

Orthopedic surgery in Estonia

Tiit Haviko and Aare Märtson

Clinic of Traumatology and Orthopedics, Clinicum of Tartu University, Puusepa 8, Tartu 51014, Estonia.

Tel +372 7 448–202. Fax –106

Submitted 99-10-13. Accepted 00-02-10

ABSTRACT – We did a survey on the development of orthopedic surgery in Estonia, especially during the past 10 years, including education, hospital-based orthopedic surgery and orthopedic research. The main types of orthopedic operations were analyzed, on the basis of data from the Estonian Social Ministry, Bureau of Medical Statistics and several departments of orthopedic. On the average, 11,831 orthopedic operations were performed yearly during the years 1996–1998 in hospital departments.

The development of orthopedics in Estonia dates back to the beginning of the 20th century. Since separate orthopedic wards did not exist, orthopedic treatment was carried out in surgical departments. The teaching of orthopedics in Estonia began at the University of Tartu (founded 1632) in 1921, when John Blumberg, docent in surgery, was Chairman of the Departments of Surgical Pathology and Orthopedic Surgery. The best known books, John Blumberg were “Aus der Chirurgischen Praxis” (1922) and “Lehrbuch der Topographischen Anatomie” (1926).

The development of orthopedics in a strict sense began in 1928, coordinated by Bernhard Jürgens, Professor of Orthopedics. He gave lectures on orthopedics together with demonstrations of patients. The first orthopedic ward with 30 beds was opened in Tartu in 1944. Amputations for post-traumatic conditions and reconstructions of the lower leg and hand, including the Krukenberg technique, were performed. Knee resections and femoral correction operations were carried out for sequelae of tuberculosis; transposition of tendons and arthrodeses were performed in patients who had had poliomyelitis. War invalids were given

prostheses and orthoses.

From 1940 until 1991, Estonia was a part of the Soviet Union. In 1988, the Declaration of Estonian Independence was accepted by the Estonian parliament, and in 1991, the independent Estonian Republic was proclaimed. Today, orthopedics in Estonia reflects to a certain extent the changes which former socialist societies have undergone over the past 10 years. Several musculoskeletal conditions, such as congenital and acquired deformities of bones and joints, are now treated according to standards accepted worldwide. Early ultrasound detection and early treatment of the hip in infants are now common. Other problems have arisen which require increasing attention. Various degenerative conditions, especially osteoarthritis of the large weight-bearing joints and spine, have assumed greater clinical importance. Osteoporotic fractures in the elderly are a real socio-economic burden. Bone neoplasms and neuromuscular diseases need modern treatment. Metabolic bone diseases, such as familial hypophosphatemic rickets, osteogenesis imperfecta and others, have evaluated in recent years. An increase in automobile traffic is responsible for the increase in number of multiple fractures and polytrauma.

Education

Orthopedic education and practice began to be organized more precisely when traumatology and orthopedics were separated from general surgery in 1984. The Clinic of Traumatology and Orthopedics of the Clinicum of Tartu University was founded in 1992. Of the total of 5,747 physicians in Estonia (1.4 million inhabitants), 116 have worked in traumatology and orthopedics since



Figure 1. The largest orthopedic units in various regions are: in north Estonia, Tallinn Mustamäe Hospital, Tallinn Central Hospital, Keila Hospital; in northeast Kohtla-Järve City Hospital, Narva City Hospital; in south Estonia, Tartu University Clinic; in west Estonia, Pärnu City Hospital.

1998, mostly in government hospitals and out-patient departments. The training system has now been developed. After graduation from the University of Tartu, there is a 1-year internship which includes training in general surgery for at least 3 months. Orthopedic residency has existed for 5 years at the University Clinic and is mandatory at certain selected hospitals for those specializing in orthopedic surgery. Practice and theory of residency training are strictly regulated by the curriculum and when it terminates, the resident must take an oral examination. The journals the resident is expected to be familiar with are *Acta Orthopaedica Scandinavica*, *The Journal of Bone and Joint Surgery* and *International Orthopaedics*. After certification, which will probably occur in the year 2000, the number of orthopedic specialists will be limited to about 100, which corresponds to 70 specialists per million inhabitants.

Current orthopedic education includes 30 hours of theoretical courses organized at the University of Tartu regularly. In addition, orthopedic surgeons will get practice in various international training courses, such as AO courses in Switzerland and elsewhere, specialized orthopedic training courses sponsored by Keggi Orthopedic Foundation (USA) and the Open Estonian Foundation. The Estonian Orthopedic Society was founded in

1972. Previously, orthopedics had been the purview of the Society of Surgeons.

Hospital-based orthopedic surgery

Hospital-based orthopedic surgery is performed in large hospitals having a long history, such as the Clinicum of Tartu University, Tallinn Central Hospital, Mustamäe Hospital and Tallinn Children's Hospital, or in smaller, non-academic regional hospitals. The last group includes the hospitals at Keila, Pärnu, Kohtla-Järve, Narva and Elva (Figure 1). In all, 13 orthopedic wards in the above-mentioned hospitals exist, including the Burns Center at Keila Hospital. The only private orthopedic unit with 10 beds is in Tallinn Magdaleena Hospital, which specializes mostly in spinal surgery and joint replacement surgery. Extremity and trunk trauma as well as orthopedic surgery are performed in these departments. Reconstruction and hand surgery are carried out in the Department of Plastic Surgery, recently opened at the University Clinic of Surgery. Thoracic and abdominal trauma patients, as well as urological trauma are treated in the respective units. In large hospitals, the whole spectrum of diseases of the musculoskeletal system is treated. Herniated disc

Table 1. Regional distribution (1996–1998) of population, hospital beds and operations in percentages (data of Bureau of Medical Statistics)

	North	Northeast	South	West
Population	42	19	23	16
Hospital beds	54	16	17	13
Operations	54	7	20	19

surgery is performed in all 3 neurosurgical units.

The average number of orthopedic operations in different hospitals in 1996–1998 varied greatly, more cases being operated on in Mustamäe Hospital, which has 3 orthopedic departments and a department of septic bone surgery. The average number of operations performed in Tartu University Clinic and the Tallinn Central Hospital 1996–1998 was about the same (Table 1). In all, 11,831 orthopedic operations were performed yearly in 1996–1998 in hospital departments.

Treatment of fractures

According to the official data from 1997, there were 28,157 fractures of the trunk, skull, cervical spine, pelvis and extremities. Fractures in children constituted 7,063 of them. In addition, 2,774 patients had multiple fractures or polytrauma. The number of people killed in accidents was approximately 300 yearly during the last 3 years. The main causes of death were brain trauma and, to a lesser extent, rupture of the heart or the aorta.

The modern treatment of fractures in Estonia began at the start of the 1980s, when the AO implants of Polish origin were introduced in most large hospitals. External osteosynthesis of complicated fractures was also introduced at that time. Bone transportations for large bone defects from one or both meta-diaphyseal parts were introduced in the middle of the 1980s.

On average, in the past 3 years 11,831 orthopedic operations have been performed yearly in the hospital departments. Operations on fractures constituted 26%, orthopedic conditions 35% and other types of trauma 39% of them. The modern treatment of fractures is rising year by year. The use of AO original implants was introduced in 1993. According to the data from 1997, osteosyn-

Table 2. Number of joint replacements in 4 big hospitals

Year	Tartu University	Keila	Tallinn Mustamäe	Tallinn Central
1996	258	221	26	237
1997	264	173	199	134
1998	394	226	267	215

thesis of fractures of tubular bones was performed yearly as follows: humerus 232 operations, radius and ulna 276, femur 875 and tibia 554 operations. Osteosynthesis of fractures in children constituted 8%.

Since the beginning of the 1980s, treatment of polytrauma patients is preferably performed in a one-step procedure. The data of Tartu University Clinic in 1990–1997 showed that one third of polytrauma patients with skeletal injuries were operated on during the first 2 hours and 60% during the first 6 hours after hospitalization.

Arthroplasty

Endoprosthetic surgery in Estonia began in 1969, when the Sivash total hip prosthesis, manufactured in Moscow, Russia, was introduced. An analysis of the results of 120 operations at Tartu University Clinic in the 1980s showed that after 10 years', good results were achieved in 21% of the patients, satisfactory results in 38%, and poor results in 41%. The main reasons for the poor results after 10 years were aseptic loosening, heterotopic ossification and late infection.

Since 1990 we have used hip and knee prostheses of modern designs. At present, the more widely used hip prostheses are Lubinus SP II, Charnley, Müller, Exeter, Zweymüller and Opti-Fix. Knee arthroplasties are performed with TACK, PFC, Zimmer and total Link rotation knee prostheses. The relationship between hip and knee arthroplasties was 4–5:1 in recent years. In revision hip surgery, special types of prostheses, such as the cementless MP reconstruction (Link) and S-ROM (Johnson & Johnson) were introduced. The MC Minn acetabular reconstruction cup system (Link) and porous-coated metal cups were used in special cases. In revision knee surgery, total rota-

tion knee and total hinge knee (Link), PFC revision system and others were introduced last year. Recently, shoulder and elbow arthroplasties were started.

During 1996–1998, 2,911 arthroplasties were performed in Estonia. Total joint replacement are done in 6 hospitals, hemiarthroplasty in 8. The number of joint replacement operations performed in 4 large hospitals in 1996–1998 is shown in Table 2. In an analysis of complications in 1,626 patients with total hip replacement in 1990–1995, the main complications were infection in 22 patients (1.4%), dislocation of the hip in 42 patients (2.6%), neural injury in 18 patients (1.1%), functionally significant heterotopic ossification in 24 patients (1.5%) and pulmonary embolism in 7 patients (0.4%). The problem of revision surgery has arisen in the last few years. An analysis of 97 revision total hip arthroplasties showed the following reasons for revision: aseptic loosening 36%, infection 23%, technical error 18% and others 23%. The estimated number of arthroplasty operations needed in Estonia, 1,400 yearly (100 operations per 100,000 inhabitants), has not been achieved as yet because of the limited financial resources for this from the health insurance fund.

Arthroscopic surgery

Arthroscopy of the knee was introduced in Estonia in 1990. At present, the number of diagnostic arthroscopies and arthroscopic operations of the knee, shoulder, elbow and ankle is rising, and 1,250 procedures were performed in 1998. New techniques, such as arthroscopic reconstruction of the anterior cruciate ligament, arthroscopic repair of shoulder instability and reconstruction of cartilage defects, were introduced last year.

Spinal surgery

The development of spinal surgery in Estonia was initiated by Professor Rein Raie in 1987. At present, surgery scoliosis, kyphosis, spondylolisthesis and old fractures is performed at Tallinn Magdaleena Hospital and Tallinn Children's Hospital.

In 1987–1998, surgical correction of scoliosis and kyphosis was performed in more than 450 patients, of spondylolisthesis in more than 100 patients and fixation of unstable and old fractures in about 150 patients. Cotrel-Dubousset and AO instruments have been used during the last 5 years instead of Harrington instruments. The treatment of fractures of the spine has also been introduced in Tartu University Clinic and Tallinn Mustamäe Hospital during the past 3 years.

Surgery of bone tumors

There are 10–15 cases of primary malignant bone tumors in Estonia yearly. The initial diagnosis of malignant bone tumors is usually made at our 2 hospitals specializing in oncology. A systematic modern treatment of tumor patients was introduced in 1995 in collaboration with oncologists, according to the principles and treatment protocols accepted worldwide. The patients who need limb salvage operations are regularly admitted the University Clinic. Bone grafting of meta-diaphyseal segments, alloarthrodesis and arthroplasty with tumor prostheses are performed.

Orthopedic research

The main areas of orthopedic research in Estonia are clinical, including the prophylaxis and treatment of orthopedic diseases and trauma. Orthopedic research is mostly done at the University Clinic, but clinical research also done in other orthopedic departments. Basic research, biomechanical studies and animal experiments are also performed at the University Clinic in collaboration with the Laboratory of Biomechanics of the Faculty of Exercise and Sports Sciences, the Chair of Histology and the Chair of Pathophysiology. Experimental and clinical studies of bone formation are carried out in connection with limb lengthening, pseudoarthroses and bone defects. The problems of bone loss are being studied in patients with osteoporosis, familial hypophosphatemic rickets and osteogenesis imperfecta. We are also studying fracture rates in premenopausal and postmenopausal women. 13 academic dissertations on



Tartu University main building (1803–1809). The University of Tartu, founded by King Gustavus Adolphus II of Sweden in 1632, is one of the oldest universities in eastern Europe. In 1802, it was reopened by Russian Czar Alexander I and, after the First World War during Estonia's War of Independence, the university was opened as Universitas Tartuensis on December 1, 1919.

As a result of the Soviet occupation from 1940–1941 and 1944–1991, the structure of the university changed significantly, the most conspicuous change being the integration of the educational and research mission of the university with political ideology

Since the end of the 1980s, it has been regaining its standing as a western-style university and research institution. Today, Tartu University has 10 faculties and 3 colleges with an academic staff of 1,038. There are also 4 museums, a University Library, which stocks over 5 million books, and other scientific and cultural institutions. At the moment (November 1999), the University of Tartu has 10,398 students, 480 interns and residents, and 370 students from 26 countries.

orthopedic topics have been presented in Tartu University and the universities and institutes of the former Soviet Union.

The academic dissertations by Estonian orthopedic surgeons are listed in Table 3.

Unfortunately, resources for orthopedic research are extremely limited and are awarded to the University Clinic mostly in competitions for grants from the Estonian Scientific Foundation. 8 original papers from the University Clinic have been published in various international orthopedic and trauma journals in 1995–1999.

Summary

Several sources have been used to collect data about the present state of orthopedic surgery in Estonia.

Education of orthopedic specialists according to European Union requirements began 5 years ago

Table 3. Academic dissertations by Estonian orthopedic surgeons

Author	Year	Title
Pökk, V	1949	Comparative experimental study of fracture healing in conditions of plaster cast and internal fixation
Seppo, A	1950	Local treatment of infected combustions by oxygenated sulphanilamide ointments
Trudnikov, V	1965	Clinical features and treatment of ruptures of biceps brachii
Liiv, E	1969	Femoral trochanteric fractures
Seeder, J	1970	Changes of lesser and greater circulation after traumatic intervention of chest (experimental study)
Raie, R	1980	Surgical treatment of scoliosis in children and adolescents
Eller, A	1982	Adrenocortical regulation of protein metabolism of myocardium during prolonged physical exercises
Mõtus, J	1984	Internal fixation of femoral neck fractures with fixator Seppo
Lenzner, A	1986	Treatment of pelvic fractures
Poljanski, V	1986	External fixation of open tibial shaft fractures
Firsov, G	1987	Complex treatment of open tibial fractures
Haviko, T	1989	Surgical correction of limb shortening and deformities
Koha, R	1990	Diagnosis, prevention and treatment of posttraumatic dyslipidemic coagulopathy

with the resident training system. The number of specialists in orthopedics is sufficient. However, the age limit of working orthopedists makes it necessary to train young doctors continuously.

The qualitative indices of hospital-based orthopedic surgery have improved in the past few years, due to modern technical facilities and training opportunities in orthopedic hospitals in Finland, Sweden, Denmark, Austria, Germany, etc., but also in the USA and Canada. Our orthopedic surgeons do not hesitate to present their results of treatment of orthopedic and trauma patients at various international meetings.

Although laboratories are obviously needed for research, the extremely limited resources for basic orthopedic research have not permitted us to establish such units as yet.

The kind assistance of several orthopedic colleagues is appreciated. Special thanks go to Rein Raie, Karl-Andres Kants, Ants Kass and Andres Kõöp.