has in fact, practiced “multidisciplinary cooperation”, “holistic treatment” and “quality control” long before these terms became trendy catchwords among health bureaucrats and politicians.

Since the establishment of the National Transplant Programme in 1969, Norway has had an active approach to the use of LD for renal tx. In 1969, five of the eight renal txs were with an organ from a LD donor and in 1985, 55 of the 156 renal txs were with an organ from a LD. During the last 20 years the rate of LD tx has been close to 40% (Fig 1). The active approach to LD, agreement on policy among nephrologists and surgeons, and support from the health authorities and the population, has been the foundation for our programme.

1) The 18 surgeons are: Flatmark, Sødal, Bondevik, Jakobsen, Brekke, Lien, Bentsdal, Pfeffer, Scholz, Øyen, Foss, Line, Jørgensen, Husberg, Fosby, Lien jr., Hagness, Wadstrøm.

New patients with ESDR will first be evaluated for a tx with a LD. Until 1984 only genetically related LDs were used, but from then, unrelated donors have been considered and utilised; mainly spouses, but occasionally also good long term friends. Of those that underwent a LD nephrectomy in 2008 31% were siblings, 27% parents, 12% offspring, 4% other relatives, 17% spouses and 7% other unrelated.

The traditional method for LD nephrectomy has been a flank incision with resection of the tip of the eleventh rib, preferably using the left kidney because of the length of the renal vein. With modern self-holding retractors, the operation can now be made without resection of the rib, but still with close proximity to the intercostal nerves. This will occasionally lead to inadvertent damage or trapping of the nerve, and sometimes chronic nerve pains.

The first laparoscopic donor nephrectomy was performed at Rikshospitalet in 1998. The first 100 operations were performed purely laparoscopically, later the procedure was changed to hand assisted using a Pfannenstiel incision. By 2010, a total of 424 laparoscopic procedures have been performed, and at present practically all donor operations are being performed with this method. This ensures a smaller operative trauma, avoids any damage to the intercostal nerves, and gives a better cosmetic result.

Including all methods, a total of 2621 LD nephrectomies were performed, during 1969–2011. without any post-operative mortality. In a recent study (2009) of morbidity in more than 300 consecutive living donors operated by the laparoscopic approach, only some 3% had experienced some morbidity after the nephrectomy.

An advantage with LD renal tx is that the whole tx procedure becomes elective surgery, allowing pre-treatment of especially complicated patient, for example removal of HLA antibodies or blood-group antibodies before receiving a blood-group incompatible graft.

A tx from a LD will on average approximately have 15% better graft survival at five years compared to a graft from a DD donor (Fig 2). Considering that graft loss usually means request for a new renal graft, longer graft survival with a kidney from a LD also in this way means less pressure on the Scandi transplant waiting list.

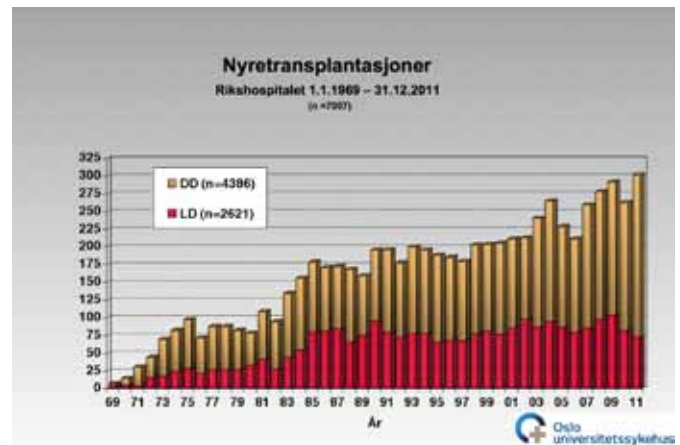


Fig 17-1. Number of performed renal transplants in Norway 1969–2011. 38% were from living donors (LD) and the others from deceased donors (DD)

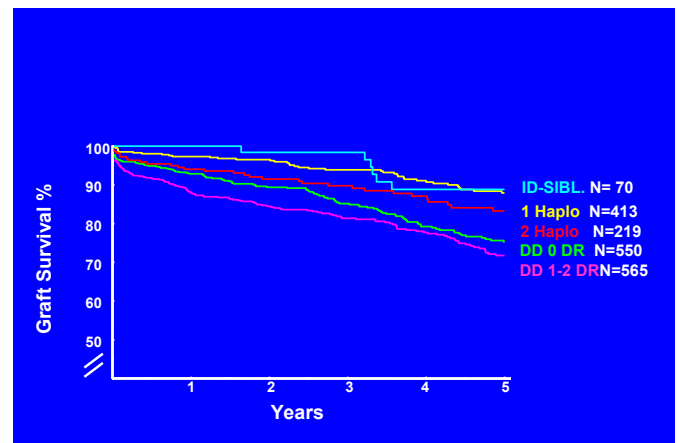


Fig 17-2. Actuarial survival of first renal grafts by donor source and HLA match in Norway 2000–2008.

ID-SIBL = LD tx, from HLA identical sibling,

1 Haplo = LD tx, from genetically related donor mismatched for one HLA haplotype, 2 Haplo = LD tx from unrelated or genetically

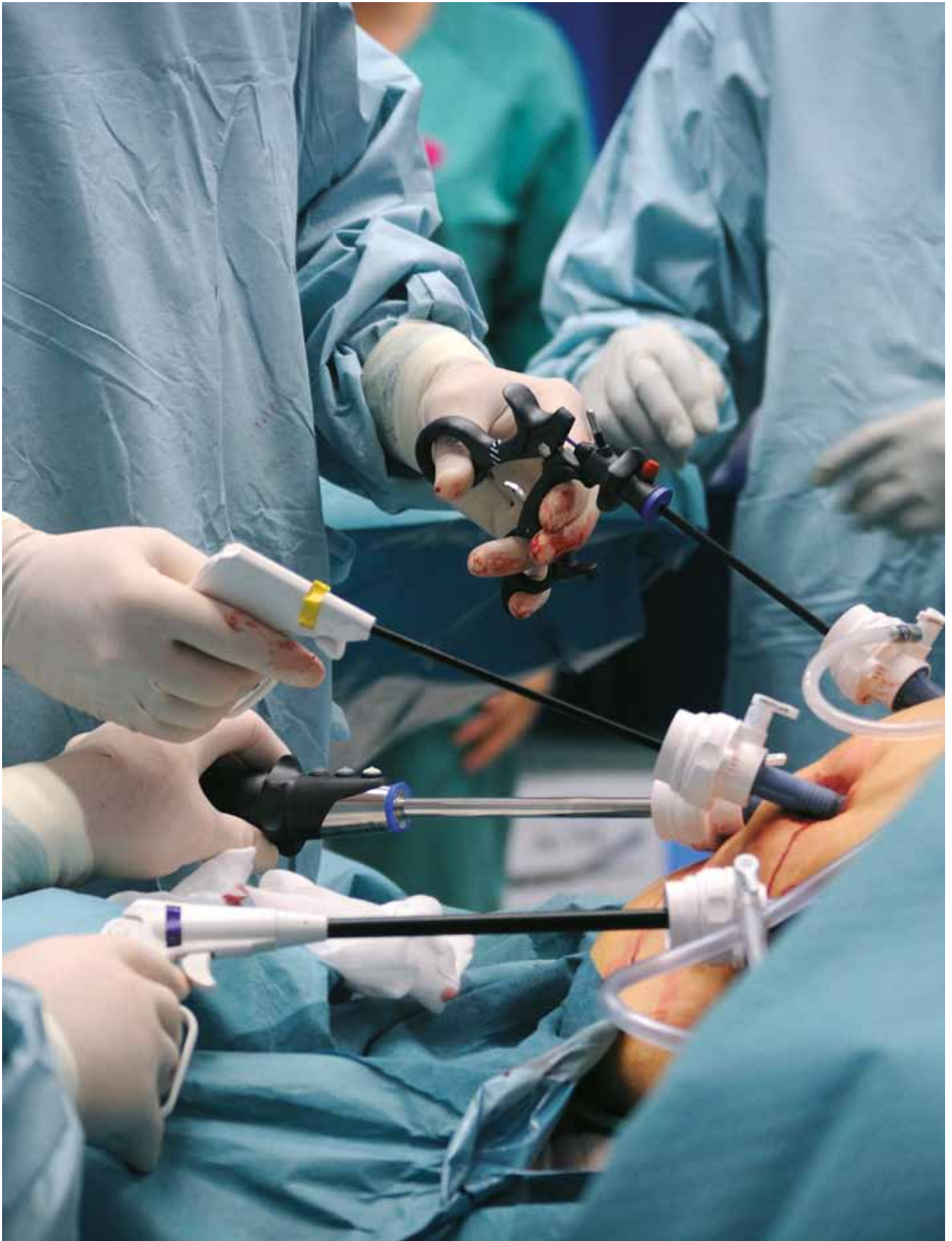
related donor mismatched for two HLA haplotypes, DD 0 DR = DD tx from HLA DR matched donor; DD 1-2 DR = DD tx from HLADR mismatched donor.

Patients not having a LD are posted on the Scandiarttransplant waiting list. Within the Scandiarttransplant organ-sharing scheme there is a primary obligation to export donor kidneys to HLA compatible recipients. One of the procured kidneys is always kept at the procurement/tx centre. Children (under 16 years) are prioritised. When a kidney from a DD becomes available for a tx in Oslo, patients are selected for tx from the waiting list according to immunological criteria, waiting time and by a “utility” assessment by the tx surgeons; “which recipient would benefit most from being transplanted with that kidney”

During 1986–2011 a total of 5573 kidney transplants were performed; 3442 were from DDs and 2131 (38%) from LDs. The recipient age was 9 months–83 years, median 56 years. 170 (3%) of the patients were children. Most of these (80%) received a LD graft. During 1986–2011 a total of 5573 kidney transplants were performed; 3442 were from DDs and 2131 (38%) from LDs. The recipient age was 9 months–83 years, median 56 years. 170 (3%) of the patients were children. Most of these (80%) received a LD graft.

The Norwegian Transplant Act (1973) is a presumed consent law if not otherwise stated, but in practice permission by next of kin is always obtained (“soft presumed consent”). The number of deceased organ donors increased from 49 in 1986 to 127 in 2011, totalling 2486 donors in this period. During this period approximately 1500 donors have been multi-organ donors, reaching 93% in the donors last year. In this period a total of 4812 kidneys for renal transplantation have been procured.

In 1986, 226 new patients developed ESRD, 50 per million population (pmp), and started renal replacement therapy (RRT). 181 of these (83%) were considered to benefit from tx. In 2010, 505 new patients (102 pmp) started renal replacement therapy (RRT). 302 patients (60,5 pmp) were treated by kidney transplantation. As the increase was due mainly to a higher number of patients older than 70 years, the proportion considered unfit for renal transplantation increased to 35%, leaving 328 patients as potential tx candidates. The waiting list decreased from 39 pmp in 1986 to 20 pmp by the end of 2011, and the median waiting time was 7.5 months. Internationally, the national renal transplantation rate is internationally uniquely high, and the waiting list and waiting time uniquely short.



18. Pancreas Transplantation

Inge B. Brekke

Diabetes is one of the most common causes of kidney failure, and diabetic patients are usually considered for organ transplantation (tx) when diabetic nephropathy becomes evident. In the majority of cases the pancreas has therefore been transplanted simultaneously with a kidney to type-1 diabetic patients with end stage renal disease (ESRD). Individual consistent normoglycaemia can be achieved in the diabetic patient by pancreas transplantation only. The rationale for transplanting a pancreas is thus to re-establish normal carbohydrate metabolism in the type-1 diabetic patient, and thereby improve not only the patient's quality of life, but also life expectancy by stopping or preventing diabetic complications to develop.

Until 1983, the kidney was the only organ transplanted in Norway. The first human pancreas was transplanted in 1983. This also was the start of multi-organ procurement in Norway, with a team from Rikshospitalet in charge of the procurement procedure. The recipient of this first pancreas was a young, type-1 diabetic man, but the pancreas only functioned for a week. The next recipient had long-term graft function with excellent blood glucose regulation.

In the following years, 10–15 pancreas txs were performed annually. At the end of 2010, a total of 261 patients had received a pancreas tx, most of these simultaneously received a kidney tx. By 2010, 18 patients have received a single pancreas tx.

We started out with the segmental duct-occluded pancreas, using Neoprene for duct occlusion (Fig. 18-1A, B). Long-term observation showed a frequent decline in graft function over time, probably caused by exocrine pancreatic fibrosis. Having used the duct occlusion technique on 53 pancreas grafts, we started in 1988 to use the whole pancreas, aiming at preserving the exocrine pancreas by adding a small segment of duodenum for drainage of exocrine pancreas to the urinary bladder (Fig. 18-2). In 1997, as some of these recipients experienced recurring urinary bladder infection, we changed to the present technique of draining the pancreas to the intestines which is a more physiological method, (Fig. 18-3). The surgical techniques are described in details elsewhere (1, 2).

With new surgical techniques and not least new immunosuppressive drugs to prevent graft rejection, the results gradually improved over the years. For one period, The International Pancreas Transplant Registry concluded that Rikshospitalet had the best results of all centres, and after a few years we became the no. 4 largest centre for pancreas-tx world wide. For type-1 diabetic patients receiving both grafts simultaneously, the survival rate for pancreas transplants is similar to that of kidney grafts, i.e. 85%–90% at one year. A functioning pancreas transplant means insulin independent patient, which in turn means normal carbohydrate metabolism and corresponding significant improvement in long-term life expectancy and quality of life for the patient. Several of our patients have now been insulin independent for more than 20 years.

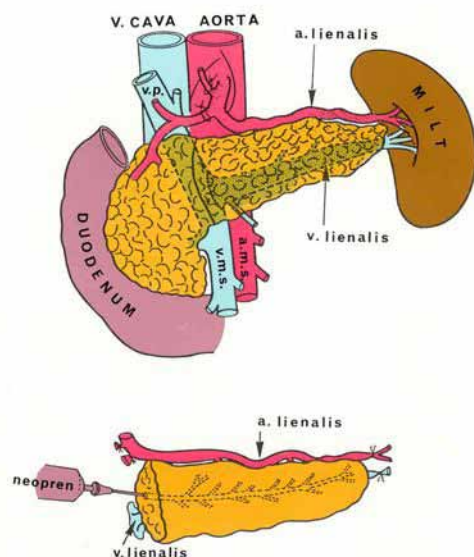


Fig 18-1A. The initial technique of pancreas transplantation using the segmental pancreas and occluding the duct with Neoprene

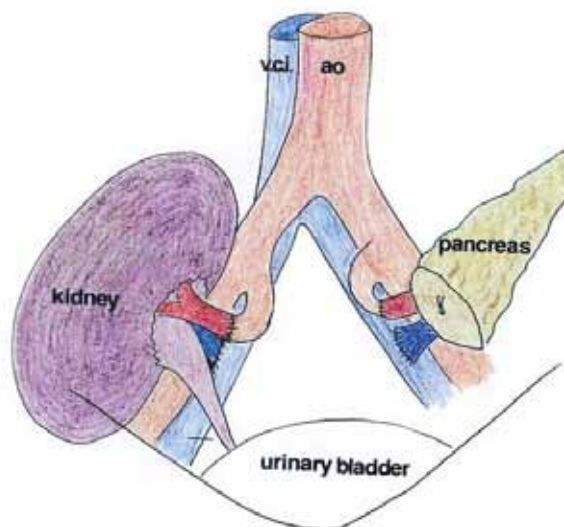


Fig 18-1B. The segmental pancreas was implanted in the iliac fossa with a technique similar to that used for renal transplantation. Drawings by the author.

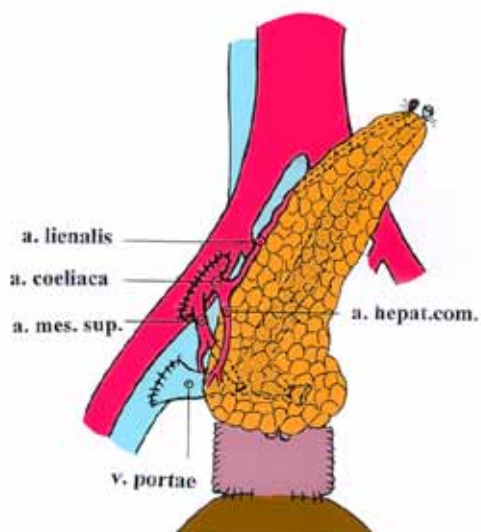


Fig 18-2. The whole pancreas transplant drained to the urinary bladder via a duodenal segment.

Drawings by the author. Reproduced with permission from ref 1.

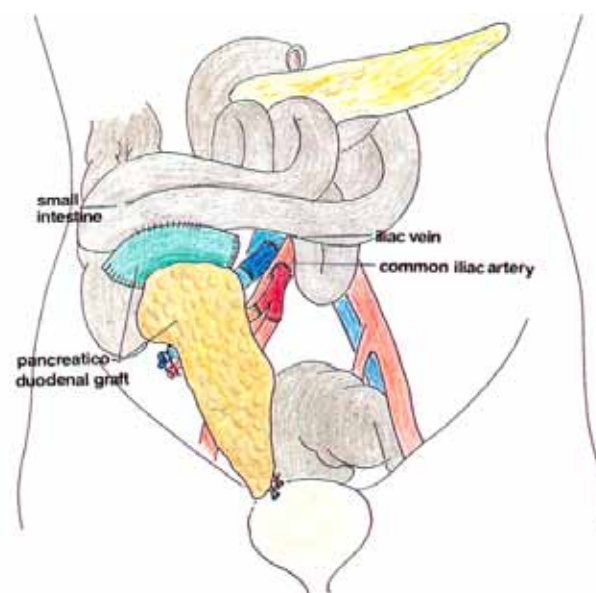


Fig 18-3. The present technique of pancreas transplantation with intestinal drainage

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19. Islet Transplantation

Aksel Foss

Isolation, culture and transplantation (tx) of islets (about 1% of the pancreatic tissue) represent an attractive option to treat type 1 diabetes. Intraportal islet tx is a minimally invasive procedure performed in local anesthesia, and the tx is performed in about 30 minutes.

The first steps to establish an islet tx programme in Norway was taken in 1990, and in 1999 we initiated close collaboration with Karolinska Institute and Uppsala University developing the Nordic Network for Clinical Islet Transplantation (NNCIT). The islet research laboratory at Rikshospitalet provides excellent infrastructure and equipment for islet isolation, cell analysis and molecular biology, including cold-storage chamber and cell culture rooms.

The first clinical islet tx in Norway was performed at Rikshospitalet in 2001. By the end of 2010, 51 islets cell txs have been performed and the annual number of islet txs are predicted to increase rapidly over the next decade. At present, the main goal is to treat patients with severe unstable diabetes aiming for stable, normalised glycemic control. The three year islet survival after islet tx is above 50% and the results are steadily improving

A major hurdle for long term efficacy of islet tx is the loss of islets from the time of organ retrieval to revascularisation. Consequently, the islet research facility programme at Rikshospitalet is focusing on improvements in organ harvesting, islet isolation techniques, ex vivo manipulation of islets and exploration of alternative sites for clinical islet tx.

20. Liver Transplantation

Aksel Foss and Anstein Bergan

The first partially successful human liver transplantation (Ltx) in Norway was performed at Ullevål hospital in 1971 by Snorre Aune and coworkers. Two patients were transplanted, the first developed sepsis and died on the 24th day, a second patient was transplanted in 1972, and survived with a functioning liver for 54 days, until he died of massive bleeding from a duodenal ulcer.

In 1984, Flatmark transplanted a 9 year-old girl with neonatal hepatitis. The patient lived for 23 years and this initiated a new era of Ltx in Norway. In the period from 1984 to 1994 only 63% of the patients survived beyond the first year. Consequently, the number of patients referred for transplantation was for a long time low. With multidisciplinary perfection and increased experience the results improved. Thus, the annual number of Ltxs increased moderately to 31 in 2000, and quite radically from 2005 to 89 in 2010 (Fig 1).

In the period from 1995 to 2004, the 1-year patient survival increased to 82% and in the period 2005 to 2008 92%. Rikshospitalet has become one of the largest centres for Ltx in Scandinavia, and the results are comparable to, and even better than the best international data.

By the end of 2010, a total of 823 Ltxs had been performed at Rikshospitalet, 101 of these in children less than 16 years of age.

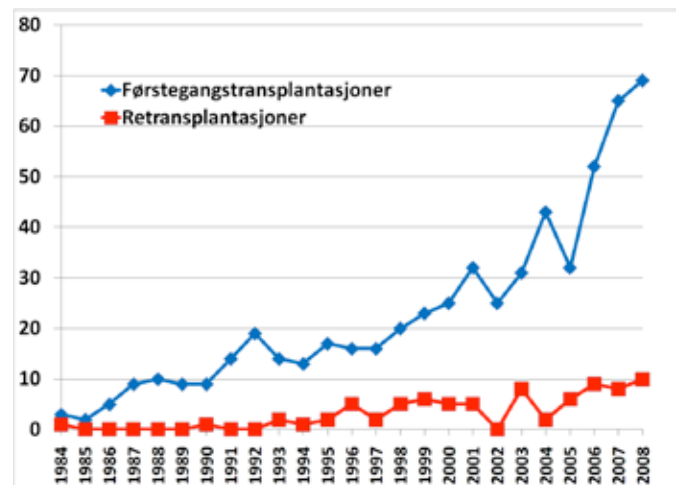


Fig 20-1. Graph of annual number of liver transplantations

From Fig. 2 it is obvious that the peri-operative phase of Ltx has a significant impact on long-term survival. There is an initial steep fall in survival, but the long-term survival curves are roughly parallel.

The three most important milestones for improved results are considered to be:

1. introduction of veno-venous bypass in 1994, which stabilised the patient in the anhepatic phase,
2. introducing in 2000, the “piggy back” technique in which the caval blood flow is maintained throughout the operation, and
3. modification of the liver artery anastomosis, as the incidence of hepatic artery complications is reported as high as 15%. The Carrel patch suture technique for the hepatic artery anastomosis was replaced by an open loop suture, which reduced the incidence of arterial thrombosis from approximately 10% to less than 2%.

Accordingly, quality indicators such as operation time and blood transfusions have improved significantly. The median operation time has been reduced from 10 hours in 1990 to 5 hours at present. The median number of blood transfusions was 20 units in 1990. At present only half of the patients need per-operative transfusions. A large number of the patients are extubated on the operation table and mobilised the first postoperative day.

Norway is in a very fortunate position regarding donor livers. The deceased donor (DD) pool comprises annually around 20 donors pmp. The Ltx rate is currently 17 per million population (pmp). Splitting high quality donor livers for two recipients, gives access to almost 25 donor livers pmp yearly. Thus, extremely few patients die on the waiting list in Norway, and over the years nearly 400 livers have been exported for transplantation in other Nordic and European centres.

Ltx for malignant tumors comprises 14% of all Ltxs in the European Liver Transplant Registry. The surplus of

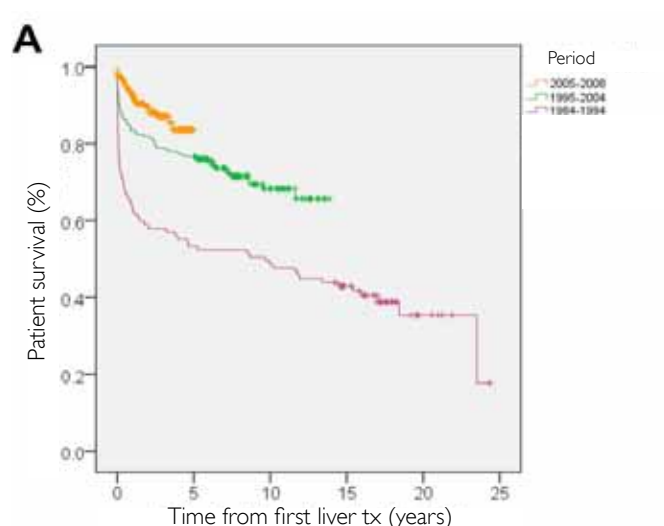


Fig 20-2. Graph showing long term survival after liver transplantations

livers for tx in Norway provides an opportunity to explore Ltx for extended criteria indications such as treatment of malignant liver diseases.

Rikshospitalet has thus become an international leading participant in exploring Ltx for malignant diseases. The Oslo criteria for accepting hepatocellular cancer patients (HCC) for Ltx, exceeds the regularly accepted criteria, targeting a 5-year survival of 50%. In 2009 we performed the first Ltx for cholangiocarcinoma (CCA) in Europe using the multimodal approach. Currently we are revisiting Ltx as treatment in selected patients with colorectal liver metastases. The preliminary data of the study show a patient survival of 94% with 4–38 months of follow up.

For ordinary indications 1- and 5-year survival after Ltx is exceeding 90% and 80% respectively, and the majority of patients can return to normal life activities. As the median number of life years gained by Ltx exceeds 15 years, and the cost for Ltx has been estimated to NOK 600.000, we believe Ltx to represent a cost-effective surgical procedure for an otherwise deadly disease.

Acknowledgements

The author and editors would like to thank Helge Bondevik, Gunnar Sødal, Snorre Aune and Gunnar Schistad for comments to the manuscript.

21. Heart and Lung Transplantation

Odd Geiran

The first heart transplantation (tx) in Norway and indeed in Scandinavia, was performed on the 6th of November 1983. As told soberly by Audun Flatmark in the chapter on organ transplantation up to 1986, the patient was alive and well 2 ½ years later.

The story behind the event in November 1983 was more thrilling. With the support of the Director of Rikshospitalet, a working group with the intent to establish a heart tx programme at Rikshospitalet had been established. The group was headed by Karl Victor Hall, and consisted among others of Tor Frøysaker and Flatmark. A project group lead by Frøysaker with other surgical colleagues Odd Geiran and Harald Lindberg was established. A detailed plan was launched and approved for a clinical introduction following study visits to Stanford University in Palo Alto, California, as well as experimental, acute surgery in pigs at the Institute of Surgical Research at Rikshospitalet.

This process was kept confidential to avoid distracting publicity in the media, from the population at large, and from other medical institutions. The most important newspapers were informed, but kept this knowledge hidden until the first transplant had been performed. The Directorate for Health and Social Services was also informed, but never responded to the information of the upcoming events.

The Norwegian law on transplantation was compatible with heart tx. Thus in November 1983, when a patient with an intracranial hemorrhage died in spite of neuro-intensive treatment, and the relatives consented to organ donation, Frøysaker called his team, and the rest is history. The first transplant was an immediate success, and the patient is still, now some 25 years later, alive and well.

The multidisciplinary team could work in peace for another 36 hours, and then a public storm broke. There were different opinions on this new medical treatment, ranging from enthusiastic support, to severe criticism. Bureaucrats, politicians, journalists, health care personnel, and lay people all participated in the debate, but in the end, it became clear that this treatment option was now established in Norway. The first child was transplanted in 1991. As of 2010, a total of 722 heart txs have been performed, 8 combined with kidney or liver tx. The one-year patient survival was 83%, five-year 77% and 10-year 59%, all patients, all etiologies and clinical state at time of tx included.

The early success of the heart programme may be attributed to several basic factors – the heart unit at Rikshospitalet was of high clinical merit, there was close collaboration with an established kidney tx programme with clinical know-how at the same hospital, cyclosporine A was available, the hospital had a tissue typing laboratory, and the

programme received extraordinary and enthusiastic efforts by all medical professions in the hospital.

In 1986, Frøysaker, Lindberg and Geiran transplanted a patient with Eisenmenger syndrome with a heart-lung bloc tx, the first of this kind performed in Scandinavia. This time neither the media nor the health administrators showed any profound interest in the event.

Geiran and Frøysaker performed the first single lung tx in March 1990 and in 1991 Lindberg and Egil Seem did the first bilateral, sequential lung tx. The second lung tx patient is alive near 20 years after the first tx.

We soon learned that donor issues, strict peri-operative surveillance and care, as well as management of pulmonary infection, were even more important than in heart tx. Recently patients with a short life expectancy due to end-stage organ failure have been given priority. Bilateral txs are now being performed more frequently due to better survival with this type of operation compared to single lung tx.

As of 2010, we have performed 89 unilateral lung txs, 244 bilateral txs and 25 heart-lung txs with three patients with simultaneous liver tx. During the last decade, the one-year survival was 82%, five-year 61, and 10-year 40%, for all isolated lung txs.

The Norwegian heart and lung tx programmes at Rikshospitalet have achieved high national rates of tx compared to the other Nordic countries and leading European nations.



Fig 21-1. Tor Frøysaker. Photo Courtesy Rikshospitalet

22. Organ Autotransplantation – Spin-off Effects of Organ Transplantation

Inge B. Brekke and Pål-Dag Line

The demonstration by the initial renal- and later liver allotransplantations that organ transplantation is technically feasible, raised the prospects for extracorporeal organ repair with subsequent autotransplantation. The development of organ preservation techniques allowed prolonged reversible ischemia. Preservation perfusates and extracorporeal cold storage, make extensive and time consuming repair work on parenchyma, vasculature and adjacent tissue possible without jeopardising organ function through ischemic damage. The extracorporeal placement ensures unlimited access to all parts of the organ.

Renal Autotransplantation

The first organ autotransplantation in Norway was performed in 1973, when Audun Flatmark managed to re-establish normal renal function in a young man by ex situ repair of an occluded artery of the man's single kidney. Since then, ex situ renal surgery and autotransplantation has become a valid alternative to in situ methods for the treatment of a variety of renal disorders.

Indications

The procedure has been used to salvage kidneys in hundreds of patients for the treatment of various vascular or urological conditions where the alternative would be nephrectomy (1). Until the end of 2010, we have per-

formed 607 renal autotransplantations at Rikshospitalet. The most common indications were renal artery stenosis or aneurysm, high aortic aneurysm involving the renal arteries, renal or ureteral malignant neoplasm, and complicated renal calculous disease. With the introduction of minimally invasive methods and “shock wave” lithotripsy, the number of renal autotransplantation has gradually decreased to about 10 cases a year.

Surgical Technique

The kidney is usually removed through a flank or midline incision. Recently however, we have started, whenever possible, to do the nephrectomy laparoscopically. The kidney is taken to a side table, where it is flushed with a cold preservation solution, and placed in a basin with ice slush. Artery pathology is corrected by excision of the affected part, and reconstruction is done by the use of autogenous vascular graft or by other techniques (see ref. 1 for technical details). When the problem is an aortic aneurysm involving the renal arteries, both kidneys may be removed and the aneurysm replaced by a prosthesis before the kidneys are retransplanted (Fig1A-B). For calculi, ultrasound examination is performed extracorporeally (at the side table) to ensure that no fragments of stones are left before replanting the kidney. When removing a malignant neoplasm, series of biopsies are made to ensure that all malignant tissue is removed. In case the whole ureter has



Fig 22-1A. Bilateral renal artery stenoses and aortic aneurysm. Courtesy Ullevål Hospital.

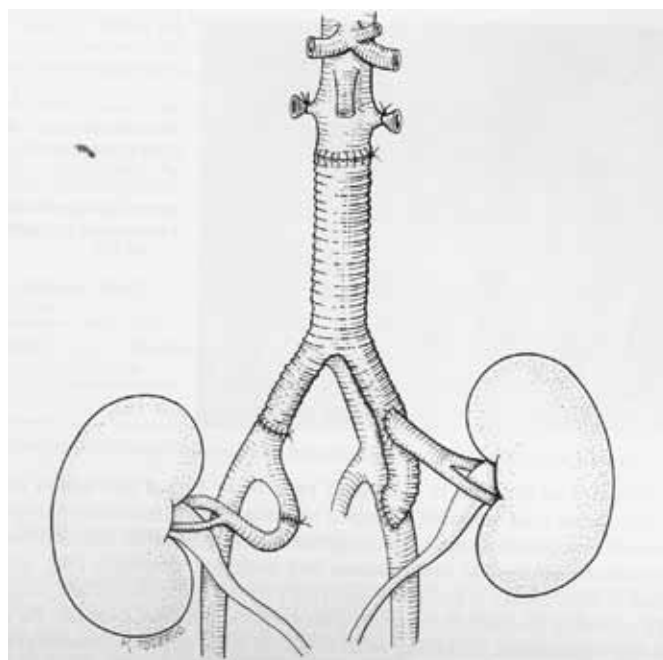


Fig 22-1B. treated with aortic prosthesis and renal autotransplantation. Drawing by Kari C.Toverud. From Brekke IB, Flatmark A. (eds) Reproduced with permission from SpringerVerlag.

to be removed, the renal pelvis is anastomosed directly to the urinary bladder. After finishing the back-table surgery, the kidney is replanted into the patient by a technique similar to that of kidney allotransplantation.

Liver Autotransplantation and Ante situm Procedures

When a hepatic lesion is judged inoperable by conventional means, extended liver surgery may be performed either by a full autotransplantation with complete excision of the liver and back-table surgery, or by the ante situm technique (2). Organ preservation follows the same principles as in kidney autotransplantation, but with the addition of veno-venous bypass. In the ante situm approach the liver is fully mobilised, the structures of the hepato-

duodenal ligament are left intact, but the liver is otherwise mobile, and can be rotated out of the abdominal cavity, allowing full access to all retro-hepatic structures.

The first liver autotransplantation was performed in 2001 in a 64-year old man with a malignant neoplasm occluding the retro-hepatic vena cava, and affecting the hepatic venous outflow (3). At the side table the neoplasm with the infiltrated caval vein was excised, and GorTex prostheses were used to reconstruct the vena cava and hepatic veins as shown in Fig. 2.

The surgery was successful and encouraged us to use the procedure in other patients with liver lesions deemed inoperable by conventional in situ surgery. A total of 14 liver autotransplantations/ante situm procedures have

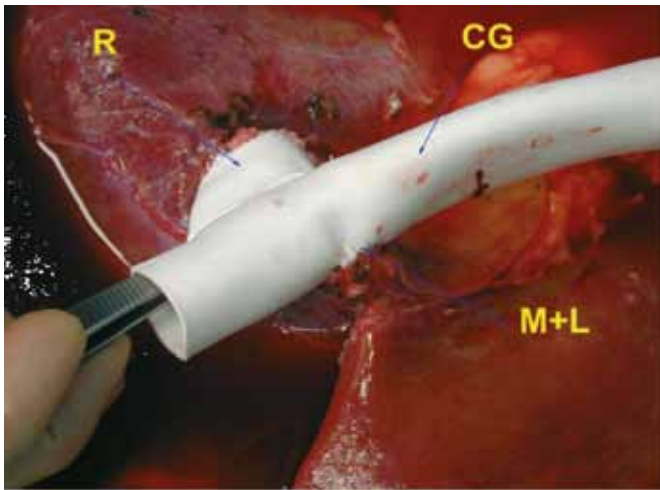
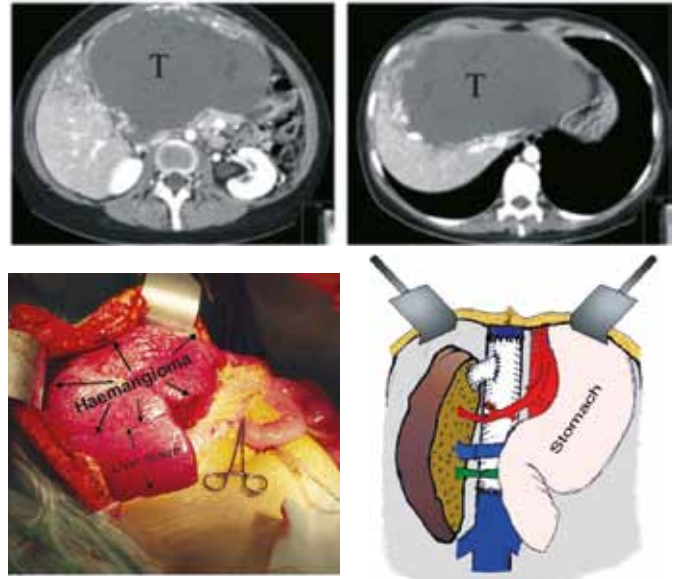


Fig 22-2. GorTex prostheses used to reconstruct vena cava and hepatic veins.
From Brekke IB, Flatmark A. (eds) Reproduced with permission from Springer Verlag.



22-3A–C. A giant haemangioma treated by extracorporeal resection, followed by autotransplantation of remaining normal liver tissue.
From Brekke IB, Flatmark A. (eds) Reproduced with permission from Springer Verlag.

been performed by the end of 2010 at Rikshospitalet. All patients have had neoplasms that were judged inoperable by conventional liver surgery. In most cases the indication was primary or secondary malignant neoplasms, while two had giant haemangiomas (Fig 3A-C). There has been no perioperative mortality in the series.

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Subspecialties of General Surgery: Urology

23. Urological Surgery in Norway up to 1985

Sten Sander

24. Urological Surgery in Norway 1980–2010

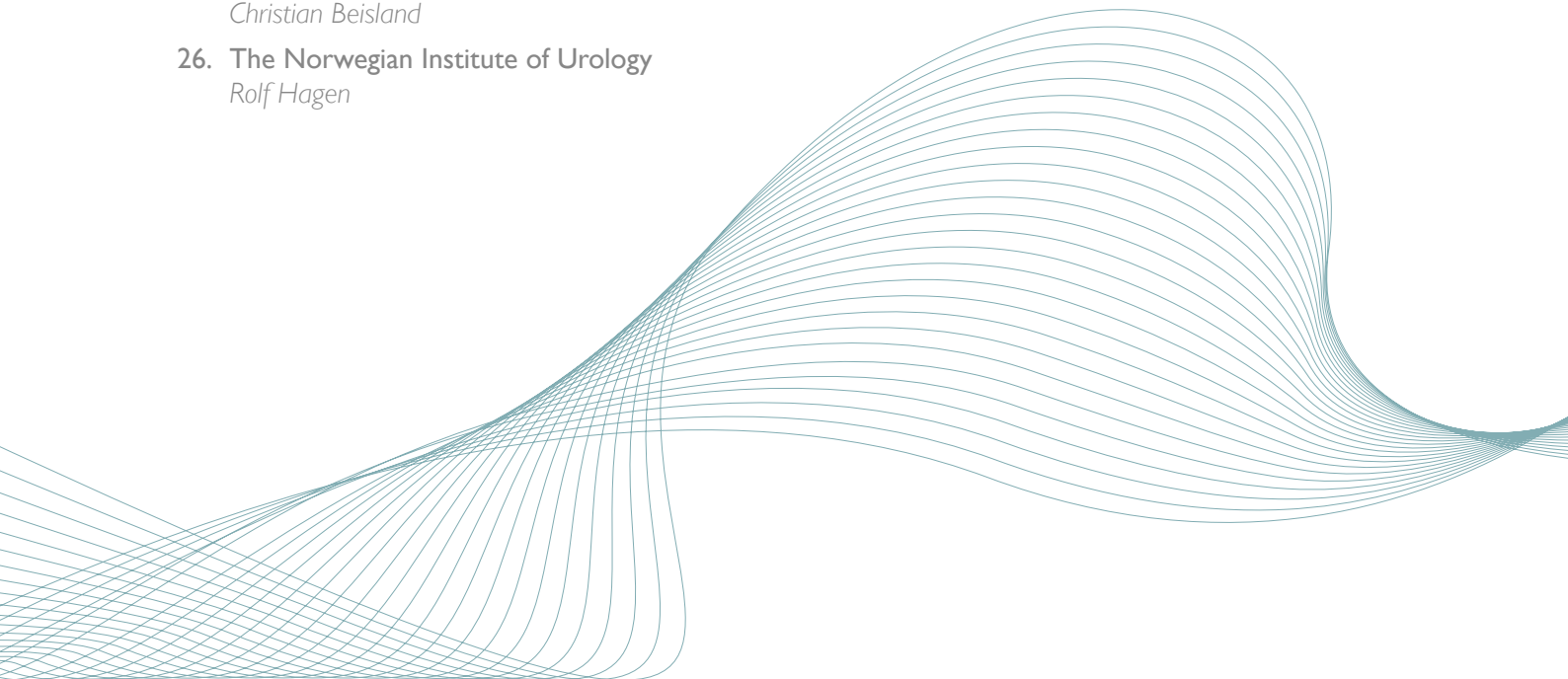
Steinar Karlsen

25. The Norwegian Urological Association

Christian Beisland

26. The Norwegian Institute of Urology

Rolf Hagen





In the da Vinci system, the surgeon sits at a viewfinder (left) and remotely manipulates probes and instruments on actuator arms over the operating table.

23. Urological Surgery in Norway up to 1985

Sten Sander 1985 (sub-headings added by J Haffner)

Urology comprises the diagnosis and surgical treatment of diseases of the kidney, urinary tract and male reproductive organs. The treatment of congenital malformations, calculi, tumours, strictures, male sexual dysfunction, and urinary incontinence are essential parts of the discipline. In many centres adrenal surgery is also included.

Urologists are first and foremost surgeons, and excellence in this field of medicine can be achieved only through diligent and exhaustive application of fundamental surgical principles. In addition urology has developed its own advanced technology with emphasis on endoscopic approaches. In Norway it is mandatory that all specialists in urology have completed training in general surgery. In addition, three years special training in urology is required before the candidates may apply for the specialty.

History

In Norway urological surgery was initially taken care of by general surgeons, some of whom took particular interest in this field of surgery. Orchiectomy, prostatectomy, nephrectomy and kidney resections were procedures familiar to many of these pioneers.

Of special interest is the observation made by Fredrik Ramm that orchiectomy as treatment for urinary retention due to prostatic hypertrophy resulted in shrinking of the prostate.

In 1948, The Norwegian Medical Association decided to accept urology as a specialty of its own, with clearly defined demands for qualification. Most of the urologists who qualified in this early period had gained parts of their training abroad, in particular from USA, Great Britain, Sweden or Denmark. International correlations have traditionally been established mainly to these countries.

The number of urologists in Norway has increased substantially since the late 1950ies. Today (1986) there are 60 qualified specialists, and the majority of them are engaged in urological sections associated with surgical departments. Separate urological units with a staff of specialists are established in the university hospitals, in community hospitals the urologist is often single and associated with the staff in general surgery.

Training positions are today mainly concentrated to the university hospitals and currently 14 candidates are engaged in training programmes.

The Norwegian Urological Association was founded in 1962 and has today 80 members. The Association is currently making preparations for the scientific and social arrangements in celebration of the 25th years anniversary.

Technical Aspects of Urology

Urology is based on the common philosophy and the same principles fundamental for all surgical practice. However, the trend towards endoscopic surgery is conspicuous in urology.

Transurethral surgery for tumours in the urinary bladder and for the correction of bladder outlet obstructions has gained wide acceptance. The improvement of lense and lighting systems, and the introduction of electrocautery, diathermy loops, flexible laser cables and a variety of working elements have resulted in standardised transurethral techniques which make it possible to deal with the greater proportion of pathological processes in the lower urinary tract. In particular the availability of advanced fibre-optic systems has enhanced this development. Transurethral instrumentation was for many years limited to the lower urinary tract. Recently techniques and instruments have become available that makes access to the upper urinary tract possible. Uretero-rensoscopy with both rigid and flexible instruments is currently in use for diagnostic purposes, and endoscopic treatment of calculi, tumours and strictures in the upper urinary tract.

Percutaneous approach to the renal pelvis has lately become an established procedure. The puncture and dilatation of tracts into the kidney makes it possible to work endoscopically inside the renal pelvis. Particularly stone surgery has greatly changed because of this method. The large flank incisions can be avoided, and stone surgery becomes more precise and less traumatic for the patients. The expanding practice of endoscopic surgery has resulted in shorter stay in hospital, less morbidity and a shorter period of postoperative sick leave.

Extracorporeal shock wave lithotripsy has revolutionised the treatment of kidney stones. This non-invasive technique makes it possible to disintegrate kidney stones down to fine particles that can pass spontaneously. The first unit for such treatment in the Scandinavian countries was activated in Oslo 1984. By this method shockwaves generated outside the body is concentrated and directed towards the kidney stone. Fragmentation of the kidney stones can be accomplished by series of shockwaves, and the procedure is safe with few possibilities for complications. The new techniques for treatment of kidney stones have greatly stimulated the cooperation between urologists and radiologists.

Diagnostic Progress

Intravenous radiotherapy and retrograde urograms for visualisation of the kidney and the urinary tract, are still essential examinations in the routine work up of urological patients. In addition, ultrasonography has proven to be very useful for the diagnosis of pathology in the kidneys and scrotum. Transrectal and transurethral ultrasound techniques have made the diagnosis of tumours in the prostate and the bladder more precise.

Cancer

The incidence of malignant disease in the urinary bladder and the prostate is increasing. Grading and staging of common tumours in urology has become more uniform thanks to increased international cooperation. International classification systems are essential in many respects and are necessary for any multicentre study of cancer treatment. Norwegian urologists are engaged in multicentre studies for the treatment of bladder cancer, prostatic cancer and cancer testis.

Bladder Cancer

Today it is realised that practically all bladder tumours are malignant in character. Previous open operations for bladder cancer has been replaced by transurethral resections, laser treatment, or in more advanced cases by preoperative radiation therapy followed by radical cystectomy. Lately modern chemotherapy for superficial bladder cancer has gained acceptance in many clinics.

Prostatic Cancer

Prostatic cancer is now the most common malignant disease among Norwegian men, with approximately 1400 new cases per year. Already at the time of diagnosis it becomes apparent that metastases are present in most cases. Endocrine treatment is then indicated, and most centres today prefer orchiectomy above the administration of oestrogen hormones. Radical prostatectomy for the treatment of localised disease has traditionally been carried out only in few cases, but lately better diagnostic accuracy have resulted in an increased interest for radical operations.

Cancer Testis

Cancer testis had for many years a mortality rate about 50%, but the results have been dramatically improved during the later years. The introduction of effective

chemotherapy and radical retroperitoneal lymph node extirpation have resulted in an over all survival better than 90 per cent.

Other Urological Conditions

Infections

Urogenital tuberculosis required much attention by urologists 25 years ago. Today new cases are rare. The sumptuousness of modern antibiotics combined with alertness to adequate draining procedures, have resulted in better control of severe infections and urosepsis.

Urinary Incontinence

Urinary incontinence is apparently a much more common problem in the population than realised in earlier days. The development of more precise urodynamic registrations has increased our knowledge of pathophysiology in the lower urinary tract. The mechanisms responsible for urinary leakage can be better recognised today with a better selection of patients for operative correction. Medical treatment and methods for electrostimulation have recently increased the possibilities for effective treatment of incontinence.

Calculi

During the last years conventional operative treatment of renal stones has to a great extent been replaced by extracorporeal shockwave treatment or percutaneous lithotripsy. Stones in the ureter can be taken out by ureteroscopy.

The stones can be disintegrated through the ureteroscope under visual endoscopic control.

Prostheses

After introduction of the silicon prostheses in the late 1970ies, effective treatment for incontinence became available. Asbjørn Igesund in Tromsø made the first implant of an AMS (American Medical Systems) sphincteric prosthesis in 1977. Penile and testicular prosthetic implants gained acceptance in the same period.

Final Comment

Anesthesia

Modern methods for spinal and epidural anesthesia are particularly useful in urological surgery. This is convenient for patients and surgeons, and has reduced the need for general anesthesia.

Training

Urological surgery has been through a turbulent process of change during the last 25 years. The trend towards endoscopic surgery is prominent and new ways of training urologists is a challenge. Video-transmission and video-recording open up new ways for teaching, and the practice of endoscopic operations performed by visual control on a TV-monitor has already been introduced.

The development of new techniques will certainly make the urologists' future exciting.

Acknowledgements

The editors would like to thank Jan Due, Ove Mjølnerød, Bernt Kvarstein and Steinar Karlsen for corrections and comments to the manuscript.

24. Urological Surgery in Norway 1980–2010

Steinar J. Karlsen

Technical and medical advances and a rapidly expanding insight into urological pathology have revolutionised urology the last thirty years. Urology has markedly distanced itself from general surgery. From being a pure surgical specialty, urology has become a self-contained profession, where functionality of the urinary tract and male sexual system is an important aspect.

Individual urologists can no longer master the total scope of the profession. This has led to subspecialisation and a multidisciplinary approach, and in some areas has changed organisation of the services to the public.

Major Technical Advances

Extracorporeal shock wave lithotripsy was first published by C. Chaussy et al in 1980. The first lithotripter in Norway was installed at Ullevål in 1984 at the initiative of Sten Sander (Aker) and Kjell Tveter (Ullevål). Today a majority of patients with urinary calculi are treated by this non-invasive modality.

Ureteroscopy was revolutionised in 1980 when Perez-Castro introduced the rigid ureteroscope. Since then there has been a gradual downsizing of the instruments, improved flexible fiberoptics with deflection properties and ancillary instrumentation. This has revolutionised the endoscopic treatment of upper tract pathology.

Percutaneous nephrolithotomy was introduced by P. Alken in 1982. It establishes a reliable access to the collecting system of the kidney. It is used for the removal of complex kidney stones. Flexible nephroscopes and ureteroscopes allow access to all parts of the upper urinary tract.

These endourological techniques were rapidly adopted in Norway and are now employed in urological departments throughout the country.

Laser technology (Neodymium-YAG) was introduced in Norway in the early 1980ies. It is suitable for application through flexible endoscopes, and is primarily used for coagulation of non-infiltrative urothelial tumors and superficial malignant changes of the penis.

The most versatile laser technology for use in urology is the Holmium-YAG laser. It is mainly employed for fragmentation of urinary calculi.

Hans Olav Beisland and collaborators at Aker promoted the dispersal of the use of lasers throughout the country. Beisland described a novel approach in his PhD thesis in 1986.

Laparoscopy was pioneered in Norway in gynaecology, followed by digestive surgery. It was introduced in urology in the early 1990ies. Guided by gastroenterological

surgeons, enthusiastic urologists acquired competence in laparoscopy, and small clinical series were presented. Two gastroenterological surgeons deserve specially mention. Arne R Rosseland and Bjørn Edwin both offered their expertise in teaching urologists laparoscopic procedures throughout the country. The first laparoscopic iliac lymphadenectomy was performed in 1992, and the first nephrectomy in 1994 by Rosseland, Per Holme and Edwin, both procedures at the Central Hospital in Akershus. The first laparoscopic radical prostatectomy was done in 1999 at Rikshospitalet by Edwin, Holme and Trygve Talseth.

In 2001 two consultants from Aker; Rolf Eigil Berg and Nicolai Wessel, were sent to Institut Mutualiste Montsouris, University Pierre et Marie Curie, Paris to learn laparoscopic radical prostatectomy (LRP). From March 2002 to November 2007 all radical operations for localised prostate cancer at Oslo Urological University Clinic (OUU), Aker were LRPs. Since 2002 laparoscopic technique has also been routinely used in radical and partial nephrectomies, adrenalectomy and operations for uretero-pelvic stenosis.

Robot assisted laparoscopy has some major advantages. Articulated surgical instruments are mounted on the robotic arms which are introduced into the body through cannulas. The device senses the surgeon's hand moments and translates them electronically into scaled-down micro-movements to manipulate the tiny proprietary instruments. It also detects and filters out any tremors in the surgeon's hand movements. The camera provides a true stereoscopic picture transmitted to the surgeon's console.

So far in Norway, the daVinci robot is mainly used in robotic assisted radical prostatectomy (RALP). The first patient was operated by RALP at Aker in March 2004 as part of a postgraduate symposium. Guest operative surgeon was professor Richard Gaston (France).

Radiumhospitalet acquired the first daVinci robot in Norway in December 2004, financed by private donations. By April 2010 more than 1000 RALP procedures had been performed. The urologists in the team have been Bjørn Brennhovd and Karol Axcróna.

Telemark Central Hospital, which later acquired a daVinci robot, had up to June 2010 treated about 500 patients in collaboration with Radiumhospitalet.

In 2007 conventional LRP was replaced by RALP at Aker. Patient number 500 was operated in March 2010. daVinci platforms were installed at Haukeland in the spring 2009, and in Stavanger and St. Olav's Hospital early 2010.

Major Pharmaceutical Advances

The introduction of cisplatin and its derivatives in treatment of testicular cancer has dramatically increased survival. The rate of surgical castration in prostate cancer is considerably reduced by the use of medical castration, and promising cytostatics are developed. In metastatic renal cancer tyrosine-kinase inhibitors are the first drugs influencing survival. Intravesical cytostatics and Bacillus Calmette-Guérin (BCG) was introduced in the treatment of urothelial cell cancer in the 1980ies. In the treatment of BPH, 5 α -reductase inhibitors and α -blockers have reduced surgical interventions. PDE 5 inhibitors, introduced in 1998, have revolutionised the treatment of erectile dysfunction. New antimuscarinic drugs to treat overactive bladder syndrome have continuously been improved through the last 20 years. Botulinum toxin injections into detrusor muscle is still off label treatment, but is gaining wide interest. New pharmaceutical principles are in the pipe-line. In urolithiasis medical prophylaxis and treatment has met increasing focus.

Some Special Urological Conditions

Prostate cancer

In Norway prostate cancer (PCa) is the most common cancer in the male. Norway is amongst the countries with the highest incidence and mortality of PCa. The incidence is increasing in all age groups. Longer life and a more active attitude towards early diagnosis may contribute to the increased incidence.

Norwegian authorities do not recommend routine screening, except in middle-aged men with a familiar disposition for PCa. In the late 1990ies the finances for participation in a coordinated European project to investigate the value of screening in a defined population was granted by the

government. In spite of this it was decided not to participate after a joint meeting between urologists, oncologists and statisticians. However, there is an increased detection of patients with early, localised disease, and radical treatment of presumably curable disease (radical prostatectomy, radical external beam radiation treatment, brachytherapy) has boosted during the last decades.

In some centres less invasive treatment has been tested. In 1991 Hans Olav Beisland published the first international series on “radical transurethral resection” of the prostate combined with laser irradiation of the prostatic cavity. Håkon Wæhre at the Radiumhospitalet and Truls Erik Bjerklund Johansen at Telemark Central Hospital studied the effects of cryotherapy, and in the last years high intensity focused ultrasound (HIFU) has been introduced in the treatment of very selected patients at Aker by Viktor Berge and Eduard Baco.

The treatment of PCa in Norway has to a variable degree been “evidence based”. The most important improvements have probably been achieved by active participation in the Scandinavian Prostate Cancer Group (SPCG). Norwegian urologists have recruited a large number of patients and the studies have brought important results: SPCG-4 showed that radical prostatectomy gives a survival profit compared to symptomatic treatment, SPCG-5 that parenteral oestrogen has an effect comparable to surgical castration without increased cardiovascular mortality, SPCG-6 that Bicalutamide gives a positive overall cancer specific survival compared to placebo in patients with locally advanced prostate cancer, SPCG-7 that hormones and radical external radiotherapy gives a clear survival profit compared to hormonal treatment alone in patients with locally advanced disease.

Most centres performing radical prostatectomies in Norway have a local quality register of their practice. The most extensive of these is probably the register initiated by Lars Magne Eri at OUU, Aker. A national registry is still desired.

Some scientific contributions in the period deserve special mention:

Haukeland, Bergen: Per Åge Høisæter is a prominent enthusiast for prostate cancer research and education, and has contributed to several scientific publications. His PhD thesis on the subject was from 1977. His strong interest in prostate physiology and pathology resulted in studies

at Roswell Park Memorial Institute during 1979–80. He mentored Peder Gjengstø, who published his PhD thesis at UiB 2008.

St Olav's Hospital in Trondheim: Anders Angelsen has contributed to numerous experimental and clinical publications since 1992. His main interests have been neuroendocrine cells and PCa. He published his PhD thesis at NTNU in 1998. In the period 1987 – 2009 Per Lundmo contributed to several studies. He published his PhD thesis in 1986.

Ullevål: Kjell Tveter et al have published several studies. In 1999 Trond Jørgensen published his PhD thesis.

Stavanger: Sigmund Vaage and collaborators recruited many patients into various national and Scandinavian clinical studies on PCa.

Aker: In 2001 The Urological Research Institute was established at the OUU under the leadership of professor Kristin Austlid Taskèn. The main focus of research has been molecular biological mechanisms related to the development of hormone resistant PCa.

Swedish Centres: Norwegian urologists have also published their PhD theses from Sweden: Svein A. Haukaas at Haukeland; Lund university in 1984. The late professor Lars Dæhlin at Haukeland; Umeå University in 1985.

In December 2009 the first “National guidelines for diagnosis, treatment and follow-up in prostate cancer” were published, supported by the National Health Authorities. Viktor Berge, Bjørn Brennhovd and Anders Angelsen were urological members of the Editorial Board. In addition, Jens Høstmark and Einar Hem gave major contribution in the preparation of the guidelines.

Bladder cancer

Cancer of the urinary bladder is one of the most frequently occurring malignancies in Norway.

The routine treatment of non-invasive bladder cancer is transurethral resection (TURP). Laser was tested as an alternative or supplementary modality by HO Beisland et al, Aker in the 1980ies. They also tested laser in treatment of superficially invasive tumours.

Treatment with intravesical cytostatics and *Bacillus Calmette-Guerin* (BCG) is now standard.

Recently photodynamic diagnostic cystoscopy (PDD) applying fluorescence cystoscopy with hexaminolevulinat in blue light has been introduced. Aker is a reference centre for this diagnostic modality, which may improve early diagnosis and possibly reduce tumour recurrence rate.

Radical cystectomy with uretero-ileal (Bricker) diversion is the routine treatment for muscle invasive bladder cancer. In 1993 Wæhre et al published a retrospective study showing that approximately 50% of patients with operable T2-T4 bladder cancer survived for at least 5 years, independent of whether the operation was done at a large uro-oncologic unit or a smaller urological section. A series published in 1996 by the oncologist Sophie Dorothea Fosså et al showed no difference in survival in patients treated before and after 1985.

In the mid 1980ies several techniques for constructing continent urinary reservoirs and neo-bladders were introduced, and small series were published in Norway.

Pål Stefan Frich, in Trondheim, published their experience with different urinary diversion techniques in 2009.

Urologists and collaborators at Haukeland have been especially active in research on bladder cancer; Tore Farsund published his PhD thesis in 1978, Jens Høstmark his in 1984 and Vendil Vatne hers in 2006.

Rolf Wahlqvist also deserves special mention. He was member of Nordic Urothelial Cancer Group in the period 1992–1996, chairman of The Norwegian Urological Cancer Group 2001–2004 and is member of a Nordic expert group on photodynamic diagnosis (NUPeG). He was the author of the national guidelines on bladder cancer on behalf of Norwegian Urological Cancer Group in 2005. He was also editor of a revised edition supported by the National Health Authorities in 2010.

Testicular cancer

Since the 1970ies the overall survival rate of testicular cancer has increased from 10% to more than 90% as a result of improved chemotherapy, surgical techniques, diagnostic procedures (CT and MRI) and tumour markers. It is

the most common cancer in young men, with increasing incidence. Since 1981 Norway and Sweden have used common treatments, the SWENOTECA programmes. They are revised every year by a Nordic multi-disciplinary group with members from Norway and Sweden. The survival rates for patients with testicular cancer in Norway and Sweden are now among the best in the world.

The urologists representing Norway in SWENOTECA at present are Anders Angelsen, St. Olav's Hospital, Rolf Wahlqvist, Aker, Bjørn Brennhovd, Radiumhospitalet and Peder Gjengstø, Haukeland. Angelsen and Wahlqvist are both members of a national group appointed by the National Health Authorities to make national guidelines for testicular cancer (to be completed 2010).

The oncologist Olbjørn Klepp, at St. Olav's Hospital, has been a driving force behind SWENOTECA since its initiation in 1981, and since 1986 he has produced numerous publications on different aspects of testicular cancer.

Renal cancer

Since 1990 laparoscopic operations have gradually replaced open surgery in the radical treatment of renal carcinomas. Small, early series have been published from several hospitals since then. Laparoscopy and robot-assisted laparoscopy are now routine modalities in radical or nephron sparing surgery for renal cancer in Norway. A promising medical drug has recently been introduced.

Christian Beisland, Haukeland, has published several studies on different aspects of renal cancer. He presented his PhD thesis in 2006 at UiB.

Urolithiasis

For several years the SWL lithotripter in Oslo served the country as a whole, being a joint venture between Aker, Ullevål and Rikshospitalet. About 1000 patients were treated annually. The early results were published in 1988 by Einar Hem et al. Brynjulf Otnes published his PhD thesis at UiO 1983, and Steinar J. Karlsen his at UiO in 1991. The development of later generation lithotripters through the years resulted in dispersion of the technology throughout the country.

Experience with ureteroscopy, was reported in Norway by E. Hem et al, Ullevål in 1988, and by Nils Magnus Ulvik et al, Haukeland in 1986. In 1995 Ulvik et al. reported that ureteroscopy is safe to use in pregnancy to diagnose and extract ureteral calculi when conservative measures fail. Their paper is constantly referred to internationally.

Percutaneous nephrolithotomy was reported by August Bakke et al, Haukeland in 1984 and by SJ. Karlsen et al, Aker, in 1986. A reference article regarding percutaneous treatment of staghorn calculi was published from Aker by SJ. Karlsen and Tor Gjølborg in 1989. PCNL is adopted as a routine method in most Norwegian urological departments.

Medical prophylaxis and treatment of complicated urinary stone disease have come into focus the last decade. Many urological departments follow the guidelines outlined by the Scandinavian cooperative group for urinary stone disease, published by PJ. Osther et al in 1999.

Benign prostatic hyperplasia (BPH)

Transurethral resection (TUR-P) is the standard treatment of BPH in Norway. Two additional major treatment modalities have been adopted in the last decades; Mini-invasive techniques for application of high temperatures to the prostate resulting in vaporisation or necrosis and shrinkage of prostatic tissue, and medical treatment has resulted in a 30% reduction in TUR-P procedures from 1990–2002 (L. Dæhlin 2004).

Lars Dæhlin, Haukeland Hospital, deserves special mention regarding research and clinical introduction of mini-invasive procedures for BPH in Norway, especially TUMT and interstitial laser coagulation. Marteinson and Due published early series of TUMT treatment from Tromsø.

Lars Magne Eri published multiple studies on urodynamic and medical aspects on BPH between 1992 and 2002. He presented his PhD thesis at UiO in 1996.

Neuro-urology and reconstructive urology

Arne Fryjordet at Ullevål Hospital was a pioneer in the field of investigations of functional disorders in the lower urinary tract. He published a classification of different types of incontinence in 1979.

During the 1980ies and 1990ies great improvements in

diagnostic technology resulted in increased knowledge of different mechanisms underlying functional disorders of the urinary tract. S. Sander, E. Fossberg and HO. Beisland, Aker, published several clinical studies on these subjects between 1981 and 1990. In 1984 Erling Fossberg published his PhD thesis at UiO.

At Akershus Central Hospital Bernt Kvarstein had special interests in urodynamics. In collaboration with the Institute of Industrial Science, UiO, he developed a novel fiberoptic transducer for pressure measurements, achieving international attention.

Ove Mjølnerød at St. Olav's Hospital showed a great talent for obtaining updated equipment for urodynamics and other purposes, and was a great enthusiast for the professional development of his young colleagues. Bjørn Brevik introduced operative techniques like continent urinary diversion and reservoir and reconstructive urologic surgery in the same region.

Intermittent non-sterile self-catheterisation has been one of the most important improvements in neuro-urological disease. August Bakke at Haukeland has contributed greatly to the implementation of this treatment both in Norway and internationally. During the period 1988–2007 he and his coworkers at Haukeland have produced many publications on related subjects. He presented his PhD thesis in 1993 at UiB.

When Bjørn Klevmark was appointed professor and head of the urological department at Rikshospitalet in 1985 he had already demonstrated his interest and insight into bladder physiology by his work at the Institute of Neurophysiology, UiO. His publications on motility of the urinary bladder from 1974 to 1980 are international reference literature. He has developed an impressive collaborating international network of world authorities on lower urinary tract physiology

The urological department at Rikshospitalet has become a corner stone in the development of neuro-urology. In this department new treatment modalities have continuously been introduced by Trygve Talseth, Alexander Schultz and Hans Hedlund. Continent urinary diversions, bladder substitution, clam entero-cystoplasties, augmentation entero-cystoplasties, continent cystostomies for cath-

eterisation, urethral male and female slings, sacral neuromodulation, botulinum injections, and artificial urethral sphincters, are used to tailor individual treatment. From 1998 open urethroplasty has been increasingly used.

In 1996 Hans Hedlund succeeded Bjørn Klevmark as professor and head of the department. His most important scientific contribution is experimental *in vitro* studies on human prostatic and erectile tissue, carried out as participant in a group led by Karl-Erik Anderson in Lund, published from 1983 to 1992. This work led to an accelerating international research on voiding physiology and erectile dysfunction, resulting in the later development of novel drugs of great clinical importance, such as α -blockers for BPH and Prostaglandin E1 and phosphodiesterase antagonists in the treatment of erectile dysfunction. From 1986 to 2010 Hans Hedlund contributed to numerous published studies on various neuro-urological problems. In 2010 he received the European Society of Sexual Medicine's Award of excellence.

The physiotherapist Kari Bø, now professor at The Norwegian School of Sport Sciences, deserves mention regarding her work on the importance of pelvic floor muscle exercise in the treatment of female stress incontinence.

Advanced Urological Andrology

Until the 1980ies erectile dysfunction was regarded as a psychiatric disorder. Bjørn Klevmark was a pioneer in accepting erectile dysfunction as an organic disease.

During the late 1980ies and 1990ies the international trend was that the cause was a "venous leak" which could be treated by surgery. Later it was accepted that it was caused by a functional failure in the cavernous tissue. Klevmark edited a series of articles in the Norwegian Medical Journal in 1988 on different aspects of erectile dysfunction.

In the late 1980ies the plastic surgeon Hans Borchgrewink and Klevmark invented a new special plication suture as an operative procedure for congenital and acquired curvature of the penis.

Penile prosthetic implantation has been used in patients who have erectile dysfunction refractory to other treatment since the 1970ies. Initially malleable rods were used, but today inflatable 3-piece prostheses are preferred.

The introduction of drugs has turned the treatment of erectile dysfunction into the hands of the general practitioners.

Multidisciplinary Practice

During the last decades the need for multidisciplinary cooperation in the treatment of the urological patient has become increasingly obvious. In addition to cooperation with other surgical specialties, collaboration with pathologists, diagnostic and interventional radiologists, and especially uro-oncologists has become a necessity.

The oncologist Sophie Dorothea Fosså at Radiumhospitalet deserves special mention in this context. During the last three decades she has made her distinctive mark on the practice and scientific research in Norwegian uro-oncology. She is probably the most internationally celebrated Norwegian scientist on the aspect of urological cancer, and is well known in most international oncological fora. She has contributed to an extensive number of high-profiled international publications, and the Norwegian urological community greatly appreciates the impressive contribution by Fosså to the knowledge and treatment of urological malignancies.

Collaboration with urotherapists has become increasingly important during the period. In 1999 the first, and only, Norwegian urotherapy education for nurses at higher level started in Bergen. The initiator, and driving force ever since, has been urotherapist Jannike Mohn. The programme focuses on bladder dysfunctions, both neurogenic and non-neurogenic. Urodynamic investigations, proper pedagogic programmes, communication- and coping strategies are essential issues, as are statistics, research items and project work methodology.

Norwegian Urological Cancer Group (NUCG)

In 1995 the chairman of The Norwegian Urological Association, Trygve Talseth, requested B. Kvarstein, PÅ. Høisæter and SD. Fosså to prepare a constitution for a multi-disciplinary interest group for urological cancer in Norway.

The constitutional meeting was held in Tromsø on November 22nd 1995 with the following participants: Per Åge Høisæter and the endocrine surgeon Jan-Erik Varhaug, Haukeland Hospital; Per Lundmo, The Regional

Hospital in Trondheim; Truls Erik Bjerklund Johansen, University of Tromsø; Håkon Wæhre, Pål Møller, Eva Skovlund, Sophie D. Fosså, Radiumhospitalet; Trygve Talseth, Rikshospitalet; Bernt Kvarstein, Akershus Central Hospital; Sverre Harvei, The Norwegian Cancer Registry.

The composition of the board of NUCG was decided upon. It should be approved by the general assembly of The Norwegian Urological Association every third year. Two professional meetings were to be arranged per year, one of which in association with Oncological Forum. The main objects of the group were to stimulate research, education, clinical trials and quality assurance, and produce guidelines on the subject of urological malignancies, based on the collaboration between Norwegian urological and oncological professional communities.

National Programmes for Prostate Cancer (NPPC)

In 2000 NUCG appointed a multi-disciplinary executive committee with the main object of establishing a Norwegian registry (programme) for prostate cancer. The preliminary experiences were presented by Rolf Wahlqvist et al in 2003. They concluded that there was a prominent need for continuous registration and surveillance of essential diagnostic and prognostic data in patients undergoing radical prostatectomy.

National Programmes for Diagnosis, Treatment and Surveillance of Patients with Cancer of the Urinary Bladder

The first edition of this programme, commissioned by NUCG and financed by The Cancer Association, was written by Wahlqvist and published in 2005. He revised the programme in 2009, commissioned by the The Directorate of Health in Norway.

National Programme for Diagnosis, Treatment and Surveillance of Patients with Cancer of the Testis

This programme will be published in 2010 by a multidisciplinary group where A. Angelsen, R. Wahlqvist and K. Axcrona are representing urology.

Nordic Urology

The Scandinavian Association of Urology has been an important institution and meeting place for the collaboration across the Nordic borders in the period. Several Norwegian urologists have contributed, and some of the

most prominent will be mentioned.

- President: Sten Sander 1985–93
- Secretary General: Alexander Schultz 1999–
- Cashier: Erling Fossberg
- Editors of the NUF-Bulletin: Per Åge Høisæter, August Bakke, Lars Dæhlin 1993–97. From 2010 Sven Løffeler and Karol Axcrona
- Honorary members: Ragnar Andersen – 1980, Erling Hjort – 1982, Thorolf Gjersvik – 1983, Sten Sander – 1993, Per Åge Høisæter – 2001, Steinar J. Karlsen – 2009
- Scandinavian Association Congresses: Trondheim 1983, Oslo 1993, Bergen 2003

Nordic cooperative groups in urology

The most marked Norwegian contributors have been

- SPCG: Per Åge Høisæter (chairman 1981–7), Sigmund Vaage (chairman 1999–2003), Kjell Tveter, Per Lundmo, Anders Angelsen, Viktor Berge
- Reconstructive urology: Alexander Schultz, August Bakke
- Neurourology: Bjørn Klevmark (chairman 1985–7), August Bakke, Trygve Talseth, Erling Fossberg
- Urothelial cancer: Rolf Wahlqvist
- BPH: Hans Hedlund, Lars Dæhlin, Trygve Talseth
- Urolithiasis: Nils Magnus Ulvik, Steinar J. Karlsen (chairman 1991–4)

Some Pioneers and Key Figures in the Early History of Norwegian Urology

Fredrik Kristian Jervell (1859–1921) who ran a private clinic in Oslo, was among the founders of the Nordic Surgical Association. He held several honorary posts in this and other professional organisations, was president of the Norwegian Medical Association 1916–17, and initiated the education of medical nurses in Norway in 1892. He performed the first nephrolithotomy in Norway in 1892, and was particularly interested in the surgical treatment of prostatic hypertrophy. By 1907 he had personally performed 13 prostatectomies.

Peter Nicolay Bull (1869–1951) was professor and head of surgery at the Surgical Department B, Rikshospitalet 1912–28. He held honorary posts in several Norwegian and Nordic professional organisations, and was an honorary member of Royal College of Surgeons, England. In



Fig 24-1. Fredrik Kristian Jervell. From Nordisk Kirurgisk Förening, Åttio År.

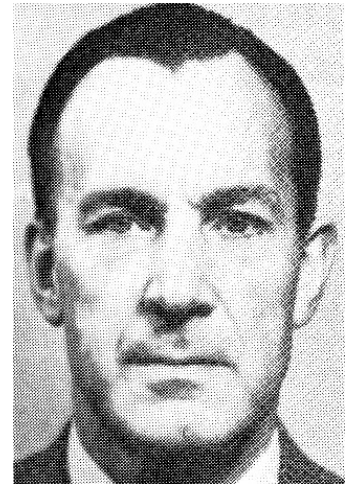


Fig 24-2. Willy Mathisen. From Fra Urologiens historie i Norge, 1987.

1904 he bought the first cystoscope at Rikshospitalet on his own account. Amongst his broad spectrum of surgical publications were some on the importance of retrograde pyelography in the diagnosis of kidney tumours, and his “10 clinical lectures on urinary tract disease”.

Stein Flemming Holst (1891–1955) became specialist in surgery in 1927, urology 1930 and medical radiology 1932. He founded and chaired his private, and very modern for its time, department of urology at Vor Frue Hospital¹ 1930–55. He recruited patients from all over Norway mainly for prostatic surgery. Amongst his pupils were Erling F. Hjort and Ragnar Andersen.

Erling Falsen Hjort (1898–1996) got his PhD in 1980 on haematogenous pyelonephritis. After working for several years as consultant surgeon at various hospitals he was discharged by the nazi authorities in 1941. He was a private assistant for Stein F. Holst at Vor Frue Hospital, and from 1943 head of surgery at the Swedish Red Cross Hospital at Midtstuen, later converted to Akershus Central Hospital. He also served several periods as consultant surgeon at the Norwegian Mobile Army Surgical Hospital in Korea during the war in 1951–1953. In the late 1920ies he initiated the novel surgical technique of resection of the lower renal pole with renal pelvis in the treatment of hydronephrosis. During his retirement he was stand-in consultant at several hospitals, and did scientific work in experimen-

tal surgery. He was chairman of the Norwegian Surgical Society 1954–55 and Oslo Surgical Society 1956–57, honorary member of the Norwegian Surgical Society and the Nordic Urological Association, and Knight of First Class of St. Olav's Order.

Ragnar Andersen (1905–93) was a close collaborator with Stein F. Holst at Vor Frue Hospital 1946–55, and succeeded Holst as chief urologist 1955–75. He held various highly profiled military medical posts, and was initiator of the Norwegian Urological Association, honorary member of the Swedish and Nordic Urological Association and the British Association of Urological surgeons, Knight of First Class of St. Olav's Order, and won His Majesty the King's gold medal 1958.

Willy Mathisen (1909–97) was educated in urology in Detroit, Ann Arbor, Gothenburg and New York. From 1952 he worked at Surgical Department A at Rikshospitalet, where he established and chaired the urological activity 1957–77. Here he taught urology to a generation of Norwegian doctors. He was associate professor 1976–79. Together with Christian Cappelen he established haemodialysis in Norway. His numerous publications embraced all fields of urology. By his great workload, enthusiasm, technical competence and talent for novel surgical techniques, he put his personal mark on the development of modern Norwegian urology. He was chairman of the Norwegian Urological Association 1967–71.

1) Vor Frue is now a part of Lovisenberg



Fig 24-3. Per Åge Høisæter: Courtesy UiB, Section for Photo and Visual Presentation



Fig 24-4. Kjell Tveter: Private photo. Reproduced with permission from Kjell Tveter.



Fig 24-5. Bjørn Klevmark: Private photo. Courtesy the Klevmark family.

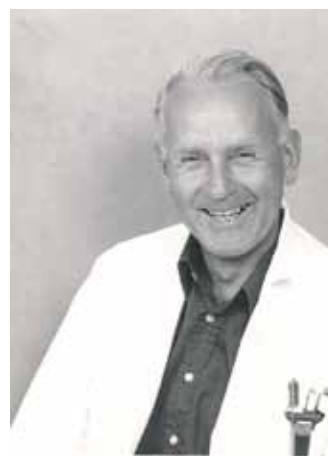


Fig 23-6. Sten Sander: Private photo. Courtesy Jorunn Sander.

Knut Høeg (1910–94) was consultant urologist at Dpt III, Ullevål 1958–64. At his time the department attracted international attention for the development of kidney resection in the treatment of renal tuberculosis, which also was the subject of Høeg's PhD thesis (1963). As chief of the department of urology 1964–80, the largest department of urology in the country, he guided the education of many Norwegian urologists.

Ove Maske (1911–88) received his education in urology in Birmingham, Alabama and Boston. He was head of surgery at the Norwegian Field Hospital in Korea 1952–53, and ran his private practice as urologist at The Red Cross Clinic, Trondheim 1957–80. For a generation he was the only practising urologist north of Dovre, and he treated patients from the whole of northern Norway. He was an enthusiastic promoter of the technique of transurethral prostatic resection.

Thorolf Gjersvik (1913–89) was educated in urology in Århus, Copenhagen and Gothenburg. From 1957 to 1983 he was attached to the Department of Surgery, Haukeland, Bergen, where he in 1961–83 established and chaired the urological activity. He markedly influenced the organisation and practice of modern urology in the western part of the country, where he for many years was the only specialist in urology. He was elected an honorary member of the Nordic Urological Association 1983.

Knut Hatteland (1919–2008) was consultant urologist at Akershus Central Hospital 1962–3, and chief of urology

at Rogaland Central Hospital 1964–89. Being the only specialist in urology for many years, he made a formidable contribution to the development of urological services for the population in the Stavanger area. He made his department one of the leading in the country.

Arne Fryjordet (1925–83) was consultant urologist at Vor Frue Hospital 1968–72. In 1972 he worked as consultant urologist at Ullevål, and from 1980 he was chief of urology. He was a pioneer in the application of urodynamic investigations, and his operative and clinical qualifications were of high quality. His educational abilities made him a sought after lecturer and supervisor. He was chairman of the Norwegian Urological Association 1978–81.

Some Influential Colleagues in the Period 1980–2010

Per Åge Høisæter (1938–) was the first professor of urology in Norway. He was appointed professor and chief urologist at UiB in 1983. His special interest has been cancer of the prostate. He was founding chairman of SPCG in 1981. Under his leadership SPCG initiated a number of important clinical studies. 1990–98 he was chairman of the Institute of Surgery, Faculty of Medicine, in Bergen. Throughout his career, Høisæter has shown great enthusiasm and pleasure in performing, teaching and discussing urology, and he has been an excellent ambassador for Norwegian urology, nationally and internationally. He is honorary member of the Norwegian Urological Association as well as the Nordic Urological Association.

Kjell Tveter (1936–) was professor and head of urology at Ullevål from 1983. In addition to being one of the most internationally celebrated academic Norwegian urologists with an extensive scientific contribution on androgen metabolism, hormone receptors, prostate ultra structure and clinical oncological urology, he was a superb practical surgical operator.

Bjørn H. Klevmark (1926–2011) was professor and head of urology at Rikshospitalet 1985–96. He was the driving force behind the specialisation of this department in neuro-urology and advanced urological andrology. He was member of the Nordic cooperative group on urodynamics 1981–87. Klevmark chaired the International Continence Society World Conference in Oslo 1988, the only surgical world conference arranged in Norway. He also organised and chaired the Oslo Biennial Symposium on Lower Urinary Tract Physiology and Pathophysiology 1993–2001. He received honorary membership of the Norwegian Urological Association in 1995.

Sten Sander (1932–2005) was professor and head of urology at Aker from 1972. He was one of the first scientists who detected oestrogen receptors in the female breast. He was a visionary professional with great talent for novel treatment modalities, such as ESWL, TUMT, lasers and urodynamics. He chaired the Norwegian Urological Society 1980–83 and was president of Scandinavian Association of Urology 1985–93. He initiated and mentored several PhD theses.

Brynjulf Otnes (1931–2009) was head of urology at The Central Hospital in Akershus 1973–82 and at Bærum Hospital from 1983 until retirement. He edited the book “From the history of urology in Norway” 1987. He chaired the Norwegian Urological Association 1977–79. Otnes was initiator of Norilco, an advocate group for Norwegian patients with urostomies or gastroenterostomies.

Steinar J. Karlsen (1944–) was professor and chairman at OUU, Aker from 2000 until the re-organisation of the

urological services into Oslo University Hospital in 2010. He was the Head of the Department of Urology at Oslo University Hospital until he retired in June 2010. He was central in the organisation of The Urological Research Institute in Oslo. He is honorary member of the Nordic Urological Association.

Ove K. Mjølnerød (1932–) was head of urology at The Regional Hospital in Trondheim from 1974 until his retirement. Mjølnerød played a central role in the development and organisation of modern urology in the Central Norway Region. He chaired the Norwegian Urological Association 1989–91.

Jan Due (1942–) was a very profiled leader of the Department of Urology in Tromsø since 1983. His contributions to international military medicine and work in war zones (UNIFIL, UNIKOM) deserve notice.

Bernt Kvarstein (1930–) was head of urology at The Central Hospital in Akershus 1982–2000, chairman of The Norwegian Urological Association 1986–9, initiator and CEO of NOFUS, an advocate group for Norwegian urological patients. He received the King's Award of Recognition in silver 2010.

Sissel Overn (1956–) deserves special mention for becoming the first female specialist in Norwegian urology 1995.

Private Practice

In the entire country only eight urologist with independent practices have contracts with the Regional Health Services : Morten Andersen in Moelv, Einar Christiansen and Espen Eggen in Oslo, Paul Gerhardt in Østfold, Arve Gustavsen in Haugesund, Knut H. Klem in Arendal, Raymond F. Mortensen in Bodø and Sissel Overn in Hokksund.

Acknowledgements

The author and editors would like to thank Hans Olav Beisland, Bernt Kvarstein, Trygve Talseth and Jannike Mohn for contributions to the manuscript, and Anders Angelsen, August Bakke, Jan Due, and Ove Mjølnerød for comments.

25 a. The Norwegian Urological Association (NUF)

Christian Beisland

NUF was founded at Vor Frue Hospital¹ in Oslo on October 31st, 1962 on the initiative of Ragnar Andersen. The Association was approved by the Norwegian Medical Association (Dnlf) on January, 13th 1963. Knut Høeg was elected as the first president, nominated by Andersen. The history of the first three decades of the Association is well described in the book "Fra urologiens historie i Norge", published by the Association in 1987.

Over the last 25 years, the primary focus of the Association has been to arrange meetings in order to keep the members updated on different topics in the field of urology.

"Høstmøtet" (The Autumn Meeting) is the main annual scientific meeting of the Association. The meeting consists of a mixture of submitted oral presentation from the members and symposia's arranged by the Board. During the last decade, the Association has started to arrange the "Høstmøteaften". This annual dinner has turned out to be the most popular event of the year. The prizes for best scientific paper every year and best presentations are awarded to the winners at "Høstmøtet"

"Vårmøtet" (The Spring Meeting) has been arranged since 1979. During the last decade, this meeting has been arranged biannually by different local committees from the different urological departments around the country. This

meeting aims to be a combination of urology topics and social events. This combination has been a proven success, and still after more than 30 years, the last meeting in 2010 in Kristiansand, gathered a large proportion of the Norwegian urologists.

"Vintermøtet" (The Winter Meeting) has been arranged annually for the last decades. This meeting was usually combined with one of the obligatory courses for residents in urology. Since the new rules on cooperation with the pharmaceutical companies were introduced some years ago, the arrangement of this meeting has been somewhat unstable. The meeting, usually kept at Geilo, Oppdal or Lillehammer, has been focusing on topics closely related to urology. How to perform and understand research, have been frequent themes. Nils Magnus Ulvik and Trygve Talseth have been key persons for many years in organising committee of "Vintermøtet".

Every ten year, the Association participates in the arrangement of the biannual congress of the Scandinavian Association of Urology (SCAUR). This congress rotates between the five Nordic countries, and Norway held the congress in 1983 (Trondheim), 1993 (Oslo) and 2003 (Bergen). In 2013, the meeting will take place in Sandefjord. Sten Sander was the president of the SCAUR from 1985 to 1993 and Alexander Schultz is the present (2010) secretary general.

1) Lovisenberg

Over the last decades much of the Nordic collaboration has been carried out within the specific collaboration groups of the SCAUR. The three most active, in recent years, have been the group on prostate cancer (the Scandinavian Prostatic Cancer Group (SPCG)), the group on reconstructive urology and the group on urinary stones. All these groups have performed and published studies within their respective fields of urology.

Day to day activity of the Association is carried out by the Board. The Board consists of the president, the vice-president, the treasurer and the secretary. The chairman is automatically a board member of the Norwegian Surgical Association. The Board operates under power of attorney from the General Assembly of the Association. The General Assembly takes place annually during "Høstmøtet". The Board is elected for two year periods. The chairmen of the Association are presented in Table 25a-1. The Association have in August 2010, 220 members. Of these 150 are working board certified urologist, 37 are residents and the remainder are retired.

A dominant question over the last decade has been recruitment. Poor recruitment to the specialty during the 1990ies and after 2000 has been a great worry for the Association. In order to increase recruitment, the Association in 2008 proposed that urology again should become a main specialty, and not just a subspecialty under General Surgery. This proposal was turned down by "Landsrådet" of Dnlf (The Annual General Meeting of The Norwegian Medical Association). The work to become a main specialty, however, will continue in the years ahead.

Table 25a-1. Chairmen of NUF

1962–1965	Knut Høeg (Oslo)
1966–1967	Thorolf Gjersvik (Bergen)
1968–1970	Willy Mathisen (Oslo)
1971–1972	Knut Hatteland (Stavanger)
1973–1976	Arne Fryjordet (Oslo)
1977–1979	Brynjulf Otnes (Oslo)
1980–1983	Sten Sander (Oslo)
1984–1985	Olaf Muri (Oslo)
1986–1989	Bernt Kvarstein (Oslo)
1990–1991	Ove Mjølnerød (Trondheim)
1992–1995	Trygve Talseth (Oslo)
1996–1997	Raymond Mortensen (Bodø)
1998–1999	Rolf Wahlquist (Oslo)
2000–2001	Per Lundmo (Trondheim)
2002–2005	Tor Erik Sand (Oslo)
2006–2009	Rolf H. Hagen (Drammen)
2010–2011	Christian Beisland (Bergen)

Literature

Otnes B, Karlsten S, Seland P eds: "Fra urologiens historie i Norge", The Norwegian Association of Urology, 1987, ISBN 82-991560-0-9

Acknowledgements

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25 b. The Norwegian Institute of Urology

Rolf Høgetveit Hagen

In 1991 The Norwegian Urological Association appointed a committee which was asked to suggest actions that could improve the scientific and professional quality of Norwegian urology. The committee consisted of urologists from all the Health Regions headed by Truls Erik Bjerklund Johansen. The result was the establishment of The Norwegian Institute of Urology (NIU) in October 1993. Its main tasks were to stimulate quality assurance, teaching and research in urology. Bjerklund Johansen was appointed leader of the Institute, Hans Olav Beisland Head of the Board.

NIU represented a novelty in Norwegian and international medicine. It established the first ever ISDN scientific medical network. This covered the entire country, comprising 25 urology departments. The database was designed by the leader of the Institute in cooperation with the IT-departments in the Norwegian Medical Association and Telenor. The teaching programmes allowed storage of scientific documents, such as research protocols, clinical registers, procedures, and visual aid for teaching. All documents could be copied at each of the work stations in the participating departments. The database eventually contained more than 100 lectures and many thousand slides.

Initially NIU focused mainly on teaching, lectures and discussions, with joint participation over the Internet. The responsibility for the programmes was left to the participating departments on rotation. Before each lecture

all participants stored the slides which would be used, and at the agreed time all departments linked up to the server with help from Telenor. At that time sound was not transferred along with slides over the Internet, but a link established by Telenor made it possible to follow the lectures through phones with loud speakers. After each lecture there was a discussion, with comments in turn from the participants all over the country. The discussions were chaired by the leader of the Institute.

The educational activity continued for more than ten years, and was of great importance for the professional development of the candidates and specialists in urology in Norway. In addition it saved the participating departments a lot of work in preparing individual teaching programmes and lectures.

Several research projects were also prepared and carried out under the leadership of NIU, and in addition a library of procedures and quality assurance documents was established.

NIU was a pioneer projects which exploited modern telecommunication before Internet and phone conferences were established.

NIU was established with financial support mainly from the Norwegian Medical Associations Fund for Quality Assurance. Additional support from various sponsors made

it possible to finance all hard ware, the network of phones with loud speakers, development of the programmes, upgrading, maintenance and support.

Rolf Høgetveit Hagen succeeded Hans Olav Beisland as Head of the Board in 1999, and Lars Magne Eri was engaged as leader of the Institute in 2001.

The Norwegian Urological Association has gradually come to the conclusion that it will be advantageous to co-ordinate the activities of the Association and the Institute, and since 2006 the two organisations have had a common Board/ Executive Committee

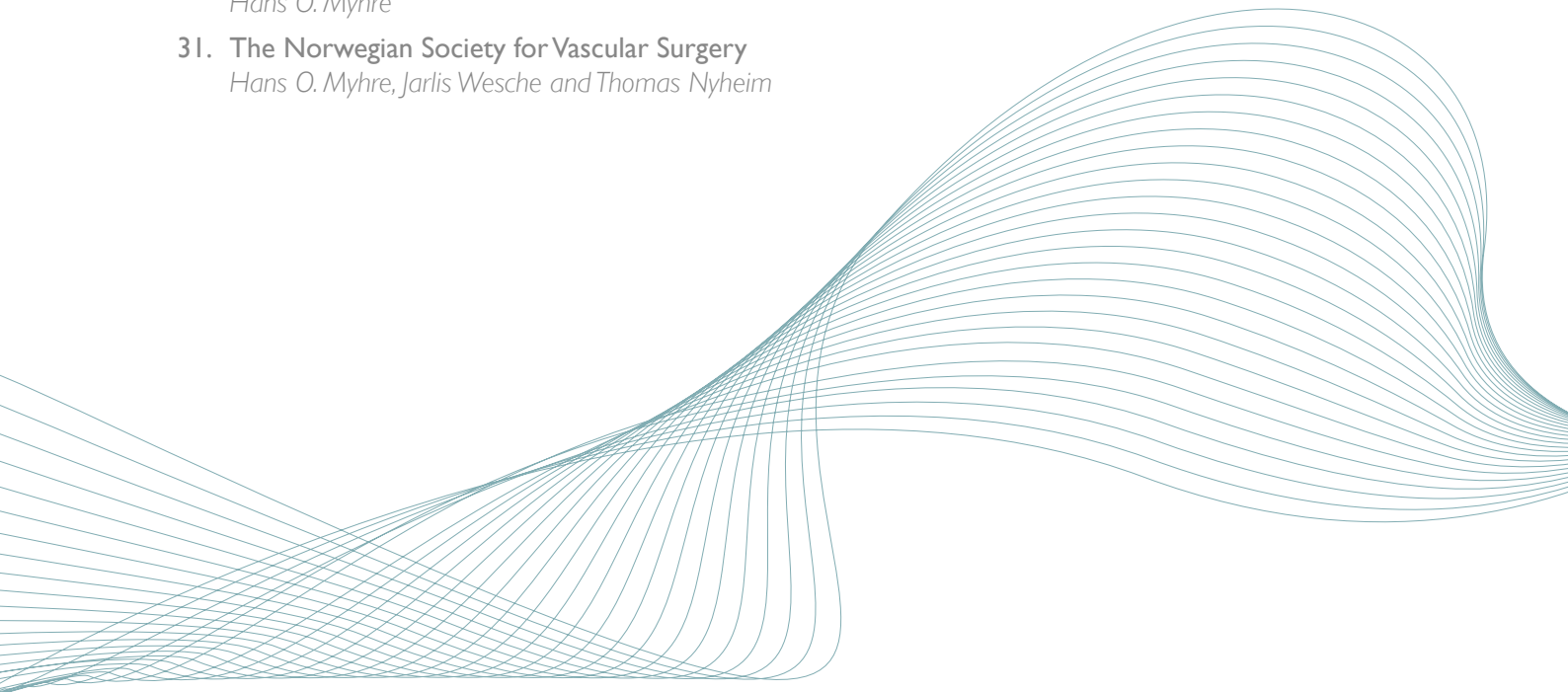
The present board of NIU, and its leader Christian Beisland, want to increase the support of urological research in Norway. At the General Assembly in October 2010 two projects were each given NOK 25.000 in financial support.

Acknowledgements

The author and editors would like to thank, Christian Beisland, Truls Bjerklund Johansen, Steinar Karlsen and Bernt Kvarstein for comments to the manuscript.

Subspecialties of General Surgery: Cardiothoracic and Vascular Surgery

26. The History of Thoracic Surgery in Norway up to 1985
Karl Victor Hall
27. General Thoracic Surgery from 1985–2010
Steinar Solberg
28. Cardiac Surgery the last 25 years
Jan L. Svennevig
29. The Norwegian Society for Thoracic and Vascular Surgery 1981–1991
and The Norwegian Association for Cardiothoracic Surgery
Leidulf Segadal
30. Vascular Surgery
Hans O. Myhre
31. The Norwegian Society for Vascular Surgery
Hans O. Myhre, Jarlis Wesche and Thomas Nyheim





26. The History of Thoracic Surgery in Norway up to 1985

Karl Victor Hall 1985 (sub-headings added by J Haffner)

Thoracic surgery as a special branch of general surgery is a child of the 20th century. However, Norwegian history of surgery contains a very special event which took place in 1894, September 4th, 2 o'clock in the morning – an event which is particular to thoracic surgery. At that particular moment a young resident by the name of Axel Cappelen at Surgical Department A, Rikshospitalet, Oslo, courageously entered the left thoracic cavity in an attempt to control a serious bleeding from a stab-wound antero-laterally in the thorax of a young man. During the procedure he found a lesion in the pericardium, which after widening revealed a wound on the left side of the heart with a pulsating haemorrhage. By continuous, as well as single sutures, he was able to control the bleeding. He thereafter separately closed the lesion in the pericardium.

The patient who at admission was soporous, woke the next day anaemic, but with a stable blood pressure and reasonable heart rate. It looked like the patient should survive after his sensational operation, but after a few hours of declining blood pressure and increasing heart rate, he succumbed the 3rd day after the operation. At autopsy it was found that the stab-wound had hit the left ventricle near the apex and that the sutures obviously still were patent. The amount of exudates in the pericardium was measured to 45 grams.

The case was reported in a Norwegian journal in Norwegian language and this explains why the possibly first ever

technically successful closure of a stab-wound in the left ventricle has not got the international fame it deserves.

Pulmonary Tuberculosis

In Norway the specialty thoracic surgery was pioneered by Johan Martin Holst and Carl Semb. They were chiefs of surgical departments at Rikshospitalet and Ullevål, respectively. Those were the two university hospitals of Oslo University, at that time the only university in Norway.

Holst described his apicolysis and thoracoplasty in 1932. The goal of this operation was a selective reduction of the space of the upper apical part of the thoracic cavity, which corresponds to the predilection site of cavernous tuberculosis. Semb modified the apicolysis and made his great experience internationally known by numerous publications. He also developed instruments well suited for this procedure. Semb's instruments are still appreciated at departments of thoracic surgery world-over. Holst also modified his method through the years by adding special fixation of the "roof", as well as conserving the first rib in selected cases for cosmetic reasons. The "roof"-plasty reduced the paradoxical respiratory movement of the "roof" and made superfluous the traditional postoperative bandaging, which was common after this type of thoracoplasty.

After World War II, selective pulmonary resections became a more favoured method at most Norwegian hospi-

tals giving surgical treatment to patients with pulmonary tuberculosis.

A few surgeons working outside the university hospitals acquired particular skills in the treatment of pulmonary tuberculosis, not only performing thoracoplasty, but also segmental pulmonary resections. One of these was Einar Murstad, chief at Lillehammer Hospital, who also performed a large series of “extra-pleural pneumothorax”, thereby achieving a highly selective collapse of the diseased part of the lung.

Early Cardiac Surgery

During World War II, Hermund Gerhart Gade made the first ligation of a Patent Ductus Arteriosus, so-called Ductus Botalli at Rikshospitalet. After the war developments went faster. Holst and his deputy, Leiv Efskind, introduced transatrial closed commissurotomy for mitral stenosis in 1950. During this period, Efskind made the first reconstructions of aortic coarctation, inspired by the work of Craaford and Gross.

As in other Western industrialised countries the specialty of thoracic surgery underwent a profound structural change around 1960. At the same time as the demand for surgical treatment of pulmonary tuberculosis declined, open-heart surgery entered the “scene”. Rikshospitalet, the only hospital for patients with somatic disorders administered directly by the federal authorities, has predominately admitted patients from other hospitals. Traditionally, it has been the hospital for the whole country for patients with less common problems, who needed more advanced technology for diagnosis and treatment. Today, the five other regional hospitals in Norway have more or less got the same status. However, Surgical Department A, the department for thoracic and cardiovascular surgery at Rikshospitalet, had resources available for open-heart surgery when the need for thoracoplasties and lung-resections declined rapidly.

Efskind, in close cooperation with an anesthetist, Otto Mollestad, and a younger surgeon, Christian Cappelen, made preparations for open heart surgery, eventually trying the technique in animal experiments.

The first clinical case was performed in 1957: An atrio-septal defect was closed, using hypothermia and in-flow

occlusion. Later on, in 1959, the first open case using extra-corporeal circulation was successfully performed on another patient with atrio-septal defect.

Cappelen, with his technical knowledge and interest, collected and combined the items for the heart/lung machine and ran it, a function he singly covered during the early years of open heart surgery in Norway. At that time pump-technology was not a profession as it is today. He therefore also was the teacher for the first few of a slowly growing group of Norwegian pump-technicians.

Efskind performed many national “firsts” in the field of correction of congenital heart abnormalities. Quantitatively the development during the 60ies was rather slow, and it was not until the year 1967 that the annual number of open heart cases exceeded one hundred, a number which increased to 260 in 1970, the last year Surgical Department A was the only “open heart centre” in Norway.

It was the coronary bypass operation which more than anything else influenced the prognosis and the volume of open heart surgery. This technique was used for the first time at Rikshospitalet in 1969 (the author), as one of the first hospitals in Europe to introduce this treatment. However, during the first years few cases were operated, because of lacking confidence in the method among cardiologists at that time.

But the growing number of patients who had successfully got heart valve replacement increased the demand and waiting-lists got more voluminous. Now resources for open heart surgery started to be a “hot” political issue, and a second “open heart centre” in Norway was founded at Ullevål, the main municipal hospital of Oslo in 1971. This activity was started and organised by Gudmund Semb, until then surgeon on the staff at Rikshospitalet. The third centre was started in Bergen in 1975 where another surgeon from Rikshospitalet, Erling Skagseth, introduced this new treatment at Haukeland.

Heart surgery was started in Tromsø in 1978 by Stephan Ekstrøm, and in Trondheim in 1983 by another surgeon from Rikshospitalet, Olaf Levang.

National Organisation of Thoracic Surgery

Parallel to the increasing popularity and success of coronary bypass surgery, the discrepancy between the needs and resources in open-heart surgery increased. Therefore, the government established a committee with representatives from all parts of the country, chaired by KV Hall (the author).

The result of the transactions was published in 1978 (NOU: 1978: 28 "Hjertekirurgi"). On the committee were representatives for all regional hospitals. These hospitals were all at the same time university hospitals, and the interest in acquiring this new surgical technique was not only dictated by "needs", but also by a wish to get on a par with development of the surgical science. The use of extracorporeal circulation and the technology and medical experience around open heart surgery and postoperative intensive care units, had also a strong influence on development of anesthesiology and pathophysiology.

The said committee unanimously recommended an increase of open-heart surgery in Norway. There were however, discrepancies as for how many "open heart centres" were needed to solve the problem. Heart surgery was started at the university hospitals in Tromsø and Trondheim in 1978 and 1983 respectively. Another committee in 1982 anticipated the need for 2000 open-heart operations annually, which means 400 cases per million inhabitants. This goal has yet not been reached in 1986. Later committees have suggested that a further increase involving some 700 open hearts per million inhabitants is a more realistic goal, for needs.

Before leaving the political issues, it is worthwhile mentioning that the patients' own organisation, "Landsforeningen for Hjerter- og Lungesyke" (= The Association for Patients with Heart and Lung Diseases), started in 1978 an organisation of transports of patients needing coronary bypass surgery to St Anthony's Hospital in London. These patients had been catheterised and evaluated at Rikshospitalet. The means for this traffic were made available by private funding. During the most recent years, the Government has supported this "export" and it is presumed that in 1986 altogether 450 patients will get their coronary bypass operation abroad. In 1983 a radiologist at Rikshospitalet, Karleif Vatne, introduced percutaneous transarterial coronary angioplasty (PTCA). Theoretically



Fig 26-1. Karl Viktor Hall

this might reduce the load on surgeons performing coronary bypass operations. It remains to be seen when this might happen.

Heart Valves

During the early years predominantly ball valves were used for heart prosthesis. Thromboembolism and poor haemodynamic performance in the smaller sizes were factors initiating enthusiasm for tilting disc valves. Surgical Department A, Rikshospitalet, accepted an offer for pre-clinical trial of the Lillehei-Kaster design and started implanting the valve in March 1970. Six months later, a similar tilting design by Björk-Shiley was also used. A couple of years later, after familiarity with the two valves was acquired, a random study was started, probably the first random study of heart valve prostheses ever.

The result of these random studies, published by Levang and others, inspired the author to try to improve the designs. An American engineer, Ralph Kaster, and a Norwegian physicist, Arne Wøien, cooperated, and prototypes were made. These were studied in pulse duplicators,

whereafter several implantations in dogs were performed in cooperation with Egil Amundsen, the chief of Institute for Surgical Research at Rikshospitalet. Eventually, in June 1977, clinical implantations started. Since then more than 1100 patients have got this valve at Rikshospitalet (the “Medtronic-Hall” valve).

Heart Surgery for Congenital Defects

The diversity of congenital heart surgery increased by the years and as a result another heart surgeon, Steinar Tjønneland, was added to the staff at Surgical Department A, Rikshospitalet in 1971, with the explicit task to cover heart surgery in the small patients. This “section” of the department has slowly developed through the years and now performs annually between 115 and 130 open operations on patients less than 15 years of age. This constitutes around 70% of all open heart cases in Norway within this group of patients. Through the years, this “section” has performed numerous operations involving conduits, Mustard’s, Senning operation, and until now more than a dozen switch operations for transposition of the great arteries. The first switch operation was performed by Tjønneland in 1983.

Cardiac transplantation

In 1970 serious preparations for human heart transplantation were started, but negative results achieved at most centres with the actual immunosuppression resulted in cancellation of a clinical trial. The situation changed when 10 years later Cyclosporine A was available and furthermore, brain death accepted as death, enforced by law. Therefore, a new committee of cardiologists, immunologists and surgeons, chaired by the author, planned and decided to introduce this treatment at Rikshospitalet. Eventually, in 1983, a surgical team led by Tor Frøysaker, performed the first heart transplantation in Scandinavia. In 1986 the same transplant-team (Tor Frøysaker, Odd Geiran, Harald Lindberg and Einar Øvrum) also successfully performed a combined heart/lung transplant.

Cardiac Arrhythmias

Surgery for cardiac arrhythmias has in Norway mainly been cases of selective myocardial resection after mapping, or endocardial circumcision in connection with the resection of left ventricular aneurysms. A number of interruptions of abnormal atrio-ventricular bundles in cases of Wolff-Parkinson-White’s Syndrome have been performed at Ullevål, the first done in 1983 by Gudmund Semb.

Bronchial Carcinoma

In Norway, bronchial carcinoma has hitherto not been quantitatively the same problem as in many other Western countries. However, the number of patients is increasing by the years. This activity is not concentrated to the university hospitals, where all open-heart surgery is performed. Sleeve-resection for conservation of lung parenchyma has been practised through many years in selected cases. Resection of trachea for stenosis and more rarely for malignant tumours, has also been performed. It is worth mentioning that the first resection of the tracheal bifurcation was performed by Hans Rostad at Surgical Department A, Rikshospitalet, in 1983, using extra-corporeal circulation.

Teaching Capacity in Cardiac Surgery

During the 60ies and the 70ies a whole generation of Norwegian heart surgeons got their main education at Surgical Department A, Rikshospitalet, and the demand for such specialists was saturated in the 80ies. Therefore, during the recent years, committees legitimised by the Government and surgical associations, have planned a fundamental structural change. This change will result in a surgical staff consisting predominantly of fully qualified cardiac surgeons attached on a permanent basis, and there will be a marked reduction of the number of jobs for educational purposes. This structural change will hopefully bring supply and demand for cardiac surgeons in harmony.

Acknowledgements

The editors would like to thank Dag Sørli, Olaf Levang, Leidulf Segadal, Jan Svennevig, Knut Kvernebo, Steinar Solberg, and Rune Haaverstad for comments to the manuscript.

27. General Thoracic Surgery from 1985 to 2010

Steinar Solberg

Introduction

This chapter focuses on the period from 1985 to 2010, but some trends are followed from earlier periods, and some colleagues from earlier years are also mentioned.

During the last 75 years, the main surgical challenge in general thoracic surgery has changed from treatment of tuberculosis and post-pneumonia empyema, to surgery for primary lung cancer and lung metastases. Today, tuberculosis is rarely seen in a thoracic department in Norway. However, the global situation reminds us that the condition must not be forgotten.

Due to the epidemic tobacco use, surgery for lung cancer now accounts for approximately 1/3 of the total number of operations in general thoracic surgery. The remaining 2/3 are surgery for metastases, malignant tumours outside the lung, benign tumours, infections, thoracic deformities and pneumothorax.

The advent and rise of cardiac surgery started in the 1960ies. In the following decades this activity reached a maximum of 5000 operations annually in Norway, compared to 1500 general thoracic procedures.

Endoscopic procedures have not gained the same position in thoracic as in abdominal surgery, but the introduction of thoracoscopic procedures have brought important

changes. Many thoracic operations can be performed by thoracoscopy.

The annual number of surgical procedures for lung cancer has increased since 1985, both for primary and secondary malignancies (lung metastases), but it is still a clinical challenge to decide which patients should be operated. This challenge is most pronounced in patients with lung metastases.

Organisation

Due to the marked increase in cardiac surgery during the last decades of the 20th century, general thoracic surgery received less attention. The last ten years we have seen a decrease in the number of heart operations, mainly due to a reduction in coronary bypass surgery, while the number of general thoracic procedures has increased.

The thoracic departments at the university- and regional hospitals provide a full range of the thoracic specialty with surgery on all organs within the thoracic cavity and the thoracic wall.

No hospital in Norway has a separate department for non-cardiac thoracic surgery.

Oesophageal surgery is now mainly done by gastro-surgeons, but occasionally thoracic surgeons participate.



Fig 27-1. Plain x-ray and CT-scan show an adenocarcinoma of the upper lobe of the right lung



Fig 27-2. The lung with the same tumour, as it was seen in the operative field

Hernias of the diaphragm are generally repaired by laparoscopy, but some are operated through the thoracic cavity by thoracic surgeons. In a few cases, resection of the diaphragm is done as a part of surgery for lung cancer.

Research / Academic Positions

There are ten professors in thoracic surgery in Norway. Several of them take part in general thoracic surgery, but few, if any, have done their main research in non-cardiac thoracic topics. The research in general thoracic surgery has been limited. Projects in cooperation with cell biologists and oncologists have been established and are running. At Rikshospitalet blood, bone marrow, tumour tissue and normal lung tissue from more than 200 patients operated for lung cancer have been harvested for research on tumour biology and immunology. All surgically treated lung cancer patients in Bodø and Tromsø are eligible for studies on irradiation sensitivity in isolated non-small cell lung cancer cells.

Cooperation with Other Surgical Specialties

Vascular- and thoracic surgery are organised as one unit in some hospitals.

Head and neck surgery is not a separate specialty in Norway. Surgery on the neck is a no man's land at night-time,

and everybody's land during office hours. Tracheotomies, larger tracheal surgery, and other neck-surgery, are done by several specialties. It is the opinion of many that health authorities should give one specialty the duty to take care of the patients needing procedures on the neck.

Pediatric surgeons also perform thoracic surgery. When needed, procedures in children are done in cooperation with thoracic surgeons. Even in pediatric patients, operations for lung metastases have increased.

Centralisation

Several scientific papers report a positive correlation between quality and volume in general thoracic surgery, but there is no general agreement on the number of operations needed to gain sufficient or optimal quality. In 1985, general thoracic surgery was performed in more than 20 hospitals, many with a limited number of operations. As early as 1980 a committee headed by Nils Bjørn Fjeld concluded that general thoracic surgery was done in too many hospitals. In 2004, the authorities in Health Region South, comprising slightly less than one million inhabitants, decided that the number of hospitals performing general thoracic surgery should be reduced from seven to one, and centralised in Rikshospitalet from 2005. The Medical Director of the health region, Bjørn Erikstein, who had a background as an oncologist, played an important role in this process. The number of hospitals providing thoracic

surgery has also been reduced in the other health regions. From 2005 to 2010 thoracic surgery was done at the following hospitals: Tromsø, Bodø, Trondheim, Bergen, Stavanger, Rikshospitalet, Ullevål and Akershus. From 2010 Ullevål and Rikshospitalet are merged, and 40% of all general thoracic surgery in Norway will be done in one institution. This represents more than 600 operations annually, which is ten times more than in the lowest volume hospital. The remaining 60% of the workload, which is divided by the other six hospitals, may also be more centralised, but no decision has so far been made.

Tromsø

Cardiac-, general thoracic- and vascular surgery have been organised in one, complete cardiovascular and thoracic department. Dag Sørli and Mons Lie have been central in thoracic surgery as professors and heads of the department. Per Erling Dahl has taken part both in the clinical work and in working out national procedures for surgery for lung cancer. During recent years Kristian Bartnes has been a dedicated representative for general thoracic surgery both at the department and nationally. Slightly less than 100 operations are performed annually

Bodø

Thoracic surgery has been performed here since the 1970ies. Jarl Moland came to the joint department for vascular and thoracic surgery in 1984 and has been responsible for thoracic surgery since then. Annually 50 – 80 thoracic operations are performed – mainly procedures for lung cancer and pneumothorax. Mediastinoscopy prior to surgery for lung cancer is emphasised.

Trondheim

General thoracic surgery was started here by Aksel Sanderud in 1966. Olaf Levang was appointed professor in 1984 and head of the cardiac department in 1993. Asbjørn Karevold took over as head of the department in 2002. Rune Haaverstad had the responsibility for general thoracic surgery 2002–2006. Papers on lung cancer treatment have been presented. General thoracic surgery is organised with cardiac surgery. Slightly less than 200 general thoracic operations are performed annually.

Bergen

In Bergen general thoracic surgery and cardiac surgery is organised in one thoracic department (section). Hogne



Fig 27-3. Positioning a patient for thoracotomy and thoracoscopy



Fig 27-4. Patient ventilated with a double-lumen tube for selective ventilation of the lungs

Engedal was head of the department until 2002, Leidulf Segadal, 2002–2006, and from 2007 Rune Haaverstad has been the leader of the department. General thoracic surgery was started by Erling Skagseth around 1975. Lodve Stangeland has been in charge of general thoracic surgery since 1985. He has made important research contributions in collaboration with oncologists. Approximately 180 general thoracic operations are performed annually

Stavanger

Karl Fredrik Kordt and Jon Erling Fossdal have been in charge of thoracic surgery. Now, Nils Olav Neverdal has the responsibility for thoracic surgery, which is organised together with vascular surgery. More than 50 thoracic operations are done annually.

Rikshospitalet and Radiumhospitalet (The Norwegian Radium Hospital)

The two hospitals merged in 2005.

Thoracic surgery has been performed at Rikshospitalet for more than 100 years. The department's computerised database which was established in 1989 reveals that 78 general thoracic operations, including 23 for lung cancer and 2 for lung metastases, were done that year. In 2009 a total of 323 general thoracic operations were performed in the hospital, including 137 for lung cancer and 63 for metastases. In addition, 38 patients with thoracic deformities were operated.

Up to his retirement in 2001, Hans Rostad was responsible for the general thoracic surgery at the department. After retiring he has worked at the Cancer Registry and has published several important scientific papers on lung cancer with main emphasis on epidemiological and surgical aspects. Jan L. Svennevig and Odd Geiran have contributed in this surgical activity. In 2002, Steinar Solberg was appointed consultant with a specific responsibility for general thoracic surgery. This was the first position with this specific profile in Norway.

Johan Høie was in charge of thoracic surgery at Radiumhospitalet from 1971 to 1999. He performed thoracic surgery related to treatment of other malignancies, including surgery for lung metastases. From 1999, Lars Jørgensen took over Høies position. After the merger in 2005, Jørgensen moved to Rikshospitalet and all thoracic

surgery was transferred there. The department has been able to offer a complete service to patients in all ages needing cardiovascular or thoracic surgery. In future, as a consequence of the present reorganisation of the hospitals in Oslo, vascular surgery will be organised in a separate department.

Some thirty lung-transplantations are performed annually at Rikshospitalet, organised jointly with the heart transplantations (see chapter on Organ transplantation)

Ullevål Hospital

Thoracic surgery has been performed for more than 70 years at Ullevål. Important contributors have been Carl Semb (the inventor of Semb's retractor and Semb's adherence clamp), Frank Bergan, Steffen Birkeland and Gunnar Støren. From 1975 until 2004 Nils Bjørn Fjeld was in charge of general thoracic surgery, which is organised integrated with cardiac surgery. Fjeld has educated several younger colleagues and participated as lecturer in several specialist courses in this field. He was succeeded in 2004 by Per Reidar Woldbæk.

In addition to providing a complete service in thoracic surgery, the department has been central in organising the treatment of trauma patients. Ullevål is a national trauma centre and takes care of a high volume of multi-traumatised patients from most of South Norway. Johan Pillgram-Larsen has been central in organising both the thoracic and the complete trauma service. Some 250 thoracic operations are performed annually, including approximately 30 thoracotomies which are done in relation to trauma-patients.

The department has a research-cooperation with Gdansk in Poland, related to cancer and infections.

Akershus University Hospital (Ahus) previously Akershus Central Hospital (SiA)

General thoracic surgery has been performed in this hospital since the 1970ies when Nils Helsing and Kaare Solheim did most of the thoracotomies. General thoracic surgery is organised with vascular surgery. Terje Brøyn, Odd Grenager, Frode Olsbø and Knut Kristiansen have been central in this activity. Some 200 operations are now performed annually. The main focus is on thoracoscopic procedures – especially thoracoscopic sympathectomies.

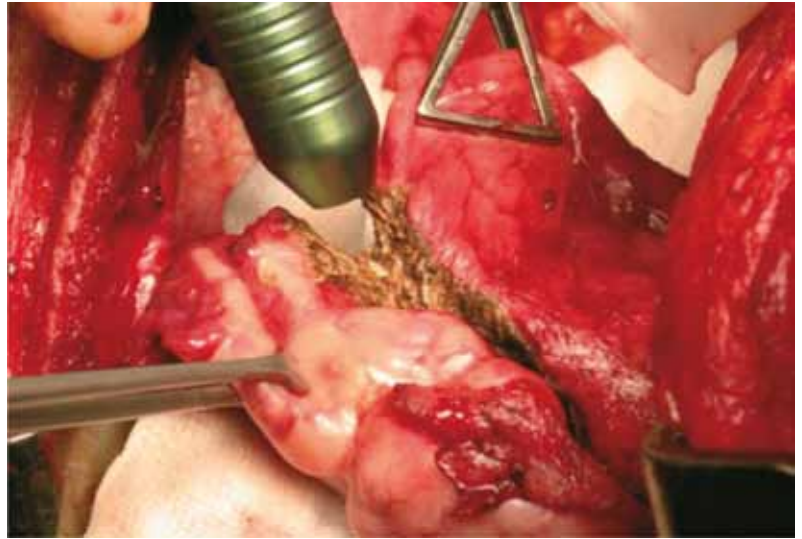


Fig 27-5. Here one can see the cut surface made by laser. The green device produced 40 watts

Publications reporting the results have been presented, and a research fellow is working on a PhD thesis on treatment of flushing and hyperhidrosis.

The National Registry for General Thoracic Surgery

In 2002, the General Assembly in the Norwegian Association of thoracic surgeons decided to establish a registry for thoracic surgery. The leader of the Committee for Quality Assurance, Steinar Solberg, was given the task. The reports for 2007 and 2008 have been practically complete. All eight hospitals where thoracic surgery is established, submit lists of their activity on paper or electronically. The annual reports are available on the Internet as part of the information presented by the Norwegian Medical Association (<http://www.legeforeningen.no/thorax>). From 2008 the report is in English.

Some tendencies from the registry:

1. There has been an increase in operations for lung cancer. The 502 operations in 2008 correspond to 20% of the 2 529 patients with newly diagnosed lung cancer that year. According to Hans Rostad the resection rate was 16% in 2002.
2. The number of mediastinoscopies is reduced, probably due to PET-scan, which was introduced in Norway in 2006, as a similar reduction was seen after the introduction of CT in 1977. New procedures may also have

been of importance, such as cytological samples taken with ultrasound guiding from the airways (EBUS) or oesophagus (EUS).

3. The number of open thoracotomies is increasing, while there is no change in the number of thorascopies and sternotomies.
4. Since 1985 the number of operations for metastases in the lungs has increased more than the number of resections for primary lung tumours. The patients operated for secondary malignancies in the lungs are younger than those with primary tumours. A prerequisite for this activity is that the operative morbidity is low and the operative mortality is very low.

Surgery for Lung Metastases

Very few operations for lung metastases were performed in 1985. As mentioned above, we are now about to pass 200 operations annually. Some patients are operated more than once in one lung for metastases. Resections are more limited – the majority are wedge resections or segmentectomies, some are lobectomies, a few bi-lobectomies, and less than five pneumonectomies are performed per year.

There are no controlled studies of this activity, but most centres experience an increased interest in resections for lung metastases.

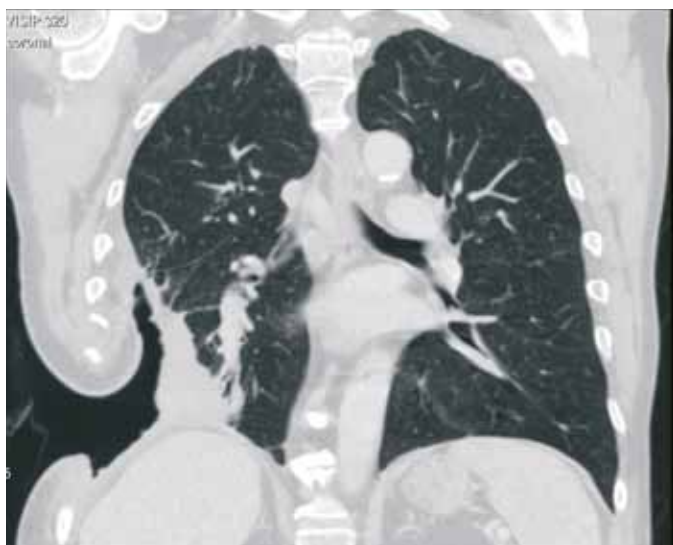


Fig 27-6. CT-scan showing a pleurocutaneous "window" for drainage of a small empyema. The thick peel over the diaphragm and towards the lung is well illustrated. Due to adequate treatment with antibiotics, drainage with fibrinolysis, and a more aggressive attitude to operation with decortication of the lung, such procedures with open drainage are now rarely done.

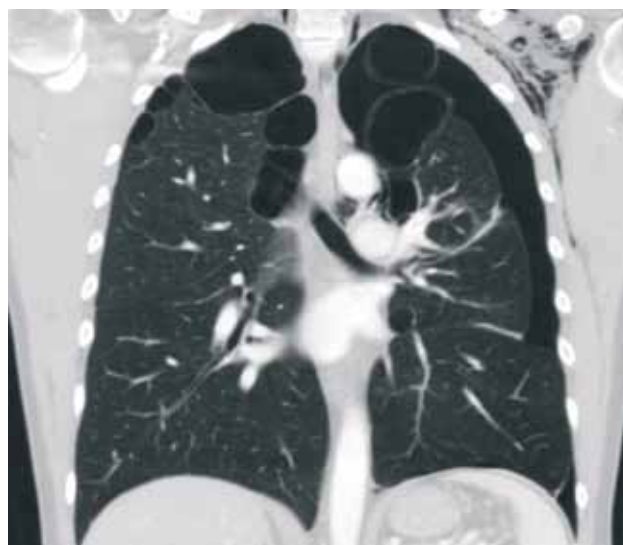


Fig 27-7. In this CT-scan, from the patient mentioned above, we can see the bilateral apical bullae in addition to left-sided pneumothorax and subcutaneous emphysema.

Laser-knife is enabling resection of tumours with less loss of lung tissue, as the resection margin can be much closer to the tumor than in the conventional resections. Treatment with laser-knife has been established at Rikshospitalet, Akershus and in Bergen.

Empyema

Operations for empyema have been performed for centuries. Purulent exudate collects in the thoracic cavity, and the visceral pleura thickens and prevents expansion of the lung. This peel has to be removed if it affects a large part of the lung surface, and the exudate has to be removed by drainage, by thoracoscope, or by open cleaning of the pleural cavity. Since 1985 the use of fibrinolysis has been used in order to release the lung from restriction. This procedure lacks scientific documentation, but it appears to be useful, especially in surgically high risk patients.

Thoracoscopic Surgery

For 2008, 321 thorascopies were reported to the national registry. This comprises 24% of all (1361) operations reported. Most of the thorascopies were diagnostic, the

rest treatment of pneumothorax, sympathectomies, minor lung resections or removal of thymic lesions.

Of the 502 operations for lung cancer in 2008, 16 (3%) were performed by thoracoscopy. Enthusiasts suggest that it should be approximately 20%. This may be discussed, but our national figure is most likely too low.

Most of the advanced thoracoscopic procedures in Norway were performed by Knut Kristiansen at Akershus, and he has presented good results for the lung cancer group. Erik Fosse at the Intervention Centre at Rikshospitalet has also contributed in the introduction of thoracoscopy by arranging training courses.

Pneumothorax

The primary treatment of pneumothorax is drainage of the air through a chest tube. Insertion of a thoracic drain is a standard procedure in all surgical departments. As a consequence of the centralisation of thoracic surgery, the patients need to be transported to a thoracic department for further surgical treatment if the air leak does not stop, or a new, ipsilateral pneumothorax occurs.

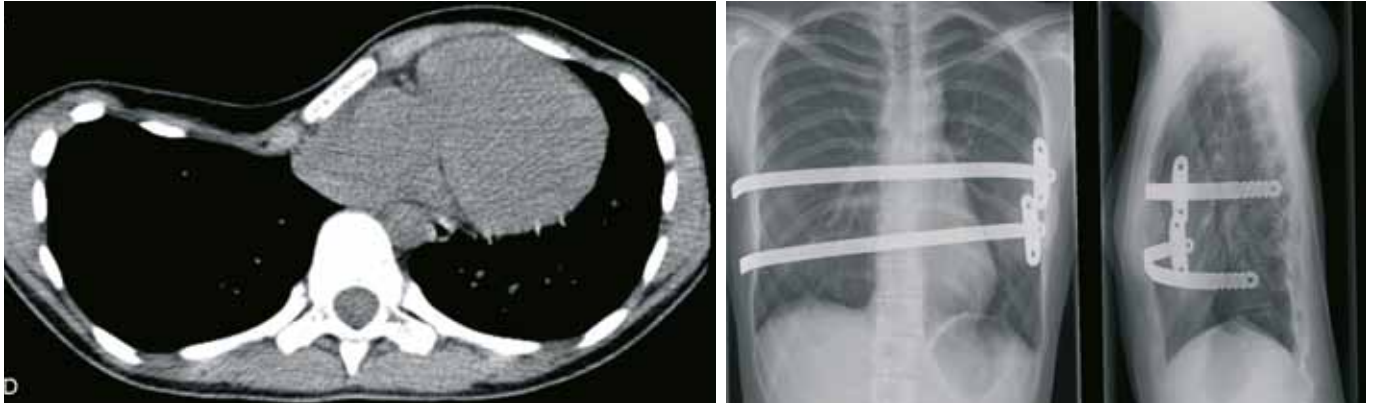


Fig 27-8. Preoperative CT-scan of a pectus excavatum deformity in a 13-year-old girl, and x-ray of the thorax three years postoperatively, prior to the removal of the two pectus bars.

Other factors, such as life and work situation, may influence the indication for surgical intervention more than in earlier years. The CT-scan presented above is from a young air-host with left-sided pneumothorax and bilateral apical bullae. After treatment of the left side with thoracoscopic removal of the bullae and pleurodesis, he was grounded from working in airplanes due to the remaining bullae on the right side. These were subsequently resected by thoracoscopy and he could return to work.

Deformities of the Thoracic Wall

The main procedure for pectus excavatum and -carinatum has been the method described by Ravitch in 1949. However, few colleagues in Norway were enthusiastic about these operations, and few patients were offered operative treatment. In 1998 Nuss described a minimal invasive method for pectus excavatum with a 10-year follow up. This method is now used by several centres in Norway. The Nuss-procedure was first taken up by Rune Haaverstad in Trondheim in 2004, and he has assisted other hospitals in taking up the procedure. In some hospitals, Hans Pilegaard from Aarhus, Denmark has been of great help in introducing the Nuss procedure.

Surgery for pectus carinatum with the Ravitch procedure, or a modified version of it, has in recent years been performed in Oslo and Bergen.

Controversies and Challenges in General Thoracic Surgery

There have been reports of alarming and unacceptably long delays in operations for lung cancer. The waiting time has to be reduced.

At which level will the observed increase in resection of pulmonary metastases end? Due to the lack of firm documentation of the benefit of these procedures, we will have to cope with debates and controversies concerning this part of our practice.

Results from ongoing international studies on lung cancer screening will hopefully clarify whether routine screening should be introduced.

Lung volume reduction by open thoracotomy or sternotomy has been tried in patients with emphysema. The results have not been as good as expected, and now very

few, if any, are operated. Thoracoscopic access may give these procedures increased actuality. Bronchial valves and bronchial shunt procedures may also be useful for the emphysematous patients.

There has been some debate about whether it is justified to do sympathectomy for facial flushing and excessive palmar or facial sweating. These are functional conditions, neither life threatening nor purely somatic. It has also been said that thoracic deformities only are of cosmetic importance. So far these debates have not led to any reduction in treatment for these conditions. However, in a publicly financed health care system, the gap between the cost of what it is possible or reasonable to do, and what the politicians are willing to finance, will increase and these discussions will probably be accentuated in the years to come.

The Future

What is in the crystal ball regarding general thoracic surgery in the next decades? We can hope for, but not be too sure of, a dramatic reduction in smoking.

There will probably be an increase in thoracoscopic procedures, especially for lung cancer. We may also see an increased use of robotic thoracic surgery.

There is a need for better diagnostic criteria for surgery in patients with lung metastases.

Hopefully we will see an increase in the utilisation of combined oncologic and surgical procedures in the treatment of lung cancer. Furthermore, the oncologic treatment will probably be more individualised, based on biological examination of each tumour. There are case-reports on successful treatment of lung cancer by vaccine – immunisation. Whether this treatment can be utilised on a large scale remains to be seen.

We can hope for a breakthrough in the oncological and biological treatment of lung cancer, like we have seen for other cancers as lymphomas, testicular cancers and leukaemia. But our trainees today will most likely be retired long before surgery has lost its central place in the treatment of lung cancer.

Acknowledgements

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28. Cardiac Surgery the last 25 years

Jan L. Svennevig

Coronary Artery Bypass Surgery

The first coronary artery bypass operation in Norway was performed by Karl Victor Hall at Rikshospitalet in 1969, two years after the introduction of modern bypass operations by Favarolo and Effler in USA. In the beginning there was much scepticism against bypass-surgery for angina pectoris. However, three international, randomised studies demonstrated improved survival after surgery for patients with stenosis of the left main coronary artery, three-vessel disease, or two-vessel disease including the proximal part of the left anterior descending artery. Reversed veins from the leg and thigh were almost exclusively used the first years, later on the increased patency of arterial grafts led to routine use of at least one internal thoracic artery.

Percutaneous interventions were introduced in Norway in 1983 and have increased rapidly since then. Today, the majority of the procedures are combined with stenting of the coronary arteries in order to prevent re-stenosis (Fig 1).

Coronary artery bypass surgery increased steadily, and became established at Ullevål in 1971 (by Gudmund Semb), in Bergen in 1975 (by Erling Skagseth), in Tromsø in 1978 (by Dag Sørli and Stig Ekestrøm), and in 1983 in Trondheim (by Olaf V. Levang).

In 1978, due to the low national capacity for coronary artery surgery, the patient organisation LHL (The Na-

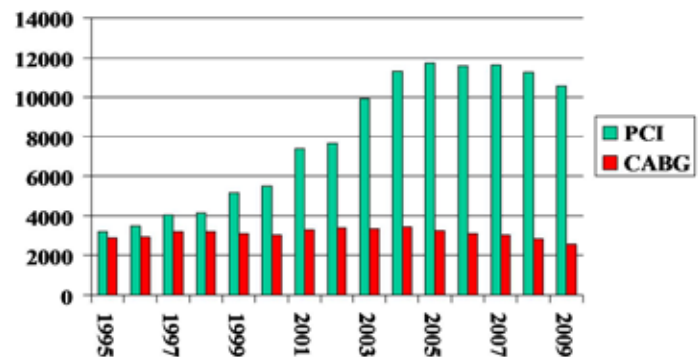


Fig 28-1. Interventional coronary treatment in Norway versus coronary bypass grafting

tional Society for Heart and Lung Diseases) established a "heart bridge" with some cardiac centres in UK. The cost was shared between the LHL and the patients. This lasted until 1990. A total of 4500 patients were operated, mainly in England, some in Scotland and some in Sweden. As the capacity for cardiac surgery still was insufficient, LHL established its own cardiac surgery unit, the Feiring Clinic, in 1978. As a political response to the arrangement of sending Norwegian patients in need of coronary artery surgery abroad for treatment, the Norwegian government and Akershus County in 1989 established The Heart Centre in Oslo (HiO) – an independent non-profit foundation for coronary bypass surgery. Eivind Øvrum was appointed director and chief surgeon.

Bypass surgery on the beating heart, without the use of a heart-lung-machine, was introduced at the Intervention Centre, Rikshospitalet by Erik Fosse in 1996. A limited approach via a small inter-costal incision ("Minicab") eventually replaced the routinely used sternum split. Despite the use of advanced stabilisers, sewing apparatus and robots, "off-pump" surgery ("Opcab") has not gained very much popularity in Norway. In 2009 only 16 operations were performed, out of a total of 2562 open coronary bypass operations.

Today coronary artery bypass surgery constitutes almost 2/3 of all heart operations in Norway. The annual report from the Norwegian Association of Cardiothoracic surgeons ("Heart Surgery in Norway") documents excellent national results with low mortality and morbidity.

Heart Valve Surgery

The first Norwegian heart valve implant was performed in 1965. Mechanical heart valves were almost exclusively used. The Norwegian valve, today termed the "Medtronic-Hall Valve", produced in Minneapolis, has been in use for more than 25 years. The valve has proven to be durable and of high quality. There has, however, been a global trend to move from single disc valve to bi-leaflet valves. Since Alain Carpentier in Paris in 1967 started to fixate porcine valves in glutaraldehyde, biological valves have gained increasing popularity. In 2007 almost 2/3 of all valves used in Norway were bio-prostheses, made of native porcine valves or constructed from bovine pericardium.

The significant increase in valve replacements seen during the last decade can best be explained by the increasing numbers of aortic valve replacements performed in elderly patients with degenerative lesions. Even octogenarians seem to benefit from aortic valve replacement, as clearly demonstrated in follow-up studies both from Rikshospitalet and Tromsø.

Rheumatic fever, once the most common cause of mitral valve disease and the main indication for valvular commissurotomy, is today a rare cause of mitral lesions. In mitral valve regurgitation, most often with a degenerative or ischaemic etiology, valve repair is the method of choice. Valve repair constituted 2/3 of all mitral valve operations (157/243) in Norway in 2009. The repair is most often combined with an artificial mitral ring in order to prevent further dilatation.

Valve replacement by transvascular approach has recently been performed at Rikshospitalet (pulmonary valve), in Tromsø and at the Feiring Clinic (aortic valve), and the first trans-apical approach in Tromsø (Rolf Busund). The number of valve replacements, and eventually valve repair, is expected to increase rapidly in future.

Heart Failure

The number of patients with heart failure is increasing. The main causes are hypertension, ischaemic heart disease, and an aging population. For the most severe cases, heart transplantation gives excellent results. However, the number of transplantations is limited by the number of donor hearts. Xenotransplantation is still a dream of the future.

For those patients who cannot be treated with drugs, the intra-aortic balloon pump (IABP) is gaining popularity among cardiologists. IABP was introduced at Rikshospitalet by Tor Frøysaker in 1973 to stabilise patients with unstable angina prior to surgery, or to treat postcardiotomy failure following open heart surgery. It is now the most frequently used mechanical support system in patients with heart failure. In patients waiting for transplantation, IABP can be used as long-term device. As an alternative, or as a further step in the treatment, external ventricular assistance systems, based on centrifugal pumps were introduced at Rikshospitalet in 1985 by Odd R Geiran.

In 1993 Jan Ludvig Svennevig began to use Extra Corporeal Membrane Oxygenation (ECMO) to treat patients with life-threatening heart failure, either as a bridge to recovery, a bridge to transplant, or as a bridge to a long-term mechanical assistance device. This programme includes means to bring patients from other hospitals by air or ground transportation to an ECMO-center, in collaboration with The Norwegian Air Ambulance and the Norwegian Air Force.

An external pneumatic driven assistance device (Thoratec) has been used for long-term assistance.

In 2005 Arnt Fiane, Geiran, and Svennevig implanted the first electrically driven ventricular assistance device in Norway in a critically sick patient. So far, this new pump type, which is driven by a hydrodynamically suspended rotor without any mechanical bearings, has been implanted at Rikshospitalet in 34 patients, either as a bridge to transplant, or as a chronic implant, with very promising results.

By the end of 2010 a total of 699 patients have undergone heart transplantation, and 25 heart-and-lung transplantation, at Rikshospitalet with a 30-day mortality rate of 7%. One- and ten-year survival rates are 85 and 53%, respectively. The most frequent causes of death in the early postoperative period are infection and rejection. For late deaths, coronary disease and cancer are the most important factors (see also chapter 21. Heart and lung transplantation).

Congenital Heart Surgery

At first the heart-lung-machine was almost exclusively used to treat congenital heart lesions. As described by Hall in chapter 26, congenital heart surgery was established by Gudmund Semb and Steinar Tjønneland at Rikshospitalet and later also at Ullevål (Gudmund Semb) and Haukeland (Leidulf Segadal). In 2003 the service was centralised to Rikshospitalet. The centralisation allows a sufficient patient volume and experience for the specialised team of surgeons, anesthetists and perfusionists and for the multidisciplinary team responsible for pre- and postoperative care. Harald Lindberg took over the position as head of the section for congenital heart disease in 1993. Today's modern heart-lung-machines with small priming vol-



Fig 28-2. Open heart surgery performed in general hypothermia 1964 and with today's modern heart lung machine



Fig 28-3. The Ventracor team

umes and a specially trained team, have made it possible to operate even very complex lesions shortly after birth. Primary operations have replaced the majority of palliative procedures, such as arterio-pulmonary shunts and banding of the pulmonary artery. Operative mortality has been reduced significantly during recent years, even in uni-ventricular lesions such as hyperplasia of the left ventricle (Egil Seem) and transposition of the great arteries.

As an increasing number of children with congenital heart lesions are successfully treated and grow up, a new group of patients (GUCH- grown up congenital heart disease) requires more attention and often repeated surgery.

Surgical Treatment of Cardiac Arrhythmias

Gudmund Semb performed surgical operations for the Wolff-Parkinson-White's Syndrome at Ullevål in 1983. In close collaboration with the cardiologists Jan P. Amlie and Kolbjørn Forfang, Svennevig introduced intra-operative mapping of the left ventricle followed by cryo-ablation of aberrant foci to treat ventricular fibrillation and serious tachycardia at Rikshospitalet in 1989. This operation is most often performed together with resection of left ventricular aneurysms and bypass surgery. Intra-operative radio-frequency ablation for atrial fibrillation was introduced in Norway by Svennevig and Kjell Arne Rein in 2001.

Rikshospitalet is today a national center for arrhythmia surgery, congenital heart surgery, and transplantation. An increasing number of patients are treated with radio-frequency ablation or with ultrasound at all university hospitals. Initial experience has been gained performing surgery for atrial fibrillation using minimally invasive surgery on the beating heart (Rein).

Documentation – The Norwegian Heart Surgery Registry

In 1992 The Norwegian Association for Cardiothoracic Surgery (Norsk thoraxkirurgisk forening- NTKF) decided to establish a national database in order to follow changes in surgical procedures and document national results. Since 1994 all the cardiac surgery departments in Norway

have submitted complete data. The Registry contained more than 72.000 records by the end of 2009.

Starting with only few data elements, the Registry was extended to include risk factors and complications in 1998. The Registry is owned and run by NTKF. Svennevig has been responsible for the Registry since the start. Annual reports under the heading "Heart surgery in Norway" can be found on the home page of the Norwegian Medical Association (www.legeforeningen.no) or on the home pages of the contributing hospitals.

Norway has contributed with a national dataset to The European Adult Cardiac Surgical Database Reports published by The European Association for Cardio-Thoracic Surgery since 1994. The Norwegian results are very good, and comparable with the best international results. In close collaboration with The Norwegian Society of Cardiology a special annual report has been published on intervention and surgery for coronary artery disease (Hjerteforum). The Registry has revealed significant differences in surgical activity when comparing the 20 Norwegian counties.

Academic Activity

Teaching of medical students takes place at all the five university hospitals. The same hospitals are responsible for training thoracic surgeons. The training covers heart and lung surgery as well as surgery on thoracic vessels. The formal education consists of three years residency in cardiothoracic surgery, based on completed training in general surgery. Part of the two programmes may overlap, but most candidates need more than three years of training in order to fulfill the requirements for operative experience.

The introduction of personal supervisors, as well as regular documented meetings between the candidate and his mentor, has improved the quality of the training. However, improved working conditions with fewer nights on-duty and reduced working hours, have made it more difficult to obtain the needed operative experience. As a consequence, many Norwegian candidates are in their forties before they can work independently as cardiothoracic consultants.

The training posts for cardiothoracic candidates are limited to four years, but training can be prolonged for another four years as a fellow-ship. These fellow-ships have become popular, especially for PhD candidates, since they allow the residents to spend 50% of working time on research.

All the university hospitals in Norway have established professorships in cardiothoracic surgery:

Table 25-1. Professors of Cardiothoracic Surgery in Norway:

Rikshospitalet	
1987–1994	Tor Frøysaker
1989–2010	Jan L Svennevig
1994–	Odd R Geiran
2009–	Harald Lindberg
Ullevål University Hospital	
1994–	Knut Kvernebo
2005–	Theis Tønnessen
Haukeland University Hospital	
1993–2010	Leidulf Segadal
2007–	Rune Haaverstad
2007–	Lodve B Stangeland
St. Olav Hospital / St. Elisabeth Clinic in Trondheim	
1983–2002	Olaf V Levang
2005–2007	Rune Haaverstad
2005–	Alexander Waba
The University Hospital in North Norway (Tromsø)	
1983–	Dag Sørli
2000–	Truls Myrmehl
2010–	Rolf Busund

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29. The Norwegian Society for Thoracic and Vascular Surgery 1981–1991 and The Norwegian Association for Cardiothoracic Surgery

Leidulf Segadal

Thoracic surgery became a recognised surgical subspecialty in 1950. Until 1986 the specialty was a joint specialty for thoracic and vascular surgery.

Requirements for thoracic surgery: 1. Full recognition as a specialist in general surgery. 2. In addition three years employment in a department/ section of thoracic and cardiovascular surgery. One year may be included in the employment required for general surgery. Operative experience and participation in theoretical courses must be documented.

Requirements for the subspecialty of peripheral vascular surgery: 1. Full recognition as a specialist in general surgery. 2. In addition two years employment in a department/ section of vascular surgery and one year in a department/ section of thoracic surgery. One year may be included in the employment required for general surgery. Operative experience and participation in theoretical courses must be documented. The requirements for operative experience have been specified for both subspecialties, as well as the requirements for theoretical courses.

The Norwegian Society for Thoracic and Vascular Surgery was founded in 1981. In 1986 the society had 84 full members. In this year Vascular Surgery became a specialty of its own. Many of the members of this society achieved specialty status in both specialties and the Society contin-

ued to be an organisation for both until 1990. Then The Norwegian Society for Vascular Surgery was established in May, and was recognised by the Norwegian Medical Association in 1991.

The Norwegian Association for Cardiothoracic Surgery was established on the 14th of December 1991. The society holds its Annual General Meeting and its scientific sessions in conjunction with The Norwegian Surgical Association's Annual Meeting in Oslo every year. Annual Spring Meeting have also has been arranged, the last years in conjunction with an international meeting for thoracic surgery at Oslo University Hospital. The chairmen of the Society are listed in table 4.

Main tasks for the Association are:

1. Advocating new specialists in thoracic surgery and supervision of the education
2. Arrange the two annual meetings.
3. Administrate the two registries, The Norwegian Cardiac surgery registry and the Norwegian General Thoracic Surgery registry.

See the chapters 26–28 on thoracic and cardiac surgery

Table 29-1. Chairmen of the Norwegian Society of Thoracic and Vascular Surgery, from 1991 of the Norwegian Association for Cardiothoracic Surgery

Period	Name	Age when elected	Hospital
1981–85	Gudmund Semb	53	Ullevål
1986–87	Harald Lindberg	40	Rikshospitalet
1988–89	Jørgen Jørgensen	41	Ullevål
1990–93	Knut S Andersen	46	Haukeland
1994–97	Erik Fosse	44	Rikshospitalet
1998–2000	Sigurd Birkeland	45	Rikshospitalet
2001–	Rune Haaverstad	47	St Olav's Trondheim, from 2007 Haukeland

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30. Vascular Surgery

Hans O. Myhre

The Pioneering Period

Professor Ragnvald Ingebrigtsen had, in 1910, studied vascular surgical technique at the Rockefeller Institute, New York, where he worked as a research fellow with Alexis Carrel (1873–1944). Ingebrigtsen made important contributions to the understanding of the hemodynamic consequences of arteriovenous fistulas. He took up these problems after having retired from the position as professor of surgery at Rikshospitalet, and made important experimental investigations even after he had passed the age of 80. Although Carrel through his experimental work developed the basic techniques for vascular surgery before 1910, his principles were not used in clinical practice to any great extent until about 1950. Around 1955 several of these vascular surgical techniques were adopted by Norwegian surgeons, mainly at Rikshospitalet and Ullevål.

In 1934 a saddle embolus was removed from a 74 year-old woman at Haukeland. Embolectomy was performed in the aortic bifurcation as well as both femoral arteries, but the patient died two days later. Without heparin and Fogarty catheters this operation was unlikely to be successful at the time.

Aorto-iliac and Infrainguinal Atherosclerosis

At Ullevål, vascular surgery was introduced by Carl Semb and Frank Bergan. On the 16th of February 1955 they did what probably was the first thrombendarterectomy

in Norway. In June the same year, Leif Efskind at Rikshospitalet, used thrombendarterectomy both for femoro-popliteal and aorto-iliac atherosclerosis. In November that year thrombendarterectomy was also used at Drammen. At Rikshospitalet freeze-dried homologous arteries were applied for femoro-popliteal bypass grafting already in 1956. However, aneurysm formation became a problem and synthetic prostheses were therefore used, at first nylon, which was unsuccessful, and thereafter dacron.

At Ullevål translumbar aortography had been introduced in 1947, but was replaced by the Seldinger technique with arterial puncture in the groin in the early 50ies. Thrombendarterectomy became the main method both for the treatment of aorto-iliac and femoro-popliteal atherosclerosis during the first years. Already in 1956, 23 thrombendarterectomies of the femoral artery had been performed at Ullevål, and the results of the first 57 operations published in 1958 (1). Bergan and Sverre Vasli compared the results of reversed saphenous vein bypass grafting and endarterectomy in the femoro-popliteal area. This work led to the application of saphenous vein bypass grafting as the standard method for infra-inguinal atherosclerosis at this institution from 1961. From the early 1960ies dacron vascular graft replacement became the method of choice for the treatment of aorto-iliac atherosclerosis.

In 1960 Karl Victor Hall conceived the idea of using the long saphenous vein in-situ as a bypass graft for femoro-

popliteal and femoro-tibial atherosclerosis. The valves were at first removed through separate small incisions (Fig.1).

His first clinical experience was published in 1962 (2). The method had a renaissance in the 1970ies due to refinement of instruments, meticulous surgical technique and the introduction of a metal valve stripper described by Hall in 1973. The American surgeon Robert Leather reported excellent results with the in-situ technique for distal bypass. This also increased the popularity of the method, which is now accepted as the standard technique in several centres around the world, especially for femoro-distal bypass grafting. Hall was also the second to describe the popliteal entrapment syndrome. The first profunda-plasty was done at Aker in 1971, after it had been introduced by Peter Martin, at Hammersmith Hospital, London. The first Dardik biograft was also implanted at Aker in 1978, and this method was used until late 80ies. However, aneurysm formation was reported and therefore PTFE and Dacron were used for femoro-popliteal bypass above the knee. A Scandinavian prospective trial indicated that Dacron actually performed better than PTFE in this position. Semiclosed endarterectomy was also used below the inguinal ligament when the saphenous vein was unavailable for bypass. However, the long-term results were not optimal.

The first extra-anatomic bypass in Norway was performed as a femoro-femoral bypass at Ullevål in 1972 and also axillo-femoral bypass was performed early at this hospital. At Haukeland, the first extra-anatomic bypasses were made in 1974 and they published large series of extra-anatomic bypass grafting. Carotid-subclavian bypass was performed at Ullevål in 1970, in a patient with subclavian steel syndrome.

At Aker, Adolf Møllerud (orthopedic surgeon) started vascular surgery in the early 60ies. Vasli established a separate unit for vascular surgery at Aker in 1967. He included a vascular laboratory, and stimulated younger colleagues to do scientific work. Carl W. Janssen started vascular surgery at Haukeland in 1965 and Arne Trippstad took over as head of the Department of Vascular Surgery in 1974. Jon Anton Johnsson started vascular surgery in Tromsø in 1968, and Nils Helsingen at Akershus in 1969. As surgeons who had had their training at Rikshospitalet, Ul-

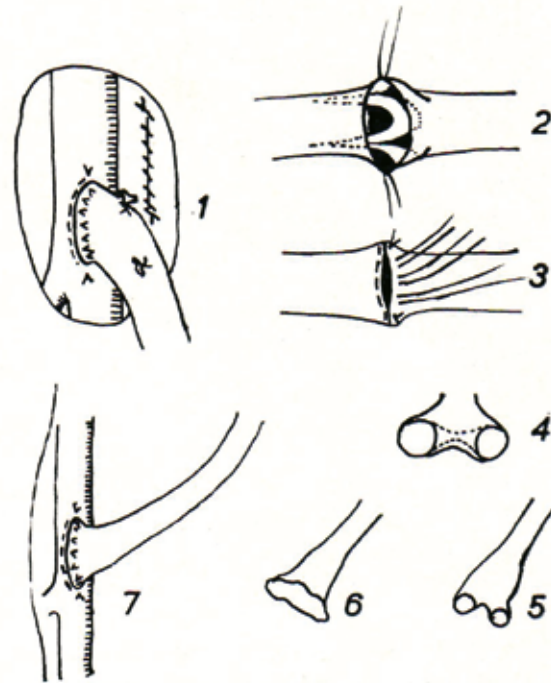


Fig 30-1. Technical details regarding in-situ vein bypass grafting as described in Hall's publication from 1962 (ref 2). (Published with permission from Surgery)

levål and Aker in the 1970ies established vascular surgery at county hospitals, vascular surgery became decentralised.

Aortic Aneurysms

The first attempt at treating an abdominal aortic aneurysm (AAA) took place at Haukeland, in 1952 using a "Surgaloy Mesh" wrapping. This technique was not used to any great extent in other hospitals. The first elective operation for abdominal aortic aneurysm was performed by Efskind at Rikshospitalet in 1956. A homologous vascular graft was used, and the postoperative course was uneventful. The first operation for ruptured aneurysm was performed at Ullevål by Bergan in 1963. The patient, a 69 year-old man, was in shock and lived only for one day. The first successful operations for ruptured AAA were performed in 1968. This year such operations were performed at three hospitals; at Ullevål by Georg Brabrand, at Aker by Vasli and in Tromsø by Johnsson. Since then there has been a significant increase in the number of operations for AAA, similar to what is seen in other western countries. Operations for aneurysm in peripheral arteries

have not been recorded systematically, but the first operation was performed at Ullevål in 1958.

The first results of thoracoabdominal aortic aneurysm repair were reported from Trondheim in 1985. Since then new techniques have been introduced, and most of these procedures are now performed with adjuncts like left heart bypass, sequential clamping of the aorta and selective perfusion of the renal and visceral arteries. Techniques for protection of the spinal cord have also been introduced and the mortality and complication rate is decreasing. From Department of Thoracic and Cardiovascular Surgery, Rikshospitalet, the experience with thoracoabdominal aortic surgery has been reported at national and international conferences.

Carotid Surgery

Pioneering work had been done in the field of carotid and vertebral angiography by Arne Engeset and Tormod Hauge. Engeset presented his experience with carotid angiography in his doctoral thesis as early as in 1944. The first successful carotid endarterectomy in Norway was performed at Ullevål in 1958 by Bergan and Kristian Kristiansen. Neurosurgeons had been involved in the treatment of cerebrovascular insufficiency from the beginning. However, carotid surgery has later been the domain of vascular surgeons. Most of the carotid operations were performed by the application of a shunt and autologous venous patch. Blood flow was measured routinely after the reconstruction.

Haukeland was the first hospital to introduce endovascular treatment of carotid artery stenosis in 1996 by Jan Wirsching and Svein Amundsen. Although several reports have indicated results of stenting comparable to surgery, conventional endarterectomy is still the dominating treatment modality for carotid artery stenosis in Norway. The number of carotid operations in Norway is about 300–350 per year.

Vascular Trauma

Norway has a relatively low incidence of vascular trauma compared to several other countries, although there has been an increase during recent years. Bergan operated a patient with traumatic aortic rupture by using a Dacron graft already in 1955, which to our knowledge was the

first such procedure in Norway. In 1994 a stent-graft was applied to repair an axillary arterial injury in Trondheim.

Early Endovascular Therapy

Already in 1967, Ivar Andresen and Torbjørn Hjemdal from Aust-Agder County Hospital, published their experience with seven patients treated with the Dotter angioplasty for infra-inguinal arterial obstruction. However, this method was soon abandoned, and it was not until the introduction of Grüntzig's balloon angioplasty that endovascular treatment became important for the treatment of atherosclerosis. The first balloon angioplasty a.m. Grüntzig in Norway was made by Staal Hatlinghus and Ivar Enge at Aker in March 1980, in a female patient with stenosis of the superficial femoral artery. Their first experience was published in 1981 (3). Almost simultaneously the method was also used at Ullevål by the radiologist Ragnar Hol. Aker was at first the leading hospital regarding endovascular treatment, both of aorto-iliac and femoro-popliteal occlusive disease. During 1980 also renal artery stenosis in a patient with renovascular hypertension was treated by balloon angioplasty, and a patient with "claudication" of the left arm was treated by balloon angioplasty of the left subclavian artery. Thus, the first angioplasty for renal artery stenosis (PTRA) was performed in 1980 and the results from Aker and Levanger Hospital, where Hatlinghus now worked, were presented in 1983 at the Scandinavian Radiological Conference in Oslo. In 1982, the technique was also applied at Rikshospitalet, at first on patients with arterial stenosis in transplanted kidneys. Later on they have published a significant experience with this technique in other patient groups.

Thrombolysis was first employed in the late 60ies at Aker. Thanks to pioneering work by Schilvold and Staxrud at Aker, the method had a renaissance in the late 1980ies for the treatment of acute arterial obstruction. The risk of bleeding still make the right selection of patients imperative.

The "Endovascular Era"

Volodos published his first experience with endovascular therapy for aneurysmal disease already in 1986 and Parodi in 1991. Endovascular aneurysm repair was introduced in Norway in 1995 when the first treatment of an abdominal aortic aneurysm was performed on the 3rd of February

in Trondheim. Jan Lundbom and Staal Hatlinghus did pioneering work with stent-grafting (Fig 3). They trained colleagues, both in Norway and in other countries in stent-grafting for abdominal aortic aneurysm. This treatment modality is now used at 10 hospitals in Norway. An annual course in endovascular therapy including the use of simulators is arranged in Trondheim as a collaboration between radiologists and surgeons.

The first thoracic stent-grafting was performed in Trondheim in 1997. The first 10 thoracic stent-grafts were so-called homemade, consisting of uncrimped polyester tubes where Gianturco Z-stents had been sutured on the inside. These implants functioned well, but have later been replaced by commercial products. The technique was first used for aneurysmal disease, but the indications have later been extended to complicated type B dissection, pseudoaneurysm, traumatic lesions of the thoracic aorta etc. Although some of the indications for thoracic aortic stent-grafting are still controversial, the method is regarded the primary choice for traumatic aortic rupture. Stent-grafting for thoracic aortic disease is so far performed at some of the university hospitals only. Hybrid operations for aneurysm and dissection were reported in 1998, while the first stent-grafts with side-branches to treat complicated aorto-iliac disease were used in 2002.

The endovascular era led to closer cooperation between vascular surgeons and interventional radiologists in the treatment of patients with vascular diseases. Thus, combined operations including open surgery as well as endovascular techniques are being more and more common. This cooperation is also reflected in the construction of so-called hybrid operating rooms for vascular surgery. In such operating rooms regular facilities for open surgery combined with an angiography laboratory is permitting both approaches to be applied during the same anesthesia. The first hybrid operating room was established at the Intervention Centre, Rikshospitalet, and later at Aker in 1999. Another example is the "Operating Room of the Future" at St. Olav's Hospital in Trondheim (www.stolav.no/for)

Venous Surgery

The development of blood flowmetry led to important investigations made by Roald Bjordal (1928–2003) in his

PhD thesis where he studied venous hemodynamics in patients with chronic venous insufficiency. He studied patients with primary varicose veins, as well as patients with deep venous insufficiency, and also investigated the function of the perforants by applying intravenous pressure measurements in addition to blood flowmetry. Bjordal's work contributed to the understanding of the pathophysiological process and the prognosis following surgical therapy. Later Duplex scanning has become the most important method for investigation of venous disease.

During recent years, radiofrequency therapy and the injection of sclerosing foam have been used instead of conventional stripping of varicose veins. In selected cases of deep venous insufficiency, vein valve reconstruction has become an alternative. As the only hospital in Norway, Aker has introduced this treatment modality, and promising results have been presented. Aker also pioneered within the application of modern thrombolytic treatment of deep venous thrombosis. It seems that better conservation of the venous valves is obtained following thrombolytic treatment compared to conventional heparin treatment only.

Medical Technology and Vascular Diagnostics

Electromagnetic flowmetry had been described in 1956 by Spencer and Dennison, but the instrument was not commercially available at the time. In cooperation with Hårek Hognestad, Christian Cappelen and Hall developed an electromagnetic flowmeter at the Norwegian Institute of Industrial Research. This flowmeter gained international reputation as a safe and reliable instrument and was produced by Nycotron, Norway. The most recently developed flowmetry technique is the ultrasound transit time flowmeter. An example is the VeriQ flowmeter developed by Medi-Stim, Norway, comprising a computer-based system with trend functions and ability to measure peripheral vascular resistance.

Significant contributions within the field of biomedical engineering of importance for vascular surgery have also been made in Trondheim. Cooperation between the Medical Faculty and the former Norwegian Institute of Technology by the cardiologist Liv Hatle and Bjørn Angelsen (engineer) led to the development of excellent duplex ultrasound equipment for non-invasive investiga-

tion, both of the heart and the peripheral circulation. This equipment is widely used in cardiological and vascular centres all over the world and was first commercialised by Vingmed, Norway, later by General Electric.

When non-invasive vascular diagnostic methods such as plethysmography and Doppler ultrasound units became available in the later 1960ies, the techniques were soon applied at Aker. At first, the examinations were handled by vascular surgeons, and simple tests by a hospital engineer. From mid-seventies the current leader, the physiologist Einar Stranden, in parallel with his PhD thesis, started establishing a separate vascular laboratory for research and clinical studies (8). “Oslo Vascular Centre” was established in 2005. The centre included an angiological outpatient clinic in addition to the outpatient clinic for circulatory physiology.

Duplex ultrasound scanning has become more and more important, especially in the preoperative diagnosis and follow-up of vascular diseases. CT and MR-angiography have replaced conventional angiography for diagnostic purposes. Sometimes more sophisticated methods are necessary, especially for diagnosing rare vascular diseases and microvascular disorders. The Department of Circulatory Physiology at Aker, under the leadership of Stranden, has the most complete vascular laboratory in Norway covering most techniques for vascular diagnosis (4). A large part of their technical equipment is developed at the department.

Organisation of Vascular Surgery

In 1981, altogether 52 Norwegian hospitals reported that vascular surgery was performed, 39 of which did elective operations. However, only eight centres reported that more than 100 arterial operations were done in 1981. Since the transportation of patients may be relatively cumbersome in Norway, one found it advantageous for the general surgeons to have a certain background in vascular surgery, at least at county hospitals. Vascular surgery has therefore been included in the requirements for becoming a specialist in general surgery.

Similar to other countries in the Western World, the need for vascular surgery had been steadily increasing. In 1969, 1100 arterial operations were performed. The number increased to 2000 in 1976. In 1981, 2500 operations were performed, an average of 600 operations per mil-

lion inhabitants. In the same year, approximately 1200 operations per million inhabitants were done in Oslo. Venous surgery is excluded from these data. The introduction of new endovascular techniques, as well as the issue of hospital volume and quality, has led many to advocate a centralisation of vascular surgery. This is now widely accepted, but the future location of Departments for Vascular Surgery are still debated.

Vascular surgery was recognised as a subspecialty based in general surgery in 1986. In addition to four years of general surgery, three years of vascular surgery at a recognised training centre is required. Furthermore, 200 specified vascular operations should have been performed and 80 hours of courses are compulsory before specialist recognition is obtained. The Norwegian Society for Vascular Surgery was established in May 1990 and was recognised by the Norwegian Medical Association in 1991. The Norwegian Society for Vascular Surgery has two annual meetings; one at the end of October and then a Winter-meeting at the beginning of March. A national vascular journal “Norsk Karkirurgi” is distributed to the members. A textbook “Nordic Vascular Surgery” was published in 1997 with Hans O. Myhre as editor (5).

In a report “Vascular surgery in Norway” from 1993 (6) the need for vascular procedures in Norway, with the exception of venous surgery, was estimated to about 1500 per million inhabitants. In 2002 a report on the structure and organisation of Norwegian vascular surgery in the future (7) was made. It was concluded that since vascular surgical techniques became more complicated, there was a need for centralisation. The plan is to have “centres” with round the clock service including the necessary cooperation with interventional radiologists. According to the Norwegian Medical Association there were in April 2011 154 certified vascular surgeons in Norway, and approximately 91 of them worked in clinical practice.

During the 1990ies and after the year 2000 there has been a steady increase in the number of vascular procedures in Norway according to the national registry, NorKar, which was established in Trondheim in 1995 (Fig.2). NorKar, as other clinical registries in Norway, will probably be reorganised in the near future under the leadership of the Norwegian Directorate of Health. It is the hope that this registry will form the basis for a log-book for trainees in

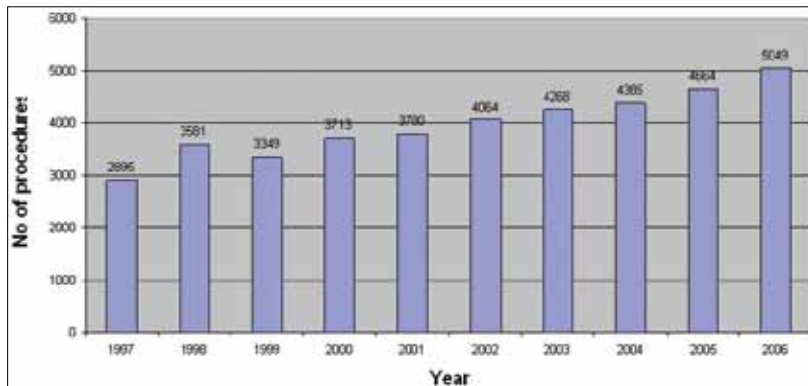


Fig 30-2. An increasing number of vascular surgical procedures have been reported to the Norwegian Vascular Registry, NorKar, during the period 1997–2006



Fig 30-3. 3D CT scan showing a stent-graft replacing the aorta and the iliac arteries in a patient with an infrarenal abdominal aortic aneurysm

vascular surgery, and that reporting to the registry will be compulsory.

The number of open operations for aorto-iliac disease has decreased significantly and most of these lesions are now treated by balloon angioplasty with or without stenting. Also infrainguinal disease is increasingly being treated with balloon angioplasty, which also has become the primary method for the treatment of renal artery stenosis (8).

Early in the 1990ies vascular stents became commercially available. The first stenting procedures in the aorto-iliac segment were performed at Ullevål while stenting of the renal arteries were first performed at Rikshospitalet. Aker reported the first Norwegian experience with laparoscopic aorto-iliac surgery for occlusive disease in 2005.

In 1997, a report on smoking and vascular diseases was made by members of the Norwegian Society for Vascular Surgery. The strong association between smoking and atherosclerosis lead to the conclusion that vascular surgeons should pay more attention to prevention, including smoking cessation programmes in patients with vascular diseases. Especially for patients with intermittent claudica-

tion, systematic training programmes should be arranged. In addition, it was realised that these patients did not get proper medical treatment. Oslo Vascular Centre at Aker has organised the care of vascular patients in an excellent manner and a supervised training programme is an important part before elective surgery is planned.

European Society for Vascular Surgery was founded in 1987 and Hans O. Myhre became the first president of the society (9). The society and its journal “European Journal of Vascular and Endovascular Surgery” have had a great impact on European vascular surgery in general, and also on Norwegian vascular surgery. In September 2009, the annual conference of this society had their meeting in Oslo with Jørgen J. Jørgensen, Aker, as chairman of the local organising committee. The Norwegian Society for Vascular Surgery decided that 2009 should be regarded the “year of vascular surgery” with focus on patients with vascular diseases. The “day of vascular surgery” was arranged at hospitals all over Norway on the 27th May 2009 (Fig 4). Demonstration of diagnostic techniques, lectures about various vascular disorders etc. were arranged. In addition, a web portal for vascular surgery in Norway was established (www.karkirurgi.org).



Fig 30-4. Scenario from the arrangement "the day of vascular surgery" in Oslo on May 27th, 2009

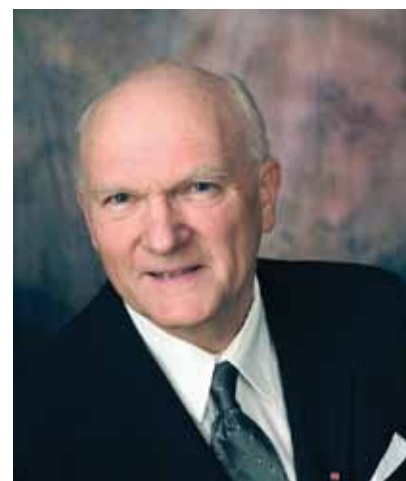


Fig 30-5. Hans Olav Myhre

Research

About 20 PhD theses have been delivered at Department of Circulatory Physiology, Aker. The main focus, in addition to clinical research, has been studies of arterial- and venous physiology and pathophysiology, transcapillary fluid balance and edema mechanisms, microcirculation, regulation of peripheral circulation and medical technology. A similar number of PhD theses has been made at the surgical clinic, St. Olav's Hospital, Trondheim, where a close collaboration with the research institution SINTEF has been extremely valuable. Several theses have been made regarding the consequences of cross-clamping of the thoracic aorta and various aspects on thoracoabdominal aortic

surgery including protection of the spinal cord. In 1990 Petter Aadahl received the prize for the best contribution at the annual conference of the European Society for Vascular Surgery. At Haukeland, the main research projects have been on long-term patency rate and survival following various vascular diseases. The Tromsø-investigation, which is organised from the University Hospital of Tromsø, has given us valuable information, especially on epidemiology and risk factors of aortic aneurysmal disease and carotid artery disease including plaque morphology. High-quality scientific papers with new and valuable information have been published from the Tromsø-study (10).

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31. The Norwegian Society for Vascular Surgery

Hans O. Myhre, Jarlis Wesche and Thomas Nyheim

Vascular surgery became subspecialty in Norway in 1986. The Norwegian Society for Vascular Surgery (NKKF) was founded in Oslo on 27th May 1990. It was officially acknowledged by the Norwegian Medical Association in 1991. Prior to 1990, vascular surgery had been represented by the Norwegian Society for Thoracic and Vascular Surgery. A provisional Board was elected in 1990. Bjørn Høivik was the first chairman and Andries Kroese, Hans O. Myhre and Henrik Dedichen were members of the founding board.

Table 31-1. The Chairmen of the Society have been:

1990–1991	Bjørn Høivik
1991–1995	Ola D. Sæther
1995–1998	Terje Hasselgård
1998–2000	Torbjørn Dahl
2000–2002	Erik Halbakken
2002–2004	Anne Karin Lindahl
2004–2006	Jarlis Wesche
2006–2008	Gustav Pedersen
2008–2009	Alfred Arvesen
2010–	Tonje Berglund

A year after the foundation of the Society, the journal “Norsk Karkirurgi” was established, with Kroese as the first editor. Initially two or three issues per year were published yearly and delivered to all members, but due to economic constraints the number of issues has decreased.

Training

The Norwegian Society for Vascular Surgery has a permanent committee which works with the education of vascular trainees, and requirements of national certification for specialisation in vascular surgery. This educational committee was established in 1986. The first members were Myhre, Karl Fr. Kordt and Dedichen. At present the elected educational committee consists of the following members: Tor Flørenes, Jarlis Wesche, Erik Halbakken, Svein R. Amundsen and Steinar Kiil (as a representative for vascular trainees).

The group organises and ratifies courses, and issues the specific recommendations for open and endovascular procedures required for certification as a specialist in vascular surgery. At present the candidates are required to be specialists in general surgery with at least three years additional training in a recognised department of vascular surgery. 1½ years of this vascular surgical training must be completed in a university hospital. 220 specified open vascular procedures are required by the candidate in addition to 20 endovascular procedures. Finally, a total of 80 hours attending obligatory and optional courses are necessary prior to the specialist recognition. In cooperation with the Norwegian Medical Association an Internet distant education course in circulatory physiology has been established. There is an annual course in vascular surgical techniques where the candidates perform vascular operations on pigs. A simulator based course in endovascular procedures has

also been established. As a consequence of the increasing trend towards application of endovascular treatment modalities, the Society plans to increase the current requirements of endovascular procedures to 50 over the next two years. Operating lists and other specialist requirements can be found at www.legeforeningen.no

Throughout the training period a consultant vascular surgeon is appointed as a supervisor for each vascular trainee. Regular formal meetings are being held to ensure that the requirements of the specialist training are fulfilled. At present there are 13 recognised training posts in university hospitals, where the candidates can complete all 3 years training, and 6 positions in county hospitals, where 1½ years of vascular training is recognised.

A challenge for NKKF is to stimulate research within vascular surgery and to encourage establishment of junior hospital posts with 50% research and 50% clinical work at the major institutions. Simulators and skills stations will become increasingly important during the training in vascular surgery.

The NORKAR Registry

NORKAR was established in 1995 as a national register in vascular surgery. Annual reports are given at www.legeforeningen.no/id/12183.0 Data are also delivered to Vascunet www.esvs.org/?vis=57. Thus, international col-

laboration between vascular registers is well established. The national registers are about to be reorganised under the leadership of the Norwegian Directorate of Health. The aim is that the registry will form the basis for a log-book for vascular trainees, provide quality control, and that reporting to the registry will become compulsory.

International Collaboration

NKKF has over the years had extensive international collaboration, especially with the European Society for Vascular Surgery (ESVS). The council members are elected by the members of ESVS in each country. Since the inauguration in 1987 this society has grown significantly. The annual meeting in 2009 was arranged in Oslo under the leadership of Jørgen J. Jørgensen. The meeting was a great success and about 1500 participants attended the meeting, including 100 “vascular” nurses and technicians. The session for nurses and technicians was arranged for the first time, and was very successful.

For the past decades the European Union of Medical Specialists (Union Européenne des Médecins Spécialistes – UEMS) has developed into a comprehensive and representative European organisation for medical specialists. Around 2005 vascular surgery emerged as an independent mono-specialty in several European countries. Previously vascular surgery was a sub-section of general surgery. The European Board of Vascular Surgery Examination is im-

portant for harmonisation of vascular training in Europe. This is a voluntary examination, which is arranged during the ESVS annual meeting. Both vascular and endovascular skills are tested at the examination. Norwegian representatives to UEMS Vasc have been Myhre, Anne Karin Lindahl, Flørenes and Kirsten Krohg-Sørensen. Information regarding UEMS may be found on www.uemsvascular.com www.uemsvascular.com/EBVS_New_Logbook.pdf www.uemsvascular.com/EBVS_Application.pdf

During the ESVS meeting in Berlin in 1994 the European Association for Vascular Surgeons in training (EAVST) was founded. In 2008 this society formally became European Vascular Surgeons in Training (EVST) and was incorporated into the European Society of Vascular Surgery.

The new society continues to promote issues pertaining to training in vascular surgery in Europe.

Closing Remarks

In Norway the population is scattered over a large geographical area. This continues to challenge our health care system, especially the issue of maintaining a high quality health service even in peripheral hospitals. As transportation has become more effective, a demand for centralisation of vascular surgical units has been forwarded by NKKF. This is a continuous process, which is still under debate.

More information about vascular surgery in Norway is available at www.karkirurgi.org.

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Acknowledgements

The author and editors would like to thank Dag Sørli, Leidulf Segadal and Tonje Berglund for comments to the manuscript.

Subspecialties of General Surgery: Pediatric Surgery

32. Pediatric Surgery in Norway 1959–1986

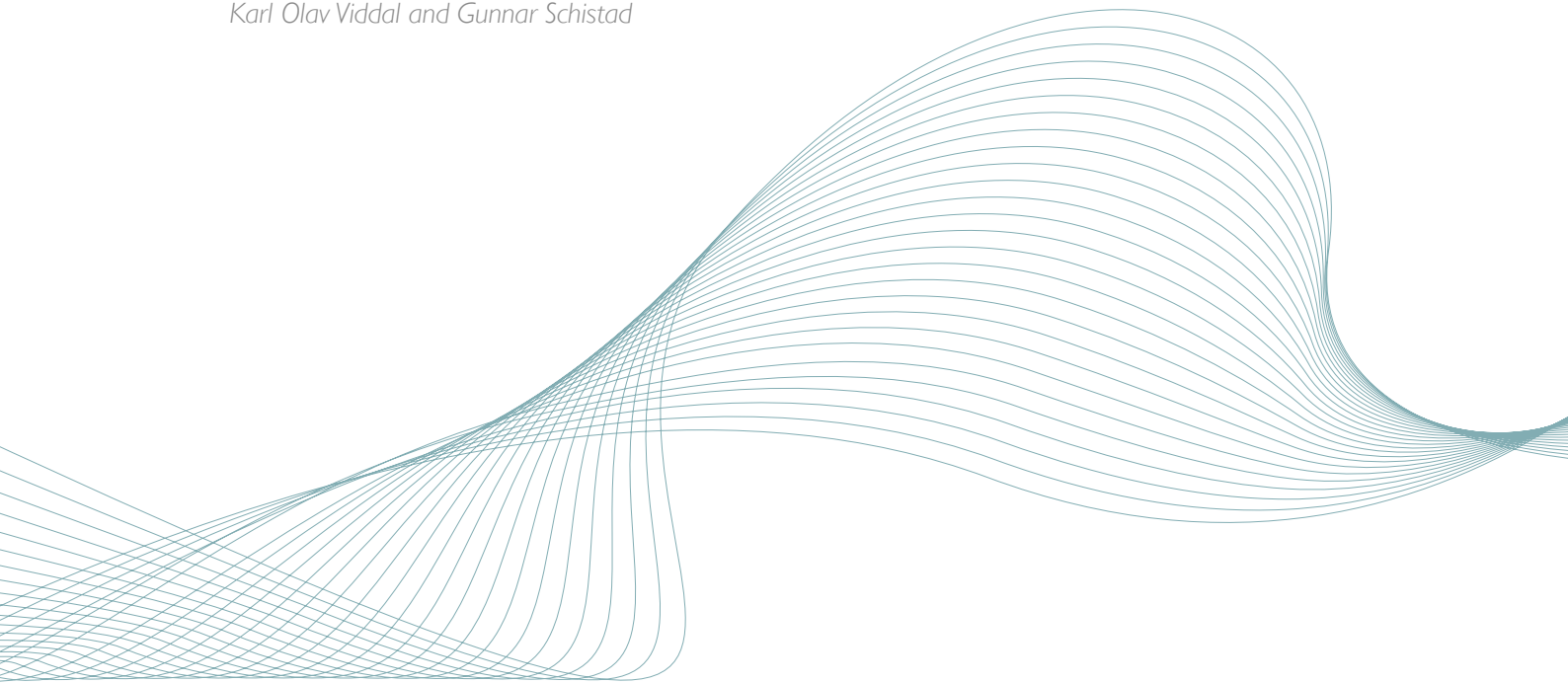
Ola Knutrud

33. Pediatric Surgery 1986–2010

Ragnhild Emblem and Stein Erik Haugen

34. The Norwegian Association of Paediatric Surgery

Karl Olav Viddal and Gunnar Schistad





32. Pediatric Surgery in Norway 1959–1986

Ola Knutrud (written in 1986)

Pediatric surgery as such was introduced in Norway in 1959¹, and it became a subspecialty in 1963. The first department of pediatric surgery was planned in 1959 at Rikshospitalet, and it became a specific service in 1962 with one department in the central block and one department in The Childrens Clinic, containing 50 beds.

It was soon clear that the elective surgical work from the whole of Norway, with a population of about 4 million people, became so important in the Pediatric Surgical Service at Rikshospitalet that we had to stop doing general surgery.

The Pediatric Surgical Service at Rikshospitalet has therefore since 1962 with increasing degree concentrated on the following:

Neonatal emergencies due to congenital malformations
Congenital malformations up to the age of 12 years
(not orthopedic)

Tumour surgery on children up to the age of 12 years

For the organisation of pediatric surgery in Norway the following events have been of great importance:

1. The Scandinavian Association of Paediatric Surgery was started in 1966.
2. The Norwegian Association of Paediatric Surgery was founded in 1973 and became a part of The Norwegian Medical Association.
3. The European Union of Paediatric Surgical Associations (EUPSA) was inaugurated in Rotterdam in 1973 with representatives for 16 European countries. This Union wrote in 1973 a most important resolution for the evolution of pediatric surgery in Europe. It was called The Rotterdam Resolution, and had the following points:
 - a. Children with surgical conditions should be treated in large pediatric centres. These centres must have a pediatric surgical team with full clinical responsibility. The definition Pediatric Surgery must include neonatal surgery, the surgery of congenital malformations, and tumours of the childhood. Depending on local conditions, sub-specialties as for instance traumatology, will or will not be included.
 - b. Each centre should draw from a minimum of one million people and should have at least two fully qualified pediatric surgeons apart from those in training. There should be a minimum of 50–60 beds per centre.

1) See Editorial Addition at the end of this chapter.

- c. The maximal age of pediatric surgical patients should be the same as that of medical pediatric patients according to local customs.
- d. In general, pediatric surgery centres should be affiliated to a medical school. Each medical school should have a pediatric surgeon on its staff, preferably a full time professor.
- e. The minimum total postgraduate period for training in pediatric surgery should be 6 years. The minimum training period in pediatric surgery should be 3 years unless the candidate is already a fully qualified general surgeon in which case the minimum period might be reduced to 2 years. Training periods should be in recognised hospitals and should be full time.

These points were accepted unanimously on behalf of the national associations. They should be referred to as The Rotterdam Resolution.

Through the following years from 1962 work was started to create new pediatric surgical departments at the other university hospitals in Norway, and in 1980 the following number of beds were specifically designed for pediatric surgery:

Rikshospitalet, Paediatric Surgical Service	46 beds
Rikshospitalet, Paediatric Neuro Surgical Service	6 beds
Rikshospitalet, Paediatric Cardiovascular Surgical Service	10 beds
Paediatric Surgical Service, Haukeland	17 beds
Paediatric Surgical Service, Ullevål (Oslo City)	20 beds
Paediatric Surgical Service, The Regional Hospital, Trondheim	13 beds
To these beds are added 15 beds for pediatric orthopedic surgery, which gives us a total of 127 beds.	

An analysis of the need for pediatric surgical beds in Norway, if all children needing surgical service should be admitted to a pediatric surgical department, would give a total of 335 pediatric surgical beds. This shows that only one third of the children in Norway needing surgical interventions are admitted to a specific pediatric unit. The others are treated in general surgical hospitals or wards.

In some hospitals the head of the surgical department is also a specialist in pediatric surgery. This includes the hospitals in Arendal (Arne Baardsen), Flekkefjord (Arthur

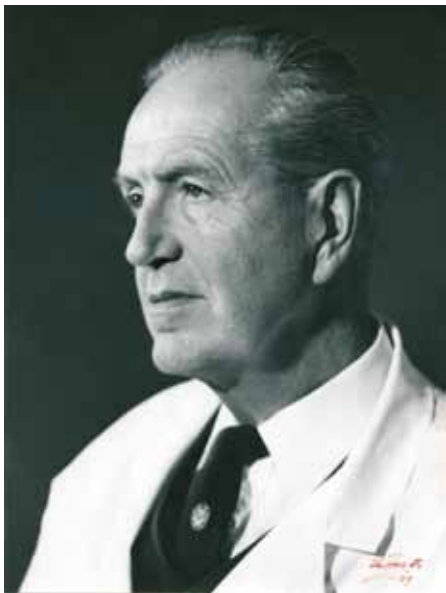


Fig 32-1. Ola Knutrud.
Photo: Else Aarseth 1979

Danielsen), Stavanger (Sigmund Vaage), Haugesund (Kåre Ohma) and Gravdal (Anders Norstrand) (names added by the editors).

The most important part of elective pediatric surgery is neonatal surgery.

At Rikshospitalet 2138 neonatal emergencies have been treated from 1959 to 1986. The number has varied from 19 in the first two years up to 132 per year, giving an average of 79 neonatal emergencies per year. This work has counted for up to 24% of the surgical operations per year.

It may also be mentioned that in the same department, surgery on babies less than two years old has varied from 37 to 53% per year.

It may be mentioned that the department has treated 259 babies with oesophageal atresia, 322 babies with anorectal malformations, 182 babies with diaphragmatic hernias and 217 babies with myelo-meningocele and 162 with gastroschisis-omphalocele.

From the beginning it was obvious that our knowledge of the metabolic response to surgery in the neonate was far from sufficient, and that this could be a crucial point in survival rate.

At Rikshospitalet we therefore initiated a research project that resulted in a thesis on this problem. (The water and electrolyte metabolism in the newborn after major surgery. Universitetsforlaget, Oslo 1965)

This work gave us the platform for evaluation of balanced parenteral feeding programmes for neonates and infants. These programmes proved to secure anabolism in the newborn child on the very day after a major surgical intervention.

Surgery on the liver was a challenge from the early beginning. Left hepatic lobectomy was done in 1967.

In 1980 a pair of Siamese twins (ischiopagus tripes asymetrica) was successfully divided. They are now 6 years old and very active and alert children.

Pediatric urology has become a most important part of the work, and urological surgical interventions count for about 40% of the operations. Uro-dynamic studies in children have become important research projects at Rikshospitalet and have resulted in increasing knowledge.

Up to 1986 The Paediatric Surgical Department in Rikshospitalet has worked as reference centre for the whole

of Norway and has not taken care of general surgery or traumatology.

The postgraduate training in pediatric surgery is 8–9 years. The candidate must first be a specialist in general surgery, which takes 5–6 years, and this is followed by three years in a pediatric surgical department. There are today (editors addition: in 1986) only two training posts that give full education in pediatric surgery.

In 1985 eight full time pediatric surgeons were working in Norway. The population in Norway is approximately 4 million people, and the birth rate has dropped from about 65 000 to approximately 50 000 per year. The Rotterdam Resolution recommends a population of a minimum of 1 million people per unit of pediatric surgery, consisting of 50 beds with 3 full time pediatric surgeons. The experience in Norway shows that it will be a great advantage when the planning aims at giving a pediatric surgery centre a background population of at least two million people.

Editors Addition:

The eight pediatric surgeons in 1985 were: Ola Knutrud, Roald Bjordal, Tom Monclair and Sigvald Refsum at Rikshospitalet, Gunnar Schistad and Karl Olav Viddal at Ullevål, Torbjørn Kufaa in Trondheim, Arne Baardsen in Arendal.

Editorial Comments:

Before pediatric surgery was introduced as a separate subspecialty in Norway, surgery on children was a part of general surgery. In most hospitals this has continued even after the introduction of the subspecialty, with the exception of neonatal surgery. The activity has generally comprised most types of acute surgery, such as intussusception, torsion of the testes, incarcerated hernias and pyloric stenosis, as well as treatment of common surgical conditions and trauma, including fractures and minor head injuries. Elective surgery has generally been limited to hernias, phimosis, and undescended testes.

From the beginning in the 1960ies, when Ola Knutrud founded the pediatric surgical services at Rikshospitalet, the activity was mostly focused on rare congenital malformations and tumour surgery.

Ullevål established pediatric surgery in the late 1960ies after Gunnar Schistad completed his subspecialty training at Great Ormond Street Hospital in 1965. Contrary to the highly specialised service at Rikshospitalet, the service at Ullevål has been very comprehensive, comprising all kinds of surgical treatment of children, also traumatology, oncology and burns. In addition the unit has engaged in neonatal surgery, mainly on children born in the municipal hospitals in Oslo and former Health Region I.

Pediatric Surgery was established in Trondheim in 1975, when Torbjørn Kufaas who had been trained in pediatric surgery in Helsinki, Sheffield and at Ullevål, was engaged. Like Ullevål, the service in Trondheim has comprised all kinds of surgical treatment of children.

At Haukeland, the university clinic in Bergen, Arne Baardsen and Henrich Sommerschild were employed as pediatric surgeons during the 1980ies, but since then the



Fig 32-2. Gunnar Schistad.
Photo: Kåre Eide. Courtesy
Ullevål. Section for Photo
and Visual Presentation



Fig 32-3. Torbjørn Kufaas.
Photo: Schrøder

service has continued without subspecialists under the leadership of Tove Berstad, specialist in general surgery and gastrointestinal surgery, with a special interest in pediatric surgery.

In the University Clinic in Tromsø the activity has been supervised by professor Arthur Revhaug, also specialist in general surgery and gastrointestinal surgery, with a special interest in pediatric surgery.

During the 1980ies and 1990ies there was a lot of discussion concerning centralisation of neonatal surgery and highly specialised neonatal surgery in Norway. It was pointed out that it is difficult to continue a pediatric surgery unit without engagement in neonatal surgery. Neonatal surgery is still performed in Bergen and Tromsø, depending on urgency, and to the extent the surgeons and the anesthesiologists feel competent.

Acknowledgements

The editors would like to thank Gunnar Schistad, Torbjørn Kufaas, Ragnhild Emblem, Stein Erik Haugen, Tove Berstad, Arthur Revhaug and Hans Skari for comments to the manuscript.

33. Pediatric Surgery 1986–2010

Ragnhild Emblem and Stein Erik Haugen

Pediatric surgery has evolved during the last 60 years, and became recognised as a separate surgical specialty in Norway in 1963. Since 1977 it has been organised as a subspecialty under general surgery.

The main responsibility of pediatric surgeons is surgery for congenital malformations and acquired diseases of the gastrointestinal, hepatobiliary and urogenital tract as well as non-cardiac thoracic surgery, in newborns and children up to the age of 15 years. The specialty also involves pediatric surgical oncology.

A common denominator of pediatric surgery is the large number of different malformations and conditions with few patients in each group. Furthermore, the presence of malformations and malfunction of more than one organ system is frequent, and a multi-disciplinary approach to treatment and follow up is often required. Increasingly, parents seek information about the disease from the internet and other sources. Some conditions have life-long consequences for the child, and the burden on parents and the parent-child interaction is heavy.

International Pediatric Surgery

Milestones

A prominent change in pediatric surgery in recent years was the introduction of minimally invasive surgery. One example is laparoscopic fundoplication for gastroesopha-

geal reflux, which is a commonly performed operation in infants. Since its introduction in the early 1990ies, laparoscopy has become the common approach for this procedure in children. Even more complicated procedures, such as surgery for oesophageal atresia, liver resection and pancreatectomy are successfully performed by minimally invasive techniques at dedicated international centres.

Advances in pediatric surgical intensive care and pediatric anesthesia are important factors for improved results and survival in neonatal and pediatric surgery. Progress in neonatal intensive care has improved survival of premature babies. The use of surfactant in treating premature babies is the most important single factor in this respect.

New treatment modalities for newborns with congenital diaphragmatic hernia, progress in reconstructive surgery for congenital malformations, and transplantations (kidney, liver, intestine) in infants and children with organ failure are other examples of therapeutic advances that have changed the outlook for the pediatric surgical patient markedly.

Organisation of Pediatric Surgery in Norway

The training of pediatric surgeons in Norway has been concentrated to the university hospitals in Trondheim and Oslo. As almost all specialised pediatric surgery is performed there, the number of trained pediatric surgeons

has been limited to filling the consultant posts at these hospitals. Acute and elective surgery for commonly occurring conditions in children and adolescents (appendicitis, hernias, trauma, etc) has also been performed satisfactorily by general and organ specialist surgeons at district and regional hospitals.

There is an ongoing discussion concerning which types of operations should be performed by pediatric surgeons and which can also be performed by other surgical subspecialists. This discussion is closely linked to the number of trained pediatric surgeons. Experienced pediatric surgeons in Norway recommend that neonatal and specialised pediatric surgery is performed by pediatric surgeons, and surgery for common conditions in children, also by other surgeons. The pediatric surgeon should, however, set the standard for all kinds of surgery on children and provide good postgraduate training for general surgeons. Internationally there is a trend towards further subspecialisation within pediatric surgery. Pediatric urology is already well established, and others are likely to follow. These subspecialties can only flourish at large pediatric surgical centres with sufficient patient volumes.

Organisation of Neonatal Surgery in Norway

Neonatal surgery is defined as surgery in children below the age of 4 weeks or 44 gestational weeks. In 1995, the Norwegian health authority classified neonatal surgery as a multiregional service to take place at pediatric surgical centres in Oslo and Trondheim. Despite this decision, neonates are still being operated on by non-specialists at other university hospitals. However, there is a growing demand among parents that their children must be treated at the highest level by a specialised team of pediatric surgeons, pediatric anesthesiologists and pediatricians as well as other collaborating pediatric professionals (radiologists, pathologists, specialist nurse practitioners) in accordance with the centralisation of neonatal and specialised pediatric surgery.

New Hospitals and Departments of Pediatric Surgery in Oslo and Trondheim

During recent years the departments of pediatric surgery in Oslo and Trondheim have moved into newly built hos-

pitals. In Oslo, Rikshospitalet moved to new buildings at Gaustad in May 2000 and in connection with this move, the number of beds was reduced by almost 50% as a result of shorter hospital stay, and change of many procedures to day care and day surgery. Thus, in the new Rikshospitalet the pediatric surgical department has only got 15 beds and 6 step-down beds. At Ullevål a new pediatric centre including a department for pediatric surgical disciplines (plastic surgery, neurosurgery, orthopedic surgery and 6 beds for pediatric surgery) was opened in 1998.

The reorganisation of health care in Oslo from 2009, merging Rikshospitalet and Ullevål, will secure that all specialised pediatric surgery within the Oslo multiregional catchment area, in the future will be performed in one department at Oslo University Hospital. During the first years, the trauma unit of this centre, will be based at Ullevål.

In Trondheim the pediatric surgical department moved into the Women's and Children's Centre of the new hospital in 2006, with 12 beds in the surgical ward and 5 beds for neonatal surgery in the neonatal intensive care unit.

Pediatric Surgery in Norway

Milestones

The use of minimally invasive treatment procedures in terms of laparoscopy, gastrointestinal endoscopy and cystoscopy in infants and children has grown substantially during the last ten years.

- Laparoscopic surgery was introduced in Norway in 1990 and came into use in pediatric surgery in 1996 when the first laparoscopic appendicostomy for antegrade colonic enema was performed. Since then techniques and equipment have developed to such an extent that a wide range of procedures in children and neonates can be performed by minimally invasive techniques and robot assisted laparoscopy. Pediatric surgery in Norway has followed the same trend, and during the last years more than one fourth of the surgical procedures at the pediatric surgical departments are performed this way.
- The use of gastrointestinal endoscopy in children is widely employed by pediatric surgeons. ERCP for investigation of occlusive hepatobiliary disorders in

neonates is performed successfully by specialised adult endoscopists.

- The treatment of children with serious vesicoureteral reflux has changed dramatically during the last twenty years. In the past, open reimplantation of the ureters for reflux was a major intervention, necessitating a hospital stay for more than a week postoperatively. Injection therapy (Teflon) by cystoscopy (the STING procedure) was introduced in Norway in the 1990ies as described by Karl Olav Viddal in 2000. Today the injection therapy (Deflux) can be performed on a day case basis. The difference for the child in terms of reduced postoperative pain and suffering is immense.
- The treatment of congenital diaphragmatic hernia (CDH) has changed from emergency surgery to gentle preoperative ventilation and delayed surgery. This new treatment strategy was introduced in the late 1980ies and survival increased from 20% to 70% [1].
- During the last 30 years Kasai's portoenterostomy has made survival possible for children with biliary atresia. A hundred per cent mortality in the 1970ies has been turned into 80% survival with Kasai's operation alone, or combined with liver transplantation for failed portoenterostomy. Early diagnosis and close collaboration between pediatric surgeons, pediatric hepatologists and transplant surgeons have been essential for the improved outcome.
- The introduction of continent urostomies in children has been of great benefit for patients with urinary incontinence due to epispadias, bladder exstrophy and spina bifida.
- Newborns with intersex conditions remain a great challenge for pediatric surgeons. From the 1990ies reports have been published warning against gender reassignment in children with male chromosomes and severe genital anomalies.
- The treatment of congenital hydronephrosis and obstructive uropathies has changed to a more conservative approach. Compared to 20 years ago, the number of patients with dilatation of the upper urinary tract undergoing surgical correction is greatly reduced. In general, surgery for dilated urinary tracts is only performed in symptomatic children, and in those where there is evidence of obstructed urinary flow.
- Management of trauma in children has changed significantly over the last decades. Multidisciplinary trauma team applying standard protocol and a conservative

approach have been successful.

- The treatment of solid malignant tumors has evolved applying multimodal therapy according to international treatment protocols.

Pediatric Surgical Research

Ola Knutrud initiated pediatric surgical research in Norway with his thesis from 1965 entitled "Water and electrolyte metabolism in the newborn child after major surgery". In the following years the capacity and resources for conducting research were limited.

Recently, however, new research activity has taken place, and in 2006 Hans Skari presented the next thesis from the Department of Pediatric Surgery at Rikshospitalet, followed by Anne Faugli in 2009. Skari's doctoral thesis was on "Consequences of Prenatal Diagnosis of Congenital Malformations" [2], and Faugli's on "Children with esophageal atresia. A biopsychosocial follow up study" [3]. Currently, several research fellows are engaged in pediatric surgical projects, and more theses will follow in the next few years.

During recent years research has had a special focus on long-term follow up studies, and consequences of surgery for congenital malformations, regarding pelvic neuro-intestinal function in particular [4]. This research is done in close collaboration with Trond Diseth's team of pediatric psychiatrists at Rikshospitalet.

Furthermore, the pediatric surgical research in Oslo has involved prospective, randomised controlled studies on consequences and results of different surgical techniques. These studies are performed in collaboration with the Intervention Centre at Rikshospitalet, other Norwegian regional centres, and with Great Ormond Street Hospital for Sick Children and the Institute of Child Health at the University of London.

The introduction of fetal ultrasound enabling prenatal diagnosis of congenital malformations has had an impact on the surgical care of newborns, and in Trondheim the developmental work has been focused on collaboration with the National Center for Fetal Medicine which was established in 1990. The first two EXIT procedures (Ex Utero Intrapartum Treatment) in Norway were done in



Fig 33-1. Roald Bjordal. Portait by Halvdan Ljøsne 1995. Courtesy Rikshospitalet



Fig 33-2. Ragnhild Emblem

2005 and 2006 at the Center, with Stein Erik Haugen as leader of the surgical team. The first case involved twins, of whom one twin had a large neck cystic hygroma causing obstruction of the trachea, which was the indication for the EXIT procedure. Both cases were performed successfully.

The thesis “Fetal and perinatal implications of anomalies in the gastrointestinal tract and the abdominal wall” by Anne Brantberg based on prenatal ultrasound studies in babies with gastroschisis, exomphalos, imperforate anus, duodenal and oesophageal atresia, was presented from the Center in 2007, with Stein Erik Haugen as collaborator and co-author [5].

Who and Where

Professor Ola Knutrud was the founder of Norwegian pediatric surgery. He was an internationally known pediatric surgeon and was honoured with the Denis Browne Gold Medal from the British Association of Paediatric Surgeons, which is considered the highest international award among pediatric surgeons. He retired from his academic and surgical work in 1986 and thereafter led an active life also as leader of the freemasons from 1990 until he died in 1996.

Roald Bjordal worked as a pediatric surgeon at Rikshospitalet from 1970. He was head of the Pediatric Surgical Department and appointed professor of surgery at the

University of Oslo from 1986. He retired in 1995 and died in 2003 after a long period of reduced health following a stroke. Professor Bjordal was a highly regarded surgeon and teacher for the Norwegian pediatric surgical and pediatric communities.

From 1992 to 1996 Tom Monclair was head of the department at Rikshospitalet. His main surgical and scientific interest has been pediatric oncological surgery.

Since 1996 Ragnhild Emblem has been head of the department and responsible for the academic activities, from 1996 as associate professor at the University of Oslo and from 2000 as a professor.

Among important persons for Norwegian pediatric surgical patients Sonja Rossvold has to be mentioned. She was a pediatric surgical nurse at Rikshospitalet for 30 years. Sonja was on call 24 hours a day, all year around, for all the patients with congenital malformations and specially for infants and children with oesophageal atresia.

Sigvald Refsum in collaboration with Henrich C. Sommerschild wrote the Norwegian textbook “Barnekirurgi” in 1999 which was revised in 2006.

The Department of Pediatric Surgery at Ullevål was established in 1970 with Gunnar Schistad as head of the unit until his retirement in 1996. He was succeeded by Karl Olav Viddal from 1996 to 2007, by Gunnar Aksnes from

2007 to 2009, and from 2009 until 2010 Ole Schistad was head of the department. From 2010 the pediatric surgical units in Oslo are a joined department within Oslo University Hospital, with Ragnhild Emblem as head.

The Department of Pediatric Surgery in Trondheim was established in 1975. Torbjørn Kufaas was head of the unit and was appointed professor of pediatric surgery at the University of Trondheim in 1985. His thesis “Tracheal reconstruction with free periosteal grafts” (Helsinki 1981) was based on experimental work. Kufaas was the only pediatric surgeon at the department until 1983 when Stein Erik Haugen joined him, first as a trainee, and from 1987 as a consultant. Haugen has been chief surgeon, head of pediatric surgery and associate professor at the University of Trondheim since Kufaas retired in 2000.

Currently (2010) all professionally active pediatric surgeons in Norway work either at the Pediatric Surgical Department of St. Olav’s Hospital in Trondheim (4) or at Oslo University Hospital (11).

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34. The Norwegian Association of Paediatric Surgery

Karl Olav Viddal and Gunnar Schistad

In the first part of the 20th Century, surgery on children was performed by general surgeons. Surgery on newborns, even with life-threatening anomalies, was rarely done before World War II. The introduction of endotracheal intubation anesthesia made these operations safer.

The Specialty of Paediatric Surgery

Paediatric Surgery was recognised as an official subspecialty in Sweden in 1947, in Finland in 1951 and in Norway in 1963. In Denmark pediatric surgery became a specialty from 1958, but was abandoned in 1971 as part of a revision of the specialty rules. Leading Danish pediatric surgeons felt that this was an unwise decision.

From 1963 the specialty has been recognised as a distinct and important entity in Norway, serving children who need surgical treatment. The Government's permanent National Council for Medical Specialisation and Distribution of Medical Specialists reviewed the entire specialist structure in 2002. In the hearing document: "Exploring the structure of surgical specialties", it was suggested that pediatric surgery should be abandoned as a separate specialty in Norway. The proposal was presented by Dag Sørli, head of the Department of Surgery in Tromsø, where surgery on children has been organised without employment of specialists in pediatric surgery. The document was discussed amongst the members of The Nor-

wegian Association of Paediatric Surgeons (NBKF) and the issue was debated in the Journal of the Norwegian Medical Association (1). The proposal of closing down the specialty of pediatric surgery was turned down by the NBKF's Specialty Committee. The leader of the Union Européenne des Médecins Spécialistes (UEMS), Section of Paediatric surgery, Gian Battista Parigi, strongly supported the maintenance of the specialty in Norway. After some discussion it was decided by The Government to keep the specialty.

The Association

The European Paediatric Surgical Association (EUPSA) was founded February 9th, 1973. It strongly recommended the establishment of national associations of pediatric surgery.

Foundation

The Norwegian Association of Paediatric Surgery (NBKF) was founded on July 7th 1973 at a meeting in Rikshospitalet, Oslo. The seven founding members were: Ola Knutrud, Gunnar Schistad, Roald Bjordal, Arne Baardsen, Henrik Sommerschild, Sigmund Vaage, and Brit Mohr.

In 1974 NBKF was accepted as separate specialist association within The Norwegian Medical Association (DNLF), and in 2006 it was reorganised as a professional association of pediatric surgery ("fagmedisinsk forening").

The statutes of NBKF were listed in nine paragraphs at the founding meeting in 1973, and last revised in 2006. For further information see: www.barnekirurgi.no.

The Annual General Meeting

The Annual General Meeting for Paediatric Surgery is arranged during the Annual Surgical Meeting. The Executive Committee presents the annual report and the financial statement. The doctors applying for membership of the Association are presented for the assembly. Every second year there are elections of members of the Executive Committee and of the Committee for the Specialty of Paediatric Surgery.

During the last decade, a scientific programme for the members has been added. Scientific pediatric surgical papers are presented in a special session, and in addition papers that are of interest for other surgeons, may be presented in other relevant surgical sections. The abstracts are printed in “Vitenskapelige forhandlinger”, the book of the Annual Surgical Meeting.

The Executive Committee and the Chairmen

The Executive Committee consists of one leader, one secretary, and 1–2 members, and after 1994 also two substitute members.

Table 34-1. The chairmen have been:

1973–1978	Ola Knutrud
1979–1987	Roald Bjordal
1988–1991	Torbjørn Kufaa
1992–1995	Karl Olav Viddal
1996–1999	Sigvald Refsum
2000–2001	Eilif Dahl
2002–2005	Borger Loe
2006–	Hans Skari

Important Documents

“The General Plan for Paediatric Surgery” (*Generalplan for kirurgisk pediatri*) was written by Ola Knutrud in 1979. A definition of “special pediatric surgery” was proposed, and an estimate was made of the numbers of departments, hospital beds and pediatric surgeons needed in Norway.

The “Rotterdam Resolution” from the EUPSA meeting in 1973, and the existing Norwegian plans for general surgery and pediatrics were useful in the estimation. The plan provoked the heads of Departments of Paediatrics in Bergen and Trondheim, as it suggested that all specialised pediatric surgery should be centralised to Oslo. This became a matter of discussions at the following annual meetings.

“Description of the Goals of Paediatric Surgery”

(*Målbeskrivelse for barnekirurgi*). There is consensus among the members of NBKF, that the specialty of pediatric surgery is based on surgery in newborns, and treatment of congenital anomalies, tumours, acquired diseases and trauma in children. The concept “highly specialised pediatric surgery” was introduced in the first half of 1990ies in an effort to centralise the treatment of not only extremely rare cases, but also cases that represent the basis for the pediatric surgical specialty. It caused hard discussions the next years between the members. No agreement has been reached regarding this concept.

Specialist Training and Continuing Education

NBKF has advocated that the numbers of training positions is kept low to ensure that the trainees get sufficient operative experience in dealing with the many rare cases in this specialty. Reduced working hours, the need for the pediatric surgeon to be on call, and increasing referrals from other hospitals have however, resulted in more positions for consultants and trainees in pediatric surgery. NBKF arranges courses in pediatric urology, and a basic course in pediatric surgery for trainees in general surgery.

As there are so few pediatric surgeons in Norway, the contact with pediatric surgical centres abroad is highly valuable for the quality of pediatric surgery in our country. NBKF has emphasised the importance of participation in international meetings and congresses, and recommended that the trainees should take part of their education abroad. It is also recommended to visit well-reputed hospitals in other countries during study periods. Some of the most relevant courses abroad are considered mandatory for the trainees in pediatric surgery: Oxford Neonatal Surgery Course, British Association of Paediatric Urology Course, Workshop in Pediatric Anorectal and Colorectal Surgical Problems.

Collaboration with The Norwegian Medical Association and The Norwegian Association of Surgery

The relationship between NBKF and The Norwegian Association of Surgery has always been good. More frequent participation in common scientific meetings in recent years, has led to even better relationships. The Norwegian Medical Association keeps survey of the Health Services in Norway and is important as a common association for all Norwegian doctors.

International Contacts

The number of pediatric surgeons in Scandinavia is small and the need for international contact was recognised early. The pioneers in Norwegian pediatric surgery (Ola Knutrud, Gunnar Schistad, and Torbjørn Kufaas) got much of their training abroad. They kept good contact with their colleagues in Scandinavia, and also with colleagues from other countries they had met during their studies or at international congresses. The most important congress was, and still is, the congress of British Association of Paediatric Surgery (BAPS), which was founded in 1953. BAPS arranges annual international congresses, every second year in UK, and every second year in another European country.

During the BAPS congress in Rotterdam in 1964, the pediatric surgeons from Scandinavia decided to establish an association for pediatric surgeons from the Nordic countries (Scandinavia, Finland and Iceland). The same

year Scandinavian Association of Paediatric Surgeons (SCAPS) was founded. SCAPS arranged scientific meetings on a regular basis until 1998, when the last meeting was held in Copenhagen. The SCAPS 2000 meeting in Oslo had to be cancelled because of too few participants.

A few years there were especially strong relations between pediatric surgeons in Gothenburg and Oslo, leading to the foundation of an unofficial association called the Swedish Norwegian Association of Paediatric Surgeons (SNAPS), which arranged popular professional and social meetings.

In 2000 another association called Nordic Forum of Paediatric Urology (NBUF) was established. Since then NBUF has arranged annual meetings in pediatric urology.

Some of the members have been especially engaged in keeping international contact. Knutrud was the local leader of the international BAPS congress in Oslo in 1977, and the SCAPS congress in Sandefjord in 1982. Kufaas arranged the congress of SCAPS in Trondheim in 1990. He was the secretary for SCAPS for many years, and gave information to the members at the annual NBKF meetings.

Hans Skari was elected as leader of the Educational Office of EUPSA in 2009 and he is also representing NBKF in UEMS.

Literature

Skari, H. Why keep the specialty in paediatric surgery? (Hvorfor beholde spesialiteten i barnekirurgi?) Tidsskr:Nor Laegeforen. 123[8], 1116, 2003.

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Subspecialties of General Surgery: Gastrointestinal Surgery

35. Abdominal Surgery up to 1986

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36. The Development of Digestive Endoscopy in Norway

Arne R Rosseland, Bjørn Edwin and Jon Haffner

37. Oesophageal and Gastric Surgery

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Hepatic, Pancreatic and Biliary (HPB) Surgery after 1985

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38. Colorectal Surgery in Norway 1986–2010

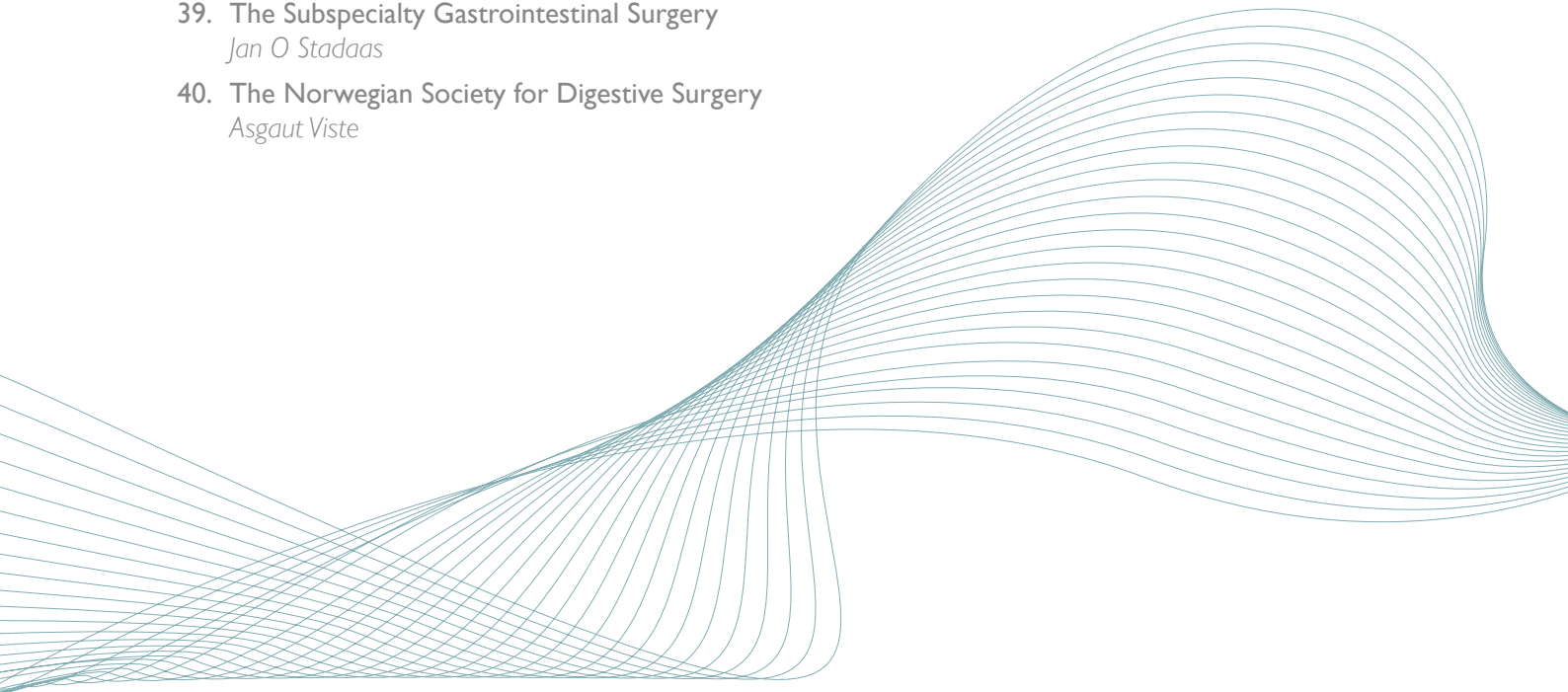
Arild Nesbakken

39. The Subspecialty Gastrointestinal Surgery

Jan O Stadaas

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35. Abdominal Surgery up to 1986

Jon Haffner 1986

Surgical gastroenterology is a young subspecialty in Norway (see separate chapter by Stadaas), but a major part of the surgical work done by general surgeons has been, and will continue to be, abdominal surgery. The following is an account of the development of diagnostic methods, anesthetic methods, blood transfusions, prophylactic use of antibiotics and anticoagulants, and the actual development of the various types of abdominal surgery in Norway.

Diagnosis

Until the turn of the century the diagnosis of gastroenterological conditions relied almost entirely on clinical examination – symptoms and signs.

Radiology

X-ray examination was discussed at a meeting in Oslo in 1896 (one year after Wilhelm Röntgen's discovery) by S Torup (professor of physiology), but it was Axel Johannesen (professor of pediatrics) who was the first to employ it for diagnostic purposes in 1898.

X-ray diagnosis of gastric carcinoma after ingestion of bismuth was described by Nicolai Paus in 1908. Twenty patients had been examined, and the diagnosis made in three. In the discussion following Paus' presentation it was mentioned that X-ray examination had also been employed to investigate patients with fistulas, and to diagnose strictures of the oesophagus.

Normal and pathological findings on X-ray examination of the stomach were presented in 1911 by Severin A Heyerdahl. The clinicians were very sceptical to the usefulness of radiology at that time.

Radiological diagnosis of gallstones was described by Hjalmar Schilling in 1916.

Radiology became fully accepted as a medical specialty in 1918, and Heyerdahl was appointed associate professor (dosent) in 1919. Since then radiology has achieved increasing importance and has been employed not only for primary diagnosis, but also in the postoperative follow up. The thesis presented by Johan Frimann-Dahl in 1935, was a treatise on diaphragmatic movements and postoperative pulmonary embolism. It was published in a surgical journal (*Acta Chirurgica Scandinavica*). Frimann-Dahl's later work and his text-book on the radiological diagnosis of acute gastroenterological conditions have been of great importance for the development of surgical gastroenterology in Norway.

Another thesis which deserves to be mentioned in this connection is that presented in 1950 by Andreas Høyer: "Abdominal distention and intestinal activity following laparotomy". Most of this thesis was based on radiological studies.

Abdominal angiography was introduced in the early 1950ies, translumbar abdominal angiography according

to Zeldinger by Per Amundsen, and splenoportography by Kjell Liverud. Trygve Aakhus at Rikshospitalet presented his thesis "Angiography in acute mechanical obstruction of the small intestine." in 1971. Interventional angiography in patients with gastro-intestinal haemorrhage was introduced by Ivar Enge at Aker, who presented his thesis "Angiography in regeneration of the liver. An experimental and clinical study." in 1977.

Peritoneography after intra- and retro-peritoneal air insufflation was introduced by Gunnar Vestby (Ullevål) in the late 1950ies, but did not become much used.

Lymphangiography and double-contrast examinations of the stomach and colon were introduced in the early 60ies, ultrasonography in the early 70ies, computer tomography in the early 80ies. These innovations as well as DSA (Digital Subtraction Angiography), and last year NMR (Nuclear Magnetic Resonance= magnetic imaging) have made radiological investigation indispensable in the diagnosis of gastroenterological conditions. Invasive radiology has also become increasingly important in the treatment of strictures, cysts and abscesses.

Endoscopy

Endoscopy of the anus and rectum has been employed since before the turn of the century. The first reference to gastroscopy is in a demonstration of Rovsing's (a Danish surgeon) gastroscope by professor Johan Nicolaysen in The Surgical Society in Oslo in 1908. (Johann von Mikulicz-Radecki's publication of the first experiences with rigid gastroscopy is from 1881). Rigid and semirigid gastroscopy apparently did not achieve great popularity in Norway, but the method was known, and employed occasionally for example by Christian Bruusgaard in his investigation of the results of more than 1000 operations for chronic gastric and duodenal ulcers at Rikshospitalet and Aker (Bruusgaard 1946).

Gastroscopy with flexible fibrescopes was introduced in 1964 by Johannes Myren, professor of gastroenterology at Ullevål. He studied one year with Hirschowitz, who invented the flexible fibreglass gastroscope, in 1957. Myren did 105 gastroscopies in 1965, and 326 the next year, when improved gastroscopes with flexible tips became available.

Myren also introduced flexible colonoscopy in 1971, and ERCP (endoscopic retrograde cholangiopancreatography) in 1974. His successor Magne Osnes has been especially active in the employment of endoscopic methods, as has the surgical gastroenterologist Arne R Rosseland, (see next chapter, 36, on digestive endoscopy)

Supporting Functions

Anesthesia

The introduction of general anesthesia with ether (1846) and chloroform (1848) made the progress in surgery possible. But it soon became apparent that these two agents had dangerous side effects. Niels Backer-Grøndahl presented a study of 75 ether anesthetics in 1905, 36 of these developed proteinuria postoperatively. It was stressed that ether was a dangerous substance which was toxic both to the kidneys and the liver, but even so it was safer than chloroform.

Nitrous oxide had until then been employed only by dentists, but in 1906 Johan Rygge suggested that it might also be used in general surgery.

Injections of local anesthetics to produce sacral block was also used, and Peter Bull strongly recommended this at a surgical meeting in 1915. His views were shared by very few other surgeons at that time. At the same meeting epidural anesthesia was mentioned by Vilhelm Magnus, a pioneer in neurosurgery who worked in a private hospital in Oslo, who had found it very disappointing.

But local anesthesia was used very frequently to induce analgesia, both alone and in patients given general anesthesia. Sophus Widerøe at Ullevål, and Otto Borchgrevink at Diakonhjemmet in Oslo, reviewed 1548 operations in 1920, and found that 50% had been given local anesthesia, and that this had been used in 86% of gastric operations and 89% of biliary operations. Most of the great surgeons during the first part of the 20th Century used local anesthesia to supplement what was often an insufficient general anesthesia.

Lumbar injections of anesthesia was recommended again in 1930, this time by Carl Semb at Ullevål. He stressed the importance of slow injection of 20 cc of 5% Novokain to allow the drug to mix with the spinal fluid.

In 1946 the first anesthesiologist in Norway, Otto Mollestad, was engaged at Rikshospitalet, and the next year Ivar Lund at Ullevål. The first professor of anesthesiology, Jacob Stovner, was appointed in 1973.

The use of curare as a muscle relaxant was discussed at a meeting of The Medical Society in Oslo in 1948, hypothermia in 1950 (Mollestad), halothane in 1956, neurolept-anesthesia in 1960 and acupuncture in 1974. In 1986 there are anaesthesiologists working in nearly all Norwegian hospitals, and they are engaged both in pre-operative evaluation of patients, the immediate postoperative treatment, and treatment of chronic painful conditions as well as administration of anesthesia.

Blood Transfusions

The first blood transfusion in Norway was given by Christian Egeberg in 1836. Kristian Haugseth is said to have been the first to give a transfusion during surgery (splenectomy) in 1919, but blood-transfusions had been discussed at the surgical congresses in both Berlin and Paris in 1920, and during a discussion about this in The Medical Society in Oslo, where Herman Fleisher Høst described the results of 120 transfusions at the medical department at Bærum, Peter Bull reported that blood transfusions both direct and with citrated blood had been carried out at Rikshospitalet for some years. The relative advantages of infusion of isotonic NaCl versus blood were also discussed, and it appears to have been generally accepted that NaCl should be tried first.

In 1986 there are bloodbanks at most Norwegian hospitals, either as separate units (medical immuno-haematology became a separate specialty in 1959) or as part of the medical laboratories.

Antibiotics

Antibiotics have become increasingly important in the treatment of surgical patients since World War II. In abdominal surgery prophylactic use of antibiotics has reduced the rate of post-operative infections dramatically; wound infections after colonic surgery have been reduced from 40 to 5%. The attempts to reduce wound infections after colonic surgery started with pre-operative cleansing in the early 1950ies, and continued with prophylactic

administration of antibiotics, primarily non-absorbable to disinfect the bowel, later systemically administered. Johan Hertzberg at Ullevål was a pioneer in this work, but it was only after the multi-centre studies organised by Karl-Erik Giercksky in Tromsø in the early 1980ies that it was generally accepted that a single dose of both aerobic and anaerobic antibiotics should be given routinely both to patients subjected to colonic surgery and to patients subjected to other operations where the postoperative rate of infections is high.

Anticoagulants

Anticoagulants are also used more and more frequently in patients subjected to abdominal surgery. The first major discussions about thrombo-embolic complications after surgery are referred to in Axel Øwre's thesis: *Studies of the Clinic and Etiology of Postoperative Thrombosis* from 1928, and in an article by Johan and Knud Nicolaysen from 1930. The prophylactic measures then used are listed: Intravenous administration of fluids, thyroid substances (tyropan and thyroxin), epitonin (ephedrine) to increase blood pressure, and elevated foot end of the bed.

In 1964 Herman Rustad advocated that prophylactic anticoagulants should be given to surgical patients. Professor Hans Fredrik Harbitz at Aker had used Trombantin (phenindion) since 1956 in selected cases.

When Øivind Havig presented his thesis in 1977, the discussion about the need for prophylactic use of anticoagulants was nearly the same as it is today; no general agreement about prophylactic treatment for all patients, but acceptance of the need for prophylaxis in high risk patients, i.e. those with a previous history of thrombo-embolism, myocardial infarction or a strong family history. Most clinics now give prophylactic treatment either with subcutaneous heparin, or low-molecular dextran intravenously.

Surgical Pathophysiology

The increasing knowledge about surgical pathophysiology, and the increased use of laboratory tests and intravenous corrections of disturbances in water and electrolyte balance, as well as improved diagnosis and treatment of infections, have been of crucial importance for the development of modern surgery the last 40 years (medical

bacteriology became a separate specialty in 1947, medical chemistry in 1965). Sophus Widerøe's discussion in 1922 of the relative merits of glucose and NaCl infusions are far from the present accurate corrections of water and electrolyte imbalance, and protein deficiency.

Ole Jacob Malm was appointed professor of surgical pathophysiology at Ullevål in 1965 and retired in 1982. He was succeeded by Morten Ræder. Malm initiated the PPP course (Pre- Per- and Postoperative) in 1973. The course soon became a compulsory part of specialist education in surgery in Norway. Steffen Birkeland led the course from 1973 to 1983, Morten Ræder has led it since 1984.

Oesophageal Surgery

Patients with oesophageal disease were primarily treated by general surgeons, ENT surgeons or thoracic surgeons, but with the introduction of the flexible endoscopes most of these patients have been referred to gastroenterologists, and operated by surgical gastroenterologists.

A case of successful transpleural excision of the oesophagus for carcinoma was reported by Peter Bull in 1921. Only two similar cases had been reported before that. Bull's patients died on the fourth day postoperatively of pneumonia. An experimental series of intra-thoracic oesophageal resection on cats had been presented 6 years before, in 1915, by Ragnvald Ingebrigtsen.

Thoraco-abdominal excision with intra-thoracic oesophago-gastrostomy is now routine treatment of oesophageal carcinoma in Norway, as a rule after preceding irradiation and/or cytostatic treatment of squamous cell carcinoma. Blunt oesophagectomy with cervical anastomosis was introduced in Norway in 1982 by Anstein Bergan and Jon Haffner. Substitution of the oesophagus with the small intestine or colon was introduced several years earlier by Knut Nygaard.

Oesophageal varices were described by J Frimann-Dahl in 1931. Portacaval anastomosis was introduced at Rikshospitalet in the early 1950ies by Bjarne Fretheim. The standard treatment of bleeding oesophageal varices at present is endoscopic sclerotherapy introduced around 1980 by Magne Osnes, Ullevål, Olav Fausa, Rikshospitalet and Arne R Rosseland, Akershus.

The results of operative treatment of hiatal hernias at Rikshospitalet from 1935 to 1953, most of them operated by professor Johan Holst, were reported in 1954. A marked improvement of results occurred with the introduction of Allison's method in 1951. The results were confirmed by K Nygaard in 1964, but since the recurrence rate in patients with reflux oesophagitis and sliding hernia was 13.9%, Nygaard introduced oesophageal manometry in the preoperative evaluation in 1971, and the operative treatment was changed to fundoplication, either Belsey Mark IV or Nissen done through the abdomen.

At present variations of Nissens method are most commonly employed, and strictures are treated with bougienage or more commonly by balloon dilatation. In Tromsø (Jon Anton Johnson) fundoplication is frequently combined with oesophago-plasty in cases with stricture.

Gastric Surgery

The first recorded gastric operation in Norway, gastrotomy on a patient with oesophageal stricture, was carried out by Johan Hjort in 1874. It is of historical interest that this operation, which was performed for the first time by Sedillot in 1849, had been suggested by Christian Egeberg at a meeting in Oslo as early as 1837.

The first pyloric resection for carcinoma was carried out in 1881 by Julius Nicolaysen, total gastrectomy was described in 1919 by Axel Christensen, and Bjarne Fretheim presented a review of the results of thoraco-abdominal total gastrectomy in his thesis in 1954. The past and present treatment of gastric carcinoma in Norway is described in Asgaut Viste's thesis from Haukeland in 1986.

Surgical treatment of gastric and duodenal ulcers has changed considerably since Kristian Jervell did the first gastro-enterostomy for benign stenosis of the pylorus in 1893. Pyloroplasty according to Heinecke-Mikulicz, was introduced in 1985 by Hagbart Strøm and Alexander Malthe. Johan Nicolaysen did gastro-enterostomy for ulcer without stenosis in 1896, and Alexander Malthe gastric resection in 1897.

The first description of the use of a special instrument for gastric surgery is Huitfeldt's report from 1908 of Dr Joseph's Clamps for Gastroenterostomy.

Jejunal ulcer after gastro-enterostomy, was described by Ingebrigtsen in 1914, and Johan Nicolaysen reported in 1924 that in a series of 340 gastro-enterostomies for ulcer, 4.1% had developed carcinoma, and 3% jejunal ulcer. He therefore advocated resection for ulcers. The discussion about whether gastro-enterostomy or resection was the best treatment for ulcer continued, but most surgeons preferred resection. As mentioned above, Bruusgaard reviewed the results of more than 1000 patients with gastric and duodenal ulcer for his thesis in 1946. His conclusion was that resection was by far the best method.

The influence of the vagal nerves on gastric physiology was obviously well known, as Knud Nicolaysen presented a series of experiments in 1920 where gastric erosions had been produced by “irritation” of the vagus. Vagotomy was not done to any great extent until the introduction of selective vagotomy in the late 1960ies. Ivar Liavåg was one of the first surgeons in Norway to adopt selective, and later proximal gastric vagotomy (PGV also called highly selective vagotomy).

Presently most surgeons in Norway do gastric resection with gastro-duodenostomy for gastric ulcers, and PGV for duodenal ulcer. Gastric resection with gastro-jejunostomy is mainly used in the treatment of older patients, since it is known that patients with resections may later develop carcinoma in the gastric remnant. Gastro-enterostomy and gastric resection with Roux-en-Y anastomosis is always combined with truncal vagotomy to prevent jejunal ulceration.

Pyloromyotomy for hypertrophic pyloric stenosis was described in 1921 separately by Peter Bull and Eivind Platou, but both referred to professor of pediatrics Axel Johannessen’s material, and long (14 years) experience in treating this condition.

Biliary Surgery

Professor Hagbarth Strøm is credited with the introduction of biliary surgery; he reported 12 cases of cholecystitis treated with cholecystostomy in 1895, and 50 in 1899. Cholecystectomy was introduced a few years later. The discussion as to whether cholecystectomy was preferable to cholecystostomy continued for many years and was one of the main subjects of discussion at the Nordic (Scandinavian) Surgical Society’s meeting in 1911.

Gallstone ileus was described in 1916 by Hjalmar Schilling.

Professor Bull described his choledocho-duodenostomy in a patient with cancer of the papilla of Vater in 1921.

Gunnar Johnson described a case in 1925 where a defect in the common bile duct had been successfully bridged with a rubber tube. Einar Murstad and Nils Natvig reported on primary suture of the common bile duct after accidental preoperative lesions the same year.

Knud Nicolaysen reported the use of retrograde cholangiography in a case with a calculus in the common bile duct in 1933.

In the early 1950ies Johan Hertzberg at Ullevål advocated choledocho-duodenostomy as a routine treatment of patients with stones in the common bile duct, and chronically dilatation of the biliary system. Both he and Bjarne Fretheim became engaged in the repair of damage to the biliary system caused by surgery.

Presently cholecystectomy, choledocho-lithotomy, choledocho-duodenostomy and even hepatico-jejunostomy is done in most surgical departments in Norway. Investigation of patients with gallstones is generally done by ultrasonography, in some cases supplemented by ERCP (endoscopic retrograde cholangio-pancreaticography), or more rarely by PTC (percutaneous transhepatic cholangio-pancreaticography). Stones in the common bile duct in old patients unsuited for surgery, and in patients who have had the gallbladder removed and treated endoscopically with EPT (endoscopic papillotomy) and extraction of calculi, residual stones after operation are treated either endoscopically or by Burhen extraction. Lithotripsy with shock waves of calculi in the common bile duct has recently been introduced by Tom Erik Ruud at Ullevål.

Malignant strictures of the bile duct in operable cases are treated by transhepatic insertions of endoprosthesis.

Pancreatic Surgery

In 1901 Francis Harbitz described 4 cases of pancreatitis with necrosis and haemorrhage, and Søren Holth described how one of these four died.

One of the main subjects for discussion at The Nordic Surgical Society's meeting in 1908 was "Modern Pancreatic Surgery".

Hjalmar Schilling described a patient with a pancreatic cyst in 1913, and Sophus Widerøe described a case of haemorrhagic pancreatitis. Einar Langfeldt presented his thesis on partial pancreatectomy as a means of producing experimental chronic diabetes in 1920. In 1922 Axel Christensen described 4 patients that had been treated operatively for acute pancreatitis, 3 successfully.

Two years later, in 1924, Peter Bull described two patients with haemorrhagic pancreatitis, one treated with peritoneal drainage, the other with cholecysto-gastrostomy. Both survived.

Diagnosis of pancreatitis by determination of urinary diastase was described by Backer-Grøndahl the same year.

Olav Usland presented his thesis on surgical treatment of pancreatic disease and postoperative pancreatic complications in 1932.

Snorre Aune tried to introduce total pancreatectomy for acute haemorrhagic pancreatitis in the early 1970ies, but the mortality in his series was too high, and total excision is now as a rule only done if the patient survives the first 3 weeks, and is still seriously ill.

ERCP (endoscopic retrograde cholangio-pancreatography) is now used at the first attack of pancreatitis to exclude biliary calculus as a causal factor, and if a calculus is found, it is removed by acute endoscopic papillotomy. This treatment was introduced by Magne Osnes.

Chronic pancreatitis is generally treated by resection or anastomosis, but Audun Flatmark advocates intraductal injection of Neoprene – a substance that solidifies in the duct after the injection, and prevents secretion.

In 1960 Johan Hertzberg discussed the operative treatment of cancer of the pancreas, and reported 7 cases of cancer of the head of the pancreas treated with partial pancreatectomy according to Whipple.

Whipple's operation is still the preferred treatment for carcinomas of the Papilla, and for small tumours in the head of the pancreas, especially in old patients, but otherwise Norwegian surgeons now prefer to do total pancreatectomy as it is generally recognised that this malignancy is frequently multifocal.

The first transplantation of the pancreas was done by Inge Brekke at Rikshospitalet in 1983.

Hepatic Surgery

Resection of the liver was introduced by Bjarne Fretheim in the late 1950ies and is now done in all the regional hospitals, both for traumatic lesions, benign conditions, and primary and secondary malignancies.

Three primarily successful transplantations of the liver were done by Snorre Aune at Ullevål in 1970–71, and two by Audun Flatmark at Rikshospitalet. All the patients died shortly after transplantation.

Liver transplantation is now only done at Rikshospitalet where it was re-introduced as part of the transplantation service by Flatmark and Bergan in 1984. (see separate chapters on Organ Transplantation).

Splenic Surgery

Splenectomy as a treatment for haemolytic disease was employed at Rikshospitalet from around 1915 by Peter Bull. His primary results were presented by PF Holst in 1917. A report on the treatment of haemolytic jaundice was presented by Sophus Widerøe and Otto Jervell in 1921. As mentioned above, bloodtransfusion given in connection with splenectomy was reported by Kristian Haugseth in 1919.

Splenectomy has been the usual treatment for traumatic rupture of the spleen since around 1920. In recent years the increasing awareness of the immunological importance of the spleen, and the increased incidence of pneumococcal infections and septicaemia after splenectomy, has led to a more conservative treatment. The spleen is now conserved whenever possible, both in children and adults. Kaare Solheim has been one of the main advocates of this treatment in Norway.

The Appendix

Appendicitis was not recognised as a disease entity until the end of the last century. It was generally diagnosed as typhlitis or perityphlitis, and it was not until 1880 that it was pointed out by the military surgeon CFH Larsen that this condition was usually caused by infection in the appendix. The standard treatment for typhlitis was opium, and this was used up to the turn of the century.

Surgical treatment of acute appendicitis is one of the most impressive achievements in the early time of modern medicine, turning an often deadly disease of otherwise young and healthy people into an easily treated condition when diagnosed in time. The history of introduction of appendectomy in Norway reflects a young surgical specialty, which was capable not only to adopt a new treatment, but also to evaluate this scientifically.

Surgical treatment initially consisted of incision of abscesses caused by appendicitis. This was first done in 1870 by Ulrik Bugge, and again in 1876 by Julius Nicolaysen. Appendectomy in a free interval was done by Alexander Malthe in 1889, and for acute appendicitis by Kristian Jervell in 1891, the same year that McBurney presented his series of 24 cases, 23 of them successfully treated by appendectomy in the acute stage.

It took nearly 20 years before appendectomy became standard treatment for acute appendicitis, and it has continued to be so since.

At Stavanger, between one and nine operations were performed each year between 1897 and 1903. The number increased to 13 operations in 1904 and 25 in 1908 (Alexander Cappelen). Several surgeons reported successful treatment by early surgery in large patient series: Hjalmar Schilling (Ullevål, 1915, 814 patients) and Peter Bull (Rikshospitalet, 1922, 600 patients). A zero mortality in 88 operations was described by Sigmund Gjestland at Rjukan during the same time period. The importance of time from onset of the disease to operation was documented by Nikolai Paus (Tønsberg) in 1925, with a complication rate of 3–4% in operations within 24 hours, 70% after 5 days and 100% after 9 days in a series of 630 patients.

Antibiotics have been used by some surgeons as standard additional treatment, but are now mainly used in cases of gangrenous and perforated appendicitis.

Peritoneal lavage (10 instillations of 1 litre peritoneal dialysis fluid with added antibiotics left for 45 minutes and then allowed to drain for 15 minutes) was advocated as standard treatment for perforated appendicitis with diffuse peritonitis by Snorre Aune in 1970, but has not achieved general acceptance, although initial comparative studies indicated that this treatment was superior to operation and parenteral administration of antibiotics.

Appendectomy “a froid” i.e. in a free interval after appendicitis with abscess had been successfully treated conservatively, continued to be done by many surgeons until the mid 1960ies, but is now abandoned, it is not considered necessary to remove the appendix after the patient has recovered.

Appendectomy “en passant” (in passing) was done by many surgeons until the mid 1970ies, but is no longer commonly done.

Hernias

Until 1883 the standard treatment of incarcerated hernias was manual reduction, and if this failed herniotomy the next day with reduction, which frequently resulted in diffuse peritonitis and a fatal outcome.

Hjalmar Schiøtz at Rikshospitalet introduced herniotomy on arrival at the hospital in 1883, and in one case also resection of gangrenous bowel. The mortality after herniotomy had been 42% in the period 1879–84, but the new approach reduced it to 13.5% by 1893, and tripled the number of herniotomies.

Surgical repair of hernia without incarceration became common in the early 1890s.

Small Bowel

Resection of the small bowel in conjunction with herniotomy was done between 1884 and 1886 as mentioned above, and Julius Nicolaysen successfully resected a myosarcoma of the small bowel in 1886.

Laparotomy for small bowel obstruction was done by Jacob Heiberg in 1873 with a fatal outcome. The first successful laparotomy for this condition – a patient with intussusception – was done in 1885 by Carl Abraham Borch, a general practitioner.

Laparotomy became standard treatment for ileus at Rikshospitalet in 1888, and several cases were successfully operated the next 10 years, most of them by Johan Nicolaysen who in 1895 presented his thesis “Studies on the etiology and pathology of ileus”.

The pathology and treatment of acute occlusion of the small bowel was the subject of Eivind Platou's thesis in 1927.

In 1986 all types of small bowel surgery is done in Norway, with the exception of transplantation; neither free transplantation, nor organ transplantation of small bowel has been done.

Total removal of the jejunum and ileum, with long term total parenteral nutrition is now done in several hospitals, but was introduced less than 10 years ago by surgeons at Haukeland and Radiumhospitalet.

Large Bowel

Anal carcinomas have been treated surgically since the 1860ies. Enterostomy in a case of ileus caused by sigmoid stenosis was done by Johan Keyser, a military surgeon, in 1870, and sigmoidectomy on a new-born with anal atresia by Hans G Lund, surgeon in Stavanger, in 1876.

The first rectal amputation was done by perineal approach by Julius Nicolaysen in 1881, and by sacral incision in 1892.

Alexander Malthe did a sigmoid resection in two stages in 1892, first colostomy, later resection. Julius Nicolaysen did a resection of the descending colon with colostomy the same year.

Low anterior resection was introduced in the mid 1930ies, but colorectal surgery did not really increase in volume till after the last war (1940–45), and the first large series of low anterior resection in Norway was presented by Sverre Osnes, a surgeon who then worked at Tønsberg.

Total colectomy for ulcerative colitis was introduced in the early 1950ies, and the first series of patients, operated by Tor Olaussen, was presented by Audun Flatmark

Flatmark has since then become the main advocate for early operation for acute ulcerative colitis, and his view are now shared by most Norwegian surgeons.

Presently the preferred primary treatment is colectomy without rectal excision, the secondary treatment being either removal of the rectum or now more commonly ileal pouch-anal anastomosis which was introduced by Giercksky and Revhaug in Tromsø in 1980, and also employed at Rikshospitalet by Bergan, Heen and Flatmark from 1982, Myrvold in Trondheim and Nygaard at Ullevål from 1983.

Coloproctectomy with continent ileostomy (Kock reservoir) was an alternative in the treatment of ulcerative colitis. It was introduced in the 1970ies by Knut Nygaard at Rikshospitalet and Jan Fredrik Halvorsen at Haukeland. They published their results jointly in 1978.

The main difficulty with Kock reservoirs is the nipple that should ensure continence, but it has a tendency to slip and 30–40% of the patients become incontinent. The operation has not achieved any popularity, it has been used on a few patients, mainly by Knut Nygaard, but recently also by Helge Myrvold in Trondheim, who has received a major part of his surgical training in Kock's department. He is using it routinely.

The treatment of Crohn's disease in Norway was pioneered by Johan Hertzberg at Ullevål in the late 1940ies, and within a decade the disease and its treatment became generally known. Initially it was thought that the disease could be cured if the all affected bowel was resected, with a good free margin. But Olav Fausa and Knut Nygaard reported in 1977, as the first internationally, that 70% of the patients who had been operated had recurrent Crohn's disease in the anastomosis. This led to a change in treatment, since the mid 1980ies the preferred treatment is minimal resections and strictureplasty of stenoses.

Diverticular disease is now becoming more and more common with the increasing proportion of old people in the population, and altered dietary habits. Surgical treat-



Fig 35-1. An abdominal operation. Jørgen Sandberg operating a patient with rectal carcinoma at Haukeland sykehus
Painting by Hans Ødegård in Haukeland hospital. Courtesy Leiv Hove and UiB, Section for Photo and Visual Presentation

ment both for this condition and for carcinoma of the colon and rectum are now extended to patients in their eighties, and sometimes even older.

The discussion of the value of cancer markers such as CEA has been raging for nearly 20 years, and still continues, but there is general agreement about the justification of surgical removal of solitary metastasis from colorectal cancer to the liver and lungs.

Pre- and post-operative irradiation of rectal carcinomas is not routinely used. Irradiation is mainly used to improve resectability, and relieve pain. A large series into the value of pre-operative treatment is now in progress.

Obesity Surgery

Intestinal bypass was introduced internationally after Payne and deWind's clinical studies in 1956–59. In Norway a series of experimental studies of intestinal bypass in rats were published by Knut Nygaard in his PhD thesis at Oslo University in 1967. His studies were continued by Karl Olav Viddal who presented his thesis in Oslo in 1983.

The first report was presented from Akershus at the Annual Meeting of The Norwegian Surgical Society in 1973 by Nils Magnus Ulvik og Nils Helsingen, who later published their results in the Journal of The Norwegian Medical Association. Jan Helge Solhaug presented the results of jejunio-ileal bypass in patients from Bergen in his PhD thesis in 1979.

Gastroplasty and gastric bypass were introduced in Norway towards the end of the 1970ies, and rapidly replaced jejunio-ileal bypass.

In 1980 Olav Bø invented gastric banding, and a preliminary series was presented by one of his residents Knut Kolle, at the annual meeting of the Norwegian Surgical Society in 1981. Kolle travelled widely, advocating the new operation, with the result that in some countries it was even named after him (Kolle's gastroplasty)! Bø presented his preliminary results in 1983 with another resident, Øyvind Modalsli, as co-author, and the operation was rapidly adopted in many hospitals in Norway, and internationally.

During the 1980ies gastroplasty, gastric bypass, gastric banding and even jejunio-ileal bypass were widely done in Norway. But reductions in surgical capacity in most parts of the country, combined with a growing concern over increasing long term complications, and uncertainty about the benefits of obesity surgery, led to a consensus that it would be wise to take a pause.

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36. The Development of Digestive Endoscopy in Norway

Arne R Rosseland, Bjørn Edwin and Jon Haffner

The term endoscope (l'endoscopie) was introduced by the French urologist Antonin Jean Desormeux (1815–1894) in 1853. He is also accredited for being the first to do operative endoscopy around 1865.

The first endoscope, a light conductor “for examinations of the canals and cavities of the human body” was developed as early as 1806 by Philipp Bozzini (1773–1809) in Mainz. But the Vienna Medical Society disapproved, and the first use of an endoscope in humans is accredited to William Beaumont (1785–1853), an American army surgeon, who in 1822 started studies on his handyman Alexis St. Martin who had a gastric fistula. Beaumont is known as the “Father of Gastric Physiology”.

Gastroscope through a hollow tube passed through the oesophagus was done by Campbell in 1850.

Hans Christian Jacobaeus (1879–1937) was probably the first to do thoracoscopy in 1910, and laparoscopy in 1912, using a Nitze cystoscope

Norbert Henning (1896–1985) in Erlangen has been given credit for introducing systematic use of endoscopy in clinical practice and research in 1934.

Georg Wolf (1873–1938) produced the first flexible (Sussman) gastroscope in 1911, but it did not function as desired, and in 1935 a new model with a mobile tip

was introduced in cooperation with Rudolph Schindler (1888–1968). Flexible endoscopy did not, however, become a reality until Harold Hopkins (1918–94) designed the fibroscope, “a coherent bundle of flexible glass fibres able to transmit an image” in the early 1950ies.

The gastrocamera, a flexible gastroscope with a miniature camera at the tip, was developed by Mutsuo Sugiura working with Olympus Corporation in 1950.

The real break through in flexible digestive endoscopy came with the introduction of the Hirschowitz flexible glassfibre gastroscope produced by American Cystoscope Makers in 1958. Bergein “Gene” Overholt (1938–) introduced the first flexible fibre optic sigmoideoscope in 1963.

Rigid Endoscopy in Norway

We have little information about the introduction of rigid digestive endoscopy in Norway, but it is known that a test for occult blood in the faeces was used in Bergen in 1905 by Haakon Grieg, who also gave a lecture on the use of rectoscopy in 1910. Tracheo-bronco-oesophagoscopy had been the subject of a lecture in Bergen by Claus Døschner Grung in 1909 (1) (see also Endoscopy p 230).

The use of the rectoscope was obviously well established in 1919, as most patients with rectal carcinoma in a series



Fig 36-1. Rigid esophagoscopes. Courtesy Medical Museum, Ullevål.

presented by Peter Bull (1) had been diagnosed by rectoscopy (2).

Naturally anoscopy and rectoscopy are still in general use, and rigid oesophagoscopy with bouginage was used in the treatment of oesophageal strictures at Rikshospitalet as late as 1986.

Flexible Digestive Endoscopy in Norway

Flexible endoscopy was introduced in Norway in 1960.

Asbjørn Nilssen Sr, who at that time worked at Akershus (SiA), brought a Hirschowitz gastro-duodenal fibrescope back from USA. The first written reports of flexible endoscopy date back to February 1961. Up to 1964, 4–6 investigations were carried out annually. In 1964 the first endoscopes which could be manoeuvred became available at SiA, and the number of investigations increased to 10–20 annually. Gastrocamos were also introduced in Norway in 1964, but achieved no general acceptance.

Between 1960 and 1970 there were no notable changes. The instruments were produced by ACMI in USA. Initially they were manoeuvrable in one plane, and then in two, which made it easier to get a good view of both stomach and duodenum, and get better biopsies.

When Olympus started making special instruments for oesophagus, stomach, duodenum and colon, this type of diagnostic procedures rapidly gained general acceptance.

Endoscopic Units

In 1964 a special “Gastroenterological laboratory” was established at Ullevål, led by Johannes Myren. Various chemical and functional tests were carried out in the laboratory, but very soon the main activity became gastroscopy. Sigmoidoscopy and colonoscopy were introduced in the early 1970ies, endoscopic retrograde cholangio-pancreaticoscopy (ERCP) a few years later. The endoscopic activity was led by Myren, but he soon trained young doctors from both the medical and surgical departments. The surgical participation came about due to an active engagement from Snorre Aune. The activity in Ullevål’s “gastrolab” became a part of the specialist education both in the medical and surgical gastroenterology specialties. The most talented of the young endoscopists was Magne Osnes, who very soon became not only a leader in the development of ERCP in Norway, but also internationally. Myren was appointed professor in 1978, and was also head of the Medical Gastroenterological unit. Osnes was appointed professor in 1985.

The endoscopic unit at Rikshospitalet was established by Egil Gjone in 1970, and Olav Fausa was engaged to run the unit. As at Ullevål, specialist candidates in both medicine and surgery participated in the endoscopic work.

At Haukeland the endoscopic activity increased gradually through the 1970ies under the leadership of the medical gastroenterologist Henning Schjønby.



Fig 36-2a. The first flexible gastroscope in Skien (GF-BK). Photo Arne Rosseland



Fig 36-2b. Prototype videogastroscope stored since 1975. Photo Telemark Hospital Skien 2010



Fig 36-2c. Diathermy apparatus with special safety device for use in endoscopy. The light bulb was being tested before each endoscopy. Photo Arne R Rosseland SiA 1975

In Trondheim a gastroenterological section with endoscopy was established in the mid 1970ies, and the corresponding section in Tromsø was established in 1973.

By 1975, endoscopic investigations were well organised in Norway; most of the large hospitals had established units for gastroenterological investigations and endoscopy.

Surgeons and specialists in internal medicine generally cooperated in running the endoscopy laboratories in Norwegian hospitals. The radiologists were not interested, and very few of the pediatricians. An exception was Gøril Perminow who presented her thesis in 2010.

Flexible Endoscopy in Skien and Akershus – My Personal Experience (Arne R. Rosseland)

The first flexible choledochoscope was brought to Skien in 1969, an ACMI instrument which was used per-operatively. Unfortunately the instrument soon needed repairs, and this type of investigations continued with non-flexible instruments.

Olympus worked hard to establish their flexible instruments, and due to a great effort by Fleming Hansen in Polack, the number of gastroscopies, colonoscopies and ERCPs increased greatly from 1972 to 1974.

At that time Odd Leidal was doing gastroscopies at Rjukan. He visited us in Skien in the summer 1972, and demonstrated the procedure on three patients with gastric ulcer – a fascinating experience.

Professor Johannes Myren arranged courses in gastroscopy and colonoscopy. I participated in a course in 1972. Magne Osnes and Kaare Solheim were also among the participants. Solheim was engaged as head of surgery in Skien 1973.

We got our first long colonoscope in 1973; a 170 cm long CF-LB 2. It lasted only for 36 investigations, but improved diagnosis of colonic conditions so much that we considered it worth the price! In 1974 we were able to buy diathermy equipment (PSD), which was suitable for use through flexible scopes.

The first endoscopy course for surgeons was arranged in Skien in 1975, with Glen Thorsen and Solheim as prime organisers. At that time we had stimulated Olympus to produce special videoscopes, which could be connected directly to a camera. Olympus had also produced new and stronger light processors, but we still needed to use a Schibaden camera. With this equipment we obtained good photographic results, which were well suited for teaching and training.

The Spread of Flexible Endoscopy

Flexible endoscopy rapidly gained broad use, and the Scandinavian cooperation was formalised when The Scandinavian Association of Digestive Endoscopy (SADE) was founded in 1976. From then on, Nordic courses were arranged annually by the organisation.

ERCP with papillotomy (EPT) was introduced in Scandinavia in 1975 by Aksel Kruse in Aarhus, four weeks before Osnes at Ullevål performed the first one in Norway. A close cooperation was established between Aarhus, Ullevål and SiA, with shared publication of results.

The first papillotomy on a Billroth II operated patient was done at SiA. It took three separate attempts and totally seven and a half hour to get the calculus out.

At that time stones in the common bile duct were removed by open operation combined with cholecystectomy. It took quite a long time before the endoscopic method came into general use. The advantages of the new method in cholecystectomised patients were obvious, but it was not until after the World Congress in Sidney in 1992 that EPT became a routine treatment.

Dilatations of oesophageal stenoses were quite early carried out with flexible endoscopy. The greatest advantage was better visualisation of the lesion, which gave better biopsies. Additionally we got a visualisation of where the guide wire was placed before passing of Eder Puestow olives, which gave a more precise dilatation than bouginage through rigid scopes.

The introduction and positioning of Celestine tubes in malignant structure was also improved. At SiA this was introduced in 1976. The same year sclerosing bleeding oesophageal varices was started. The results were not accepted for publication in the Norwegian Medical Journal, but published by Njaal Stray in *Acta Medica Scandinavica* a few years later.

Polypectomy in stomach and colon was started in 1975, and again Skien was among the first to use this technique. Palliative treatment of bleeding gastric cancer was also introduced.

Patients with suspected upper gastrointestinal bleeding were quite early subjected to flexible endoscopy, this be-

came routine treatment in 1973 in Skien. The techniques for stopping bleeding evolved rapidly from 1975 to 1985. Monopolar diathermy was not always optimal, and a bipolar system (Bicap), was developed, then a heat probe, Laser systems, and various local injections. Skien and SiA published the results successively.

The establishment of endoscopic services in Norway is well illustrated by the figures presented by Myren and Janssen (1), reproduced in a slightly altered form in Table 1. The number of procedures increased correspondingly, as shown in Table 2.

Videoscopes with chips in the distal end became more and more common during the 1990ies. The photographic documentation became gradually better, with possibilities for enlargement and change in colour, which allowed for better diagnosis of mucosal changes.

Laparoscopy

The first laparoscopic procedures were performed on dogs by Georg Kelling in 1902, and the first operation on humans by Hans Christian Jacobaeus in 1910.

Diagnostic laparoscopy appears to have started in the 1950ies when Raoul Palmer published the first series. Mouret is credited with the first laparoscopic cholecystectomy with video documentation in 1987 as addition to a gynecological laparoscopy. In 1981 Kurt Semm performed the first appendectomy.

The interest in laparoscopy was minimal among surgeons in Norway in 1960–1970. In Skien and at SiA the method was introduced in the mid 1970ies. It was used as a diagnostic method for patients with suspected abdominal disease. Reports were published by Tom Erik Ruud and Glen Thorsen (3), Ola Reiertsen et al (4), and from Haukeland by Husebø, Bjerkeset and Tore Kalager, (4,5).

Operative Laparoscopy in Norway

Operative laparoscopy was introduced in Norway in 1990, and again the surgeons trained in Skien by Solheim were among the first to employ the method. Bjørn Helge Nilsen, then working at Gjøvik, did the first laparoscopic

Table 36-1. New centres for endoscopic service in Norway 1965–1985.

Procedure:	–1965	1965–70	1970–75	1975–80	1980–85	Totally
Gastroscopy	2	6	20	9		37
Colonoscopy		3	10	11	10	34
ERCP			4	15	11	30
Therapeutic		4	12	14		30

Reproduced from (1) page 138

Table 36-2. Diagnostic and therapeutic endoscopies in Norwegian hospitals 1978–85

Method:	1978	1985
Gastroscopy	22 000	34 000
Colonoscopy	4 000	10 000
ERCP	2 200	4 000
Polypectomy	560	320
Papillotomy	200	330
Other procedures		750

Reproduced from (2) page 138

cholecystectomy in august 1990. Then came Haukeland, Bærum (Ruud) and SiA (Rosseland). The surgeons were all experienced in endoscopy and diagnostic laparoscopy.

Bjørn Edwin started doing laparoscopic cholecystectomy as day-surgery in Elverum 1991, and reported his results at the annual meeting of the Norwegian Surgical Society in 1992. He was strongly criticised at that time, mainly due to fear of post-operative complications. At present the authorities wish that as much as possible should be done as day-surgery.

Most departments rapidly changed from open to laparoscopic cholecystectomy. A national voluntary registration was started to document the results and complications of the new method, and to make it possible to compare results from different departments.

Lesion of the common bile duct was a common complication initially, and led to heated discussions about whether the new method led to more complications than the old,

or whether the apparent increase was a result of improved registration. But most surgeons rapidly learnt that it was easy to mistake the anatomy of ligamentum hepatica duodenale. Erik Trondsen focused on this and improvements in the procedure in his PhD thesis, and as a result there were only two lesions of the common bile duct in 1200 laparoscopic cholecystectomies at Ullevål. He also showed how monopolar diathermy can be hazardous near the bile ducts.

Introduction of laparoscopic methods was slowed by capacity problems in the operative rooms; the laparoscopic procedures took longer time to complete (especially initially) than the corresponding open operations. In spite of this, laparoscopic procedures came into general use during the next 5 years. This is the most rapid conversion of method in the history of Norwegian surgery.

All operations in the abdomen can be done by laparoscopy, but after the initial break through for cholecystectomy, the use in other operations has been much slower.

Table 36-3. Laparoscopic and open operations in Norway in 2000

Operation:	Open	Laparoscopic	Mean % (range)
Cholecystectomy	336	2498	13 (0–60)
Fundoplication	104	377	28 (0–57)
Appendectomy	3792	471	89 (50–99)
Splenectomy	56	12	82
Adrenalectomy	21	28	42

Adapted from Hegstad and Rosseland (7)

For many years diagnostic laparoscopy has been done for acute appendicitis, and the first laparoscopic appendectomy was done at Akershus (SiA) in 1991. The introduction of laparoscopic appendectomy at SiA was left to the surgeon on call, who had to choose procedure according to personal competence. Ola Reiertsen (6) focused on the introduction of this method in his PhD thesis. Experienced laparoscopic surgeons did all the operations, also the open ones. This led to a conversion to laparoscopic appendectomy as standard procedure at SiA during a two-year period.

Now 20 years later, most surgical departments employ the method. The most systematic in training of young surgeons in the method has been Buskerud in Drammen, where laparoscopic operation was chosen as the prime treatment for appendicitis by Ulf Jakobsen and Jon Haffner in 1993. A systematic training programme was started with Ole Christian Olsen as chief organiser. In cooperation with Steven Widecrantz and Knut Magne Uv, and support from the department, he developed D-Box, a simulator for laparoscopy. Gradually requirements for simulator training were introduced before the young surgeons were allowed to operate without supervision on patients. In 2007 it was decided that all abdominal operations in the department should start as laparoscopic procedures.

Laparoscopic fundoplication was introduced by Ronald Mårvik and Gjermund Johnsen in Trondheim in 1991.

The procedure was soon adopted by other hospitals in Norway, and within five years most fundoplications were done by laparoscopy. Laparoscopic splenectomy was introduced at Haukeland in 1992, colo-rectal resections at SiA 1992–93, nephrectomy SiA and Ullevål 1992.

In 1995 it was decided by the Norwegian Storting (parliament) that a national centre for advanced laparoscopy (NSALK) should be established, and also a national centre for highly technological surgery (IVS). The two centres were established in 1996, NSALK in Trondheim with Mårvik as leader, and The Intervention Centre at Oslo University Hospital at Rikshospitalet in Oslo with Erik Fosse and Odd Søreide as leaders, and Bjørn Edwin as chief laparoscopic surgeon. The laparoscopic activities at these centres are described below.

The laparoscopic activity in Norway increased rapidly. In a review in 2001 Elisabeth Hegstad and Rosseland (7), compared some laparoscopic procedures with open (see table 3).

It is interesting to note that at that time laparoscopy was generally used for cholecystectomy, whereas appendectomy still was an open operation. The Northernmost counties had the highest percentage of open cholecystectomies. The conclusion was that laparoscopy was not used as frequently as it ought to be.



Fig 36-3a. The modern operating field, on the screen! (Photo Ronald Mårvik)



Fig 36-3b. The modern operating field, instruments in position. (Photo Ronald Mårvik)

In 2004 Helge Myrvold reported that laparoscopic gastric bypass had been chosen as the standard treatment for obesity surgery in Trondheim.

The Norwegian Thoraco-Laparoscopic Forum (Assosiation)

The Norwegian Thoraco-Laparoscopic Forum was established in 1992, and Arne R Rosseland was elected as its leader. He has retained the position since then.

The first Newsletter was sent to all members in September 1994, after an initiative from Trond Buanes. Since then two Newsletters have been published annually.

A National Registry for laparoscopic cholecystectomy was started in 1992 with Buanes as leader, and completed in 1995 with 5353 registered events, representing 67% of all cholecystectomies the 33 months the Registry covered. Of the 4332 operations started laparoscopically, 442 were converted to open. (see also Chapter 38).

In 1994 there was a symposium on laparoscopic hernia operations with direct transmission of operations from Ullevål to the Annual Meeting of The Norwegian Surgical Society at Holmenkollen Park Hotel. Nearly 80 surgeons participated. A similar symposium with TV transmission and subsequent discussions was arranged in 1995.

In 1995 four members of the Board of the Forum, Roseland, Buanes, Fosse and Myrvold, were invited to a meeting in the Parliaments Committee on Health. The same year, the Directorate of Health set money aside for the establishment of a competence centre for laparoscopic surgery in Trondheim.

The first symposium in cooperation with the Russian Society of Laparoscopy was arranged in 2003.

Bjørn Edwin was awarded the Danish Surgical Society's for the most important international contribution to the advancement of surgery in 2006.

The Thoraco-Laparoscopic Forum has also been actively engaged in national and international post-graduate courses, and has provided a link to international endoscopic fora.

Endoscopic Activity at the Intervention Centre at Rikshospitalet

The Intervention Centre was built on radiologically guided intervention, EMR guided intervention, laparoscopy and ultrasound. Telecommunication and IT technology have been essential parts of the activity. Doctors and nurses with different specialties have cooperated closely with engineers and technicians. (see Chapter 9)

Bjørn Edwin, who leads the laparoscopic activity, has several years technical education, and this has facilitated the joint work. In cooperation with Aker and Ullevål, laparoscopic procedures have been introduced for adrenal, pancreatic and liver surgery. Day-surgery was well established at Ullevål led by Buanes and Trondsen. This gave Edwin the chance to do day-surgery also on the spleen and the adrenal glands, which was of great importance for his PhD thesis.

Edwin also cooperated with the pediatric surgeons, and soon established laparoscopic fundoplication and nephrectomy as part of their methods. Together with the gynecologists he has also been actively engaged in treating patients with endometriosis with bowel involvement.

At the start in 1996 the focus was on adrenal surgery, the first adrenalectomy was done in early 1997, followed by



Fig 36-3c. The modern operating field, operation in progress. (Photo Ronald Mårvik)

resection of the pancreas the same year, liver surgery and living donor nephrectomy in 1998. The first laparoscopic radical prostatectomy was done in 1999 by Edwin, Per Leif Holme, and Trygve Talseth.

Later Edwin has shown in the Intervention Centre that even major operations, such as total colectomy (2000), formal liver resections (2004) and Whipple's operations (2007) can safely be performed laparoscopically. Since February 2009, Single Port techniques have been tried out. The first operation was a cholecystectomy carried out in the Intervention Centre by Elisabeth Hegstad and Edwin.

Simultaneously with the rapid technical development, studies were carried out on the socio-psychological aspects of the new operative procedures. This work was published in different publications presented by Faiza Moghal, Bjørn Erik Mørk and Marit Helen Andersen.

Since the start training equipment and simulators placed outside the operating rooms have been used to develop endoscopic dexterity. As a part of this development the simulator company SIMSURGERY was started with help from the Intervention Centre, and Fredrik Halvorsen used one of their simulators as part of the work for his thesis.

National Center for Advanced Laparoscopic Surgery (NSALK)

In 1996 NSALK was opened in Trondheim. The description on the Institute's Internet pages gives a good presentation of Mårvik's ambition for the Institute (www.nsalk.org/about-nsalk)

NSALK has been a great success, and it has contributed greatly to the introduction and improvement of endoscopic procedures in Norway (see also Chapter 13).

Post-graduate Courses

Telemedical contact has been established with most hospitals in Mid-Norway, with courses every 4 weeks, distribution of international presentations and information, and even assistance by robot-regulation of cameras. At the 5-year jubilee in 2001, it was reported that until then 64 courses had been arranged with a total of 1158 participants. The intensive course activity has continued, with up to twelve postgraduate courses in endoscopy annually. Demonstration operations have been carried out at NSALK by surgeons in Brussels.

“On duty” on the Internet

As consultants in surgical gastroenterology, Mårvik and his co-workers at NSALK have been “on duty” over the Internet, guiding surgeons operating in the Surgical Department in Trondheim.



Fig 36-3d. The modern operating field, the entire scene (Photo Ronald Mårvik)



Fig 36-4. Ronald Mårvik training young surgeons in the lab. (Photo Ronald Mårvik)

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37. Oesophageal and Gastric Surgery

Asgaut Viste

Introduction

The late professor Peter Heimann started the era of sub-specialisation in general surgery when he was appointed to the Chair of Surgery at the University of Bergen in 1972. He brought the idea of dividing the "old" general surgical departments into separate sections from his work in Sweden. Gastrointestinal surgery was one of the sections which were established at Haukeland during his work in Bergen, and this way of organising surgery has later spread all over Norway.

Gastrointestinal surgery became a subspecialty in 1978, and the first specialists were licensed during the next few years. At first gastrointestinal surgeons had a society common with medical gastroenterologists, but the surgeons founded their own society in 1992 under the name The Norwegian Society for Digestive Surgery.

Oesophageal Surgery

Benign Conditions

Zenkers diverticulae were previously operated with open cervical access. With the advent of surgical lasers this changed partially, and YAG or CO₂ lasers, as well as endoscopic use of diathermy to cut the wedge between the diverticulum and oesophagus, were applied. The next step forward was application of orally introduced linear cutting staplers to divide the web between the diverticulum and

oesophagus, first applied by Gjermund Johnsen and co-workers at St. Olav's Hospital in Trondheim.

The introduction of minimal invasive surgery in 1990 represented a paradigm shift in reflux surgery. During the next few years several hospitals offered their patients with gastro-oesophageal reflux disease, a laparoscopic Nissen fundoplication. The major pioneers in this type of surgery were Bjørn Edwin at Rikshospitalet and Ronald Mårvik at St. Olav's Hospital. As a consequence of minimal access surgery, the incidence of performed reflux operations increased significantly.

The last decade has also seen a continuous evolvement of new experimental methods for treating gastro-oesophageal reflux. A few Norwegian hospitals tried the Endocinch method, which is a sort of endoscopic intraluminal suturing. The long-term results of this method have, however, been rather disappointing. Later on, implantation of foreign material in the distal sphincter and ablative methods like radiofrequency ablation, have been tried with rather limited success.

Although most patients with achalasia were treated during this period with balloon dilatation, Heller's myotomy was also performed laparoscopically with good results.

Malignant Conditions

As seen in many Western countries the incidence of squamous cell oesophageal cancers has decreased whereas the incidence of the adenocarcinomas in the distal oesophagus has increased tremendously. Following new endoscopic techniques it is possible to diagnose some of these cancers at an earlier stage and thereby change the treatment modality. During the last decade there has been a great focus on endoscopic resections of superficial carcinomas of the oesophagus, and Ullevål as well as Haukeland has achieved some experience with this technique. Trond Warloe at Radiumhospitalet has applied photodynamic therapy for early oesophageal cancer patients with reasonable success.

Since the late 1970ies there has been a close connection between Norwegian and Japanese gastrointestinal surgeons – a cooperation that was mainly established through the professors Knut Nygaard and Knut Svanes. They both visited The National Cancer Centre Hospital in Tokyo, and brought back new operative techniques for oesophageal and later also gastric cancer. Three-field advanced lymphadenectomy technique was introduced at Rikshospitalet and at Haukeland and later also at Radiumhospitalet by professor Karl-Erik Giercksky. The operations were tedious and took most of the day, lymph nodes were harvested and studied extensively. Although mortality following these operations was acceptable, morbidity as well as in-hospital stay was high. Following introduction of laparoscopic surgery, this was also applied for oesophageal

cancers, partly as intrathoracic dissection, and partly as intraabdominal formation of the gastric tube.

During the same period there was a national consensus that oesophageal cancer surgery should be centralised to the regional hospitals.

To improve survival for oesophageal cancer patients, Nygaard and co-workers initiated a Nordic study on radiochemotherapy combined with surgery (1). Preoperative radiotherapy improved survival, but not chemotherapy. Although few patients were included, this study is still one of the oesophageal cancer studies that are quoted in international reviews. Haukeland has for the last 10 years applied neoadjuvant high-dose radiochemotherapy for these patients, with a slight improvement compared to surgery alone. Since 2009 several Norwegian hospitals have also participated in the Scandinavian Neores study, applying neo-adjuvant radiochemotherapy.

In order to avoid oesophagectomies in patients with distant metastases, the advent of PET-CT has been awaited with some enthusiasm. PET-CT machines are installed at Radiumhospitalet/Rikshospitalet, Haukeland, and at Ullevål, although the results of this diagnostic modality are still debated.

Most of the oesophageal cancer patients need palliative care and Norwegian hospitals have taken part in novel therapies for this group. This includes laser therapy as well

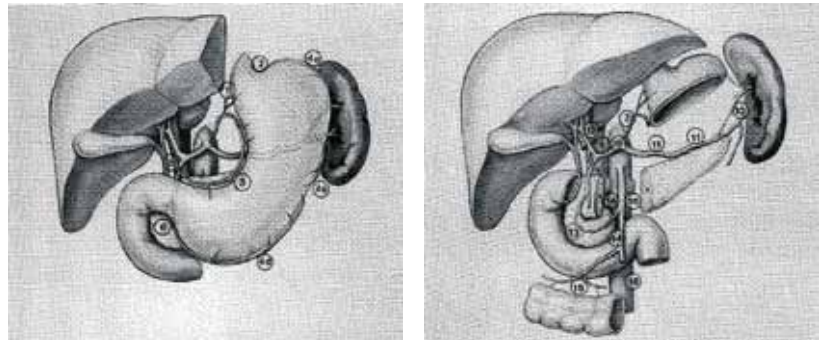


Fig 37-1. Relevant lymph node stations in gastric cancer surgery

as the introduction of flexible self-expandable stents, and has been of great benefit for these patients.

Gastric Surgery

Benign Conditions

Following introduction of H₂-blockers, proton pump inhibitors, and later on also antibiotic triple therapy, surgery for peptic ulcer disease has almost disappeared. Complications following gastro-duodenal ulcer disease – like bleeding and perforations, however, are still of about the same magnitude, and surgical skills in treating these disorders are still needed. Gastric and duodenal perforations are to some extent treated by laparoscopic suturing. This is done rather sporadically at several hospitals, and the benefit of this treatment is not well documented compared to open technique. Bleeding ulcers are mainly taken care of by endoscopic therapy, or ultimately by radiological interventional techniques. Endoscopic therapy in Norway is carried out by medical as well as surgical endoscopists, depending upon organisation at the local hospital.

Malignant Disorders

Gastric cancer was originally a major disease in Norway, but has declined from 1100 new cases per year by 1980, to about 500 new cases last year. The high incidence attracted focus to improvements in surgical technique, and again there was a close cooperation between Japanese and Norwegian surgeons (Nygaard, Svanes, Odd Søreide and Asgaut Viste). During the early 1990ies there was a major

focus on lymphadenectomy, and with Søreide as promotor, several advanced courses in surgical technique were arranged at Rikshospitalet. Haukeland also participated in one of the trials, randomising patients to advanced lymphadenectomy or traditional surgical treatment of gastric cancer (British MRC-trial). By now it is known that the benefit of extensive lymphadenectomy is rather limited.

The last two years gastrointestinal surgeons, in cooperation with medical oncologists, have developed national guidelines for treatment of oesophageal and gastric cancer on behalf of The Ministry of Health. According to these guidelines curable gastric cancer stage II – IV should have neo-adjuvant chemotherapy. A report of the implementation of these guidelines has been conducted and is published by Hølmekbakk et al (2).

Following development of flexible self-expanding stents, these techniques have also been introduced for gastric outlet obstructions. The stents are applied via endoscopes and fluoroscopy, and the method has been established with acceptable success in several hospitals.

Bariatric Surgery

Bariatric surgery started in the late 1970ies with jejuno-ileal bypass. The method was abandoned due to an unacceptable high complication rate and questionable long-term results. Rikshospitalet, Ullevål, and Haukeland were among the leading institutions in this field.

Villy Våge has later evaluated the results from the series from Haukeland, and he found that the long-term results were acceptable (3).

Later on, gastric bypass and gastric banding were introduced, and during the late 1980ies also vertical gastric banding. The last method had some immediate success, but following new complications like band perforations and breakdown of stapler lines, this method was also abandoned. As mentioned in the paragraph on Obesity Surgery in Chapter 35, reductions in surgical capacity, and uncertainty about the long term results, led to a drastic reduction in the volume of bariatric surgery at the end of the 1980ies.

The new era for this patient group started in 2001 when Villy Våge, then working at Førde, introduced the duodenal switch operation in Norway, and later also gastroplasties. Further improvements have occurred with laparoscopic access, and a large number of operations, mainly laparoscopic gastric banding, are now performed in Norwegian hospitals.

Cooperation with Other Departments

To our knowledge the special and successful cooperation between medical and surgical gastroenterologists is a specific Norwegian matter. This is reflected in many hospitals in a common endoscopy unit, where both specialties are performing the same endoscopic procedures, and also have a common programme for education. Norwegian medical gastroenterologists have been in the frontline in developing ultrasonography in gastroenterology, and this has materialised as the National Centre for Advanced Gastrointestinal Ultrasonography in Bergen, with professor Svein Ødegaard as the great pioneer. Advancement in investigational techniques for reflux disease – like 24 hour pH-measurement, manometry and endoscopic ultrasonography – have also been a great advent, and have helped surgeons to establish a correct basis for therapy. There is also a close and fruitful cooperation between gastrointestinal surgeons and radiologists.

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38. Hepatic, Biliary and Pancreatic Surgery (HPB-surgery) after 1985

Trond Buanes

Main Developments in HPB-Surgery

Large patients groups with benign conditions experienced more “patient friendly” surgical procedures after 1989, when the first gallbladder was removed laparoscopically in France. The method was introduced in Norway the year after, and minimally invasive procedures have subsequently profoundly changed HPB-surgery. This has been the most significant change of surgical technique in the period, but the general and systematic development of clinical research also led to profound alterations of investigational algorithms, patient logistics and surgical care.

In 1985 pancreatic, as well as liver resections, were relatively rare in Norway as in the rest of the world. Less than 10% of pancreatic cancer patients underwent radical surgery. Patients with liver metastases, even from colorectal cancer (CRM), were supposed to have limited survival after resection. Nationally, as well as internationally, this has changed profoundly.

The role of surgery in the care of pancreatic cancer patients has expanded in two ways: firstly, earlier diagnosis makes conventional resection available to more patients, secondly, refined surgical techniques have led to secure comprehensive surgical procedures, reconstructing mesenteric vessels in numerous patients with locally advanced cancer. A further reason is the unfortunate fact that most pancreatic carcinomas are chemotherapy-resistant.

The main reason for the increased rate of liver resections is the oncological development: CRM can be treated effectively with chemotherapy, and down-staging of liver lesions may change intrahepatic surgical anatomy profoundly. Another reason is the fact that “liver sparing” techniques have proved effective.

Laparoscopic Surgery in Scandinavia – Who, When and Where?

Laparoscopic cholecystectomy (LC) was introduced in Norway by Bjørn Helge Nilsen in 1990, when he worked as a consultant in Gjøvik. Several other Norwegian hospitals introduced LC almost simultaneously, and most hospitals with a surgical department followed during the early 90ies, the same development as in Denmark, Sweden and Finland. The rapid transition to the new techniques made patient security a major issue. Reports about serious complications increased, particularly numerous injuries to the common bile duct.

The Norwegian Surgical Society established a permanent committee for all minimally invasive techniques in 1992, The Norwegian Thoraco-Laparoscopic Forum, led by Arne R Rosseland. The first main task for this group was to record prospectively the outcome of all cholecystectomy procedures in Norway, and a national registry was established at Ullevål with Trond Buanes as chairman.

The outcome was a comprehensive audit, with more than 5000 records included when the database was closed. Similar registries were concurrently established in Denmark, Sweden and Finland, and a fruitful Scandinavian cooperation developed, resulting in critical analyses of surgical routines in each country (3).

The educational side of laparoscopic surgery was taken care of at courses, meetings, and by international cooperation. The surgeons in Trondheim played an important part in this process during the early 1990ies, together with colleagues in Oslo and at Akershus.

The Centre of Advanced Laparoscopic Surgery, led by Ronald Mårvik, was opened in Trondheim by the Norwegian Minister of Health, Gudmund Hernes in 1996. Numerous educational courses have been conducted at this centre. Mårvik was a member of the Board of the European Association of Endoscopic Surgery (EAES), and the annual EAES meeting which took place in Trondheim in 1996 was one of the most successful EAES meetings ever.

At the same time (1996) Rikshospitalet opened their Intervention Centre, which had a broader focus: digital pictures, as a key to development of new treatment modalities, but again laparoscopic surgical techniques became crucial. Bjørn Edwin has been the leader of laparoscopic activity there, and he rapidly increased the field of application of laparoscopic techniques to almost all parts of visceral surgery. Resections of the distal pancreas with or without concurrent splenectomy, and even comprehensive liver resections, were done with good results. The surgeons at Rikshospitalet have since reported some of the most comprehensive patient series in world literature on laparoscopic HPB surgery (1).

Edwin's PhD in 2005 had the title: Advanced laparoscopy – from the research and development department to day care surgery. The main new organisational idea in this work exploited the Intervention Centre as a research and development (R & D) department, using new laparoscopic procedures in routine work as on an industry “conveyor belt”. The Department for Day Surgery at Ullevål, became the “conveyor belt” in this nomenclature, and the model attracted significant attention from hospital management quarters and health political circles in Norway and internationally. The new principles, described as “The

Hospital of Tomorrow”, have gained increasing relevance during the continuous reorganisation and development of modern surgical care.

Even though laparoscopic techniques were patient-friendly, the rapid introduction, which was strongly “user driven” (patient and/or industry), led to critical focus on laparoscopic surgical methods in general (4). It was pointed out that there was a lack of systematic assessment of new methods in advance of widespread use. The standard procedure for introduction of new drugs via phase I (safety), phase II (optimal dose/administration) and phase III randomised controlled trials (randomised controlled trials – RCT), comparing the new drug with the best available treatment, was not followed when LC was introduced. This was a major principal point in the criticism (4). However, as the discussion went on, it became clear that introduction of surgical techniques cannot be handled like introduction of new drugs. Factors like the surgeons' learning curve, team function, and local patient logistics, influence surgical outcome to different degrees in different hospitals. This comprehension has been important for changes in surgical techniques in general, as in HPB surgery.

Patient Volume and Pancreatic Surgery

The risk of serious postoperative complications has been a major problem in conventional pancreatic surgery, and a very good reason for clinical research to find ways to minimise the problem. Large studies during the 90ies documented that postoperative mortality is higher in small centres (2), and that the clinical outcome improves proportionally to patient volume. There is no apparent patient volume threshold where the effect of increasing patient numbers on clinical outcome fades. Accordingly a limited number of surgical centres should take care of pancreatic surgery, particularly in the small Norwegian population. This is important for the quality of surgical care, but also for radiological assessment, endoscopic management and standardisation of histological examination of surgical specimens. Gradually these principles have been implemented, and centralisation to the university hospitals has become accepted. A parallel process has taken place internationally. One of the consequences has been significant improvement of surgical techniques, and reconstructive surgery on mesenteric vessels have now increasing application in locally advanced pancreatic tumours.

Postoperative complication rates and long term survival can be kept at the same level as Whipple's procedures for small tumours, without vascular reconstruction.

Centres for Pancreatic Surgery in Norway

Rikshospitalet has been responsible for pancreatic surgery in Health Region South, led by Anstein Bergan and Odd Søreide in the early nineties, then by Øystein Mathisen and Ivar Gladhaug.

Ullevål has been responsible for pancreatic surgery in Health Region East, led by Jan Stadaas in the late 80ies, then by Morten Ræder and Trond Buanes during the 90ies and thereafter.

Close cooperation developed in laparoscopic pancreatic surgery between the two university hospitals in Oslo, and after the merger of Health Regions East and West, one centre for HPB surgery is developing.

Haukeland takes care of most pancreatic surgery in Health Region West. Asgaut Viste, Arild Horn and Dag Hoem are the responsible consultants. Some procedures are also performed at Stavanger.

In the Health Region for The Middle of Norway, pancreatic surgery is centralised to Trondheim, St Olavs Hospital, led by Jon Erik Grønbech.

In Health Region North, Tromsø is the pancreatic surgical centre, led by Arthur Revhaug.

Liver Surgery and Hepatology

Colorectal metastases

The prognosis of colorectal cancer improved for several reasons after the 90ies, and cooperation between oncologists and HPB surgeons played an important part in the therapeutic upgrading. Potent chemotherapy and targeted drugs have now almost changed metastatic disease from a deadly, to a chronic condition. Several patients live for years with repeated liver resections alternating with first, second and third line chemotherapy. Multidisciplinary meetings have been introduced as the final assessment place for liver tumours, involving oncologists, HPB surgeons, endoscopists, and finally committed radiologists. Patient logistics have

been adjusted, focusing on the decision making process, in order to offer the conclusion from the multidisciplinary assessment during one single consultation.

Increasing knowledge about surgical techniques, related to survival, was another important reason for the rapidly increasing rates of liver resections after 2000. Liver sparing surgery can offer the same survival benefits as formal resections, and the surgical trauma can thereby be significantly reduced. Liver resections in two or even more séances, with or without embolisation of relevant branches of the portal vein, further expand the resectional treatment options for liver metastases. Together with continual refinements of surgical resection techniques, this has tripled the yearly number of liver resections in Norwegian university hospitals.

Non-Colorectal Liver Metastases

The documentation of survival benefits of surgical treatment of metastases from other GI neoplasms is far less convincing. Observational studies are in process internationally, but widespread use in the near future seems unlikely.

Primary Liver Tumours

The main primary liver malignancy, hepatocellular carcinoma (HCC), usually develops in hepatitis B infected livers, and the liver remnant bears an increased risk of new carcinogenesis after resectional therapy. The capacity for regeneration of residual liver tissue is also limited in cirrhotic livers, and the surgical treatment of HCC is therefore liver transplantation in numerous patients. This fact illustrates that there is close and increasing cooperation between the fields of HPB and transplantation surgery.

Centres for Liver Surgery

The same hospitals and surgeons who led pancreatic surgery, also took care of liver surgery until the laparoscopic technique was introduced. Bjørn Edwin and the Intervention Centre at Rikshospitalet became increasingly important during the 90ies.

When the number of resections began to increase rapidly, around 2005, Bjørn Atle Bjørnbeth became the main liver surgeon at Ullevål, and Anne Waage introduced laparoscopic liver resections together with Erik Trondsen, both supervised by Edwin.

In Trondheim, Erling Bringeland became a new key person in HPB surgery. Together with Bjørnbeth and others, a pilot project was initiated in 2009, The National Registry for Liver Resections, led by the National Cancer Registry.

Experimental Research

In 1983, Morten Ræder became professor of surgical pathophysiology after Ole Jacob Malm, and developed his experimental research group at the Institute of Experimental Medical Research (IEMR) at Ullevål. The field of research was pancreatic and liver physiology, and his work got increasing impact also in clinical HPB-surgery and surgical education in general, until he retired in January 2009. During all these years he was the leader of the com-

mittee for the course in pre-, per-, and postoperative care (PPP-course), and developed a comprehensive textbook, containing all the lectures and principles which were the basis for the course exam. He supervised numerous PhD candidates, today working in the field of HPB surgery.

The University Hospital of Northern Norway (UNN) in Tromsø, has developed experimental research groups of high international quality, and a particular one in the field of hepatology. Arthur Revhaug has been the leader of this group for years, obtaining several international and national prizes, as for example the Helge Bell price at the yearly meeting of the Norwegian Gastroenterological Society in 2008.

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Fig 38- I.Snorre Aune. Portrait by Ville Aarseth. Courtesy Ullevål Hospital

Editorial Comment

After the manuscript was completed we have been informed by Øystein Mathisen, Head of The Department for Hepato-Pancreatic and Biliary Surgery at Rikshospitalet, that his department has been credited as a “center of excellence” by the European Neuroendocrine Tumor Society. We congratulate Mathisen and the Department with their achievement.

Neuroendocrine tumors were previously thought to be rare, and as a result few surgeons gained much experience in treating these patients. New data both from the US and Europe demonstrate an increasing incidence and prevalence. Neuroendocrine tumors of the GI tract are now surpassed only by colorectal cancers. Snorre Aune demonstrated as early as 1972 that ligation of the hepatic artery

was an effective treatment for carcinoid syndrome with hepatic involvement. To achieve increased patient survival in patients with neuroendocrine tumors, Audun Flatmark established in the 1980ies a multidisciplinary team of gastrosurgeons, gastroenterologists and radiologists. Over the years, multimodal treatment, combining advanced surgical principles with oncology and biotherapeutic approaches, has ensured that all patients with liver metastasis are offered active treatment. For pancreatic tumors, laparoscopic procedures are first choice. With tumor involvement of the coeliac axis or the portal vein, vascular surgical techniques are frequently employed. The volume of patients now represent more than 10% of all the patients treated at the HPB Department at Rikshospitalet.

39. Colorectal Surgery in Norway 1986–2010

Arild Nesbakken

Gastrointestinal surgery was established as a sub-specialty of general surgery in 1977. Unlike many other countries, Norway did not give colorectal surgery the status of a separate sub-specialty. Nevertheless, in the course of the 1980ies and 90ies a threefold division of responsibility was established between the practitioners of colorectal, hepatobiliary and oesophageal/gastric surgery at several of the major departments of gastrointestinal surgery in Norway. Colorectal surgery has gradually developed into a separate area of expertise with fora such as the Norwegian Rectal Cancer Registry (see below), and in the last 5 to 6 years national meetings at St Olav's Hospital in Trondheim (on the initiative of Arne Wibe) and annual colon surgery meetings at Gardermoen under the auspices of the Norwegian Society for Digestive Surgery.

A study performed at Haukeland has provided a summary of technical procedures for gastrointestinal surgery that were being used in Norway in the mid 1980ies (1). Since then great changes have taken place in colorectal surgery, particularly in anastomotic techniques and suture material, and much new equipment has been developed such as suturing instruments and laparoscopic equipment.

Laparoscopy can be used for the majority of procedures in the field of colorectal surgery, and laparoscopic operations have become common in the last few years. The relatively small volume of patients in Norway limits the kinds of procedures that can be learned if divided between many

Norwegian hospitals. However, colon resection for both benign and malignant conditions has been introduced in an increasing number of hospitals.

During the last 25 years, great changes have occurred in preoperative, peroperative and postoperative procedures. Some of the principles of fast-track surgery (enhanced recovery after surgery, ERAS) are being practised at a number of hospitals. Substantial changes have taken place in anesthetic procedures, postoperative pain treatment, routines for bowel emptying etc. Increasing use of outpatient surgery, same day surgery and reduction in hospitalisation days are typical trends.

Cooperation and dependence on other specialties have increased over the last few years. This applies particularly to oncological surgery, where there is broad consensus that patients should be assessed and treated by a multidisciplinary team. The most important participants in such teams are the colorectal surgeon, the oncologist, the radiologist and the pathologist, and in the event of metastases the liver surgeon.

Standardised routines for the treatment and follow-up of colorectal cancer have been established by the Norwegian Gastro-Intestinal Cancer Group (NGICG) which was founded in 1992. In 2008 the Norwegian Health Directorate began publishing national guidelines based on input from the NGICG.

It has become increasingly recognised that several colorectal conditions should be treated at fewer centres than previously, in order to ensure that each centre has a sufficient volume of patients to achieve and maintain the necessary competence, and to measure and document the quality of the service. This is especially important in cancer surgery. A certain volume is necessary not only among surgeons, but also among the other participants in the multidisciplinary team. All health regions have now established a clear division of responsibility and functions, and treatment is concentrated in fewer units.

Developments in Diagnostics

Most but not all Norwegian colorectal surgeons perform colonoscopy themselves, a practice that is considered to be both important and appropriate. There have been substantial advances in technology in the field; modern endoscopes have a powerful light source and very high definition, and are equipped with a camera that projects the image onto a screen. This is an excellent examination tool, but much training is required to master colonoscopy and obtain full visualisation of all areas of the colon and rectum and to perform endoscopic procedures.

There have also been substantial developments in the field of radiology. Ultrasound examinations were introduced in Norway at the end of the 1980ies, and until recently has been the preferred method for detection of liver metastases. In the last few years liver ultrasound with contrast enhancement, highly specific for metastases, has been introduced.

Endo-luminal ultrasound is being used in some hospitals. A stiff probe is used in the anus and rectum, and the examination is important in loco-regional staging of polyps and neoplasms, for assessing anorectal fistulas, abscesses and anal sphincter injuries.

The use of computed tomography (CT) has increased as fast CT scanners with a low radiation dose have become available in all hospitals. CT scanning is now often the method of choice for examining acute abdominal conditions, and has high accuracy in appendicitis, diverticulitis, pericolic and intra-abdominal abscesses, abdominal vascular catastrophes and colon obstruction. CT is the main method used for detecting neoplasms in parenchy-

matic organs and for loco-regional staging of cancer, and has replaced ultrasound in the diagnosis of metastases. CT angiography is useful in the event of bleeding and abdominal vascular catastrophes.

CT colography (virtual colonoscopy) has been established at some hospitals during the last few years. The examination is gentle and more tolerable for the patient than colonoscopy, and the detection rate for polyps and neoplasms is almost as high as that of colonoscopy. It is mainly used for examining patients in whom total colonoscopy was unsuccessful or who have not agreed to the procedure. It may have a future role in screening for colorectal cancer.

Magnetic resonance imaging (MRI) is in continual development. MRI has become a routine procedure for locoregional staging of rectal cancer the last ten years. Interpretation of findings is difficult and radiological competence needs to be developed.

Positron emission tomography – computed tomography (PET-CT) has been developed as a supplementary method for detecting metastases in other locations than the lung and liver and local recurrence. Capacity is still too low in Norway.

Non-surgical Therapy

Endoscopic interventions have become more common as the number of diagnostic procedures increases and more advanced therapeutic instruments are developed. Endoscopy can often replace laparotomy and colon resection in removing larger polyps. Laser coagulation has also been used for many years as a supplement to polypectomy in order to reduce the risk of recurrence. Ole Christian Lunde has broad experience in this technique and has published his results from Aker. Argon plasma coagulation and other ablation techniques have now been introduced as well.

Radiological procedures have over the last 10–15 years occupied an increasingly important place in therapy. Image guidance is usually performed using ultrasound and sometimes CT. Image-guided sampling is widely used for biopsies, cytology/histology and bacteriological examinations. Image-guided percutaneous drainage of abscesses and collections of fluid has now been standardised and is

often the method of choice in the case of appendicitic or pericolic abscesses.

Colorectal Cancer

Rectal cancer. By the beginning of the 1990ies, it was recognised that there were great differences in the results of rectal cancer surgery, especially with regard to local recurrence. Also in Norway the results were disappointing. The results published by the British surgeon William Heald attracted considerable attention. He systemised and described the dissection technique called Total Mesorectal Excision (TME), and maintained that visually guided, sharp dissection in the mesorectal plane could reduce local recurrence and functional symptoms more effectively than conventional blunt dissection. Heald's results were much better than most of those published by others at the time.

Norway was the first country to follow this up. Several surgeons visited Heald in England, he was invited to hospitals in Norway, and in 1993 to a course in cancer surgery organised by Odd Søreide at Rikshospitalet. Shortly afterwards a new course took place at Hurtigruten followed by operations at UNN. Practical demonstrations of operations were performed with video transmission and plenary lectures. The importance of correct handling and examination of the resected specimen were emphasised by the pathologist Philip Quirke. The focus was on assessing the integrity of the mesorectal fascia on the specimen, and measuring the distance from the tumour (and any lymph node metastases) to the fascia, i.e. the circumferential resection margin (CRM).

In 1993 Erik Carlsen, Johan Wiig and Jarle Norstein took the initiative to establish a registry to monitor the results of TME surgery in Norway. It was soon realised that to gain sufficient support for such registrations, close cooperation with the professional environment was necessary. Eventually, in close cooperation with NGICG (important persons also the oncologists Kjell Magne Tveit and Olav Dahl), The Norwegian Rectal Cancer Registry was set up under the auspices of The Cancer Registry of Norway (Director Frøydis Langmark). A reference group consisting of representatives of all the hospitals treating rectal cancer was appointed, and were responsible for running the registry. Initially the group was headed by Søreide, then for many years by Carlsen, and later by

Barthold Vonen. Responsible for the daily running of the registry have been (in succession) Norstein, Wibe, Morten Tandberg-Eriksen, Maria Gaard and Liv Marit Dørum. In addition to auditing the results of rectal cancer treatment, the purpose of the project was to spread knowledge about TME and establish a professional forum for surgeons, pathologists and oncologists (and more recently radiologists). Treatment results were openly published at the national level and the individual hospitals received feedback on their own results.

In the course of the project, the number of hospitals that performed resection for rectal carcinoma has been halved. The incidence of local recurrence has been reduced, and the five-year survival has significantly improved (2). Low anterior resection is more often performed instead of abdominoperineal resection with a permanent stoma.

The Registry has produced several PhDs. The project has deservedly received great attention, among others from health politicians and the health administration authorities, and has become a model for quality assurance in surgery.

After the introduction of TME, many surgeons thought that most patients with rectal cancer could be cured by surgery alone without neo-adjuvant radio-chemotherapy, and this was supported by the registry reference group. Only about 10% of patients received preoperative treatment in the 90ies. However, the results demonstrated that certain subgroups of patients had an unacceptably high risk of local recurrence when treated by surgery alone, and in 2005 the reference group advised that Norwegian patients should receive neo-adjuvant therapy if MRI indicate a CRM less than 4 mm. About 30–35% of all patients treated with curative intent now receive neo-adjuvant therapy.

The rectal cancer project has done much to consolidate colorectal surgery in Norway and unite the surgeons working in the field, in spite of the fact that colorectal surgery is not formally recognised as a sub-specialty.

Transanal endoscopic microsurgery (TEM) was introduced in Norway in the mid 90ies by Ronald Mårvik and Jan Erik Thoresen at St Olav's Hospital. The method is suitable for treating large, broadbased premalignant polyps in the rectum that can be removed with free margins

for reliable histology, thereby avoiding rectal amputation. In the last few years the method has been used extensively at Haukeland (by Ola Røkke, later Gunnar Baatrup) and Aker (by Arild Nesbakken), all of whom have published their results. These institutions have also promoted the use of TEM as curative treatment in certain patients with early cancer (T1), and as a compromise intervention in patients with poor health and T2 cancer, and the published results have been promising. Baatrup has arranged Scandinavian TEM conferences in which leading European TEM surgeons have participated. TEM is now also performed at Akershus, Stavanger, and UNN.

Colonic cancer. During the last few years there has been an increasing focus on surgical techniques in the treatment of this cancer. Since the 90ies, surgeons at Aker (Knut Nygaard) have advocated radical lymph node dissection for all surgery with curative intention. Since then greater emphasis has also been given to precise dissection in the mesocolic plane and surgical techniques that ensure accurate removal of cancerous tissue in the event of involvement of adjacent organs, inspired also by the work of the German surgeon Werner Hohenberger (total mesocolic excision). The question of surgical techniques was emphasised at the first national colon surgery meeting in 2005, in publications on the website of the NGICG (www.ngicg.no) and in the Journal of the Norwegian Medical Association (2007) (Nesbakken).

Since then, it has been recognised that the treatment results for colonic cancer may vary from one hospital to another, and also with patient volume in the hospital. For the purpose of quality assurance, it was decided in 2007 to expand the Norwegian Rectal Cancer Registry to include all patients with colonic cancer. The Registry has now been renamed The Norwegian Colorectal Cancer Registry.

Also, the Norwegian Polyposis Registry exists under the Norwegian Cancer Registry as a surveillance service for doctors/hospitals handling patients with familiar adenomatous polyposis (FAP) and risk family members since the early 1980ies.

Almost 20% of all patients with colonic cancer and about 5% of patients with rectal cancer are admitted as emergencies with obstruction. Over the last 10 years, decompression by means of an endoscopically placed self-

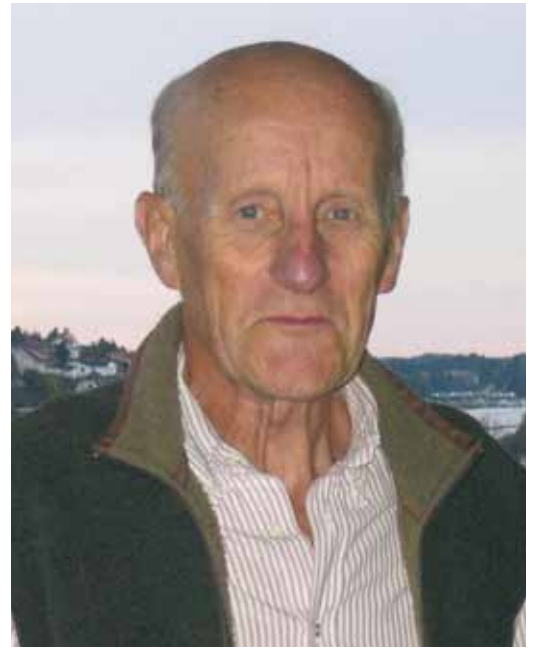


Fig 39-1. Knut Nygaard. Photo: Lillian Nesbakken

expanding metal stent has been introduced as treatment for left-sided colonic obstruction. Successful decompression has been achieved in more than 70% of patients, and resection can then be performed as elective surgery after about one week. A stent can also be used for patients with metastases for whom chemotherapy should be started without delay, and as permanent treatment for inoperable patients.

Anal carcinoma. Since the 1980ies, combined radio-chemotherapy has been established as the routine treatment for anal cancer. Olav Dahl (oncologist) and Arne Skarstein at Haukeland were among the first to adopt this method and to publish their results. Resection is now confined to patients with a very small primary tumour and patients who do not achieve full clinico-pathological response to radio-chemotherapy or who experience local recurrence after such therapy. These patients are treated and followed up by an oncologist and a surgeon in close cooperation.

Benign Colorectal Diseases

Acute appendicitis: Diagnostic laparoscopy was introduced at the beginning of the 90ies as a result of the fact that the clinical diagnosis of appendicitis is uncertain, especially in women of reproductive age. In December 1990 the first laparoscopic appendectomy in Norway was performed at Akershus (by Arne Bakka), and the first series published 1991. Most appendectomies are now performed laparoscopically.

Inflammatory bowel disease (IBD): In the 70ies, continent ileostomy with Kock's reservoir was often performed after colectomy for ulcerative colitis. However, this was largely abandoned during the 80ies and was replaced by ileal pouch anal anastomosis as the method of reconstruction. At first, dissection close to the intestinal wall and removal of the entire rectum followed by hand-sewn coloanal anastomosis was customary, but after the introduction of TME for rectal cancer in the mid 90ies, dissection is now usually performed in the same way as TME, the distal 2–3 cm of the rectum is retained and a stapled colorectal anastomosis performed.

The changeover to pouch surgery using the TME technique, and the appointment of specialised colorectal surgeons to the main county hospitals, led to an expansion of such surgery to many hospitals. Since then the need for surgical treatment has declined, partly because medical therapy has improved, and partly because the risk of cancer development has been found to be lower than previously estimated, thus reducing the need for surgery as cancer prophylaxis. Ileorectal anastomosis is also used in some cases. The low volume of pouch surgery probably means that the treatment of these patients will over time become more centralised.

Many patients with Crohn's disease require surgery owing to the development of stenosis or severe symptoms due to inflammation. Radical removal of the intestine to prevent relapse was abandoned during the 1980ies after it had been shown (by Nygaard and Olav Fausa) that the majority of patients experienced relapse after surgery. There was general agreement that minimal bowel resection should be performed in order to avoid the loss of large segments of intestine, and from the 90ies stricturoplasty of the stenotic bowel instead of resection was performed whenever possible.

Diverticulitis: Over the last 25 years, there have been few changes in the treatment of this condition. Uncomplicated disease only requires observation and possibly antibiotics, and recurring, uncomplicated attacks are not necessarily considered an indication for surgery in Norway. Although pericolic abscess is now usually drained percutaneously, many patients require surgery later on owing to recurring inflammation, fistulas or stenosis. Diffuse peritonitis has until now been treated by resection and usually a temporary stoma, but laparoscopic peritoneal lavage has been introduced as an alternative in the event of non-faecal peritonitis and a sealed-off perforation.

Rectal prolapse: External rectal prolapse is often treated by perineal procedures (Delorme's or Altemeier's operation) in elderly patients and those in poor health. The use of abdominal procedures has become more and more common, especially since the introduction of laparoscopy. Rectopexy, if necessary combined with sigmoid resection, is now a standard procedure. The use of foreign material in rectopexy has been minimised because this can lead to stenosis.

Anal incontinence: Anal incontinence has been identified as a widespread and often neglected problem, but a number of hospitals have now established a service for this group of patients. In the 1980ies, Rikshospitalet (Ragnhild Emblem, later on Bakka and Ylva Sahlin) and the University Hospital of North Norway (UNN) (Arthur Revhaug and Pål Øian) began offering this service. At Rikshospitalet this has now been discontinued. In recent years a number of regional hospitals have provided examination and treatment, and complete pelvic floor centres are established at UNN (Vonen, Stig Norderval, Rolv-Ole Lindsetmo), Akershus (Nazir Naimy, Bakka and Tom Øresland), later also at St Olavs hospital (Astrid Rydning and Wibe). The regional hospital trusts have proposed that the UNN service should be upgraded to a national competence centre. An essential requirement for a successful service is a multidisciplinary approach involving neurologists, gynecologists, physiotherapists and urotherapists, stoma nurses, pediatric doctors, radiologists and professionals experienced in patient teaching.

Simple sphincteroplasty surgery was performed for many years, but collected data led to somewhat fewer procedures. Electrostimulated ("dynamic") graciloplasty with an implanted pacemaker was established as a method in Norway at Rikshospitalet (by Bakka) and soon after at UNN (by

Vonen). However, long term results from international multicentre follow-up studies, where also Rikshospitalet participated, were found mostly unsatisfactory, and this method is now reserved for patients who are unable to have artificial sphincters. In 1999 UNN was the first hospital in Scandinavia to introduce sacral nerve stimulation for anal incontinence, a treatment that later became established in several other hospitals in Norway. During the last ten years more conservative treatment options such as biofeedback, electro-stimulation and anal injections are also offered. In 2005 UNN reintroduced implantation of artificial anal sphincters and continues to use this method.

Incontinence centres also treat patients with constipation, obstructed defecation syndrome, anismus, internal rectal prolapse and rectoceles – all challenging patient groups. Colon transit time and defaecography are widely used examinations, and recent progress in the treatment of such conditions includes the use of biofeedback and appendicostomy for antegrade colonic lavage. More experimental procedures are also attempted.

Anal fistula was usually treated by direct or delayed fistulotomy with a cutting seton if the fistula included a large part of the sphincter system. Division of more than a minimal part of the anal sphincter has now been abandoned because of the risk of incontinence, and methods such as draining seton (Nygaard) and advancement flap (Bakka, Sahlin) have been used. Tissue glue or a synthetic plug has also been tried with varying success.

Haemorrhoids: Rubber band ligation was introduced in Norway by Lars Semb, and Ole Christian Lunde described

the method and published his results from Kongsvinger in 1978. The method is now standard in the case of haemorrhoids when the anal prolapse is not too large. Milligan–Morgan’s haemorrhoidectomy has been the standard procedure for prolapsing haemorrhoids, but Longo’s stapling method, LigaSure haemorrhoidectomy, and other methods have been introduced as alternatives by some centres in recent years. There is no consensus on the use of these methods.

Anal fissure. Three-to-four-finger anal dilatation was previously frequently used, but was abandoned in the 80ies owing to the risk of incontinence after such treatment. Surgery involving lateral internal sphincterotomy became increasingly widespread. In the last 10 years “chemical” sphincterotomy has become the method of choice, using nitroglycerine or Diltiazem cream or Botulinum toxin injection in the sphincter.

Stoma nurses. The university hospitals have employed stoma nurses since the 70ies and 80ies, and now the practice is followed by a large number of hospitals. At the end of the 90ies a stoma nursing programme was started in Bergen on the initiative of T. E. Olsen, a stoma nurse who had been trained in Sweden. Since then Høgskolen i Bergen (Bergen University College) has arranged regular courses, which have been attended by participants from all over the country, and also from Denmark. Stoma nurses play an important role in therapy, especially for patients treated for colorectal cancer or inflammatory bowel disease and to an increasing extent for other patient groups as well.

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40 a. The Subspecialty Gastrointestinal Surgery

Jan Olav Stadaas 1986

A motion suggesting gastrointestinal surgery as a new subspecialty in surgery was passed at The Norwegian Medical Association Annual General Meeting in June 1977.

The initiative for the new subspecialty was taken by Jan Stadaas and Johan Hertzberg. During 1976 they had contacted a large number of colleagues in surgery, internal medicine and laboratory specialties to judge how those felt about the need for a separate subspecialty. The response was overwhelming. Bjarne Fretheim, who had tried to establish the specialty a few years earlier, warmly supported the suggestion.

The new specialty should be activated officially on January 1st 1978. In the autumn of 1977 a specialty committee was appointed to establish the requirements for the specialty. At the first meeting on November 29th Stadaas was elected chairman. The other members of the Committee were: Jon Anton Johnson, Ola-Petter Grüner, Knut Nygaard and Magne Roland, who was elected secretary. Substitutes were: Ivar Liavåg, Olaf Holter and Tom Erik Ruud.

The committee's definition of the requested competence was as follows: The specialist must have a good knowledge of all gastroenterological operations, and experience in gastrointestinal endoscopy. His knowledge must be sufficient to be in charge of a section for gastrointestinal

surgery at a county hospital. The head of such a section should also have knowledge of, and experience in, scientific work.

After the requirements for teaching departments had been established, the university clinics applied for recognition as teaching units in the new subspecialty, documenting their teaching programmes. The surgical departments at Aker, Haukeland, Rikshospitalet, The Regional Hospitals in Trondheim and Tromsø, and Ullevål, were certified as teaching units.

The Committee required 120 hours in theoretical courses, of which 60 should be on specific gastroenterological subjects. In addition specific requirements for operative and endoscopic experience were defined.

As an interim arrangement consultant surgeons could apply for recognition as specialists before 1978, provided they could document competence corresponding to the new requirements. A total of 27 specialists were certified according to the interim arrangement.

At the end of 1986 there were 56 subspecialists in gastrointestinal surgery in Norway.

The establishment of the new specialty has been of great importance not only for the subspecialty itself, but also for

medical gastroenterology, gastroenterological pathology, radiology, laboratory medicine and not least, research. Clinical and experimental research within gastroenterology has increased considerably, and is still growing to the benefit of both patients and surgeons.

The requirements stand at a risk to be reduced as there is an increasing demand for new specialists, and a limited number of suitable teaching operations to be shared both by candidates in general surgery and gastrointestinal surgery. Moreover, incorporating a lot of general surgical work in gastrointestinal surgery has been detrimental to the original intention that the new specialists should have the responsibility mainly for special and advanced tasks in gastroenterology. It is a great challenge to keep the quality high in order to avoid that the specialists lose their special competence.

40 b. The Norwegian Society for Digestive Surgery

Asgaut Viste

Although the subspecialty Gastrointestinal Surgery has existed since 1978, there was no society for these surgeons until 1997. Until then the Educational Board of Gastrointestinal Surgery, was appointed by the Norwegian Society for Gastroenterology, and all reports about education and development of the specialty were discussed in fora where few surgeons were present.

Knut Nygaard made an attempt to start a society for gastrointestinal surgery shortly after the specialty was recognised in Norway, but the attempt failed.

After the Annual Meeting of The Norwegian Surgical Society in 1997, Odd Søreide invited several prominent gastrointestinal surgeons to a founding meeting in his office in Rikshospitalet. Among those present were Asgaut Viste, Torgeir Løvig, Anstein Bergan.

Asgaut Viste became the first chairman of The Norwegian Society for Digestive Surgery. The complete list of chairmen is presented in Table 1.

Table 40-1.
Chairmen of The Norwegian Society for Digestive Surgery

1997–2001	Asgaut Viste
2002–2003	Jon Arne Søreide
2004–2005	Erik Carlsen
2006–2009	Morten Tandberg Eriksen
2010–	Rolv-Ole Lindsetmo

The Society is responsible for gastrointestinal surgery at Norwegian Surgical Association’s Annual Meetings, and also arranges a separate own Spring Meeting at Gardermoen.

Subspecialties of General Surgery: Breast and Endocrine Surgery

41. Breast Surgery

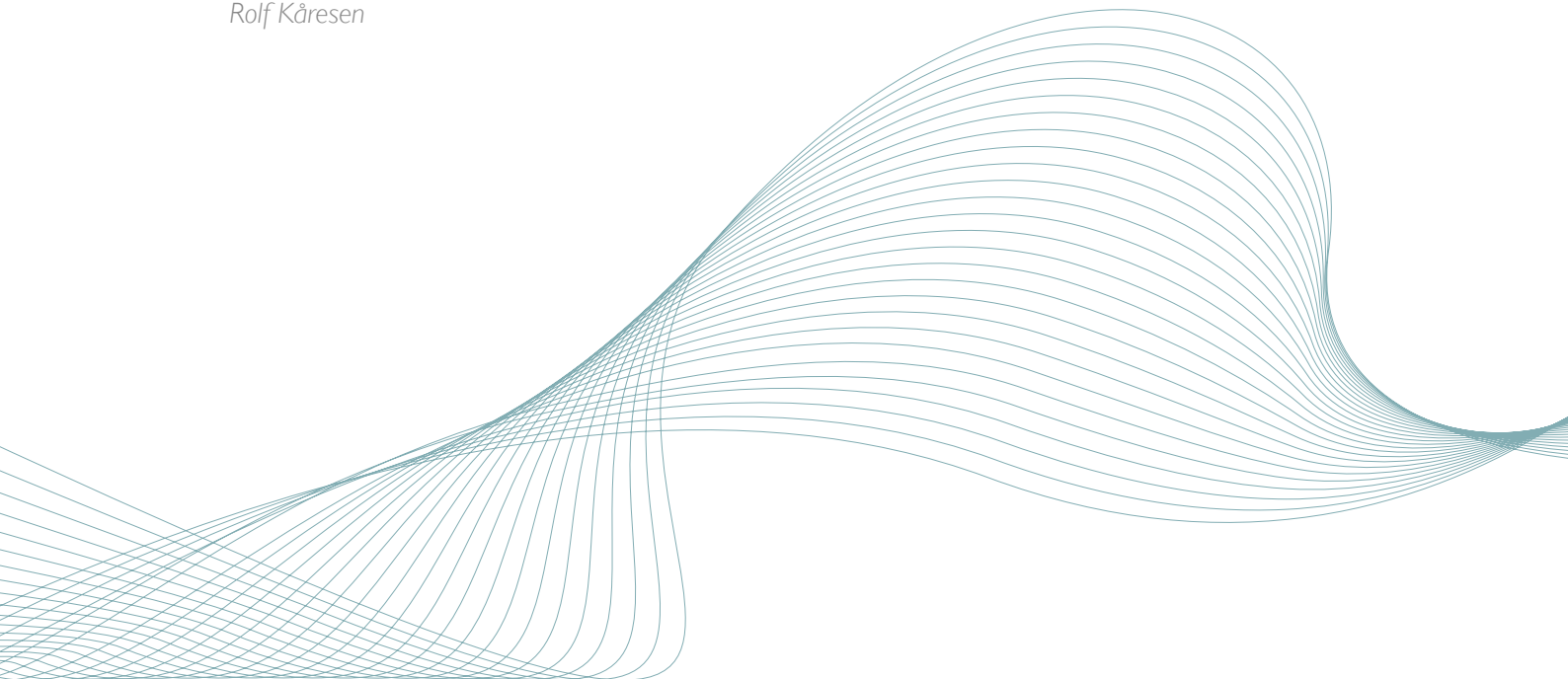
Rolf Kåresen

42. Endocrine Surgery

Jan Erik Varhaug

43. The Norwegian Society for Breast and Endocrine Surgery

Rolf Kåresen





41. Breast Surgery

Rolf Kåresen

Introduction: An International Perspective on Breast Surgery

To fully understand the history of Norwegian breast surgery, a short international perspective might be of value to see how our development was in line with present knowledge.

Hippokrates (460–375 BC) associated breast cancer with menopause (1). Galen (129–200 BC) was a great admirer of Hippokrates and developed his humoral theory of cancer further. He was of the opinion that menstruation, and the following loss of blood, kept the black bile in balance and by that the breast cancer. As a consequence he recommended enemas, diet and bloodletting as therapy. Etching agents followed by zinc ointments treated ulcerating cancers. In the medieval times (400–1500AD) Galen's theories were prevailing and surgery was rarely done.

In the 19th century a more rational approach to the disease was developed. In 1867 the English surgeon Charles Moore gave strong arguments for extirpation of the tumor en block and not piecemeal. In 1882 William Banks recommended that axillary toilette should be routinely done in addition. Thus, it is somewhat unfair that William Halsted (1852–1922) has been given the credit for developing the radical mastectomy. Halsted's results were not impressive, but the 40% 5 year survival from the beginning of the 20th century, was better than the 18% survival of untreated cases in Middlesex Hospital Charity Ward in the same period.

The first surgeon to question the necessity of mutilating radical mastectomy (RM) was the English surgeon Geoffrey Keynes. In 1932 he introduced implantation of radium needles as the only treatment of small breast cancers showing by historical controls just as good results as with surgery alone. He published the results in 1942 (2).

But his findings were not recognised, and what happened was that the radicality of breast cancer surgery was slowly "diminished" through a series of randomised trials during the 1950ies to 1970ies by DH Patey, RS Handley and H Auchincloss, who in 1979 documented that the results were just as good if both the pectoralis muscles was left. Thus the term modified radical mastectomy (MRM) was born.

The honor of "reintroducing" breast conserving therapy (BCT) must be shared between Umberto Veronesi and Bernard Fisher. In randomised clinical trials between MRM and BCT combined with radiotherapy starting in 1960ies and first published in 1975, they documented that BCT is just as safe as MRM.

To my mind, however, the most important innovation in breast cancer surgery is the introduction of the sentinel node (SN) technique by AE Giuliano in 1994. It helps us to avoid axillary toilette in approximately two out of three patients.

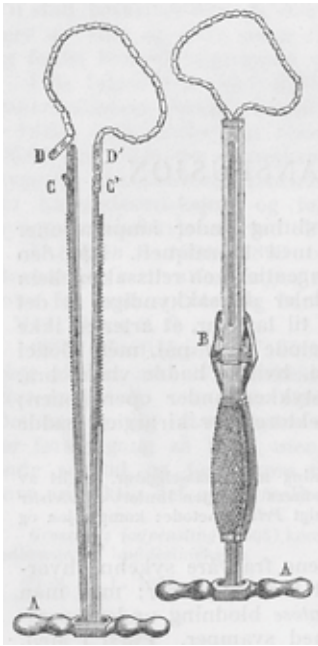


Fig 41-1. Chassaignac's encrasseur

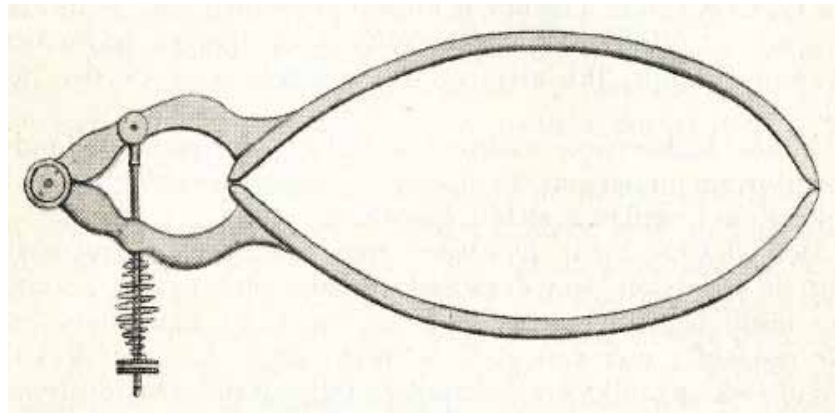


Fig 41-2. Heibergs caustic clamp

The 19th Century and before: Barber Surgeons, Anesthesia and Antiseptic Surgery

The first recorded case of breast surgery in Norway was a tumor removal done in 1749 by the university educated public doctor (stadsfysikus) in Bergen, Johan Gotfred Erichsen (1713–1768)(3). The first mastectomy was performed in 1825 by the barber surgeon Jørgen Bernhard, also in Bergen. He was reprimanded for his daring achievement by the city's medical officer. In 1827 Christian Wilhelm Wisbech (1740–1822) reported removal of an ulcerated breast tumor with a "deep seated" tumor in the axilla, probably the first (modified?) axillary toilette. The patient survived. In March 1847 Till Morton reported on ether narcosis, previously operations were done without anesthesia. As early as October 1847 the first ether narcosis was used at Rikshospitalet (3).

A problem was still not solved, the wound infections that so often followed surgery. In two series from 1859 and in 1861, one out of three mastectomy patients died of sepsis. This problem was more or less overcome when Lister's antiseptic technique was introduced in 1867. Professor Julius Nicolaysen (1831–1909) visited Lister in 1868 and introduced the technique at Rikshospitalet.

The techniques used for the mastectomies at that time were still very crude. In the series from 1861 all the three actual

possibilities were in use. One consisted of by long needles bringing two sutures through the sagittal midline of the breast close to the muscle fascia, and then knotting them so hard on the medial and lateral borders that the breast with the tumor eventually got necrotic and fell off. The other was Chassaignacs encrasseur (Fig 1) that in principle was a chainsaw that could be placed around the breast, which then was literally "sawed off" by use of the handle. The third was by use of an apparatus invented by the Norwegian surgeon Christen Heiberg (1799–1872), the "caustic clamp" (Fig 2). The long arms of the clamp were hollow and could be filled by an etching agent. They were placed around the breast and gradually tightened as the etching agent "dug" its way through the tissue till the breast fell off after a few days. The problem was of course pain so intense as often to necessitate anesthesia many times during the process. Another problem was, no wonder, wound infection. The wound was left open to granulate and epithelialise. Of the three operated in 1861, the one with the tight sutures died.

When aseptic procedures were well established in the middle of the 1860ies, all breasts were removed by knife and the wound sutured. Axillary toilette was not regularly done till after 1875. In 1878 Julius Nicolaysen gave a lecture in the Medical Society of Norway where he strongly recommended early operation including axillary toilette. He also

meant it was important through lectures and brochures to inform the women about the disease. I see this as the first advertisement of rational treatment of breast cancer.

First Half of the 20th Century: Radical Surgery and increasing use of X-ray Therapy

Death due to breast cancer was not very common. In the periods 1901–10 the average was 83 per year, 1921–30 163 and in 1931 205. The absolute number of cases at the time is not known. This might be compared with the 666 who died of the disease in 2007.

The treatment of breast tumors was the main subject at the annual meeting of the Norwegian Surgical Society in 1937. According to Knud Dahl Nicolaysen, radical surgery a.m. Halsted had been the mainstay of surgical treatment in the period (4). There was a discussion on whether radiotherapy should be given as a supplement to radical surgery. The majority favored that, given postoperatively with maximal tolerable doses. He published the overall survival from Drammen without radiotherapy 1927–1936 and with in 1936–1947, as shown in the table:

Year after surgery	1927–1936 Total/alive (%)	1936–1947 Total/alive (%)	1936–1947 Total/alive (%)	
	Without radio-therapy	With radio-therapy	Without In met	With In met
1	60/47	143/125		
5	35/15 (43)	70/37 (53)	29/19 (55)	41/18 (43)
9	9/1	19/9	7/6	12/3

In met= lymph node metastases

His conclusion was that they would continue to use radiotherapy, as there seemed to be a small gain in survival between the two periods. He makes no comment on the fact that stage distribution is shown only for the 1936–47 series.

These results are very similar to a survey of 3867 cases of breast cancer operated in Radiumhospitalet between 1932 and 1957 reported by Selmer Rennes (5). For the entire material, all stages, the five year survival was 54%, for clinical stage I (no lymph node metastasis) 76%, stage II (mobile lymph node metastasis) 47%, stage III (confluent or fixed nodes) 19%, and stage IV (distant metastases) 1,6%.

Prophylactic ovarian irradiation to stage II patients below

50 years of age was introduced in 1947. In the period 1932–46 the five-year survival in this group was 44%. In that period, when 2/3 of the cases received radiotherapy to the ovaries, survival was 57% (63% in the treated and 55% in the non-treated). Rennes concludes that they will continue to investigate “the significance of castration in premenopausal women”.

In 1974 Jan Svennevig published the results of treatment of primary breast cancer in Arendal 1957–66, with similar results. They were still using Halsted’s technique, slightly modified as they left a very small portion of m. pectoralis major just below clavícula. In locally advanced cancer, preoperative radiotherapy was given. In stage II they added cyclophosphamide or proresidor (podophyllotoxin) as adjuvant therapy as a cure over the first six postoperative days, with no further treatment even in patients with lymph node metastases.

In a “state of the art” publication in The Nordic Medical Yearbook (Medisinsk Årbok) 1958 (6) the treatment options were summed up as follows:

Operable breast cancer: Radical mastectomy. If microscopic metastasis is found in the axilla, radiotherapy to the area.

Inoperable breast cancer: Ablatio simplex (optional: after preoperative radiotherapy). Recurrences and metastatic disease: radiotherapy, hormones such as oestrogens, androgens or hydrocortisone. Alternatively oophorectomy, adrenalectomy or hypophysectomy.

1960–1979: Introduction of New Diagnostic Tools, Modified Radical Mastectomy and Postoperative Adjuvant Therapy

The history of breast surgery cannot be written without a description of the development of the multidisciplinary team, which is essential in the diagnosis and treatment of this disease.

Mammography was first introduced at Radiumhospitalet by the radiologist Kjell Liverud in 1968. Before that, as the first in the Nordic countries, he had for some years experimented with a “home designed” apparatus for mammography. The apparatus had a very bad resolution, but by continuous improvement by him and his colleague Tor Drevvatne it reached a practical useful level in the beginning of the 1970ies.

In the same period and in the same hospital, the pathologists Cristine Mellem and Torill Sauer took breast cytology into use. Sauer, the radiologist Per Skaane, and the surgeon Rolf Kåresen introduced the triple diagnostic procedure at Ullevål in 1990. The procedure was spread throughout the country, especially after mammography screening started in 1996. Ultrasound was introduced as a diagnostic tool by Skaane in the late 1980ies. He was also the first to introduce MRI of the breast in Norway in 1996.

In the 1960 and 1970ies Halsted's radical mastectomy was still standard surgical therapy in Norway. When I, as a young resident in 1979, for the first time was introduced to breast surgery at Radiumhospitalet, two out of three attending surgeons still used that operation for all their patients. The third, Johan Høie, had recognised the studies of Patey, Handley and Auchincloss and used Patey's MRM. However, at Aker Hospital in Oslo professor Hans Fredrik Harbitz introduced Patey's operation as early as 1969, concomitant with Roar Nissen Meyer's introduction of adjuvant chemotherapy (see below). Thorstein Harbitz followed in his fathers footsteps as a breast surgeon, and also became secretary for Oslo Cancer Forum (Oslo Kreftråd) 1982–2003. Together with the chairman, the oncologist Steinar Hagen at Ullevål, he made important contributions to establish guidelines for several types of cancer, including breast cancer. The shift from RM to MRM in the rest of the country probably came during the early 1980ies. MRM was standard operation in Ullevål from 1983.

The big "leap forward" in primary breast cancer treatment in this period was the introduction and scientific proof of the efficacy of postoperative adjuvant chemotherapy. One of the leading international researchers at the time was Roar Nissen-Meyer. In 1965 he started his studies of giving cyclophosphamide on day one and seven after surgery, and as the first, published the positive effect on survival. After a median of 17,1 years of observation, the relative survival improvement of those given adjuvant treatment as compared to those who were randomised to surgery alone, was 13.5% (7). Shortly later, his results were confirmed by the American Bernard Fischer and the Italian Umberto Veronesi, using a combination of compounds Cyclophosphamide/Methotrexate/ 5-fluorouracil (CMF), giving an approximately 30% relative survival gain compared to surgery alone. The exact time for the introduction of these treatments as standard in Norway is not recorded,



Fig 41-3. Middle age mastectomy technique, a rather gruesome procedure

but at Ullevål the Nissen-Meyer regime was used in 1973, and CMF was on trial in Radiumhospitalet in 1979.

The conventional radiotherapy, which had been unchanged for many decenniums, was also slowly changed at Radiumhospitalet during the 1960ies. The high voltage Cobolt machine was installed at Radiumhospitalet in 1965/66. The machine gave much higher dose to the target volume and less to the skin, but also had a much higher potential to harm deeper structures such as nerve tissue, heart, lung and bone. That was in fact also what happened. During the late 1970ies, and the beginning of 1980ies, Herman Høst and Ivar Brennhovd conducted a randomised trial of RM/MRM alone versus surgery plus radiotherapy to the lymphnodes, in patients with histologically involved nodes. They found no improvement in



Fig 41-4. Breast-preserving therapy 2009. Right-sided surgery can hardly be seen. Photo Rolf Kåresen

survival. Later Canadian and Danish studies, and long time follow up, has proven that the conclusion was wrong. There is a small, but significant survival gain by radiotherapy in node positive patients. However, that gain was camouflaged by increasing rates of heart deaths in the radiotherapy treated group, deaths that can be prevented by using the present high voltage machines. Another example of complications following their introduction was what happened in Radiumhospitalet in the late 1970ies and early 1980ies. Due to increasing capacity problems, treatment days per week were reduced from five to four, but the weekly dose was kept the same. The change resulted in a high number of severe complications 10–15 years later.

Generally the treatment results are much better with high voltage machines, but their introduction in Norway was very slow. Ullevål and Haukeland started using them in 1972, Trondheim in 1981, and Tromsø in 1986. Thus for a 10–15 year period the quality of the radiotherapy given was depending on the home addresses of the patients (although those from Trøndelag and Northern Norway were sent to Radiumhospitalet for treatment from 1982).

1980–1999: Introduction of the Multidisciplinary Team, Breast Preserving Therapy, Anti-Oestrogens and Mammography Screening

During this period breast conserving therapy (BCT) was introduced in Norway. The first to adopt the principle in Norway was Johan Wiig working in Trondheim and cooperating with the oncologist Olbjørn Klepp for the necessary breast

X-ray. They published their first results of BCT in 1984.

In spite of this, the introduction of BCT was delayed in Norway. In the beginning this was due to uncertainty about whether BCT was equal to MRM when it came to survival, but after a meta-analysis published in 1995 showed no difference between the two approaches, there was not much reason for such skepticism. Still only 17% of all breast cancer surgery in Norway was performed as BCT in 1990 and 21% in 1995.

Another reason for the low frequency of BCT might be that too many hospitals were involved, and that a low number of patients may have been associated with a lack of knowledge about new treatment strategies. In 1995 sixty-two hospitals in Norway were doing breast surgery, and 25% of them treated less than 10 cases per year.

The introduction of mammography screening for breast cancer was very controversial and much debated. In Sweden, and later in Great Britain and The Netherlands, randomised trials from the mid 1970ies to the mid 1980ies, showed a reduction of deaths in the screening population as compared to not screened between 20 and 30%.

The first recommendation for screening in Norway was given in 1985 by a body appointed by the Oslo Kreftråd (8). A similar advice was given in NOU 7/1987, namely to screen all women between 50 and 69 years of age every second year. This was followed by a long period of indecision. In 1995 the Norwegian Cancer Society donated 5 million kroner to the cause and this induced The Gov-

ernment to start in four counties, Akershus, Hordaland, Rogaland and Oslo in January 1996. Slowly the rest of the country followed, and the last counties, Hedemark, Sogn og Fjordane and Vestfold, were up and running in 2002. A quality assurance programme for the screening was implemented, and documented that the screening met international accepted quality standards. However, till the present day we do not know whether the primary goal has been reached, a reduction of death from breast cancer by 30%.

One good effect of the screening is obvious. In most counties Breast Diagnostic Centers (BDS) were established, and the number of surgical departments participating has been reduced from 62 in 1995 to 19 in 2010. Mortality of breast cancer started to decline in the beginning of the 1990ies and has continued to fall to a total of 10% for all age groups taken together. Screening alone cannot explain this fact. The reason is probably a combination of screening, increasing breast awareness among women, better adjuvant treatment, and better quality of diagnosis in BDS.

The establishment of the Norwegian Breast Cancer Group (NBCG) in 1981 was very important for the improved quality in diagnosis and treatment of breast cancer. Among “the founding fathers” were the oncologists Stener Kvinnsland and Stein Gundersen, and the surgeons Jan Erik Varhaug and Johan Høie. NBCG was, and still is, a self appointed body of clinicians that have taken upon themselves to establish and publish “Norwegian standard guidelines”. A steering committee was formally established in 1988 with Jan Erik Varhaug as the first leader, followed by Rolf Kåresen. Today the group has 27 members who meet twice a year to discuss changes in policy.

The first written guidelines (pet name “Blåboka”) were published in 1982, the next editions in 1988, 1992, 1994, 1998 and 2000. The shortening intervals between the editions reflect the increasing influx of new evidence necessitating change. As a consequence the guideline since 2002 has only been available online (www.nbcg.no). NBCG has never received any public support, but has been sponsored by The Norwegian Cancer Society and pharmaceutical firms. However, government bodies such as the Ministry of Health, and the Directorate of Health and Social Security, accept the authority of NBCG, and frequently use the organisation for advice and hearings. NBCG also functions as a trial organi-

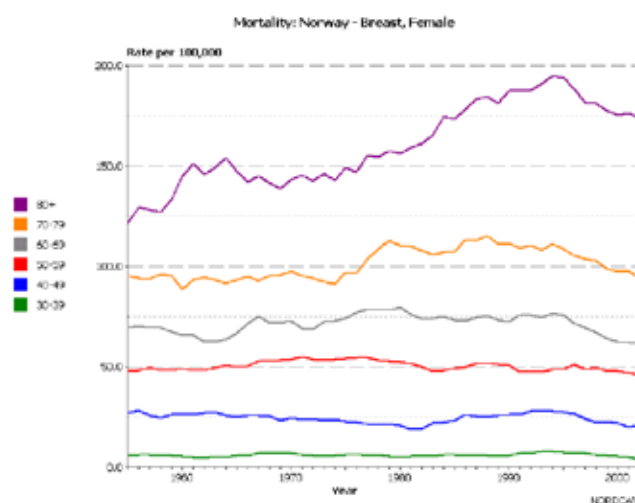


Fig 41-5. Mortality rates per 100 000 of breast cancer 1953–2002 in Norway

sation, often cooperating in large international trials.

Another important event was the introduction of the anti-oestrogen tamoxifen in adjuvant treatment for patients that have oestrogen sensitive tumors. The basic research was done in the 1970ies, but the first “heavy” clinical proof came in 1983 when Michel Baum and his colleagues published the results of the so called NATO trial, a randomisation between tamoxifen and placebo in primary operated breast cancer. They found a significant survival gain in favor of the tamoxifen. These results were confirmed in a meta-analysis of similar trials including the first NBCG trial by the Oxford Group lead by Richard Peto.

In Norway “Blåboka” from 1981 has a recommendation that tamoxifen 20 mg daily should be given to all lymph node positive patients with oestrogen sensitive tumors for a year. In 1992 Nils Raabe tested the compliance to this recommendations in the four Oslo-hospitals which had treated breast cancer in 1980–89. He found that even in the last two years of the period, as many as 30% of those who should have been given tamoxifen, did not receive it. One will of course assume that this fault was due to the fact that this was early days in such treatment. This assumption is not corroborated by the finding that a shift from tamoxifen to aromatase inhibitor after two years of

treatment, was not implemented in nearly one third of the patients operated in UNN in 2003 and in 20% Ullevål 2004–2008. Thus doctor and patients compliance with adjuvant treatment plans seems to be a general problem relatively constant over time.

2000–2010: Introduction of the Sentinel Node Technique and Highly Differentiated Adjuvant Therapy

The sentinel node technique (SN) is one of the greatest advances in breast surgery as it eliminates axillary toilette in two out of three women. Contrary to most other procedures in breast cancer, the implementation of this technique was very rapid. It was first published in 1994 by Giuliano and as early as in 1997 Hans Fjøsne started a training project in Trondheim, followed by Haukeland and Ullevål in 1998. SN was first taken into routine use in Telemark in 1999 by Ivar Guldvog shortly after followed by the three afore mentioned. By 2002 all hospitals in Norway who operated breast cancer had established the technique. The driving force was probably a keen interest in the technique in the media, which resulted in knowledge of it among breast cancer patients who used their right to choose hospital for treatment.

Another trend was the increasing complexity of adjuvant treatment. New combinations of chemotherapy regimens were frequently introduced and related to the molecular characteristics of the breast cancer. A good example was the introduction of a monoclonal antibody to a cell surface oncogen, the HER 2 receptor, in 2007. This antibody, trastuzumab (Herceptin), blocks the receptor and thus prevents the natural ligand to access it, and by that the stimulus to cell division. This, together with the principle of determination of the oestrogen receptor status of the patient, and the use of the anti-oestrogen drug tamoxifen, from the beginning of the 1980ies, are examples of a trend that will accelerate in the years to come, determination of specific genes and gene products, and tailored therapy against them.

Since 2007 NBCG and The Norwegian Cancer Register have established a Norwegian Breast Cancer Register (NBCR), with financial support from Breast Operated Women's Association. It has been impossible to obtain support for this development through the public bud-

gets. The aim is to register important steps in diagnosis and treatment of breast cancer, and later events up to the death of the patient. The data will be used for three purposes: ordinary epidemiological statistics, as clinical data in research protocols, and as a quality assurance database for diagnostics and treatment. Data collection started in two hospitals in 2008, two more in 2011, and the rest will follow during 2012.

The establishment of breast- and endocrine surgery as a subspecialty in 2008 was an important milestone for the status and development of breast surgery. More than ten years had passed since it was first suggested to the authorities by Sander, Varhaug and Kåresen. Varhaug was appointed leader of the first specialist committee, and Kåresen was elected leader of The Norwegian Society for Breast and Endocrine Surgery.

Research in Breast Cancer in Norway

There was little research in breast cancer and breast diseases in Norway the first two thirds of the 20th century. Most publications from that period are retrospect studies.

Magnus Haaland was an early pioneer, who in the years 1905–1911 studied experimental cancer, mostly mammary in mice, at prestigious institutes such as Pasteur in Paris, Ehrlich in Frankfurt, and Imperial Cancer Research Fund in London. At the time there was much interest in the hypothesis that cancer might be induced by micro-organisms. In a paper published in 1927 (10) he sums up his experience: "It is most likely that it is surviving living cells, and not a hypothetical virus, that give rise to tumor growth."

Carl Semb presented his thesis "A pathologico-anatomical and clinical investigation of fibroadenomatosis cystica mammae and its relation to other pathological condition in the mamma, especially cancer" in 1928 (9). The main conclusions were that there are two types, fibroadenomatosis (f.a.) simplex and f.a.cystica, but that they seem to be part of the same process. These are still valid conclusions. When he, however, concludes that f.a. cystica is the primary disease and infiltrating cancer secondary, he is "on thin ice". The conclusion was based on the fact that he found early infiltrating cancer in 6% of f.a simplex, 24% in f.a cystica, and fibroadenomatosis in 77% of clinical infiltrating cases. He does not discuss the possibility of coincident

presence of two very common pathological conditions, which most probably was the cause. His clinical recommendations based on the findings were rather drastic. He advocated prophylactic mastectomies in all patients over 35 to 40 years with f.a. cystica, while patients with f.a. simplex might be observed after removal of the lesion.

Roar Nissen-Meyer has been mentioned before. He was one of the first to prove that adjuvant chemotherapy improved survival. He should also be credited for the introduction in Norway of oophorectomy as supplementary therapy both in advanced breast cancer and in metastatic disease.

Another example of early clinical studies with international impact is the Oslo study. The results of a trial of combined surgery, chemotherapy, and X-ray treatment, vs surgery and chemotherapy alone, were published by Herman Høst and Ivar Brennhovd during the 1970ies and 1980ies. They did not find any survival gain by X-ray to the regional lymph node stations in stage II patients. Later it has been proven that there is a survival gain, but that it was lost in the Oslo study due to a surplus of cardiovascular deaths.

When NBCG was established in 1981, one of its goals was to function as a trial organisation. This goal has been achieved, the latest is NBCG trial no 13. Most of the studies have been on metastatic breast cancer, but some on adjuvant treatment. In fact NBCG trial no 1 was a randomised trial of tamoxifen versus placebo, and no 2 and 3 other combinations of anti-oestrogen adjuvant treatment. Hans Fjøsne has been one of the prime investigators in these studies.

In Haukeland, Varhaug, Per Eystein Lønning, and Turid Ås studied the mechanisms of oestrogen sensitivity and chemo resistance in advanced breast cancer with important results often cited in international literature.

From 1996 and onwards a very active research group, the Oslo Breast Cancer Consortium, has been doing studies on the biology of micro-metastases (0.2–2mm) and isolated tumor cells (<0.2mm) in blood and bone marrow, and the genetic profile of the primary tumor. It is a cooperation between the Radiumhospitalet geneticist Anne-Lise Børresen-Dale, the oncologist Bjørn Naume,

and Ullevål surgeons Kåresen, Ellen Schlichting and Gro Wiedswang, with many coauthors. A new series of patients is now under recruitment to study the genprofiles in the micro-metastases, and the metabolism of the primary tumor both in vivo and in vitro, in collaboration with the MRI laboratory at the University in Trondheim. This is an example of the elaborate cooperation needed in modern research.

Another interesting study has been done in cooperation between the Department of Genetics at Radiumhospitalet and the Breast- and Endocrine Surgical Department of St Olav's Hospital, with Anne Irene Hagen as primary investigator. They have studied families with BraCa 1 and 2 mutations in Norway, and more specifically the incidence of such mutations in primary breast cancer patients operated in St Olav's Hospital, finding that to be slightly less than 2%.

Summing up, there has been a promising increase in breast cancer research in Norway, and many surgeons are actively involved. My hope and expectation for the future is that this trend will be even more evident. The good economic position of the country, the fact that breast surgery is a specialty, and the proven willingness of Norwegian women to be recruited into scientific protocols, should make this expectation a reality. Let this statement be a challenge to all young breast surgeons from an old one!

What can be learnt from The Past, and what will come in The Future?

Going through the history of a disease generates some thoughts, which I allow myself to share with the reader: First of all, that an impressing number of colleagues have dedicated their time and effort to improve the diagnosis and treatment of such a common disease as primary breast cancer, and that an improvement really has been gained, proven by the fact that five year death rates have come down from 25% in 1995 to 15% in 2007. Secondly, that many improvements have been surprisingly slowly introduced in our country, exemplified by breast preserving therapy in the 1990ies. In addition, compliance is obviously a problem both among doctors and patients.

These facts are challenges to the coming generation of surgeons, and have to be met by continuous and open-mind-

ed study of the literature, and contact with colleagues abroad supplemented by Norwegian research. Quality assurance by help of a clinical database, perhaps even suggesting recommended treatment, might also be helpful.

Regarding treatment in the future, I am fairly sure that the increasing complexity of the adjuvant treatment of primary operable breast cancer will accelerate. Many types of kinase inhibitors, blocking the cascades of intracellular events leading to cell division, are in phase II and III trials. They are already part of routine treatment in other cancer forms.

Another trend is that more than one pathway has to be blocked in many cancers, as they have pathological changes in more than one pathway. Thus cell division may still take place, although one of the pathological pathways might be effectively blocked. This is probably the explanation of so called resistance to tamoxifen in HER2 positive oestrogen receptor positive breast cancer. Both tamoxifen and Herceptin has to be used for effective blockade in these cases. In addition to the complexity of treatment, the cost will also increase due to multi-drug therapy, and probably be a problem to the hospital economy if the financial system is not changed.

Phase III randomised trial of intra-operative radiotherapy in BCT is under way, and seems to be just as good as the present 25 or 32 days postoperative treatment, at least

for women above 50. Thus it seems that the length of treatment, and resource use in BCT, can be significantly reduced in the near future.

When it comes to surgery, the development will probably be even less mutilating procedures. The first trials on destroying small primary cancers, either by cryo-therapy or heat probes introduced without skin incisions, are under way, and I cannot see any reason why that should not be just as safe as open surgery. There is also an ongoing discussion about whether axillary toilette is necessary in all cases of proven sentinel node metastases.

But even if the amount of surgery will decrease, the demand on the surgeons' knowledge of the biology of the disease will be increasing. Patients with larger tumors necessitating mastectomies will never disappear. For those patients the demand for reconstruction will increase. The same will be the case of those having mutation in the BraCa gens 1 and 2 wishing prophylactic mastectomies. For the medium sized tumors advanced oncoplastic techniques will allow BCT where we today do mastectomies. With an overload of work in the plastic surgery departments, and unacceptable long waiting times, specialists in breast surgery should be trained to perform such procedures. Thus there will be plenty of challenges for breast surgeons also in the future.

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42. Endocrine Surgery

Jan Erik Varhaug

What is “Endocrine Surgery”?

In *The History of Endocrine Surgery*, (Praeger, NY, 1990), Richard B. Welbourn describes three phases in the evolution of endocrine surgery:

At first, surgery of the endocrine glands was a part of general surgery. There are reports of surgery on life threatening goitres from the Salerno school about 1170. The first account of a successful removal of a goitre stems from Paris 1791.

Then followed the emergence of endocrinology and recognition of syndromes of hormonal excess. Cure of metabolic diseases by surgery was a novel principle in early 1900. It was applied to hyperthyroidism, hyperparathyroidism, hyperinsulinism, and hypercatecholaminemia. Antithyroid drugs made thyroid surgery safer. Characterisation and production of hormones allowed for hormonal substitution after organ removal.

The present phase started around 1950, when surgeons began to view endocrine surgery as a whole instead of concentrating on separate glands. It was accepted that the tumour first diagnosed could be a part of a multiple endocrine adenopathy. The concept of the APUD system (Amino precursor uptake and decarboxylation) and APUD tumours (Alexander Pearse) has been modified, but it was useful for drawing attention to the neuroendocrine system.

One could add a fourth phase, initiated by the disclosure in the 1980ies of germ cell mutations that cause multiple endocrine tumour syndromes (MEN1, MEN2A, MEN2B). Prophylactic surgery can be done in childhood to avoid cancers that otherwise develop with high degree of penetrance. An example is thyroidectomy in MEN2 Ret mutation carriers to prevent medullary thyroid carcinoma.

Endocrine Surgery in Norway up to 1950

In 1895 Fredrik Ramm, Tromsø, reported positive effects of castration in patients with urinary retention caused by prostatic hypertrophy.

From the end of the 19th century and until drugs were developed from 1970ies that could counteract or abolish oestrogen production, oophorectomy, adrenalectomy, and even hypophysectomy was used in the treatment of advanced breast cancer.

Andreas Tanberg, a rheumatologist, published his thesis called “Experimental investigations into the function of the parathyroid glands” in 1913. He was especially interested in the relation between the thyroid and parathyroid glands, and was able to demonstrate in animals that “The parathyroid and thyroid glands are independent organs, each having specific functions”.

Kristian Brandt published “two new cases of osteomalacia” in 1913. The same year Johan Nicolaysen reported on short time effects of homotransplants and longer lasting effects of autotransplants in “Transplantation of parathyroid (tissue) in postoperative tetany”. The report clearly reveals to present day readers the very serious consequences of hypo- or a-parathyroidism at a time with insufficient ways to treat hypocalcemia.

In 1915 Peter Bull and Francis Harbitz (professor of pathology) published a very thorough report on “A case of osteomalacia with a parathyroid tumor”. They concluded that “There must be some kind of connection between osteomalacia and the parathyroid glands, directly, or perhaps more likely, indirectly. It is of note, though, that osteomalacia occurs without parathyroid hyperplasia, and there are parathyroid hyperplasias without osteomalacia” (translated from Norwegian). Harbitz also presented more cases and wrote an interesting review “On Tumors of the Parathyroid glands”, describing the status of international knowledge at that time, a few years before major break through in understanding functions of the parathyroid glands. He described a problem that is still not solved, – the differentiation between parathyroid adenoma and hyperplasia.

In 1924 Harald A Salvesen defended his thesis “Studies on the physiology of the parathyroids” at The University of Oslo. Salvesen made the landmark observation, based on studies in dogs, that the parathyroid glands control calcium metabolism with consequences for “probably all organs”.

The first operation in Norway for goitre, a partial resection of a struma parenchymatosa, followed later by ligation of the contralateral superior thyroid artery, was mentioned in the annual report from Rikshospitalet by Johan Hjort in 1868. Some of the succeeding chiefs of surgery at Rikshospitalet, Johan Nicolaysen, Peter Bull and Johan A Holst, wrote articles about thyroid surgery. Holst wrote several articles about thyreotoxicosis, some with surgical aspects. His doctoral thesis 1923 was named “Untersuchungen über die Pathogenese des Morb. Basedowii”.

According to Johan Nicolaysen, Ulfert Lied at Drammen hospital was the Norwegian surgeon who had the largest experience with operations for goitre and Graves’ disease, with eminent results. From about 1900, “thanks

to the good results and low mortality from his operations, surgical treatment became accepted –by patients as well as doctors – as the only correct treatment for Mb. Basedow”.

Endocrine Surgery becomes a Separate Entity

In the 1950ies and 60ies parathyroidectomy was generally performed by urologists. The most notable were Sten Sander at Aker, Thorolf Gjersvik at Haukeland, and Willy Mathisen at Rikshospitalet. The main reason was that urinary calculi frequently occurred in patients with hyperparathyroidism (HPT). At Rikshospitalet the majority of patients undergoing parathyroid surgery were uremic patients in dialysis (secondary HPT) and, later on, patients with persisting (tertiary) HPT after successful renal transplantation.

The term Endocrine Surgery was rarely used in Scandinavia until the end of the 1960ies. At the beginning of the 1970ies the concept of endocrine surgery as a “multi-organ” unity, was gradually accepted in several Swedish centres like Uppsala, Stockholm, Gothenburg, and Malmö/Lund, and also in Copenhagen.

In 1970 Peter Heimann, associate professor of surgery at Sahlgrenska Hospital, Gothenburg, was called upon to become professor and chief of surgery at Haukeland University Hospital in Bergen. He reorganised clinical work, as well as education and research. The Department of General Surgery was divided into relatively autonomous units, including a Section of Endocrine Surgery, which he headed himself.

Endocrine surgery comprised diseases and tumours of the thyroid, parathyroids, adrenals, and neuroendocrine GIP (GIP = gastro-intestinal-pancreatic) system. In addition, breast cancer became the responsibility of the unit, partly because endocrine treatment was an important part of breast cancer treatment, partly because of the low volume of endocrine surgery.

Professor Heimann was an ardent spokesman for endocrine surgery, which was his main surgical field of interest. He arranged national postgraduate courses in Bergen (see below). In these courses, and in daily work, strong emphasis was made on routines for multidisciplinary coopera-

tion with medical endocrinology, pathology, radiology, oncology, ENT, and hormone laboratory. The endocrine surgeon should be well educated, and able to contribute to multidisciplinary patient care in all phases, - diagnostic, therapeutic, follow-up.

Heimann also established the first regional service centre for cancer patients in cooperation with the Norwegian Cancer Society. He had many international contacts. He was on the editorial board of *World Journal of Surgery*. He was the key person for founding the International Association of Endocrine Surgeons (IAES) in 1979. His contributions to international endocrine surgery are commemorated at the IAES congresses by the honorary Peter Heimann Lecture. Heimann was the major initiator of endocrine surgery as a concept in Norway. He put the concept into practice by establishing the first specialised surgical unit in Norway in this field. Peter Heimann untimely died from cancer in 1978.

The Present Situation

During the last years there has been a trend towards “focused”, “mini-invasive” strategy techniques with the aim of better cosmetic results, especially in parathyroid and thyroid surgery. Access to the neck can be achieved from incisions in the axilla or periareolarly in the breast. Laparoscopic adrenal surgery, both trans-peritoneal and retroperitoneal, brings less morbidity as compared to open surgery.

Parathyroid Surgery

Primary hyperparathyroidism (pHPT) is presently being diagnosed more frequently than previously. From 1999 to 2005, the number of parathyroid operations increased by 58%, from 282 to 446 per year, and the number of hospitals performing such operations decreased from 29 to 19. Eight out of the 29 hospitals performed > 20 operations per year, only two hospitals more than 50. The number of patients operated upon for HPT varied between counties, from 19 to less than 5 per year and 100 000 inhabitants. The reasons for these major differences were not found in a study carried out by Lindeklev and co-workers in 2009.

Presently there is increased focus on early diagnosis and treatment of “subclinical” stages of HPT. Better localising techniques and the use of per-operative s-PTH determi-

nations are valuable, but it is still a challenge to identify multi-glandular disease, especially prior to surgery. The trend to use minimally invasive approaches in HPT surgery requires high quality localisation techniques.

Thyroid Surgery

In 1990-94 thyroid surgery was done in 63 hospitals, in 2007 this had been reduced to 19. Marked differences between counties in frequencies of thyroid surgery are still evident. One aim of the Norwegian Society for Breast- and Endocrine Surgery, is to have centres for diagnostic evaluation of thyroid patients in 17 hospitals, corresponding to the Breast Diagnostic Centres.

A major requirement of a thyroid centre is access to high quality ultra-sonography (US), and US-guided fine needle cytology (FNC). The accepted indications for surgery are nodules or goitres with known or suspected malignancy, and benign tumours and goitres with symptoms or intrathoracic extension.

Most goitres in Norway are relatively small, causing few or no symptoms, and the majority of patients do not need an operation. A prerequisite for avoiding surgery is a thorough multidisciplinary diagnostic work-up including clinical history and examination and US with guided FNAC. Such evaluations are best made in centres with high volume experience. Norwegian guidelines are under revision (2010).

About 220 new cases of thyroid cancer are diagnosed in Norway every year. Although the prognosis is good in the majority of cases, surgery is important for morbidity and mortality. A thorough preoperative evaluation is needed to plan operative strategy adequately. Departments treating thyroid cancer must have good connections to head and neck-, and thoracic surgery.

About 1300 thyroid operations are performed in Norway per year. This volume is relatively low, and centralisation to hospitals with dedicated thyroid milieu is reasonable also from an educational view.

In some hospitals thyroid surgery has traditionally been performed both in general surgery and ENT departments. There is presently however, a tendency to combine forces.

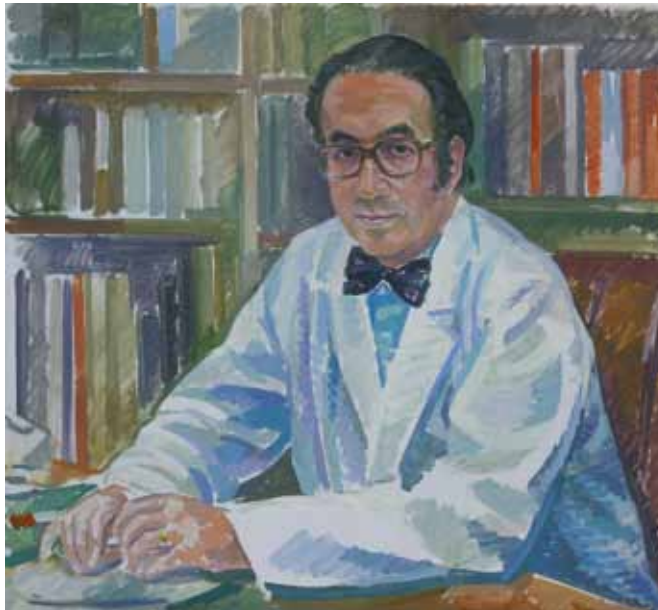


Fig 42-1. Peter Heimann. Painting by Bjørn Tvedt. Courtesy UiB, Section for Photo and Visual Presentations



Fig 42-2. Jan Erik Varhaug. Courtesy UiB, Section for Photo and Visual Presentations

Adrenal Surgery

Incidentalomas in adrenal glands are not rare. Determining indications for surgery is a multidisciplinary task where endocrinologists, radiologists, nuclear medicine physicians, and endocrine surgeons are of major importance. In over 90% of cases, adrenal tumour removal can be done laparoscopically. Laparoscopic adrenalectomy was initiated at Rikshospitalet (Bjørn Edwin) in 1986, at Haukeland Hospital in 1987, St. Olav's Hospital and Tromsø 2002. As of 2010, more than 600 laparoscopic adrenalectomies have been performed in Norway. This technique has largely reduced morbidity from adrenal operations. Laparoscopic resections for endocrine pancreatic tumours are performed in selected cases, especially in cases of a solitary tumour.

Clinical Units of Endocrine and Breast Surgery

The first clinical unit, a Section of Breast- and Endocrine Surgery, was established at Haukeland in 1971 by Peter Heimann (see above). He was succeeded by Jan Fredrik Halvorsen in 1978, and Jan Erik Varhaug from 1984 to

2005. Since 2005, Turid Aas has been head of the hospital section, and Varhaug head of the Breast- and endocrine section of the University Department of Surgical Sciences, University in Bergen.

Units for endocrine surgery have since been established first in the other university clinics, Trondheim (Hans Fjøsne), Ullevål (Rolf Kåresen), Aker (Thorstein Harbitz), Tromsø (Jan Due), and later, with varying degrees of autonomy, in most counties.

Many endocrine surgery patients can be given good care in a day-care surgery setting. During recent years about 60% of thyroid operations at Haukeland, and an increasing number of parathyroid operations, have been carried out in day care units, with the patient staying in the patient hotel the first night after operation.

Academic positions

In 1991 Jan Erik Varhaug was appointed professor of breast and endocrine surgery at the University in Bergen/Haukeland. This was the first academic position in



Fig 42-3. Rolf Kåresen

breast and endocrine surgery in Norway. In 2008 Michael Brauckhoff was appointed, also at Haukeland. He came from University Clinic, Halle, Germany, one of the main international centres of endocrine surgery, with special competence in advanced cancer surgery.

Rolf Kåresen was appointed professor in breast surgery at Ullevål in 2007. He retired in 2010. Two novel academic positions at UiO have been announced, but not filled. Hans Fjøsne was appointed Associate professor at NTNU/ St Olav's Hospital in 2011.

Dissertations and Other Publications the Last Fifty Years

During the later decades, only a few doctoral theses by Norwegian surgeons have been based on endocrine organs. Peter Heimann had presented his dissertation on the ultra-structure of the human thyroid in Gothenburg in 1966, i.e. before he came to Norway.

Rolf Kåresen studied morphology and immunology in guinea-pig thyroid and presented his thesis in 1971. Eldar

Normann presented his studies on parathyroid location using toluidine blue in 1974.

During recent years, surgeons in Arendal, Stavanger/ Haugesund, Akershus, Bergen, Tromsø, Aker, Rikshospitalet, Radiumhospitalet and Skien, have presented clinical experiences in thyroid and/or parathyroid surgery.

"Thyroid carcinoma; – molecular and clinical aspects", has been a major joint research project at Haukeland and University of Bergen for many years, based on a tissue bank from thyroid operations. It has produced novel insights into thyroid cancer biology and has so far been the basis for nine doctoral theses. Unfortunately, none of the medical candidates have chosen to become surgeons.

Textbooks and Guidelines for Treatment

In the 1970ies books on endocrine surgery started to appear. In Sweden, Sten Tibblin and Bengt Zederfeldt in 1972 wrote a tiny textbook, probably the first one, for medical students. The first international textbook, "Manual of Endocrine Surgery", was published in 1975.

In Norway a multidisciplinary booklet on diagnosis and treatment of thyroid diseases was published in 1996, edited by Sylvi Aanderud and Trine Bjørø. The third revised edition will soon be published.

In 2007 Norwegian guidelines were made for the diagnosis, treatment and follow up for thyroid carcinoma. These guidelines are presently under revision under the auspices of the Norwegian Directorate of Health.

Organised Teaching of Endocrine Surgery

In the 1970ies and 1980ies postgraduate courses in endocrine surgery were arranged at the Royal Postgraduate Medical School, Hammersmith Hospital, London. The courses were excellent and probably had inspirational impact for the building up of Nordic postgraduate courses.

In 1973 a postgraduate two days course named “Diseases in the Parathyroid glands”, was arranged at Aker. This may be considered a sign that time was ripe for “endocrine surgery”.

The first Norwegian postgraduate courses in Endocrine Surgery were initiated by Heimann. In 1975 the course covered thyroid and parathyroid surgery, in 1976 the adrenals and the neuro-endocrine pancreas. Postgraduate courses in endocrine surgery (mainly thyroid and parathyroid surgery) were arranged every other year, alternating with breast cancer courses, at the Haukeland the following 20 years. These courses became compulsory education for the specialty of General Surgery.

The Nordic Surgical Society had an active Nordic Endocrine Surgery Group, which arranged courses and coordinated Nordic research in Endocrine Surgery. It has continued its function even after The Nordic Surgical Society stopped having special Nordic congresses. The first Nordic course in endocrine surgery was arranged in 1978, and since then 13 more courses, initially covering both endocrine and breast surgery, have been arranged by Nordic cooperation.

The International Association of Endocrine Surgeons (IAES) arranges advanced courses every second year.

Present Day National Courses

Ullevål and the Norwegian Breast Cancer Group arrange a 30 hours course on breast cancer, and Haukeland a 30 hours course in endocrine surgery every second year, both compulsory courses for the subspecialty Breast-and Endocrine Surgery.

St.Olav's Hospital is responsible for a compulsory combined course in breast- and endocrine surgery for General Surgery candidates.

The European Specialty of Endocrine Surgery

The European Society of Endocrine Surgeons (ESES) was founded in 2003.

Since 2003 The Division of Endocrine Surgery, Board of Surgery of the UEMS (= Union Européenne des Medecins Specialistes) has administered board examinations in endocrine surgery. As of 2011, there are two Norwegian “Fellow of the Division of Endocrine Surgery of the European Union of Medical Specialities”.

The Specialty of Endocrine Surgery in Norway

In 1998, Rolf Kåresen, Sten Sander and Jan Erik Varhaug suggested to the Norwegian Surgical Society that a process should be started to establish a formal breast- and endocrine surgery “profile” within one of the surgical subspecialties.

In 2004 the general assembly of The Society appointed four members, Rolf Kåresen, Ivar Guldvog, Ida R Bukholm and Jan Erik Varhaug, to work out a plan, including goals and required skills, for Breast- and Endocrine surgery as a subspecialty within General Surgery. Breast- and endocrine surgery were the only remaining areas of General Surgery without formal requirements for skills and knowledge at an advanced level, and thyroid and parathyroid surgery were performed at many hospitals with very few cases per year (see above).

The Ministry of Health established the subspecialty in 2006, and decided that it should comprise thyroid,

parathyroid, and breast surgery. Adrenal and GIP tumours should be the responsibility of the respective organ specialists: urology and gastrointestinal surgery.

Detailed requirements have been made regarding clinical training, types of educational hospital, numbers and types of surgical procedures, compulsory courses and by-choice courses.

Number of Specialists Needed

The Norwegian Society of Breast- and Endocrine surgery estimates the need for specialists in endocrine surgery to be 50–60 surgeons. Only 47 have been authorised up to now (2011). Their median age is nearly 50 years. The number of training posts for specialist candidates is presently too low to meet the needed education and training requirements of new candidates.

The Future

The new subspecialty and the dispersion of specialists make a strong foundation for clinical and scientific cooperation, but it is necessary to continue the ongoing process, and establish new, good cooperative clinical milieus with colleagues in endocrinology, pathology, oncology, head and neck surgery, radiology, ultra-sonography, and nuclear medicine. The academic milieu within the speciality is weak with only three positions (UIB and NTNU) established at the present time (end of 2011). It should be a goal that at least all university hospitals have a top rank academic position.

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43. The Norwegian Society for Breast and Endocrine Surgery

Rolf Kåresen

The Norwegian Society for Breast and Endocrine Surgery (NSBE) is by far the youngest surgical specialist society in the Norwegian Medical Association (NMA) as Breast and Endocrine Surgery first was accepted as a subspecialty in May 2007. Nearly twenty years had then passed since a similar event occurred.

The establishment of the subspecialty was a logical consequence of the fact that the specialty General Surgery had been split into eight different specialties and subspecialties over the years. Thus most of the general surgery was distributed to subspecialties and only breast and endocrine surgery were left as “orphans”. Realising that this most probably was the reason why breast surgery had such a low status in Norway and observing that endocrine surgery was a “pet” activity of surgeons very busy in their ordinary subspecialties and not really concentrating on research and development in endocrine surgery, Sten Sander, Jan Erik Varhaug and Rolf Kåresen (the author of this chapter), early in the 1990ies took the initiative to propose that the Norwegian Surgical Society (renamed Association in 2006) should recommend that a subspecialty covering breast and endocrine surgery should be established.

In three consecutive General Assemblies in Norwegian Surgical Society a great majority of those present supported the suggestion, but without much reaction from the Norwegian Medical Association. At last, through active

lobbying, we got the support of NMA's Board in April 2003. However, when the General Assembly of NMA had it on its Annual Meeting in May that year, 58 voted no, 57 yes to the proposition. In spite of this, we succeeded in November 2004 to bring the case to a government body responsible for the education and deployment of doctors in Norway (Nasjonalt råd for spesialistutdanning av leger og legefordeling (NR)) and they recommended its establishment. Still nothing happened, and NR again had the case with a recommendation in November 2005. As nothing happened even after this decision, we got the support of the Association of Women Operated for Breast Cancer for a direct contact with the Health Minister in the autumn of 2006, and in November the Minister ordered that the subspecialty should be established, and that practical work with appointing a specialty committee, specialty rules, etc should start.

Jan Erik Varhaug was appointed as the first leader of the committee. In August 2008 the specialty requirements were accepted by the Norwegian Medical Association, and in February 2008 by NR. The final letter of approval came from the Ministry of Health in May 2008. Whether the process should be called an extreme example of bureaucracy or very thorough handling is a matter of taste. Anyhow, this is a warning to anyone who plans to suggest a new specialty. You must be a stayer to succeed!

Realising that only formalities were left, members of a

preliminary board of NABE were appointed by NSA in October 2007 with Ellen Schlicting as president. The board started their work in January 2008 and laid its foundation. Rolf Kåresen was elected president from 1. January 2009 till 31. December 2010.

The main activities of the Board have been to recruit members to the society (per October 2009 the number was 44), to run a homepage with information to the members, to establish a broadband based educational meeting system for the country, to establish grants for members who wish to go abroad as observers, and to take part in the activities of the Norwegian Medical Association through hearings and meetings.

The president represents NABE on the Board of the Norwegian Surgical Association. The borderline between NABE activities and the subspecialty committee's work has easily been drawn. The committee concentrates on the

evaluation and acceptance of both institutions and individuals according to the rules, while NABE has its focus on education and health political aspects within the specialty. In order to coordinate activities, the president of NABE has also been a member of the specialty committee.

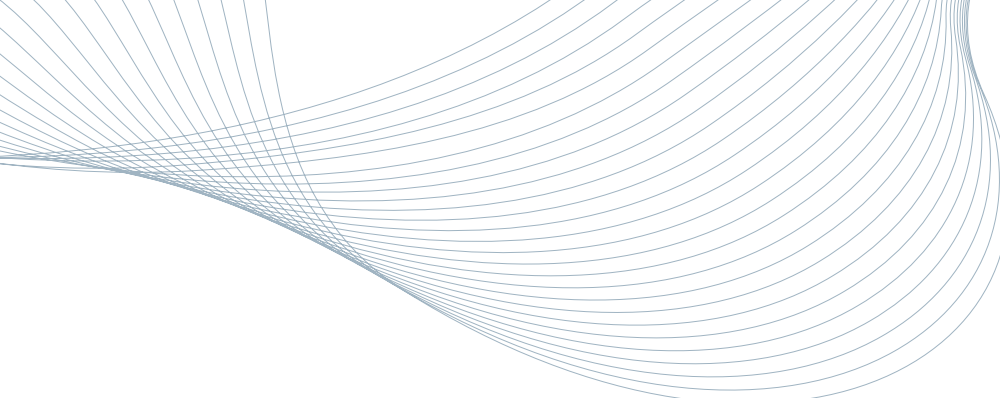
A new board was elected by the general assembly of NABE October 2009 with Anne Irene Hagen as president.

Table 43-1. The Chairmen of The Norwegian Society for Breast and Endocrine Surgery

2008–2010	Rolf Kåresen
2011–	Anne Irene Hagen

Acknowledgement

The author and editors would like to thank Jan Erik Varhaug and Anne Irene Hagen for comments to the manuscript.



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44. Orthopedic Surgery in Norway up to 1986

Arne Rugtveit (written in 1985, edited by J Haffner 2010)

In 1741 the Frenchman Andry introduced “orthopedic” derived from the greek *orthos* (meaning to straighten) and *pais* (child) in his book “*Ortopaëdie ou l’art de prevenir et corriger les deformités dans les enfants*” (“the art of preventing and correcting deformations in children”). During the next century this narrow field developed into its own medical specialty encompassing damage and disease in the musculoskeletal system in both adults and children and became known as orthopedic surgery.

The primary development differed in America and Europe. A “bandage technique” was the basis on the American continent whilst the anglo-saxon orthopedist was known as “the bone-setter” being primarily surgically minded with greatest emphasis on fractures and damaged joints and muscles. In some contrast to the European development, the Scandinavian development was very special since it originated from the social aspects of orthopedics.

Sophies Minde

In Norway, it started with the Fleischer sisters, Agnes and Nana. On a trip to Finland they became acquainted with the work done for the disabled. The following year the society for the disabled persons was established. This was the setting stones for a central and important part of orthopedic surgery, namely rehabilitation, fifty years later.

The private initiative of the Fleischer sisters strongly affected the establishment of a central disablement institution for the whole country. A donation from King Oscar II and Queen Sophie gave a solid economical basis for a school called Sophies Minde Ortopedisk Hospital (Sophie Memorial Orthopaedic Hospital).

This was to be a centre for Norwegian orthopedics for the next half a century. The school was founded in Skådalen just outside Oslo, but within a few years, due to limited space, new localities in Trondheimsveien 132 were bought (in 1915). However, rebuilding took time, and the move from Skådalen to the new Sophies Minde occurred as late as 1927. A “Students Hall” was incorporated in the new localities and the education offered at that time was considerable, being both practical and theoretical. Later a workshop for orthopedic bandaging and footwear was established. At last there was a possibility of combining orthopedic surgery and physiotherapy.

Paul Victor Bülow-Hansen was the first chief consultant. His orthopedic work included a good deal of open surgery. He shared his experiences with his Scandinavian colleagues at The Nordic Orthopaedic Federation Congress in Gothenburg in 1927 with his talk on “Some typical orthopedic operations with follow-up”. Bülow-Hansen’s surgical treatment of Erbs paralysis should be mentioned, namely transposition of *musculus subscapularis* from the

crista tuberculum minores to the dorsal side of tuberculum majus.

In 1934 Eivind Platou (Fig 1) took over as chief consultant and retained this appointment 3 times longer than his predecessor. Due to his surgical activities and teaching of junior staff and medical students, Platou contributed immensely to Norwegian orthopedic surgery under his leadership. The treatment of congenital hip displacement was improved. He also performed plastic operations on the knee joint with some success. Platou also introduced surgical sympathectomy to improve peripheral circulation in poliomyelitis affected patients.

Platou retired in 1953 and was succeeded by Ivar Alvik (Fig. 2). He functioned at a time when great progress was being made in Norwegian orthopedic surgery, contributing himself in this development. His doctorate involved tuberculous spondylitis. He had a wide field of interest within orthopedic surgery. In 1958 he was bestowed a professorship in connection with his consultant appointment and thus became the first professor of orthopedic surgery in Norway.

Alvik was very dynamic and everyone acquainted with him during their orthopedic career was affected by him. His contribution to Norwegian orthopedic surgery raised it to international level. Alvik's main interests centred on back and hip problems. Although he was concerned with rehabilitation, Alvik supported the closure of the Students Hall at Sophies Minde. He wished to transfer this type of teaching school out into society as part of a conscious social integration of the physically and mentally handicapped. On the other hand, the establishment of the technical prosthetic engineering school, the first in Scandinavia, was due to Alvik. Under his leadership the surgical and nursing unit was extended and modernised. The institution changed face and name; from "Disabled Institution Sophie Memorial" to "Sophies Minde". Alvik had strong feelings about the role orthopedic surgery was destined to play, and he did not hide the fact that orthopedics was undervalued by his surgical colleagues. He worked energetically to establish orthopedic departments all over the country for both acute and elective orthopedic surgery.

After Alvik's death in 1971, Magnor Foss Hauge was appointed chief consultant and professor. He retired in 1982 and was succeeded by Ingjald Bjerkreim.

The Coastal Hospitals

Before looking further at orthopedic development, some special institutions which played a tremendous role in Norwegian orthopedic surgery should be considered, namely, the "Coastal Hospitals". In the previous and early part of this century tuberculosis was a serious community disease. Among manifestations seen were scrofulosis and bone and joint affection. Four coastal hospitals were built because of these tuberculous manifestations. Their positioning at that time, was supposed to be favourable therapeutically due to climatic conditions.

The Coastal Hospital, Stavern, opened in 1892 and Christian Sinding-Larsen was the first chief consultant. He submitted his thesis on tuberculous coxitis in 1908. His main surgical procedures involved the evacuation of tuberculous foci, but he also undertook hip joint resections. Later he preferred immobilisation as choice treatment. He stepped down in 1910, and was followed by Halfdan Sundt. In 1923 Sundt's doctorate on Perthe's disease was internationally acclaimed. He was succeeded by Henrik Støren in 1943, and he followed up with active surgical treatment of tuberculous foci. However the number of cases of tuberculosis declined, and this empty capacity was filled by non-tuberculous orthopedic problems. Physiotherapy was established and junior doctors were employed. Støren retired in 1963 and was succeeded by Kåre Hadland until surgical activity disappeared in 1965. The hospital then became a rehabilitation centre under Nils Alm's leadership.

The Coastal Hospital, Hagevik in Bergen opened in 1893. It was the largest of the coastal hospitals with 200 beds. Its function involved the treatment of children with varying tubercular lesions, and it resembled a sanatorium.

Herman Gade was the first Head of Department, followed by Herman Thrap-Meyer in 1946. Like Stavern, as tuberculosis became controlled, the character of Hagevik changed and more non-tubercular orthopedic problems were treated. Otto Brinchman Hansen took over in 1953 and he was followed by Einar Sudman in 1978. The 3 last mentioned consultants had received their orthopedic education at Sophies Minde. During Sudman's appointment, the surgical activities increased enormously, but concentration was placed on elective surgery. A professorship was assigned to the chief consultant appointment eventually.



Fig 44-1. Eivind Platou. Portrait by Sigfrid Ørstad 1953. Courtesy Rikshospitalet



44-2. Ivar Alvik. Courtesy Elling Alvik

Sudman affected renovation of the hospitals building and after a period of insecurity it has found a natural place in regional health care although it is situated 60 kilometres from Bergen and the university.

The Coastal Hospital, Vadsø, opened in 1912 with 28 beds. Treatment was mainly conservative and this hospital functioned until 1945.

Tromsø Coastal Hospital was opened in 1924 with 100 beds. Carl Meyer was the first chief consultant. Tuberculous spondylitis was treated by operative fixation and tuberculous knee and hip joints were resected. In 1943 he was succeeded by John Egilsrud, but 2 years later Leif Sire took over as chief consultant and functioned until the hospital closed in 1961.

Other Orthopedic Hospitals

Martina Hansen's Hospital, Sandvika, just outside Oslo, was founded in 1936 due to a testamentary gift. The benefactors name was bestowed on the hospital. As at coastal hospitals, treatment was confined to scrofulosis and bone tuberculous patients. As time progressed and tuberculosis was practically eradicated, non-tubercular orthopedic problems were treated. John K Hald was appointed the first chief consultant until 1961, when Bernhard Paus took over. Paus retired in 1980 and Rolf Hagen was his successor. This hospital treats practically all

bone and joint tubercular cases in Norway today, but this accounts for less than 1% of the hospitals patients. 99% of the patients have non-tubercular problems.

Kronprinsesse Märthas Institute (KMI), Oslo was built by the Poliomyelitis Association and opened in 1956. Vaccination quickly controlled the spread of the disease, and practically from the start KMI functioned as a special orthopedic hospital with its main emphasis on neuro-orthopedic and hand surgery. Henrik Nissen-Lie was the first head of this hospital. The Norwegian state took over KMI in 1965. Nissen-Lie retired in 1973 and was succeeded by Arne Rugtveit. Since 1983, KMI and Sophies Minde have functioned as orthopedic centres for Health Regions 1 and 2. KMI has 74 beds, half devoted to hand surgical patients. In 1983 KMI started to function as an extremity replantation centre for Health Regions 1 and 2.

Orthopedic Service in General Hospitals

The Norwegian orthopedic service has developed progressively during the past 25 years. Orthopedic departments and units dealing with both acute and elective surgery have sprung up in most counties. An overview of the first establishments of orthopedic surgery within a general public hospital in the various counties in Norway is shown in Table 1.

Table 44-1. Overview of first establishment* of orthopedic surgery within a general public hospital in the various counties in Norway

County	Place of hospital	Year of first establishment	Name of the first orthopedic surgeon
Sør-Trøndelag	Trondheim	1959	Peter Sundt
Vestfold	Tønsberg	1963	Bernhard Paus
Oslo	Aker	1964	Adolf Møllerud
Telemark	Skien	1965	Kåre Hadland
Troms	Tromsø	1967	John Hald
Vest-Agder	Kristiansand	1968	Helge Fjermeros
Møre og Romsdal	Ålesund	1971	Kjell Matre
Aust-Agder	Arendal	1972	Jarle Skaugen
Oppland	Gjøvik	1972	Kristoffer Ihler
Østfold	Fredrikstad	1972	Erik Lie
Nord-Trøndelag	Namsos	1973	Einar Vestad
Hordaland	Bergen	1974	Sven Olerud
Sogn og Fjordane	Lærdal	1974	Erik Odberg
Hedmark	Elverum	1975	Eldbjørn Ronglan
Nordland	Bodø	1976	Lorentz Rolfsen
Buskerud	Drammen	1980	Imre Gabor
Rogaland	Stavanger	1982	Sverre Skeie
Finnmark	Hammerfest	1983	Erik Odberg
Akershus	Lørenskog	1984	Lars Skogland

* Establishment which resulted in continuous service within a wide field of orthopedic surgery.

All the orthopedic surgeons mentioned in table 1 have paid valuable contributions to the further development within orthopedic surgery in Norway.

The development of orthopedic surgery at the general hospitals has taken place despite the lack of support from general surgeons. However, 3 general surgeons who have supported orthopedic progress deserve special mention: Arne Arnesen, Trondheim, Francis K Harbitz, Aker Hospital and Gunnar Ulland, Sandnes Hospital.

Development Orthopedic Surgery within the Largest General Hospitals

Trondheim Regional Hospital. The head of the surgical department Arne Arnesen was behind the opening of a combined acute and elective orthopedic department independent from the surgical department in Trondheim in

1959. Petter Sundt was the first chief consultant, followed in 1973 by Per Edvardsen in the present Regional Hospital in Trondheim. Edvardsen received simultaneously a professorship. After his death in 1985, Pål Benum became chief consultant. He had earlier experience in that department and was also given professorship. At the moment (1985), the department employs three consultants of whom one is in particular involved in hand surgery (Harald Russwurm) and another in rheumasurgery (Jaques Vassal).

Aker Hospital, Oslo. At this hospital professor Harbitz at the surgical department opened an independent orthopedic unit in 1964. Adolf Møllerud was made head of department, but was succeeded by Ulf Slungaard in 1980. Acute and elective orthopedic surgical procedures are undertaken.

Tromsø Regional Hospital acquired its own orthopedic surgical department in 1967. John Hald was the first head

of this department, Einar Sudmann was appointed as associated professor in 1975. Later Olav Reikerås has been appointed a professor.

Haukeland Hospital, Bergen. The Swede Sven Olerud was appointed as a professor in general surgery in 1974. He was also an orthopedic surgeon, and in fact orthopedic surgery was his main interest. Primarily Haukeland Hospital had dealt with traumatic orthopedic problems, occasionally doing some elective procedures. Elective surgery increased during Oleruds reign whilst traumatological interests were maintained. Two years later Antti Alho succeeded Olerud and elective orthopedic surgery increased further throughout the seventies. Haukelands central block was opened in 1983 and on the fourth of March 1985 a separate traumatological orthopedic unit was started together with an increase in the number of beds. These events increased the capacity and led to a considerable increase in elective surgical activity. This orthopedic traumatological unit, has to date, 66 beds for adults and 8–10 for children. Norvald Langeland is head of department (1983–92; editors note).

Rogaland Central Hospital, Stavanger. An orthopedic department was established in 1982 under the leadership of Sverre Skeie. Much credit for the development of orthopedic surgery in Rogaland has also to be paid to Gunnar Ulland who took the charge in 1943 as surgical consultant at Sandnes Hospital, a small mixed local hospital with 25 beds. He immediately started to extend the hospital which in the course of a few years expanded to 70 beds. Ulland realised however, at an early stage, that if Sandnes Hospital should have a future, it had to be a hospital with specialised functions. He chose orthopedic surgery, and in 1954 the planning committee for hospital building decided that Sandnes Hospital should function as a specialised entity for orthopedic surgery in Rogaland County. In the meantime, Ulland who was originally a general surgeon, qualified as an orthopedic surgeon. He provided the elective orthopedic service in Rogaland until

retirement in 1972 when Sverre Skeie took over. In 1982 the Hospital was transferred to the new Rogaland Central Hospital, and the number of beds increased to 123 incorporating both acute and elective orthopedics.

Ullevål Hospital, Oslo. This hospital was the last regional hospital where a section for orthopedic surgery has been established (1982). Before that time an extensive activity within fracture treatment and selected fields of reconstructive orthopedic surgery was performed under the leadership of general surgeons with special qualifications within this field of surgery (Arne Haukebø and Hans K. Dahl at Surgical Department II and III, respectively). Antti Alho was appointed chief and professor in 1983.

Orthopedic surgical units are now found at all central and regional hospitals in Norway, except at Rikshospitalet in Oslo, and also at some county hospitals. However, the situation appears to be difficult in those hospitals where orthopedic surgeons still overlap with general surgeons. The number of orthopedic specialists is often too small to cover the existing need in both acute and elective surgery. Also, the orthopedic surgeon often has to cover general surgery, a task he may not feel competent to. The general opinion among orthopedic surgeons is that an orthopedic unit should preferably be organised with its own staff.

Research and Specialisation

At University level, Norway's first professorship arose in 1958. This has increased to 8 by 1985. Considerable research activity has occurred in orthopedics and its side branches in the past 15 years. This must be considered in conjunction with the increased possibilities within the general orthopedic field and more specifically with the increased number of departments and appointments. This has led to an increased number of specialists in the orthopedic specialty. From 1955 to 1965 only 15 new specialists qualified. From 1965 to 1974, 40 qualified, and from 1975 to 1984, 62 specialists emerged.

Acknowledgements

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45. Microsurgery in Norway up to 1986

Astor Reigstad 1986

Microsurgery is one of the most remarkable advances in the realm of surgery within the last decades. The broad application of this new technique in Norway renders conventional operations altered in a profound way.

Otolaryngology

It is now more than 60 years since the two Swedish otolaryngologists Nylén and Holmgren operated a patient with otosclerosis using a binocular microscope in the operative procedure. They were of the opinion that operating microscopes of suitable working distance, and good illumination would improve the operative results compared to those obtained by using loupes. Suturing and anastomosis of fine structures could, however, not be performed until conventional surgical equipment were replaced by a variety of sophisticated microsurgical instruments and delicate atraumatic needles and sutures. With the accomplishment of these technical progress experimental microsurgery was established as a new branch of medical science around 1960.

Microsurgery is not a surgical specialty, but a surgical technique which can be applied in almost all branches of surgery. In Norway the otolaryngologist, Truls Leegaard, Ullevål Hospital, did the first operations under an operating microscope in 1948. He had become familiar with the technique during a study trip to USA. Starting with microsurgery of the middle ear, he soon extended the use of

the microscope to such procedures as dissecting tumours of the parotid gland and suturing peripheral nerves. The operating microscope is now widely used among Norwegian otolaryngologists both for diagnostic and therapeutic purposes.

Ophthalmology

In 1950 ophthalmology entered a new era when Barraguer and Perit sutured the cornea under an operating microscope. The first eye operation by means of a microscope in Norway was done at The Department of Ophthalmology at Rikshospitalet, Oslo, in 1961. Since this early introduction of microsurgery to clinical ophthalmology, its benefits have aroused the interests of all Norwegian ophthalmologists. All intraocular operations such as corneal transplantation, glaucoma surgery, cataract extraction, and repairing of ocular injuries are now performed under the microscope.

Hand Surgery

Repair of injured peripheral nerves is a common problem in hand surgery. In the two hand surgery centres in Norway, Kronprinsesse Märthas Institutt (KMI) in Oslo, and the Department for Plastic and Reconstructive Surgery at Haukeland Hospital, Bergen (earlier Betanien Hospital), operating microscope has been used in nerve suturing

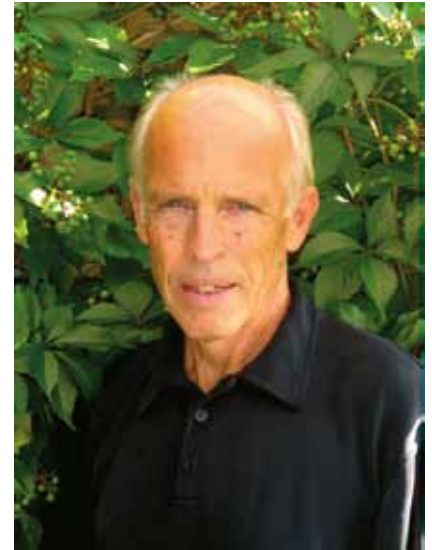


Fig 45-1. Astor Reigstad

since 1965. After the report of Millesi in 1972 on intrafascicular non-vascularised nerve grafts, this microsurgical technique in repairing a nerve with loss of a large segment of its trunk, was adopted at KMI by Arne Rugtveit in 1972. The technique of nervegrafting has now become a standard procedure among hand surgeons and neurosurgeons in Norway.

Neurosurgery

One of the most significant developments in neurosurgery was the introduction of microsurgical techniques. In 1962 Kurze and Doyle reported the removal of an auditory neuroma using an operating microscope. In Norway the microsurgical technique was introduced at the Department of Neurosurgery Rikshospitalet, by Helge Nornes around 1970, and already the following year the number of operations under microscope surpassed a hundred. The microscope was first used in operations for intracranial aneurysms and arteriovenous malformations, but already in the beginning of the 1970ies the first extra-cranial artery bypass was performed. The same neurosurgical department designed in 1969 an experimental model for anastomosing arteries in rats, which was used in developing microprobes for electromagnetic flowmeters. These probes were later used directly on cerebral blood vessels during operations. Microsurgical technique is now widely used in all the four Norwegian neurosurgical departments

in nearly all aspects of neurosurgery, such as cerebrovascular diseases, brain tumours, surgery of the cranial and peripheral nerves, and congenital malformations.

Experimental Surgery

In 1961 Sun Lee, San Diego, USA, successfully performed portacaval shunts in rats. Before that time patency of anastomosis of small vessels could not be assured. Thus, it was necessary in organ transplantation to choose relatively large animals in order to achieve successful vascular anastomoses. With the accomplishment of the new technique, Gonzales in 1962 was able to substitute rats for larger animals for renal transplantation, and later in 1962 Abbott et al used rats in cardiac transplantation. In 1977 Inge Brekke at The Department of Surgery Rikshospitalet, used microsurgical technique in his model for pancreas transplantation in rats, which was published in his thesis "Transplantation of the duct-occluded rat pancreas." Since 1978 the same department has arranged four courses in microsurgery for Norwegian surgeons, led by professor Sun Lee. Since 1980 Inge Brekke has performed microsurgical re-anastomosis of vas deferens in individuals previously sterilised by vasectomy. This technique is now adopted by several Norwegian urologists. Tube reconstruction has been performed under the microscope at Department of Gynecology, Rikshospitalet since 1982, and later at the other university clinics in Norway.

Replantation

In 1965 Komatsu and Tamai in Japan successfully replanted a completely severed thumb. The first totally amputated forearm was replanted by Chen Zhong-wei and Chien Jing-ching in Shanghai in 1963. Malt in Boston did a successful replantation of a totally amputated arm of a 12-year old boy in 1962. Since the calibre of blood vessels of the arm is relatively large, microsurgery is not considered indispensable. But the survival of replanted limbs depend very much on the patency of the anastomosed vessels, and high-quality anastomosis of vessels less than 3 mm in diameter is difficult to achieve without using operating microscopes or excellent magnifying glasses. The encouraging results of replantation surgery led to the establishment of emergency microsurgical services in many hospitals around the world.

The first successful replantation in Norway was performed by Dag Sørli, heart surgeon at The University Clinic in Tromsø in 1981. He replanted a thumb which was totally amputated just distal to the MPC-joint in a 17 year old worker by suturing two arteries and two veins, using loupes with four times magnification. In 1983 a centre for emergency microsurgery was established at Kronprinsesse Märthas Institutt (KMI), Oslo, led by Astor Reigstad. The first finger recirculation was performed just after the start of the centre, and the first replantation of a totally amputated distal forearm was performed in October the same year with good success. In December 1983 a subtotally amputated femur was replanted, and in June 1984 a foot which was totally amputated through the ankle joint. Until December 1986 141 replantations have been done at this centre, including 18 hand replantations with a total healing rate of 80 per cent.

Free Tissue Transfer

In 1972 Kiyonori Hari in Tokyo did the first free tissue transfer. He used the omentum to cover a large scalp defect. Later the same year he performed the first free skin flap. From this humble beginning we have witnessed a revolution in reconstructive microvascular surgery. More than 30 different free tissue grafts are now available, including skin flaps, muscle and musculocutaneous flaps, vascularised bone segments and osteocutaneous flaps, intestinal segments etc, and new promising flaps have recently been described.

In 1981 the two plastic surgeons, Øyvind Veholmen and Einar Aspelund in the Central Hospital, Stavanger, did the first free flap in Norway. They covered successfully a chronic heel ulcer by a latissimus dorsi flap. In January 1984 a centre for microsurgery was established at The Department for Plastic and Reconstructive Surgery, Haukeland, led by Børje Sundell, and later by Tore Haga. The first free scapular skin flap and the first thumb replantations were done in January 1984. At the Department of Orthopedics in the Regional Hospital in Trondheim, replantations have been performed from 1984, and free tissue transfer from 1985, led by Harald Russwurm. At Kronprinsesse Märthas Institutt in Oslo, the first free flap was operated in November 1983. A combined iliac osteocutaneous flap was used for covering a traumatic tissue loss of the upper forearm including a defect of the radial bone of 6 cm. Until December 1986 46 free grafts have been performed at KMI including transferral of 17 second toes for thumb reconstruction.

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The author and editors would like to thank Torstein Husby for comments to the manuscript.

46. Organisation of Orthopedic Surgery in Norway after 1986

Pål Benum

As described in the previous chapter about orthopedic surgery in Norway up to 1986, almost all elective surgery until the 1960ies took place in special hospitals for reconstructive surgery. In the following years up to 1986 elective orthopedic surgery became established in practically all general hospitals, but orthopedic service was still given in sub-units for orthopedic surgery in the surgical departments. Separate orthopedic departments were almost exclusively to be found in the university hospitals. The following years several separate orthopedic departments were established due to increased activity and sub-specialisation.

An overview of the organisation of the orthopedic service in 2009 is shown in table 1.

Table 46-1. Organisation of orthopedic service in Norway 2009

Health regions	Orthopedic departments	Orthopedic units	No formal orthopedic unit
South-East	16	5	3
West	5	5	1
Middle Norway	4	4	0
North	3	3	4
Total	28	17	8

In 16 of the 28 orthopedic departments sub-specialisation has resulted in more or less formally established sub-units for special disorders. In some large university departments six to eight such sub-units are found. Examples are sub-units for fracture treatment, spine surgery, replacement of major joints, arthroscopic surgery, foot and ankle surgery, children orthopedics, hand surgery, infections, amputations and prosthetics, neuro-orthopedic disorders and rheumasurgery. There is no common pattern for the composition of sections at the various hospitals. However, units for fracture treatment, hand surgery, spine surgery and replacement of major joints are found in most of the highly specialised orthopedic departments.

Sub-specialisation has to some extent also taken place in some of the 17 hospitals where a section for orthopedic surgery is found within a surgical department. In 8 hospitals with no formal orthopedic unit, orthopedic service is given by specialists of orthopedic surgery within the frame of the general surgical department.

In total, there is a specialist service in 53 surgical units in Norway. In only two of these the service is limited to elective surgery. Thus the distribution of orthopedic service has increased considerably since the middle of the 1980ies. It is worth noticing, that specialists in ortho-

pedic surgery are responsible for the fracture treatment in almost all hospitals in Norway.

Treatment of certain disorders are centralised to the university hospitals, such as part of pediatric orthopedics, neuro-orthopedic surgery, complicated reconstructive hand surgery, complicated revisions of arthroplasties, special spine surgery, chronic bone infections, multitrauma and some fractures such as fractures of the spine and acetabulum needing operative treatment. Furthermore, a national service for orthopedic treatment of patients with haemophilia and replantation surgery has been established at Rikshospitalet.

It is also worth noticing that there has been a major reorganisation of orthopedic surgery in Oslo. Sophies Minde, the first orthopedic hospital in Norway, established in 1927, and Kronprinsesse Märthas Institutt (KMI) amalgamated with the State Center for Orthopedic Surgery in 1991. In 1995 this unit was joined with Rikshospitalet, and in 2002 it became part of the new Rikshospitalet at Gaustad, constituting the orthopedic department. In 2009 the three university hospitals Rikshospitalet, Ullevål, and Aker amalgamated into one, Oslo University Hospital (see chapter 4 for details)

Akershus University Hospital (Ahus), which is located close to Oslo, was given an increased role in the educational functions of Oslo University.

The changed organisation of orthopedic surgery has given improvements: Combined service for trauma and elective surgery has led to a positive exchange of knowledge between the two fields of orthopedic surgery. The transfer of elective orthopedic surgery from isolated orthopedic hospitals to the general hospitals has improved service from other specialties to patients needing elective orthopedic surgery. Also the sub-specialisation within the fields of orthopedic surgery has improved the standard of treatment offered to orthopedic patients.

Education of Specialists. Posts for Orthopedic Surgeons.

Orthopedic surgery was a surgical subspecialty from 1977 to 1997; the specialty in general surgery was a prerequisite for approval as a specialist in orthopedic surgery. During the same period a large number of posts for trainees were

altered to posts for specialists. A considerable number of orthopedic surgeons could now be employed in the new posts for specialists in minor and medium-sized hospitals. At such hospitals qualifications in general surgery were necessary since the surgeons had to cover all types of acute surgery on duty. The new rules for becoming a specialist within orthopedic surgery led to an increased number of orthopedic consultants around the country during the period 1980 to the early 1990ies. However, due to the increasing need for orthopedic surgery, and the sub-specialisation which gradually took place, the majority of orthopedic surgeons were in favour of a reorganisation of the specialist education, substituting general surgery with longer orthopedic training. Hence, orthopedic surgery was re-established as a specialty of its own in 1997. In 2009 the minimum length of hospital training is 6 years.

Most of the education takes place at the major regional hospitals and at the university hospitals. In addition to special requirements to the clinical education, a number of specified operations and courses are required before a candidate can be approved as a specialist. The number of approved specialists in orthopedic surgery trained in Norway more than doubled during the period 1991–2000 compared to the previous ten years. From 2001 the number seems to be stable (table 2).

Table 46-2. Approved specialists within orthopedic surgery 1971–2009

	Educated in Norway	Educated abroad
1971–80	57	
1981–90	92	
1991–2000	154	124
2001–2009	132	202
Total	435	326

A considerable number of surgeons from countries outside Norway have been approved as specialists in orthopedic surgery in Norway during the last two decades (Table 2). The majority of these are from other Scandinavian countries (Table 3). In addition a considerable number of the specialists from the foreign countries have been working in Norway for short periods.

Table 46-3. Distribution of approved specialists educated in countries outside Norway (EU and EEA)

Sweden	48.8%
Iceland	24.2%
Denmark	14.4%
Germany	6.7%
Other countries (n=10)	5.9%

The numbers of orthopedic surgeons in Norway in July 2009 are shown in table 4. Most of the 444 specialists were employed in university and county hospitals. However, there were also a considerable number in private hospitals (17%). This is in contrast to the 1980ies when only a few orthopedic surgeons were working full-time in private hospitals. It is worth noticing that the total number of specialists has increased more than 500% since 1980, and 30% since 2000; the numbers of such specialists were 84 and 344, respectively, in 1980 and 2000.

Table 46-4. Hospital posts in orthopedic surgery in Norway 01.07.2009

	Specialists	Trainees
University Hospitals	197	104
County Hospitals	128	98
Private Hospitals	76	13
Private practice	13	
Various	30	9
Total	444	224

Professors in Orthopedic Surgery 1986–2010

In 1986 there were only 6 professors in orthopedic surgery in Norway. As seen from table 5, 26 orthopedic surgeons have been professors during the period 1986–2010. At present there are 19; 8 at the University of Oslo, 6 at the University of Bergen, four at NTNU Trondheim and one at the University of Tromsø. There has also been a considerable increase in other type of scientific positions.

Table 46-5. Professors in orthopedic surgery in Norway 1986–2010

Oslo University	Bergen University	NTNU, Trondheim	Tromsø University
Ingjald Bjerkreim (SM)	Einar Sudmann	Per Edvardsen	Olav Reikerås
Olav Reikerås (RH)	Norvald Langeland	Pål Benum	Oddmund Johansen
Paul Lereim (RH)	Anders Mølster	Ingard Lereim	
Terje Terjesen (RH)	Leiv Hove	Terje Terjesen	
Annti Alho (UH)	Leif I. Havelin	Lars Engebretsen	
Arne Ekeland (UH)	Lars B. Engesæter	Vilhjalmur Finsen	
Lars Engebretsen (UH)	Ove Furnes	Helge Rønningen	
Lars Nordsletten (UH)	Eirik Solheim	Arild Aamodt	
Jan E. Madsen (UH)			
Knut Strømsøe (AH)			
Olav Røise			

SM: Sophies Minde, RH: Rikshospitalet, UH: Ullevål Hospital, AH: Aker Hospital

Research

Special Centres and Research Institutes

The Norwegian Directorate of Health has established a number of centres which are responsible for care of special groups of patients; and some centres that are responsible for development and research within special fields of medicine. Some of these centres relate only to orthopedic problems.

The National Centre for Dysmelia is located at Rikshospitalet. The majority of patients with dysmelia in Norway are treated at this centre.

The National Centre for Sarcomas is located at the Norwegian Radium Hospital. The majority of patients with bone- and soft tissue sarcomas in Norway are treated there. However, services in this field of orthopedic surgery are also given at the university hospitals in Bergen and Trondheim.

The Norwegian Arthroplasty Register is located at Bergen. It was established by The Norwegian Orthopaedic Association in 1987 on an initiative from Einar Sudmann, Lasse Engesæter and Norvald Langeland as a register for total hip arthroplasties. In 1994 arthroplasties of all types of joints were included. It has later been given the status of a national centre.

The National Centre for Orthopaedic Implants was established at St. Olavs Hospital, Norwegian University of Technology and Science in Trondheim in 1998. At this centre, which includes a biomechanical laboratory, clinical and biomechanical studies of orthopedic implants are performed.

The National Center of Reconstructive Hand Surgery in Tetraplegia was formally established at Haukeland in 2010, after a ten years period when the hospital had provided service in this field of surgery to the whole country.

Other Centres of importance for Orthopedic Research

The Institute for Surgical Research, Rikshospitalet. At this institute, which is the largest institute for experimental surgical research in Norway, there is a special group for experimental orthopedic research.

The Biomechanical Laboratory, Department of Orthopaedic Surgery, Rikshospitalet. This laboratory has been in particular involved in studies of bone healing, bone lengthening procedures, and spinal disorders.



Fig 46-1 Leif Havelin

The Unit for Research at The Orthopaedic Centre Ullevål Hospital. This unit includes experimental and clinical studies, mainly in traumatology, joint disorders and rehabilitation.

Oslo Sports Trauma Research Centre. This centre, which has been given a status as a FIFA Medical Centre of Excellence, is based on a cooperation between The Orthopaedic Centre, Ullevål, and The Norwegian School of Sport Sciences. The aim of this research centre is to prevent injuries in sports through research on risk factors, injury mechanisms, and injury prevention methods in sport activities.

The Unit for Orthopaedic Biomaterials at the orthopedic department Haukeland carries out studies on orthopedic biomaterials in cooperation with the Department of Clinical Dentistry.

Although all these centres have contributed to improved standard of the treatment of several orthopedic disorders, it seems justified to give some special comments on The National Register of Arthroplasties. The register is nationwide, and nearly all arthroplasties in Norway are reported to it. Based on observed complications resulting in revision surgery, the quality of the various types of implants can be evaluated. The analyses of the results have certainly given valuable information influencing the choice of implants, and several scientific reports have been given from this centre, first of all by Leif Havelin (Fig. 1) and co-workers. From 1987 to 1994 only total hip replacements were registered. From 1995 all types



Fig 46-2 Olav Reikerås



Fig 46-3 Terje Terjesen



Fig 46-4 Lars Engebretsen



Fig 46-5 Lars Nordsletten

of artificial joints are reported. A register of hip fractures and knee ligament injuries has also been established. The total number of reported primary total hip replacements until end of 2007 was 129 481. After 1994 all types of artificial joints are reported. Also a register of hip fractures and knee ligament injuries have been established. Havelin was the director of this register in 16 years from 1987. In 2003 he was succeeded by Ove Furnes.

Research Activities

There has been a considerable increase in research activities during these last twenty-five years. This is partly due to the activity at the centres mentioned above. However, important contributions have also been made by researchers working outside these centres. It is worth noticing that close to 30 per cent of the papers presented at the last combined meeting of the Norwegian Surgical Society and The Norwegian Orthopaedic Association in 2006 were related to orthopedic surgery. In 2008 12% of the scientific contributions came from non-university units. Furthermore, 11% were results of research performed in cooperation between such units and university departments, whereas 77% of the presented studies had been performed within university departments.

Since 1986 the number of papers published in international medical journals has increased considerably. The same is true for the number of PhDs. The research activity during the recent years has been in particular high at the orthopedic centre at Ullevål, where the number of publica-

tions in international medical journals was 36 in 2008 and the number of PhD candidates was 12. However, there has also been a considerable activity at the orthopedic departments in Bergen and Trondheim. The number of PhDs related to orthopedic surgery in the 10 years period 1999–2008 is shown in table 7.

Table 46-7. Number of PhDs related to orthopedic surgery 1999–2008

Oslo University	Bergen University	NTNU Trondheim	Tromsø University
24	7	10	2

Fourteen of the doctoral theses at Oslo University Hospital came from Ullevål, 9 from Rikshospitalet and one from Aker. Five of the theses at NTNU were based on experimental research at the National Centre for Implant Research; two of them at the Faculty of Engineering, Science and Technology.

Following a period with relatively high research activity at the university departments in Bergen and Trondheim, the activity during the last ten years has been significantly higher in Oslo. The present activity is particular high in the research groups of Olav Reikerås (Fig. 2), Terje Terjesen (Fig 3) and Harald Steen at Rikshospitalet, and Lars Engebretsen (Fig 4) and Lars Nordsletten (Fig 5) at Ullevål.

Profiles of Research Activities

Although some experimental and clinical research is performed at all university hospitals, the profiles differ.

Oslo University Hospital

Ullevål: Fracture and trauma treatment, bone metabolism, tendon healing, total hip replacement, knee injuries, cartilage lesions, sport injuries and rehabilitation.

Rikshospitalet: Pediatric orthopedics including neuromuscular disorders, hand and replantation surgery, total hip replacement, experimental research on fracture healing.

Aker: Fracture epidemiology, fracture treatment and geriatric traumatology.

Akershus University Hospital

Cartilage injuries and repair, fracture treatment.

University of Bergen

Arthroplasty register studies, fracture treatment, knee ligament injuries, experimental studies on fracture healing and hip arthroplasty, studies on biomaterials, pediatric orthopedics, hand surgery.

NTNU, Trondheim

Fracture epidemiology and fracture treatment, ultrasonography in hip dysplasia, experimental biomechanical studies, bone infections, total hip replacement (laboratory and clinical studies), knee ligament injuries, hand surgery.

University of Tromsø

Experimental fracture healing, cartilage research, in particular cartilage repair.

Development of New implants

Some new types of orthopedic implants have been developed in Norway.

The Christiansen hemi- and total prostheses (Christiansen 1974) is discussed in next chapter, "Trends in Orthopedic Surgery".

Most of the developed implants are related to fracture treatment. Among these is a compression screw for fixation of femoral neck fractures. This device was developed at Ullevål by Arne Haukebo (Svenningsen et al 1984).

Antti Alho developed the "Ullevål nail for fixation of combined fractures of the proximal part and the diaphysis of the femur" (Alho et al 1996).

At Haukeland, Per Helland developed a new type of external fixation (Exfire) enabling a controlled reduction of displaced tibial fractures (Helland et al 1996).

In cooperation with Leiv Hove, Helland also developed a dynamic fixator (Dynawrist fixator) for fractures of the wrist (Hove et al 1999).

Espen Haukeland at Diakonhjemmet has developed a special nail for proximal fractures of the humerus.

Although good results have been published after use of these fixation devices, none of them have been used to any large extent outside Norway.

In the field of artificial joints there have also been some Norwegian innovations:

An elbow prosthesis (NES Norwegian Elbow System) was developed at the Oslo Sanitetsforening Rheumatism Hospital in Oslo (Risung 1997), this prosthesis is also used outside Norway.

Finally a CT-based non-cemented customised femoral stem has been developed at the Orthopedic Department in Trondheim. This device, which was developed by Pål Benum and Arild Aamodt after comprehensive achieved studies, in cooperation with a group of mechanical engineers, was taken into use in 1995 (Aamodt et al 1999, Aamodt et al 2001, Aamodt et al 2002). The indication for this individually designed femoral stem is first of all deformities and abnormal size of the upper femur (Fig. 6). Promising 7 and 10 years results have been experienced (Benum and Aamodt 2010). The device, which is produced by Scandinavian Customised Prosthesis as (SCP) in Trondheim, is also in use in 5 countries outside Norway.



Fig 46-6a. Preoperative X-ray picture showing large valgus deformity of both femurs after previous valgisation osteotomies in a case with osteoarthritis secondary to hip dysplasia. Insertion of standard femoral components would be difficult without doing corrective osteotomies.



Fig 46-6b. X-ray picture showing inserted non-cemented custom femoral stems (Unique®, SCP Trondheim) with HA-coating of the proximal half of the stems.

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47. Trends in Orthopedic Surgery in Norway

Pål Benum

Orthopaedic surgery was established as a formal specialty in Norway in 1932. However, surgery related to fractures and disorders within the musculoskeletal system had been performed for more than 100 years prior to that. Furthermore, fractures and other injuries have been taken care of both by orthopedic surgeons and by general surgeons, up to the last 25–30 years.

The following survey of the trends in orthopedic surgery will mainly deal with the last 50 years, when very important changes have taken place. Important trends in the fracture treatment from the period when the majority of the fractures was treated by the general surgeons will also be mentioned.

Fracture Treatment.

In 1889 Jørgen Sandberg in Bergen performed an open reduction of an avulsed tibial tuberosity using an awl. A few years later some fractures were fixed with nails. Julius Nicolaysen performed the first nail fixation of a dislocated femoral neck fracture at Rikshospitalet as early as in 1894, but until the beginning of the 1960ies fracture treatment was mainly conservative with immobilisation in plaster cast, or traction treatment.

During the 1950 and early 1960ies there was a change in the treatment of certain fractures. Hemiarthroplasty with use of Moore or Thompson prostheses was used in some

femoral neck fractures. These types of prostheses were partly replaced during the 1960ies by the Christiansen hemi-prosthesis, developed by Tor Christiansen at Kongsberg. A few fractures of the tibia were fixed with screws or Parham's band, but this type of internal fixation did not eliminate the need for use of plaster casts. The same was true for diaphyseal fractures treated with Rush pins, and fractures of the tibial condyles and the ankle, fixed with screws or pins. However, during the following years, significant changes took place. Some of the most important are shown in table 1.

Use of intramedullary nailing of femur and tibia with the Küntscher technique, was introduced during the middle of the 1950ies by Arne Haukebø. This technique was taken into general use during the 1960 and early 1970ies in most hospitals in Norway. Haukebø (Fig. 1) and Hans K. Dahl (Fig. 2) were the pioneers in operative fracture treatment in Norway during the period 1960–1985. During the early 1960ies Haukebø introduced the AO-technique, which was developed by ME.Müller, M Allgöwer, H Willenegger and R Schneider in Switzerland. External fixation with the Hoffman device was taken into use by Haukebø during the 1970ies and became a generally used method in open and compound diaphyseal fractures, in particular in the leg.

The Swede Svend Olerud, the first professor of orthopedics at Haukeland, improved fracture treatment during his stay in Bergen 1974–76. His successor, Antti Alho



Fig 47-1. Arne Haukebø



Fig 47-2. Hans K. Dahl



Fig 47-3. Antti Alho



Fig 47-4. Pål Benum

Table 47-1. Trends in fracture treatment in Norway

	1955	1960	1970	1980	1990	2000	2005	2010
Intramedullary nailing	-----							
AO	-----							
External fixation	-----							
Interlocking nailing	-----							
Functional treatment.	-----							
Primary soft tissue reconstr.	-----							
Arthrosc. ass. repair intraartic. fr	-----							
Op. treatment columna fract	-----							
Op. treatment acetabular fract	-----							
Bone transport	-----							
Angle stable screws	-----							
LISS	-----							

from Finland (Fig 3), also had a very positive influence on the development. One of his contributions in the early 1980ies, was the introduction of trapezoid external compression frames for stabilising pelvic fractures. Such frames had been taken into use some years earlier in his home country, after thorough biomechanical studies performed by Slätis and Karaharju. It appeared later that the external frames not only stabilise the pelvic fractures, but also reduce the amount of bleeding.

Internal fixation of fractures according to the AO-principles improved the results, but severe soft tissue complications and deep infections after plate fixation of fractures of the tibia caused considerable concerns. This was the background for an increasing popularity of functional treatment as advised by Augusto Sarmiento. Ove Fasting, was the pioneer in this type of fracture treatment in Norway. Gradually functional treatment, with use of bracing, was taken into use in most hospital as an alternative to internal and external fixation.

Gradually it became evident that primary reconstruction of large soft tissue defects was a useful method. From the late 1970ies pedicled musculocutaneous flaps, and free flaps with vascular anastomosis, were taken into use by orthopedic surgeons such as Astor Reigstad at Kronprinsesse Märtha's Institute, and Harald Russwurm at St. Olav's Hospital. In the university departments in Bergen and Tromsø, plastic surgeons performed such procedures. Some years later bone transport procedures, which were taken into use at the university departments, improved the results of the treatment of non-unions with large defects of bone.

During the 1980 and early 1990ies some surgeons started using closed reduction of intra-articular fractures guided by X-ray intensifier, and arthroscopy. Screws served for fixation. This method was introduced at Haukeland by Anders Mølster, at Ullevål by Arne Ekeland and in Trondheim by Torbjørn Grøntvedt. Later this method has been widely used in many hospitals.

During the same period operative treatment of fractures of the spine were introduced in the university hospitals, and later even in medium sized hospitals. Other special procedures such as operations of difficult acetabular fractures, according to the principles of Letournel, are still centralised to the university departments, after they were introduced in the early 1990ies in Haukeland by Anders Mølster, Ullevål by Antti Alho, and in Trondheim by Pål Benum (Fig 4). Treatment of such fractures is centralised due to the fact that they are relatively uncommon. Ullevål is covering the service for the largest population in this field, and has developed a special expertise under the guidance of Olav Røise and Jan Erik Madsen.

During the last 10 years "angle-stable" screw mini-invasive technique has been employed in plate fixation of some fractures of the extremities. This reduces soft tissue damage secondary to operative intervention. Interlocking nailing is still the most commonly used method in diaphyseal fractures of femur and tibia in adults. There has been some change in the treatment of dislocated femoral neck fractures, with more frequent use of hemi-arthroplasty.

During the last twenty years operative treatment has been taken into general use in severely displaced fractures of the distal radius. Leiv Hove in Bergen, and Harald Russwurm

and Vilhjalmur Finsen in Trondheim, have been important in the introduction of plate fixation and external fixation as treatment of dislocated fractures of the distal radius.

The treatment of certain fractures in children has also changed during the last twenty years. Thus use of flexible nails has replaced traction treatment in diaphyseal femoral fractures in older children. Pin fixation has to a large extent replaced traction treatment of supracondylar fractures of the humerus. Lasse Engesæter at Haukeland was the first to introduce these changes.

Some operative procedures that were introduced during the last 50 years, have later been abandoned. Among these are condylo-cephalic nailing of trochanteric femoral fractures, and Hackethal nailing of fractures of the humerus.

Courses in Fracture Treatment

Arne Haukebø and Hans K. Dahl started AO-courses in Norway at Ullevål. From 1971 these courses were replaced by a basic course in fracture treatment arranged at Voss. Dahl was the leader for several years. Besides Haukebø and Dahl, Einar Sudmann, Anders Mølster, and Knut Strømsøe (Figs 5, 6 and 7) have played important roles in this course through many years.

The advanced course for fracture treatment has also been of great importance. This course, which initially was arranged in Oslo by Antti Alho, has been held at Oppdal since 1991. Arne Ekeland and Jan Erik Madsen have later been leaders of the advanced course. Both courses have been of great importance for the improvement of fracture treatment in Norway.

Orthopedic Surgery in Children

Treatment of congenital disorders within the musculoskeletal system was the "original" or most early field of orthopedic surgery. In Norway, Wilhelm Boeck combined operative and manipulation techniques of club feet in the middle of the 19th century. Closed reduction of congenital dislocated hips was performed in 1898 by Paul Viktor Bülow-Hansen, who later became the first chief at Sophie Minde.

Open reduction of congenital dislocated hips was commonly used in the early 1930ies. Supplementary roof plas-



Fig 47-5. Einar Sudmann



Fig 47-6. Anders Mølster



Fig 47-7. Knut Strømsøe

ties were also performed at that time. During the 1950 and 1960ies traction was routinely used before application of cast or operative reposition. Salter pelvic osteotomy was introduced at the end of the 1960ies in younger children.

During the last twenty years there has been some change in the treatment of established congenital dislocation of the hip. The length of preoperative traction has been reduced, and operative reposition is more frequently used. Shortening osteotomy of the femur is frequently performed to reduce the risk of femoral head necrosis.

Since the early 1960ies there has been a great improvement in the neonatal screening of hip dysplasia. The use of ultrasonography, developed during the early 1990ies by Terje Terjesen in Trondheim, has proven helpful in newborns that carry a special risk for developing dysplasia. Due to these improvements more children with risk of developing osseous dysplastic changes, have been treated effectively with Frejka's pillow.

Subtrochanteric rotational femoral osteotomies, which became a commonly used method in children with increased anteversion of the femoral neck during the 1950 and 1960ies, have been less frequently used after research done by Svein Svenningsen in Trondheim. He showed that the tendency to spontaneous correction was higher than believed. On the other hand, Olav Reikerås showed during the same period that severely increased anteversion ought to be corrected.

There has also been a great change in treatment of children with Calvé Legg Perthe's disease (CLP) during the last decades. Prolonged bed-rest and restricted weight-bearing have been abandoned. In cases with extensive necrosis of the femoral head, and in cases where the head "grows out" of the acetabulum, varisation osteotomies are performed according to the Caterall criteria.

Treatment of congenital foot deformities such as clubfoot was conservative during the first half of the last century. During the second half of the century such deformities have been operated with various methods when conservative treatment was unsuccessful. The Ponseti treatment principle has given promising results during the last ten years.

It is also worth noticing that the operative treatment of patients with spastic cerebral palsy has changed considerably since operative treatment was taken into extensive use 40 years ago by Cato Hellum. In contrast to earlier days, a great number of corrections, mainly tendon lengthenings, tenotomies, release of contractures and correcting osteotomies, are now done during the same operation. Facilities for gait analysis at the university hospitals in Oslo, Bergen and Trondheim have certainly improved pre- and postoperative evaluation of these patients.

Sophies Minde played a very important role in the development of pediatric orthopedics in Norway up to 2002 when, the activities of the hospital were transferred to Rikshospitalet. In particular, Ingjald Bjerkreim contribut-

ed greatly to further development of children orthopedics during the last decades of this period. It is worth noticing that the orthopedic surgeons who became responsible for pediatric orthopedics at the university departments in Bergen (Einar Sudmann and Lasse Engesæter) and Trondheim (Per Edvardsen) had most of their education from Sophies Minde.

Treatment of Sequela after Poliomyelitis

Treatment of sequela after poliomyelitis was one of the early challenges within orthopedic surgery. Release of contractures of joints, tendon transfers, osteotomies, fusions and application of various orthotic devices were performed early in the last century. Even in the middle of the century, nearly 60 per cent of the patients treated at Sophies Minde were treated for such sequela. KMI was established in 1956 to improve the service within this field. Henrich Nissen-Lie was the first head of the hospital.

There has been a significant decrease in the need for such service since the last case of acute poliomyelitis was diagnosed in 1969. However, during the last years, immigration from countries where poliomyelitis still occurs, has served as a reminder of the need for knowledge in this field.

Treatment of Bone Infections

Tuberculosis in bone and joints was among the most serious problems in orthopedic surgery a hundred years ago. In the second half of the 19th century resection of joints affected by tuberculosis was taken into use in several countries.

Christen Heiberg performed the first elbow resection in Norway at Rikshospitalet in 1862. The first successful hip resection was performed in 1870 at Christiania Hospital, by Fredrik Herman Gjør. Resection of knee joints was also performed. In 1880 nine such operations were done, eight of these were successful. Tuberculosis of bone and joints was one of the reasons for establishing the coastal hospitals in Hagevik, Stavern, Tromsø and Vadsø.

Tuberculous affection of the skeletal system remained a great problem during the first 50 to 60 years of the 20th century. It is worth noticing that Ivar Alviks thesis from 1949 was based on a follow up and classification of 507

patients with tuberculosis of the spine. Furthermore, tuberculosis was the reason for fusion in 66 of the 75 patients with hip disease that were described in the thesis of Magnor Foss Hauge in 1963. Martina Hansen Hospital in Bærum, close to Oslo, specialised in treatment of tuberculous disorders. It is also worth mentioning that Bernhard Paus' thesis from 1964 was related to tuberculosis of the spine. Paus, who was the head of Martina Hansen Hospital from 1964 to 1980, gradually replaced long-lasting immobilisation with more aggressive surgical debridement, shorter immobilisation and early fusions. Use of effective medical treatment also contributed to a success of the new methods. Later even re-articulation with application of artificial joints was accepted as a relatively safe treatment in previously fused hips.

Non-tuberculous bone infection was also one of the problems the old orthopedic surgeons were faced with. From the 1970ies there was an increase of such problems due to more frequent use of open reduction and internal fixation of fractures. Furthermore, infections after arthroplasties have been a challenge for orthopedic surgeons. A specialisation in the treatment of orthopedic infections has taken place. Eivind Witsø in Trondheim has contributed to increased knowledge within this field in close cooperation with bacteriologists. Immediate soft tissue revisions has become a routine in treatment of infected arthroplasties. Antibiotics are not given pre-operatively, only postoperatively after multiple intra-operative biopsies have been taken for bacterial culture. Multi-resistant bacteria are still far less common in Norway than in many other countries.

Amputations, Prosthetics and Orthotics

Surgical amputations have been performed at least from the 15th century. The main reasons for amputations in those early days were gangrenous or terribly damaged extremities. The success rate was low before improvements in surgical techniques were combined with better haemorrhage control in the beginning of the 19th century, anesthesia from the 1840ies, and antiseptic techniques and disinfection from the 1860ies. Development of more sophisticated prosthetic limbs during the 20th century further improved the function after amputation.

In the early days nearly all amputations of the lower extremity were done through the femur or the tibia. The

amputation techniques became gradually more differentiated through the 20th century, with introduction of special procedures which had been developed more than 100 years earlier such as Lisfranc's transmetatarsal amputation (1815), Symes ankle joint amputation (1843), and Gritti's knee disarticulation (1857), later modified by Stoke. Van-Ness rotation/ rotationplasty (foot being turned around and re-attached to allow the ankle joint to be used as a knee) was sometimes applied in children. Amputations of the upper extremity were performed far less frequently.

The amputation service in Norway was greatly improved following the establishment of Sophies Minde, where a close cooperation developed between the orthopedic surgeons and the technicians at the orthopedic workshop.

Thomas Wyller was responsible for the amputation service from 1964 to 1984. He had great knowledge in amputations, prosthetics and orthotics, treatment of scoliosis, and biomechanics. He was responsible for the establishment of The School of Prosthetic and Orthotic Engineering in Norway, an institution that has been very important for education of highly qualified engineers within prosthetics and orthotics in Norway. Wyller also established a biomechanical laboratory at Sophies Minde.

In 1977 a centre for prosthetic and orthotic engineering was established at St. Olav's Hospital in Trondheim, after an initiative from Per Edvardsen. The workshop is owned by the hospital, and together with the orthopedic department it constitutes the second Centre for Prosthetics in Norway.

Presently amputations are performed in many orthopedic departments in Norway. Most of these departments are served by private companies producing limb prostheses.

What are the reasons and types of amputations of the lower extremity, and what is the rate of re-amputations? The results from a study performed by Eivind Witsø and co-workers (2001) give us some idea. They performed a consecutive recording and follow up of all operations at St. Olav's Hospital from January 1994 to January 1997. A total of 215 primary lower limb amputations were carried out: 40 partial foot amputations, 2 ankle disarticulations, 51 trans-tibial amputations, 68 knee disarticulations, 50 transfemoral amputations and 4 hip disarticulations. Sev-

enty-four (34%) of the amputees had diabetes mellitus, 113 (53%) had peripheral vascular disease, and 28 (13%) of the amputees had other diseases. In the patients who were amputated due to diabetic and peripheral vascular disease, the overall re-amputation rate was 19% and 20%, respectively. The rates of re-amputation at trans-tibial and knee level were similar. In the city of Trondheim the annual incidence of primary amputations was 34 per 100 000 and 4.4 per 1 000 diabetic subjects. The incidence of lower limb amputations was 25 times higher in diabetics than non-diabetics.

New Developments

Technical improvements in prosthetics and orthotics in other countries have also improved the quality of the devices that are produced in Norway. Examples are the development of sockets that allow much earlier weight bearing in amputations of the lower limb, and CATCAM technique that gives an improved fit of the sockets. Furthermore, robotic myoelectric prostheses have been taken into use in some patients after amputation of the upper extremity.

At The Centre for Prosthetics in Trondheim, a new type of amputation stumps has been developed following amputations through the lower humerus. The use of arm prosthesis in trans-humeral amputees is limited due to the cone form of the amputation stump. A Humerus-T-Prosthesis has been implanted into the lower end of the humerus to create artificial humerus condyles, and a new trans-humeral arm prosthesis has been developed. This arm prosthesis has a socket that is suspended and stabilised by the humerus and implant only, eliminating the need for straps around the shoulder at the opposite side. Traction and rotational stability are secured by adjustable pressure adaptation around the artificial condyles.

Arthroscopic Surgery

Arthroscopy of the knee was introduced in Norway in 1976 by Anders Mølster at Haukeland and Gisle Upheim at Sophies Minde. Shortly afterwards it became a standard procedure in most hospitals for diagnosis of menisci, cartilage and the cruciate ligaments. From the middle of the eighties arthroscopic surgical procedures replaced open surgery in such injuries. Direct suture of anterior cruciate ruptures was replaced by reconstructive

procedures, using grafts from the patellar ligament or the semitendinosus tendon. Arthroscopic procedures have also been taken into use in some disorders of other joints, such as the hip, the elbow and the shoulder. In particular, it is worth noticing that repair of ruptures of the rotator cuff tendons of the shoulder is usually performed by combining arthroscopy and mini-invasive suture technique.

Many orthopedic surgeons have taken part in the development of arthroscopic surgery in Norway. Mølster at Haukeland, Torbjørn Strand and Eirik Solheim at The Deaconess Hospital in Bergen, Lars Engebretsen in Trondheim, – later Ullevål, Torbjørn Grøntvedt in Trondheim, Gisle Uppheim at Lovisenberg in Oslo, Ove Fasting at Aker – later Ullevål, Tom Ludvigsen at Ullevål and Gunnar Knutsen and Oddmund Johansen at Tromsø are among these.

Arthroplasties

Hip Replacements

Total hip prostheses were taken in use in Norway in the late 1960ies in the treatment of osteoarthritis of the hip. Before that time, fusion of the hip and Smith-Petersen shelf arthroplasty had been used for several years. The vitallium cup arthroplasty was developed in 1938 by Smith-Petersen, who was a professor in Boston. He was originally a Norwegian, who emigrated from Grimstad at the age of seventeen. His method was introduced by Hans K. Dahl in Ullevål in 1947, and the results of this procedure was the basis for Arnt Jakobsen's thesis in 1957. Gradually this method also became popular at other Norwegian hospitals. Fusion became extensively used after Ivar Alvik in the early 1950ies developed a new fixation method that eliminated the need for use of plaster cast after the operation. Gradually total hip arthroplasty replaced these two methods, and also the use of intertrochanteric femoral osteotomies.

During the first years of the total hip replacement era, the Müller and the Charnley cemented prostheses were most popular. Use of the Charnley prosthesis started at Ålesund Hospital in 1971 (Kjell Matre) and this prosthesis became very popular in many hospitals. In particular Sverre Skeie at Sandnes Hospital, and later at Stavanger, got an extensive experience with this prosthesis. It became the “gold

standard” when evaluating the results after use of other types of prostheses. Unfortunately, some of these resulted in a poor clinical outcome. The Norwegian Christiansen total hip prosthesis was among these. The poor medium term results experienced with this prosthesis were mainly due to aggressive osteolysis because of the tissue reaction on wear particles of polyacetal (Delrin), which was used as a material for acetabulum and the special trunnion bearing joint within the head of the prosthesis. Since several aspects of many of the prostheses were poorly documented, and some seemed to give inferior results, The Norwegian Orthopaedic Association established a national hip register in 1987 to improve the quality control of the implants used (see Chapter 46.). According to this register the number of implanted total hip prostheses in Norway has increased by 68% during the 20 years from 1988–2007. The increase is most marked in patients older than 79 years, and between 45 and 59.

From the beginning of the eighties non-cemented total hip prostheses have been more frequently used in younger patients than previously. A high rate of femoral loosening was experienced before porous and hydroxyl-apatite coatings were taken into use. On the acetabular side a higher rate of wear of the polyethylene was experienced when using non-cemented technique with polyethylene liners within metallic shells, compared to cemented acetabular components. Hence, ceramic on high density polyethylene articulations have been taken into use, and to a more limited extent ceramic on ceramic. Hard bearings in terms of metal on metal are hardly used in Norway.

Non-cemented technique was used in only 20% of the total hip replacements performed in Norway in 2007. Mini-invasive technique and computer-navigation were used in less than 2 and 1%, respectively. This is in contrast to common practice in many other countries.

In revision surgery, bone impaction has been used since the middle of the 1990ies. In 2007 this method was used in close to 20% of the acetabular revisions, and 7% in stem revisions. (Report 2008 The Norwegian Arthroplasty Register).

It is worth noticing that second generation surface replacements are rarely used in Norway. This is prob-

ably due to the bad results experienced with the first generation of surface replacements around 1980. Despite improvements on the acetabular side, many orthopedic surgeons fear that long-term complications may occur since no major changes have been made in the femoral component.

Many orthopedic surgeons have influenced the development of hip arthroplasty in Norway. Among those are: Kjell Matre, Sverre Skeie, Olav Reikerås, Paul Lereim, Astor Reigstad, Lars Nordsletten, Leif Havelin, Arild Aamodt, Pål Benum, Leif Persen and Otto Schnell Husby.

Knee Replacements

Artificial knees have been far less used in Norway than in many other countries. Thus osteotomy was almost the only operative method used in treatment of osteoarthritis of the knee until the late 1970ies. In rheumatoid arthritis, however, total knee replacement was used by Jan Pahle's group at Oslo Sanitetsforening Rheumatism Hospital, and by Jean Jaques Vassal at Unit for Rheumasurgery in Trondheim. During the last decade however, the number of total knee replacements has increased considerably. At present the number of knee replacements corresponds to 50 per cent of the number of total hip replacements. Almost all total knee prostheses are cemented. Prostheses based on conservation of the posterior cruciate ligament are most commonly used.

The most controversial part of the use of knee prostheses is related to unicondylar prostheses. Such prostheses are used in approximately 14 per cent of the patients despite a revision rate that is twice that of bicondylar prostheses according to The Norwegian Arthroplasty Register. It is argued that use of unicondylar prostheses is justified in selected cases because of shorter rehabilitation and rather good revision results.

Computer navigation has been taken into use in total knee replacement at some hospitals during the recent years.

Artificial shoulder, elbow and ankle joints have also been more frequently used during recent years.

Elective Surgery of the Spine

In Norway surgery of the cervical spine is done only by neurosurgeons, surgery of the thoracic and lumbar spine is performed also by orthopedic surgeons.

Lumbar spondylolisthesis was frequently operated 50 years ago. Most operations were performed at Sophies Minde. Surgical treatment of this condition was also gradually taken into use at other hospitals. In most cases with moderate ante-position of the affected segment inter-transversal fusion was performed. In cases with signs of nerve compression, decompression laminectomy was used, sometimes combined with fusion. In cases with a pronounced forward slip anterior fusion was also used. During the last decade ALIF (anterior lumbar interbody fusion), PLIF (posterior lumbar interbody fusion) and TLIF (transforaminal lateral interbody fusion) have been performed by minimally invasive surgical technique.

Lumbar disc hernias have been treated operatively since the 1950ies. CT and MRI have greatly improved preoperative evaluation. Microsurgical technique was taken in use during the 1980ies, and is now routine in most orthopedic departments.

Laminectomies for decompression in spinal stenosis have been taken into general use since the 1980ies. Spinal fusions are often done if laminectomy is performed at more than one level. Posterior fusion in the lumbar area has been performed in degenerative disease mainly as inter-transversal fixation. In some cases of anterior fusion, cages are combined with posterior pedicle screws. Disc prostheses have not been used in Norway except in a prospective randomised study at some university hospitals comparing prostheses to conservative treatment.

Operative treatment of idiopathic scoliosis was introduced by Ivar Alvik at Sophies Minde in the 1950ies. The Harrington internal distraction and fixation system was introduced by Ingjald Bjerkreim in 1972. Later several other systems have been used. Anterior fusions were introduced during the 1970ies by spine surgeons at Sophies Minde in cooperation with general surgeons at Ullevål. Nowadays operations for scoliosis are also performed in Hagevik and in The Orthopaedic Department in Trondheim. Various equipments for obtaining derotation and correction of the scolioses have been developed and also taken into use in

Norway. Roger Sørensen at Rikshospitalet was the first to use wedge osteotomies for correction of severe kyphosis.

Surgeons at Sophies Minde, and later the Orthopaedic Department Rikshospitalet, have certainly greatly influenced the development within spine surgery in Norway. Besides those mentioned above, Johan Emil Lange has played an important role. Otto Schnell Husby and Helge Rønningen in Trondheim have also contributed to the development by taking new methods into early use.

Other Surgical Procedures

Lengthening procedures in large bone length discrepancies, and in extremely short individuals, were started at Sophies Minde during the early 1980ies. Harald Steen, and later Leif Pål Kristiansen, pioneered this type of surgery.

Tumour surgery was performed nearly 200 years ago. The activity at Rikshospitalet during the first half of the 19th century was reported in “Eyr”, the first medical journal in Norway. According to these reports osteosarcomas were treated by resections and amputations even before the introduction of anesthesia. However, during the next hundred years treatment of malignant tumours in the musculoskeletal system was often unsuccessful. Following the development of modern imaging techniques during the last 30 years, and the development of modern cytostatics, the results after limb-saving surgery have greatly improved.

The service for patients with malignant primary tumours of the musculoskeletal system has been centralised to the university hospitals. In Bergen Antti Alho was a pioneer, later Anders Walløe and Clement Trovik specialised in orthopedic oncology. Harald Russwurm systematised the surgery of tumours in the musculoskeletal system in Trondheim; Martinus Bråten has been responsible the last years. The most difficult cases are usually transferred to The Norwegian Radium Hospital where Gunnar Follerås and his co-workers have built an advanced service in this field since the tumour surgery was transferred from Sophies Minde in 1999.

Prerequisites for Development of Modern Orthopaedic Surgery.

In the nineteenth century there were four important mile-

stones in the development of surgery: The introduction of general anesthesia in 1846 by William T.G. Norton, antiseptic treatment in 1862 by Ignaz Ziemmelweis, disinfection in 1867 by Joseph Lister, and finally the discovery of X-rays in 1895 by William von Röntgen. Further advances in these fields have led to development of new surgical techniques with improved results in the treatment of orthopedic injuries and disorders.

Advances in Anesthesia

Infiltration of cocaine was introduced for local anesthesia in 1884, and a few years later to block the peripheral nerves. After improvement of the local anesthetic agents, brachial plexus anesthesia, intravenous infusion anesthesia and spinal anesthesia were taken into use during the first decade of the 20th century, and epidural anesthesia in the early 1930ies. These methods were taken into use in orthopedic surgery in Norway a few years after they had been developed.

The safety of general anesthesia has been gradually improved with shortening of the “hangover effect”, and treatment of pain has also been greatly improved. A large number of operations can now be performed in the outpatients department or as day surgery.

Prevention of Infections

Development of antiseptic and disinfection techniques was of utmost importance for the success in orthopedic operations. Use of antibiotics to prevent infections has also been of importance, although the development of resistance against antibiotics has been a painful lesson of overuse. According to the National Register for Arthroplasties, antibiotic prophylaxis in major orthopedic surgery, such as hip arthroplasty, has been reduced from several days to one day only. Multi-resistant bacteria are less common in Norway than in many other European countries.

Imaging Techniques in Orthopedic Surgery

In 1904 Paul Viktor Bülow-Hansen published in The Journal of The Norwegian Medical Association an article on the use of radiography in the diagnosis of congenital dislocation of the hip. Pictures taken in 1903 were of surprisingly good quality. Further development of the radiology has been, and is, of the utmost importance for the increased quality of many orthopedic procedures.

Arthrography with contrast, and myelography, were introduced in the 1930ies. Myelography was improved in 1959 by a new type of water-soluble non-ionic contrast, Amipaque®, which was developed in Norway by the pharmaceutical firm Nycomed.

Fluoroscopy with an X-ray image intensifier was introduced in the 1960ies, and double plane fluoroscopy in the 1970ies. This further improved fracture treatment, in particular of the hip.

Ultrasound scanners, first developed in USA in 1963, were introduced in Norway during the late 1960ies, and improved diagnosis of soft tissue injuries. After further technical development ultrasonography also became a useful tool in the evaluation of some joint disorders, such as dysplasia of the hip.

Skeletal scintigraphy, using phosphates or diphosphonates labelled with technetium 99m, has turned out to be a sen-

sitive method of detecting bone metastases. It has also been used in the diagnosis of other bone abnormalities, such as fatigue fractures and non-dislocated scaphoid fractures.

The introduction of CT of sufficient quality for use in orthopedic disorders and fractures in the early 1980ies, was a great step forward. This technique improved visualisation, in particular of intra-articular fractures, fractures of the spine, disc hernias and tumours of the musculoskeletal system. The development of three-dimensional reconstructions during the late 1990ies, further improved evaluation of some fractures, such as fractures of the acetabulum and the spine.

Finally, from the 1990ies MRI has significantly improved the diagnosis of disc hernias, tumours, lesions of the menisci, cartilage, muscles, ligaments and tendons. MRI has also given valuable information about metastatic lesions in bones.

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Acknowledgments

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48. The Norwegian Society for Orthopaedic Surgery

Elling Alvik

Orthopaedic Treatment was recognised as a separate specialty when specialisation started in Norway in 1918. In 1932 the name was changed to Orthopaedics, and in 1945 to Orthopaedic Surgery. It was a subspecialty of General Surgery from 1977 to 1997.

The Nordic Orthopaedic Association was founded in 1919, but it gradually became evident that each Nordic country required a national orthopedic association.

Sweden and Denmark founded their national organisations during World War II.

The Norwegian Orthopaedic Association was founded the 10th of September 1947. The meeting took place at Martina Hansen's Hospital in the residence of the head of the hospital, John Kløve Hald. There were six other founding members, Ivar Alvik, Henrich Nissen-Lie, Bjarne Mørch, Henrik Støren, Petter Sundt and Marianne Jaroschy. They also planned the first general assembly, and discussed what was required to become a specialist, and education programmes.

The establishment of an independent orthopedic association was not without complications. There were strong opinions among general surgeons. Division in separate organisations was regarded a disadvantage. Carl Semb was the head of the surgical department at Ullevål hospital, the largest hospital in Norway, and chairman of the

Norwegian Surgical Society from 1941 to 1948. He was a powerful opponent. At a joint meeting he left in protest after he had delivered a passionate speech.

In 1954 the General Assembly comprised 15 members. The annual subscription was 10 kroner. In 1966 35 members participated.

The relation to the Norwegian Surgical Association was again in focus in 1971 and it was discussed at the General Assembly. For some years the banquet had been arranged together with the general surgeons. Herman Thrap-Meyer wanted a banquet for orthopedic surgeons alone. In his speech he declared that orthopedic surgery must not become "just one egg in the whole surgical scramble".

Reorganisation of the the Norwegian Surgical Society and the Norwegian Medical Association (NMA)

General surgery has gradually been divided into separate specialties and subspecialties, with corresponding specialty societies/associations. In 1997 The Norwegian Surgical Society was reorganised as a federation of all surgical subspecialties. The intention was to increase the influence of all surgeons within the Norwegian Medical Association. In 2007 the Norwegian Medical Association was reorganised. This included, among other things, that the Norwegian Orthopaedic Association, which up to

then had been only an associated organisation, became a formalised separate specialist organisation in NMA.

Orthopedic Meetings

The Orthopedic Autumn Conferences and the Annual General Meetings were at first arranged in Sophies Minde Hospital. They were then moved to Ullevål. For many years there were joint meetings with the Norwegian Surgical Society, and the other surgical societies at Ullevål and later at Holmenkollen Park Hotel. Those joint meetings were organised with several parallel sections, and every specialty and subspecialty had their own separate section. As the number of participants increased, however, it became clear that the localities were insufficient, and since 2007 The Norwegian Orthopaedic Association has arranged independent annual orthopedic conferences in the centre of Oslo.

From the beginning of the Association, orthopedic spring meetings were arranged every second year alternating with Nordic orthopedic congresses. After 1990 there has been an inflation of congresses and meetings in May and June every year. The 50 Year Anniversary Congress in Tønsberg in spring 1997 was organised by Gunnar Aas-Aune. The last spring meeting was arranged in Haugesund two years later by Emil Mohr. The Nordic orthopedic congresses have been revitalised after the Netherlands and Estonia became full members.

The proceedings of the Association's scientific meetings were published in *Acta Orthopædica Scandinavica*.

The Norwegian Orthopaedic Journal

This journal was established in 1996. Elling Alvik had the idea to start the journal, and proposed the name *Norsk Ortopedpost*. John Slørdahl became the first editor. Through advertisements it has become a strong economic factor for the Association. Bjørg Kiste Bryne improved the quality of the Journal as the next editor. For many years Knut Fjeldsgaard has done a tremendous job as editor.

Table 48-1.

Chairmen of the Norwegian Orthopaedic Association

Period	Name
1947–49	John Kløve Hald
1950–51	Henrik Støren
1952–53	Eivind Platou
1954–57	Henrich S Nissen-Lie
1958–59	Ivar Alvik
1960–61	Herman Thrap-Meyer
1962–63	Adolf Møllerud
1964–67	Eigil Sandaa
1968–69	Ingulf Medbø
1970–71	Rolf Hagen
1972–73	Per Edvardsen
1974–75	Per Edvardsen
1976–77	Pål Benum
1978–79	Pål Benum
1980–81	Norvald Langeland
1982–83	John Hald
1984–87	Tore Grønmark
1988–89	Helge Rønningen
1990–91	Anders Walløe
1992–93	Anders Walløe
1994–95	Ludvig Fjeld Solheim
1996–97	Elling Alvik
1998–99	Elling Alvik
2000–01	Henrik Hofgaard
2002–03	Kari Indrekvam
2004–05	Eivind Witzø
2006–07	Hebe Désirée Kvernmo
2008–09	Hebe Désirée Kvernmo
2009–10	Ketil Holen

The Orthopedic Registers

In May 1985 Einar Sudmann and Norvald Langeland (Fig 1) established the Hip Register in Bergen on behalf of the Association. In the beginning the authorities decided to give the hospitals NOK 12.000 extra for each hip that was registered. Therefore nearly every hospital in Norway sent reports. Later knee prostheses were included. Now all prostheses in any joint are registered. The benefit of registers was highlighted in 1993, when information from the Norwegian Hip Register led to the discovery of the Bone-loc cement scandal. A warning was sent out from Bergen that many patients suffered from very early loosening of hip prosthesis. In recent years the register in Bergen has launched separate registers on crucial ligaments, trauma, and proximal femur fracture. Our Norwegian registers have gained international reputation.

The International Aspect

USA has played a leading role in orthopedic innovation. The last 30 years there has been a stronger European activity.

The European Federation of National Associations of Orthopaedics and Traumatology (EFORT) was founded in 1991. One year later European Union Orthopaedics Section (UEMS) was established under the EU umbrella. EFORT Congresses have been arranged every other year. At the same time subspecialties have created European groups with their own orthopedic conferences on limited topics. This leads to more specialisation and also better treatment. UEMS has concentrated on harmonising specialty rules in Europe. It has also worked to establish a European orthopedic exam and certification. A common European orthopedic employment market has also been an issue. In recent years Kari Indrekvam and Hebe Kvernmo have been Norwegian representatives.

For many years the Course for Continental Surgeons was very popular among Norwegian orthopedic surgeons. It consisted of one intensive week in London and one in Nottingham, with outstanding British teachers. The popularity has now declined, and other congresses and specialty courses are now more important.

Orthopedic Surgery as an Independent Specialty

This has been the most important issue the Association has worked with.

In 1977 the General Assembly of the Norwegian Medical Association (NMA) decided that orthopedic surgery should be organised as a subspecialty under general surgery along with urology, thoracic surgery, and pediatric surgery. This was contrary to the wishes of the members of the Norwegian Orthopaedic Association,

Øyvind Grand, who was chairman of the specialty committee for orthopedic surgery, worked out an important consequence analysis for the specialty. Ludvig Fjeld Solheim launched the case for a separate specialty in the NMA's General Assembly. But it was hard to get common approval, and it took several attempts and a lot of lobbying before the General Assembly of NMA agreed in 1994. The Health Authorities were also negative to re-establish orthopedic surgery as a separate specialty from general surgery. The strategy had to be changed. Elling Alvik, who was chairman of The Norwegian Association of Orthopaedic Surgery, established direct contact with the Minister of Health, Gudmund Hernes. Several meetings took place. Later Norvald Langeland joined the lobby work.

On the 24th of March 1997 orthopedic surgery was re-established as an independent specialty, as the last country in Europe.

Orthopedic Quality

In the last 20 years there has been a special focus on how to secure quality in orthopedic practice. New ideas came from industry, bureaucracy and administration, and attempts have been made to implement them in the health services. The new concepts included quality indicators, method books and consensus.

In 1997 an Orthopedic Quality Committee was established. The first leader was Emil Mohr. A hip fracture project was started. The idea was to use the results to start a separate Hip Fracture Register run by the Arthroplasty Register in Bergen. It was also a challenge how DRG funding should be implemented in new quality concepts.

Orthopedic Surgery – Status Quo?

Orthopedic surgery and our organisation have changed tremendously.

We have developed from an "equal guild" society to a "mother" organisation with subgroups which reflect the increasing specialisation: arthroscopy, spinal surgery, pediatric surgery, arthroplasty, surgery on the rheumatoid patient, chronic bone and implant infection, deformities, foot and ankle, and orthopedic traumatology.

Orthopedic research has been enhanced. It is today possible for a young orthopedic surgeon to do substantial orthopedic scientific work, and still have an adequate economic outcome.

We have got numerous orthopedic consultant posts around the country in new orthopedic departments, many of them with university status. This is partly because the orthopedic surgeons now have assumed responsibility for fractures and injuries, partly because of the developments within orthopedics, especially the increasing use of implants.

But there is still need for expansion and improvements. More focus and resources on orthopedic problems is justified in our opinion. Therefore Norwegian Orthopaedic Association has a substantial job to do in years and decades to come.

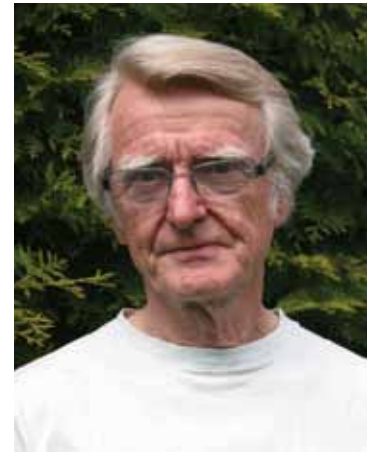


Fig 48-1. Norvald Langeland.
Private photo.

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49. Hand Surgery in Norway up to 1986

Arne Rugtveit (written in 1986)

In Norway, as in many other countries, hand surgery developed from two established specialties, orthopedic and plastic surgery.

Henrich Nissen-Lie was the pioneer from orthopedic surgery. Prior to his position as Chief Consultant at KMI, he was a consultant at Ullevål Hospital and lecturer in traumatology at The University of Oslo. He became interested and involved in hand surgery, and it was in this particular field that he excelled at KMI. For his achievements he was awarded in 1973 the Knights Cross of St. Olav's Order.

After his retirement in 1973 hand surgery has continually increased at KMI. The hospital has been given the regional function for Health Regions 1 and 2, which comprises 54% of Norway's 4 million inhabitants. After several years preparation, the technique of microvascular surgery was started, and has been routinely used since 1983. During the past two years, one replantation per tenth day has been accomplished. In addition, a considerable number of free tissue autografts have been transferred.

The two plastic surgeons, Halfdan Schjelderup and Henrik Søliland also pioneered hand surgery. The former was chief consultant of the plastic surgery department in Betanien Hospital, Bergen from 1968. In 1967 his unit was incorporated into the university clinic in Bergen, and for his achievements in plastic and hand surgery he was awarded Knights Cross of St. Olav's Order. He was a

corresponding member of The British Society for Hand Surgery.

The plastic surgery department in Bergen now has its own hand surgical section, which has a regional function for Health Region 3, involving 20% of the country's population. From the start of the eighties, microvascular techniques have been used particularly for the transfer of completely free tissue transplants and gradually replantation and recirculation has become routine.

The second plastic surgeon mentioned, Henrik Søliland, had a private practice in plastic and hand surgery in Stavanger, and at the same time he held a consultant post at the local hospital. His work laid the foundation for later developments in hand surgery in Stavanger.

The Central Hospital in Trondheim opened its orthopedic-traumatic department in 1959, and four years later it engaged its first permanent consultant with hand surgery as primary function. The Central Hospital evolved gradually to Regional Hospital status for Health Region 4, involving 15% of the country's inhabitants. Since 1975 Trondheim Regional Hospital has been given university status. This contributed to hand surgery development in the hospital, and since 1986 hand surgery has been a separate unit. The Regional Hospital in Tromsø, which serves Health Region 5, involving 11% of the country's inhabit-



Fig 49-1. Henrich Nissen Lie

ants, treats its acute hand surgery in the general surgery department. This activity is run by a consultant with an interest in hand surgery.

Apart from the above mentioned four centres, there is reason to mention two hand surgery units both incorporated in plastic surgery departments. One is found at Rikshospitalet, and the other in Stavanger.

In 1953 Johan W Loenneken was engaged as consultant of the newly started plastic surgery department at Rikshospitalet. He was interested in hand surgery and treated a large number of patients with foetal deformities localised to the hands. This development has continued with the years and extended to secondary reconstructions after hand trauma, particularly burn damage. For several years the department has perfected microvascular techniques, and already in 1980 transplantation of circulated tissue areas were done with good results.

The second hand surgery unit there is reason to mention, must be looked upon as a continuation of Henrik Søliland's work in Stavanger. After his death in 1963 there was clearly a need for continuation of this work in that

region of the country. Work was started to organise hand surgical service more closely knitted to the public hospital service. In 1965 the Plastic Surgery Department at The Central Hospital in Rogaland opened. From the beginning, hand surgery dominated, comprising at least a 1/3 of the department's activity. Rogaland belong to Health Region 3. The Plastic Surgery Department at Rogaland therefore cooperates with the plastic surgery department in Bergen particularly when demanding hand surgical problems arise.

Hand surgery in Norway is unfortunately still not accepted as an independent specialty, but this is not the occasion for further discussion, especially in a jubilee journal for The Norwegian Surgical Society. The fact that hand surgery is not a separate specialty reduces its development in several ways. Likewise the necessary centralisation of hand surgery activity has been delayed, and also the development of separate hand surgery units. This has affected the structure of medical departments, and made the education of specialists within the hand surgery area difficult.

In 1979 The Norwegian Association for Hand Surgery was accepted as a separate organisation by The Norwegian Medical Association. The society's primary aim is to expand the hand surgical service in Norway and also acting as an important tool in the work needed to gain acceptance of hand surgery as its own specialty. Arne Rugtveit was the society's first chairman. Following two terms in office he was succeeded in 1983 by Astor Reigstad. In 1986 the society has 41 members.

After initiative from The Norwegian Society for Hand Surgery, the Directorate of Health appointed a special committee to consider and work out a general plan for hand surgery in Norway. This committee delivered its plan on June 1st 1986. It has been circulated for discussion and the comments were positive. There is reason to expect that this plan will affect further development, and hopefully give better conditions and faster development of hand surgery in Norway.

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50. The History of Hand Surgery in Norway

Astor Reigstad

Hand surgery is not recognised as a surgical specialty by the health authorities in Norway. Sterling Bunnell (1944), who was one of the founders of modern hand surgery, saw this specialty as a combination of orthopedic surgery, plastic surgery, and neurosurgery, applied on the upper extremity. Later the microsurgical technique with sophisticated instruments and delicate atraumatic needles and sutures was added as a very important tool in hand surgery. The idea of a modern “hand surgeon” has been a doctor who is able to reconstruct bones, tendons, nerves, vessels, and skin of an injured upper extremity. Traditionally, hand surgeons have been recruited from the orthopedic or plastic surgical field. The first organisation for hand surgery started in USA in 1946 when American Society for surgery of the Hand (ASSH) was founded. Several national hand societies have later been started. The International Federation of Societies for Surgeries of the Hand (IFFSH) was founded in 1968, and the Federation of European Societies for Surgery of the Hand (FESSH) in 1990.

In Norway operations on the hand have traditionally been performed by general surgeons. The few orthopedic departments that existed in 1945 worked exclusively with traditional cold orthopedics, and the first plastic surgery department was opened in 1953. After the progression of the orthopedic and plastic specialties more and more of the activity in hand surgery has been turned over to these specialties.

Oslo Region

The first important hand surgery centres in Norway developed in Oslo and Bergen. Up to 1956 the national hospital Kronprinsesse Märthas Institutt (KMI), in 1956 in Oslo functioned a surgery centres for patients with sequela after polio. It gradually changed to a hospital for orthopedic and rheumatoid patients in general, but with a special responsibility in upper extremity surgery. Some of the competence in surgery of the upper extremity was achieved from work with poliosequela where different types of arthrodeses, osteotomies, tendon transfers, shortening and elongation of tendons and combinations of these operations were common procedures. Henrich Nissen-Lie, who was the first chief surgeon at KMI, was recruited from a position as consultant in surgery and associate professor at Ullevål. He was a skilled orthopedic surgeon and had studied at different hand surgery centres abroad. In this period flexor tendon and nerve repair, as well as more elective procedures, was carried out on patients from most of the country. Nissen-Lie was a near friend and collaborator of the Swedish pioneer in hand surgery, Erik Moberg. In 1973 when he retired, Nissen-Lie was awarded with the Knights Cross of St. Olav for his achievements in orthopedics and hand surgery in Norway.

Arne Rugtveit succeeded Nissen-Lie as chief surgeon. He was an orthopedic surgeon with special interests in microsurgical techniques. Nerve reconstructions were systematically done with nerve transplantations as suggested by the Austrian plastic surgeon Hanno Millesi a few years



Fig 50-1. A severed hand

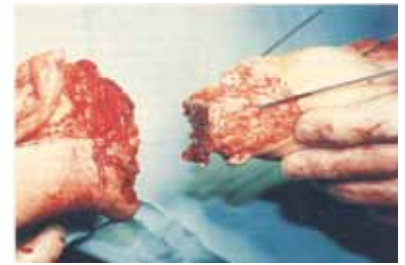


Fig 50-2a and b. Preparing the severed ends for surgery

earlier. Rugtveit also adopted the dynamic training system after flexor tendon suture introduced by Harold Kleinert, which considerably improved the results. In this period KMI built a well-trained staff of hand therapists for rehabilitation of patients with serious upper extremity injuries.

Microvascular surgery was adopted at KMI in 1983 by Astor Reigstad, who had studied at microsurgery centres in Vienna and Munich. He was specialist in orthopedic surgery, and had trained in hand surgery at KMI. He joined in the leadership of the hospital. The first revascularisation of a subtotal index finger amputation was performed the same year. The first replantation of an amputated hand was performed by Astor Reigstad and Karl R. Hetland the following year, more than 20 years after Zhong Wei Chen did this for the first time in Shanghai.

In 1985 replantation surgery was organised with a special team, which was on-call for patients with severe upper extremity injuries from the whole country. In the same period free tissue transfer was adopted, and the first toe-to-thumb transplantation was performed in 1983. Soft tissue cover with microvascular flaps is often needed after upper extremity trauma, and different flaps like scapular, upper arm, latissimus dorsi, fibula, and others have been used. Different types of grip reconstruction after hand amputation have been developed during the following years.

The surgical care of children with malformations or growth disorders of the upper extremity, have been carried out at KMI since the hospital was opened. From the end of the 1980ies Kjell Bye led this activity. He had studied hand surgery in Nancy and worked closely with other Scandinavian specialists, and systematised this surgery in Norway. The interest of upper extremity surgery in patients with cerebral palsy had previously been low in

Norway. Svein Waage got engaged in this type of surgery in the early 1990ies. He also worked with pediatric brachial plexus surgery, muscle and tendon transfers and traumatic brachial plexus surgery in adults. The first wrist arthroscopy in Norway was carried out at KMI in 1991. Since then this has been an important diagnostic tool in hand surgery along with CT scan, MRI and ultrasound.

In 1990 the Health Authorities decided that advanced hand surgery in Norway should be carried out in each health region by the university hospitals in Oslo, Bergen, Trondheim and Tromsø. KMI became responsible for hand surgery in South and East Norway with a population of two million, and for all replantation surgery in the country. Karl R. Hetland led the hand unit from 1996 to 2000. When the new Rikshospitalet in Oslo was built, the orthopedic surgery at KMI, including hand surgery, was reorganised as a department at Rikshospitalet with hand surgery as a section. From 2000 Magne Røkkum has been the head of the Section for Hand and Microsurgery, which has a staff of 8 consultants and 3 registrars. In 2002 the Hand Section moved to the new hospital.

The hand surgeons at KMI/Rikshospitalet have organised the postgraduate university courses in upper extremity surgery in Oslo from 1965. They have been organisers and active contributors at national, Scandinavian, and international conferences in hand surgery and microsurgery, and they have published several scientific papers in international journals.

Patients with hand problems in rheumatoid disease were gradually transferred to the Rheumatology Hospital in Oslo (OSR), where the orthopedic and hand surgery was led by Jan Pahle and Jens Teigland. The unit was incorporated in the orthopedic department at Rikshospitalet in 2000.



Fig 50-3. The severed hand is fixed to the radius and ulna



Fig 50-4. The pincers point to the radial artery where it is anastomosed to an interposed vein. Forearm fasciotomy and splitting of the carpal tunnel have been carried out. Note the deficient skin coverage

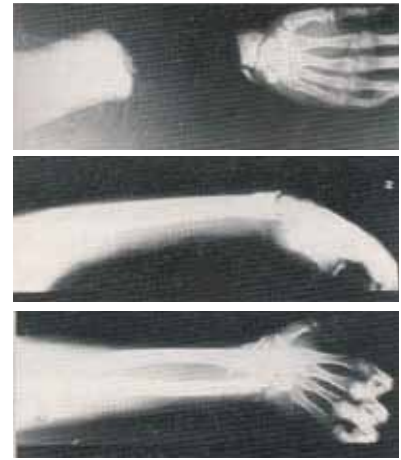


Fig 50-5a Preoperative X-ray, 5b Postoperative, front, 5c Postoperative, side

The Oslo Municipal Emergency Centre (Oslo kommunale legevakt) has a long tradition for treating outpatients with hand injuries. Before the industrial workplaces in Oslo were drastically reduced in the mid 1970ies, more than one third of all injuries treated at the Emergency Centre were localised to the hand. The majority of patients had minor injuries. From 1963 the plastic surgeon Yngvar Kjelstrup, who was trained in hand surgery in England, had the responsibility for the hand surgery at the Emergency Centre. He treated flexor tendon injuries and other conditions as elective procedures, which was the tradition at that time. Arnt Jakobsen who became professor in traumatology in 1968, taught hand surgery to medical students at Oslo University as part of traumatology, and the students had practice in hand surgery at the Centre. In 1990 the municipal hand surgery was organised at the Department for Plastic Surgery at Ullevål, and from 2000 hand surgery was incorporated in the Orthopedic Department. From 2005 Hebe Kvernmo has been the head of the Section for Hand Surgery in the Orthopedic Department at Ullevål.

Bergen Region

Until 1948 hand surgery in Bergen was carried out at the Bergen Municipal Emergency Centre and at Haukeland. There was little interest in this type of surgery, and it was mainly dealt with by young registrars in general surgery. Halfdan Schjelderup (1911–1991) trained as plastic surgeon by Harold Gillies at The Plastic and Jaw Unit

at Basingstoke near London. The hospital treated many patients with old and acute hand injuries, and Schjelderup got a training in hand surgery as well as in plastic surgery. He also got in contact with Sterling Bunnell, and visited him in San Francisco for several months. Back in Bergen in 1948 Schjelderup reacted to the inferior treatment of hand patients in Norway, and tried to get the Health Authorities interested in organising such activities. That failed, but he got the opportunity to perform plastic and hand operations at the private hospital Red Cross Clinic in Bergen, where a few beds were allocated to him for this purpose. In 1957 this activity moved to another private hospital, Betanien, with a separate department for plastic and hand surgery from 1960. In 1983 this department moved to the newly rebuilt Haukeland. Schjelderup was a lecturer in plastic and hand surgery at the Bergen University from 1958. He trained several surgeons in hand surgery, and had close contact with hand centres abroad. Yearly from 1959 he organised weeklong post-graduate courses in hand surgery for general, orthopedic, and plastic surgeons, often with lecturers from abroad. In 1981 when he retired, Halfdan Schjelderup was awarded with the Knights Cross of St. Olav for his achievements in plastic and hand surgery in Norway.

In 1972 Tore Haga joined the department. He was trained as a hand surgeon in Umeå and Malmö, Sweden and in rheumasurgery in Heinola, Finland. At that time hand surgery was an established specialty in Sweden. He



Fig 50-6. Dorsal vein anastomosed



Fig 50-7. Replanted hand, The scar over the ulna after skin transplantation was removed later

became specialist both in hand surgery and in plastic surgery. Haga gradually took over the responsibility for the hand surgery in Bergen. He reorganised the yearly university courses. Together with Börje Sundell, who was the head of the Department for Plastic and Reconstructive Surgery at Haukeland, Haga introduced acute and elective microvascular surgery at the hospital. In 1984 they performed the first toe-to-hand transfer.

From 1970 the care for rheumatoid patients with hand problems in the Bergen region was carried out at Dia-konissehjemmet's Hospital by Ottar Heggø. He trained in plastic, orthopedic, hand, and rheumatoid surgery in Bergen, Oslo, Gothenburg, Uppsala and Heinola. He did a great job with those patients. He retired in 1992. From then on, the rheumatoid hand surgery has been carried out at the Department for Plastic Surgery. After the reorganisation, hand surgery represents 35% and 90% of the elective and acute activity, respectively, at the department. Some hand surgery – mainly fracture surgery – has been carried out at the Orthopedic Department at Haukeland. From 1998 the hand surgeon Leiv Hove has kept the position as professor in orthopedic surgery at the hospital. In 1995 he presented the first thesis on a hand surgical subject in Norway.

Henrik Søiland was one of the first surgeons who worked with Schjelderup in Bergen. He trained in plastic and hand surgery at the Academic Hospital in Uppsala,

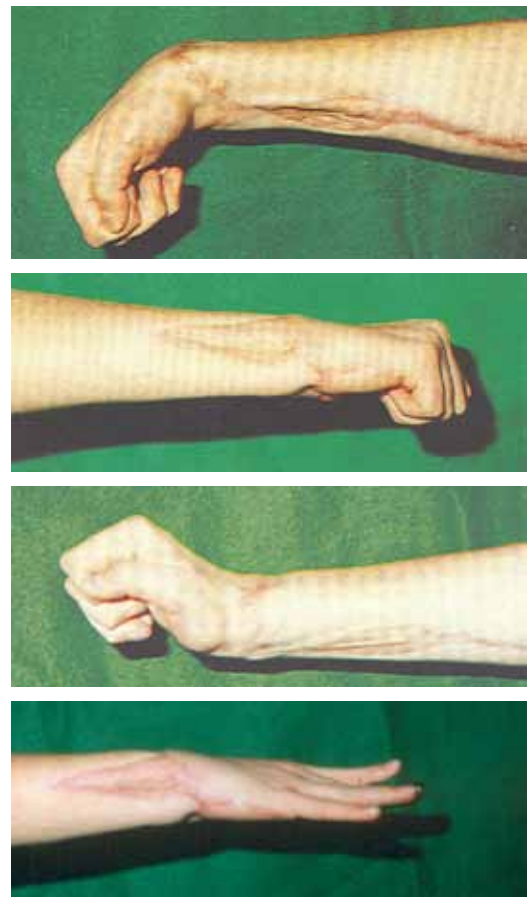


Fig 50-8. Function 20 weeks after replantation:
8a Wrist flexion,
8b Finger flexion,
8c Wrist extension,
8d Finger extension.

Sweden, and in hand surgery by Sterling Bunnell. He worked in Bergen until he moved to Stavanger where he had a big private practice in hand surgery. In 1965 a department for plastic surgery was established at Rogaland Hospital in Stavanger, and hand surgery in the Stavanger region was gradually taken over by this department.

The incidence of Dupuytren's disease is high in the Scandinavian countries, and many operations are performed every year for contractures in the hand due to this disease. Otto Mikkelsen who worked as rheumatoid surgeon in Haugesund, made an important epidemiological study when he investigated more than 16 000 persons for Dupuytren's disease (They participated in compulsory tuberculous screening by chest x-rays). The results from his investigations were published in the 1970ies, and he became one of the Norwegian surgeons who is most cited internationally.

Trondheim Region

In 1959 a department of orthopedic surgery/traumatology was established as a separate department in Trondheim. The need for a consultant in hand surgery soon became obvious. Inger Schulstad who had trained in general, plastic, and orthopedic surgery in Norway and abroad, assumed the responsibility for hand surgery in 1963–77. During this period the hospital became a university clinic. Knut Skoglund served as hand surgeon until 1980. He was trained at the Hand Unit at the Academic Hospital in Malmö. From 1981 Harald Russwurm who had been trained in orthopedic, hand, and rheumatoid surgery in Oslo and abroad, was employed as consultant in hand surgery. He organised a good hand therapeutic service at the hospital. The volume of hand surgery including

rheumatoid surgery of the hand was increasing, and in 1987 a Section for Hand Surgery was separated from the Orthopedic Department with Russwurm as head. One of the consultants in hand surgery, Vilhjalmur Finsen, has the position as professor in orthopedic surgery. In 1991 the hand surgical team organised the congress of the Scandinavian Society for Surgery of the Hand jointly with the German-speaking Hand Society. From 1995 the hospital established a hand surgical on call team, and from 2004 six consultants have hand surgery as their main activity at the Orthopedic Department. Hand surgery constitutes 20% of the orthopedic activity.

Tromsø Region

Hand surgery in the northern part of Norway has a shorter history than in other parts of the country. Surgery was not sub-specialised in Tromsø until 1972 when Tromsø University was established with a medical faculty. Jan Sæbøe-Larsen was a very handy general surgeon with special interest in hand surgery. He treated flexor tendon injuries electively according to Iseline, he operated syndactylies and a great volume of more common hand conditions. In the 1980ies he started with replantation surgery. From 1980 hand therapy became more organised in the hospital. In 1991 a department of plastic surgery was established in Tromsø, and hand surgery was taken over by this department. From 1995 the name was changed to Department of Plastic and Hand Surgery. Harry Johansen joined the department in 1999. He was an orthopedic surgeon who had trained in plastic and hand surgery at Haukeland. From 1997 hand surgeons from the University Clinic in Linköping, Sweden, have worked part-time in Tromsø. Some hand surgery has also been carried out in Bodø and in Mo i Rana.

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Acknowledgement

The author and editors would like to thank Leiv Hove, Harald Russwurm, Knut Skoglund and Adalstein Odinson for comments to the manuscript

51. The Norwegian Society for Surgery of the Hand

Leiv M. Hove

The Society was established in 1979. During the fall and winter 1978–79 Arne Rugtveit and Cato Hellum from Kronprinsesse Märthas Institutt (KMI) in Oslo arranged meetings and talks preparing a Norwegian society for surgery of the hand. Jens Teigland was the secretary and writer of minutes at these meeting. However, cooperation between Norwegian hand surgeons had started much earlier as part of a Scandinavian project.

Nordic Cooperation

Erik Moberg in Gothenburg who had published his book “Akut Handkirurgi” in 1947 was the “primus motor” in bringing modern hand surgery to Scandinavia. During the Nordic Surgical Society’s meeting in Copenhagen in 1951, the main topic of the first day was hand surgery. Before the meeting, Erik Moberg had written to all Nordic colleagues who were engaged in surgery of the hand, and invited them to a founding meeting for a new society. At a lunch-meeting at the restaurant in the National Museum in Copenhagen 30 Nordic surgeons founded the Nordic Hand Club. Erik Moberg was the first president. This was the world’s second society for hand surgery after the American. The British Hand Club (later BSSH) was established in 1952. From Norway, Halfdan Schelderup, Heinrich Nissen-Lie, Wilhelm Loennecken, and Magnor Foss Hauge were among the “founding fathers”. The following years The Nordic Hand Club had separate sessions during the Nordic Surgical Meetings, the first during the congress

in Copenhagen in 1953. At the first Scandinavian congress in Norway, in Sandefjord 1977, the name of the hand club was changed to Scandinavian Society for Surgery of the Hand (SSSH). In 1991 the Scandinavian Hand Surgery Congress was in Trondheim, in 1998 in Oslo, and in 2006 at Svalbard. Torstein Husby and Jan-Ragnar Haugstvedt are the only Norwegians that have been chairmen of the Scandinavian Hand Society (1998–2000 and 2008–2010, respectively). The Society (SSSH) is part-owner of the Scandinavian Journal of Plastic and Reconstructive Surgery and Hand Surgery. The SSSH is a member of the International Federation of Societies for Surgery of the Hand (IFSSH), established in 1968, with Erik Moberg as the first president (1968–69) (3).

The Norwegian Society for Surgery of the Hand (NSSH)

For many years the Nordic Hand Club was the only society for Norwegian hand surgeons. But eventually, on the 24th of Mars 1979 nine Norwegian hand surgeons met at KMI in Oslo to a founding meeting of the Norwegian Society for Surgery of the Hand (NSSH). The nine hand surgeons were Arne Rugtveit, Cato Hellum, Jens Teigland, Jan Pahle, Lasse Kvarnes, Olav Reikerås, Tormod Risholt, Finn Risung, and Harald Russwurm. A few weeks later the Society had 22 members. Arne Rugtveit was elected the first chairman (4).

The main goal for the new society was to work for the clinical and scientific development of hand surgery in Norway. The Norwegian Society for Surgery of the Hand was approved as a specialty society (spesialforening) of the Norwegian Medical Association. From the first year the Society has participated in the annual National Surgical Meeting (Kirurgisk Høstmøte) with separate sessions and a general assembly.

Hand Surgery as a Separate Specialty

Hand surgery was established as a separate clinical specialty in 1969 in Sweden as the first country in the world. In Finland and Iceland hand surgery is also a defined clinical specialty, based on full specialty in orthopedic surgery or plastic surgery, and sub-specialisation in hand surgery. It was therefore natural for the Norwegian Society for Surgery of the Hand (NSSH) to work for hand surgery as a separate specialty also in our country. During the 1980ies several attempts were made. In 1991 the National Assembly of the Norwegian Medical Association voted against a separate specialty in hand surgery, despite joint recommendations from all other surgical societies in the country. In 1999 a new attempt was made, after the National Council for Medical Specialisations had been established. The surgical societies and the executive officers at the department of health were in favour, but again the Norwegian Medical Association was against. Thus the conclusion from the National Council had to be negative. Several Norwegian hand surgeons have gained their formal specialty in hand surgery after clinical training in Sweden, as a full authorised Swedish specialist, or from the Icelandic's authorities, based on the EEA-agreements. The European Federation of Societies for Surgery of the Hand (FESSH) has established a European Diploma in Hand Surgery. Based on this a special Norwegian Diploma in Hand Surgery has also been created.

Although hand surgery has not yet been defined a formal clinical specialty in our country, it is defined as a regional subspecialty. All Norwegian university hospitals have separate sections for hand surgery as part of their orthopedic or plastic surgery departments. At the academic scene two Norwegian hand surgeons have been appointed professors, Bill Finsen at the University of Trondheim (1996) and Leiv Hove at the University of Bergen (1998). Several attempts have been made to establish an academic chair in Oslo as well, but until now, without success (4).

The Annual Courses and the Textbook

In 1959 Halfdan Schjelderup established the first annual instructional course in hand surgery in Bergen. After 25 years (1984) the first full page written course manual was produced, representing the first written compendium in the Norwegian language. The last 15 years the annual courses have rotated between Oslo, Trondheim, and Bergen. The first Norwegian text book in hand surgery, a fully illustrated glossy paper book, was published at the 50-years anniversary for the courses in 2009 (5).

Table 51-1. The Chairmen of The Norwegian Society for Surgery of the Hand

1979–83	Arne Rugtveit
1984–87	Astor Reigstad
1988–91	Tore Haga
1992–95	Kjell Bye
1996–99	Leiv Hove
2000–03	Eugen Eide
2004–07	Magne Røkkum
2008–10	Adalsteinn Ódínsson
2011–	Hebe Kvernmo

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Acknowledgement

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52. Rheumatoid Arthritis Surgery or Rheumaorthopedic Surgery

Albert C. Paus and Kari Eikvar

Rheumaorthopedic surgery is the operative treatment of the musculoskeletal system in patients with chronic noninfectious autoimmune inflammatory joint diseases. The majority of these consist of rheumatoid arthritis, ankylosing spondylitis and psoriatic arthropathy. Joint involvement secondary to various infectious diseases is also included. Connective tissue diseases, like systemic lupus erythematosus, scleroderma, dermatomyositis and mixed connective tissue disease, may also lead to joint deformities similar to those following the chronic inflammatory diseases.

International Development of Rheumatoid Arthritis Surgery

Volkman advised removal of the diseased synovial membrane for tuberculous arthritis already in 1877 and Shüller in 1893 described synovectomy in rheumatoid arthritis. The modern history of rheumasurgery started in Heinola in Finland early in the 1950ies. After World War II, a large hospital for rheumatic diseases was built there. The rheumatologist Veikko Laine was the head of this hospital, and he soon realised the need for rheumasurgery and professor Kauko Vainio was employed. Professor Vainio was a dynamic surgeon and he was very systematic, and already after a few years he could publish large series of patients treated operatively with procedures that were also performed in other countries, but only sporadically with access only to few patients. Heinola thus became the Mecca for education of surgeons both from Europe and the USA.

Laine and Vainio described the principle of the “Combined Unit”, where the patients were treated comprehensively, with a full multiprofessional team available. Norbert Geschwend became the head of the Schultess Clinic in 1962, and after a few years this clinic also developed to become a centre of excellence in the combined treatment of these patients.

The development of rheumasurgery as a subspecialty raised the need for international communication. The Norwegian and the Swedish associations for rheumasurgery (established 1972 and 1975) had close cooperation. In 1979 ERASS (European Rheumatoid Arthritis Surgical Society) was established with Jan A. Pahle as the first president. It has congresses biannually, and in June 1993 the 7th ERASS congress was arranged in Oslo. The main topics were Pre-, Per- and Post Operative Management, Synovectomy, Fractures in Rheumatoid Patients and Training of Rheumasurgeons.

Later Jens Teigland was vice-president for four years, and Albert C. Paus has been a member of the Scientific Committee for ten years. ERASS has 15 Norwegian members today, with Jan A. Pahle as an honorary member.

Later there were centres both in Europe and in the USA. Orthopedic surgery has developed dramatically since then, with the possibilities of supplying patients with joint replacements for almost any joint. In addition the

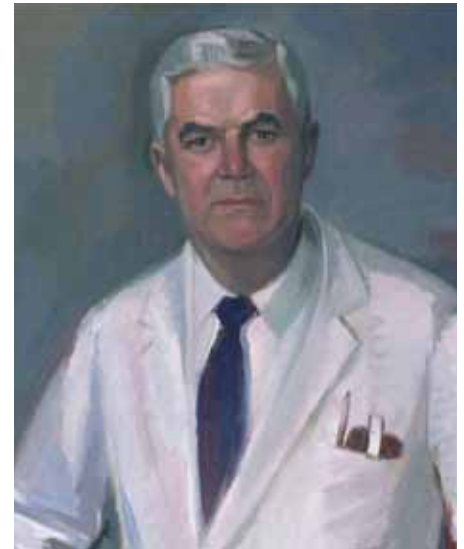


Fig 52-1. Jan Pahle, Portrait by Jan Thomas Njerve 1964. Courtesy Rikshospitalet

subspecialisation of the orthopedic surgeons has impeded the idea of holistic treatment by the one surgeon and in one unique setting. Also the rheumaorthopedic surgeons subspecialise, and furthermore, in the majority of places in the world today they will not be doing solely rheumaorthopedic surgery.

Rheumasurgery in Norway

In Oslo the first hospital for rheumatism, Oslo Sanitetsforenings Revmatismesykehus (OSR), was opened in 1938. Initially it was run by Oslo Sanitetsforening (Oslo branch of The Norwegian Women's Association for Public Health), but in 1962 the Norwegian State became responsible for running the hospital. Professor Erik Kåss was employed in 1963, and he soon realised, like Laine in Heinola, the need for a comprehensive unit.

After the documentation from Heinola early in the 50ies, some rheumasurgery was performed at Kronprinsesse Märthas Institutt, but Kåss soon realised the need for a "combined unit" also in Oslo, and Jan A. Pahle was appointed as a rheumasurgeon in 1966. This was indeed a lucky choice for Norwegian rheumasurgery, and the following 30 years he was teaching and preaching rheumasurgery, and fighting politically for this group of patients. OSR became in Norway what Heinola was in Finland. Pahle had a very broad international net of contacts and OSR received visitors from all over the world.

In 1992 Pahle retired, and Jens Teigland followed till 1998, and subsequently Albert C. Paus was appointed. In 2000 the whole hospital was included in the "New Rikshospitalet". After this transferal, the "combined unit" principle had a difficult time surviving. After a few years, in 2003, all rheumasurgery for adults were transferred to Diakonhjemmets Hospital in Oslo. Rikshospitalet continued to handle the care for rheumasurgery on children and surgery of the rheumatoid cervical column.

In 1970 Haugesund Sanitetsforenings Rheumatism Hospital appointed Otto Mikkelsen as a rheumasurgeon developing a "combined unit". He was followed by Herman Luhr and Ivar Eikill.

A course in rheumasurgery in 1970, held at OSR and arranged by Pahle, included many international surgeons on the panel. Following this, many orthopedic surgeons in Norway worked as rheumasurgeons, either in combined units, or in orthopedic departments with responsibility for this subspecialty.

In 1979 the new Department of Rheumatology in Diakonhjemmet's Hospital was opened, and Tore Ottesen was the first rheumasurgeon there. He was followed by Espen Haukeland. This rheumasurgical department was primarily built as a local hospital for the population of Oslo, but soon became a regional department, and after the union with Rikshospitalets Department of Rheumasurgery, has become

a regional department for all of Southern and Eastern Norway, with four consultants doing full time rheumasurgery.

Martina Hansens Hospital in Bærum was primarily built for children with scrofulosis, but as this was eradicated, it became a hospital for bone and joint tuberculosis. In the 1980ies a department for rheumatology and rheumasurgery became an integral part of the hospital with Asbjørn Roaas as the first rheumasurgeon. Later Peter Aaser has been in charge of rheumasurgery here.

In Betanien Hospital in Skien there is also a combined unit, where Finn Risung has been followed by Andreas Dietze, and later Øystein Aasen, as rheumasurgeons.

In Bergen the rheumatoid surgery of the hand was performed by the Department of Plastic Surgery, starting with Ottar Heggø at Haraldsplass, followed by Tore Haga, while other orthopedic problems were treated at the Orthopedic Department under the responsibility of Arne Skredderstuen.

In Lillehammer it was Bjørn Næs who started, followed by Tor Denstad. Bjørn Næs later moved to Tromsø, where he worked together with Harry Johansen.

In Trondheim Jacques Vassal took care of the rheumasurgery, and later both Carl Harald Fredrik Russwurm and John Williksen followed in his footsteps.

Kjell Matre was followed by Lage Aarseth in Ålesund.

Kristoffer Ihler started in Kongsvinger, but both Ole Jakob Fretheim and later Odd-Geir Skogesal have been important for the rheumasurgery there.

Helge Svendsen was followed by Terje Ugland in Kristiansand, while Knut Ramstad started in Bodø, Jon Åby in Levanger, Leif Nygaard in Fredrikstad, Jarl Skaugen in Arendal and Egil Holmsen in Sarpsborg

Rheumasurgery is Changing

Synovectomies of joints and tendons were a major part of the subspecialty of rheumasurgery, as well as joint replacements of many joints. The development of modern rheumatology with potent drugs has dramatically reduced

the number of patients requiring synovectomies. In addition, there has been a development with many orthopedic surgeons acquiring experience in replacement of knees and hips. Consequently many of these patients are today treated in ordinary orthopedic departments.

The number of joints for replacement and particularly the difficult revision surgery has expanded. The replacements for other joints (ankle, wrist, elbow, shoulder) are more often demanding, and are often referred to a centre for rheumasurgery, where the number of prosthetic implants for these joints is large enough for high quality surgery.

The reduction in synovectomies does not fully correspond to the increased demands for special types of reconstructive- and revision surgery, and rheumasurgery is still an important part of orthopedic treatment.

There are at least 14 units in Norway performing rheumasurgery:

UNN in Tromsø

Nordlandssykehuset, Bodø

St.Olav hospital, Trondheim

Ålesund Sykehus

Haukeland

Haugesund Revmatismesjuehus

Lillehammer Sykehus

Kongsvinger Sykehus

Sarpsborg Sykehus

Betanien Hospital in Skien

Kristiansand sykehus

Martina Hansens hospital

Diakonhjemmets sykehus

Rikshospitalet (children, cervical spine)

Education

Education is important. Many of our rheumasurgeons are going to retire within a few years. There are few places in Norway where the young orthopedic surgeons learn rheumasurgery. At Diakonhjemmet there is one training post for a resident attached to the rheumasurgical team, as well as one post for orthopedic residents on rotation. At Martina Hansen's Hospital there is one junior post for training in orthopedic surgery on rotation through the section for rheumasurgery. A close cooperation with a rheumatologic department is emphasised, as rheumasur-

geons need to know whether their patients are adequately treated medically, prior to finding the indications for symptomatic orthopedic treatment.

So far Albert C. Paus and Andreas Dietze have their PhDs in Norway directly related to rheumasurgery, and Hanne Osnes-Ringen defended her thesis “Elective orthopedic surgery in patients with inflammatory arthropathies” in May 2010.

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The authors and editors would like to thank Jan Pahle and Pål Benum for comments to the manuscript

53. The Norwegian Society for Rheumasurgery

Kari Eikvar

The Society was founded in 1972, initiated by Jan August Pahle, who also was the first president.

The Society united the Norwegian orthopedic surgeons who were interested in treating patients with chronic inflammatory diseases by surgery. The Society became a meeting place for both academic and practical development of rheumasurgery in Norway. The main task has been an annual symposium for professional and social exchange, thus promoting the subspecialty of rheumasurgery.

Table 53-1. The Chairmen of The Norwegian Society for Rheumasurgery

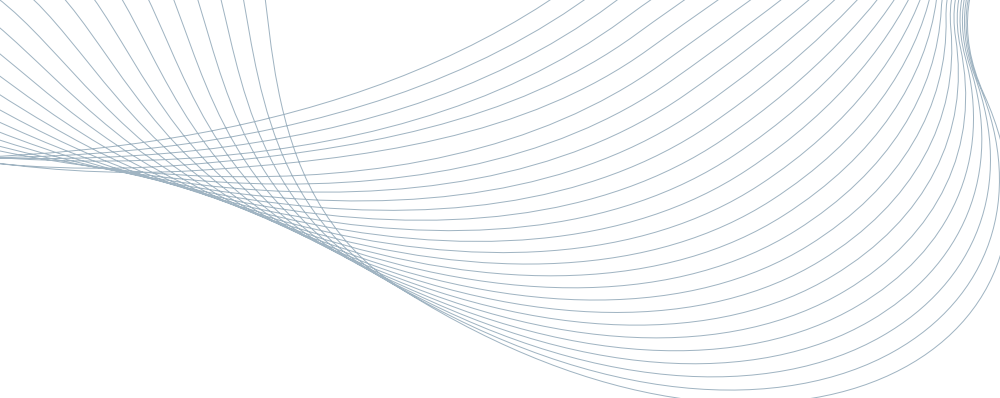
1972–78	Jan A Pahle, Oslo Sanitetsforenings Revmatismesykehus
1978–81	Finn Risung, Telemark Sentralsykehus
1981–85	Jens Teigland, Oslo Sanitetsforenings Revmatismesykehus
1982–86	Tore Ottesen, Diakonhjemmets sykehus
1986–91	Asbjørn Roaas, Martina Hansens hospital
1991–95	Gunnar P Andersen, Martina Hansens hospital
1995–99	Albert C Paus, Oslo Sanitetsforenings Revmatismesykehus
1999–2004	Peter Aaser, Martina Hansens hospital
2004–2009	Kari Eikvar, Diakonhjemmets sykehus
2009–	Ola Aarseth, Betanien Hospital, Skien

The number of members is 60, and there is only one honorary member: Jan A Pahle.

The Norwegian Society of Rheumasurgery is associated to the ERASS (European Rheumatoid Arthritis Surgical Society), which was constituted September 1979 in Wiesbaden. Two important lessons still to be the basic doctrine in ERASS are:

1. The treatment of patients suffering from rheumatoid arthritis should be a teamwork, and is best done in a combined unit.
2. Surgical treatment of rheumatoid arthritis is only a part of the total care of the patient, who is suffering from a multi-organic disease.

Our own pioneer in rheumasurgery, Jan A Pahle was the first President of ERASS, and has for many years been an honorary member. Jens Teigland has been vice-president, and Albert C. Paus is presently a member of the Scientific Committee.



Other Surgical Specialties: Plastic Surgery

54. Plastic Surgery in Norway

Frank Åbyholm and Hallvard Vindenes

55. The Norwegian Association of Plastic Surgeons

Frank Åbyholm and Hallvard Vindenes



54. Plastic Surgery in Norway

Frank Åbyholm and Hallvard Vindenes

Plastic surgery is a reconstructive surgical specialty, trying to reconstruct missing parts or deformed parts of the body, whether it is a congenital deformity or a deformity caused by trauma or radical surgery. The goal is to achieve normal functional and a cosmetic good result.

Since 1949, when plastic surgery was recognised as a specialty in Norway, great progress has been made in the field. New principles of tissue transfer and the introduction of new instruments, sutures and implant materials, have greatly expanded the field of reconstructive surgery.

For covering large and difficult tissue defects after trauma or radical cancer surgery, new and safe methods have been developed with the use of, axial flaps (skin territories nourished by one or two major vessels running in the long axis of the flap), musculocutaneous flaps (composite flaps consisting of a skin area and the underlying muscle), and fasciocutaneous flaps, (composite flaps consisting of skin with the underlying fascia).

A new and fascinating field was opened through the development of microvascular surgical techniques, making it possible to anastomose blood vessels with outer diameter of 1 mm, or even less. With this technique it became possible to replant amputated parts (fingers, hands, scalp, ears, etc) and to transplant composite grafts from any suitable donor area to cover defects almost anywhere on the body. Difficult reconstructive challenges can now be solved by a

one stage surgical procedure, which earlier had to be dealt with through several operations, and with less satisfactory results. The first microvascular procedure within the field of plastic surgery in Norway was performed by Lars Traaholt and Gorm Bretteville at Rikshospitalet, in 1980.

The treatment of burns has made great progress during the last 50 years. The use of meshed autografts, homo- and heterografts, and various types of «synthetic skin», and cultured skin, has made it possible to attack the large burn wound earlier and more aggressively. Early excision of necrotic tissue followed by skin grafting reduces the danger of invasive infection, shortens the length of hospitalisation, and leads to better cosmetic and functional results.

Craniofacial surgery is an advanced technique for reconstructive surgery in patients with craniofacial malformations. Paul Tessier, a French plastic surgeon, and others, pioneered it in the 1960ies. A team approach is used to treat patients with these malformations. This team consists of plastic surgeons, neurosurgeons, oral surgeons, orthodontists, anesthesiologists, ophthalmologists, radiologists, pediatrician, geneticist, and others. In Norway a National Centre for the treatment of these malformations was established at Rikshospitalet in the late 90ies.

The treatment of patients with cleft lip and palate has been a major part of the workload for the Plastic Surgery Departments at Rikshospitalet, and Haukeland. The

treatment requires a long term plan which starts shortly after birth and continues until adulthood. A close cooperation between plastic surgeon, orthodontist, speech and language therapist, psychologist, geneticist, otolaryngologist, pediatrician and social worker is necessary in order to obtain a satisfactory end result.

Hand surgery was earlier a part of plastic surgery, but there has been a development during the last years that has made hand surgery, in some health regions, a subspecialty of orthopedic surgery.

Cosmetic (aesthetic) surgery is defined as plastic surgery performed on healthy individuals in order to improve appearance or alleviate signs of aging. It is not covered by government funds and is almost entirely performed in private clinics. Most of the surgical methods used in cosmetic surgery are, however, also used in reconstructive surgery. Teaching of these methods is done in cases where there is medical indication, like hemi facelift in cases of facial palsy.

Development of Plastic Surgery in Norway

Plastic surgery was introduced in Norway in 1948, when Wilhelm Loenneken (Fig 1) and Halfdan Schjelderup (Fig 2) returned from England where they had trained with the legendary Sir Harold Gillies. In 1953, Loenneken was appointed head of the Department of Plastic Surgery at Rikshospitalet in Oslo, while Schjelderup introduced the specialty in Bergen.

Gunnar Eskeland succeeded Loenneken as head of Department of Plastic Surgery in 1967. The Department was at that time localised in the old military hospital in Wergelandsveien 27, a patrician villa built in 1864, a building not really suited for advanced surgery (Fig 3). The location was quite a distance from the main hospital, something that made cooperation with other specialties difficult. Eskeland worked hard in order to have the department moved to the main hospital, and in 1990, the year he retired, he succeeded. Another great achievement was that Eskeland, together with orthodontist Olav Bergland, managed to have the Dental Clinic, so important for the treatment of Cleft patients, incorporated in the Department of Plastic Surgery. This clinic had earlier been located at Bretvedt Speech Centre. Eskeland also worked hard in order to prevent burn injuries in children, and in 1984–85 regulations

were implemented forbidding production, import and sale of flammable textiles to be used for children.

Henrik Borchgrevink started his plastic surgery career as assistant for Schjelderup at Betanien Hospital in Bergen. After one year there, he moved to Oslo and worked with Eskeland from 1967 to 1991. He was an outstanding plastic surgeon, and many plastic surgeons have benefited from his teaching. His special interests in plastic surgery was cleft lip and palate, and Gender Identity Disorders (transsexuals). Eskeland held his position until 1990 when he was succeeded by Frank Åbyholm, who was also appointed professor in plastic surgery at the University of Oslo. In 2000 a new and beautiful Rikshospital was built at Gaustad, at the outskirts of Oslo. Here the most modern equipment was installed. Under the leadership of Frank Åbyholm, the Department of Plastic Surgery was reorganised and located close to the ENT-department, the orthopedic department and the neurosurgical department, making cooperation between the specialties convenient. This was of great importance for the treatment of craniofacial malformations, and the reconstruction of head and neck defects following cancer operations. In the Åbyholm period there was more focus on research than earlier, and the number of theses and scientific publications increased. Åbyholm retired in 2008.

In Bergen, Halfdan Schjelderup established a private unit in the The Red Cross Clinic in 1949, and later at the private hospital Betanien. Schjelderup travelled annually with Hurtigruten along the Norwegian coast to consult with cleft patients who had been operated in Bergen, and he did also perform secondary corrections in local hospitals along the coast. Schjelderup was also an excellent hand surgeon. In 1967 the department he had established at Betanien Hospital was incorporated in Haukeland as the Department of Plastic Surgery.

In 1964 Gunnar Espolin Johnson started his career in plastic surgery as assistant for Schjelderup. He had spent two years in Newcastle-upon-Tyne, where he got training in the treatment of cleft lip and palate patients. In the period 1972–86 Johnson was the only surgeon who performed primary cleft surgery in Bergen.

In 1983 the Department of Plastic Surgery was moved to the new Haukeland. The proximity to the maxillofacial



Fig 54-1. Wilhelm Loenneken, the first head of the Department of Plastic Surgery, Rikshospitalet, Oslo

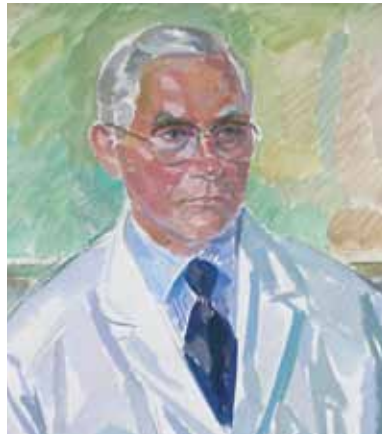


Fig 54-2. Halfdan Schjelderup, the first head of the Department of Plastic Surgery, Haukeland, Bergen. Portrait by Bjørn Tvedt. Courtesy UiB, Section for Photo anVisual Presentation



Fig 54-3. The Department of Plastic Surgery at Rikshospitalet from 1953–1990

surgical unit and the ENT-department made team work for head and neck surgery easy.

A national centre for treatment of extensive burns was opened in 1984 as part of the Plastic Surgery Department. Johnson and Eskeland were important in the establishment of this centre. The location to Bergen was chosen because of the vast off-shore oil activity in the North Sea. The burn unit was staffed according to international standards. It was well equipped, and became a great relief for the other plastic surgery departments in Norway. Gunnar Johnson retired in 1994.

Halfdan Shjelderup was succeeded by Børje Sundell from Finland in 1983. He established the microvascular technique at the department. When he moved back to Finland in 1994, Tore Haga succeeded him in this field. Haga and Leiv Hove continued the hand surgical work that Schjelderup had started.

In 1985 Frank Åbyholm was appointed head of the department and professor at the University of Bergen. He initiated research on burn injuries and continued the scientific work on cleft lip and palate which he had started at Rikshospitalet. He returned to Rikshospitalet in 1990 as head of the department of plastic surgery there.

Plastic Surgery in Oslo

In the seventies there were two plastic surgeons in Health

Region 1, Trygve Brekke, who worked part time at the Red Cross clinic, and Hans Hilberg, who worked at the Urology Department at Ullevål. In the early eighties Ole Ugland came to the Red Cross Clinic and established a department there.

Ugland was one of the pillars of Norwegian plastic surgery. After two years of training in Porsgrunn he moved to Uppsala and trained with Tord Skoog, who at that time was one of the world leaders in plastic surgery. At his department Ugland worked with the brightest young plastic surgeons coming from all over the world to share the knowledge and be inspired by professor Skoog. He finished his training there, and was certified as a plastic surgeon in 1965. He continued on staff in Uppsala and simultaneously finished his academic thesis on electrical burns in 1967. He was the first Norwegian surgeon with an academic degree related directly to plastic surgery. Subsequently he was honoured with membership of the exclusive Tord Skoog Society.

After returning to Norway he worked at Sentralsykehuset in Akershus treating burns, serving as the natural source of burns expertise in Eastern Norway. In 1977 he moved to Red Cross Clinic in Oslo. From here his department provided plastic surgical services for Ullevål and Health Region 1 (Eastern Norway). In 1991 his department was incorporated in Ullevål, but continued to function as an independent department within the Surgical Clinic. In the following years his department became even more heavily involved in traumatology and head and neck reconstruc-

tion, and the plastic surgeon on call became an integrated part of the trauma team with considerable influence in decision-making regarding life-threatening conditions of major soft tissue injury and infections.

When Ugland retired in 1994 he was succeeded by Morten Rynning Kveim. He trained in general surgery at Ullevål, and his academic thesis in surgical pathophysiology (1977) provided scientific basis for the use of Ringers acetate as resuscitation fluid. He was trained in plastic surgery at Stanford University and University of California. At Ullevål, Kveim performed the first microvascular TRAM (transverse rectus myocutaneous flap) in Norway, in a case of chronic empyema, followed by the first seven microvascular breast reconstructions, without any major complications.

Kveim left for private practice in 1997. His successors have been Barbara Dahl, Troy Rusli, Sverre Harbo and Kjartan Arctander. From 2010 the Department of Plastic Surgery in Oslo have been united into one, as part of the reorganisation of Rikshospitalet, DNR, Aker and Ullevål into one joined Oslo University Hospital.

Det Norske Radiumhospital (DNR) had great need for plastic surgical expertise because of the high number of cancer patients who required reconstructive surgery.

In 1973 Hans Hillberg was engaged as part time plastic surgeon. He was succeeded in 1978 by Roar Rindal, who in 1984 was appointed full time consultant plastic surgeon. This was the beginning of a section for plastic surgery at DNR. Rindal worked as the only plastic surgeon there until 1990, when new positions were established. Rindal showed great interest for breast reconstructions and performed the first reconstruction with Latissimus Dorsi flap in 1979. He later acquired the technique of pedicled TRAM flap for breast reconstruction. Rindal was for many years engaged in spreading information about breast reconstruction in cooperation with the Norwegian Cancer Association.

In 1996 Hans Petter Gullestad was engaged as consultant plastic surgeon and he succeeded as head of the department when Rindal retired in 1999. At this time the department was recognised as an educational department for plastic surgeons. Besides breast reconstructions, the department has acquired great expertise in reconstructions of the pelvic and perineal areas.

The three plastic surgery departments in Oslo, DNR, Rikshospitalet and Ullevål have always had different profiles. While Rikshospitalet was mainly occupied with congenital malformations and elective plastic surgery, the DNR unit was naturally occupied with breast reconstruction and some other cancer reconstructions. Ullevål, being the trauma centre in Oslo, naturally generated plenty of trauma and other plastic surgery cases requiring emergency treatment. This way the need for microvascular techniques became clearly evident. Ullevål and Rikshospitalet both had their share of general plastic surgery. Even if the departments had to serve different health regions there was never a problem with free movement of patients between the departments when this was required for medical reasons. For various reasons, however, several attempts failed at instituting formal rotation arrangements for the residents.

Plastic Surgery in Telemark

A department for plastic surgery was opened in Porsgrunn in 1960, mainly because Norsk Hydro in Porsgrunn needed treatment facilities for burn injuries, which could happen in their factories. A department with 25 beds and a separate surgical theatre, was established. The first head of department was Roar Funder.

In the period 1981–2000 the department went through turbulent times. In 1981 it was moved to Skien, joined with the ENT-department, and reduced to 12 beds. Tormod Risholt succeeded Funder (1984–88), and Jan Hygen became head of department in the period 1988–96. In 1992 the department was again reduced, this time to 7 beds + an isolate for burns. In 1994 a new reduction took place to 4 beds.

Leif Apelland became head of department in 1996, and the department was increased to 7 beds + an isolate for burns, and a separate department in Porsgrunn with 5 beds.

In 1998 Anadi Begic took over as head of department. Under his leadership the activity expanded and the department was better staffed. In this period microvascular surgery was established at the department.

Plastic Surgery in Tromsø

During the 1970–80ies the surgical community thrived under the enthusiastic and visionary leadership of pro-

fessor Jon Anton Johnson. Patients with plastic surgery related problems were handled by well qualified surgeons from the General Surgery and Thoracic Surgery Departments. In particular Jan Sæbøe-Larsen, who was very interested in burns, pediatric urology and hand surgery. He had qualified as a general surgeon, but was well known for his excellent surgical skills, and a remarkable ability and willingness to broaden his repertoire. The collaboration with Dag Sørli, later head of the Surgical Department and professor in Thoracic Surgery, was very fruitful, and together they performed advanced burn surgery on «floating» patients suspended in frames. They managed to save patients with up to 80% burns, and even used xeno transplants collected from a pig farm in central Troms County. They also had a Clinitron bed for their reconstructive patients. In their first years they used Ole Ugland in Oslo as their reference. Later Haukeland took over the treatment of extensive burns.

The collaboration between Sæbøe-Larsen and Sørli also led to responsibility for replantation of amputated hands and fingers. As early as 1981, they performed replantation of a thumb on a 17-year old boy, who worked in the fishing industry. With the ever increasing demand for vascular and thoracic surgery, they tried to teach the other surgeons the technique of microsurgery, and they also ran rat dissection courses. This activity was, however, later taken over by the specialists at Kronprinsesse Märthas Institutt in Oslo.

In the late 1980ies the Director (CEO) Knut E. Schrøder was looking for a plastic surgeon in order to start the development of a Plastic Surgery Department in Tromsø. He needed somebody with formal training in plastic surgery to support Sæbøe-Larsen. No surgeons were available in Norway at that time and he had to look abroad, and found a plastic surgeon from USA, who, however, left within a year.

In 1989, Rolf E Nordström from Finland was appointed as head of Department of Plastic Surgery, a department with 10 beds located within the former ENT-department. Nordström started animal experimental research on skin transplants and expanders via the large animal research lab in the surgical department. This led to a PhD.

Nordström also started with cleft lip and palate surgery. This caused strong opposition from the cleft teams in Oslo and Bergen, because at this time it was well known that centralisation of cleft treatment was an important factor in order to achieve optimal results. This view was also supported by the Health Authorities, and the treatment of clefts in Tromsø was therefore stopped.

Nordström returned to Finland in 1995, and was succeeded by Jan Bertil Wieslander from Sweden. He managed to create a continuous relay of plastic surgeons, and hand surgeons, from Linköping in Sweden. This made it possible to establish a standard of care at a satisfying level.

In this period Wictoria Hefter from Poland and Sweden also started her work at the department. Erling Bjordal returned in 1998 from Rikshospitalet, where he had finished his formal training in plastic surgery. He had completed his training in general surgery in Tromsø before starting training in Plastic Surgery. On his return to Tromsø, the relay from Linköping was reduced, and during the following years the need for external professional support decreased. The department was strengthened by the arrival of Harry Johansen, an experienced and dedicated hand surgeon. In 2008 the department was fused with the orthopedic department as a response to the demands for economic cuts.

The department in Tromsø is classified as a Group II department¹ by the Norwegian Medical Association. The ambition is to achieve a Class I approval² as the scientific activity is now increasing.

Plastic Surgery in Stavanger

Henrik Søiland senior was the first plastic surgeon in Stavanger. He opened a private practice with some beds at Sanitetsforeningens Clinic in 1952. Besides general plastic surgery he was engaged in hand surgery, and also cleft lip and palate surgery.

In 1963 it was decided to establish a Plastic Surgery Department at the County Hospital of Rogaland, and in 1965 the department was opened with Ivar Dommersnes as the first head.

1) A part of the training period in the department may be used in the specialist training

2) The entire training period qualifies to the specialty

Plastic Surgery in Trondheim

The establishment of Plastic Surgery at St Olav's Hospital has been long and strenuous, and the baby is not yet fully born. Despite national decrees demanding the establishment of plastic surgery at all university hospitals in Norway, the health authorities in Central Norway have not ear-marked any resources for plastic surgery. Good, but vague intentions through the ages, have never been implemented. In the fall of 2008 a group was once again appointed to define and upgrade plastic surgery at St Olav's. The hospital board states that "it is the intention of the hospital to develop the existing plastic surgery unit in the hospital into a complete plastic surgery department". Such a plan has hence been developed, but not yet approved. However, the department has actually expanded during the past two years, and a cautious optimism reigns. Maybe, after another 1–2 years of hard work, we may be able to present a healthy and vital department of plastic surgery in Trondheim.

Due to the lack of plastic surgeons at the hospital, challenges regarding treatment of wounds, burns and soft tissue reconstruction have been handled by the orthopedic surgeons at St Olav's Hospital through the years. Dedicated orthopedic surgeons have developed a substantial know-how in these fields. They have established wound out-patient clinics, they cover wounds by means of large myo-cutaneous flaps, and they are responsible for burn patients. The orthopedic department also tried to perform microvascular reconstructions in the 1990ies, but this project was eventually abandoned due to an unacceptable number of flap failures.

Frode Samdal started as the hospital's first consultant in plastic surgery in December 1993. He got little resources his first years; an office two blocks away from the main hospital, where he also had to see his outpatients, no nurse or secretary, no PC or dictaphone. The plastic surgery section was placed under the Department of General Surgery. The head of surgery at that time, Hans O. Myhre, wrote letters of concern to the Director, pointing out that the establishment of plastic surgery at the hospital was taking place without any accompanying resources whatsoever. Hence, resources had to be relocated from existing activity at the surgical department, and this led to quite a bit of friction with the other surgical sections. Samdal left his position in 1998, as he felt that the conditions made de-

velopment of a proper plastic surgery division impossible. He established Clinic Stokkan, a private clinic in plastic surgery, and has later been joined by other plastic surgeons who were equally tired of knocking on closed doors in attempts to expand plastic surgery at St Olav's Hospital.

After Frode Samdal gave up, seven years with unstable staff followed. From 1998 to 1999, the Department of Plastic Surgery was staffed solely by plastic surgeons on rotation from the department of Plastic Surgery in Malmö, Sweden. These consultants have been hired on demand ever since, and are well established as a part of the hospital. In 2000 Ola Evjen was employed as new consultant. A resident was employed the same year. Evjen also chose to leave his position after a short while due to no added resources, little hope for expanding the surgical field, and demands for self-financing. National authorities realised that plastic surgery in Central Norway was clearly understaffed, and another three positions in plastic surgery were thrown at the hospital, without the hospital ever asking for them. However, salaries were never put in the budgets, and the positions could therefore not be filled. For two periods (2000–01 and 2004–05), the department was run by a resident doctor, assisted by specialists from Malmö, on weekly rotation. Residents at St Olav's have had a very steep learning curve, and an impressive amount of operating time. Anne Elisabeth Isern was employed as new senior doctor in 2001, but she has had a research leave of absence since 2004.

In 2000 the hospital employed Ivan Pavlovic, a plastic and micro surgeon from Belgrade. Hence, the department could for the first time offer microsurgical reconstructions. As the word of this possibility spread, demand increased. Cooperation with other surgical departments escalated, and this clearly contributed to the recognition by the other surgical entities of plastic surgery as a necessary supplement.

In the fall of 2008, resources were relocated to employ a second consultant, Kathrin S. Sneve. The budgets for 2010 allowed for a third consultant in addition to the existing resident. Given the population and tasks allocated to plastic surgery, St Olav's Hospital should have 5 consultants and 3 residents. Hand surgery in Central Norway has a long historic tradition with the orthopedic surgeons, but both parties agree that burn injuries and much of the

wound and reconstructive surgery should be relocated to the plastic surgeons. The new St Olav's Hospital is being built these days, and plastic surgeons and orthopedic surgeons will move into the same building come fall 2009. This is a natural starting point for relocation of work tasks, and for further expansion of the plastic surgery department. St Olav's Hospital is one of the largest hospitals in the country, serving a population large enough to present many and exiting challenges within plastic surgery.

Plastic Surgery in Fredrikstad

In Østfold plastic surgery has been performed at Østfold Hospital in Fredrikstad for many years. In the early eighties Johannes Smehaug and Oscar Eikeland established a department with 13 beds, plus 5 beds for children in the pediatric department.

International Recognition

Norwegian plastic surgeons have had international impact in only one area of plastic surgery, namely in the field of Cleft lip and Palate treatment. Both cleft centers in Norway, Rikshospitalet and Haukeland have long traditions in this field. It is impossible to describe only the surgical part of the treatment of cleft patients, because it is a team work, and it would have been impossible to reach the present standard of care without a close cooperation between members of a multi-disciplinary team.

The Development of the Cleft Treatment in Oslo

Before the first plastic surgeons were educated the cleft patients were operated by general surgeons. The methods used often caused great growth impairments of the maxilla, and the teeth were erupting in very irregular patterns. The palate was often scarred or not operated. The patients were a great challenge for the dentists and speech therapists.

In 1919 Granhaug school for speech disorders was established in Bærum, and in this institution a unit for cleft lip and palate patients was opened in 1922 under the management of Hans Eng. The dentist Arne Bøhn, who was very dedicated to the care of cleft patients, was attached to the unit in 1935, and took care of the prosthetic treatment of the cleft patients.

In 1945 orthodontist Egil Harvold started a close cooperation with Bøhn. Harvold was the first in the world to show that it was possible, by simple orthodontic means, to bring the dislocated lateral maxillary segment in cleft patients into a right position. He also understood how important right timing and delicate surgical technique were in order to avoid growth disturbance of the maxilla. In 1952 Harvold was appointed professor in Toronto, and he was succeeded by orthodontist Olav Bergland. Bergland had an enormous influence on the development of the cleft treatment at Rikshospitalet, and he also understood fully the importance of a multidisciplinary team.

The National Centre for Speech Disorders at Bredtvet was opened in 1967 under the management of Lorange Hansen and later Oddlaug Myklebust. During the first years of Berglands work with cleft patients he had no official employment at Rikshospitalet, but spent a lot of time teaching the surgeons to make accurate journals for the patients with clefts, to operate delicate and establish standardised treatment protocols. He was often to be seen in the operating theater keenly observing the cleft surgeons. Bergland established in the mid 1950ies a standardised documentation for cleft patients in order to evaluate results of the cleft team work. X-rays, plaster casts of maxillae and photographs were taken at certain ages. Bergland was critical to all treatment that could not be proven to be beneficial for the patients. The children should not be subjected to unnecessary treatment. It is first in the 1990ties that «burden of Care» is mentioned in international fora, so Bergland was a pioneer in this field.

Orthodontist Gunvor Semb succeeded Bergland when he died in 1987. She continued and improved Bergland's principles of documentation. During her period at Rikshospitalet, the Oslo Archive became internationally recognised, and many other Cleft Centres wanted to compare their results with the Oslo cleft material. Gunvor Semb was appointed professor at the Dental School at the University of Manchester in 1995, but maintained a part time position at Rikshospitalet. From 1996 she has held a professor II position at the Faculty of Dentistry at the University of Oslo. Elisabeth Rønning succeeded Gunvor Semb as head of the Dental Clinic.

Up to 1949 primary cleft surgery was performed by general surgeons. When Wilhelm Loenneken, specialist in

Plastic Surgery, started his work in Oslo, it was the beginning of a new epoch. In 1967 Gunnar Eskeland succeeded Loenneken, and at the same time Henrik Borchgrevink was attached to the department. Both played a major role in the development of the surgical treatment for cleft lip and palate patients in Norway.

After being inspired by two articles by Boyne and Sands (1972, 1976) Bergland took the initiative together with Frank Åbyholm, to start with secondary bone grafting of the alveolar cleft in 1977. Åbyholm, both a dentist and a plastic surgeon, who had been affiliated to the department at Rikshospitalet in 1975, understood and agreed to Berglands philosophy, and saw the advantages this treatment could bring to the cleft patients. The goal for this surgical technique was to create bone in the cleft area which responded normally to tooth eruption and orthodontic movement of teeth, without interfering with maxillary growth. The patients could then have a complete dental rehabilitation without the use of bridgework or prosthesis. A combined surgical and orthodontic treatment protocol was established.

The results of this treatment were first presented at The 4th International Conference for Cleft Palate and Other Related Anomalies in Acapulco, Mexico in 1981. As a result of this, the Oslo Cleft Team became internationally known, and members of many cleft teams from all over the world came to Oslo to learn the technique (The Oslo Technique). The Oslo Team was invited to several cleft Centers to demonstrate the surgical technique. They also published several articles about this treatment, and showed results based on large number of patients. Today this combined surgical/orthodontic treatment is incorporated in the treatment protocols of the vast majority of the cleft centers in the world. The method represented a new epoch in the dental rehabilitation of cleft patients, and is regarded as the greatest improvement in cleft care during the last 25–30 years. The Oslo team has still the largest analyzed material of bone grafted cleft patients in the world.

Key factors for the cleft lip and palate treatment by the Oslo team has been: centralisation of treatment, team work, long-term follow up, good documentation. When the Scandinavian countries were chosen to host the 9th International Congress of Cleft Palate and Related

Craniofacial anomalies in 2001, Åbyholm was appointed president for this congress (1997–2001).

The Development of the Cleft Treatment in Bergen.

Halfdan Schjelderup understood that the treatment of clefts was a team work, and made contact with the Orthodontic Department when the Odontological Institute in Bergen was opened in 1962. He was supported by professor Asbjørn Hasund who had followed the development in Oslo, and a cooperation between plastic surgeons and the orthodontists Steinar Kvinsland and Per Rygh was established. All primary surgery in cleft patients will cause some degree of maxillary growth impairment. In the period before orthognathic surgery for the retruded maxilla was available in Norway, Rygh in cooperation with orthodontist Rolf Tindlund in 1977 started with interceptive treatment of children at the age of 6–8 years (based upon Delair's studies) in order to achieve an overbite, using fixed dental appliances. Rolf Tindlund has presented the results of this treatment internationally, and has together with Hallvard Vindenes made the Bergen team well known worldwide.

When Haukeland took over the Department of Plastic Surgery in 1967 a cooperation was established with the pediatric department, and the newborns with clefts were admitted to this department for observation and pre surgical orthopedic treatment. When Gunnar Johnson took over the surgical treatment of cleft patients, he developed a structured team concept, with systematic control of the patients in multidisciplinary clinics when the patients were 6 and 15 years of age. Plastic surgeon, orthodontist, speech pathologist, otolaryngologist, pediatrician, and psychiatrist were present at these clinics. A written report, in which the future treatment plan was outlined, was sent to the parents/patient. This was a very efficient work model for the team members, and for the patients it was very rewarding because they could be seen by all specialists in one session. The Oslo Team adopted this model with multidisciplinary clinics when Frank Åbyholm moved from Bergen to Oslo in 1990. The Cleft surgeons who succeeded Gunnar Johnson in Bergen were Hallvard Vindenes and Paul Gravem.

The way in which the cleft treatment in Norway has been organised has had international impact. The head of

WHO's task force for these anomalies has described it as «the golden standard of cleft care». When Great Britain in 1998 should reorganise the cleft treatment, and reduce the cleft centers from 50 to 11, the Norwegian model was used. Looking back, it is quite clear that without the personal dedication of the pioneers in the Cleft Team, Norway would never have achieved the international recognition it has today in this field (Fig 5).

Education

Three departments have been evaluated by the Norwegian Medical Association to qualify for Group I attestation as far as education of specialists in Plastic Surgery is concerned, namely the departments at Rikshospitalet, Haukeland and Ullevål. Each of these departments has had 5–7 candidates annually.

Research

Most of the research and publication of scientific articles and theses within plastic surgery has been carried out at the plastic surgery departments at Rikshospitalet and Haukeland.

Before 1981 there was no thesis in the field of plastic surgery published by plastic surgeons in Norway. The first plastic surgeons to hold academic degrees (PhD) were Gunnar Eskeland (1966) and Ole Ugland (1967), later followed by Morten Kveim (1977). Because two of these were related to basic science, and Uglands work on burns came from the University of Uppsala, Åbyholms thesis on cleft palate was in fact the first degree in plastic surgery in Norway (1981). He was later followed by Hallvard Vindenes, Frode Samdal, Kjell Andenæs, Kim Alexander Tønseth and Åse Sivertsen.



Fig 54-4. A girl born with a complete cleft lip and palate on the right side.

A: The patient at the age of 9 years, before bone grafting to the cleft.

B: X-ray of the cleft before bone grafting.

C: The result 31 months after bone grafting and subsequent orthodontic treatment. D: X-ray of the cleft area after treatment.



Fig 54-5. A boy with a complete bilateral cleft lip and palate before and after treatment.

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55. The Norwegian Association of Plastic Surgeons

Frank Åbyholm and Hallvard Vindenes

Plastic surgery is a separate specialty requiring four years training in a department for plastic surgery and two in general surgery.

The Norwegian Society of Plastic and Reconstructive Surgery was founded in 1954. Due to reorganisation of the structure of The Norwegian Medical Association in 2006, the name has been changed to The Norwegian Association of Plastic Surgeons.

In January 2010 The Norwegian Association of Plastic Surgeons had 154 members.

Gunnar Eskeland, Halfdan Schjelderup, Ole Ugland, Henrik Borchgrevink have been appointed honorary members. There were 167 specialists in plastic surgery in Norway.

Table 55-1. The Chairmen of The Norwegian Association of Plastic Surgeons

Period	Name
1954–57	Wilhelm Loennecken
1958–67	Halfdan Schjelderup
1967–69	Roar Funder
1970–73	Henrik Borchgrevink
1974–77	Halfdan Schjelderup
1978–81	Gunnar Eskeland
1982–83	Gunnar Johnson
1984–85	Ole Ugland
1986–87	Einar Aspelund
1988–89	Tormod Risholt
1990–93	Tore Haga
1994–95	Morten Kveim
1996–97	Einar Gjessing
1998–99	Petter Frode Amland
2000–01	Helge Einar Roald
2001–02	Kjell Aass
2002–03	Kjartan Arctander
2004–05	Knut Chr Skolleborg
2005–07	Jan Terje Røttingen
2008–10	Bjørn Hokland
2010–	Thomas Sjøberg

The Association has a Board with four members in addition to the Chairman. One of the Board members represents the specialist candidates. The Board is elected for a period of two years.

The General Assembly is held each year, usually in connection with the Annual Meeting of The Norwegian Surgical Association.

Some of the Main Tasks for the Association have been:

Education of candidates for the specialty of Plastic Surgery: this involves a continuous analysis of the need for specialists in this field in Norway. It also involves proper educational programmes for the candidates.

In 1951 a Nordic cooperation in education of specialists was established. An educational programme including five compulsory courses was made. These courses are arranged alternatively among the University Plastic Surgery Departments in Norway, Finland, Sweden and Denmark. The subjects covered by these courses are: congenital malformations, tumours, wound healing and wound treatment.

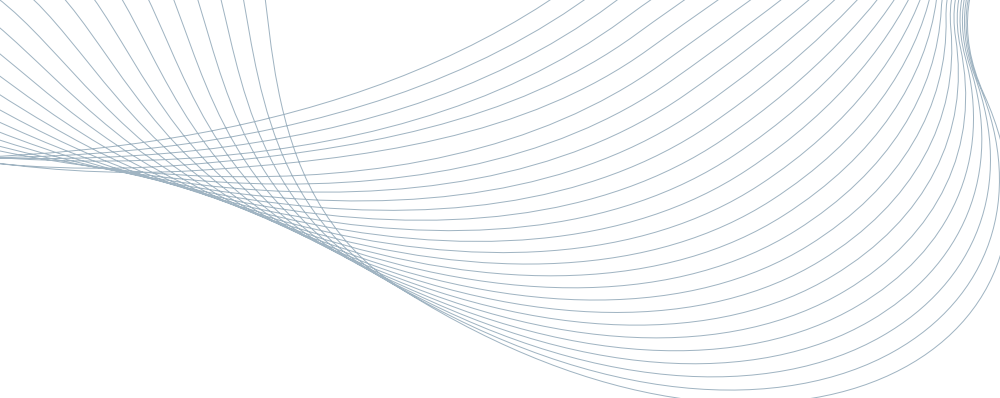
For many years the Association tried to motivate the Health Authorities to establish Plastic Surgery Departments at all regional hospitals in Norway. In 1978 only

Region 2 (Rikshospitalet) and Region 3 (Haukeland) had such departments. The aim was to establish departments in Tromsø, Trondheim and at Ullevål. This was fulfilled in 1990 (Tromsø), in 1991 (Ullevål), and in 1993 (Trondheim).

During the period 1998 – 2001, the Association established ethical guidelines for the members. The background for this was a number of reports in the media concerning improper advertisements of cosmetic surgery. The guidelines have been incorporated in the by-laws since 2001.

In 1984/85 The Norwegian Association of Aesthetic Surgery was established as a sub-association of the Norwegian Association of Plastic Surgery. The first leader was Gorm Bretteville. The Association has today 55 members.

The Norwegian Association of Plastic Surgeons participates in the international organisations UEMS, EOPRAS and IPRAS.



Other Surgical Specialties: Neurosurgery

56. Neurosurgery in Norway

Tryggve Lundar

57. The Norwegian Neurosurgical Society

Tryggve Lundar



56. Neurosurgery in Norway

Trygve Lundar

Modern neurosurgery was started in Great Britain by William Macewen in Scotland and later on by Victor Horsley at the National Hospital in London in the 1880ies.

Vilhelm Magnus

The first neurosurgeon in Norway, Vilhelm Magnus, was born in USA in 1869, but the family went to Corsica, and from the age of 12 he finished school in Bergen. After graduation from medical school at the University in Kristiania (Oslo) in 1897, he started training under professor Cristopher Blom Leegaard in the Neurological Department at Rikshospitalet. Leegaard had become the second professor in neurology in the world in 1895, after Jean Martin Charcot in Paris in 1882.

In 1903 and 1904 Magnus spent several months with Victor Horsley assisting him during neurosurgical operations, mostly for brain tumours. He performed his first two-staged operation for a brain tumour in Oslo in 1903. Magnus developed and practised neurosurgery during the next 26 years, until his unexpected sudden death from a heart attack during the dinner of the Scandinavian Surgical Society in Oslo in June 1929.

During the years 1907 to 1909, he was also affiliated to the Neurological Department at Rikshospitalet as a senior resident.

Magnus performed operations in private homes, and at his clinic in Wergelandsveien in Oslo with ether anesthesia, and mostly without assistants. He was an eminent clinical doctor, and was able to distinguish between patients with meningiomas and malignant brain tumours merely by taking a careful history of the patient's symptoms and signs.

The two stages were necessary to overcome the blood loss in patients with large and highly vascularised meningioma in a time without blood transfusion. During the first operation the cranium and dura were opened. After 3 weeks, when the patients had recovered from the blood loss, the tumour was extirpated in the second procedure.

He was a brilliant surgeon for his time, and his clinical results were amazingly good – about 10% mortality after brain tumour resections. He also performed large series of operative treatment in patients with trigeminal neuralgia with excellent results.

Because Magnus published his clinical work in Norwegian medical journals, the good results were not well known, although they were recognised after presentations at various surgical meetings in Scandinavia and Rome during the later years of his work.

In 1921, after professor Leegaards death, Magnus applied for this academic position, but withdrew his application, and Georg Herman Monrad-Krohn became professor and a famous teacher in neurology until he retired in 1954.

1920–1986

In the 1920ies and 1930ies some neurosurgical operations were performed at Rikshospitalet by Peter Bull and later on by Ragnvald Ingebrigtsen. They were both professors in general surgery. Ingebrigtsen like Magnus visited Harvey Cushing in Boston, but would not leave general surgery. Ingebrigtsen performed the first carotid angiography in Norway (open procedure) in 1934.

In 1935 Arne Torkildsen (1899–1968) returned to Rikshospitalet after studies in neurosurgery in London and Montreal. He performed neurosurgery in the operating room in the Neurological Department, and from 1941 was the leader of the Neurosurgical Section. The volume of intracranial operations increased rapidly from 19 in 1935, to 164 in 1938. Introduction of air into the ventricular system (ventriculography), or by the lumbar route (encephalography), made it possible to localise expansive lesions better. In 1937 Torkildsen introduced a new treatment for patients with obliteration of the aqueduct. He relieved severe hydrocephalus by placing a rubber catheter from the lateral ventricle to the cisterna magna – internationally known as the Torkildsen procedure.

In the following years Gunnar Røvig, Ragnar Norlie and Tormod Hauge became residents in neurosurgery. Spinal neurosurgery was sporadic in the 1930ies for tumours, and in a few cases resected lumbar disk protrusions were called chondroxyoma. During the following years the nature of degenerative lumbar disease became known, and the need for surgical intervention in selected cases was understood. The number of spinal operation increased from 12 in 1940 to 58 in 1948. Røvig's dissertation in 1949 was on Rupture of lumbar discs with intraspinal protrusion of the nucleus pulposus.

In 1951 the first Norwegian neurosurgical department was established under the leadership of Røvig. He also became assistant professor at Oslo University.

From 1953 neurosurgery was a new specialty. Until 1963 neurosurgeons had to be general surgeons as well.

In 1956 Tormod Hauge took over as chief neurosurgeon and professor (1961) at Rikshospitalet.

At Ullevål, Kristian Kristiansen had worked as a neurosurgeon from the early 1950ies in a large general surgical department. His dissertation was on head trauma. He became professor in 1961, and since neurosurgery had expanded during many years, a neurosurgical department with 53 beds was opened in 1964.

With time neurosurgery became a regional specialty and new neurosurgical departments were established in Bergen at the Haukeland in 1969, in Trondheim in 1974, in Tromsø in 1986. The neurosurgical departments and academic positions are listed at the end of this chapter.

New Trends in Norwegian Neurosurgery

Norwegian neurosurgery has undergone remarkable changes during the last 40 years. In 1968, Helge Nornes introduced the operating microscope, and microsurgery spread from vascular surgery (ruptured arterial aneurysms, arteriovenous malformation and carotid artery disease) to tumour surgery and other intracranial operations, as well as intraspinal surgery. Neuroanesthesia improved, intracranial pressure monitoring was introduced, modern understanding of cerebral pathophysiology developed, and eventually neurointensive care was gradually introduced.

From 1975 CT scans became available and extremely useful in the handling of neurosurgical patients. The need for air encephalography, ventriculography and indirect evaluation of intracranial expansive lesions by angiography disappeared, and diagnosis, planning of operations and controls became fast and effective. With time the quality of this method has improved dramatically, and distribution of CT scanners in all hospitals has been of tremendous value in the handling of head injuries and neurological and neurosurgical patients.

From 1986 MR scanning of the brain and spinal canal was introduced, and non-invasive imaging came into a new era. Now, more than 20 years later, MR is essential in planning and performing neurosurgical operations, i.e. guiding the surgeon during the operative procedure. Furthermore, MR techniques can tell us if a tumour is highly malignant (increased blood flow), and by spectroscopy (typical patterns of amino acids for malignant versus low grade tumours), MR can today visualise the cortical representation of important functions (motor-speech-

vision-hearing) as well as important fibre connections, and thereby help the surgeon to avoid and reduce damage to important functions during operative procedures.

Hydrocephalus

From 1961 patients with hydrocephalus could be effectively treated by implantation of a shunt system. The ventricular fluid was drained from the lateral ventricle through a valve outside the skull and to the right atrium. This could solve the hydrocephalic problem also in cases where obstruction of the aqueduct was not the problem. These ventriculo-atrial shunts improved the prognosis for patients with severe hydrocephalus dramatically. A few patients over time died from thrombo-embolic complications, and the standard procedure was changed to ventriculo-peritoneal (VP) shunting from 1980.

Most shunted individuals become shunt dependent for the rest of their lives. They run the risk of shunt failure and may need revision of the shunt. During the last 15 years, introduction of modern endoscopes has led to a reduction in shunting procedures. Endoscopically performed ventriculo-cisternostomy (fenestration of the floor of the IIIrd ventricle) is now always considered as an option to VP shunting, and can be combined with taking tumour biopsy, fenestration of cysts etc.

Functional Neurosurgery

Surgical treatment for epilepsy has been performed for 50 years by resection of the cortical focus, or the affected hemisphere, and in selected cases section of corpus callosum to reduce spread to the opposite hemisphere in selected cases. From 1993 this surgery was centralised to Rikshospitalet, and in recent years modern MR and neurophysiology has improved the selection of patients. Pacing of the left vagus nerve has from the 1990ies been a valuable supplement to reduce epilepsy in patients not suitable for resection of the epileptic focus, and when antiepileptic drugs are not effective.

Surgery for motor dysfunction (Parkinson's disease, essential tremor and dystonias) by stereo-tactically placed lesions in specific target areas in the brain, has been replaced by deep brain stimulation (stereo-tactically implantation

of electrodes) and stimulation by a pacemaker; giving a new life to severely affected patients.

Treatment of severe spasticity by Baclofen infusion pumps and a spinal catheter, is very effective, and has been performed since 1991. Adult patients with spinal causes (traumatic lesions of medulla spinalis, MS) dominated during the first years. Today cerebral causes dominate in children with severe brain damage (asphyxia and other causes of CP, near drowning, metabolic disease).

Surgical treatment of trigeminal neuralgia has been performed for a hundred years in Norway (Vilhelm Magnus). Injection of absolute alcohol, and later on glycerol, was of some help for many years. Microsurgical decompression of the trigeminal root is now a standard procedure with rewarding results, even in very old individuals, and decompression of the facial nerve in the cerebello-pontine angle is helpful in severe cases of hemi-facial spasm.

Modulation of pain by epidurally placed electrodes in the spinal canal and a pacemaker is also performed in the neurosurgical departments. Interestingly good results are obtained in patients with otherwise intractable angina pectoris (by-pass and endovascular treatment) and myocardial perfusion is improved in addition to pain relief.

Pediatric Neurosurgery

Torkildsen was a good posterior-fossa surgeon for his time, and performed tumour resections in cerebellum and the IV ventricle also in children. Although this was risky in small children, some of the patients operated in the 1940ies are still alive.

In 1968, Karl H. Hovind Hovind returned from a 2 year stay at Peter Bent Brigham Hospital in Boston. He was trained by Donald Matson, the founder of pediatric neurosurgery. Hovind gradually built up the service for hydrocephalic children and other pediatric patients.

In the 1990ies the pediatric neurosurgical service at Rikshospitalet increased markedly because patients were transferred from Ullevål. A national service for cranio-facial surgery was established, and the patients were taken care of in a pediatric neurosurgical ward with 20 beds. Annually, 600–700 operative procedures are now

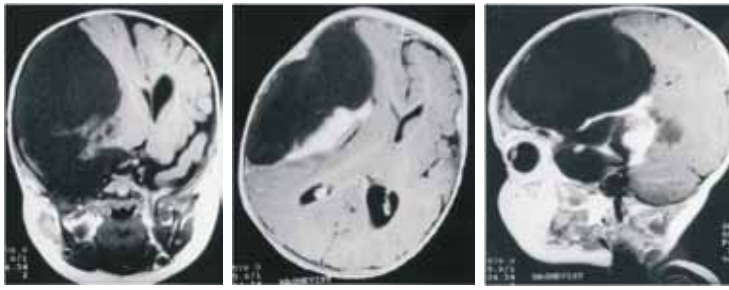


Fig 56-I. 6 months old boy. Symptoms of increased ICP; left-sided hemiplegia. Dramatical increase in head circumference. Histology: Pleomorphic xantastrocytoma.

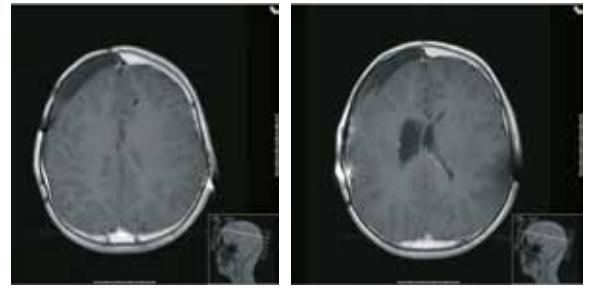


Fig 56-Ib. 15 years later – high-school student

performed (tumours and other expansive lesions, hydrocephalus, malformations, craniofacial cases, functional neurosurgery).

The prognosis for children treated for brain tumours has improved markedly during the last 40 years. The majority of pediatric brain tumours are treated with surgical resection(s) without adjuvant chemo- or radiotherapy (Fig 1).

Vascular Neurosurgery

The handling of patients with acute aneurismal subarachnoid haemorrhage (SAH) has improved dramatically due to a number of reasons during the last 40 years. Helge Nornes improved the clinical results of surgical treatment in patients with acute SAH and cerebral arteriovenous malformations (AVM) to high quality international levels in the 1970ies and 1980ies by meticulous microsurgery. With Rune Aaslid he also introduced the trans-cranial Doppler technique in 1982 (Fig 2). From the 1990ies the importance of acute intervention was established, and neuro-intensive care further improved.

At this time, endovascular neuroradiology became available, and ruptured saccular cerebral aneurysms could be coiled by an endovascular procedure as an option to the standard clip ligation (Fig 3). The endovascular treatment can also be used for treatment of cerebral AVMs, and the method

was established and developed in Norway by Per Nakstad and Søren Jacob Bakke in Oslo. Endovascular treatment is now available in all Norwegian neurosurgical centres.

Tumour Surgery

Management of patients with intracranial and intraspinal tumours has also changed during the last decades. CT and MR has taken over as diagnostic tools, but they also make it possible to use neuro-navigation intraoperatively and in the planning of tumour resections. In Trondheim Geirmund Unsgaard has introduced 3-D ultrasound as an optional method for neuro-navigation.

In Bergen Erik-Olof Backlund took over after Martin Berg-Jensen in 1984, and gamma knife treatment (radio-surgery) was introduced in Norway in 1988. Such highly focused radiation can be a valuable treatment both as an option to surgical resection (vestibularis schwannomas, brain metastasis), and as a supplement.

Spinal Surgery

Spinal degenerative disease has a good prognosis without operative intervention in most cases. In selected cases operative removal of lumbar disc herniation is of great value. From the early 1970ies lumbar spinal stenosis was recognised and operative treatment established. General and orthopedic surgeons later took over much of the lum-

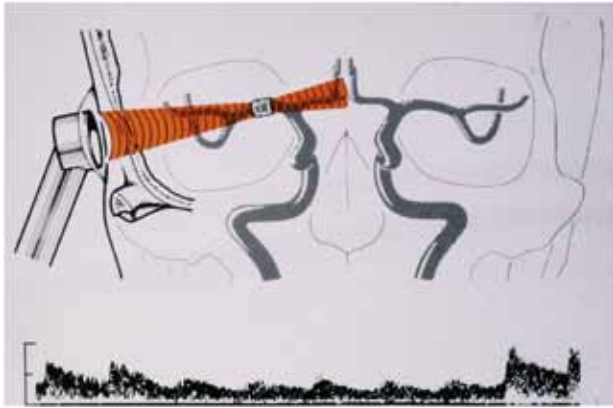


Fig 56-2. Transcranial Doppler ultrasound. Note the flow velocity signal in the right arteria cerebri media. Manual compression of the ipsilateral internal carotid artery instantly reduces the flow velocity. After 5 heart beats the compression is terminated, and flow velocity shows a short overshoot before regulation back to the original level.

J Neurosurg: December 1982.

bar surgery, but it varies in different parts of the country. All surgery for lumbar and cervical degenerative disease in Northern Norway is now performed in the Neurosurgical Department in Tromsø.

Operations for cervical disk herniation and spinal stenosis are performed by neurosurgeons in Norway. During the last decades new techniques have been introduced in degenerative disease (cages, disk implants), as well as in the handling of patients with metastatic disease to the vertebral column, and in trauma patients.

Neurotrauma

Handling of head and spinal trauma patients has always been a central part of neurosurgery. Due to the large number of mild head trauma patients, many such patients are taken care of in general surgical departments outside the regional university hospitals. While patients with brain concussion often were observed over-night some decades ago, new Scandinavian guidelines have changed this the last ten years.

After careful history taking, Glasgow Coma scoring, and eventual CT scanning, patients with minimal and mild head injuries can safely be sent home.

In the 1970ies some large central hospitals employed a neurosurgeon in their surgical department to do spinal

surgery and take care of head and spinal trauma patients (Ahus, Skien, Stavanger). Due to the need for intracranial pressure monitoring, and neurointensive care in addition to surgical intervention in severe head trauma patients, most severe neurotrauma cases are now centralised to the neurosurgical departments.

In Oslo neurotrauma has been taken care of at Ullevål, while the pediatric neurosurgery service is located at the Rikshospitalet.

The Departments of Neurosurgery in Norway

Oslo

At Rikshospitalet in Oslo, Arne Torkildsen performed neurosurgical operations from 1935 and led the Neurosurgical Division in the Neurological Department from 1940 – 1950.

In 1951 the first Neurosurgical department in Norway was opened led by Gunnar Røvig, followed by Tormod Hauge in 1956. After Hauge retired in 1979, Helge Nornes led the department for a short period, until Nic Zwetnow took over in 1980–1981. Thereafter Karl H. Hovind led the department temporarily until Helge Nornes returned from Berne and led the department until 1997, when Tryggve Lundar took over. From September 2005, Geir K. Røste led the department for 4 months.

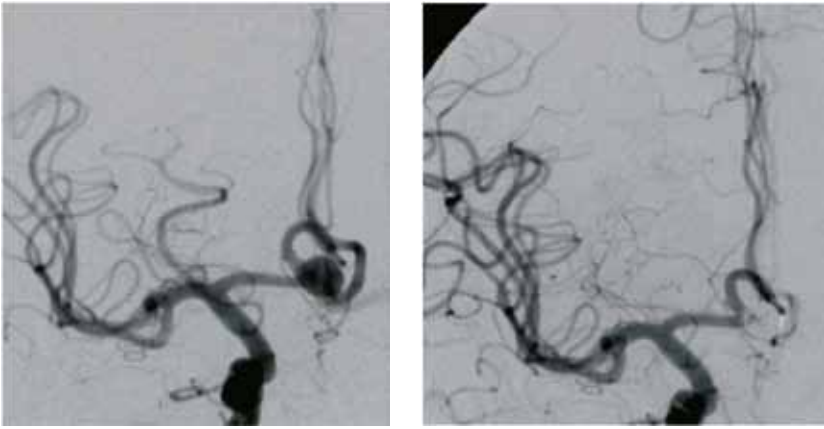


Fig 56-3. Patient with acute subarachnoid haemorrhage. Cerebral angiography shows an aneurysm at the basilar bifurcation. A: Before and B: After endovascular coil treatment in the acute stage and elimination of the risk of re-bleed. Courtesy Rikshospitalet



Fig 56-4. Gunnar Røvig. Portrait by Jo Stang 1975. Courtesy Rikshospitalet

Eirik Helseth led the department in 2006–2007 and Jon Berg-Johnsen took over in May 2008.

Kristian Kristiansen led the department at Ullevål from 1955 to 1977. Nils Eie led the department for a year, until Ragnar Nesbakken took over and was chief until his sudden death in 1987. From 1983 this department has been a Center for Neurotrauma for both health regions in Southeastern Norway, covering 2.6 million people. Bjørn Magnæs led the department in 1988–1989, Hans Kristian Nordby in 1990, Tryggve Lundar in 1991–1993. Bjørn Magnæs again took over and led the department in 1993 until he retired in 2001, and was followed by Sissel Reinlie. She has led the combined neurosurgical department in Oslo University Hospital since 2010.

Bergen

Neurosurgery was until 1966 only practised in Oslo (Rikshospitalet and Ullevål), when Martin Berg-Jensen introduced neurological surgery at the Haukeland in Bergen. In 1969 a neurosurgical department was established, with its own patient ward from 1976. Erik-Olof Backlund took over the department from 1982 and introduced gamma-knife radiation treatment in Norway from 1988. Knut Wester led the department in Bergen from 1990 to 2001, when Erling Myrseth took over.

Trondheim

In Trondheim, neurosurgery was introduced in 1974 by Rolf Ringkjøb and a neurosurgical department was established within a few years. Ringkjøb retired in 1986 and Andreas Stolt-Nielsen took over. Geirmund Unsgård has led the department since 1996.

Tromsø

Neurosurgery was introduced in Tromsø in 1985 by Alf Tysvær. A neurosurgical department was built by Jens Hugo Trumpy from 1986. He retired in 1998. Tor Ingebrigtsen took over and led the department until 2006, when he was followed by Roar Kloster.

Stavanger

In Stavanger, the hospital authorities wanted to build up neurosurgery, and up to three neurosurgeons have been working in this second neurosurgical unit in Western Norway. This has been controversial, as neurosurgery has been considered a regional service, and many small units will not meet the needs for education and handling of small patient groups.



Fig 56-5. Helge Nornes. Portrait by Ida Lorentzen 1998. Courtesy Rikshospitalet

Academic Positions Abroad held by Norwegian Neurosurgeons:

Arne Torkildsen was professor in Neurosurgery at the University of Cairo 1950–54,

Helge Nornes was professor of Neurosurgery at the University of Bern 1981–1983

Iver Arne Langmoen was professor of Neurosurgery at Karolinska Institute 1997–2005.

The Future

In Oslo, the two oldest and largest neurosurgical units are now being merged in the new Oslo University Hospital. Hopefully, this will give new strength to the neurosurgical service in Norway in the future.

Table 56-1. Academic Positions in Clinical Neurosurgery

University of Oslo:		
Gunnar Røvig	Docent	1950–1954
Tormod Hauge	Professor	1961–1979
Kristian Kristiansen	Professor	1961–1978
Ragnar Nesbakken	Professor	1978–1987
Nicolaus Zwetnov	Professor	1980–1981
Helge Nornes	Professor	1983–1997
Trygve Lundar	Professor	1990–
Bjørn Magnæs	Professor	1993–2000
Karl-Fredrik Lindegaard	Professor	1997–
Eirik Helseth	Professor	2004–
Iver A. Langmoen	Professor	2005–
Jon Berg-Johnsen	Professor	2008–
Per Kristian Eide	Professor	2010–
University of Bergen:		
Karl Krogness	Docent	1978–1979
Eric-Olof Backlund	Professor	1982–1992
Knut Wester	Professor	1989–2010
Paal-Henning Pedersen	Professor	2002–
Morten Lund-Johansen	Professor	2007–
University of Trondheim:		
Geirmund Unsgård	Professor	1989–
	Dean	1993–1998
University of Tromsø:		
Jens Hugo Trumpy	Professor	1994–1998
Bertil Romner	Professor	1999–
Rune Hennig	Professor	1999–
Tor Ingebrigtsen	Professor	2006–

Acknowledgements

The author and editors would like to thank Jon Berg-Johnsen, Knut Wester, Sissel Reinlie and Roar Kloster for comments to the manuscript.

57. The Norwegian Neurosurgical Society

Tryggve Lundar

Twelve years after neurosurgery had become a new and independent specialty, the Norwegian Neurosurgical Society (NNS) was founded during a meeting at Ullevål.

The founders were: Ragnar Gjone, Rolf Ringkjøb, Ragnar Nesbakken, Jens Hugo Trumpy, Sven Holst, Martin Berg-Jensen, Per N. Helsing, Karl Krogness, Helge Nornes, Ole B. Styri, Peter Aaser, Kristian Kristiansen, Nils Eie, Tormod Hauge, Svein Bøyesen and Steen Flood.

From 1985 NNS has held annual meetings with a scientific as well as a social programme, and from 1992 these meetings have been arranged in cooperation with the Norwegian Surgical Association.

NNS has a training committee visiting the neurosurgical departments annually and reporting to the Norwegian Medical Society on education of neurosurgeons in Norway.

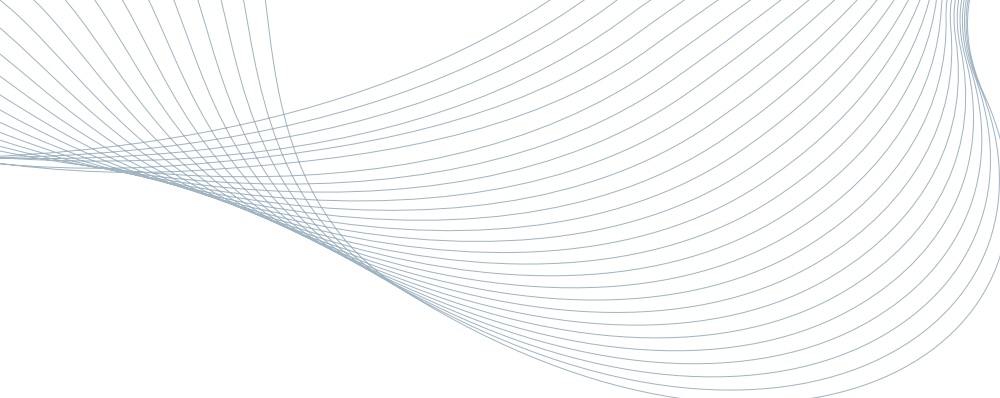
During the last ten years, two members of NNS, Eirik Helseth and Iver A. Langmoen, have arranged a one week Scandinavian Training Course in neurosurgery at Beitostølen. This has become a popular and valuable local supplement to the European Training Courses for our trainees in neurosurgery.

Table 57-1.
The Chairmen of The Norwegian Neurosurgical Society

1965–1967	Kristian Kristiansen
1968–1969	Tormod Hauge
1970–1971	Martin Berg-Jensen
1972–1975	Steen Flood
1976–1977	Helge Nornes
1978–1979	Rolf Ringkjøb
1980	Eivinn Hauglie-Hanssen
1981–1983	Svein Bøyesen
1984–1985	Eivinn Hauglie-Hanssen
1986–1987	Ragnar Nesbakken
1988–1989	Tryggve Lundar
1990–1991	Bjørn Magnæs
1992–1993	Geirmund Unsgård
1994–1995	Knut Wester
1996–1997	Iver A. Langmoen
1998–2001	Jon Berg-Johnsen
2002–2003	Morten Lund-Johansen
2004–2005	Tor Ingebrigtsen
2006–2007	Eirik Helseth
2008–2009	Tomm Brostrup Müller
2010–	Iver A. Langmoen

NNS, in cooperation with the Scandinavian Neurosurgical Society (The Scandinavian Neurotrauma Committee), introduced Scandinavian guidelines for Initial management of patients with minimal, mild, and moderate head injuries in Scandinavian countries in 2000 (J Trauma 48(4): 760-6; 2000).

NNS participates in the Scandinavian Neurosurgical Society and the European Neurosurgical Society. Many neurosurgeons are also members of American Societies, or specific societies such as the European Society for Paediatric Neurosurgery or the International Society for Paediatric Neurosurgery.



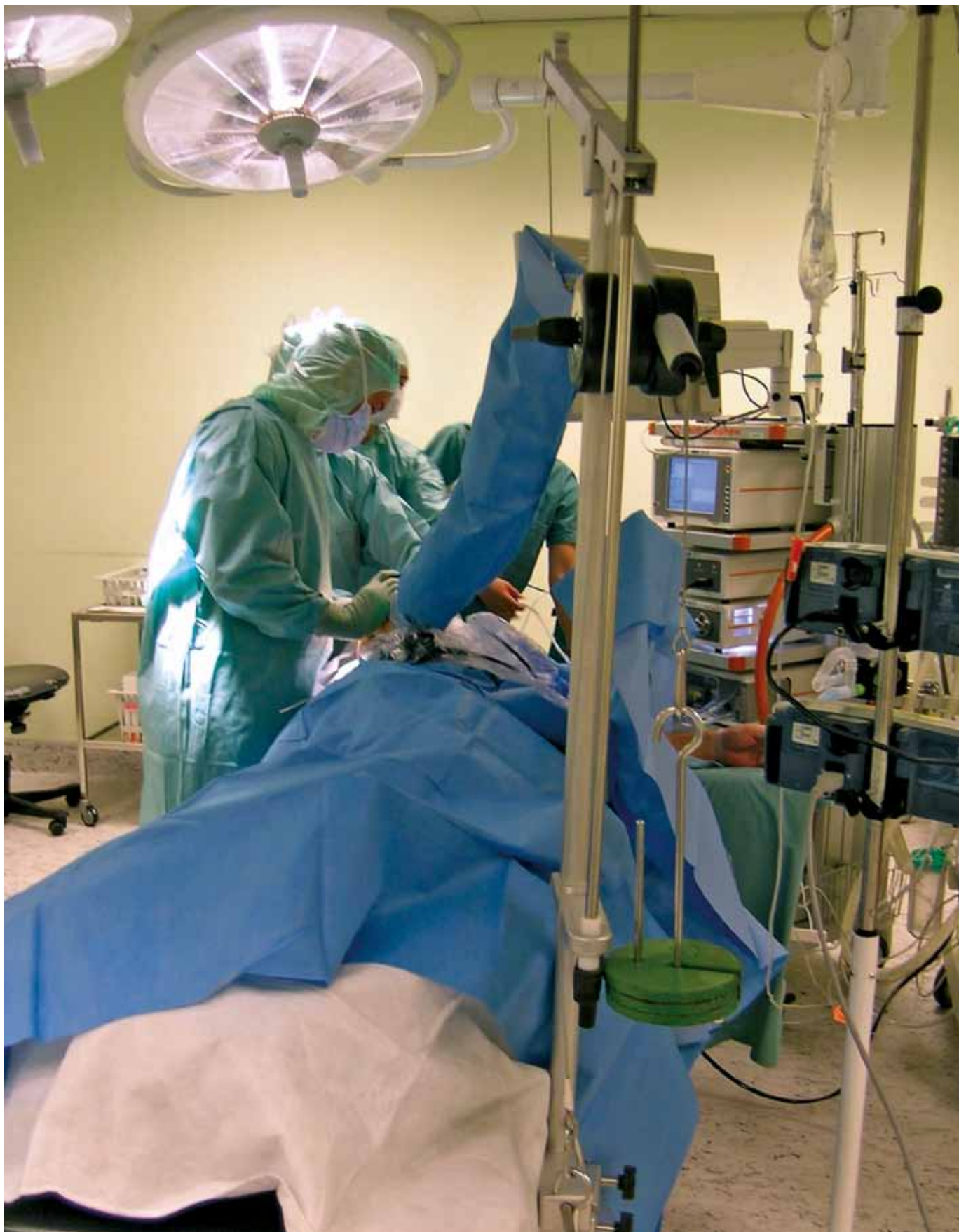
Other Surgical Specialties: Maxillofacial Surgery

58. Maxillofacial Surgery

Per Skjelbred and Torstein Lyberg

59. The Norwegian Society for Maxillofacial Surgery

Per Skjelbred and Torstein Lyberg



58. Maxillofacial Surgery in Norway

Per Skjelbred and Torstein Lyberg

Definition

Maxillofacial surgery is surgery to correct a wide spectrum of diseases, injuries, and defects in the entire cranio-maxillofacial complex: anatomical area of the mouth, jaws, face, skull and associated structures.

The Specialty

Following a proposal from doctor and dentist Sophus Lossius, The Norwegian Medical Association established in 1936 a specialty in Maxillofacial Surgery, initially named Dental Jaw Surgery. In 1965 this specialty was renamed Jaw Surgery and Oral Diseases. The Maxillofacial Surgery specialty in Norway is a medical specialty, which up to now has been based upon a full basic education in both medicine (MD) and dentistry (DDS). Further, four years residency training in a hospital department of maxillofacial surgery is required.

The Maxillofacial Surgery specialty should not be confused with the specialties “Oral Surgery and Oral Medicine” or “Orthodontics” which are both specialties in dentistry.

Geographical Spread of Specialists

Ullevål

Maxillofacial surgery at Ullevål was from 1925 based on consultant services, and a dental clinic was opened in the

Administration Building in 1932. In 1937, twelve beds were dedicated to maxillofacial surgery in the Surgical Department. Following rebuilding and modernisation, a comprehensive unit for maxillofacial surgery was established in 1958, the first of its kind in Norway. The department had 21 beds at its disposal at the time, employed four doctors, and had its own outpatient clinic. A dental clinic was also associated with the department. The Department of Maxillofacial Surgery was from 1932 led by Sophus Lossius, who was also a professor at the School of Dentistry, Surgical Department. Lossius was succeeded in 1948 by Rolf Wang-Norderud, who held the position until 1982. He had great influence on the education of specialists in three decades, in close cooperation with consultants Ola Rake and Svein Nafstad. Since then, the chairmen of the department have been Torstein Lyberg from 1984–1995, Olav Anders Olstad from 1995–1999, and Per Skjelbred from 1999 until now. In 1982, it was decided to establish a joint Surgical Clinic at Ullevål incorporating the Departments of Maxillofacial Surgery, Thoracic Surgery, Gastrointestinal Surgery, Urology, Pediatric Surgery, Neurosurgery and Orthopedic Surgery with a joint administrative management. The Maxillofacial Department's ward and operation unit were moved to the Central Surgical Block in 1989, while the outpatient clinic remained in the old location. The outpatient clinic was incorporated into the mass of central surgical buildings in 2006. The department, which now employs seven doctors (five consultants and two residents), is the only



Fig 58-I. Different eras in the treatment of midface fractures. a) External pin fixation of the midface to a plaster of Paris cap. b) External pin fixation of facial fractures supported by a pericranial halo frame. c) Internal fixation of multiple midface fractures with titanium plates. Courtesy Ullevål Hospital

Group 1¹ educational institution within the specialty maxillofacial surgery in Norway and has educated nearly all of the specialists in this field for the last 70 years. The department has also had teaching responsibilities for students both at the Medical and Dental Faculties at the University of Oslo. Skjelbred was a professor II² of medicine (maxillofacial surgery) from 1995 until 2000 and has been a professor II of odontology (oral surgery) from 2001 until the present.

Since 1952 a full year of clinical service at a hospital department of maxillofacial surgery has been required for the dental surgery specialty. Maxillofacial surgery was at that time fully established only at Ullevål, and this hospital therefore came to play a major role in the education of dental surgeons. The department has residents in oral surgery from the University of Oslo.

A number of ear, nose and throat doctors needing experience in treating trauma cases come to observe the work and learn the procedures in the department. There have also been residents from Latvia and Romania.

Rikshospitalet

At Rikshospitalet, it all began during World War II with a modest Dental and Jaw Clinic located in the surgical

admitting area. From the 1950ies on, the department was under the direction of doctor, dentist and later professor Eigil Aas. He was succeeded by Jørgen Johansen in 1968, and Sigurd Trebo, who was head of the department from 1982, when it was physically moved to the premises of the Ear, Nose and Throat (ENT) Department. When Rikshospitalet moved to Gaustad in 2000, the Dental and Jaw Department became a section of the ENT Department, and the chief consultant from 2000 is Geir Støre who also holds a professorship in oral surgery at the University of Tromsø. The staff consists of one consultant and two oral surgeons who share a position.

Haukeland

Doctor and dentist Hilmar Myrhaug was appointed in 1952 to direct the newly established Dental Clinic at Haukeland and served as maxillofacial surgeon for all of Western Norway until 1973. In 1967, the position was changed to a consultant position. Ole Gilhuus-Moe was appointed professor in oral surgery at the University of Bergen in 1973, and was at the same time engaged in an affiliate position as chairman of the newly established Department of Oral and Maxillofacial Surgery. At the same time one additional full-time post and three affiliate posts were established, all of which have later been held by oral surgeons. The department was modernised during the building of

1) The entire training period in the department qualifies in specialty training

2) Part-time professor in addition to being a clinical consultant



Fig 58-2. A patient with maxillary retrognathia and mandibular prognathia corrected with LeFort I osteotomy of the maxilla and bilateral sagittal ramus osteotomy of the mandible.

a) From the side before operation b) Front before operation
Courtesy Ullevål Hospital

c) From the side after operation d) Front after operation

the new Central Block in 1982. Originally, the plan was ten beds shared with the Plastic Surgery Department. The number of beds for maxillofacial surgery was reduced to five from the mid 1990ies. For two decades, until 1997, the department had status as Group 1 for the specialty maxillofacial surgery. Since then, it has not employed maxillofacial surgeons and the department, which is now under the direction of oral surgeons, has lost its Group 1 status.

St. Olav's Hospital in Trondheim

The Maxillofacial Surgery Department at St. Olav's Hospital is the only maxillofacial surgery department north of Oslo. Doctor and dentist Gunnar Nordgaard was appointed to a newly established position as a maxillofacial surgeon in 1962, and built up the department as a unit, which covered the needs of the region. The necessary beds were provided by the Orthopedic Trauma Department. In 1971, the Maxillofacial Surgery Unit was moved to a separate location, and beds were provided in the ENT Department. Ernst Torger Pedersen was chairman of the department 1984–2003, and from 2005 Christoph Ziegler holds this position, and is also appointed professor II at the Norwegian University of Science and Technology. Today the department employs two maxillofacial consultants and one resident, and has Group 2 status with regards to specialist training.³

Bodø

At the Central Hospital of Bodø, specialist in ENT and maxillofacial surgery, Anton Gulsvik offered services in maxillofacial surgery to the inhabitants of Northern Norway from 1950. During the period 1973–1985 a separate Department of Maxillofacial Surgery was established, under the direction of Kjeld S. Aarnes. This department functioned as a regional department for Northern Norway, and had up to 15 beds at its disposal in the ENT ward. Since then, the hospital in Bodø has been staffed by oral surgeons, and the more difficult cases have been sent to Trondheim or to Ullevål. The Hospital in Tromsø employed a maxillofacial surgeon for a very short period in the 1990ies, but the specialty has never been properly established there.

Gjøvik

At Innlandet Hospital, Gjøvik Division, there has been a maxillofacial surgeon (Kjeld S. Aarnes) associated with the ENT Department from 1991. Later, the section has been expanded by employment of two oral surgeons and is presently headed by Jan Mangersnes. However, he resigned in 2011.

3) A part of the training in the department may be used in the specialist training

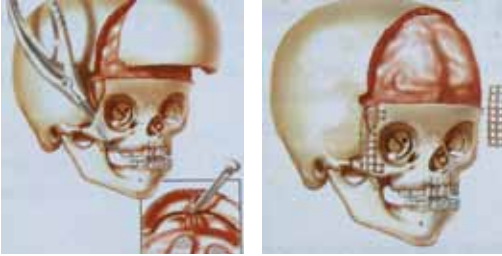


Fig 58-3. Depiction of monobloc osteotomy with midface internal distraction (MID) device.
Courtesy Ullevål Hospital

The Growth and Development of the Profession

The department at Ullevål has always been the professional and the academic centre for Norwegian maxillofacial surgery. While individuals have been important, it is the environment that has been built up which will continue maxillofacial surgery on an international level in Norway. Since 1948 the staff has, in spite of extensive expansion of activities, only been increased with two consultants. The Directorate of Health and Social Services evaluated the maxillofacial specialty in 2002, and concluded that the department at Ullevål would need 10 consultants and three residents. This has not been followed up by the hospital authorities.

Facial Traumatology (Ref 1, 2, Fig 1, Fig 5, Fig 6)

Fractures in the face often involve tooth-bearing bones such as the mandible and the maxilla. Re-establishment of the correct bite with intermaxillary fixation was the old method of treatment. Odontological competence has thus always been of importance. The use of various bone sutures with steel wire was another widely used method. Comprehensive panfacial injuries, with the tendency to give a flat and broad face, were treated with steel wire/ elastics- tension from the mid-face and to a Hoffmann

frame, which was attached to the head with a plaster of Paris cap or later, to a pericranial halo frame. In the mid-1970ies, the first mini-plates for maxillofacial surgery were introduced at Ullevål, but were not routinely used until 1983.

New systems, based on titanium plates of varying dimensions, have led to vastly improved treatment for patients with facial fractures. Access to the facial skeleton was revolutionised by the French plastic surgeon Paul Tessier early in the 1970ies with bi-temporal coronal incision and subperiosteal dissection of the forehead, orbits and the nasal skeleton. This has now become a common procedure, as is mid-face degloving with exposure of the mid-face and nasal cartilages and bone via an oral vestibular incision.

In the beginning of the 1980ies, approximately 250 patients were admitted and operated for facial fractures at Ullevål each year. In 2009 more than 1000 were evaluated and 577 were treated. The Department of Maxillofacial Surgery at Ullevål treats more than half of all patients admitted with facial fractures to Norwegian hospitals.

Corrective Osteotomies of the Facial Skeleton (3, Fig 2)
Correction of malocclusions including overbites, under-



Fig 58-4. A patient with Crouzon syndrome before (a) and after (b) monobloc osteotomy and distraction with MID device.
Courtesy Ullevål Hospital

bites, open bites etc. was performed from 1939 at Ullevål. The most frequently used method was the subcondylar mandibular osteotomy through a short retromandibular cutaneous incision. The other method was osteotomy of the corpus mandibulae. In 1975, the sagittal ramus osteotomy was introduced. Senior registrar Georg Lende, after a resident period in USA, was the first to perform a Le Fort I osteotomy at Ullevål in 1981. Meanwhile, Kjeld Aarnes also performed both Le Fort I and sagittal split operations during the late 1970ies in Bodø.

Craniofacial Surgery (Ref 4,5, Fig 3, Fig 4)

Craniofacial surgery was introduced at Ullevål in the mid 1980ies. Surgical displacement of the malar bones was first performed in 1982. Lyberg introduced modern techniques for correcting craniosynostoses in 1986, replacing the traditional surgical treatment that had earlier been used by the neurosurgeons. In 1987 Lyberg, Olstad and Skjelbred performed the first leFort III osteotomy on a patient with Crouzon syndrome with satisfying results. In 1999, an agreement was made between the neurosurgical departments at Ullevål and Rikshospitalet that all craniofacial operations should be carried out at Rikshospitalet. Distraction devices for craniofacial surgery became available at the same time. This led to much better results

than before. The first monobloc operation (movement of the forehead, orbits and mid-face in one piece) was performed at Rikshospitalet in 1999, in cooperation between maxillofacial surgeons from Ullevål and neurosurgeons from Rikshospitalet. A few years later this surgery was offered on a national basis by the formal institution of the National Craniofacial Team. From 1999 to 2010 altogether 26 patients have been operated with craniofacial distraction.

Patients with Other Facial Malformations

The department at Ullevål was early engaged in the treatment of different branchial arch syndromes such as hemifacial microsomia, Goldenhar syndrome (oculo-auriculo-vertebral spectrum) and Treacher Collins syndrome (mandibulofacial dysostosis). Reconstruction of the temporomandibular joints with costochondral transplants was introduced by Wang-Norderud and established as a treatment option in the late 1970ies, whereas distraction of the facial skeleton and soft tissue corrections have been offered to this group of patients within the last two decades. Since the craniofacial pediatric patients were moved to Rikshospitalet's Neurosurgical Department in 1999, it was logical to move the other children to Rikshospitalet's Plastic Surgery Department, and include the group in the

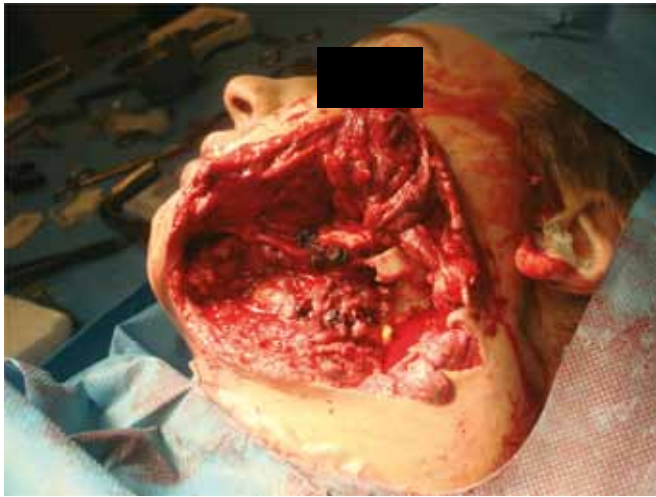


Fig 58-5 a. Patient with shotgun injury to the face including defect fracture of the mandible. Cortesy Ullevål Hospital



Fig 58-5 b and c. The patient after initial, conservative soft tissue preservation and mandibular reconstruction with microvascular bone flap from the iliac crest. Cortesy Ullevål Hospital

Craniofacial Team. Maxillofacial surgeons from Ullevål have later operated on this group of patients at Rikshospitalet's Plastic Surgery Department.

Facial Microvascular Surgery (Ref 6, Fig 5, Fig 6)

The first mandible reconstruction with a microvascular iliac crest transplant was performed at Ullevål in 1985 by Olstad, Lyberg and Skjelbred. Eventually, a number of other free, soft tissue- and bone micro-vascular flaps were used (radialis, fibula, latissimus dorsi, jejunum etc.). These improved techniques for reconstruction of bone and soft tissue laid the foundation for an altered approach (expanded indications) to which malignant tumours in the jaw/facial area could be considered operable. Almost 200 patients have been treated with micro-vascular grafts in the period 1985–2010.

Head and Neck Oncological Surgery

The Department of Maxillofacial Surgery at Ullevål established collaboration with the ENT department and the Oncological Department early on. Together they operated a number of cancer patients. Not least, in the time after the introduction of free microvascular flaps, which enabled reconstruction of larger resections in the face. After both head and neck oncology and ENT surgery were

centralised to Rikshospitalet-Radiumhospitalet in 2007, it became impractical to operate cancer patients at Ullevål. The exception is children with sarcomas in the facial skeleton, who are treated at Ullevål in collaboration with the Pediatric Oncological Team. The maxillofacial surgeons are also engaged in the treatment of malignant tumours at the Department of Ophthalmology.

Oculoplastic Surgery

When oculoplastic surgery on a national basis was added to the Ophthalmology Department at Ullevål in the mid-1990ies, it was natural to cooperate with the maxillofacial surgeons who, based on their management of trauma cases and corrective osteotomies, had a lot of experience in orbital surgery. Resections of orbital tumours and reconstructions after injuries and diseases constitute a large portion of the patient group.

Temporomandibular Joint Surgery (7)

The department at Ullevål has long traditions in all forms of temporomandibular joint surgery. Resection of ankyloses were performed in the early 1950ies, with the insertion of moulded prostheses (penny operation). Later, commercially available prostheses were used. Early in the 1950ies, surgery on the articular disc was introduced and

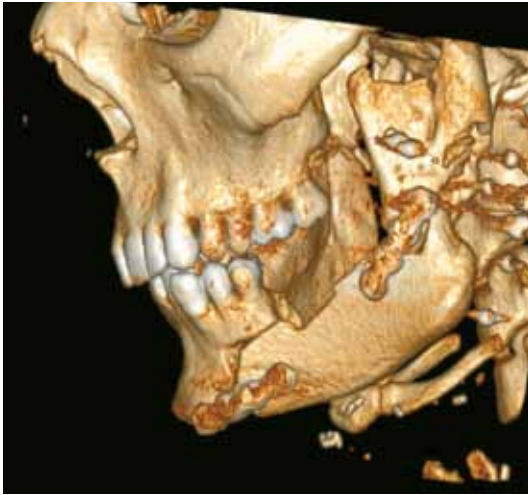


Fig 58-5 d. Postoperative 3D-reconstructed CT scan showing reconstructed mandible

it was resumed in a wider scale in the 1980ies. Open joint surgery with discectomies and arthroplasties are common procedures and endoscopic lavage and lysis are also offered today.

Implant Surgery

Temporomandibular joint implants were, from the 1950ies on, custom-made from chrome/cobalt alloys. Later, pre-formed implants made out of titanium (the mandibular condyle part) and polyethylene/teflon (the glenoid fossa part) have taken over (7). With the Swedish professor Per-Ingvar Brånemarks research group as a starting point in the late 1960ies, titanium implants (screw implants) were developed. Starting in the early 1980ies, these were used with great success to anchor tooth prostheses for bite rehabilitation following injuries or cancer (6). The system is also used to anchor facial prostheses (ear, nose and facial parts with eye and eyelids) and hearing aids (8). Onlay implants made from silicone, polytetraethylene and polyethylene have also been used in augmentation plasties on the chin, nose and malar bones in cosmetic facial surgery.

Cosmetic Facial Surgery

From the middle of the 1980ies, cosmetic facial surgery

was included as a part of the surgical activity in the maxillofacial surgery department. Many of the patients with facial injuries are in need of secondary correction of scars, etc. The department at Ullevål was among the first to offer transplants of fat to defects in the face (Coleman technique) and subperiosteal face lifts, in addition to standard face lifts, forehead lift, blepharoplasties and rhinoplasties.

Areas of Difficulty for the Specialty

There are 11 departments of maxillofacial/oral surgery at hospitals in Norway today. Only two of these have maxillofacial surgeons, the rest are staffed by dentists with oral surgery specialty. The Norwegian Society for Maxillofacial Surgery has on three occasions (1989, 1998 and 2009) applied to The Norwegian Medical Association in order to change the formal name of the specialty to maxillofacial surgery, which has been the international designation of this specialty since the 1950ies. Each time, the application has been rejected, mainly due to protests from the ENT- and the Plastic Surgery Societies. In 2002, a proposal was put forth to discontinue the maxillofacial specialty, which the Directorate of Health and Social Services rejected. Meanwhile, the content of the specialist training was changed. Omitting the requirement for the DDS degree, there was no longer a requirement for double education,



Fig 58-6 a) Vascularized fibular bone graft harvested for total reconstruction of the mandible.

b) Osteotomized and plated fibula ready for implantation



Fig 58-6 c). Micrograft in situ



Fig 58-6 d) Patient one week after surgery. Courtesy Ullevål Hospital

something the academic and professional environment found regrettable.

When maxillofacial surgery was established as the ninth main surgical specialty in the United Kingdom in 1994,

the main reasoning was that these doubly educated specialists in facial surgery alone could provide better treatment at a lower cost for the population, within areas which previously were fragmented between plastic surgery, ENT, oral surgery and other specialties.

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7. Lyberg T. Kjeveleddskirurgi. Tidsskr Nor Lægeforen 1986; 106: 2315-2319.
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Acknowledgements

The authors and the editors would like to thank Ida Gjessing Trumpy for comments to the manuscript.

59. The Norwegian Society for Maxillofacial Surgery

Per Skjelbred and Torstein Lyberg

The Norwegian Society of Jaw Surgery was founded in the early 1950ies. Regrettably, the early files have been destroyed. In 1998 the name of the Society was changed to The Norwegian Society for Maxillofacial Surgery. The chairmen of this Society are presented in table 1.

Name of the Specialty

In Norway, maxillofacial surgery was recognised as a separate surgical specialty in 1936. The requirements were double degree in dentistry (DDS) and medicine (MD) and three years training in a hospital department of maxillofacial surgery. The name of the specialty was originally "Dental Jaw Surgery". In 1965 the name was changed to "Jaw Surgery and Oral Diseases". The required hospital training has been increased to four years.

In 1989, 1998 and 2009 the Society applied for the name Maxillofacial surgery, which had been the international designation of this professional field since the 1950ies, but this was rejected by the Norwegian Medical Association, mainly after resistance from the Societies of ENT and Plastic Surgery.

Education

The Department of maxillofacial surgery at Ullevål hospital has been the main place for education of special-

ists. One year training from the surgical departments at the Dental Faculties in Oslo and Bergen was accepted in the 1980ies. In 1995 a resident post was established at St. Olav's hospital in Trondheim. The last year of training was taken at Ullevål. Two specialists have been educated in this way. Only one specialist has been educated at Haukeland Hospital in collaboration with the Dental Faculty in Bergen.

In 2001, there was an attempt to discontinue the specialty. This proposal was rejected by the Health Authorities. However, the long education with the requirement of double degree was changed. Dentistry was not needed any more, and the training was extended to 6 years. However, if the applicant was doubly educated, the training was reduced to four years. Doubly educated candidates still outweighs the medically trained applicants to the three resident positions, and so far no specialists have been educated based on medical education alone.

Demographic Variables

At present there are totally 40 registered specialists in maxillofacial surgery, eight of those have retired from active work. The majority of specialists (n=14) hold positions at hospital departments of maxillofacial surgery. Only a few specialists (n=6) are in private practice. The age distribution is as seen in table 2. Due to the long education there

is a skew age distribution of specialists towards the older age groups (>60 years).

Eleven of the members hold one or two medical specialties in addition to maxillofacial surgery, i.e. general surgery, thoracic surgery, plastic surgery and ENT. Ten members have PhDs in medicine. The last decade, 11 members from different EU countries, mostly German, have registered as formal members of the Society. Otherwise the number of specialists has been more or less the same (25–30 individuals) for the last four decades.

Maxillofacial vs Oral Surgeons

When maxillofacial surgery was recognised as the ninth surgical specialty in the UK, the main argument was that these specialists could give better service at a lower cost to the population than a fragmentation between plastic surgery, ENT, oral surgery and other specialties. Since then maxillofacial surgery has become one of the fastest growing specialties in the UK. 80% of head and neck tumours and most of the facial injuries are treated at maxillofacial units.

The Norwegian Health Authorities have never addressed this problem. Hence, we have different models. There are 11 hospital departments of oral and maxillofacial surgery in Norway, most of these staffed with one or two singly educated oral surgeons working in cooperation with ENT surgeons. The only departments of maxillofacial surgery alone are located at Ullevål and at St. Olav's Hospital. In the Nordic countries, Finland has doubly qualified maxillofacial surgeons in line with most of the Central European countries, whereas both Sweden and Denmark relies on the team model with oral surgeons, ENT, plastic surgeons and other specialties. This model is far more expensive than the use of maxillofacial surgeons.

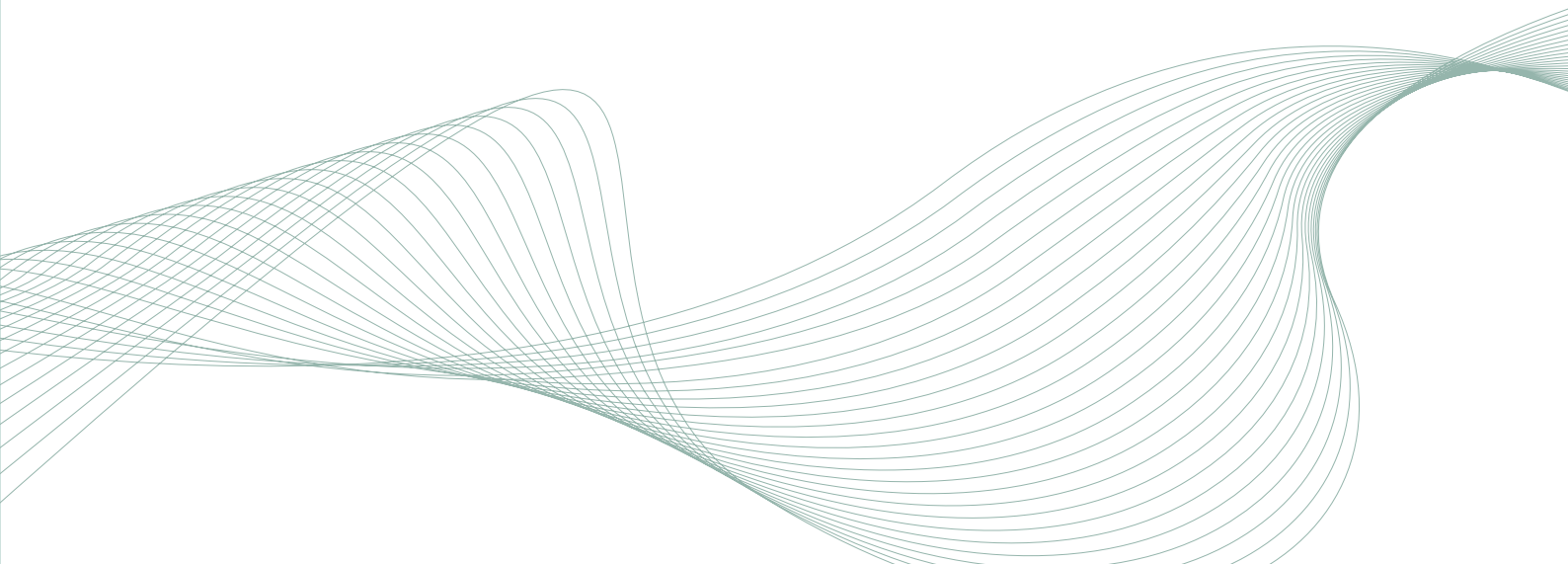
Table 59-1. Chairmen of the Norwegian Society for Maxillofacial Surgery

Period	Name	Title	Hospital
1954–58	Egil Aas	Fellow	Dental High School
1959–65	Ola Rake	Consultant	Ullevål
1965–67	Ole Gilhuus-Moe	Fellow/Assoc prof	University of Oslo
1967–68	Sigurd Trebo	Resident	Ullevål
1969–71	Jacob Klafstad	Resident	Ullevål
1972–75	Haakon Thorkelsen	Resident	Rikshospitalet
1975–77	Ida Gjessing Trumpy	Resident	Ullevål
1987–80	Gunnar Nordgaard	Consultant	Trondheim
1981–84	Ernst T. Pedersen	Consultant	Trondheim
1985–87	Ragnar Voss	Resident/Consultant	Rikshospitalet
1987–91	Per Skjelbred	Resident	Ullevål
1991–93	Olav A Olstad	Consultant	Ullevål
1993–97	Hans Erik Høgevold	Consultant	Ullevål
1997–01	Bjørn Hansen	Private	Tønsberg
2001–05	Anne Marie Ransve	Consultant	Ullevål
2005–09	Jan Mangersnes	Consultant	Gjøvik
2009–	Christoph Ziegler	Consultant	Trondheim

Table 59-2. Age distribution of specialists residing in Norway

Age group	Number of specialists
30–39 years	1
40–49	9
50–59	6
60–69	10
70+	8

Names with Abbreviated Biographical Information



60. Names with Abbreviated Biographical Information

Jon Haffner, Arnt Jakobsen and Tom Gerner

Abbreviations

anesthesiol = anesthesiology

ass = assistant

assoc = association

assoc prof = associated professor = dosent

br = breast

chair = leader of a society/ association chem = chemistry

clin = clinical

cardiol = cardiology

Coll= College

com = committee

cons = consultant, hospital specialist

dig = digestive

dis = disease

Direct = Directorate

dpt = department

endocrin = endocrinology or endocrine

ENT= ear, nose and throat

Europ = European

experim = experimental

gastro = gastrointestinal surgery

gastroenterol = medical gastroenterology

gen = general

head = head of hospital department

hon memb = honorary member

hon secy = unpaid secretary

hosp = hospital

inst = institute

int med = internal medicine

ltm = lieutenant

med = medical

med dir = medical director = head of a hospital or a region's medical activities

nat = national

neuro = neurology

neurosurg = neurosurgery

NMA = Norwegian Medical Association

Nordic = Denmark, Finland, Iceland, Norway and Sweden

Norw = Norwegian

NTNU = Norwegian University of Science and Technology (in Trondheim)

NSS = Norwegian Surgical Society

oncol = oncology

orthop = orthopedic

outpat = outpatient

ped = pediatric

physiol = physiology

plast = plastic surgery

pres = president

priv pract = private practice

prof = professor

pulm = pulmonary

radiol = radiology

reg = registry

rheuma = rheumatology

rehab = rehabilitation
 soc = society
 surg = surgical or surgery
 temp= temporary
 thorac = thoracic
 tidsskr = tidsskrift= journal
 transpl = transplant = tx
 UiB = University in Bergen
 UiO = University in Oslo
 UiT = University of Tromsø
 urol = urology
 vasc = vascular
 visit = visiting

Hospitals and Insitutions

As many hospitals have changed names several times, they are most often referred to by location, Bærum = Bærum Hospital, Tønsberg = Sentralsykehuset in Vestfold, Tønsberg, with some exceptions:

Ahus= Akershus University Hospital, previously Akershus Central Hospital (SiA) located at Lørenskog
 Aker = Aker University Hospital (in Oslo)
 Diakonhj = Diakonhjemmet Hospital (in Oslo)
 DNR = Radiumhospitalet–The Norwegian Radium Hospital, also called The Norwegian Cancer Hospital (in Oslo)

Haraldsplass = Haraldsplass Diaconal Hospital (in Bergen)
 Haukeland = Haukeland University Hospital (in Bergen)
 KMI = Kronprinsesse Märtha's Institute–Crownprincess Märtha's Institute (in Oslo)
 Legevakten= the Municipal Emergency Centre
 Lovisenberg = Lovisenberg Diaconess Hospital (in Oslo)
 OSR = Rheumatology Hospital Oslo = Oslo Sanitetsforenings revmatismesykehus
 RH = Rikshospitalet–The National Hospital (in Oslo)
 RTV = Rikstrygdeverket = National Social Security
 St Olav's = St Olav's Hospital= The University and Regional Hospital in Trondheim
 Sophies Minde= Sophies Minde (= memorial) Orthopedic Hospital (in Oslo)
 Ullevål = Ullevål University Hospital (in Oslo)
 UiO = The University in Oslo
 UiB = The University in Bergen
 UiT = The University of Tromsø
 UNN = The University Hospital of North Norway (in Tromsø)
 NTNU = Norwegian University of Science and Technology (in Trondheim)

All Names mentioned in the Text

All names mentioned in the text are presented, organised alphabetically according to surname. The information contains lifespan, subspecialty (nearly all those mentioned are specialists in general surgery), the most important location where they have worked as specialist, and leading positions in professional capacity, head of department, professor, chair in national or Nordic specialty societies.

A

Aaberge, Lars (1954–), cardiol, Dpt Med B RH 1995–99, head cardiol Dpt Med RH 2003–

Aadahl, Petter (1955–), anesthesiol, Trondheim 1990–

Aakhus, Trygve (1923–), radiol, Ullevål 1971–72, head and prof RH 1972–91.

Aamodt, Arild (1955–), orthop, Trondheim 1995–, head and prof 2008–

Aamold, Jens (1932–), orthop, Moss 1973–87, Sophies Minde 1983–85, head Moss 1987–90, head Dpt Orthop Fredrikstad 1990–, chair Norw Surg Soc 1980–82

Aanderud, Sylvi (1943–), med endocrine, Haukeland 1984–2010, prof 1990–2010

Aarnes, Kjeld Snorre (1933–2010), maxillofacial, Bodø 1973–85, Gjøvik 1991–2007

Aarseth, Lage (1964–), orthopedic, Ålesund

Aarseth, Ola (1948), orthop, Betanien Skien 2006–, chair Norw Soc Rheumasurg 2009–

Aas, Kjell (1924–), ped, RH 1963–, head Voksentoppen 1971–80, med leader 1981–, prof clin allergol 1992, hon memb many internat societies, Knight St Olav 1989

Aas-Aune, Gunnar (1935–), orthop, Trondheim 1972–73, Lt Col, head Unifil Hosp Lebanon 1978–79, Tønsberg 1979–97, Lt Col, head Normedcoy (Norw MASH) Gulf War 1991

Aas, Eigil (1916–2000), maxillofacial, RH 1954–65, prof 1964–86, chair Norw Soc Maxillofac Surg 1954–58

Aas, Turid (1951–), breast and endocrine, Haukeland 1991–, head 2005–

Aasen, Ansgar (1945–), gastro, Inst Surg Res RH, head and prof experim surg 1991–

Aasen, Øystein (1948–), orthop, Betanien, Skien 1989–

Aaser, Peter (1952–), orthop, rheumasurg Martina Hansen 1990–

Aaser, Peter E (1918–), neurosurg, Rikshospitalet ca 1960–1965, Dpt Surg Skien, founding memb Norw Soc Neurosurg

Aaslid, Rune (1943–), engineer, PhD in cardiovasc physiol, Dpt Neurosurg RH 1983–84, Univ Washington, Seattle, US 1985–87, director neurosurg research Bern Switzerland 1988–98, director research, hemodynamics AG, Bern 1998–, affil prof Dpt Neurosurg and Neurovasc Lab Berne 1989–, assoc prof Univ Washington 1991–

Aass, Kjell (1944–), gen surg 79 and plastic surg 85, priv practice surg Drammen 1980–82, plastic surg 1985–88, Dpt Plastic Surg Rikshospitalet 1988–90, priv pract plastic surg Drammen 1990–. Chair Norw Soc Plast Surg, 1889–91, chair Norw Soc Cosmetic Surg 1991–

Aksnes, Gunnar (1956–), ped, head ped surg Ullevål 2007–08, RH 2009–.

Albrechtsen, Dagfinn (1940–), gen surg, Dpt Surg B and head surg outpat RH 1986–2009

Albriksen, Ernst Rolv, engineer, Tromsø

Alho, Antti (1935–2000), orthop, head and prof Dpt Orthop Haukeland 1976–83, head and prof Dpt Orthop Ullevål 1983–95, med director Orton Orthop Hosp of the Invalid Foundation, Helsinki, Finland. 1995–99

Alken, Peter German, prof Urologisch Clinic Univ Mannheim 1987–

Alm, Nils (1927–), orthop, Coastal Hosp Stavern 1971–86, Longyearbyen 1983–88, RTV 1989–93

Almdahl, Sven M (1954–), vasc and thoracic, Tromsø 1989–1995 Dpt Surg A Rikshospitalet 1995–1998, Feiring clinic 1998–2009, Tromsø 2009

Alvik, Elling (1945–), orthop, Martina Hansen 1988–2002, Drammen Private Hosp 2003–2007, Ålesund 2008–, chair Norw Orthop Assoc 1996–99

Alvik, Ivar (1905–71), orthop, head Sophies Minde 1953–71, assoc prof UiO 1953, prof 1958–71, founding memb Norw Orthop Assoc, chair 1958–59, active in resistance during the World War II and many commissions in the Army and afterwards

Amland, Petter Frode (1952–), gastro, plast surg, RH 1992–2000, priv pract Nobel Clinic 1993–

Amlie, Jan Peder (1940–), cardiol, Dpt Med RH 1989–, prof 1989–, chair Norw Soc Cardiol 1987–91

Amundsen, Bjørn (1934–), technician and instrument maker, Inst Expt Med Res Ullevål 1951–2004

Amundsen, Egil (1924–97), surg, prof and head Inst Surg Res RH 1969–94

Amundsen, Per (1912–83), radiol, Ullevål 1956, head neuroradiol 1964, visit prof Alabama 1968, Rochester 1973, chair Norw Soc Radiol, 1967–69, Nordic Soc Neuroradiol 1975

Amundsen, Svein Roar (1950–), vasc, Haukeland

Andenæs, Kjell (1945–), plastic surg, RH 1991–92, Moss 1992–93, part-time RH 1993, private practice Oslo

Andersen, Egil (1950–), vasc, Stavanger 1995–1999, Tønsberg 1999–

Andersen, Gunnar Pål (1948–1999), orthop, Martina Hansen 1993–, chair Norw Soc Rheumasurg 1991–95

Andersen, Knut S (1944–), cardiothoracic, Dpt Cardiothorac Surg Haukeland 1986–, chair Norw Assoc Cardiothoracic Surg 1990–93

Andersen, Marit Helen, (1958–), RN, MSN, research nurse Dpt Surg RH,

Andersen, Morten (1953–), urol, Lillehammer 1996–98, Hamar 1998–2006, Moelven urologisk senter 2006–

Andersen, Ove Kjell (1946–), gastro, Tromsø 1983–87, Åhus 1987–92 head 1991–92, head Fredrikstad 1992–94, later consultant The Norw Medical Assoc, Health Region South-East

Andersen, Ragnar (1905–1993), urol, priv pract Oslo 1932–34, Harstad 1934, Vor Frues Hospital 1946– 1975, Army Surgeon 1932–40, Head Medical division of Norw Armed Forces (Hærens Sanitet) 1940–46, hon memb Norw, Swedish, British and Nordic Surgical Assoc, hon memb Nordic Assoc Urol

Andersen Vidar Ytterdal (1970–) perfusionist, RH

Anderson, Karl-Erik, Swedish urologist

Andresen, Ivar (1913–), radiol, Arendal 1958–1982

Angelsen, Anders (1955–), urol, Trondheim 1991–, NTNU 1998

Angelsen, Bjørn AJ (1946–) dr techn, prof Biomed Engineering, NTNU

Angelsen, Jon Helge (1974–), gastro, Bergen

Apelland, Leif (1933–), plastic surg, Skien 1979–80, private practice Porsgrunn 1980–89, Skien 1990–

Arctander, Kjartan (1957–), plastic surg and dentistry, RH 1992–, chair Norw Assoc Plast Surg 2002–03

Arnesen, Arne (1888–1972), surg, Sør-Odal 1940–46, Trondheim 1946–66, chair Norw Surg Soc 1955–56

Arvesen, Alfred (1958–), vasc, Aker, chair Norw Soc Vasc Surg 2008–09

Aspelund, Einar (1928–), plastic surg, Stavanger 1969–79, head 1979–94

Attramadal, Håvard (1959–94), Inst Med Biochem 1989–90, Duke Univ USA 1990–93, Inst Surg Res RH 1994–, prof expt surg RH 2003–

Augestad, Knut-Magne (1966–), gen surg, Colorectal Div, Cleveland, USA, Dpt Gastrointest Surg, Tromsø

Aukland, Knut (1929–), physiology, IEMR 1965–70, prof Int Physiol Bergen 1970–, chair Norw Soc Physiol 1970–73, hon memb Amer Physiol Soc

Aune, Snorre (1925–), gastro, Dpt Surg II Ullevål 1970–83, head and prof 1972–83, head Kristiansand 1983–92, founder memb Coll Chir Dig, hon memb Nordic Surg Soc

Aune, Steinar (1955–), vasc, Haukeland 1993–, prof 2006–

Axcrona, Eugen Jan Karol (1967–), urol, DNR

B

Baardsen, Arne (1929–2004), ped and gyn obst, gyn obst RH 1976–77, head gyn-obst Arendal 1975–77, ped surg Haukeland 1985–86, head Dpt Surg Arendal 1977–1999

Baatrup, Gunnar (1956–), gastro, Haukeland, prof 2010–

Backer-Grøndahl, Niels (1877–1975), surg, head and director Haukeland 1927–47, hon memb Swedish Surg Soc, Nordic Surg Soc, Norw Surg Soc, Finnish Surg Soc

Backer, Lars (1812–84), practicing surgeon in Holmestrand 1840–47, assistant surgeon RH 1949–52, the remainder of his career military surgeon

Backlund, Erik-Olof (1931–), neurosurg, Haukeland 1984–90, prof 1982–92

Baco, Eduard (1959–), urol, Aker 2007–

Bakka, Arne (1947–), gastro, Åhus 1987–88, Dpt Surg B RH 1989–98, head Åhus 1998–, prof 2003–

Bakke, August Magnar (1946–), urol, Haukeland 1985–, head Dpt surg 2000–, prof Haukeland 1998–

Bakke, Søren Jacob (1946–), radiol, Fredrikstad 1985–87, Dpt Neurorad RH 1987–

Bakke, Valborg (1970–), urol, Ålesund

Barstad, Rolf Marius (1956–), plastic, Fornebu Clinic

Bartnes, Kristian (1963–), thoracic, Tromsø 1998–

Begic, Anadi (1961–), plastic surg, Porsgrunn

Beisland, Christian (1968–), urol, Haukeland 2003–, head Dept Urol 2010–, assoc prof 2008–, chair Norw Urol Assoc 2010–11

Beisland, Hans Olav (1942–), urol, Aker 1987–92, and 1997–98, head Dpt Surg Ahus 1992–97 Arendal 1999–, head Norw Inst Urol 1991–98, chair Norw Surg Soc 1992–94

Bell, Helge (1946–2004), gastroent, Dpt Med Aker 1984–2004, head hepatology 1991–2004

Bendz, Bjørn (1964–), cardiol, Dpt Med B RH 2004–

Bentdal, Øystein (1948–), transplant, Dpt Surg B RH 1987–

Benum, Pål (1935–), orthop, Trondheim 1976–2005, assoc prof 1976–82, prof 1982–2005, head 1985–2005, chair Norw Orthop Assoc 1976–79, pres Nordic Orthop Fed 1984–86, founding memb Europ Hip Society

Berg, Atle (1899–1985), surg, director and head Dpt Surg Tromsø 1939–47, head Tønsberg 1947–69, Scand Field Hosp Korea 1952–53, director Norw Field Hosp Korea 1954

Berg, Eli technical assistance, Tromsø

Berg, Rolf Eigil (1957–), urol, Aker

Berg-Jensen, Martin (1916–95), neurosurg, RH 1962–65, Haukeland 1966–84, chair Norw Soc Neurosurg 1970–72

Berg-Johnsen, Jon (1955–), neurosurg, RH, prof 2008–, chair Norw Soc Neurosurg 1998–2001

Bergan, Anstein (1940–), gastro, prof gastro Dpt Surg B RH 1980–2008, head 2000–2007

Bergan, Frank (1909–85), thoracic, Dpt Surg III Ullevål 1955–79, head and prof 1965–79

Berge, Viktor (1957–), urology, Ahus 1995–2003, Aker 2003–

Bergland, Olav (-1987), orthodontist, Granhaug School for Speech Disorders 1952–

Berglund, Tonje (1968–), vasc, Ahus, chair Norw Soc Vasc Surg 2010–

Bergseth, Hans Petter, engineer, Tromsø

Bergsland, Jacob (1948–), cardiac surg State Univ New York 1983–85, assoc prof 1981–85, prof surg 1985–

Bernhard, Poul Jørgen City Surgeon in Bergen 1742

Berstad, Arnold (1940–), gastroent, Dpt Med Lovisenberg Oslo 1977–87, head and prof gastroent Dpt Med Haukeland 1987–

Berstad, Tove (1939–), gastro, Haukeland 1988–2009

Bie, Knut (1915–), Ullevål 1957–60, Scand Teaching Hosp Korea 1960–61, Haugesund 1961–73, Stavanger 1973–83, hon memb Norw Surg Soc and South Korean Med Assoc

Birkeland, Sigurd (1953–), cardiothoracic, Dpt Surg A RH, chair Norw Assoc Cardiothoracic Surg 1998–2000

Birkeland, Steffen (1921–2006), vasc, Ullevål 1965–83, head vasc surg 1983–91, assoc prof 1967–79, prof 1979–91

Bjerkset, Ottar Arild (1953–), gastro, breast and endocrin, Stavanger, head breast and endocrine

Bjerkset, Tormod (1932–), gastro, Haukeland 1978–80, head Innherred (Levanger) 1980–2002

Bjerkreim, Ingjald E (1927–), orthop, Sophie Minde 1980–97, head 1882–1997, prof Tromsø 1980–81, assoc prof UiO 1977–1982, prof 1982–97, visit prof Univ Illinois 1981–82

Bjordial, Erling (1957–), plastic surg, Tromsø

Bjordial, Roald (1928–2003), ped, Dpt Surg B RH 1970–95, head and prof 1986–95, chair Norw Assoc Ped Surg 1979–87

Bjørnbeth, Bjørn Atle (1962–), gastro, Ullevål 2002–, head Dpt Gastrosurg 2009–

Bjørnland, Kristin (1962–), ped, Dpt Surg B RH 1992–

Bjørnson, Torleif, Icelandic author of Norwegian-Icelandic medical textbook around 1500.

Bjørnstad, Per (1941–), ped (cardiol), Dpt Ped RH 1978

Bjøro, Trine (1955–), med chem, Aker 1992/DNR

Bless, Janne, engineer, Tromsø,

Boeck, Carl Wilhelm (1808–1875), dermatol RH 1848, 1854–61 also unpaid head Christiania(Oslo) Municipal Hosp, prof dermatol and fract RH 1851–69, repr Kongsberg in The Norw Parliament (Stortinget) 1845

Bohmansson, Gösta (1887–), Swedish surgeon, Umeå 1922, head 1925–, head Örebro 1928, director 1929–, prof 1946–, hon memb Norw Surg Soc

Bondevik, Helge (1933–), transplant, Dpt Surg B RH 1977–87, Bærum 1987, head 1991–2003

Bonsack, Henrik (16??–1711) silver mine doctor, Kongsberg 1687, general army staff medical officer 1690, chief medical officer Christiania 1709, examining new candidates for approval of licence

- Borch, Carl Abraham** (1853–1919), district doctor Sarpsborg, Indviken, Ullensaker, Sarpsborg 1880–1919
- Borchgrevink, Hans Henrik** (1926–2003) plastic, RH 1967–91, chair Norw Soc Plast Surg 1970–73, hon secy Nordic Soc Plastic Surg 1972–88, hon memb Norw and Nordic Soc Plastic Surg
- Borchgrevink, Otto Johan** (1856–1928), Diakonhjemmet Oslo 1896–
- Brabrand, Georg** (1923–91), Lillehammer 1969–91
- Brandt, Kristian** (1859–1932), chief and prof gynecol Rikshospitalet 1906–1929, pres Norw Med Assoc 1910–11, hon memb several foreign gyn soc
- Brantberg, Anne** (1957–), medical director Centre for Fetal Medicine Trondheim
- Brattebø, Guttorm** (1961–), anesthesiol, Haukeland
- Brattebø, Johannes** (1951–), surg, Voss 1988–93, Dpt Orthop Trondheim 1994–
- Brauckhoff, Michael** (1966–), gastro and vasc, Haukeland, prof endocrine surg 2008–
- Breivik, Knut** (1945–), breast and endocrine, Kristiansand
- Brekke, Alexander** (1885–1960), gen surg, head and director Stavanger 1932–, chair Norw Surg Soc 1937–41
- Brekke, Inge B** (1938–), transplant, Dpt Surg B RH 1983–2005, head transplan 1995–2003, prof transplant 2001–2005
- Brekke, Trygve** (1914–95), plastic surg, Red Cross Clinic Oslo 1961–84
- Brennhovd, Bjørn** (1960–), urol, Aker, DNR
- Brennhovd, Ivar Olav** (1920–86), surg, DNR 1958–87, head 1966–87
- Bretteville, Gorm** (1939–), plastic surg, RH 1980–92, private practice Oslo/Stensby/Drammen 1992–
- Brevik, Bjørn** (1933–), urol, Trondheim
- Brinchman Hansen, Otto** (1908–84), orthop, head Hagevik 1954–78
- Brodersen, Nils Henrik** (1899–1988), gen surg, Stokmarknes 1938–46, Kristiansand 46–70, medical director (sjeflege) 1966–70)
- Bruusgaard, Christian** (1902–82), Ullevål 1948–54, head and prof Dpt Surg B RH 1954–59, head and prof Dpt Surg II Ullevål 1959–72
- Brøyn, Terje** (1932–), thoracic and vasc, head Ahus 1987–2000
- Bryne, Bjørg Kiste** (1964–), orto, Drammen 2005–07, Lovisenberg 2007–08, OUS 2008–
- Brånemark, Per-Ingvar** (1929–), Swedish prof anatomy, Gothenburg
- Bråten, Martinus** (1954–), orthop, Trondheim 1994–
- Buanes, Trond** (1950–), gastro, Ullevål 1990–, prof 1998–
- Bugge-Asperheim, Bjørn** (1934–), thoracic and vasc, Molde 1983, Ringerike 1983–85, Arendal 1985–2004, head thoracic and vasc surg
- Bugge, Ulrik** (1843–1910), RH 1868, private practice Ringsaker 1969–
- Bukholm, Ida R K** (1963–), gastro, breast and endocrine, Ahus
- Bull, Peter Nicolay** (1869–1951), Dpt Surg B RH 1913, prof 1912–27, head Lovisenberg 1928–39, hon secy gen Nordic Surg Soc 1921–29, hon memb Royal Coll Surg England, Assoc Surg Great Britain, Finnish and Swedish Med Assoc
- Bull-Njaa, Trygve** (1953–), urol, Dpt Urol Aker 1994–
- Busund, Rolf** (1955–), cardiothoracic, and vasc, Tromsø, head and prof 2010–
- Bye, Kjell** (1943–), orthop, KMI 1989–2002, RH2002–
- Bülow-Hansen, Paul Viktor** (1861–1938), orthop, Sophie Minde 1926–34
- Bækkelund, Oliver** (1966–), gastro, Drammen 2008–
- Bø, Kari** (1955–), physiotherapist, PhD, prof Norw School of Sport Sciences Oslo, research co-ord, Akershus
- Bø, Olav** (1927–1994), surg, head Stavanger 1975–79, head Fredrikstad 1979–93
- Bøhn, Arne** (1904–93), dentist (dr odont), pioneer in treatment of cleft palate
- Børresen-Dale, Ann-Lise** (1946–), biochem and geneticist, head Dpt Genetics Research Inst Cancer Research Oslo 1999–2010, head KG Jebsen Centre for Breast Cancer Research 2010–, prof tumour biology Oslo 1992–, prof molecular oncol Bergen 2000–2005
- Bøyesen, Svein** (1918–) neurosurg, Ullevål 65–78, chair Norw Soc Neurosurg 1981–83

C

- Cappelen, Axel Hermansen** (1858–1919), Dpt Surg A RH 1893–96, head Dpt Surg Stavanger 1897–1919
- Cappelen, Christian jr** (1917–93), surg pathophysiol, Dpt Surg A RH 1954–87
- Carlsen, Erik** (1946–), gastro, Ullevål 1991–, head Dpt Gastrosurg 1993–2008, med dir 2008–, chair Norw Soc Dig Surg 2004–05
- Charcot, Jean-Martin** (1825–93), neurologist in Paris
- Chaussy, Christian G**, German urologist, prof Munich 1981–, pres German Lithotripsy Soc
- Chen, Duan** (1960–), surgeon Nanjing Med Univ Hosp China 1985–89, assoc prof Lund 1996–99, prof expt surg Trondheim 1999–
- Christensen, Einar Axel** (1879–1943), director and head Aker 1914, chair Norw Surg Soc 1925–30
- Christensen, Geir** (1954–), IEMR Ullevål, 1998–
- Christiansen, Einar Thorolf** (1902–87), gen surg, chief Norw Field Hosp Sweden 1945, South Odal 1950–57 Skien 1957–73, priv pract 1973–83
- Christiansen, Einar** (1944–), urol, Diakonhjemmet 1986–92, priv pract, Oslo 1992–
- Christiansen, Tor** (1917–81), surg, head Dpt Surg Kongsberg 1973–81
- Christie, Werner** (1949–), MD, MHA, Minister of Health, 1992–95
- Courivaud, Frederic**, (1971–), physicist dr scient, Intervent Centre RH
- Cushing, Harvey Williams** (1869–93), American neurosurgeon, Peter Bent Brigham Hosp Boston 1911, prof Harvard Medical School 1912–

D

- Dahl, Barbara Hansteen** (1944–), plast surg, Ullevål, Volvat
- Dahl, Eilif** (1945–), ped, prof Legevakten Oslo 1994–96, ped Dpt Surg B RH 1996–2002, prof gen surg 1997–2002, prof maritime med Bergen 2008–, chair Norw Assoc Ped Surg 2000–01
- Dahl, Hans K** (1919–2003), orthop, Dpt Surg III Ullevål 1964–81, med director (sjeflege) 1982–89, chair Norw Surg Soc 1971–73
- Dahl, Olav** (1948–), oncol, Gades inst 1980–89, head 1990, prof therapeut oncol 1986, head and prof Haukeland oncology 1905–
- Dahl, Per Erling** (1952–), thoracic, Tromsø 1987–
- Dahl, Steinar** (1951–), plastic, breast and endocrine, head Kristiansund 1991–92, Molde 1992–
- Dahl, Torbjørn** (1956–), vasc, Trondheim, chair Norw Soc Vasc Surg 1998–2000
- Dahl Iversen, Erling** (1892–), Danish surgeon, prof Dpt Surg C Rigshospitalet Copenhagen, 1935–63 hon memb Norw and Nordic Surg Soc
- Dalin, Marius Langballe** (1966–), urol, Førde 1995
- Dalsegg, Aud Synnøve** (1955–), journalist and author, Dagbladet, editor Allers 2007–
- Danielsen, Arthur** (1924–), ped surg, head Flekkefjord 1969–90, director 1978–90
- Danielsen, Steinar** (1936–), gastro, head Bodø 1978–, head 1989–1996, Diakonhjemmet 1996–2004
- Debes, Anders Johan** (1972–) Surgical registrar, Ahus
- Dedichen, Henrik Thaulow** (1926–), thoracic and vasc, Aker 1979, Ullevål 1979–
- Denstad, Tor Finn** (1937–), orthop, Hamar 1980–83, Lillehammer 1983–2004, head orthop surg 1988–2004
- Diseth, Trond H** (1957–), child psychiatry, head and prof RH
- Dietze, Andreas** (1959–), orthop, Tønsberg
- Dommersnes, Ivar** (1913–94), plastic surg, Oslo Military Hosp 1958–65, Stavanger 1965–
- Drevvatne, Tor Petter** (1924–), radiol, Ullevål 1956–65, DNR 1966–, chair Norw Soc Med Radiology, hon secy gen Nordic Soc Med Radiol 1978–90
- Due-Tønnesen, Bernt Johan** (1960–) neurosurg, RH 1993–
- Due, Jan** (1942–), urol, Tromsø 1983–, pres Nordic Surg Soc 1997
- Dæhlin, Lars Jørgen** (1946–2007), urol, prof Haukeland.1996–2007
- Døhlen, Gaute** (1965–) ped cardiol, Dpt Ped and Ped Research, RH
- Døhlen, Herman** (1902–91), surg, Kristiansund 1944–72, chair Norw Surg Soc 1957–59
- Dørum, Liv Marit** (1979–), research assistant, the Nat Cancer Registry, Inst Cancer Res, Oslo

E

Edvardsen, Per (1924–85), orthop, Trondheim 1973–85, prof 1975–85, chair Norw Orthop Assoc 1972–75

Edwin, Bjørn (1955–), gastro, Elverum 1991–1993, Ahus 1993–96, Dpt Surg B and Intervent Centre RH 1996–

Effler, Donald B (1905–2004), American cardiac surgeon, Cleveland Clinic Ohio 1950–1975, St Joseph's Hosp Syracuse USA 1975–85

Efskind, Leif (1904–87), Dpt Surg A RH 1949–52, head and prof Dpt Surg A 1952–74, visit prof Tromsø 1974, hon secy gen Nordic Surg Soc 1960–79, hon memb Surg Soc Denmark, Finland, Iceland, Norway and Sweden, and Norw Soc Pulmonary Med

Egeberg, Christian (1809–74), RH 1835–37, military surgeon and private practice 1839–74, first blood transfusion 1936, first to do ovariectomy, first in the world to suggest gastrostomy for oesophageal stricture, founder of Nordic Scientific Meetings 1839

Eggen, Espen (1956–) urol, community medical officer Frei 1985–86, urol Drammen 1995–2000, Ahus 2000–05, priv practice Oslo 2005–

Egilsrud, Johan (1903–93), orthop, Coastal Hosp Tromsø 1944–46, Legevakten Oslo 1952–69

Eide, Eugen (1952–), orthop, Trondheim

Eide, Per Kristian (1963–), neurosurg, Oslo Univ Hosp, prof 2010–

Eie, Nils (1915–95), neurosurg, Ullevål 1964–84, head 1977–79

Eikeland, Oskar (1943–), plastic surg, Fredrikstad 1986–

Eikill, Ivar (1952–), orthop, Haugesund

Eikvar, Kari Helene, (1962–), orthop, Diakonhjemmet, chair Norw Soc Rheumasurg 2004–09

Ekeland, Arne (1942–), orthop, Ullevål 1987–90, head Surg Clinic Ullevål 1990–96, head Martina Hansen 1996, prof UiO 1990–

Eken, Torsten (1960–), anesthesiology, Ullevål

Eker, Bjarne Reidar (1903–1996), pathol, DNR 1939–74, director Norw Hydros Ins Cancer Res 1953–75, chair Norw Soc Pathol 1955

Ekeström, Stig Swedish coronary surgeon from Stockholm, worked in Tromsø in 1978

Emblem, Ragnhild (1948–), ped, Dpt Surg B RH 1991–, head ped surg 1996–, assoc prof 1996–2000, prof 2000–

Eng, Hans philology and logopedic, chair Granhaug School for Speech Disorders 1922–

Enge, Ivar Paul (1922–), radiol, RH 1968–78, Aker 1978–92, prof 1978–, chair Norw Soc Med Radiol 1978, hon memb 1991, pres Nordic Soc Med Radiol. 1993, pres Cardiovasc Internat Radiol Soc Europe 1991, hon fellow Am Coll Radiol 1991

Engbretsen, Lars (1949–), orthop, Dpt Orthop Trondheim 1991–, head Dpt Orthop Ullevål 1996–99, head Oslo Univ Orthop Clinic 2000–2002, head Orthop Centre, Oslo 2002–07, prof NTNU Trondheim 1993–96, prof UiO 1996–, assoc prof Dpt Orthop Surg Univ Minnesota 1993–94, assoc prof 1994–96, head sports med Norw Olympic Sport Fed and head Scientific Activities Olympic Committee (IOC) 2007.

Engedal, Hogne (1937–), cardiothoracic, head Haukeland 1978–2002

Engeset, Arne (1906–1973), radiol, Lab Hematol and Lymphol, DNR

Engesæter, Lars (1948–), orthop, Haukeland 1985–90, Hagevik 1990–91, Haukeland 1991–, prof 1994–

Eri, Lars Magne (1949–), urol, Ullevål 1992–, Aker 2000– prof Aker 2005–, leader Norw Inst Urol 2000–2004

Erichsen, Johan Gotfred (1713–1768), dr med (PhD) 1746, municipal doctor in Bergen 1747, recognised barber surgeon in Copenhagen 1749

Erichsen, Kari (1972–) Haraldsplass, Bergen repr surgeons in training Norw Surg Assoc 2010–2011

Eriksen, Morten Tandberg (1961–), gastro, Drammen 1998–2006, Ullevål 2006–, head Oslo Univ Hosp colorectal surg 2011–, chair Norw Soc Digest Surg 2005–2009

Erikstein, Bjørn K (1952–), oncol, DNR 1993–2003, medical director Health Region South 2003–4, adm director (CEO) 2005–7, Dpt Health 2007–2011, CEO Oslo Univ Hosp 2011–

Eskeland, Gunnar (1923–), plastic surg, head plast surg RH 1968–89, prof 1982–89, chair Norw Soc Plast Surg 1978–81, hon memb Norw Surg Soc

Evjen, Ola (1963–), plastic surg, Trondheim

F

Farsund, Tore (1933–), urol, Dpt Surg B RH 1983–84, Haukeland 1994–

Fasting, Ove (1942–), orthop, Aker 1982–94, Ullevål, 1994–2007, Asker Surg Clinic 1982–, founder

ARTOF=Assoc for the Rational Treatm of Fract, founder and pres Norw Arthroscopic Assoc

Faugli, Anne (1956–), child psychiatry, Vestre Viken Trust

Fausa, Olav (1935–), gastroent, Dpt Med A RH 1971–, assoc prof 1977–78, prof 1987–93

Favaloro, René G (1923–2000), Argentinian cardiac surgeon, Cleveland Clinic Ohio 1962–71, Buenos Aires 1971, Inst Cardiol Cardiovasc Surg, Favaloro Foundation, Buenos Aires, Argentina 1992–2000

Faye, Frans Christian (1806–90), military surgeon, 1846 head The Birth Clinic and Midwifery School in Oslo, prof obstetrics and gynecology 1850–1876

Fiane, Arnt E (1958–), cardiothoracic, Dpt Surg A RH 1991–, assoc prof 2008–

Finsen, Vilhjalmur (Bill) (1946–), orthop, Trondheim 1990–, prof 1994–

Fjeld, Nils Bjørn (1935–), thoracic, Ullevål 1974–2003, head 1991–95

Fjeldsgaard, Knut A (1952–), orthop, Bergen Municipal Emergency Centre 1983–89, Dpt Orthop Surg Haukeland 1990–, chair NorwOrthoped Assoc 2012–

Fjermeros, Helge (1927–), orthop, Martina Hansen 1967, head Kristiansand 1968–94

Fjøsne, Hans (1948–), breast and endocrine, Trondheim 1990–, head 1994–

Flatmark, Audun (1926–2004), ped, gastro, transplant, Dpt Surg B RH, assoc prof 1970, head and prof 1977–92

Flood, Steen (1920–95), neurosurg, pediatric neurosurg Ullevål 1970–90, chair Norw Soc Neurosurg 1972–1975, founding memb Internat Soc Pediatric Neurosurg, pres 1977

Flørenes, Tor Leif (1945–), vasc, Bærum 1986–7, Ski 1987–88, Aker 1990–

Fodstad, Øystein (1943–), head Dpt Tumour Biol DNR 1986–92, head Research DNR 1992– prof UiO 1989–

Follerås, Gunnar (1942–), orthop, Sophies Minde 1985–99, head National Sarcoma Centre DNR/RH 1999–2009. Head National Resource Center Sarcomas 2000–2010

Forfang, Kolbjørn (1935–), cardiol, Fredrikstad 1976–77 and 1978–80, Dpt Med B RH 1980–2005

Forsdahl, Signe Helene (1963–), radiol, Tromsø

Foss, Aksel (1955–), transplant, Dpt Surg B RH 1995–, head transplant 2008–, prof transplant 2010–

Foss, Olav Andreas, (1958–), orthop, head Centre Orthop Implants Trondheim

Fossberg, Erling (1935–2001), urol, Aker 1977–2001

Fossdal, Jon Erling (1938–) vasc, Stavanger 1983–87, head vasc surg 1987–90, and 1991– 2005, Aker 1990–91

Fosse, Erik (1950–), cardiothoracic, Ullevål 1991–96, Intervent Center RH 1996–, head 1996–, prof expt surg 1999–, chair Norw Assoc Cardiothoracic Surg 1994–97

Fosse, Lars (1954–), med consultant MSD Trondheim

Fosså, Sophie Dorothea (1941–), oncology, DNR 1977–, prof 1993–

Fretheim, Bjarne (1907–1983), Dpt Surg A RH 1953–55, Stavanger 1955–59, head and prof Dpt Surg B RH 1960–77

Fretheim, Ole Jakob (1942–), orthop, Kongsvinger 1984–, head orthop 1990–

Frich, Lars (1966–), Interv Centre and Dpt Surg B RH 2001–

Frich, Pål Stefan (1981–), Dpt Cancer Res and Molecular Med, NTNU, Trondheim

Frimann-Dahl, Johan (1902–84), radiol, Dpt Radiol Ullevål 1938–70, prof radiol 1957–70, chair Norw Soc Radiol 1939–47, hon memb Roy Soc Med, Brit Inst Radiol, Danish Finnish and Swedish Soc Radiol

Fryjordet, Arne (1925–83), urol, Ullevål 1972–83, head 1980–83, chair Norw Urol Assoc 1972–76

Frøysaker, Tor (1929–94), thoracic, Dpt Surg A RH 1974–94, head 1987–94, assoc prof 1974–87, prof 1987–94

Funder, Roar (1914–), plastic surg, RH 1957–60, head plast surg Porsgrunn 1960–84

Furnes, Ove (1962–), orthop, Haukeland 1998, head 2006–, prof 2007–, chair Norw Arthroplasty Reg 2003–

Følling, Ivar Asbjørn (1888–1973), int med, prof UiO nutrition research 1932–35, veterinary physiol 1935–53, head and prof Central Lab RH 1953–58. Anders Jahre's Medical Prize 1960 for work on phenylketonuria

G

Gaard, Maria (1958–), gastro, Cancer Registry of Norway, 1996–

Gaarder, Christine (1964–), gastro, Trauma Unit Ullevål, head 2005–

Gabor, Imre (1931–2001), orthop, Drammen 1980–81, Sophies Minde 1981–98, private practice 1998–2001

Gabrielsen, Ole-Edvard (1956–), gen surg and orthoped, head Dpt Surg Narvik

Gade, Herman (1870–1953), Hagevik 1898, head and director of the hospital from 1902

Gade, Herman Gerhard (1901–1972), surg, RH 1941–48, head and prof Dpt Surg Haukeland 1948–71

Gallimore, Michael J. Inst Expt Med Res RH, Kent Haemophilia Center, Kent and Canterbury Hosp, UK

Gaston, Richard prof of urol, Bordeaux, France

Gaudernack, Gustav (1943–), MSc, Tromsø 1972–83 Inst Transpl Immunol RH/DNR/ Oslo Univ Hosp 1983–, head Dpt Immunol, Inst Cancer Research, Prof UiO 2007–. Pioneer in Cancer Vaccines

Geiran, Odd (1943–), cardiothoracic, Dpt Surg A RH 1982–, prof 1995–, head Surgical Division Oslo Univ Hosp 2010–

Gerhardt, Paul (1941–), urol, Sarpsborg 1986–, Sarpsborg as part of Østfold 1993–, priv pract Sarpsborg

Gerner, Tom Ivar (1945–), gastro, breast and endocrine, Ullevål 1997–90, head Dpt Surg Lillehammer 1990–2004, head research Sykehuset Innlandet 2004–2006, head Dpt Surg Bærum 2006–2008, head surg research Bærum/Vestre Viken 2008–2011, chair Norw Surgical Soc 1987–89, hon memb Norw Surg Soc 2009

Giercksky, Karl-Erik (1942–), gastro, Tromsø 1982–86, assoc prof 80–82, prof 1983–86, Dpt Surg B RH 1986–87, head and prof DNR 1987–2009

Giertsen, Per (1906–90), gen surg, county med officer Nedre Eiker 1932–34, priv pract Oslo 1934–, medical consultant (sjømannslege) Fred Olsen Shipping 1935–47, corporate medical officer (bedriftslege) Aftenposten 1945–73, Norw Esso 1945–55, L Høegh 1956–75, personal physician The Royal Norw Court 1945–. Knight first order St Olav 1979

Gilbert, Mads (1947–), anesthesiol, Tromsø 1989–, head and professor Emergency Med 1995–

Gilhuus-Moe, Ole (1929–), maxillofacial, Ullevål 1967–73, head Haukeland 1974–96, dean Faculty Dentistry Bergen Univ 1982–88, assoc prof Oslo 1967–73, prof Bergen 1973–96, visit prof Alabama USA several period 96–89, chair Norw Soc Maxillofac Surg 1965–67

Gjengstø, Peder (1960–), urol, Haukeland

Gjerdet, Nils Roar (1950–), dentist, Dpt Clin Dentistry Bergen, prof (biomaterials) 1992–

Gjersvik, Thorolf Ingvar (1913–89), urol, Haukeland 1961–83, hon memb Norw Assoc Urol

Gjertsen, Kjell (1919–2005), gastrointest, priv pract and military doctor 1947–48, Porsgrunn 1956–76, Skien 1976–86. Chief Norw Field Hosp Gaza 1963 (4months) His Majesty's Gold Medal for Research

Gjessing, Einar (1937–), plastic surg, part time RH 1987– and Dept Plast Surg Volvat Med Centre (priv) 1987–

Gjessing Trumpy, Ida (1939–), maxillofacial, Ullevål 1977–2009, chair Norw Soc Maxillofac Surg 1975–77

Gjestland, Sigmund (1878–1965), Vadsø 1911–15, Lister og Mandal 1916–19, Rjukan 1919–

Gjone, Egil (1925–99), gastroent, Dpt Med A RH 1969–, assoc prof 1970–, chief and prof 1981–91, chair Norw Soc Gastroent 1978–79

Gjone, Ragnar (1923–87), neurosurg, Sunnås Rehab Hosp 1969, head 1971, chair Norw Soc Phys Med 1975–77

Gjølberg, Tor Øystein (1941–), int med and radiol, Aker 1985–

Gjør, Fredrik Herman (1828–1905), Christiania (Oslo) Hosp 1861–62, private practice Oslo 1862–1905

Gladhaug, Ivar (1953–), gastro, RH 1995–, prof 2009–

Glomsaker, Tom (1960–), gastro, head Gjøvik 2001–2003, head Stavanger 2003–2004, chair Norw Surg Soc 2006–2010

Grand, Øyvind (1946–95), orthop, Skien 1985–1995

Gravem, Paul (1948–), plastic surg, Haukeland 1990–, private practice part time Bergen 1991–

Greisiger, Ralph (1971–), Intervent Centre RH 2009,

Grenager, Odd (1955–), vasc, Askim 1989–92, Åhus 1992–

Grieg, Haakon (1874–1936), private practice Bergen, mainly gastroenterol, 1902–36

Grong, Ketil (1954–), Inst Surg Sci, Haukeland, prof 1993–

Grotmol, Tom (1952–), epidemiology, IEMR 1983–87, visit res fellow Univ California San Francisco 1987–89, Inst Cancer research DNR 1990–, prof 2 Norw Veterinary High School

Grung, Claus Døscher (1876–1946), private practice, mainly ENT Bergen 1904–31, Haugesund 1931–39

Grüner, Ola-Petter (1930–93), gastro, Skien 1977–78, head Bærum 1978–93, the King's Medal for Research, UNEF medal

Grøgaard, Bjarne (1946–), orthop, Dpt Orthop Ullevål 1990–

Grønningsæter, Åge (1961–), engineer Nation Centre for 3D-ultrasound Trondheim –1998, private company SonoWand 1998–

Grønbech, Jon Erik (1949–), gastro, Head Dpt Gastrointest Surg Trondheim 1991–, prof 1995–

Grønmark, Tore Olai (1937–), orthop, Skien 1982–95, head 1996–2004, chair Norw Orthop Assoc 1984–87

Grøntvedt, Torbjørn (1949–), orthop, Trondheim 1988–2006, one of the founders of Rosenborg Sport Clinic 1988, full time cons 2006–

Guldvog, Ivar (1944–), gastro, breast and endocrine, RH 1989–91, Ullevål 1991–97, Rigshospitalet Copenhagen 1997–99, head breast and endocrine Skien 1999–

Gullestad, Hans Petter (1946–), plastic surg, DNR 1966–, head plastic surg 1999–

Gulsvik, Anton (1909–84), maxillofacial, ENT, head Bodø 1950–79

Gundersen, Stein (1945–2008), oncol, DNR/Fredrikstad 1981–2008

Gustavsen, Arve (1952–), urol, Kristiansand 1991–Haugesund priv pract

H

Haaland, Knud Magnus (1876–1935), director Gades Inst Pathol Bergen 1911–31

Haaverstad, Rune (1954–), cardiothoracic, and vasc, Cardiff/Newcastle, UK 1999–2001, Trondheim 1989–2007, prof NTNU 2005–2007, head and prof Haukeland 2007–, chair Norw Assoc Cardiothorac Surg 2001–11

Hadland, Kåre (1913–1999), orthop, head Stavern Coast Hosp 1963–65, head Skien 1965–1981

Haffner, Johan WR (1906–89), gen surg, gyn/obst, radiol. Head Dpt Gyn Obst Tønsberg 1947–86. Chair Norw Assoc Junior Hosp Doctors 1940–46, president NMA 1954–58, chair Norw Academic Liaison 1960–64, Norw Assoc Senior Hosp Physicians 1961–63.

Haffner, Jon (Johan F W) (1940–), gastro, Ullevål 1986–94, head Dpt Surg and Surg Clinic Drammen 1994–2004,

medical director (sjeflege) 2004–2007, prof propedeut med Faculty Dentistry UiO 2003–2007, chair Norw Surg Soc 1982–86, hon secy gen Nordic Surg Soc 1992–98, pres Norw Med Assoc 1988–92, hon memb Norw Surg Soc

Hafsahl, John Geir (1945–), radiol, Ullevål 1986–95, RH 95–

Haga, Tore (1935–), plastic surg, hand surg (Sweden), Haukeland 1972–, hon secy gen Nordic Soc Hand Surg 1981–83, chair Norw Soc Hand Surg 1988–91, chair Norw Soc Plastic Surg 1991–93

Hagen, Anne Irene (1959–), breast and endocrine, Trondheim

Hagen, Arvid van der (1963–), urol, Fredrikstad 2002–08, head urology 2008–

Hagen, Rolf (1925–2002), orthop, Martina Hansen 1968–80, head 1980–95, chair Norw Orthop Assoc 1970–71

Hagen, Rolf Høgetveit (1953–), urol, Buskerud 1990–, head urol 1991–2005, head Surg Clinic 2003–2009, leader Norw Inst Urol 1999–2000, chair Norw Assoc Urol 2005–2009

Hagen, Steinar (1935–), oncol, Ullevål 1972–, head 1984–

Hagerup, Hege, adm staff, Tromsø

Halbakken, Erik (1953–), vasc, Tønsberg 1994, head 2002–07, chair Norw Soc Vasc Surg 2000–02

Hald, John K (1893–1969), orthop, Drammen 1931, Martina Hansen 1933–63, chair Norw Orth Assoc 1947–49

Hald, John Kløve (1923–), orthoped, Tromsø 1967–78, Martina Hansen 1978–92, chair Norw Orth Assoc 1982–84

Hall, Karl Victor (1917–2001), thoracic and vasc, Dpt Surg A RH, 1967–74, head-74, assoc prof 1967, prof 1974, hon secy gen Nordic Surg Soc 1965, hon secy gen Nordic Soc Thoracic Surg 1975, pres 1983, hon memb Nordic Surg Soc 1985, Norw Surg Soc 1986

Halvorsen, Fredrik Herman (1974–), The Intervention Centre, RH, Dpt Surg Kristiansand

Halvorsen, Jan Fredrik (1935–02), gastro, Haukeland 1978–2002, head breast and endocrine 1978–84, prof (medical postgraduate education) 1989–2002

Hanoa, Rolf (1944–), vasc, prof Social Med Tromsø 1977–84, prof Health Politics and Admin Bergen Univ 1984–86, Ullevål 2001–

Hansen, Bjørn Jemtegård (1953–), maxillofacial, private practice, Tønsberg, chair Norw Soc Maxillofac Surg 1997–2001

Hansen, Fleming employed by Polack Instruments

Hansen, Gunnar (1938–), pulm dis, Glittre San 1978–82, Dpt Med Aker 1982–, head 1988–91, Dpt Lung Diseases RH 1991–, chair Norw Soc Pulm Dis 1982–86

Hansen, Kari Schrøder (1958–), surg traumatology, Haukeland

Hansen, Knut, engineer, Tromsø

Hansen, Lorang (–1990), headmaster Granhaug School for Speech Disorders 1967–

Hansen, Marit Helene (1969–), gastrointest, Dpt Digest Surg Tromsø

Harbitz, Francis G (1867–1950), prof pathol (incl. forensic med) RH, Oslo Univ 1900–37, private practice Oslo 1894–1908, various engagements in Oslo Univ, politics, med insurance

Harbitz, Hans Fredrik (1900–1971), head surg Molde 1938–46, head Aker 1947–70, prof 1951–70, chair National Hosp Council (Statens sykehusråd) 48–60, chair Norw Surg Soc 48–50, pres Nord Surg Soc 1963–65, hon memb Nordic Surg Soc 1969

Harbitz, Thorstein Bache (1937–), gastro, surg oncol, Aker 1982–2006, founder memb World Ass HPB Surg (Int HPB Ass)

Harbo, Sverre Olaus (1959–), plastic surg, head Dpt Plast Surg Ullevål

Harboe, Morten (1929–), immunol, IEMR Ullevål 1962–83, head Armauer Hansen Research Inst Ethiopia 1969–70, Dpt Gen Immunol RH 1983–99, ass prof Oslo Univ 1966–72, prof 1972–99

Hareide, Ellinor, lab assistant, Tromsø

Harvei, Sverre (1933–), community med, Norw Health Dept 1970–73, Nat Cancer Registry 1973–

Harvold, Egil orthodontist, Granhaug School for Speech Disorders 1945–1952, prof Toronto 1952–

Hasselgård, Terje (1948–), vasc, Molde 1993–, chair Norw Soc Vasc Surg 1995–98

Hasund, Asbjørn (1930–), dr odont, prof maxillary orthopedics Bergen Univ 1968–80, dean Faculty of Odontology Bergen 1970–73

Hatle, Liv Kristin (1936–), cardiology, Trondheim 1974–93, prof 1985 King Feisal Hosp Riad Saudi Arabia 1992–, numerous internat research prizes

Hatlinghus, Staal (1945–), radiol, Levanger 1981–92, Trondheim 1992–

Hatteland, Knut (1919–2008), urol, Stavanger 1964–89, head Urol, chair Norw Assoc Urol 1971–72

Hauge, Magnor Foss (1915–), orthop, Sophie Minde 1959–71, head 1971–82, assoc prof 1969–73, prof 1973–82

Hauge, Tormod (1909–88), neurosurg, RH 1955, head 1957, prof 1962, chair Norw Soc Neurosurg 1968–69

Hauge, Truls (1954–), int med and gastroent,

Haugen, Stein Erik (1946–), ped, Trondheim 1987–98, King's College Hospital, London, 1998–2001, head ped surg Trondheim 2001

Hauglie-Hanssen, Eivinn (1930–), neurosurg, RH 1974–, chair Norw Soc Neurosurg 1984–85

Haugseth, Kristian (1885–1948), Aker 1914–16, RH 1916–18, Horten Navy 1918–48

Haugstvedt, Jan-Ragnar (1954–), orthop. KMI 1995–2002, Dpt Ortho RH 2002–,

Haukaas, Svein Andreas (1940–), urol, Haukeland 1985–2010, prof 1997–2010

Haukebo, Arne (1916–), surg, Dpt Surg II Ullevål 1964–80, Dpt Orthop 1981–83

Haukeland, Espen (1947–) orthop, Diakonhjemmet 1990–

Havelin, Leif I (1949–) orthop, Haukeland 1989–, head 2001–2006, prof 2004, chair The Norw Arthropl Reg 1987–2003

Havig, Øyvind (1936–), gastro, Ullevål 1979–80, Diakonhjemmet 1981–

Heald, William British surgeon, Basingstoke, England Introduced in 1982 TME (total mesorectal excision), for rectal carcinoma

Hedlund, Hans Erik (1942–), urol, Dpt Surg A RH, prof and head 1996–

Heen, Leif (1940–), gastro, Molde 1984–87, Arendal 1987–92, Kristiansand 1993–2010

Hefter, Wictoria Polish plastic surgeon, Tromsø

Heggø, Ottar (1923–), plastic surg, Diakonissehjemmet 1970–92, head 1971–91, pioneered rheumasurg in Hordaland

Hegstad, Elisabeth (1956–), gastro, Akershus, Aker, Moss

Heiberg, Christen (1799–1872), surg, private practice Bergen 1822–26, RH 1836–72, prof surg, orthop, ophthalmol UiO 1836–72

Heiberg, Jacob (1843–1888), surgeon, Universitets-Klinik Rostock 1871–72, Military surgeon Trondheim 1872–73, priv pract Eye 1873–1882, prof anatomy, histology embryology 1878–1887

Heimann, Peter (1926–78), assoc prof Sahlgrenska Gothenburg Sweden 1967–70, head and prof Haukeland 1971–78, founder International Assoc of Endocrine Surgeons

Helgerud, Per (1944–), gastro, Bærum 1987–89, Notodden 1990, Dept Surg Oncol DNR 1990–2011

Helland, Per (1933–), orthop, Kristiansand, 1976–84, Ålesund 1985–86, Haukeland 1986–2000

Hellum, Cato (1928–), orthop, KMI 1973–85, head Center for prosthetics Sophie Minde 1985–99, consultant Inst Cerebral Paresis Oslo 1973–99

Helset, Kristin (1965–), breast and endocrine, Trondheim 1998–

Helseth, Eirik, neurosurg, chair Norw Neurosurg Soc 2006–07

Hellström, John (1890–1966), Swedish urologist, hon memb Norw Surg Soc

Helsingen, Nils Nilsson (1921–), vasc, Dpt Surg A RH 1966–7, Ullevål 1967–69, Ahus 1969–91, prof 1969, hon memb Norw Assoc Surg

Helsingen, Per N (1924–), neurosurg, head Kirkenes 1967–74 and 79–80, Namdal 1974–79, Dpt Acute Trauma Trondheim 1980–

Hem, Einar (1942–), urol, Ullevål, Bærum, Ahus

Hennig, Rune (1952–), neurosurg, Tromsø, prof 1999–

Hertzberg, Johan (1909–2005), gastro, Dpt Surg II Ullevål 1953–1979, head and acting prof 1957–58, assoc prof 1962–79, head surg Nat Med Centre, Seoul, Korea 1960–62

Hetland Karl R. (1943–), orthop, KMI 1988–2002, RH 2002–

Heyerdahl, Severin Andreas (1870–1940), Dpt Radiol RH 1919–30, head 1930–38, director DNR 1931–40, assoc prof radiol 1919–31, chair Norw Soc Radiol, pres Nordic Soc Radiol, hon memb Amer Coll Radiol, The Roentgen Soc London, Nordic Soc Med Radiol

Hilberg, Hans Kristian (1915–), plastic surg, Ullevål 1963–83

Hirschberg, Henry (1940–), neurosurg, RH 1990–2006

Hjemdal, Torbjørn (1933–), int med, RH

Hjort, Erling F (1898–2001), urol, Høyanger 1934–38, Ålesund 1938–41, Vor Frues Hosp 1942–43, Swedish Red Cross Hosp 1943–45, Akershus 1945–1968, medical director (sjeflege) 1969, chair Norw Soc Surg 1954–55, hon memb Norw Soc Surg and Nordic Urol Soc, hon memb Norw Assoc Urol

Hjort, Johan Storm Aubert (1835–1905), surg, RH 1867–80, head Dpt Surg B RH 1873–1900, prof surg and ophthalmol 1873–1899

Hoem, Dag (1954–), gastro, Haukeland

Hoff, Geir (1946–), med gastroent, Skien 1987–, head 1990–98, Inst Cancer Res DNR 2000–, head research Skien 2004–, prof UiO 2006–

Hofgaard, Henrik (1956–), orthop, Aker 1991–95, Lovisenberg 1995–99, head and private practice Red Cross Hosp Omnia 1999–2004, consultant orthop surg Cumberland Valley Orthop Associates 2004–06, consultant and medical head Help24Nimi 2006–, chair Norw Orthop Assoc 2000–01

Hognestad, Hårek (1929–), engineer Bærum

Hognestad, Jens (1933–), gastrointest, Diakonhj, Aker

Hokland, Bjørn (1956–), plastic surg, Ullevål, chair Norw Assoc Plast Surg 2008–2010

Hol, Per Kristian (1952–), radiol, Ullevål 1991–93, Lovisenberg 1993–, RH-

Hol, Ragnar (1920–), radiol, Ullevål

Holen, Jarle (1932–), radiology, Inst Surg Res RH, Dpt Radiol RH

Holen, Ketil (1953–), orthop, Trondheim 1996–, chair Norw Orthop Assoc 2009–10

Holme, Per Leif (1948–), urol, Aker 1988–91, Akershus 1991–95, head urol Fredrikstad 1995–2005, Aker 2005–

Holmsen, Egil (1951–), orthop, Diakonhjemmet 1989–

Holst, Fredrik (1791–1871), prof medicine (pharmacology, toxicology and hygiene) 1823–1865, founding memb and first leader of The Medical Society in Oslo 1833

Holst, Johan Martin (1892–1953), head and prof Dpt Surg A RH 1930–53, leader Med Services Norw Armed Forces during World War II, chair Norw Assoc Hosp Doctors 1922–23, hon memb Norw Surg Soc, editor Nor Mag Lægevidensk, participant in Finnish Winter War 1918, multiple nat and internat honours

Holst, Peter Fredrik (1861–1935), int med (bact and

pathol), RH 1890–1932, assoc prof 1897, prof 1902–32, private practice Oslo 1890–

Holst, Stein Flemming (1891–1955), urology, private practice Oslo from 1927

Holst, Sven Viktor (1927–87), Red Cross Emergency Centre Oslo 1965–87

Holter, Olaf (1933–), gastro, Tønsberg 1977–2003, head 1990–2003

Holth, Søren (1863–1937), ophthalmologist, pioneer in eye surgery, and active in research, priv pract Oslo 1896–

Horn, Arild (1947–), gastro, Haukeland 1994–, head 2008–

Horsley, Victor (1857–1916), English neurosurgeon, Univ College London, prof pathology 1887–96, prof clinical surg 1899–1902

Hove, Leiv M (1948–), orthop, Betanien/Haukeland plastic surg 1981–85, Bergen Legevakt (Emergency Centre) hand surg 1985–90, Haukeland 1991–, head Nat Center of Reconstr Hand Surgery, Haukeland 1998–, prof 1998–, chair Norw Soc Surg Hand 1996–99

Hovind, Karl (1923–2008), neurosurg, pediatric neurosurg RH 1971–88, pres Internat Soc Ped Neurosurg 1984

Huitfeldt, Hans Ludvig Carl (1876–1969), gen surg, private pract Oslo from 1904. Part-owner Jervell's Clinic, started Kristiania Radiuminstitut, chair Norw Radium Hosp. Doctor to the Royal family. Chair Oslo Surg Soc 24–25. Hon memb Nordic Soc Radiol, Håkon VII Jubilee Medal, Knight 1st order St Olav

Husby, Otto Schnell (1954–) orthop, Trondheim 1991–

Husby, Paul (1945–), anesthesiol, Haukeland, prof 1995–

Husby, Torstein (1948–), orthop, KMI 1992–

Husebø, Odd Sigfred (1943–), surg, Haukeland

Husfeldt, Erik (1901–84) Danish prof surg 1943–Copenhagen

Husum, Hans Petter (1947–) orthop, trauma and war-surgeon, Afganistan, Tromsø Mine Victim Resource Center

Hveem, Brit (1957–), gen surg, Harstad

Hygen, Jan (1938–), plastic surg, Skien 1984–, head 1988–

Høeg, Knut (1910–94), urol, Surg Dpt III Ullevål 1958–64, Surg Dpt V 1964–80, head urol, chair Norw Assoc Urol 1962–65, hon memb Norw Assoc Urol

Høgevoid, Hans Erik (1954–), maxillofacial and plastic, Ullevål 1995–2006, RH 2006–, chair Norw Soc Maxillofac Surg 1993–97

Hoie, Johan (1931–), thoracic, DNR 1978–2001

Høisæter, Per Åge (1938–), urol, Haukeland 1983–, head 1990–98, prof 1984–2000

Høivik, Bjørn (1937–), vasc, Ahus 1983–93, Gjøvik 1993–2002, chair Norw Soc Vasc Surg 1990

Holmebakk, Søren T Manthey (1956–), gastro, Dpt Surg Gastroent, Oslo Univ Hosp, Aker

Høst, Herman (1926–), oncol, Dpt Oncol DNR 1963, head 1975, prof Oslo 1975

Høst, Herman Fleisher (1883–1980), int med, private practice Oslo 1912–24, head Bærum 1924–51

Høstmark, Jens Gerhard (1950–), urol, Haukeland, prof 2008–

Høyer, Andreas (1907–1972), surg and radiol, head Dia-konhjemmet 1952–72, chair Norw Surg Soc 1957–59

I

Igesund, Asbjørn (1926–), urol, Odda 1970–74, Tromsø 1974–82, Førde 1982–83–86, Kristiansand 1986–91 head urol 1987–91

Ihler, Per Kristoffer (1924–2006), orthop, Gjøvik 1971–79, head Kongsvinger 1979–2006

Ilebekk, Arnfinn (1941–), IEMR Ullevål 1974–, prof 1992–

Illingworth, Sir Charles (1899–1991), Scottish prof surgery 1939–64, Western infirmary Glasgow, hon memb Norw Surg Soc

Inberg, Karl Rainer (1903–) Finnish professor of surgery

Indrekvam, Kari (1961–), orthop, Hagevik 1998–2004, head 2004–, assoc prof UiB 2002–, chair Norw Orthop Assoc 2002– 2003

Ingebrigtsen, Ragnvald (1882–1975), head Stavanger 1920–28, head and prof Dpt Surg B RH 1928–54, hon memb Nordic Surg Soc

Ingebrigtsen, Tor (1963–), neurosurg, head Tromsø 1998–2006, prof 2006–, chair Norw Soc Neurosurg 2004–05, med director Health Reg North 2006–7, adm director Univ Hosp Tromsø 2007–

Irtun, Øivind (1951–) gastro, Tromsø, prof 2005–

Isern, Anne Elisabeth (1960–), plastic surg, Malmø, Trondheim, Klinik Stokkan

Iversen, Erling Dahl (1892–1978), Danish prof surg, surg dpt C, Rigshospitalet Copenhagen 1936–54

J

Jablonski, Greg (1960–), Inst Surg Res RH

Jacobsen, Bjarne K (1956–), PhD, Inst Community Med, Tromsø

Jakobsen, Arnt (1906–1989) surg, Dpt Surg III Ullevål 1952–58, head Legevakten Oslo 1958–76, National Medical Centre, Seoul Korea 1964–66, prof UiO 1966–76

Jakobsen, Arnt (1938–), transplant, Dpt Surg B RH 1978–1994, founding memb ESOT, medical director (sjeflege) RH 1994–2005, chair Scandiatransplant 2004–2010

Jakobsen, Ulf (1950–), gastro, Ringerike 1990–92, Drammen 1992–

Janbu, Torunn (1954–), gen surg and orthoped, Dept Orthoped RH 2001–. President Norw Med Assoc 2005–2011.

Janssen, Carl W (1929–2002), gastro, Haukeland 1970–1999

Jaroschy, Marianne (1896–1973), orthop, private practice Hamar, founding memb Norw Orthop Assoc

Jensen, Harry, engineer, Tromsø

Jenssen, Carl Fredrik (1907–90), gen kir, Ullevål 56–64, head Bærrum 64–78

Jervell, Fredrik Kristian (1859–1921), surgeon with private clinic in Oslo 1891, pres Surg Soc Oslo 1899–1900, pres Nordic Surg Soc 1907, pres Norw Medical Assoc 1916–17

Jervell, Otto (1893–1973), int med, Lovisenberg 1940–63, chair Norw Soc Int Med 1939–41

Johannesen, Jan Einar (1935–), Diakonhjemmet 1977–2005

Johannessen, Axel Theodor (1849–1926), ped, prof RH 1912–21

Johannessen, Jan Vincent (1941–), pathology, consultant DNR 1972–83, managing director DNR 1983–2011, prof ass prof pathol, Columbia Univ Coll New York USA 1979–82, prof 1982–, chair a multitude of Norw and internat organisations

Johansen, Harry (1947–), orthop, Tromsø 1985–92, head 1993–2005

Johansen, Jørgen (1915–83), maxillofacial, RH 1968–82

Johansen, Kjell, (1932–87), zoophysiol, IEMR Ullevål 1956–1971, prof Aarhus 1971–87

Johansen, Oddmund (1948–) orthop, Tromsø 1996–,

assoc prof 1995– 2001, prof 2001–, visit prof Dpt Orth Iowa Univ USA 2004–2005

Johansen, Truls Erik Bjerklund (1951–), urol, Sandefjord 1984–85 and 1987–88, Skien 1988–2008, prof urol Tromsø 1995–2001, head and prof Århus, Denmark 2008–, first leader Norw Inst Urol 1993

Johnsen, Gjermund (1952–), gastro, Trondheim 1991–

Johnson, Egil (1955–), gastro, Ullevål 1994–, prof 2003–

Johnson, Gunnar (1895–1957), head Harstad 1927– 35, head Municip Emerg Centre Oslo, 1935–57

Johnson, Gunnar Espolin (1929–), plastic surg, Betanien/Haukeland 1964–

Johnson, Jon Anton (1920–2000), gastro, head Tromsø 1967–87, prof 1971–87, hon memb Norw Surg Soc and Norw Soc Gastroent

Jynge, Per (1938–) surg, Dpt Circulation and Med Imaging, NTNU

Jørgensen, Jørgen J (1947–), vasc and thoracic, Ullevål 1985–87, Aker 1988– head 1991, prof 2008, chair Norw Assoc Cardiothorac Surg 1988–89, chair Norw Soc Vasc Surg 1992–93, chair Norw Assoc Cardiothoracic Surg 1988–89, prof 2008–

Jørgensen, Lars Hilmar (1955–), thoracic, DNR 1999–2005, Dpt Surg A RH 2005–

Jørgensen, Pål F (1960–), vasc and transplant, Drammen 2002–2004, Dpt.Surg B RH 2004–

Jørgensen, Trond (1958–), urol, priv pract Oslo

K

Kaastad, Trine Sand (1954–), orthop, Aker, (1993), head Div ENT, Plast and Orthop Surg RH

Kalager, Tore (1938–), int med and infectious dis, Drammen 1987–89, and 1992–, Tawam hosp al' Ayn United Arab Emirates 1989–91

Kalsnes, Søren (1902–), radiol and gen surg, Moss 1949–72

Karevold, Asbjørn (1951–), cardiothoracic, Trondheim; head 2003–

Karlsen, Steinar Johan (1944–), urol, Bodø 1981–83, Aker 1983–, head 1998–2010, prof 2001–2010, hon memb Scand Assoc Urol

Kaster, RL (Bob), American engineer, developed the Hall-Kaster heart valve

Kay, Sir Andrew (1914–2011), Scottish professor of surgery, Univ Glasgow, Scotland 1964–81, hon memb Norw Surg Soc

Keyser, Jacob Johan (1828–1913), RH 1860–63, private practice surg and ophthalmol, military surgeon

Kiil, Fredrik (1921–), int med, director and prof Inst Expt Med Res (IEMR) Ullevål 1962–91

Kiil, Steinar (1961–), vasc, Oslo

Kjekshus, John (1936–), int med cardiology, Bærum 1979–84, head 1984–92, Med Dpt B RH 1992–2006, prof 1992–06, chair Norw Soc Cardiol 1993

Kjelstrup Yngvar (1916–91), plastic surg, hand surg Oslo Municipal Emergency Centre 1963–

Klaastad, Øivind (1944–), anesthesiol, Arendal 1984–86, RH 1986–92, Nat Centre Orthoped 1992–

Klafstad, Jacob (1934–), maxillofacial, private practice Oslo 1975–82, military doctor 1982–, chair Norw Soc Maxillofacial Surg 1969–71

Klem, Knut Henning (1964–), urol, priv pract Arendal

Klepp, Olbjørn (1944–), oncology, DNR 1977–80, head and prof Dpt Oncol Trondheim 1991–

Kleven, Atle, engineer, Inst Expt 3-D ultrasound, started SonoWand in 1998

Klevmark, Bjørn H (1926–2011), urol, Akershus 1983–85, head Urol and prof RH 1985–96, hon memb Norw Assoc Urol

Kloster, Roar (1960–), neurosurg, head Tromsø 2006–

Kluge, Trond (1935–85), Dpt Surg A+B RH 1969–70, Tromsø 1973, prof 1973–79, Chief Surgeon General Norw Armed Forces 1979–85

Knutrud, Ola (1919–96), ped, Dpt Surg B RH 1962–70, prof 1970–1986, chair Norw Soc Ped Surg 1973–78, pres Nordic Ped Soc 69–77, multiple hon memberships, medals and distinctions

Knutsen, Gunnar (1954–) orthop, Tromsø 1994–, head 2010–, assoc prof 2008–

Kolberg, Andreas (1909–2001), IEMR Ullevål 1951–55, Dpt Pharmacol Univ Oslo 1960–79

Kolle, Knut (1945–), gen surg, Clinic 8 (private) 1985–88, private practice 1985–

Kolstad, Per (1925–91), gyn/obst, DNR 1964–91, head Dept Gyn/obst 1967–91, prof 1972–91

Kordt, Karl Fredrik (1927–2002), vasc, Stavanger 1973–95, head 1983–95

Korvald, Erik (1935–), vasc surg, Kongsberg 1974–93, head 1981–87, med director (sjeflege) Kongsberg 1986–92 and surg cons St Josephs Hosp 1987–93, head Secretariat Healthplan Health Region 2 1993–95, head Secretariat Patient Admission County of Buskerud 1995–2003, DRG coordinator Kongsberg 2004–05

Kristiansen, Knut (1949–), thoracic and vasc, Fredrikstad 1993–2005, Ahus 2005–

Kristiansen, Kristian (1907–1993), neurology and neurosurg, head Dpt Neurosurg Ullevål 1951–77, prof 1961–77, chair Norw Soc Neurosurg 1965–1967, pres Nordic Soc Neurosurg 1962–65, chair Norw Soc Med Hist 1961–65

Kristiansen, Leif Pål (1959–), orthop, RH 1999–2005 (50%), cons Axxess Clinic (Private Hosp 2001–06), consultant Aleris (Private Hosp) 2006–

Kroese, Andries Jan (1941–), thoracic and vasc, Aker 1983–, prof 1992–

Krog, John (1918–), zoophysiol, IEMR Ullevål 1954–65, Inst Physiol Oslo Univ 1965, prof zoophysiology

Krogness, Karl Guldberg (1924–79), neurosurg and clin neurophysiol, Haukeland 1975–79

Krohg-Sørensen, Kirsten (1953–), vasc, Bærum 1992–95, Dpt Surg A RH 2001–

Kruse, Aksel Danish gastro surgeon, Århus 1970–2010

Kufaa, Torbjørn (1934–), ped, head ped surg Trondheim 1976–2000, prof ped surg 1985–2000, chair Norw Assoc Paed Surg 1988–91, hon sec gen Nordic Paed Surg Soc 1992

Kvalsund, Berit (1951–), public med, Ålesund

Kvarnes, T Lasse (1937–2006), orthop, Oslo Rheuma Hosp 1989–2000, Dpt Ortop RH 2000–2004

Kvarstein, Bernt (1930–), urol, Ahus 1979–82, head urol 1982–88 and 1989–2000, Ullevål 1988–1989, chair Norw Assoc Urol 1986–89, hon memb Norw Assoc Urol

Kveim, Morten (1947–), plastic surg, Red Cross Clinic Oslo 1987–91, Ullevål 1991–, head 1994, private practice Oslo, chair Norw Soc Plast Surg 1993–94, chair Norw Soc Aesthetic Plast Surg 1988–89

Kvernebo, Knut (1949–), cardiothoracic, and vascular, Aker 1987–90, Ullevål 1994–, prof 1994–, chair Norw Surg Soc 1998–2001

Kvernmo, Hebe (1961–), orthop, Unit Hand- and Microsurgery RH 2004–05, head Unit Hand- and Microsurgery Dpt Orthop Ullevål 2005–08, divisional director Neuro- and Orthop Surgery, Tromsø 2008–09, head Up-

per Extremity- and Microsurgery, Oslo Univ Hosp 2009–, chair Norw Orthop Assoc 2006–09

Kvinnslund, Stener (1948–), oncol, Haukeland 1984–86, head Dpt Oncol Trondheim 1987–91 1987–91, head DNR, prof 1992–2003, Haukeland 2003–, ass director Health Reg West 2003–2006, adm director Health Bergen 2006–2010, head and prof Dpt Oncol Haukeland 2011–

Kvinsland, Steinar (1931–), dr odont, prof Inst Anatomy Bergen Univ

Kåresen, Rolf (1940–), gastro and breast and endocrine, Ullevål 1986–2010, medical director (sjeflege) 1994–2007, prof breast and endocrine 2007–10, chair Norw Soc Breast and Endocrine 2008–2010

Kåss, Erik (1923–), med rheumatol, OSR 1961, head 1963–93, prof 1966, chair Norw Soc Rheumatol 1969, hon member Norw, Finnish, French, Yugoslavian and Swedish Soc Rheumatol

L

Labori, Knut Jørgen (1965–), gastro, Ullevål 2005,
Lange, Conrad (1953–), vasc, Trondheim 1992–

Lange, Johan Emil (1933–), orthop, Sophie Minde 1982–1996, Dpt Orthop RH 1996–2003

Langeland, Norvald, (1936–), orthop, Sophie Minde 1976–83, head and prof Haukeland 1983–1992, head Drammen 1992–2003, chair Norw Orthop Assoc 1980–81, pres Nordic Orthop Federation 2000–2002

Langfeldt, Einar (1884–1966), prof physiol and med chem 1925–54

Langmark, Frøydis (1941–), pathol, DNR 1977–80, Norw Cancer Register 1980–, head 1983–2010

Langmoen, Iver Arne (1952–), neurosurg, RH 1993–97, head and prof Karolinska, Stockholm, Ullevål 2005, prof 2005–, chair Norw Soc Neurosurg 1996–97 and 2010–

Langård, Øyvind (1939–), orthop, Aker 1984–

Larsen, Carl Fredrik (1830–1909), military doctor, Dpt Med RH 1870–80

Larsen, Stein Gunnar (1957–), gastro, Ringerike 1993–7, med direct 1995–97, DNR 1998–Leegaard, Cristopher Blom (1851–1921), neurol, head Dpt Neurol RH 1895, assoc prof 1893, prof 1896–21

Larsen, Øivind (1938–), community medicine, prof community med Tromsø 1976–77, assoc prof medical history Oslo 1971–76, 1977–84, prof 1985–, chair Norw Soc Community Med, Norw Medical Soc, Norw Soc Medi-

cal History and several other Norwegian and international organisations

Leegaard, Truls Michael (1903–99), ENT, Aker 1939–48, Ullevål Hospital 1949–73, prof ENT Oslo 1954–73, private practice Oslo 1973–87, chair Norw Soc Otolaryngol 1947–49 and 1962–63

Leidal, Odd (1933–90), head Rjukan 1970–74, Hamar 1976–90

Lekven, Jon (1941–), Inst Surg Sci Haukeland, assoc prof 1977, prof 1984–, visit prof Duke N Carol USA 1986–87, dean Faculty Medicine, Bergen 1993–98

Lende, Georg (1940–), maxillofacial, private practice Oslo

Lennquist, Sten Swedish prof of surgery (endocrine, disaster/trauma), head Dpt Surg Linköping 1992–2001, director Inst Disaster Med Linköping 2001–, Sweden, hon secy gen Nordic Surg Soc 1986–1992

Leraand, Severin (1931–), engineer, IEMR Ullevål 1959–98

Lereim, Inggard (1941–), orthop, Trondheim 1979–85, head Dpt Trauma for Outpatients and prof traumatol 1985–, dir Surg Clin Ullevål 1998–2002, deputy managing director Ullevål 2002–08, senior consultant Central Norway Health Authority 2008–

Lereim, Paul (1938–), orthop, Sophies Minde 1977–2002, RH 2002–08, head 2000–2002, sports medicine UiO 1980–, head Inst Sports Medicine, assoc prof St Lukes Presbyterian Hosp Chicago 1977–78, prof sports med UiO 1986–2008

Levang, Olaf W (1932–), thoracic and vasc, Trondheim 1982–2003, head Cardiac Clinic 1993–, assoc prof 1982, prof 1984–2003

Liavaag, Kaare (1908–81), thoracic, head Drammen 1959–78, also hosp director (adm overlege) 1968–78, chair Norw Surg Soc 1967–69

Liavåg, Ivar (1923–96), gastro, head Lovisenberg 1969–73, Aker 1973–90, prof Aker 1985–90

Lie, Erik (1920–2010), orthop, St. Joseph's Hosp Fredrikstad 1959–71, head Fredrikstad 1972–90

Lie, Mons (1938–), thoracic and vasc, Tromsø 1985–89 and 1990–98, prof 1992–98, Ullevål 1981–84 and 1997–2008

Lied, Ole Ulfert (1865–1931), private practice Drammen 1892, head Drammen 1910–31

Lied, Rolf (1918–86), gastro, Kongsvinger 1962–68, Gjøvik 1968–83, hosp director (asdm overlege) 1968–83, chair Norw Surg Soc 1969–71

Lien, Bjørn (1945–), transplant Dpt Surg B RH 1992–

Lillehei, C Walton (1918–99), American cardiac surg, Univ Minnesota 1951–67, 1967–75 Cornell Univ N.Y., director med affair St Jukes Inc and prof surg Univ Minnesota 1975–

Lilleås, Finn (1945–), radiol, Dpt Neurorad Ullevål 1982–91, Dpt Radiol RH, 1991–

Lindahl, Anne Karin (1960–), vasc, Volvat 2000–02, head Bærum 2002–05, med director Health Region South, later South-East 2006–08, head Dpt Quality Measurement and Patient Safety Norw Knowledge Centre 2008–, chair Norw Soc Vasc Surg 2002–04

Lindberg, Harald L (1945–), thoracic and vasc, Dpt Surg A RH congenital cardiac surg, 1986–, head 1992–, prof 1998, chair Norw Assoc Cardiothoracic Surg 1985–86

Lindboe, Einar Fr (1876–1953), gen surg, Diakonhjemmet 1906–1939, started and owned Josefines Clinic, board memb of several med institutions and soc, military doctor, member and regular participant in Nordic and German annual meetings, participant in Finnish-Russian war 1940. Red Cross Medal of Hon, Crowningsmedal, several other Medals

Lindegaard, Karl-Fredrik (1946–), neurosurg, RH 1990–, prof Oslo 1997–

Lindekleiv, Haakon Magnus (1982–), Tromsø

Lindsetmo, Rolv-Ole (1959–), gastro, Tromsø, chair Norw Soc Dig Surg 2010–

Line, Pål-Dag (1960–), vasc, transplant Dpt Surg B RH, head 2005

Lingaas, Per Snorre (1959–), gen surg, Intervent Centre RH

Liverud, Kjell (1909–1997), radiol, Ullevål 1953–56, DNR 1956–

Ljunggren, Einar (1896–1986) professor and head of surgery, Sahlgrenska Hosp Gothenburg Sweden, hon memb Norw Surg Soc

Loe, Borger (1948–), ped, Trondheim 1991–93, Ullevål hospital 1993–2001, Trondheim 2001–, chair Norw Assoc Ped Surg 2002–05

Loenneken, Karl Johan Wilhelm (1907–73), general and plastic surg, RH 1953–67

Lossius, Sophus (1890–1976), maxillofacial, head Ullevål 1932–48, prof Dpt Surg, Dental High School Oslo.

Lothe, Ragnhild A (1958–), DNR, head Dept Cancer Prevention, Inst for Cancer Research

Ludvigsen, Tom (1951–), orthop, Arendal 1990–95,

Ullevål 1996–

Luhr, Herman (1956–), orthop, Kongsberg 1990–92, Drammen 1992–

Lund-Johansen, Morten (1959–), neurosurg, Haukeland, prof 2007–, chair Norw Soc Neurosurg 2002–03,

Lund, Bengt-Lasse (1945–) gen surg and orthoped, Sophies Minde 1984–85, Bærum 1985–87, secy gen NMA 1986–90, med dir and hief med officer Gensidige NOR Assurance 1988–, chair Incita Assurance. Chair Norw Assoc Junior Hosp Doctors 1980–83, president NMA 1983–87

Lund, Halfdan (1880–1965), surg training Berlin, Hamburg, RH, private pract Oslo from 1910, head Elverum from 1925

Lund, Hans Geelmuyden (1845–1912), private practice Stavanger 1875–1912

Lund, Ivar (1911–92), anesthesiol, head Dpt Anesthesiol Ullevål 1947–81, prof 1972–81

Lundar, Tryggve (1945–), neurosurg and neurol, Dpt Neurosurg RH 1986–90, Ullevål 1991–93, head 91–93, RH 1993–, head 1997–2005, prof Oslo Univ 1990–, chair Norw Soc Neurosurg 1988–89

Lundblad, Runar (1955–), surg, Intervent Centre RH 1998

Lundbom, Jan (1948–2006), thoracic and vasc, head Trondheim Emergency Centre 1966–82

Lunde, Ole Christian (1944–), gastro, Aker 1987–, head gastro 1998–2010

Lunde, Knut B engineer, Norw Orthop Implant Res Unit, NTNU

Lundgren, Tor-Ivar (1945–), Inst med biology Tromsø, KITH Trondheim, director Research and Developmt NIR-VACO

Lundmo, Per Inge (1946–2009), urol, Trondheim, chair Norw Assoc Urol 2000–2001

Lyberg, Torstein (1947–), maxillofacial, Ullevål 1980–, head 1984–95, Senior Scientist Ullevål Research Forum / Center for Clinical Research 1995–

Lützow-Holm, Georg (1892–1965), gen surg, head Lovisenberg Oslo 1940–62

Lærum, Frode (1947–), radiol, Dpt Radiol Aker 86–87, part-time 1987–92, prof Inst Surg Res RH 1987–

Løffeler, Sven (1972–), urol, Tønsberg

Lønning, Per Eystein (1953–), oncol, Dpt Med Haukeland 1990–, prof 1992–

Løvig, Torgeir (1946–), gastro, Moss 1986–98 head 1990–98, Aker 1998–2002, senior advisor Direct Health 2002–2010, chair Norw Surgical Soc 1994–98, chair Specialty Com Gen Surg 1998–2010

Løyning, Einar Waale (1932–), urol, Dpt Surg A RH 1980–81, Torsby, Sweden 1982–83, DNR 1983–84, RH 1984–85, med judge health insurance 1985–

M

Macewen, William (1848–1924), Scottish neurosurgeon, Royal Infirmary Glasgow 1843–, prof surg 1892–

Mackey, Arthur W, British surgeon, hon memb Norw Surg Soc

Madsen, Jan Erik (1958–) orthop, Ullevål 1999–, prof 2003–

Magnus, Vilhelm (1871–1929), private practice Oslo 1898–1929, founder of neurosurgery in Norway

Magnæs, Bjørn Agnar (1932), neurosurg, Ullevål 1979–2000, prof 1993–2000, chair Norw Soc Neurosurg 1990–1991

Majak Gundersen, Joanna (1974–), Aker, Unit Breast and Endocrine Surg Oslo Univ Hosp 2009–

Mala, Tom (1968–), gastro, Aker 2007–, Intervent Centre RH

Malm, Ole Jacob (1910–2005), clin chem and med biochem and physiology, prof and research director USA 1954–61, IEMR Ullevål 1961–62, Dpt II (as surg pathophysiol) Ullevål 1963–1980, prof Oslo Univ 1965–1980, various leaderships in resistance during World War II

Malthe, Alexander (1845–1928), private practice Oslo 1875–, private Surg Clinic 1886–1928, resection of maxilla 1885, first appendectomy for recurring appendicitis 1889, gastric resection 1897, established several med legacies

Mangersnes, Jan (1961–), maxillofacial, Gjøvik, 2007–, chair Norw Soc Maxillofac Surg 2005–09

Maske, Ove (1911–88). urol, Trondheim 1957–80

Marteinsson, Valur Thor Icelandic urologist, Tromsø

Manthey, Carl Ludvig (1869–193), naval and war surgeon, 1916–30, also private pract Horten from 1917. Red Cross Medal of Honour

Mathisen, Willy Eugen (1909–97), urol, head Urol RH 1957–79, chair Norw Assoc Urol 1967–71, hon memb Norw Assoc Urol

Mathisen, Øystein (1945–), gastro, Dpt Surg B gastro RH 1987–, head HPB 1998–

Matre, Kjell (1930–) orthop, Ålesund 1971–88, Karlshamn Sverige 1988–91, Hagevik Coastal Hosp 1991– 1997

Matre, Knut (1950–), MSc, Surg Res Lab Haukeland 1979–85, Inst Med Bergen prof 2002–

Matson, Donald (1913–69) American neurosurgeon, the founder of ped neurosurgery, Peter Bent Brigham and Children's Hospitals 1948–69, head 1964–69, prof neurosurg Harvard Medical School 1968–69

Medbye, Per Chr. (1945–), urol, Lillehammer 1985–2004, Hamar 2004–

Medbø, Ingulf Utheim (1919–1969), orthop, Sophies Minde 1967–69, chair Norw Orthop Assoc 1968–69

Meling, Torstein Ragnar (1968–), neurosurgery, RH 2003–

Mellem, Christine (1947–), pathol, RH

Meyer, Carl (1891–1943), head and director, Tromsø Coastal Hosp 1924–43

Mikkelsen, Otto (1928– 2008), surg, Haugesund Hosp and Haugesund Reumahosp 1970–73

Mikkelsen, Otto Danish professor of surgery, Copenhagen City Hosp, hon memb Norw Surg Soc

Mjølnerød, Ove K (1932–) urol, Trondheim, head urol 1974–, chair Norw Assoc Urol 1990–91

Mjøs, Ole Danbolt (1939–), physiology, IEMR 1967–72, res fellow San Francisco 1972–73, and Edinburgh 1973–74, ass prof Tromsø physiology 1974, prof from 1975, prorektor Univ Tromsø 1985–89, rector 1989–, dean Med Fac, 1983–86, chair multiple natinal and internat committees, among them the Nobel Peace Prize Comm. several research prizes, pres Eur Soc Clin Invest 1980–81, hon memb Polish Card Soc

Moberg, Erik (1905–1993) Swedish pioneer in hand surgery Sahlgrenska Institute 1947–71

Modalslie, Øyvind (1950–), uro, Sykehusene Østfold 1988–93 and 1996–2011, head 2008–11, head urol OUS 2011–

Mo, Arve (1937–87), gen surg, Notodden 1979–87

Moe, Jens (1943–2000), gen pract Drøbak 1972–76, 1988– Initiated “Doctor staffed ambulance” service in Oslo 1967, founder and director The Norwegian Air Ambulance 1978–85 and founder of Ring (later Volvat), Medical Center 1985.

Moe, Morten Carstens (1975–), ophthalmology Inst Expt Med, Ullevål

Moen, Oddvar (1951–), maxillofacial and cardiothoracic, Ullevål 2002–

Moen, Ove (1942–), keeper of dogs, IEMR Ullevål 1963–92

Mohn, Jannike (1960–), nurse, urotherapist, Haukeland

Mohr, Brit (1941–), anesthes, Dpt Anesth RH 1974–

Mohr, Emil (1940–), orthop, Haugesund 1980–1985, Stavanger 1985–88, head Haugesund 1988–2008, consultant and med advisor Haugesund 2008

Moland, Jarl H (1945–), thoracic and vasc, Bodø 1984–89, Tromsø 1989–

Mollestad, Otto (1908–73), anesthesiol, head Anesthesiol RH 1947–73, chair N Soc Anaesthesiol 1950, Norw Hosp in Korea 1960–61

Monclair, Tom (1942–), ped, Dpt Surg B RH 1986–, head ped surg 1992–96

Monrad-Krohn, Georg Herman (1884–1964), neurology, RH 1917, prof neurology 1922–, chair Norw Soc Neurology

Morken, Torill (1954–), gastro, breast and endocrine, Ullevål–2006, Bærum 2006–

Mortensen, Kim Erlend (1968–), surg research lab, Tromsø 2011–

Mortensen, Raymond F. (1946–), urol, Bodø 1985–, priv pract Bodø, chair Norw Assoc Urol 1996–97

Muri, Olaf jr (1925–), urol, Lovisenberg 1973–93, Aker 1993–95, chair Nordic Assoc Urol 1984–85

Murstad, Einar (1892–1968), surg, head Lillehammer 1932–62

Myhr, Karin, technical assistance, Tromsø

Myhre, Hans Olav (1939–), thoracic and vascular, Aker 1977–82, head and prof Surg Clin Trondheim 1982–2009, multiple national and internat prizes for research, founding memb and pres Europ Soc Vasc Surg 1987–88, hon memb 2008, hon memb Norw Surg Soc

Myklebust, Oddlaug headmaster Granhaug School for Speech Disorders

Müller, Sébastien (1977–) engineer, Dpt Struct Engineer, NTNU

Müller, Tømm Brostrup (1961–), neurosurg, chair Norw Soc Neurosurg 2008–2009

Myren, Johannes (1915–96), gastroent, Dept Med IX Ul-

levål 1964–85, assoc prof 1964, prof 1977

Myrhaug, Hilmar (1904–87), maxillofacial and ENT, Haukeland 1952–73, private practice Bergen from 1952

Myrmel, Truls (1959–), cardiothoracic, Tromsø, prof 2000–

Myrseth, Erling (1950–), neurosurg, Haukeland, head 2001–

Myrvold, Helge Elliot (1934–), gastro, assoc prof Surg Clin II Sahlgrenska Hosp Gothenburg Sweden 1979–82, head gastro 1982–91, prof Trondheim 1982–2004

Møller, Pål (1946–), genetics, Oslo Municipal Health Dpt 1982–88, 1988–, head med genetics DNR.

Møllerud, Adolf (1910–2002), orthop, Aker 1957–63, head Dpt Orthop 1963–78, chair Orthoped Soc 1962–63, head Norw Army Hosp Seol Korea 1953–54

Mølster, Anders (1941–), orthop, Haukeland 1984–92, head traumatology 1992, prof Inst Surg Sci Bergen 1994–

Mørck, Bjarne (1890–1964), orthop, private practice Oslo 1920–64, founding memb Norw Orthop Assoc, chair 1948–52

Mårvik, Ronald (1949–), gastro, Trondheim 1987–, head NSALK 1996–

N

Nafstad, Svein (1910–99), maxillofacial, Ullevål 1954–1977

Nakstad, Per Hjalmar (1946–), radiol, RH 1977–92, head neuroradiol and prof Ullevål 1992, chair Norw Soc Neuroradiol

Natvig, Jacob Birger (1934–), immunology an transfusion med, Rockefeller Univ NY USA 1966–67, head Inst Gen and Rheum Immunology RH 1967–77, prof clinical immunol Karolinska Inst 1977–78 managing dir RH 1978–86, prof immunol and consultant RH 1986–, chair Norw Soc Immunol 1972–75, chair several other Norw and internat org

Natvig, Nils Olsen (1869–1951), head Oslo Military Hosp 1914–34

Naume, Bjørn (1961–), oncol, DNR 1993–, prof oncol 2011–

Nazir, Naimy, gastro, Ullevål

Nedredal, Geir Ivar (1971–), gen surg, Aker

Nesbakken, Arild (1950–), gastro, Dpt Surg Kongsberg

1987–91, head 1990–91, Drammen 1991–95, Aker 1995–, assoc prof 2005, prof 2009–

Nesbakken, Ragnar (1933–1987), neurosurg, RH 1972–78, head and prof Ullevål 1978–87, chair Norw Soc Neurosurg 1986–1987

Nestvold, Torunn (1965–) gastrointest, Bodø 2004–, head Unit Obesity Surg

Neverdal, Nils Olav (1966–), thoracic, Stavanger 2007–

Nicolaysen, Johan (1860–1944), private practice in Oslo 1888–, head and prof Dpt Surg A RH 1909–1930, hon fellow Royal Coll Surg England, Royal Academy of Medicine Ireland

Nicolaysen, Julius (1831–1909), prof surgery 1870–1908, head Dpt Surg A RH 1873–1908, founding memb Nordic Surg Soc, pres 1895, first leader of Surg Soc in Oslo 1894

Nicolaysen, Knud Dahl (1891–1973), Haugesund 1927–32, Drammen 1933–60, chair Norw Surg Soc 1935–37

Nicolaysen, Niels Aars (1885–1958), private practice Bergen 1922–, hon memb Norw Surg Soc

Nilsen, Bjørn Helge (1943–), gastro, Gjøvik 1987–93, Haukeland 1993, Lillehammer

Nilssen, Asbjørn (1912–86), gastro, Dpt Surg II Ullevål 1957–59, Åhus 1959–82, The Norwegian Field Hosp Korea 1954, Korean War Medal, UN-medal

Nissen-Lie, Henrich (1903–1978), orthop, Drammen 1947–49, Ullevål 1949–55, head KMI 1956–73, assoc prof Oslo 1949–

Nissen-Meyer, Roar (1914–2008), endocrine, DNR 1957–68, Aker 1968–

Nordby, Hans Kristian (1944–), neurosurg, Ullevål, head 1990

Norbye, Bjørn (1938–), gen surg, Tynset 1976–, head 1980–

Norderval, Stig (1961–), gastro, UNN Tromsø

Nordgaard, Gunnar (1914–94), maxillofacial, head Trondheim 1962–84, chair Norw Soc Maxillofacial Surg 1977–80

Nordrehaug, Jan Erik (1947–), clin physiol and int med and cardiol, Dpt Cardiol Haukeland 1990–91, Odda 1991–92, head Outpat and Invest Haukeland 1992–, prof 1998–

Nordsletten, Lars (1959–), orthop, Ullevål 1997–, prof 1998–

Nordstrand, Anders (1936–) ped surg, Stokmarknes 1972–81, Lindebergs lasarett Sweden 1982–83, Gravdal 1984–

Nordstrand, Kenneth (1941–2001), cardiothoracic, Feiring Clinic for Cardiac Surg 1993–2001

Nordström, Rolf E (1947–), Finnish plastic surg, head plastic surg 1989–95, prof Tromsø 1991–97

Norgren, Lars (1942–), Swedish vasc surgeon, prof Trondheim 1995– prof and head Lund 1978–2000, prof and head Örebro from 2000–

Normann, Eldar R (1932–), thoracic, Dpt Surg III Ullevål 1979–82, Tønsberg 1982–2003

Nornes, Helge (1930–), neurosurg, RH 1970–81, director and prof Bern Switzerland 1981–83, head and prof RH 1983–1997, chair Norw Soc Neurosurg 1976–1977

Norstein Jarle (1950–), gastro, RH – 1998, Norw Cancer Registry –2005

Nygaard, Knut (1933–2010), gastro, Dpt Surg B RH 1974–80, assoc prof 1977–91, Ullevål 1980–91, head and prof Aker 1991–2003

Nygaard, Leif (1930–), orthop, Fredrikstad 1972

Nygaard, Øystein Petter (1953–), neurosurg, Trondheim, prof 2006–

Nyheim, Thomas (1967–), vasc, Oslo Vasc Centre Aker 2006–

Næs, Bjørn (1932–), orthop, Lillehammer 1975–83, rheumasurg Tromsø 1978–79, head Dpt Orthop Thorsby Sweden 1983–

Næss, Arne Martin (1925–), vascular, Bodø 1973–77, Lovisenberg 77–78, Lillehammer 1978–95, head 1978–89. Founder memb World Assoc Hepto-Pancreatico-Biliary Surg

Næss, Frode (1950–), gastro, Bærum 1992–

Næss, Hans-Petter (1955–), gastro, Sandefjord 1997, head 1999–2002, Tønsberg 2002–, head 2005–2007, chair Younger Doc Ass 1994–5 chair Norw Surg Soc 2002–04

Næss, Pål Aksel (1958–), ped, Ullevål 1999–

O

Odberg, Erik (1929–), orthop, Lærdal 1974–76, private practice Sarpsborg 1976, Arvika / Strömstad Sweden 1977–80, Saudi Arabia 1980–82, Hammerfest 1983–

Odinsson, Adelsteinn (1965–), orthop, Trondheim, chair Norw Soc Hand Surg

Ofstad, Ragnar Egil (1927–), gastro, Lovisenberg 1974–

Ohma, Kåre (1921–), ped surg, UN Gaza 1960, Stavan-
ger 1966–73, head Haugesund 1973–88, medical director
(sjeflege) 1977–88

Olaussen, Tor Olav (1907–97), Tønsberg 1952–77

Olerud, Sven (1923–), orthop, prof Haukeland 1974–76,
prof Uppsala Sweden 1976–90

Olsbø, Frode (1960–) vasc Ahus 1997–, head 2007–

Olsen, Børre (1961–), urol, Skien/Porsgrunn.

Olsen, Ole Christian, (1961–), gastro, Drammen 2000–

Olsen, T E, stoma nurse at Haukeland in the 1950ies

Olstad, Olav Anders (1947–), maxillofacial and vasc, Ul-
levål 1987–, head 1995–99, chair Norw Soc Maxillofacial
Surg 1991–93

Osbakk, Svein Are (1971–), anesthesiol, UNN Tromsø

Osnes-Ringen, Hanne (1972–), orthop, rheumasurg
Diakonhjemmet 2001–

Osnes, Magne (1937–), gastroent, Dpt Med IX Ullevål,
prof 1985–2007

Osnes, Sverre (1914–), int med, Tønsberg

Osther, Palle Jørn, Danish urol, Urol Research Center,
Dpt Urol Fredericia Hospital, Part of Hospital Littlebelt,
Univ South Denmark

Otnes, Brynjulf (1931–2009), urol, Akershus 1973–82,
Bærum 1983–, chair Norw Assoc Urol 1977–79, hon
memb Norw Assoc Urol

Otnes, Johan Wilhelm (1902–86), St Joseph's Hospital
Fredrikstad 1937–72, chair Norw Surg Soc 1962–64, the
King's Medal of Merit in Gold 1972

Ottesen, Tore (1937–), orthop, Askim 1974–76, Dia-
konhjemmet 1980–92, Larvik 1992–, chair Norw Soc
Rheumasurg 1982–86

Ous, Sigurd (1928–2003) urol, DNR 1973–1997

Overn, Sissel (1956–), urol, Arendal 1996–98, Drammen
1998–2007, head urol 2003–07, priv pract Hokksund
2007–

P

Pahle, Jan A (1924–), orthop, head OSF 1968–98,
founder Norw Soc Rheuma Surg 1972, hon memb

ERASS, Nat Med Center Seoul Korea 1959–61

Paulsen, Trond Harder (1954–), br and endocrine,
Haukeland, Aker, head endocrine

Paus, Albert Collett (1946–), orthop, med director
(sjeflege) Aker 1991–92, OSR 1992–, head and director
1993–2000, RH 2000–, chair Norw Assoc Junior Hosp
Doctors 1986–87, chair Norw Soc Rheumasurg 1995–99

Paus, Bernhard (1910–99), orthop, Tønsberg 1963–64,
head and director Martina Hansen's Hosp 1964–80,
Norw Army Hosp Seoul Korea 1951 and 1953, head
Scand Education Hosp Seoul 1958–60, multiple leading
positions in The Norw Armed Forces

Paus, Nicolai Nissen (1877–1956), surg, head and direc-
tor Tønsberg 1918–1947

Pavlovic, Ivan (1970–), plastic surg, Trondheim

Pedersen, Christiern (1480–1554), Danish clerical schol-
ar and publisher, among other publ: “Nøttelig Legebog
faar Fattige och Rige Unge och Gamle” in 1533

Pedersen, Ernst (1935–2003), maxillofacial, head
Trondheim 1984–2003, chair Norw Soc Maxillofac Surg
1981–84.

Pedersen, Gustav (1964–), vasc, Haukeland 2005–, chair
Norw Soc Vasc Surg 2006–08

Pedersen, Paal-Henning (1952–), neurosurg, Dpt Neuro-
surg, Bergen, prof

Perez-Castro, Enrique (1908–80), Spanish urologist,
Hospital Provincial Madrid, head urol, assoc prof Central
University Madrid

Perminow, Gøri (1965–), ped, Oslo

Persen, Leif (1942–), orthop, Trondheim 1988–2009

Pettersen, Jorun Støvne, head nurse Tromsø

Pettersen, Sune Hansborg (1976–), engineer, Dpt Struct
Engin NTNU, Trondheim

Pfeffer, Per (1945–), transplant, Dpt Surg B RH 1987–

Pilegaard, Hans Kristian (1951–), thoracic, Aarhus Uni-
versity Hospital, Denmark

Pillgram-Larsen, Johan (1944–), vasc and cardiothoracic,
Dpt Surg III Ullevål 1987–, head Trauma Centre Ullevål,
head Norw Field Hosp Iraq 1991, ltn colonel 1994

Platou, Eivind (1883–1958), gen surg, private pract Oslo
from 1913–58, RH Outpat Dpt 1925–30, Sophies Minde
1930–, head from 1934–53. Several military commis-
sions. Participated in the Serbian-Turkish war 1913. Serb
St Stava Order. Chair Norw Orthop Assoc 1952–53

Poppe, Erik (1905–), radiol, oncol, Tromsø 1941–47, head Dpt Radiol Dpt Radiol RH 1947–54, head Dpt Oncol DNR 1954–75, prof oncol UiO 1962–75, chair Norw Soc Radiol 1951–54, pres Nordic Soc Med Radiol 1959

Prydz, Hans (1933–2011), prof Tromsø Inst Med Biol 1971–78, prof Univ Oslo Inst Med Research 1980–2003

Q

Quirke, Philip English pathologist, prof pathol, Leeds

R

Raabe, Nils Kristian (1946–), geriatrics and oncol, Dpt Oncol Ullevål 1988–

Rake, Ola (1915–93), maxillofacial, Ullevål 1955–1980, chair Norw Soc Maxillofac Surg 1959–65

Ramm, Fredrik (1855–1932), surg RH 1891–94, Tromsø 1894–98, head Aker 1998–1912

Ramm-Pettersen, Jon Terje (1966–), neurosurg, RH

Ramstad, Knut (1930–), orthop, head orthop surg Bodø 1987–

Raugstad, Tor Steinar (1942–), orthop, Stavanger 1983–, head 1985–89

Ransve, Anne Marie (1959–), maxillofacial, Ullevål 2001–, chair Norw Soc Maxillofac Surg 2001–05

Rasch, Elisabeth, technical assistant, Tromsø

Refsum, Sigvald (1941–), ped, Dpt Surg Östra Sjukhuset Sweden 1984–85, Haukeland 1985, Ullevål 1985–93, RH 1993–2010, chair Norw Assoc Ped Surg 1996–1999, hon memb Norw Surg Assoc

Reiertsen, Ola (1948–), gastro, Akershus 1995–, head 2007–

Reigstad, Astor (1937–), orthop, head KMI 1983–1995, RH 1999–2007, head 1999–2000

Reikerås, Olav (1947–), orthop, prof Tromsø 1985–93, Sophie Minde 1990–2002, head 1996–1999, RH 2002–, prof 1993–

Rein, Kjell Arne (1951–), cardiothoracic, and vasc, Trondheim 1990–93, RH 1993–

Reinlie, Gunn Sissel (1952–), neurosurg, Ullevål, head 2001–

Reitan, Jan, technical assistant, Tromsø

Rennæs, Selmer (1909–82), radiol, DNR 1972, Haukeland 1972–76, assoc prof 1972–76

Resch, Fin (1936–), thoracic and vasc, Haukeland 1980–2001, Dpt thoracic and cardiovasc surg, first head Feiring 1998 (on leave from Haukeland)

Revhaug, Arthur (1950–), gastro, Tromsø, head and prof Dept Surg 1988–

Rindal, Roar (1932–), plastic surg, RH 1963–68, DNR and part time private practice in Oslo 1976–

Ringheim, Frode (1940–), gen surg, chief Rana 1979–88, Longyearbyen 88–93, Rana 1994–

Ringkjøb, Rolf (1918–93), neurosurg, Trondheim 1974–87, chair Norw Soc Neurosurg 1978–79

Risholt, Tormod (1933–99), plastic surg, Skien, chair Norw Assoc Plast Surg 1988–89

Risung, Finn (1933–), orthop and plastic surg, head Longyearbyen 1963–66, head rheumasurg Skien 1976–97, chair Norw Soc Rheumasurg 1978–81

Roaas, Asbjørn (1936–92), orthop, Martina Hansen 1980–92, chair Norw Soc Rheumasurg 1986–91

Roald, Helge Einar (1958–), plastic surg, RH, DNR, priv pract Colosseumklinikken, chair Norw Assoc Plast Surg 2000–01

Roland, Alf Magne (1939–), gastro, Aker 1979–82, and 1987–89, med dir (sjeflege) 1982–87, head Dpt Surg 1989–91, director Somatic Division 1991–94, managing director Lovisenberg 1997–2003, chair Norw Soc Gastroent 1980–83

Rolfsen, Lorentz (1932–), orthop, Ålesund 1974–76, head Bodø 1976–78, Legevakten Oslo 1978–79, Aker 1979–82: Royal Infirmary Dundee Scotland 1983–1984, Tønsberg 1984–86, Åhus 1986–91, 1991, private practise related to prosthetic and orthotic devices 1992–2003

Romner, Bertil (1953–), neurosurg, Lund 1991–, assoc prof 1994, prof 2006, prof Tromsø 1999–

Ronglan, Eldbjørn (1934–) orthop, head Elverum 1975–2001

Rosén, Leif Sverre (1951–), vasc, consultant Aker and chief surgeon Norwegian Defence Forces 1988–99, surg general Joint Medical Services Norw Armed Forces 1999–2009, private practice Lunner from 2009, prof Military Medical Academy, Beograd, Serbia.

Rosenlund, Alf Frimann (1949–), urol and breast and endocrine Tromsø

Rosseland, Arne R (1942–), Ahus 1982–2001, Aker 2001–2003, RH 2003–, chair Norw Surg Soc 1990–91, chair Norw Soc Gastroent 1986–87, hon memb Swedish Soc Endoscopy

Rosseland, Bjarne (1912–2001), surg Fredrikstad, 1963–73, head Volda 1973–74 head Halden 1974–82, hon secy Norw Surg Soc

Rossvoll, Sonja, pediatric surgery nurse RH for 30 years

Rostad, Hans A (1930–), thoracic and vasc, Dpt Surg A RH 1978–2000, chair Norw Surg Soc 1978–80

Rugtveit, Arne (1922–), orthop, KMI 1967–73, head 1973–92, chair Norw Soc Handsurg 1979–82

Rusli, Troy (1945–), plastic surg, Oslo Emergency Centre 1986–87, Dpt Plastic Surg Red Cross Clin Oslo 1987–91, Ullevål 1991–

Russwurm, Harald (1935–), orthop, Lillehammer 1979–80, head Unit Hand-Surg Dpt Orthop Trondheim 1981–

Rustad, Herman (1918–70), surg, Dpt Surg B RH

Ruud, Tom Erik (1944–) gastro, Ullevål 1988–90, Bærum 90–92, Aker 1992–94, Bærum 94–, head 1996–2002

Rydning, Astrid (1951–), gastro, Gjøvik 1993–, Surg Dpt Trondheim

Rygge, Johan (1868–1944), MD and dentist, private practice as dentist in Oslo 1897–, prof dentistry 1919–1938

Rygh, Per (1930–2008), orthodontist, priv practice Stavanger 1958–76, prof Bergen 1976–97

Ræder, Morten G (1939–), gastro, Dpt Surg Ullevål 1982–2009, prof surg pathophysiol IEMR Ullevål 1982–2009

Røise, Olav (1953–), orthop, Ullevål 1991–, head Admission Ward, Surgical Out-pat Clinic and Day Surg 1991–96, head Orthop Centre 2006–07, head Division of Neuroscience and Musculoskeletal Medicine 2007–09, head Clinic of Emergency Medicine Oslo Univ Hosp and prof UiO 2010–

Røkke, Ola (1953–), gastro, Ahus, prof 2003–

Røkkum, Magne (1953–), orthop, KMI 1993–2002, RH 2002–

Rønning, Elisabeth, dentist, oral surg, head maxilloorthop surg, Dpt Plastic Surg RH

Rønningen, Helge (1949–), orthop, Trondheim 1991–, prof 1994–, chair Norw Orthop Assoc 1988–89

Røttingen, Jan Terje (1948–), plastic surg, Dpt Plast Surg Haukeland 1987–. Visiting consultant Tawam Hosp, United Arab Emirates 1989–90

Røsok, Bård Ingvald (1966–), gastro, RH 2007–

Røste, Geir Ketil (1957–), neurosurg, RH 2000–, head 2005–07

Røttingen, Jan Terje (1948–), plast surg, Haukeland 1987–98, Stavanger 1998–, head 2002–03, chair Norw Assoc Plast Surg 2005–07

Røvig, Gunnar (1904–1973), neurosurg, assoc prof 1950–1954

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Saatvedt, Kjell Johan (1957–), Dpt Pediatric Cardiac Surg, RH

Saeed, Usman (1983–), Haugesund

Sahlin, Ylva (1953–), gastro, Trondheim, RH, Lillehammer–2003, head Surg Dept Hamar 2003–

Salvesen, Harald Astrup (1889–1972), int med and endocrinol, chief and prof Dpt Med B RH 1932–59, hon memb Norw Soc Internal Med, Danish Soc Internal Med

Samdal, Frode (1954–), plastic surg, priv practice cosmetic surg Stokkan 1988–, RH 1993–

Samset, Eigil (1973–), engineer Interv Centre

Sand, Tor-Erik (1946–), urol, temp prof pharmacol Faculty Dentistry UiO 1984–88, urol Diakonhjemmet 1996–98, Ahus 1996–2011, head surg division and medical director (sjeflege) 1998–02, chair Norw Assoc Urol 2002–05

Sande, Endre (1948–), vasc surg, Trondheim

Sandaa, Eigil (1908–88) orthop, Martina Hansen 1957–78, chair Norw Orthop Assoc 1964–67

Sandberg, Jørgen (1850–1942), surg, private practice Bergen 1878, head and director Bergen Hosp 1984–1927, part-owner of private clinic in Bergen 1884–1905

Sander, Sten (1932–2005), urol, assoc prof Lørenskog 1970–72, head and prof Aker 1972–2005, medical director (sjeflege) Aker 1988–89, pres Nordic Soc Urol 1985–93

Sanderud, Axel I (1915–), ped and thoracic, RH 1960–66, head Trondheim 1966–81, prof 1975–81, president

Nordic Soc Thoracic Surg 1975

Sandven, Per (1946–), bacteriol, Dpt Bacteriol, Nat Inst of Public Health, Oslo

Sandvig, Finn (1918–97), surg, Bærum 1964–88, chair Norw Surg Soc 1975–76

Sauar, Jostein (1939–), int med, gastroenterol, Skien 1980–

Sauer, Torill (1949–), pathol, Ullevål 1988–2009, prof pathol 2004–

Schancke, Kaare (1906–90), gen surg, Dpt Outpat RH 1965–73. Assoc prof 1955–73. Chair Norw Assoc Junior Hosp Doctors 1950–53, president NMA 1958–61

Schie, Einar G (1902–77), surg, head Fredrikstad 1945–72, also director 1956–72, surgeon during the battle of Narvik World War II, chair Norw Surg Soc 1964–67, hon memb Norw Surg Soc

Schilling, Hjalmar (1867–1946), military surgeon, private practice in Oslo 1896–, RH 1908–11, head surgeon Kristiania Public 1911–17, Dpt III Ullevål 1911–1934

Schistad, Gunnar (1926–), ped, Ullevål 1972–96, head ped surg 1972–96

Schistad, Ole (1956–), ped, Ullevål 1993–, head ped surg 2009–2010

Schiøtz, Hjalmar August (1850–1927), ophthalmol, private practice Oslo 1881–, RH 1981–84, private clinic surg and ophthalmol (with Strøm) 1888–1891, head RH 1899, prof 1901–21, inventor of several ophthalmol instruments

Schjelderup, Halfdan (1911–1991), plastic surg, priv practice Betanien Bergen 1949–66, head Haukeland plast surg 1967–, chair Norw Soc Plast Surg, hon memb 1973, pres Nordic Soc 1974–75, hon fellow Royal Coll Surg England

Schjønby, Henning (1937–), gastroent, Dpt Med Haukeland 1974–78, Dpt Med Aker 1978–prof 1978–

Schjøth-Iversen, Ingjald (1896–1985), surg, head Stensby 1933–66, chair Norw Surg Soc 1951–53

Schlichting, Ellen (1957–), gastro and breast and endocrin, Ullevål 1997–, head breast and endocrine 2007–, founding memb Norw Soc Breast and Endocrine Surg

Scholz, Tim (1957–), transplant, Dpt Surg B RH 1994–

Schrøder, Knut Einar (1941–), ENT, Tromsø 1976–, head 1977–84, director Tromsø Univ Hosp 1984–2008

Schubert, Oscar Swedish professor of surgery, hon memb Norw Surg Soc

Schulstad, Inger (1920–), orthop, Trondheim 1963–76

Schultz, Alexander (1946–), urol, RH 2002–, hon secy Nordic Assoc Urol

Scribner, Belding (1921–2003), head Nephrology Division Univ Washington 1958–91. Invented the Scribner shunt in 1960

Seem, Egil (1948–), cardiothoracic, Dpt Surg A RH 1990–

Segadal Leidulf (1940–), cardiothoracic, Haukeland 1979, head Cardiac Surg 1997–2006, prof Inst Surg Sci 1993

Sejersted, Ole Mathias (1947–), IEMR Ullevål 1975–79 (biochemist), and 1980–82, Inst Muscle Physiol Oslo Univ 1982–86, head 1984–86, Dpt Physiol. National Institute of Occupational Health 1986–91, prof sports medicine Oslo Univ 1989–91, head and prof IEMR Ullevål 1991–

Semb, Bjarne (1939–), cardiothoracic, Dpt Surg A RH 1980–1984, head and prof Karolinska Hosp Stockholm 1984–, first operation with artificial heart 1985

Semb, Carl B (1895–1971), head surg Ullevål 1935–65, prof 1951–65, director Inst for Resp Phys and chair IEMR 1951–66, prof National Univ Korea 1962, visit prof Edinburgh 1964, Iran 1951, actively engaged in resistance during World War II and medical services in The Norw Armed Forces in various capacities, chair Norw Assoc Surg 1940–48,

Semb, Gudmund (1928–), cardiothoracic, Dpt Surg A RH 1970, Ullevål 1970–90, head Feiring Heart Clinic 1990–97–, chair Norw Assoc Cardiothoracic Surg 1981–85

Semb, Gunvor (1946–), orthodontist, head Dental Unit RH 1987–, prof 1995–, senior lecturer Manchester 1995–

Semb, Lars (1933–80), gastro, head Diakonhjemmet sykehus 1973–80, chair Norw Soc Gastroent 1976–78), pres Europ Soc Surg Research 1973–74

Serck-Hanssen, Fin (1894–1972), surg, Haugesund 1932–40, Bærum 1940–64, chair Norw Surg Soc 1948–50

Seternes, Arne (1967–), gastrointest and vasc surg, Sect Vasc Surg Trondheim

Sinding-Larsen, Christian Magnus (1866–1930), surg, Coast Hosp for TBC Stavern 1892–, director RH Oslo 1911–

Singh, Kulbir, (1953–), radiol, Tromsø

Sire, Leif (1901–82), Florø 1945–46, Coast Hosp Tromsø 1946–61, The State's Pulmonary Hospital (Statens ssykehus for lungesykdommer) Tromsø 1962–71

Sivertsen, Åse (1961–), genetic epidemiology, Dpt Public Health and Primary Care, assoc prof Univ Bergen

Sjaastad, Ivar (1960–), prof surg pathol IEMR Ullevål 2009–

Sjøberg, Thomas Kristian (1968–) plastic surg, Dpt Plast Surg Tromsø, chair Norw Assoc Plast Surg 2010–

Skaane, Per (1944–), radiol, Ullevål 1986–93, prof

Skaarland, Elsa (1941–1994), pathol, Haukeland 1974, prof 1988–94

Skaga, Nils Oddvar (1959–), anesthesiology, Ullevål

Skagseth, Erling jr (1935–78), cardiothoracic, Haukeland 1975–78

Skajaa, Kristjar (1890–56), surg and gynecol/obstetrics, DNR 1936–38, Oslo Municipal Womens Hosp (Kommunale Kvinneklinik) 1938–56, chair Norw Soc Neurosurg 1932–34, chair Norw Surg Soc 1934–35

Skalleberg, Leif Christian (1920–), gastrointest, Elverum 1964–91

Skari, Hans (1963–), ped, Dpt Surg B RH 1994–94, 1997–2002, 2004–08, Ullevål 2009–, chair Norw Assoc Ped Surg 2007–

Skarstein, Arne (1935–), gastro, Diakonissehjemmet Bergen 1984–1997, prof 1990–, head 1991–, prof Haukeland 1997–2005, hon memb Norw Soc Gastroent

Skattum, Jorunn (1971–), gastro, Ullevål

Skaugen, Jarl (1931–2006), orthop, Arendal 1972–1998, head Ortop Unit 1972–92

Skeie, Hallvard (1902–93), gen surg, Ålesund 1947–56, Stavanger 1956–72

Skeie, Sverre (1920–), orthop, head Molde 1962–67, Stavanger 1967–72, head 1972–90

Skjelbred, Per (1949–), maxillofacial, Ullevål 1987–, head 1999–, prof 1995–, chair Norw Soc Maxillofac Surg 1987–91

Skjelderup, Michael (1769–1852), prof surgery Copenhagen 1805, head surgery Military and Civilian Hospital in Oslo 1814–, prof medicine 1813–, established a legacy for surgeons

Skjerven, Helle Kristine (1966–), breast and endocrine, Drammen 2006–, head 2008–

Skogesal, Odd-Geir (1956–), orthop, Halden, Kristiansand, Kongsvinger

Skogland, Lars Birger (1937–), orthop, Akershus 1984–86, Martina Hansen 1986–2004

Skoglund, Einar (1946–), cand mag, Norw Medical Assoc 1974–, head Dpt Medical Specialisat 1976, head Sect Educat 2004–2011.

Skoglund, Knut (1939–), orthop, Levanger 1983–85, Lillehammer 1985–

Skolleborg, Knut Chr. (1952–), plastic surg, RH 1995–2000, private practice and founder of Colosseumklinikken Oslo 2000–. Chair Norw Assoc Plast Surg 2004–05

Skovlund, Eva (1959–) statistician PhD, prof, Dpt Clin Research, DNR

Skredderstuen, Arne (1949–), orthop, Diakonissehjemmet 1991–93, Haukeland 1993–

Skulberg, Andreas (1924–), anesthesiol, head Fredrikstad 1960–67, head Ullevål 1967–88, med director Ulevål 1988–90, med-head Oslo Ambulance Services 1990–94, chair Norw Soc Anesthesiol 1963–64

Slungaard, Ulf (1924–2011), orthop, Aker 1969–78, head Dpt Orthop 1978–93

Slørdahl, John (1945–), orthoped, Ålesund 1986–

Smehaug, Johannes (1935–), plastic surg, Fredrikstad 1984–, head 1985–

Smiseth, Otto A (1949–), cardiol, Dpt Med Aker 1991–93, Dpt Med B RH 1993–, prof and head cardiol RH 1995–, head Heart and Lung clinic 2005–, head Div Int med RH 2009

Smith-Petersen, Marius (1886–1953), orthop, Head Orthop Service Massachusetts General Hosp 1929–1946, instructor orthop surg Harvard Medical School Boston 1930–35, clinical prof 1935–46 (Born in Grimstad, Norway)

Sneve, Kathrin (1968–), plastic surg, Trondheim, head 2008–

Solberg, Sigrun (1947–), orthop, Laksevåg Orthop Rehab, Bergen 1988–

Solberg, Steinar (1953–), thoracic and vasc, Tromsø 1991–2001, Dpt Surg A RH 2002–

Solhaug, Jan Helge (1938–2003), gastro, head Thorsby (Sweden) 1976–85, head Elverum 1985–89, head Diakonhjemmet 1989–2003. Chair Norw Soc Gastroent 1990–92

Solheim, Eirik (1960–), orthop, Diakonesshjemmet Bergen, 1998–2003, Bergen Surg Hosp (Teres Medical Group) 2003–, prof UiB 2009–

Solheim, Kaare (1928–2002), gastro, head Skien 1973–75, prof Ahus 1975–86, head and prof Ullevål Hospital 1986–98

- Solheim, Ludvig Fjeld** (1944–), orthop, Ullevål 1989–93, Diakonissehuset Oslo 1993–, head 1997–, chair Norw Orthop Assoc 1994–95
- Sommerschild, Henrich C** (1929–90), ped, Haukeland 1975–86
- Stadaas, Jan Olav** (1934–2011), gastro, Dpt II Ullevål 1978–1990, head Surg Clin 1984–90, assoc prof 1979, prof 1983, med director (sjeflege) 1990–2001, Chair Norw Surg Soc 1977–78
- Stangeland, Lodve** (1941–), thoracic and vasc, Haukeland 1976–, prof cardiothoracic surg 2006–11
- Starzl, Thomas** (1926–), transplant surgeon, Denver and Pittsburgh, USA
- Steen, Harald** (1950–), orthop, Sophies Minde 1980–1995, RH 1996–
- Steen, Johan B** (1934–), zoophysiol, prof Dpt Medic Physiol Tromsø 1971–78, prof Dpt Biology Oslo 1978–
- Steen, Petter Andreas** (1947–), anesthesiol, Ullevål, 1982–89, head and prof 1982–89, Inst Expt Med Res Ullevål 1990– prof emergency medicine Oslo Univ 1990–
- Stenström, Björn MD, PhD** Swedish, Dpt Cancer Res and Mol Med, NTNU Trondheim 2006–, Dpt Gastroent, Sir Charles Gairdner Hospital, Perth, Western Australia
- Stolt-Nielsen, Niels Andreas** (1941–), neurosurg, Trondheim 1979–, head 86–
- Stordahl, Arvid** (1948–), gastro, Dpt Surg Aker 1997–92, head medical services Norw Armed Forces 1992–93, director Norw Res Council 1993–, Dpt Surg Aker
- Stovner, Jacob** (1916–80), anesthesiol, DNR 1958–71, RH 1971– 80, prof 1973–80, chair Norw Soc Anaesthesiol 1956–59
- Strand, Torbjørn** (1947–), orthop, Hagevik 1985–1994, Haukeland 1995, Hagevik 1996–97, Deaconess Hosp Haraldsplass 1998, head orthop 2000–
- Stranden, Einar** (1935–) dr philos, prof clinical circulation physiology, Aker 1979–
- Stray, Kristian** (1900–1978), Haugesund 1946–60, prof and head Dpt Surg B Haukeland 1960–1970
- Stray, Njaal** (1944–), gastroent, Dpt Med Diakonhjemmet, 1986–
- Strøm, Hagbarth** (1854–1912), private clinic Oslo 1887, head Dpt Surg B RH 1897–1912, prof surgery 1896–1912
- Strømsø, Knut** (1946–), orthop, Hønefoss 1986–87, Ullevål 1987–93, Diakonhjemmet 1993–1994, Ullevål 1995–98, Aker 1998–, prof 1998–
- Styri, Ole B** (1917–2000), neurosurg, RH 1966–72, head Dpt Surg Ringerike 1974–87
- Støre, Geir** (1945–), maxillofacial, RH 1990–, prof Tromsø 2007–
- Støren, Eilert Johan** (1922–86), Dpt Surg Bærum 1972–86, chair Specialty Committ Gen Surg 1974–86
- Støren, Gunnar** (1924–04), vasc, Dpt Surg III Ullevål 1969–78, head Oslo Municipal Emergency Centre 1978–91, assoc prof Oslo Univ 1969–78, prof 1978–91
- Støren, Henrik** (1892–1972), orthop, Vardø 1930–31, military commission 1932–34, private practice 1934–44, head Coastal Hosp Stavern 1943–63, founding memb Norw Orthop Assoc, chair 1950–51
- Størkson, Ragnhild** (1961–), gastrointest, Oslo Univ Hosp Aker, private pract Son
- Sudmann, Einar** (1932–), orthop, prof Tromsø 1975–79, Hagavik Coastal Hosp (orthop) and Haukeland 1979–2002, head Hagavik 1979–03, director 1979–90, assoc prof Bergen Univ 1979–93, prof 1993–2002
- Sundal, Bjørn** (1933–), gen surg, Larvik 1973–2000, head 1978–
- Sundell, Børje** Finnish plastic surg, prof Haukeland 1983–94
- Sundhagen, Otto** (1955–) vasc, Aker –2001, head Fredrikstad 2001–05, Aker 2005, head vasc. 2006–
- Sundset, Arve** (1958–), int medicine, RH
- Sundt, Halfdan** (1873–1951), orthop, Coastal Hosp Vadsø 1908, Coast Hosp Stavern 1911–1943
- Sundt, Peter** (1904–89), orthop, Norw Army Hosp Korea 1952, head Dpt Orthop Trondheim 1959–71, founding memb Norw Orthop Assoc
- Svanes, Knut** (1931–), gastro, Haukeland 1980, prof Inst Surg Sci 1985–2001
- Sveen, Ola** (1945–) Dpt of Physics, UiO
- Svendsen, Helge** (1931–), rheumasurg, Sørlandet Revmatismesykehus 1972–81, Kristiansand 1981–
- Svendsen, Lars**, chemist, Inst Expt Med RH
- Svennevig, Jan-Ludvig** (1943–), cardiothoracic, Dpt Surg III Ullevål 1984–89, Dpt Surg A RH 1989–2010, head 1994–2010, prof 1989–2010
- Svenningsen, Svein** (1946–), orthop, Trondheim 1987–89, Arendal 1989–, head Orthop Unit/ Dpt Surg 1992–2002, head Dpt Orthop 2002–
- Sæbøe-Larsen, Jan** (1931– 2003), surg, Tromsø 1968–
- Sæther, Ola Dalsegg** (1946–), vasc surg, Trondheim

1989–, prof 2005–, chair Norw Soc Vasc Surg 1990–95 (1952–), vasc surg, Ullevål, ISR RH (2001), Aker (2005)

Sødal, Gunnar (1931–), transplant, Dpt Surg B RH 1974–98, hon memb Norw Assoc Surg 2011

Søiland, Henrik jr (1936–2004), plastic, Fredrikstad, Stavanger, private practice Stavanger

Søiland, Henrik senior (1906–1963), plastic surg, private practice Stavanger 1947–63 and consultant plastic surg Stavanger Hosp

Søndena, Karl (1948–), gastro, Stavanger 2000–2004, Haraldsplass Bergen 2004–, prof 2005–

Søreide, Jon Arne (1950–), gastro, Stavanger 1987, head surg gastroent 1993, prof Bergen Univ 1999–

Søreide Kjetil (1977–), gastro, Dpt Surg Stavanger, prof Bergen 2010

Søreide, Odd (1944–), gastro, Haukeland 1985–93, head 1991–1993, RH 1993–2000, head 1993–2000, research director Helse Vest, Bergen 2003–2004, medical director Helse Vest 2005–2009, prof Bergen 1990–93, prof Oslo 1993–2000, prof SINTEF 2001–2002, prof Haukeland 2003–2004, prof Center for Health Administration, Oslo 2004–2005

Sørensen, Nils Berner (1774–1857), prof pharmacol, pathol and therapy and clinical med Christiania Municipal Hosp and from 1826 RH 1814–1840, head Dept Med RH 1826–1839

Sørensen, Roger (1945–), orthop, Sophies Minde 1988–2002, RH 2002–

Sørli, Dag G (1942–), thoracic and vasc, Tromsø 1979–86, head 1987–97, assoc prof 1979–83, prof part-time 1983–86, prof full time 1986–

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Taksdal, Sigbjørn (1932–), urol, Tønsberg 1976–93, head 1991–93, head Kiruna, Sweden, 1991–1993 Tønsberg 1993–1995, head Sandefjord 1995–1999

Talseth, Trygve (1946–), urol, Ullevål 1983–86, Dpt Surg A RH 1986–, chair Norw Assoc Urol 1992–95

Tanberg, Andreas (1873–1968), rheumatol, head Sandefjord Bad 1910–38, head Oslo Rheumatol Hosp 1938–47

Tandberg, Olaf (1879–1932), Trondheim 1910–11, Levanger 1911–17, Lillehammer 1917–32, pres Norw Med Assoc 1929–30

Taskèn, Kristin Austlid (1965–), civil engineer PhD, Oslo Urological Univ Clinic, Aker 2007–2010, Dpt Tumor Biol, Oslo Univ Clinic 2010–, prof UiO 2008–

Teigland, Jens C (1929–), plastic surg, Oslo Rheuma Hosp 1986–92, head 1993–, chair Norw Soc Rheumasurg 1981–85

Terjesen, Terje (1942–), orthop, Dpt Orthop Trondheim 1984–95, prof 1989–95, Sophies Minde 1995–96, Dpt Orthop RH 1996–, prof 1999–

Tessier, Paul (1917–2008), French plastic surgeon

Thaulow, Erik (1949–), cardiologist, Dpt Med B RH 1988–

Thomassen, Hans Thorwild (1962–), urol, Kristiansand

Thoresen, Jan Eirik (1952–), gastro, Trondheim 1988–, med director Trondheim 2000, med director 2005, CEO Health Region Mid-Norway 2007–08, director Dept Health 2008–2009, project director Ullevål 2009, director Health Reg South-East 2010–

Thoresen, Steinar Østerbø (1951–), pathol, Norw Cancer Register

Thorkelsen, Håkon (1925–), maxillofacial, ENT, Tønsberg 1976–92, chair Norw Soc Maxillofacial Surg 1972–75.

Thorsby, Erik (1938–), immunology, head Tissue Typing Lab RH 1970–2005, prof 1983.

Thorsen, Glen (1943–), gastro, Harstad 1978–, also medical director (sjeflege) 1992–

Thorvaldson, Jørgen (1941–), vasc, Arendal 1990–96, Ullevål 1996–2007, Aker 2007–08

Thrap Meyer, Herman (1901–1977), orthop, Hagevik 1946–53, Legevakten Oslo 1954–55, RTV 1955–61, National Medical Centre, Seoul, Korea 1961–62, Oslo Orthop Inst, private practice Oslo 1939–46 and 1954–77, chair Norw Orthop Assoc 1960–61

Thulstrup, Magnus Andreas (1769–1844), chief military surgeon 1801–1814, chief surgeon RH 1826–36, prof surg obstet 1814, personal doctor to king Carl Johan and king Oscar 1, hon member Surg Academ Copenhagen 1812, Swedish Med Assoc 1816

Tidemann, Carl Fredrik M (1932–), surg, Bærum 1975–82, Chief Surgeon The Norw Armed Forces 1975–1984, Surgeon General Norw Armed Forces 1984–92, several international medical commands: Biafra 1969–70, 1970, Jordan 1970, Bangladesh 1971/72, Nigeria 1972, Lebanon 1976

Tindlund, Rolf (1943–), orthodontist, Haukeland

Tjellstrøm, A (1937–), Swedish ENT surgeon, Sahlgrenska Gothenburg

Tjomsland, Ole (1962–), cardiothoracic, dir Aleris–2007, med dir Bærum 2007–09/ Vestre Viken 2009–

Tjønneland, Steinar (1922–), cardiothoracic (ped), Dpt Surg A RH 1970–91

Torkildsen, Arne (1899–1968), neurosurg and neurology, RH 1940–50, prof Cairo 1950–54, hon memb Nordic Soc Neurosurg, Soc British Neurol Surg and many more

Torup, Sophus Carl Fredrik (1861–1937), prof physiol 1889–1931

Traaholt, Lars Martin (1937–), plastic surg, Tawam Hosp United Arab Emirates 1982–83 and 1987–89, Red Cross Clinic Oslo 1983–87, RH 1989–

Tranø, Gerd (1960–), gastrointest, Dpt Public Health and Gen pract NTNU Trondheim, Dpt Surg Levanger

Trebo, Sigurd (1932–2006), maxillofacial and ENT, RH 1982–1999, chair Norw Soc Maxillofac Surg 1967–68

Trippestad, Arne (1928–), vasc, Haukeland 1974–98, as-soc prof 1974–85, head and prof vasc surg 1985–98

Trondsen, Erik (1947–), gastro, Ahus 1984–88, Ullevål 1989–

Trope, Clas (1943–), gyn/obst, head and prof gyn oncol Lund Sweden 1981–86, head Dpt Gyn/Obst DNR 1986–2006, head Research and Devt gyn oncol UiO 2006, prof 1990–

Trovik, Clement (1955–), orthop, Haukeland 1995–, head Musculo-Skeletal Tumour Center 2003–

Trumpy, Jens Hugo (1929–2008), neurosurg and neurology, Dpt Neurosurg Ullevål 1977–85, head Dpt Neurosurg Tromsø 1985, prof 1994–98

Trønnes, Sigurd (1944–), gastrointest, Ski 1985–86, Akershus 1987– head Sect Gastrointest Surg 1989

Tveten, Stein (1961–), MD and dentist maxillofacial, private practice in Oslo 1999, Oberstdorf, Germany 2003, Bad Honnef 2006

Tveter, Kjell (1936–), urol, Trondheim 1977–81, Dpt Surg A RH 1981–83, Ullevål 1983–, prof 1985–2006

Tysvæ, Alf (1937–2001), neurosurg, Stavanger 1982–85, head Tromsø 1985–86, head Stavanger 1987–

Tønnesen, Tor Inge (1956–), anesthesiol, Dpt Anesthesiol RH 1995, prof 1997

Tønnessen, Theis (1962–) cardiothoracic, Dpt Surg Ullevål, head 2005–2009, prof 2005–

Tønseth, Kim Alexander (1974–), plastic surg, RH, head Oslo Univ Hosp 2009–

Tøtterman, Anna (1961–) orthoped, Ullevål

U

Uggen, Per Einar (1956–), gastro, Trondheim 1995–

Ugland, Ole Martinus (1924–2005), plastic surg, private practice 1968–77, Ahus 1973–74, Red Cross Clinic Oslo 1977–91, head plastic surg Ullevål 1991–94, chair Norw Soc Plast Surg 1992–94

Ugland, Terje Osmund (1941–), orthop, Kristiansand

Ulland, Gunnar (1902–92), orthop, Sandnes Hosp 1943–1972, multiple international engagements for Norw Red Cross

Ulvik, Nils Magnus (1941–), urol, Haukeland 1985–

Unhjem, Olav (1945–), cand real PhD, Inst Surg Res RH

Unsgård, Geirmund (1948–), neurosurg, Trondheim 1986, prof 1989–, chair Norw Soc Neurosurg 1992–1993–. Knight, First Class, The Royal Norwegian Order of St. Olav 2009

Uppheim, Gisle (1944–), orthop, Tromsø 1980–81, KMI 1983–84, Menighetssøsterhjemmet 1984–1993, Lovisenberg 1993–

Usland, Olav (1886–1954), surg, private practice Trondheim 1921–54

Ustvedt, Hans Jacob (1903–82), Dpt Med IX Ullevål 1959–62, head and prof int med Oslo Univ 1951–62, head Norw Broadcasting 1962–72

Uv, Knut Magne (1961–), gyn, Drammen

V

Vaage, Ingvar Jarle (1944–), cardiothoracic, and vasc, Tromsø 1985–92, prof 1989–92, thoracic surg Karolinska (Sweden) 1992– assoc prof 1993–. Ullevål 2003–, prof Oslo Univ 2003–

Vaage, Sigmund (1933–2003), ped and urology, Stavanger 1990, head urology 1990–2003

Varhaug, Jan Erik (1942–), breast and endocrine, Haukeland 1973, head breast and endocrine 1984–2005, prof 1991–

Vasli, Lars (1954–), surg, director Oslo Private Hospital

1992–2002, Lovisenberg 2002–, chair Norw Surg Soc 2004–05

Vasli, Sverre (1919–2004), thoracic and vasc, Dpt Surg III Ullevål 1962–66, Aker 1967–89, head and assoc prof 1965, prof 1970–89, chair Norw Surg Soc 1973–74, hon memb Norw Surg Soc, Nordic Surg Soc

Vassal, Jean Jaques (1935–), orthop, Trondheim 1980–1998, now Oslo

Vatne, Karleif (1941–), radiology, RH 1978–2009

Vatne, Vendil (1956–), urol, Diakonissehjemmet Bergen 1991–92, Haukeland 1992–

Veholmen, Øyvind (1941–), plastic surg, Stavanger 1979–

Vengen, Øystein (1953–), cardiothoracic, Ullevål 1995–, head Dpt Cardiothoracic Surg 2002–09

Veel, Terje (1953–), anesthesiol, Ullevål 1992–99, Feiring 1999–2004 og 2005–, RH 2004.

Vestad, Einar (1926–2004), orthop, Namsos 1973–81, head Drammen 1981–93

Vestby, Gunnar (1912–82), radiol, Ullevål, assoc prof 1968

Viddal, Karl Olav (1942–), ped, Ullevål 1984–, head ped surg 1996–2007, chair Norw Assoc Ped Surg 1992–95

Villanger, Olaus (1959–), gastro, Dpt Surg B RH 2002–, chair Norw Surg Assoc 1910–

Vindenes, Halvard (1946–), plastic and maxillofacial and oral surg, plastic surg Haukeland 1990–, head Dpt Plastic Surgery 1993–2000, head Cleft Lip and Palate Team from 2000, head Burn Centre 2002–2005

Viste, Asgaut (1947–), gastro, Haukeland 1986–87, head 1989–90 and 1993–97, prof 1997– chair NFGK 1996–2001

Vogt, Aud (1916–), nurse, Central Lab Ullevål 1946–, daily administrator Inst Expt Med Ullevål 1951–85

Vonen, Barthold (1953–), gastro, Tromsø 1995–, prof 2000–, projectleader Safe Surgery Health Region West 2008–, med director Bodø 2010–

Voss, Ragnar (1945–), maxillofacial, ENT, Drammen 1986–87, Fredrikstad 1991–2006, chair Norw Soc Maxillofacial Surg 1985–87

Våge, Villy (1961–), gastro, Førde 2000–

W

Waage Svein (1940–), orthop, KMI 1985–2002, Dpt Ortop RH 2002–

Waage, Anne (1960–), gastro, Ullevål 2006–

Wahba, Alexander (1962–), cardiothoracic, prof Trondheim 2005–

Wahl, Astrid Klopstad (1963–), dr polit UIB 1999, prof Inst of Health and Society, Fac Medicine, UIO 2006–

Wahlqvist, Rolf (1951–), urol, Ullevål 1987–2000, Aker 2000–, chair Norw Assoc Urol 1998–99

Walløe, Anders (1944–), orthop, Haukeland 1985–96, head 1992–96, Ullevål 1996–, chair Norw Orthoped Assoc

Walløe, Lars (1938–), assoc prof Inst Informatics Univ Oslo 1977–77, prof cybernetics 1988, prof physiol 1988–, director Inst Informatics 1977–80, multiple internat engagements and awards

Wang-Norderud, Rolf (1913–2000), maxillofacial, head Ullevål 1948–82, chair Nordic Dental Soc 1951–52, pres Norw Assoc Dentistry 1959–65, hon memb Norw and Amer Assoc Dentistry

Warloe, Trond (1948–), gastro, DNR, Oslo Univ Hosp

Wesche, Jarlis (1954–), vasc, Åhus, chair Norw Soc Vasc Surg 2004–06

Wessel, Nicolai (1961–), urol, Aker 2000–

Wester, Knut Gustav (1940–), neurosurg, Haukeland 1986–, head 1990, prof 1989–, chair Norw Soc Neurosurg 1994–95

Westerborn, Anders Swedish professor of surgery, Uppsala/ Örebro Sweden, hon memb Norw Surg Soc

Wexels, Jan Cyril (1953–), gastro, Ålesund, Bærum 1999–

Wibe, Arne (1954–), gastro, Levanger 1991–93, Trondheim 1993–, prof 2007–

Widecrantz, Steven Consultant, Urology, Laparoscopy and robotic surgery at Herlev Hospital Copenhagen Area, Denmark. Resident Drammen in 1993

Widerøe, Sofus (1880–1937), surg, head Oslo Municipal Hosp and later Dpt III Ullevål, 1917–1937, private practice Oslo 1918–

Wiedswang, Gro (1958–), gastro, Ullevål, 2005–

Wieslander, Jan Bertil (1943–), Swedish plastic surgeon, head plastic surg Tromsø 1995–

Wiig, Johan (1942–), gastro, Trondheim 1984–87, Bærum 1987–90, DNR 1990–

Wille, Sven Øivind (1945–), engineer, prof Dpt for Engineer Educat (IU), Faculty Engineer, Oslo Univ College (Høyskolen i Oslo)

Williksen, John Håkon (1952–), orthop, Oslo Univ Hosp

Wilson, Richard E (1929–89), transplant surgeon Peter Bent Brigham Hosp Boston, prof Harvard Med School Boston, Mass, USA, head Division Cancer Surg 1975–89

Wirsching, Jan (1953–), radiol, Haukeland 1991–

Wisbech, Christian Wilhelm (1740–1822), City Surgeon in Bergen from 1772, carried out operations, also ophthalmic

Wisborg, Torben (1956–), anesthesiol, Hammerfest 1990–93, head Dpt Anesthesiol 1993–

Witso, Eivind (1951–), orthop, Dpt Orthop Trondheim 1990–, chair Norw Ortop Assoc 2004–2005

Wold, Terje (1958–), urol, Kristiansand

Woldbæk, Per Reidar (1961–), cardiothoracic, Ullevål 1998–

Wulff, Helge (1903–86) Swedish professor of surgery, Malmö, Sweden 1947, hon memb Norw Surg Soc

Wyller, Thomas (1917–2008), orthop, Sophies Minde 1964–71, head Center for Prosthetics Sophies Minde 1972–1984

Wæhre, Håkon (1937–), urol, Moss 1982–83, Drammen 1983–86, Ullevål 1986–88, DNR 1988–, head urol 1997–2007

Wøien, Arne (1931–2006), civil engineer, inventor of various electromagnetic instruments for cardiac studies, one of the founders of Vingmed Horten, producers of med electromagn equipm, established Ole Storsteins price for cardiology, hon memb Norw Soc Cardiol

Y

Ystgaard, Brynjulf (1951–), gastrointest, Trondheim 1991–, participated in several internat aid activities such as: war surgery with Red Cross in Afghanistan, Rwanda and Sudan, disaster relief with Red Cross in India, Indonesia and Haiti, Surgical teaching unit Masanga, Sierra Leone
Ystgaard, Brynjulf (1951–), gastrointest, Trondheim 1991–, participated in several internat aid activities such as: war surgery with Red Cross in Afghanistan, Rwanda and Sudan, disaster relief with Red Cross in India, Indonesia and Haiti, Surgical teaching unit Masanga, Sierra Leone

Ytrebø, Lars Marius (1967–), Tromsø

Ytterstad, Børge (1943–), urol, Harstad 1977–87, head 88–

Z

Ziegler, Christoph (1964–), maxillofacial, head Trondheim 2005–, prof NTNU, chair Norw Soc Maxillofacial Surg 2010–

Zwetnow, Nicolaus (1929–), neurosurg, Gothenburg 1972–73, prof Karolinska Sweden 1973–80, prof RH 1980–1981, prof exp neurosurg Inst Expt Med Res RH 1981–

Ø

Ødegaard, Svein (1945–), gastroent, Haukeland 1986–

Øgreid, Per (1943–) urol, Stavanger 1986–93, Ullevål 1993–

Ølstørn, Håvard (1974–), Inst Expt Med Res RH, Dpt Neurosurg RH

Øresland, Tom (1948–), gastro, Sahlgrenska, Sweden 1991–2007, Ahus 2007, prof Oslo 2007–

Østgård, Ole Jørn, technical ass, Tromsø

Øvrebø, Kjell Kåre (1958–), gastro, Haukeland 2001–, prof gastro 2008–

Øvrum, Eivind (1946–), cardiothoracic, and vasc, Dpt Surg A RH 1985–90, head Oslo Cardiac Centre 1989–

Øwre, Axel Andreas (1898–1969), surg, Dpt V, Ullevål 1937–64

Øyen, Ole (1957–), transplant. Dpt. Surg B, RH 1994–

Å

Åby, Jon Hallvard (1928–91), orthop, Levanger 1965–91

Åbyholm, Frank (1939–), plastic surg and dentistry, RH 1980–85, head and prof Haukeland 1985–90, head and prof RH 1990–2009

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62. Chairmen and Boards of The Norwegian Surgical Society/Association

Jon Haffner

Most of the Society's archives up to 1963 have been lost. The information presented below is partly based "Jubileumsskrift for Norsk kirurgisk forening ved 75-årsjubileet", but the years in office have been edited according to two years in office. Annual reports with detailed information are available from 1964, minutes from the Board meetings from 1976. In addition information has been obtained from Norges Leger, and the Year Books of the Norwegian Medical Association (courtesy Einar Skoglund). In a few instances the information in the different sources are contradictory.

The Constitution/ By-laws

The Norwegian Surgical Society was founded on the first of August 1911. It functioned without any written regulations until the first Constitution was agreed upon in 1918. Since then the Constitution and the By-laws have been changed several times, in 1924, -27, -39, -46, -53, -64, -84, -97, 2004 and 2006.

The Court of Arms

The court of arms of the Norwegian Surgical Society consists of a map of Norway, crossed by a surgical scalpel, with the name of the society in Norwegian (Norsk Kirurgisk Forening) and the year the Society was founded (1911) encircling the symbol. It was designed by Jon Haffner based on an idea from Liv Slungaard, daughter of the first treasurer, Ulf Slungaard.

Membership

In 1924 membership was opened to surgeons in training, at first after a minimum of two years of training. This provision was removed in 1984.

As Fig 62-2 shows, the number of members has increased from 35 when the Society was founded, to 1247 in 2011.



Fig 62-1. The court of arms of the Norwegian Surgical Society/Association

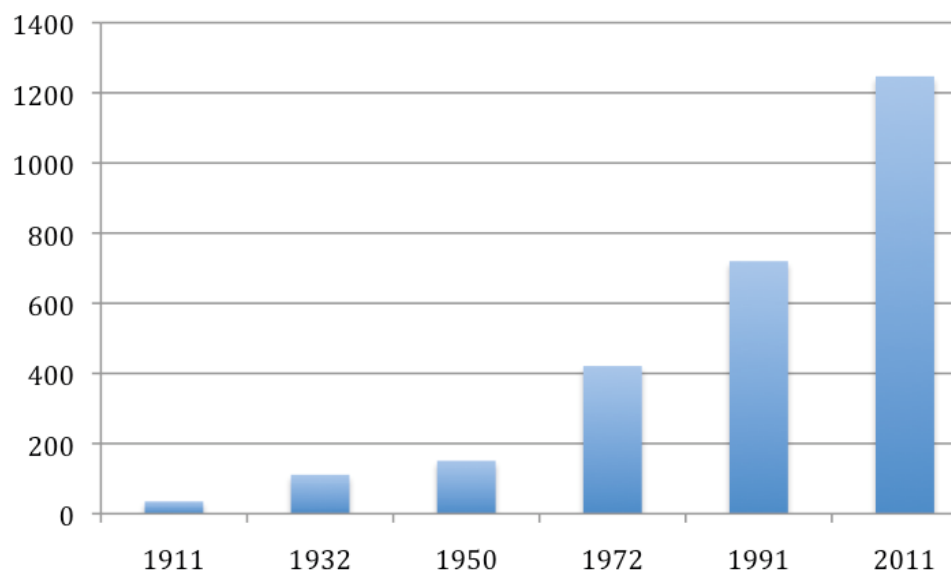


Fig 62-2. Membership in the Norwegian Surgical Society/Association

The Board

The Board consisted initially of three members. In 1924 it was changed to four: Chairman, Vice Chairman and two board members. In addition three substitutes and two auditors were elected. The maximum term of office was two years with one possible re-election, i. e. a total of 4 years. Two members of the Board were changed every year. An exception was made because of World War II, Carl Semb was chairman from 1942 to 1946.

In 1964 it was decided that the Society should work in two sections, one for surgery/ organization, one for scientific matters. The Board was expanded to 7, plus 3 substitutes, and divided into the organizational section: chairman or vice chairman, secretary for organisational matters, and one board member, and the scientific section: chairman or vice chairman, secretary for scientific matters, editor and one board member. The term of office was two years, with a possibility for one re-election with the exception of the secretary for organization who might be re-elected several times. In addition two auditors were elected for two years at a time, as previously. The chairman in 1987, Tom Gerner, was re-elected for only one year in 1987, to adjust the change of Board to the corresponding change in the Norwegian Medical Association.

In 1997 the structure of the Society was changed from a society to an association, and only the chairman and two other members of the Board were elected by the General Assembly, the remainder were appointed by the surgical societies they represented. In 2004 it was decided that the other surgical societies should be represented by their leaders (chairpersons).

Initially the chairmen and boards took office immediately after the election at the Annual General Meeting, but from 1987 the term of office and financial year were changed to correspond to the terms of office in the Norwegian Medical Association. They now follow the calendar i. e. from January 1. to December 31. The chairman in 1987, Tom Gerner, and the board, were elected for only one year.

After the two first chairmen the maximum term of office was limited to two period of two years, i. e. a total of 4 years. An exception was made because of World War II, Carl Semb was chairman from 1941 to 1948.

The Chairmen

Table 62-1. The Chairmen of the Norwegian Surgical Society/Association

1911–24	Otto Johan Borchgrevink
1925–30	Einar Axel Christensen
1931–32	Olaf Tandberg
1933–34	Kristjar Skajaa
1935–36	Knud Nicolaysen
1937–41	Alexander Brekke
1942–46	Carl Boye Semb
1947–48	Fin Serck-Hanssen
1949–50	Hans Fredrik Harbitz
1951–52	Ingjald Schjøth-Iversen
1953–54	Erling Hjort
1955–56	Arne Arnesen
1957–58	Herman Døhlen
1959–62	Christian Bruusgaard
1963–64	Johan Wilhelm Otnes
1965–66	Einar Schie
1967–68	Kaare Liavaag
1969–70	Rolf Lied
1971–72	Hans K Dahl
1973–74	Sverre Vasli
1975–76	Finn Sandvig
1977–78	Jan Stadaas
1979–80	Hans Rostad
1981–82	Jens Aamold
1983–86	Jon Haffner
1987–89	Tom Gerner
1990–91	Arne Rosseland
1992–93	Hans Olav Beisland
1994–97	Torgeir Løvig
1998–2001	Knut Kvernebo
2002–03	Hans-Petter Næss
2004–05	Lars Vasli
2006–09	Tom Glomsaker
2010–13	Olaug Villanger

See below for pictures and bibliographic information about the chairmen.

The Secretaries

Up to 1952 a combined secretary and treasurer was elected among the ordinary members. He received a small remuneration, but was not a member of the Board.

Table 62-2. Secretaries of the Norwegian Surgical Society/ Association 1911–51

1911–18	Hans Ludvig Carl Huitfeldt
1918–22	Ragnvald Ingebrigtsen
1922–25	Halfdan Lund
1925–28	Kristjar Skajaa
1928–32	Georg Lützow-Holm
1932–35	Axel Øwre
1935–38	Nils Henrik Brodersen
1938–39	Arne Arnesen
1939–45	Herman Døhlen
1945–48	Christian Bruusgaard
1948–49	Ivar Alvik
1949–50	Søren Kalsnes
1950–51	Ivar Alvik

In 1952 it was decided that the chairman should engage and pay for secretarial assistance whenever needed.

In 1965 the function as secretary was delegated to two of the board members, one for organisation; organisational matters, contact with the Norwegian Medical Association and alike, and one for scientific/ surgical aspects including the programme and proceedings of the scientific part of the Annual Meeting.

Table 62-3. Honorary Secretaries of the Norwegian Surgical Society/ Association

Year	Secretary for Organisation	Secretary for Scientific Programme
1965–66	Rolf Lied	Nils Helsingen
1967–68	Hans K Dahl	Nils Helsingen
1969–70	Bjarne Rosseland	Sverre Vasli
1971–72	Bjarne Rosseland	Jan Stadaas
1973–74	Bjarne Rosseland	Jan Stadaas
1975–76	Jens Aamold	Hans Rostad
1977–78	Jens Aamold	Hans Rostad
1979–80	Jens Aamold	Jon Haffner
1981–82	Sigbjørn Taksdal	Jon Haffner
1983–84	Arne Rosseland	Tom Gerner
1985–86	Arne R Rosseland	Tom Gerner
1987–88	Sigurd Trønnes	Bjarne Grøgaard/ Hans Olav Beisland
1989–90	Torgeir Løvig	Hans Olav Beisland
1991–92	Arild Aamodt	Viktor Berge
1993–94	Arild Aamodt	Viktor Berge
1996–97	Viktor Borge	Henrik Hofgaard
1998–99	Lars Vasli	Henrik Hofgaard
2000–01	Lars Vasli	Kirsten Krogh-Sørensen
2002–03	Lars Vasli	

After the reorganisation of NMA in 2006, secretarial assistance to the Board has been provided by NMA; Ragni Skille Berger 2006–2007, Ida Waal Rømuld 2008–2009, Tatjana Razumova 2009–2011, Ole-Anders Stensen 2012–. The Society has paid salary for a 20% engagement.

The Treasurers

As stated above, combined secretary/ treasurer were elected from 1911 to 1952.

The chairman handled the finances from 1952 to 1984 when Ulf Slungaard was appointed treasurer. The treasurers since then have been:

Table 62-3. The treasurers of the Norwegian Surgical Society/Association

1984–86	Ulf Slungaard
1987–88	Fin Resch
1989–98	Lars Vasli

From 1998 onwards, the financial affairs of the Society, including the Annual Meeting and the simultaneous Surgical Exhibition, have been managed by a professional company run by Lars Vasli. The Society's assets have increased greatly under Lars Vasli's leadership.

The Auditors

The economic transactions of the Society have been registered since the start, and they have been audited annually. Combined with the available annual reports this gives us the names of the auditors:

Table 62-4. Auditors

1926–27	Eivind Platou, Niels Aars Nicolaysen
1928–45	Per Giertsen, Einar Fr Lindboe
1946–49	Eivind Platou, Einar Fr Lindboe
1950–54	Ragnar Andersen, Christian Bruusgaard
1955–66	Andreas Høyer, Ragnar Andersen
1967–68	Andreas Høyer, Sverre Vasli
1969–73	Andreas Høyer, Arne Haukebø,
1974–76	Arne Haukebø, ?? Signature undecipherable
1977–78	Georg Brabrandt, Bjarne Rosseland
1979–89	Georg Brabrandt, Leif Skalleberg
1990–95	Arnt Jakobsen, Hans K Dahl
1996–2007	Arnt Jakobsen, Rolf Kåresen
2008–	Kjelstrup og Wiggen AS

The Archives

Erling Larsen, head of the offices (kontorsjef) in the Norwegian Medical Association (NMA) reorganized all documents from the time of the foundation, and kept the Society's archives up to 1965. NMA has changed office buildings twice since then, and regrettably some of the archived material has been lost.

Presentations of the Chairmen

Term of office



Fig 62-3. Otto Johan Borchgrevink.

1911–1924

Otto Johan Borchgrevink (1856–1928), MD Oslo 1880, PhD Oslo 1901.

Pre-surgical experience: Private practice Kristiansund 1880–94.

Surgical training: RH 1894–1908. Visits to Berlin, Stockholm, Paris.

Surgeon at: Diakonhjemmet 1896– Competed for professor of surgery at Oslo University 1909 and 1912.

Organisations: Chair Kristiania (Oslo) Surgical Society 1909. Founding member and first chairman of Norwegian Surgical Society 1911–24 Regular attendant at annual Nordic and German surgical meetings.

Honours: Knight of 1. Class of St. Olav 1928.

Publications (Norges leger): Klinische und experimentelle Beiträge zur Lehre von der Bauchfelltuberkulose (PhD). Brok og brokbehandling. Kristiania 1907. 252 pp

Die ambulatorische Extensionsbehandlung der oberen Extremität. Jena 1908, 166 pp, and more than 30 other publications.

Boards:

1911–22: Otto Johan Borchgrevink, Axel Cappelen, Ole Ulferts Brumbas Lied.

1922–24: Otto Johan Borchgrevink, Ole Ulferts Brumbas Lied, Olaf Tandberg.



Fig 62-4. Axel Christensen. Courtesy Else Carlsen.

1925–30

Einar Axel Christensen (1879–1943), MD Oslo 1904. Specialist in surgery 1917.

Pre-surgical experience: Private practice Time, Jæren 1906–1910.

Surgical training: Kristiania Maternity Clinic (Oslo), Stavanger, Dpt Surg A RH, Oslo Military Hosp. Visits to Germany, Switzerland and France.

Surgeon at: Aker 1914–43, also director 1914–43.

Organisations: Chair Norwegian Surgical Society 1925–30, chair Oslo Surgical Society 1936–37, commisar Norwegian Medical Association 1941–43. Regular participant in annual Nordic and German surgical meetings.

Publications (Norges leger): More than 30.

Boards:

1925–26: Einar Axel Christensen, Olaf Tandberg, Niels Aars Nicolaysen, Eivind Stoud Platou

1927–28: Einar Axel Christensen, Eivind Stoud Platou, Niels Aars Nicolaysen, Carl Ludvig Manthey.

1929–30: Einar Axel Christensen, Eivind Stoud Platou, Niels Aars Nicolaysen / Kristjar Skajaa, Knud Nicolaysen

Maximum term of office: two periods of two years.



Fig 62-4. Olaf Tandberg

1931–32

Olaf Tandberg (1879–1932), MD Oslo 1904.

Pre-surgical experience: Military doctor

Surgical training: Stavanger, RH, Switzerland (3 months 1906), Levanger, Germany (3 months 1909).

Surgeon at: Trondheim 1910–11, Levanger 1911–17, Lillehammer 1917–32.

Organisations: President Norwegian Medical Association 1929–30, chair Norwegian Surgical Society 1931–32.

Publications (Norges leger): 12.

Boards:

1931: Olaf Tandberg, Eivind Stoud Platou, Kristjar Skajaa, Knud Nicolaysen.

1932: Olaf Tandberg, Kristjar Skajaa, Johan Martin Holst, Knud Nicolaysen.



Fig 62-5. Kristjar Skajaa

1933–34

Kristjar Skajaa (1890–56), MD Oslo 1916. PhD Oslo 1922). Specialist in gynecology and obstetrics 1927.

Surgical training: Flekkefjord, Ullevål, Oslo Maternity Hospital (Kvindeklínikken), RH, Aker.

Surgeon at: DNR 1936–38, head Oslo Municipal Womens Hospital (Kommunale Kvinneklíník) 1938–56. Teacher in Gyn/obst at Oslo University 1931–34.

Organisations: Chair Norwegian Surgical Society 1933–34.

Publications (Norges leger): Om influenza og influenza-pneumoni (PhD), and 20 others.

Board:

1933–34: Kristjaar Skajaa, Johan Martin Holst, Alexander Brekke, Georg Lützow Holm.



Fig 62-6. Knud Nicolaysen

1935–36

Knud Dahl Nicolaysen (1891–1973), MD Oslo 1915, PhD Oslo 1922). Specialist in Surgery.

Surgical training: RH (gyn obst and surg), visits to Austria, Germany, France, England, USA.

Surgeon at: Haugesund 1927–32, head Drammen 1933–60.

Organisations: Chair Oslo Surgical Society, chair Norwegian Hospital Board, chair Norwegian Surgical Society 1935–36.

Honours: Knight 1. Class of St Olav, Finnish Freedom Cross with Sword, Red Cross Mark of Honour.

Publications (Norges leger): Pathologisch-Anatomische und Experimentelle Studien über die Pathogenese des Chronischen Magensgeswürs (PhD). Some papers on pathological, anatomical and surgical subjects.

Boards:

1935: Knud Nicolaysen, Johan Martin Holst, Alexander Brekke, Georg Lützow Holm.

1936: Knud Nicolaysen, Georg Lützow Holm, Otto Christian Borchgrevink, Alexander Brekke.



Fig 62-7. Alexander Brekke. Photo Sponland, Courtesy Fylkes-FOTOarkivet i Møre og Romsdal)

1937–41

Alexander Brekke (1885–1960), MD Oslo 1910. PhD 1917. Specialist in surgery 1918.

Surgical training: Bergen, Stavanger. Visits to Copenhagen, Stockholm, Germany.

Surgeon at: Head Ålesund 1918–29, head Stavanger 1929–, and also director 1932–.

Organisations: chair Norwegian Surgical Society 1937–41.

Publications (Norges leger): About typhus vaccination and serological methods for evaluation of its effect). 1918 (PhD). Approx 40 other publications.

Boards:

1937–38: Alexander Brekke, Georg Lützow Holm, Otto Christian Borchgrevink, Carl Boye Semb.

1938–40: Alexander Brekke, Otto Christian Borchgrevink, Carl Boye Semb, Fin Serck-Hanssen.

1940–41: Alexander Brekke, Carl Boye Semb, Fin Serck-Hanssen, Jon Hald.

(According to Year Book, Norw Med Ass 1941)



Fig 62-8. Carl Semb

1942–46

Carl Boye Semb (1895–1971), MD Oslo 1920. PhD Oslo . Specialist in Surgery 1931.

Surgical training: RH and Ullevål. Study tours to USA, Denmark, Germany, Sweden, England, France 1931–36

Surgeon at: Dpt III (Surgery) Ullevål 1935–65. Professor of surgery Oslo University 1951–65, initiator and director Institute for Respiratory Physiology and Institute of Experimental Surgery, Oslo. Professor of surgery National University of Korea 1962, visiting professor Edinburgh 1964, Iran 1951. Actively engaged in the Norwegian resistance during World War II, and in various capacities within the medical services in The Norwegian Armed Forces.

Organisations: Chair Norwegian Surgical Society 1942–46, chair Surgical Society Oslo 1953–54, president Nordic Surgical Society 1955–56. Numerous other international engagements.

Honours: Honorary member American College of Surgeons, Royal College of Surgeons England, Royal College of Surgeons Edinburgh, Czech Society of Surgeons, Swedish Surgical Society, Amer Association for Thoracic Surg, Thoracic Surgeons of Great Britain and Ireland, Finnish Medical Association, Association of Surgeons in Great Britain and Ireland, Norwegian Surgical Society, Nordic Surgical Society, Gothenburg Medical Society, Norwegian Society Tuberculosis and Lung Diseases, Korean Association of Surgery.

Danish Surgical Society silver medal 1958, Peer Dubb Medal 1960, Malthe Medal 1966, Knight 1. Class of St Olav. UN Korea War Medal, Red Cross Mark of Honour, and many more!

Publications (Norges leger): Pathological-anatomical and clinical investigations of the fibroadenomatosis cystica mammae and its relation to other pathological conditions in the mammae, especially cancer (PhD). Thoracoplasty with extrafacial apicolysis 1935. Long series of publications on surgical treatment on pulmonary tuberculosis, renal surgery, trauma surgery and orthopedics, acute abdominal conditions, spinal anesthesia and more. Several chapters in surgical textbooks.

Boards:

1942–46: Carl Boye Semb, Fin Serck-Hanssen, Jon Hald, Ragnvald Georg Bakke.

(According to “Norges leger”, Semb was chairman from 1940–48, and Serck-Hansen 1947–48)



Fig 62-9. Fin Serck-Hanssen

1947–48

Fin Serck-Hanssen (1894–1972), MD Oslo 1918. Specialist in surgery 1932.

Surgical training: Haukeland, RH, Aker. Visits to London, Heidelberg, Leipzig, Berlin, Newcastle.

Surgeon at: Haugesund 1932–40, Bærum 1940–64.

Organisations: Chair Surgical Society Oslo 1947–48, chair Norwegian Surgical Society 1948.

Publications (Norges leger): Additions to our knowledge about spore-producing anaerobe micro-organisms Bergen 1937. Several publications on surgery, toxicology and wound infections.

Board:

1947–48: Fin Serck-Hanssen, Ingjald Schjøth-Iversen, Herman Døhlen, Hans Fredrik Harbitz.

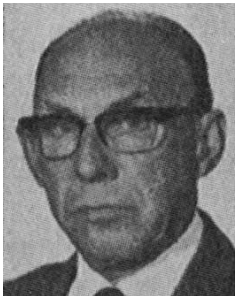


Fig 62-10. Hans Fredrik Harbitz

1949–50

Hans Fredrik Harbitz (1900–1971) MD Oslo 1924, PhD Oslo 1934. Specialist in surgery 1931.

Surgical training: Drammen, Bærum, Ullevål, RH. Visits to Germany, France, Austria, Hungary, USA and Denmark.

Surgeon at: Head Molde 1938–47, head Aker 1947–70. Professor of surgery Oslo University 1950–70.

Organisations: Chair National Board for Hospital Planning (Statens sykehusråd) 1948–60, chair Norwegian Surgical Society 49–50, president Nordic Surgical Society 1963–65.

Honours: Honorary member Nordic Surgical Society 1969.

Publications (Norges leger and PubMed 2012): Clinical Pathogenetic and Experimental Investigations of Endometriosis (PhD), chapters on neck and breast Surgery in Nordic textbook on Surgery 1955, 1962, 1965, “Planning of General Hospitals 1959”, and a multitude of publications, mainly surgical and pathological-anatomical issues.

Board:

1949–50: Hans Fredrik Harbitz, Ingjald Schjøth-Iversen, Herman Døhlen, Erling Hjort.



Fig 62-11. Ingjald Schjøth-Iversen, Courtesy Line Schjøth-Iversen

1951–52

Ingjald Schjøth-Iversen (1896–1985) MD Oslo 1922, Specialist in Surgery 1929.

Surgical training: Molde, Ullevål, visits to Berlin, Stockholm, Copenhagen, Berlin, Israel.

Surgeon at: head Stensby 1933–66.

Organisations: Chair Norwegian Surgical Society 1951–52

Honours: The Medal of Merit 1956.

Publications (Norges leger): A series of surgical papers, especially on breast cancer.

Boards:

1951–52: Ingjald Schjøth-Iversen, Erling Hjort, Arne Arnesen, Herman Døhlen.

Substitutes: Atle Berg.



Fig 62-12. Erling Hjort.
Courtesy Institute for
Surgical Research, RH

1953–54

Erling Hjort (1898–2001), MD Oslo 1923, PhD Oslo 1980. Specialist in general Surgery 1932, urology 1952.

Surgical training: RH, Levanger, Ullevål, Trondheim,

Surgeon at: Høyanger 1934–38, Ålesund 1938–41, Vor Frues Hospital 1942–43, Swedish Red Cross Hospital 1943–45, Akershus 1945–1968. Medical director (sjeflege) Akershus 1969.

Organisations: chair Norwegian Society Surgical 1953–54.

Honours: Honorary member Norwegian Society Surgical 1982, and Nordic Urological Society. Knight 1. Class of St Olav, Red Cross Medal of Honour, American Order of Merit, UN Medical Korean order.

Publications (Norges leger): An Experimental study on Hematogenous Pylonephritis in the Rat and its possible bearing on Human Pathology (PhD). Approx 50. (PubMed 20 publications after 1950).

Board: 1953–54: Erling Hjort, Arne Arnesen, Christian Bruusgaard, Atle Berg.



Fig 62-13. Arne Arnesen

1955–56

Arne Arnesen (1888–1972), MD Oslo 1925. Specialist in Surgery 1933.

Surgical training: Kristiansund, Namdal, RH Oslo Municipal Emergency Centre. Visits to USA, England and Scotland.

Surgeon at: Sør-Odal 1940–46, Trondheim 1946–66.

Organisations: Chair Norwegian Surgical Society 1955–56.

Honours: Honorary member Norwegian Surgical Society 1955–56.

Publications (Norges leger): Approx 20, mainly on fracture treatment and urology.

Boards:

1955: Arne Arnesen, Christian Bruusgaard, Atle Berg, Magnus Dahle. Substitutes: Søren Kalsnes, C Fr Jenssen, J Wilhelm Otnes.

1956: Arne Arnesen, Christian Bruusgaard, Johan Wilhelm Otnes, Søren Kalsnes. Substitutes: Carl Fr Jenssen, H Skeie, Magnor Foss Hauge.



Fig 62-14. Herman
Døhlen

1957–58

Herman Døhlen (1902–91), MD Oslo 1928 Surg,

Surgical training: Stavanger, Ullevål, Ålesund,

Surgeon at: Kristiansund 1944–72.

Organisations: Chair Norwegian Surgical Society 1957–58.

Publications (Norges leger): Approx 15, mainly on therapeutic surgery.

Board:

1957–58: Herman Døhlen, Johan Wilhelm Otnes, Carl Fredrik Jensen, Søren Kalsnes. Substitutes: Magnor Foss Hauge, Einar Schie, Bjarne Fretheim.



Fig 62-15. Christian Bruusgaard

1959–62

Christian Bruusgaard (1902–82), MD Oslo 1927, PhD Oslo 1946. Specialist in Surgery.

Surgical training: RH, Drammen, Aker, Ullevål.

Surgeon at: Ullevål 1948–54, head and professor Dpt Surg B RH 1954–59, head and professor Dpt II (Surg) Ullevål 1959–72.

Organisations: Chair Oslo Surgical Society, chair Norwegian Gastroent Society, chair Norwegian Surgical Society 1959–62.

Publications (Norges leger): The operative treatment of gastric and duodenal ulcer (PhD), many other, mainly on gastrointestinal subjects. (PubMed 20 publications after 1950).

Boards:

1959–60: Christian Bruusgaard, Johan Wilhelm Otnes, Søren Kalsnes, Magnor Foss Hauge.

1960–61: Christian Bruusgaard, Johan Wilhelm Otnes, Magnor Foss Hauge, Einar Schie.

1961–62: Christian Bruusgaard, Magnor Foss Hauge, Einar Schie, Rolf Lied.



Fig 62-16. Wilhelm Otnes. Courtesy Grete Eckhardt

1963–64

Johan Wilhelm Otnes (1902–86),

Surgical training: Arendal, RH, Ullevål. Visits to Sweden and England.

Surgeon at: St Joseph's Hospital Fredrikstad 1937–72.

After retirement: Tynset 9 months, Arendal 3 months, Stensby 3 months. Private practice Fredrikstad. Company doctor DeNoFa 1976.

Organisations: Chair Norwegian Surgical Society 1962–64.

Honours: The King's Medal of Merit in Gold 1972.

Publications (Norges leger): Several publ on surgical subjects. (one in PubMed)

Boards:

1963–64: Johan Wilhelm Otnes, Magnor Foss Hauge, Einar Schie, Rolf Lied.

Substitutes: Kaare Liavaag, Bjarne Fretheim, Arnt Jakobsen. Auditors: Andreas Høyer, Ragnar Andersen.



Fig 62-17. Einar Schie. Courtesy Kari Gudmundson Schie Kilde

1965–66

Einar Schie (1902–77), MD Oslo 1923. Specialist in general Surgery 1939.

Surgical training: Ullevål, RH, Bodø, Drammen, Haukeland.

Surgeon at: Fredrikstad 1945–72, also hospital director 1956–72, Surgeon during the battle of Narvik World War II.

Organisations: Chair Norwegian Surgical Society 1965–66.

Publications: None registered in Norges leger, one in PubMed

Boards:

1965–66: Einar Schie, Kaare Liavaag vc, Nils Helsingen secy sc, Gunnar Eskeland redactor, Rolf Lied secy org, Bjarne Fretheim, Hans K Dahl. Substitutes: Arnt Jakobsen, Finn Sandvig, Eilert Støren. Auditors: Ragnar Andersen, Andreas Høyer.



Fig 62-18. Kaare Liavaag.
Courtesy Sverre and
Inger Liavaag

1967–68

Kaare Liavaag (1908–81), MD Oslo 1934, Specialist in general surgery 1946, thoracic Surgery 1950.

Pre-surgical experience: One year doctor at the Whaling Station on South Georgia.

Surgical training: Drammen, Tønsberg, Univ Minnesota USA, Surg Dpt A RH.

Surgeon at: Head Drammen 1952–78, except 1955–57 when he was consultant and associate professor at Surg Dpt A RH. Also hospital director (adm overlege) Drammen 1968–78,

Organisations: chair Norwegian Surgical Society 1967–68.

Publications (PubMed 2012): 32.

Board:

1967–68: Kaare Liavaag, Rolf Lied, Hans K Dahl, Bjarne Fretheim, Arnt Jakobsen Sr, Nils Helsing, Eilert Støren.

Substitutes: Finn Sandvig, Bjarne Rosseland, Cato Hellum. Auditors: Andreas Høyer, Sverre Vasli

1969–70

Rolf Lied (1918–86), MD Oslo 1947. Specialist in general surgery 1965, gastrointestinal surgery 1980.

Surgical training: Porsgrunn Lutherske Hospital, Drammen, Ullevål, visits to Holland, England, USA.

Surgeon at: Ullevål 1959–62, also temporary associate professor of surgery Oslo University, head Dpt Surg Kongsvinger 1962–68, Gjøvik 1968–83, also hospital director (adm overlege) Kongsvinger 1962–68, Gjøvik 1968–72.

Organisations: Chair Norwegian Surgical Society 1969–70.

Publications (Norges leger): Approx 20. (PubMed 2012, 9 publications after 1950).

Board:

1969–70: Rolf Lied, Hans K Dahl, Bjarne Rosseland, Sverre Vasli, Eilert Støren, Finn Sandvig, Brynjulf Otnes.

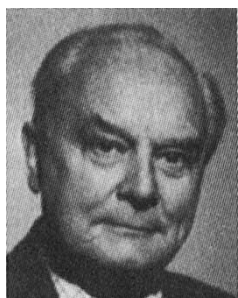


Fig 62-19. Rolf Lied

1971–72

Hans Karsten Dahl (1919–2003), Chemistry and Biochemistry Oslo 1942, MD Oslo 1948. Specialist in general surgery 1958, orthopedic surg 1972.

Surgical training: Mo i Rana, Martina Hansen's Hospital, Kristiansund, Halden, Ullevål. Visits to Sweden, Denmark, Germany, Switzerland, France and England.

Surgeon at: Dpt III (Surg) Ullevål 1964–81. Medical director (sjeflege) Ullevål 1982–89.

Organisations: Chair Norwegian Surgical Society 1971–72.

Honours: Honorary member Norwegian Surgical Society 1986, His Majesty's Gold Medal for Research 1965.

Publications (Norges leger): The stability of the hip joint. A clinical and functional study of normal and diseased hip joints treated with vitallium-cup-arthroplasty Oslo 1965, and approx 60 other publications. (PubMed 2012, 14 publications after 1950).

Board:

1971–72: Hans K Dahl, Sverre Vasli, Bjarne Rosseland, Jan Stadaas, Finn Sandvig, Kjell Gjertsen, Brynjulf Otnes.



Fig 62-20. Hans K Dahl



Fig 62-21. Sverre Vasli

1973–74

Sverre Vasli (1919–2004), MD Oslo 1947, PhD Oslo 1963. Specialist in general surgery 1954, thoracic surgery 1967, vascular surgery 1986.

Surgical training: Drammen, Stensby, Ålesund, Ullevål, Coll Virginia USA.

Surgeon at: Dpt III (Surg) Ullevål 1962–66, Aker 1967–89, head and associate professor Oslo University 1965, professor 1970–89.

Organisations: Chair Norwegian Senior Hospital Doctor Association (Overlegeforeningen) 1973–77, chair Norwegian Surgical Society 1973–74.

Honours: Honorary member Norwegian Surgical Society, Scandinavian (Nordic) Surgical Society.

Publications (Norges leger): Postischaemic polarography in human calf muscle. A study of the circulation in normal and arteriosclerotic legs, and approx 100 other publications. (PubMed 2012, 42 publications after 1950)

Board:

1973–74: Sverre Vasli, Finn Sandvig, Bjarne Rosseland, Jan O Stadaas, Kjell Gjertsen, Hans Rostad, Georg Brabrand.

Substitutes: Leif Skalleberg, Jens Aamold, Olav Bøe. Auditors: Steffen Birkeland, Arne Haukebø

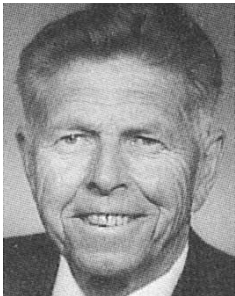


Fig 62-22. Finn Sandvig

1975–76

Finn Sandvig (1918–97), MD Oslo 1947. Specialist in general Surgery 1966.

Surgical training: Kristiansund, Ålesund, Haukeland, Aker, Aker..

Surgeon at: Consultant Bærum 1964–88,

Organisations: Chair Norwegian Surgical Society 1975–76.

Publications (Norges leger): A couple.

Board: 1975–76: Finn Sandvig, Jan O Stadaas, Bjarne Rosseland, Hans Rostad, Georg Brabrand, Leif Skalleberg, Jens Aamold

Substitutes: Audun Flatmark, Dagfinn Albrechtsen, Jon Haffner.

Fig 62-23. Jan Stadaas.
Courtesy Turid Stadaas**1977–78**

Jan Olav Stadaas (1934–2011), MD Oslo 1959. PhD Oslo 1975. Specialist in general and gastrointestinal surgery.

Surgical training: Kirkenes, Kongsvinger, Kronprinsesse Märthas Institutt (KMI), RH, Ullevål.

Surgeon at: Dpt II (Surg) Ullevål 1976–1990, head Surgical Clinic Ullevål 1984–90. Associate professor 1979–83, professor of surgery, Oslo University 1983–. Medical director (sjeflege) Ullevål 1990–2001.

Organisations: Chair Norwegian Surgical Society 1977–78.

Honours: The Kings Medal of Merit in Gold 2004,

Publications: Intragastric pressure/volume relationship. A clinical and experimental study (PhD), and 108 other publications (PubMed 2012).

Board:

1977–78: Jan O Stadaas, Hans Rostad, Jens Aamold, Leif Skalleberg, Bjørn Sundal, Jon Haffner, Dagfinn Albrechtsen.

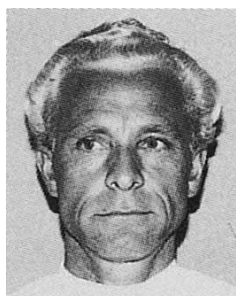


Fig 62-24. Hans Rostad

1979–80

Hans Rostad (1930–), MD Oslo 1955. PhD Oslo 1974. Specialist in general surgery 1964, thoracic surgery 1964, vascular surgery 1988.

Surgical training: Orkdal, Fredrikstad, Aker, RH.

Surgeon at: Dpt Surg A RH 1978–2000.

Organisations: Chair Norwegian Surgical Society 1979–80.

Publications: Central and peripheral nervous control of colonic mobility in the cat (PhD). Monography: Mitral valve replacement. A randomized study comparing the Bjørk-Shiley and Lillehei-Kaster disc valves 1981, and 101 other publications (PubMed 2012).

Board:

1979–80: Hans Rostad, Jens Aamold, Jon Haffner, Bjørn Sundal, Erik Korvald, Arve Mo, Dag Sørli



Fig 62-25. Jens Aamold

1981–82

Jens Aamold (1932–), MD Oslo 1958. ECFMG 1964. Specialist in general Surgery 1968, orthopedic Surg 1985.

Surgical training: Moss, Ullevål, DNR, RH, Aker, St Luke's Hospital Nigeria. Visit USA.

Surgeon at: Moss 1973–87, Sophies Minde 1983–85, head Moss 1987–90, head Dpt Orthop Fredrikstad 1990–98, privat practice Sports Clinic Fredrikstad 1998–2005.

Organisations: Chair Norwegian Surgical Society 1981–82, chair Specialty Committee General Surgery 1991–97.

Publications: 6 (PubMed 2012)

Board:

1981–82: Jens Aamold, Jon Haffner, Sigbjørn Taksdal, Erik Korvald, Arve Mo, Dag Sørli, Arne R Rosseland. Substitutes: Ulf Slungård, Tom Gerner, Jens Hognestad.

1983–86

Jon (Johan F W) Haffner (1940–), MBChB Glasgow 1964. ECFMG 1964. PhD Oslo 1973. MHA Oslo 1992. Specialist in general surgery 1977, gastrointestinal surgery 1981.

Surgical training: Ullevål and RH.

Surgeon at: Ullevål 1984–94, head Dpt Surg Drammen 1994–97, also head Surgical Clinic 1997–2004. Medical director (sjeflege) Drammen 2004–07. Temporary head of Surgical Departments Sandnessjøen 1976, DNR 1986 and Mo i Rana 1988. Medical director Health Region South 2005. Professor of Propedeutic Medicine, Faculty of Dentistry Oslo University 2004–07.

Organisations: Founding member Scandinavian Association for Gastrointestinal Motility (SAGIM) 1987, and European Forum of Medical Associations (EFMA) in Europe and WHO 1989. Chair Norwegian Surgical Society 1983–86, president Norwegian Medical Association 1988–91, secretary general Scandinavian (Nordic) Surgical Society 1992–98.

Honours: Honorary member Norwegian Surgical Society 1995.

Publications: The Excitatory Adrenergic Response in Gastric Smooth Muscle (PhD), Gastrointestinal Surgery (Textbook for nurses Gyldendal 1985), Specialist Services in Internal Medicine and Surgery (Norw Board of Health 1996 and 1997), National Medical Assoc in Europe (WHO Europe, founder and editor 1992–96) and approx 80 other publications (PubMed 2012).

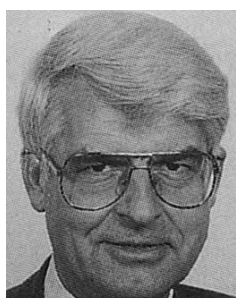


Fig 62-26. Jon Haffner

Boards:

1983–84: Jon Haffner, Sigbjørn Taksdal, Tom Gerner, Ulf Slungård, Arne R Rosseland, Jens Hognestad, Arne Næss

1985–86: Jon Haffner, Tom Gerner, Arne R Rosseland, Ulf Slungård, Jens Hognestad, Arne Næss, Sigurd Trønnes. Substitutes: Pål Benum, Einar Hem, Fin Resch

Change of office bearers adjusted to correspond with the changes in the Norwegian Medical Association.

1987–89

Tom Gerner (1945–), MD Oslo 1969. PhD Oslo 1979. Specialist in general surgery 1978, gastrointestinal surgery 1983, breast and endocrine surgery 2010.

Surgical training: Haukeland, Lillehammer and Ullevål.

Surgeon at: Ullevål 1987–90, head Surgical Department Lillehammer 1990–2004. Chair cooperative organisation plans for Surgical departments in Oppland and later Sykehuset Innlandet. Head research Sykehuset Innlandet 2004–06. Consultant and head Surgical Department Bærum 2006–08. Head research Surgical Clinic, Vestre Viken from 2008.

Organisations: Chair Norwegian Surgical Society 1987–89, chair of the Society's Annual General Meetings 1992–2007, chair Specialty Committee General Surgery 1991–97.

Honours: Honorary member Norwegian Surgical Society 2009.

Publications: The Effect of Cholecystokin-pancreozymin on gastric motor activity in vitro (PhD), and 55 other publications (PubMed 2012).

Boards:

1987–88: Tom Gerner, Arne R Rosseland, Sigurd Trønnes, Fin Resch, Pål Benum, Ragnhild Emblem, Bjarne Grøgaard. Substitutes: Hans Olav Beisland, Torgeir Løvig, Helge Lilleby

1989: Tom Gerner, Arne R Rosseland, Sigurd Trønnes, Hans Olav Beisland, Fin Resch, Pål Benum, Ragnhild Emblem. Substitutes: Torgeir Løvig, Tore Grønmark, Lars Vasli

1990–91

Arne Retvedt Rosseland (1942–), MD Münster 1966. PhD Oslo 1989. Specialist in general surgery 1982, gastrointestinal surgery 1982.

Surgical training: Skien, Akershus.

Surgeon at: Akershus 1982–2001, Aker 2001–2003, RH 2003–. Professor of gastrointestinal surgery Oslo University (Aker) 2001–03.

Organisations: Founding member Scandinavian Association for Diagnostic Endoscopy 1976. Chair Norwegian Society for Gastroenterology 1986–87, chair Norwegian Surgical Society 1990–91, chair Norwegian Thoraco-Laparoscopic Forum 1993–2011.

Honours: Honorary member Norwegian Surgical Society and Swedish Society for Endoscopy.

Publications: Endoscopic papillotomy. A clinical and experimental study (PhD), and 112 other publications (PubMed 2012).

Board:

1990–91: Arne R Rosseland, Hans Olav Beisland, Torgeir Løvig, Lars R Vasli, Tore Grønmark, Sigrun Solberg, Egil Johnson. Substitutes: Arthur Revhaug, Endre Sande, Trine Sand Kaastad.



Fig 62-27. Tom Gerner

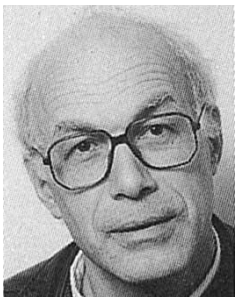


Fig 62-28. Arne Retvedt Rosseland

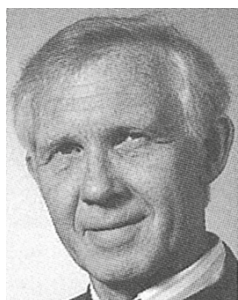


Fig 62-29. Hans Olav Beisland

1992–93

Hans Olav Beisland (1942–), MD Basel 1968, MHA Oslo 1991, PhD Oslo 1987 Specialist in general surgery and urology.

Surgical training: Arendal, Mandal, Lillehammer.

Surgeon at: Aker 1987–92, and 1997–98, head Dpt Surg Akershus 1992–97, Arendal 1999–2012.

Organisations: Chair Norwegian Surgical Society 1992–93.

Publications: Neodymium-YAG laser in the treatment of urinary bladder carcinoma and localized prostatic carcinoma (PhD), and 56 other publications (PubMed 2012).

Board:

1992–93: Hans Olav Beisland, Torgeir Løvig, Lars Vasli, Arild Aamodt, Sigrun Solberg, Tore Grønmark, Arne Bakka. Substitutes: Asgaut Viste, Berit Kvalsund, Viktor Berge



Fig 62-30. Torgeir Løvig

1994–97

Torgeir Løvig (1946–). MD Oslo 1971. Specialist in general surgery 1982, gastrointestinal surgery 1984.

Surgical training: Fredrikstad, Bodø, Moss, Ullevål.

Surgeon at: Moss 1986–98 (head 1990–98), Aker 1998–2002. Senior advisor Directorate of Health 2002–2010.

Organisations: Founding member Norwegian Society for Digestive Surgery, chair Norwegian Surgical Society 1994–97, chair Specialty Committee for General Surgery 1998–2010.

Honours: Honorary member Norwegian Surgical Society 2002.

Publications: 19 (PubMed 2012)

Boards:

1994–95: Torgeir Løvig, Asgaut Viste, Lars Vasli, Arild Aamodt, Ragnhild Størkson, Arne Bakka, Tor Steinar Raugstad, Viktor Berge. Substitutes: Lars Vasli, Knut Kvernebo, Truls Erik Bjerklund Johansen

1996–97: Torgeir Løvig, Odd Søreide, Lars Vasli, Viktor Berge, Henrik Hofgaard, Truls Erik Bjerklund Johansen, Britt Hveem, Knut Kvernebo, Tor Steinar Raugstad, Astrid Rydning.



Fig 62-31. Knut Kvernebo

1998–2001

Knut Kvernebo (1949–), MD Oslo 1975. PhD Oslo 1988. Specialist in general surgery 1984, vascular Surgery 1988, thoracic surgery 1993.

Surgical training: Lillehammer, Drammen, Aker, RH, University Hospital of Wales (Cardiff).

Surgeon at: Aker 1987–90, Ullevål 1994–. Professor of cardio-thoracic surgery Oslo University 1994–.

Organisations: Chair Norwegian Surgical Society 1998–2001.

Honours: HM the Norwegian King's Gold Medal 1990). Fellow of the Royal College of Surgeons of England (ad eundem = by invitation) 2004.

Publications: Laser Doppler flowmetry in evaluation of lower limb atherosclerosis (PhD), Erythromelalgia – A condition caused by microvascular arterio-venous shunting, and 89 other publications (PubMed 2012).

Boards:

1998–99: Knut Kvernebo, Odd Søreide, Henrik Hofgaard, Bjørn Nordby, Brit Hveem, Asgaut Viste, Kirsten Krogh-Sørensen, Jon Berg-Johnsen, Kjell Johan Saatvedt, Rolf Wahlquist. Secy/finances: Lars Vasli.

2000–01: Knut Kvernebo, Truls Erik Bjerkklund Johansen, Kirsten Krogh-Sørensen, Frode Ringheim, Marit Helene Hansen, Asgaut Viste, Odd Grenager, HE Roald/Kjell Aass, Kari Indrekvam, Sigurd Birkeland, Trygve Bull-Njaa.

Secy/finances: Lars Vasli. Editor “Kirurgen” Kirsten Krogh-Sørensen

2002–03

Hans-Petter Næss, (1955–), sociology Bergen 1975, MD Trondheim 1981, MHA Oslo 2004. Specialist in general surgery 1991, gastrointestinal surgery 1997.

Surgical training: Tønsberg, Arendal, RH.

Surgeon at: Sandefjord 1997– (head 1999–2002), Tønsberg 2002– (head 2005–2007).

Organisations: Chair Junior Doctors Association 1994–5, chair Norwegian Surgical Society 2002–03

Boards:

2002–03: Hans Petter Næss, Kirsten Krogh-Sørensen, Gerd Tranø, Knut Magne Augestad, Arne Bakka, Odd Grenager, Borger Loe, Eivind Witsø, Rune Haaverstad, Tor Erik Sand.

Secy/finances: Lars Vasli. Editor “Kirurgen” 2000–2002: Kirsten Krogh-Sørensen, from 2002–05: Lars Vasli



Fig 62-32. Hans-Petter Næss

2004–05

Lars Vasli (1954–). MD Dublin 1979. MPH Harvard School of Public Health Boston 1990–91. Specialist in general surgery 1990.

Surgical training: Akershus, Diakonissehuset Lovisenberg, Aker.

Surgeon at: CEO Oslo Private Hospital 1992–1995, CEO Red Cross Hospital/ Omnia Hospital 1995–2002, Director of Surgery Lovisenberg Diakonale Sykehus from 2002.

Organisations: Chair Norwegian Surgical Society 2004–05. Treasurer Norwegian Surgical Society 1990 – 2011.

Honours: Honorary member Norwegian Surgical Society 2011.

Publications: 10 (PubMed 2012).



Fig 62-33. Lars Vasli

Board:

2004–05: Lars Vasli, Tom Glomsaker, Anne Karin Lindahl, Torunn Nestvold, Erik Carlsen, Otto Sundhagen, Knut Skolleborg, Ole Edvard Gabrielsen, Rune Haaverstad, Tor-Erik Sand.

Secy/finances: Lars Vasli. Editor “Kirurgen”: Lars R Vasli.



Fig 62-34. Tom
Glomsaker

2006–09

Tom Glomsaker (1960–). MD Lübeck 1985, MHA (Oslo) 1995. Specialist in general surgery 1994–95, gastrointestinal surgery 1999.

Surgical training: Torsby and Uppsala Sweden, Akershus,

Surgeon at: *Kongsvinger* 1993–95, *head Torsby, Sweden* 2000–2001, *head Gjøvik* 2001–2003, head Surgical Clinic Stavanger 2003–2004, head Section for Gastrointestinal Surgery Stavanger 2004–.

Organisations: Chair Norwegian gastroenterological association 2004–2005, chair Norwegian Surgical Society 2006–2009. Secretary General, Section of Surgery UEMS 2012–, president Nordic Surgical Society 2012.

Publications: 24 (PubMed 2012).

Boards:

2006–07: Tom Glomsaker, Jon-Helge Angelsen, Bård Røsok, Hans Skari, Ellen Schlichting, Morten Tandberg-Eriksen, Torunn Sætre, Hebe Desiré Kvernmo, Jan Terje Røttingen, Rune Haaverstad, Rolf Høgetveit Hagen. Secy/finances: Lars Vasli.

Editor “Kirurgen”: Bård Røsok.

2008–09: Tom Glomsaker, Bård Røsok, Jon-Helge Angelsen, Hans Skari, Rolf Kaaresen, Morten Tandberg-Eriksen, Alfred Arvesen, Tømm Müller Brostrup, Hebe Désirée Kvernmo, Bjørn M Hokland, Rune Haaverstad, Rolf Høgetveit Hagen. Secy/finances: Lars Vasli.

Editor “Kirurgen”: Bård Røsok, MIK editor: Olaug Villanger. Internet editor www.kirurgen.no 2007–10: Jon-Helge Angelsen.



Fig 62-35. Olaug
Villanger. Foto: Mark
Cabot

2010–13

Olaug Villanger (1959–). Psychology Bergen 1978, MD Bergen 1987. PhD Oslo 1995. Masterstudies in leadership NHH 2004. Specialist in general surgery 1999 and gastrointestinal surgery 2002.

Surgical training: Kristiansand, Ullevål, Bærum, Rikshospitalet.

Surgeon at: Bærum 2000–01, Rikshospitalet 2001–, head Section Specialist Education, Dpt Gastrointestinal Surg, Oslo Univ Hosp 2011–.

Organisations: Chair Norwegian Surgical Association 2010–13. Secretary General Scandinavian (Nordic) Surgical Society 2012–.

Publications: “Secretion from liver and pancreas under normal conditions and during hyperbilirubinemia (PhD), and 13 other publications (PubMed 2012).

Boards:

2010–2011: Olaug Villanger, Torill Morken, Tonje Berglund, Christian Beisland, Ketil Holen, Rune Haaverstad, Anne Irene Hagen, Kari Erichsen, Rolv-Ole Lindsetmo, Tømm Brostrup Müller, Thomas Sjøberg, Hans Skari.

Secy/finances: Lars Vasli.

Editor “Kirurgen”: Hans Skari. Internet editor: Bård Røsok, Minimally Invasive Surgery (MIK) editor: Olaug Villanger.

2012–2013: Olaug Villanger, Arne Seternes, Brynjulf Ystgaard, Christian Beisland, Hans Skari, Iver Arne Langmoen, Knut A Fjeldsgaard, Rune Haaverstad, Thomas Sjøberg, Toril Anneli Kiuru Morken, Turid Aas, Usman Saeed.

Secy/finances: Lars Vasli.

Editor “Kirurgen”: Hans Skari. Internet editor: Bård Røsok, MIK editor: Anders Debes.

References

1. Aamold J: What do the board minutes of the Norwegian Surgical Society tell us? (in Norwegian: Hva forteller styreprotokollene i Norsk kirurgisk forening?) In: Jubileumsskrift for Norsk kirurgisk forening ved 75-års jubileet. Eds: Dahl HK, Aamold J, Soleim K, Støren EJ. Norwegian Surgical Society Oslo 1986. ISBN 82-991471-0-7. Pp 87-105.
2. "Norsk Kirurgisk forening journal; notes on correspondance from 1925 to 1951.
Quote: "1950, 22/11. Letter from J Borchgrevink sent to new chairman Schjøth-Iversen"
3. Schjøth-Iversen, Ingjald. In: Larsen Ø. Ed: Norges Leger; IV, Norwegian Medical Association Oslo 1996.
ISBN 82-90921-44-6 and 82-90921-46-2. Page 683
4. Norwegian Surgical Society/ Association. Annual Reports 1984-2011.

Acknowledgements

The author and editors would like to thank Hans Rostad, Jens Aamold, Arne Rosseland, Torgeir Løvig, Knut Kvernebo, Hans-Petter Næss and Tom Glomsaker for comments to the manuscript.



NORWEGIAN SURGICAL SOCIETY

Surgery in Norway

A Comprehensive Review at the 100-year Jubilee of
The Norwegian Surgical Society
1911–2011

Additions and Corrections 2012

Corrections made in the original manuscript according to suggestions and comments from the members of the Norwegian Surgical Societies, who received a printed "working" version in 2011, and one additional chapter on Chairmen and Boards of The Norwegian Surgical Society/ Association

The final document is presented on Internet as surgery-in-norway.no

The Norwegian Surgical Association – Oslo 2012-07-31
Editors: Jon Haffner, Tom Gerner And Arnt Jakobsen

Preface

The Jubilee book "Surgery in Norway" was sent to all the 2 250 members of the Surgical Societies and Associations in Norway at the 100 year Jubilee in 2011. The members were asked to send comments and corrections to the editors.

In addition all authors were requested to read proof again, and the editors did the same.

As a result nearly 2 000 corrections have been made in the manuscript.

Most of these were minor; spelling mistakes, punctuation and alike, they are not specified here.

The list of names mentioned in the text, which is presented at the end of the book was incomplete. The missing names have been added. The list contained several names which had been included in early versions of the manuscript, but not in the final document. These names have now been deleted.

Regrettably there were also some major mistakes and omissions, and also in some chapters a need for updating information. In addition a few illustrations, photos and figures needed to be altered.

The resulting changes are presented below, chapter by chapter.

The Board of Norwegian Surgical Association also wanted an extra chapter, presenting all the chairmen and boards of the Society/ Association.

This is presented in the initial pages of this document. It will be included in the Internet version of the book.

**The completed and corrected manuscript will be made freely available on Internet at a separate adress:
surgery-in-norway.no in October 2012.**

We would like to thank all authors and commentators for their engaged work with the manuscript, and hope that the improved final version may be found interesting and useful not only for surgeons, but also other readers.

Oslo September 2012.

Jon Haffner, Tom Gerner, Arnt Jakobsen

Corrections and Additions, Chapter by Chapter.

Preface:

Updated: A new second last paragraph has been added
 ”The initial manuscript was printed and distributed to all members of the surgical societies in Norway (totally 2250) in 2011 for corrections and comments. The present Internet edition has been corrected according to the comments received, and an extra chapter on former Chairmen and Boards of The Norwegian Surgical Society/ Association.”

Presentation of Editors and Authors:

Some minor changes have been made in the information

1. Surgery in Norway before 1900

No notable changes

2. Hospital Structure and the Number of Surgeons

Page 43: Tables 2-2 and 2-3 have been updated

3. Surgical Specialisation

No notable changes

4. The University Clinics and Professors of Surgery

Page 55. Table 4-7. Professors of Surgery at Ullevål Hospital

Gastrointestinal Surgery

Corrected period: 1984-98 Kaare Solheim

Corrected spelling of name: Johnson

Cardiothoracic Surgery

Corrected spelling of name: Tønnessen

Page 56. Table 4-9. Professors of Surgery at Aker Hospital. Gastrointestinal Surgery.

Inserted: 2001-03 Arne R Rosseland above Arild Nesbakken

Page 57. Table 4-10. Professors of Surgery at Sentralsykehuset i Akershus – SiA/ Ahus

Corrected period: 1975-84 Kaare Solheim

Page 60. Table 4-11. Professors of Surgery at Haukeland Hospital

Orthopedic Surgery

Corrected spelling of first name: Eirik Solheim

Gastrointestinal Surgery

Inserted after Odd Søreide: Karl Søndena 2005

Inserted after Søndena: Kjetil Søreide 2011

Page 62. Table 4-12. Professors of Surgery at Trondheim Regional Hospital

Cardiothoracic and Vascular Surgery

Corrected spelling of name: Wahba

Pediatric Surgery

Corrected spelling of name: Torbjørn

Page 63. Table 4-13. Professors of Surgery at Tromsø Regional Hospital

Neurosurgery

Corrected year of engagement for Tor Ingebrigtsen: 2006

5. The Norwegian Surgical Society/ Association

Page 67. Table 5-1. Chairmen of the Norwegian Surgical Society.

Corrected name of the chairman in 1951: Ingjald

Schjøth-Iversen. Ernst Harald Schjøtt-Rivers was wrongly included in the table, and the same mistake is made in the 75-year Jubilee Book.

As requested by the Board, an additional “Chapter 62. Chairmen and Boards of the Norwegian Surgical Society/ Association” has been written. Table 5-1 is also included in that chapter as Table 62-1.

The table has been changed, as further studies of the archives showed that this was necessary.

Page 69. Table 5-2. Chairmen of the Specialty Committee, line 6:

Corrected name 1962: Ingjald Schjøth-Iversen

Page 73: Table 5-4. Free Presentations, Symposia and Courses at The Annual Meeting

Updated: The table has been altered: the last column has been changed to present the figures for 2010, and the names of the surgical specialties in the first column are brought in accordance with the nomenclature used elsewhere in the book.

6. General Surgery in Norway 1900-1986.

Page 82. Column 1, paragraph 3. Hospital Structure. The text has been altered to:

“Like the central hospitals, the other institutions around the country developed from small wards into “mixed hospitals” with surgery, internal medicine and radiology.

Further differentiation occurred in the 1930ies. It accelerated after the war and has progressed to our days. The national hospital structure has changed from independent hospitals, through a period based on the counties (fylker), with one central and several local hospitals in each county, into a regional system with five largely self-supporting health regions....”

7. Traumatology.

No notable changes

8. Surgical Oncology

No notable changes

9. The Intervention Centre at Oslo University Hospital

The name has been changed to Intervention Centre throughout the book.

10. The First Institute for Experimental Medical Research in Norway – IEMR at Ullevål Hospital.

No notable changes.

11. Experimental Surgical Research at Rikshospitalet in Oslo

Page 122, column 2, before the paragraph starting with “Further examples..”, new paragraph added:

“Ola Didrik Saugstad started work at the Institute in the early 1970ies. He discovered that resuscitation with 100% oxygen damaged the lungs in newborn experimental animals. Room air, which contains 21% oxygen, was far better. Several clinical studies on newborn infants confirmed this. Today many hospitals worldwide have stopped using 100% oxygen to resuscitate”

12. Experimental Surgery in Bergen

No notable changes

13. Experimental Surgical Research at St. Olav's Hospital, Trondheim.

Page 131, column 2, the last paragraph in the chapter has been changed to:

“Geirmund Unsgård, who has been the leader of the group, has supervised 12 PhD students up to 2011.”

14. Experimental Surgery in Tromsø – from Basement Rats to a Modern Large Animal Facility.

No notable changes

15. Organ Transplantation in Norway 1956-2010

Page 145, the figures are updated.

16. Organ Transplantation in Norway before 1986

No notable changes

17. Kidney Transplantation 1986-2010.

Page 144, column 2, paragraph 1, last sentence updated to:

”All 5573 kidney txs (deceased donors (DD) and living donors (LD) performed during 1986-2011 were performed by 18 surgeons 1 ”.

The note at the bottom of the page is changed to:

“The 18 surgeons are: Flatmark, Sødal, Bondevik, Jakobsen, Brekke, Lien, Bentsdal, Pfeffer, Scholz, Øyen, Foss, Line, Jørgensen, Husberg, Fosby, Lien jr., Hagness, Wadstrøm.”

Page 145. Figure 17-1 is updated with new figure text:

”Fig.17-1. Number of performed renal transplants in Norway 1969-2011. 38% were from living donors (LD) and the others from deceased donors (DD)

Page 145. Fig 17-2. Figure legend changed to:

”Actuarial survival of first renal grafts by donor source and HLA match in Norway 2000-2008.

ID-SIB = LD tx, from HLA identical sibling , 1 Haplo = LD tx, from genetically related donor mismatched for one HLA haplotype, 2 Haplo = LD tx from unrelated or genetically related donor mismatched for two HLA haplotypes, DD 0 DR = DD tx from HLA DR matched donor, DD1-2 DR = DD tx from HLADR mismatched donor.”

Page 145, paragraph 4, sentence 1, changed to:

”Including all methods, a total of 2621 LD nephrectomies were performed during 1969-2011, without any post-operative mortality”

Page 146, paragraph 2, sentence 1. The text up to ”These results...” has been updated to:

”During 1986-2011 a total of 5573 kidney transplants were performed; 3442 were from DDs and 2131 (38%) from LDs. The recipient age was 9 months-83 years, median 56 years. 170 (3%) of the patients were children. Most of these (80%) received a LD graft.”

Page 146, paragraph 3. The second sentence has been updated to:

"The number of deceased organ donors increased from 49 in 1986 to 127 in 2011, totalling 2486 donors in this period."

The last sentence has been updated to:

"In this period a total of 4812 kidneys for renal transplantation have been procured"

Page 146, paragraph 4. The last three sentences have been updated to:

"The waiting list decreased from 20 pmp in 1986 to 39 pmp by the end of 2011, and the median waiting time was 7.5 months. Internationally, the national renal transplantation rate is internationally uniquely high, and the waiting list and waiting time uniquely short."

18. Pancreas Transplantation

Page 149. A new Fig 18-1B has been added.

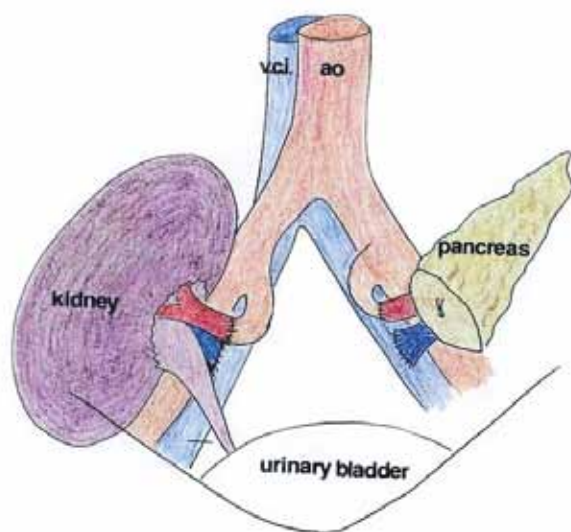


Fig 18-1B. The segmental pancreas was implanted in the iliac fossa with a technique similar to that used for renal transplantation. Drawings by the author.

19. Islet Transplantation

No notable changes.

20. Liver Transplantation

No notable changes.

21. Heart and Lung Transplantation

No notable changes.

22. Organ Autotransplantation – Spin-off Effects of Organ Transplantation

No notable changes.

Page 160. Picture changed to da Vinci robot

23. Urological Surgery in Norway up to 1986.

No notable changes.

24. Urological Surgery in Norway 1980-2010

Page 166, column 1, paragraph 1. The sentence "The Norwegian urologists declined....." has been changed to: "In spite of this, it was decided not to participate after a joint meeting between urologists, oncologists and statisticians".

25 a. The Norwegian Urological Association (NUF)

Page 174, column 1.

Inserted: A new third paragraph before the paragraph which starts with "Vårmøtet":

The "Høstmøtet" (The Autumn Meeting) is the main annual scientific meeting of the Association. The meeting consists of a mixture of submitted oral presentation from the members and symposia's arranged by the Board. During the last decade, the Association has started to arrange the "Høstmøteften". This annual dinner has turned out to be the most popular event of the year. The prizes for best scientific paper every year and best presentations are awarded to the winners at the "Høstmøtet".

Page 175. Table 25a-1. Corrected spelling of name: Høeg

25 b. The Norwegian Institute of Urology

No notable changes.

26. The History of Thoracic Surgery in Norway up to 1985

No notable changes.

27. General Thoracic Surgery from 1985 to 2010

Page 190. Figure 27-6 has been changed. It now shows the pleuro-cutane window.

Page 191. Figure legend 27-8 has been corrected to: "Pre-operative CT-scan of a pectus excavatum deformity in a 13-year-old girl, and X-ray of the thorax three years post-operatively, prior to the removal of the two pectus bars."

28. Cardiac Surgery the last 25 years.

Page 197. Inserted above Acknowledgements: Literature:

Liedberg N et al. Nordisk Kirurgisk Forening Åttio År. Lund 1973.

Kristiansen K, Larsen Ø. Surgical science, general surgery and superspecialization. The Development of Surgery in Norway in the 20th Century. The European Journal of Surgery (Acta Chirurgica) 1991; 175 (suppl 565):1-59.

Dahl HK et al. Jubileumsskrift for Norsk Kirurgisk Forening. Oslo 1986.

Svennevig JL. Utvikling av norsk hjertekirurgi. I: Forfang K, Rasmussen K. Det norske hjerte. Universitetsforlaget, Oslo 2007.

29. The Norwegian Society for Thoracic and Vascular Surgery

1981-1991 and the Norwegian Association for Cardiothoracic Surgery.

No notable changes.

30. Vascular Surgery

Page 202, column 2, paragraph 3, sentence 2 corrected to: "Thanks to pioneering work by Schilvold and Staxrud at Aker, the method had a renaissance in the late 1980ies for the treatment of acute arterial obstruction. The risk of bleeding still make the right selection of patients imperative."

The text has to some extent been re-arranged and coordinated with Chapter 31.

31. The Norwegian Society for Vascular Surgery

No notable changes.

32. Pediatric Surgery in Norway 1959-86

Page 216. Changed: Photo of Torbjørn Kufaa

33. Pediatric Surgery 1986-2010

No notable changes.

34. The Norwegian Association of Paediatric Surgery

No notable changes.

35. Abdominal Surgery

Page 236, column 2, paragraph 3. The text from last word in line 4. "...Bergan,..." has been changed to:

"...Giercksky and Revhaug in Tromsø in 1980, and also employed at Rikshospitalet by Bergan, Heen and Flatmark from 1982, Myrvold in Trondheim and Nygaard at Ullevål from 1983."

Page 236, column 2, paragraphs 4 and 5.

"Koch's" corrected to "Kock".

Page 236, column 2, paragraph 5. Added to text at the end of the paragraph:

"He is using it routinely."

36. The Development of Digestive Endoscopy in Norway

Corrected: Arne Rosseland has been changed to Arne R Rosseland throughout the book.

Page 243. Table 36-2. The heading has been changed to: Table 36.2. Diagnostic and therapeutic endoscopies in Norwegian Hospitals 1978-85

37. Oesophageal and Gastric Surgery

No notable changes.

38. Hepatic, Biliary and Pancreatic Surgery (HPB)-surgery) after 1985

No notable changes.

39. Colorectal Surgery in Norway 1986-2010

Page 262, column 1, paragraph 3, sentence 1. The text has been changed to:

"The changeover to pouch surgery using the TME technique, and the appointment of specialised colorectal surgeons to the main county hospitals, led to an ..."

40 a. The Subspecialty Gastrointestinal Surgery

No notable changes.

40 b. The Norwegian Society for Digestive Surgery

No notable changes.

Page 270: The photo has been changed.

41. Breast Surgery

Page 279, reference 4. The last figures in the reference has been changed to:

"1947-67, 423-424."

42 Endocrine Surgery

Page 285, column 1, paragraph 2, last sentence. Text changed to :

”Two novel academic positions at UiO have been announced, but not filled. Hans Fjøsne was appointed Associate professor at NTNU/ St Olav’s Hospital in 2011.”

Page 285, column 2, paragraph 2 last sentence. Text changed to:

”The academic milieu within the speciality is weak with only three positions (UIB and NTNU) established at the present time (end of 2011).”

Page 286, column 1, paragraph 4, last sentence. Text changed to:

“As of 2011, there are two Norwegian “Fellow of the Division of Endocrine Surgery of the European Union of Medical Specialities”.

43. The Norwegian Society for Breast and Endocrine Surgery

Page 289, column 2, last paragraph. Text changed to:

”Realizing that only formalities were left, members of a preliminary board of NABE were appointed by NSA in October 2007 with Ellen Schlicting as president. The board started their work in January 2008 and laid its foundation. Rolf Kåresen was elected president from 1. January 2009 till 31. December 2010.”

44. Orthopedic Surgery in Norway up to 1986

No notable changes.

45. Microsurgery in Norway up to 1986

No notable changes.

46. Organisation of Orthopedic Surgery in Norway after 1986

Page 303. Table 46-4.2. University Hospitals. Last column.

Corrected: the number of Trainees to 104

Page 307. Fig 46-6a and Fig 46b.

Corrected: The figures have been changed to:



Fig 46-6a. Preoperative X-ray picture showing large valgus deformity of both femurs after previous valgisation osteotomies in a case with osteoarthritis secondary to hip dysplasia. Insertion of standard femoral components would be difficult without doing corrective osteotomies.



Fig 46-6b. X-ray picture showing inserted non-cemented custom femoral stems (Unique®, SCP Trondheim) with HA-coating of the proximal half of the stems.

Table 47-1. Trends in fracture treatment in Norway

	1955	1960	1970	1980	1990	2000	2005	2010
Intramedullary nailing	-----							
AO	-----							
External fixation	-----							
Interlocking nailing	-----							
Functional treatment.	-----							
Primary soft tissue reconstr.	-----							
Arthrosc. ass. repair intraartic. fr	-----							
Op. treatment columna fract	-----							
Op. treatment acetabular fract	-----							
Bone transport	-----							
Angle stable screws	-----							
LISS	-----							

47. Trends in Orthopedic Surgery in Norway

Page 309. Fig 47-1. First line.

The years are now correctly placed (see above)

Page 312, column 1, paragraph 1, last sentence. Text changed to:

"It is worth noticing that the orthopedic surgeons who became responsible for pediatric orthopedics at the university departments in Bergen (Einar Sudmann and Lasse Engesæter) and Trondheim (Per Edvardsen) had most of their education from Sophie Minde."

Page 316. Column 2, paragraph 1, last sentence. Text (year) changed to:

"..and finally the discovery of X-rays in 1895 by William Roentgen...."

48. The Norwegian Society for Orthopaedic Surgery

Page 319. Table 48-1.

First name has been added for all chairmen.

49. Hand Surgery in Norway up to 1986

No notable changes.

50. The History of Hand Surgery in Norway

No notable changes.

51. The Norwegian Society for Surgery of the Hand

No notable changes.

52. Rheumatoid Arthritis Surgery or Rheumaorthopedic Surgery

No notable changes.

53. The Norwegian Society for Rheumasurgery

No notable changes.

54. Plastic Surgery

No notable changes.

55. The Norwegian Association of Plastic Surgeons

No notable changes.

56. Neurosurgery in Norway

Page 356. Fig 56-1a and Fig 56-1b. Figure legends corrected to:

Fig 56-1a. 6 months old boy. Symptoms of increased ICP; left-sided hemiplegia. Dramatical increase in head circumference. Histology: Pleomorphic xantastrocytoma. Fig 56-1b. 15 years later - high-school student

Page 358, column 1, paragraph 2. Added text at the end of the paragraph, after Sissel Reinlie:

" She has led the combined neurosurgical department in Oslo University Hospital since 2010."

57. The Norwegian Neurosurgical Society

No notable changes.

58. Maxillofacial Surgery in Norway

Page 371. Fig 58-5d

Figure legend changed to:

Fig 58-5 d) Postoperative 3D-reconstructed CT scan showing reconstructed mandible

59. The Norwegian Society for Maxillofacial Surgery

No notable changes.

60. Names with Abbreviated Biographical Information.

Considerable changes have been made; some names have been omitted, some are added, and the bibliography is changed in some.

The reader is referred to the Internet edition at surgery-in-norway.com for the new text.