

Proceedings of the Norwegian Orthopaedic Society

Bodø, May 23–25, 1985

Editor: Bernhard Paus

Ullern Alle 117, 0381 Oslo 3,
Norway

Bone and joint allografts for aggressive and low grade malignant tumors

Antti Alho

Orthopaedic Service, Ullevaal Hospital, University of Oslo, N-0407 Oslo 4, Norway

Deep-frozen allogeneic (cadaver) bone and cartilage was used to replace defects after wide resection of nine aggressive and low-grade malignant tumors of bone: 5 giant cell tumors, 3 chondrosarcomas and one chondroblastoma. The bone grafts were: block and intercalary graft – 4, unicondylar femoral graft – 3, and distal femoral half-joint (bicondylar) – 2. The patients (4 females and 5 males, 16–49 years of age) were followed for $\frac{1}{2}$ to $8\frac{1}{2}$ years. The grafts had been gradually frozen to -70°C over 48 h and kept frozen for 4–8 weeks. In the last grafts dimethyl sulphoxide was used as preservative of the joint cartilage. Quick thawing in $+45^{\circ}\text{C}$ lactated Ringer's was used before transplantation.

No infections or wound healing problems were experienced. In one unicondylar graft, augmentation with autogeneic bone was necessary due to partial resorption of the graft and collapse of the femoral condylar surface. The same patient sustained a femoral neck fracture, most likely due to disuse osteoporosis, with uneventful healing. In an intercalary transplantation, autogeneic augmentation was done later because of delayed union.

A slight gradual deterioration of the joint surface was observed in the first three osteoarticular transplantations. The functional results were: excellent – 2, good – 4, fair – 2, and too recent for assessment – 1. There have been no tumor recurrences.

In conclusion, block resection allows radical removal of tumors with an otherwise high rate of local recurrence. Allogeneic bone grafting gives acceptable results.

Healing of diaphyseal osteotomies in rats

Anders Mølster, Antti Alho, Norvald Langeland & Nils Gjerdet

Department of Orthopaedic Surgery and
Department of Dental Materials, University of
Bergen, 5000 Bergen, Norway

A transverse osteotomy was performed on the left femur after intramedullary reaming in 25 adult rats. In 12 rats (Group 1), intramedullary nailing with interlocking of both ends was performed with solid stainless steel nails. In the remaining rats, two modifications of the operation were introduced: one group (Group 2, 6 rats) had an incomplete osteotomy, penetrating only two thirds of the femur. The last group (Group 3, 7 rats) had reaming and complete osteotomy; osteosynthesis, however, was not performed. Postoperatively, unrestricted ambulation was allowed. Radiographs were taken with 2–6 week intervals and at sacrifice after 24 weeks when histological examination and mechanical testing were performed as well.

Results: All osteotomies in Group 1 healed with the formation of moderate amounts of external callus, and with signs of remodelling at 24 weeks. In Group 2, the incomplete osteotomies revealed no external callus, and histological examination showed "gap healing" with almost no remodelling. In Group 3, all osteotomies were non-united, with gross instability, malposition and signs of bone atrophy where lack of contact between bone ends remained.

Conclusions: In open osteotomy, osteosynthesis is necessary to obtain union in adult rat femora. Absolute rigidity, as in incomplete osteotomy, gives healing without external callus and with slow remodelling.

Acromioclavicular dislocation

Kari Indrekam, Ragnhild Størkson, Markus Hordvik & Norvald Langeland

Department of Surgery, Haukeland Hospital, 5000 Bergen, Norway

Thirty-six patients treated for acromioclavicular dislocations were followed up. Twenty-two were treated operatively and 14 conservatively. The mean follow-up was 6 years.

The results were good in 94% of the operatively and 92% of the conservatively treated cases. The operatively treated were unable to work for a longer period than the conservatively treated patients. In addition, they had minor complications related to the surgical treatment. The patients treated conservatively had more pain than those treated operatively. We therefore recommend surgical treatment in complete disruption of the acromioclavicular joint, especially in young and physically active persons.

Cavernous hemangioma of the calf

Helge Lilleby

Diakonissehusets Hospital, Lovisenberggt. 17, 0456 Oslo 4, Norway

Intramuscular cavernous hemangiomas are very rare. The tumor is benign, but may infiltrate muscle tissue without producing remote metastases.

A 41-year-old man with pain and diffuse soft tissue swelling of the calf was examined with CT, angiography and biopsy. An intramuscular tumor in the gastrocnemius muscle, measuring 21 × 8 cm, with diffuse blood supply, was diagnosed. Plain X-ray examination showed a number of phlebolites. At biopsy a vascular tumor with large-sized vessels was found, histologically it was cavernous hemangioma. The tumor which had infiltrated the lateral part of the muscle was completely excised.

Cavernous hemangiomas of the muscle should be treated surgically, as radically as possible. Important nerves and vessels however, should be spared. Recurrence is possible with insufficient radicality, and may necessitate a reoperation. Radiation or embolisation is not recommended. Malign transformation is not known, but may occur after radiation.

Good information about the localisation, extension and condition is mandatory before the treatment is started. Deep soft tissue tumors should be examined with CT, angiography and biopsy as well as plain X-rays.

The prognosis of total hip replacement. A comparison between two 5-year series with an 8-year interval

Hans Christian Blom, Arne Skoglund & Astor Reigstad

Kronprinsess Märthas Institutt, Jørgen Løvlandsgt. 5, 0570 Oslo 5, Norway

In two periods with an 8-year interval, 100 consecutive total hip replacements were followed for 5 years postoperatively. The first group of patients was operated in the period 1.6.69–30.1.72, and the second group in the period 1.11.77–30.4.79. All the patients had the hip replaced with the Müller curved stem prosthesis.

No statistically significant differences in sex, age and hip disease were seen. In both series 8 patients died during the follow-up period. These were excluded from the study. The aim of the study was to compare the results of the operation in the two series with regard to serious postoperative complications, early and late deep infections and mechanical loosening of the implants.

One patient in the first period had a cerebral insult. No other serious postoperative complications occurred in the two series. Four deep infections were seen in the first period, compared to two in the last. In the first period 15 mechanical loosening of the prosthesis were shown radiographically, compared to 7 in the last period. Six hips and one hip had been reoperated in the 5-year follow-up period, respectively. The study indicates that the prognosis of total hip replacement improved over the 8-year period. Several factors may have contributed to this improvement.

Improvement of function in partial finger amputation after lengthening procedures

Roald Sætermo & Harald Russwurm

Department of Orthopaedic Surgery, Regionsykehus, 7000 Trondheim, Norway

A short presentation was made of current methods of improving the function of the hand after digital amputations.

A simple method of lengthening in two stages, using external fixation, was illustrated by case histories.

Osteochondritis dissecans in the knee and ankle joints treated with bone peg fixation

Erik Rosenlund & Paul Lereim

Sophies Minde Orthopaedic Hospital,
Trondheimsvn 132, 0570 Oslo 5, Norway

The surgical procedure in the treatment of osteochondritis dissecans in juveniles and young adults recommended by most authors consists of removal of necrotic tissue, drilling of the sclerotic bed and fixation of the fragment by means of screws and pins. These are removed in a second arthrotomy after healing of the fragment. With the use of bone pegs for fixation, a second operation is rarely needed. Evaluating 13 knees using this procedure, we found that bone healing of the fragment had occurred in all cases. In 5 patients the contour of the subchondral cortical bone plate became normal, while in the remaining 8 a slight flattening of the subchondral bone was observed. In 3 knees broken pegs were removed by arthroscopy. The clinical result after an average observation time of 28 months was excellent.

To get access to the lesion of the medial border of the trochlea tali, an osteotomy of the medial malleolus was performed. Necrotic tissue was removed, multiple holes were drilled in the sclerotic bed, and the fragment was fixed with bone pegs from the distal metaphysis. Radiographic and clinical results of the 4 ankles operated were good.

There are two main points in this presentation: using bone pegs a secondary arthrotomy is rarely needed; in lesions of the trochlea tali an osteotomy of the medial malleolus gives excellent access to the entire lesion.

Double cup arthroplasty with the Tharies hip prosthesis. A six-year experience

Carl Erik Schultz & Elin Nesse

Nordland Sentralsykehus, 8000 Bodø, Norway

Since January 1979, the Tharies total hip prosthesis (THP) has been used as a routine procedure in patients with hip disease where a THP is indicated. The vascularization and solidity of the femoral head at the time of operation have determined whether or not this prosthesis could be used. More than 300 patients have been operated in this manner. The patients were operated by an anterolateral incision without osteotomy of the trochanter. In the period Aug 1979 to June 1981 109 consecutive and unselected hips were resurfaced. Five patients were operated bilaterally the same day. Eighty patients were

available for personal interview, clinical examination and X-ray. Eleven patients had bilateral replacements. The average observation time was 4½ years.

Ten hips had been reoperated because of mechanical loosening of one or both components. Two patients had clinical and radiographic findings requiring revision surgery in the near future. Nine hips were suspected of loosening because of their radiographic appearance, but these patients were asymptomatic. The average blood loss during operation averaged 409 ml. The maximum blood loss was 957 ml. Thirty percent of the patients needed no transfusion. There were no deep infections.

Seventy hips of 91 (76 percent) were classified as excellent as regards pain and range of movement.

A new concept in fixation of unstable fractures

R. Hammer

Regionsjukhuset i Linköping, Sweden

The present report describes a new external fixation device by which it is possible to manipulate fracture fragments with complete control of stability. It is designed as a unilateral single frame device, and consists of two functionally different components: the correction unit and the fixation unit.

The mechanical behaviour under load was analysed and compared to a conventional Hoffman-Vidal Audrey quadrilateral system. Testing was performed by a material testing machine, and the slope of the force deformation curve was used to determine a stiffness ratio. Rotational rigidity was analysed in a separate study. In axial loading the two different systems were comparable within the loading range 0–1000 N. The stiffness ratio varied from 378–667 N/mm. In the anterior-posterior plane the stiffness ratio of the unilateral system was significantly higher. In lateral bending, and axial loading the two systems were comparable. The turning moment required to induce a 5-degree angular deformation of the quadrilateral system was 4.8 ± 0.6 Nm, and the corresponding figure for the unilateral system, was 8.8 ± 4.0 Nm, the difference being statistically highly significant. The major advantage of this new system is closed, atraumatic reduction and the possibility of lasting interfragmentary compression of oblique fractures.

The conclusion is that a rather simple unilateral external fixation device may be designed so that its rigidity is comparable to a more complex external configuration.

Spontaneous osteonecrosis of the knee

Gisle Upheim

Menighetssøsterhjemmets Sykehus, Rosenborg gt 8,
0570 Oslo, Norway

Spontaneous aseptic osteonecrosis of the knee most often affects the weightbearing surface of the medial femoral condyle in women over 60 years. There is a sudden onset of pain at the medial aspect of the knee. The typical radiographic changes develop on average 4–5 months later. A subchondral radiolucent line with a sclerotic halo and a sclerotic dead bone plate in the defect can then be seen. Before the development of radiographic changes, the diagnosis can be made by radionuclide scintimetry. There is a high focal activity on the scintigram.

The etiology most probably is a stress fracture in osteoporotic subchondral bone. There may be a slow secondary development of arthrosis or, in some cases, a rapid collapse of the medial compartment. Small lesions with high focal scintimetric activity have the best prognosis regarding the development of arthrosis.

In most cases the treatment of choice is a high tibial valgus osteotomy. If the secondary arthrotic changes are severe, a hemiprosthesis or a total condylar knee prosthesis will be needed.

In spite of several publications on the subject during recent years, the condition seems to be unknown to many radiologists and orthopaedic surgeons, as shown by three recent cases, all incorrectly diagnosed as having osteochondritis dissecans, which is a totally different disease.

Humeral shaft fractures

Eivind Witsø

Department of Surgery, Haukeland Hospital, 5000
Bergen, Norway

The results of treatment of 59 humeral shaft fractures are evaluated. Of 33 fractures treated with a "hanging-cast", 3 were operated secondarily. All of them healed.

Fourteen fractures were treated with a "U"-slab. In this group there was one pseudarthrosis, resulting in minor complaints. The patient refused operative treatment.

Of 4 patients treated with primary osteosynthesis there was one pseudarthrosis, one secondary operation because of delayed union and one radial nerve palsy.

The primary treatment of these fractures should in most instances be conservative – preferably a few weeks in a "U"-slab. The "hanging-cast" should not be used, and primary operative treatment should be considered only in special situations.

Limb lengthening by callus distraction and physeal distraction

Einar Sudmann

Hagavik Orthopaedic Hospital, University of
Bergen, 5220 Hagavik, Norway

In diaphyseal limb lengthening in adults, rapid callus formation can be induced by grafting autologous bone chips as soon as the osteotomy has been done. As illustrated by case reports, such callus formation can also be induced without bone grafts when graded distraction is started after an initial 3-week-period of compression of the osteotomy. As illustrated by CT records, such callus distraction seems to give a periosteal cuff of new bone, thus preserving the integrity of the medullary cavity.

The Orthofix apparatus was also used for graded physeal distraction in adolescents; in one, the Orthofix cancellous bone screws bent, which stopped the physeal distraction.

Christiansen total hip arthroplasty 1970–1977

Ola Aarseth & Knut Ramstad

Nordland Sentralsykehus, 8000 Bodø, Norway

From December 1970 to September 1977, 200 Christiansen total hip arthroplasties were performed in NSS; 148 of these patients were reexamined in a follow-up study in 1982/83. The observation time was 7 (4–12) years.

Sixty-nine prostheses showed evident loosening of one or both cemented components, including 35 which have already been verified during reoperation. Nineteen showed radiographic signs of loosening. Fifty-five showed no signs of loosening.

We have not found any single factor, or combination of factors in the study responsible for the relatively high incidence of loosening.

In our opinion a loosening frequency of 88 out of 148 (59 per cent) total hip arthroplasties makes the further use of the Christiansen total hip prosthesis unacceptable.

Muscle paralysis in a patient with total hip prosthesis and silver-impregnated antibacterial bone cement

Einar Sudmann, Hogne Vik, Milan Rait, Kari Todnem, Knut Jan Andersen & Kåre Julsham

Hagavik Orthopaedic Hospital, Laboratory of Clinical Biochemistry, Departments of Neurology and Medicine, Haukeland Hospital, University of Bergen, and Institute of Nutrition, 5000 Bergen, Norway

In one patient, at Christiansen total hip arthroplasty revision, silver-impregnated bone cement was used as prophylaxis against deep infection. Five years later the patient developed serious neurological deficits, and the prosthesis was loose. The loose prosthesis and the silver-impregnated bone cement were removed, and a Charnley prosthesis was inserted. Peroperatively, the concentration of silver in the joint cavity was assessed to be more than 900 times the normal serum concentration. During the following year the serum concentration of silver decreased from more than 60 times to 15 times the normal serum concentration; simultaneously the patient recovered from her grave axonal damage.

Five-to-ten-year follow-up after primary repair of anterior cruciate ligament injuries

Torbjørn Strand

Department of Surgery, Haukeland Hospital, 5000 Bergen, Norway

Sixty-eight patients, 36 males and 32 females aged 13–70 (median 36) years at injury were evaluated 5–10 years after primary repair of ACL tears by the Palmer technique without augmentation. All but four patients had combined ligament injuries. Two-thirds of the females and 1/3 of the males sustained their injuries in skiing accidents, while 1/3 of the males were injured in contact sports, notably soccer.

At follow-up instrumental testing of sagittal instability by the KT-1000 was added to the clinical evaluation. Knee function was assessed by the Lysholm score, while activity level was graded by the Tegner score.

Three patients had been reoperated by ACL reconstruction and the status before reoperation was recorded as the result. Only 2 secondary meniscectomies had been performed, and 60/68 patients had both menisci intact at follow-up.

Forty-two patients were stable by ALRI and Lach-

mann tests, with a median Injured/Normal difference of 1.0 mm by instrumental testing at 20 degrees/20 lb. Twelve patients had minor ACL instability (guarding or trace positive ALRI combined with 1 + Lachmann) with a median I/N difference of 2.75 mm. Fourteen patients had major instability (2 – 3 + ALRI or 2 – 3 + Lachmann) with a median I/N difference of 6.5 mm.

No significant correlation was revealed between stability at follow-up and preoperative activity level score nor actual/attempted return to contact sports.

The median Lysholm score was 92, with 48 of 68 graded excellent-good. The most unstable patients had significantly lower score values (median 75) than the stable group (median 97) ($p < 0.002$) and the minor instability group (median 93) ($p < 0.01$). No significant difference was found between scores of stable patients and those with minor instability.

Thus, in this series with a relatively low average activity level, an objectively stable knee was obtained in 2/3 without augmentation techniques. Whether or not the minor instability group have partially intact ACLs preventing major instability, and thus probably gained ACL stability from surgery, is currently being assessed by a CT study. As the long-term results of nonoperative treatment of combined ACL injuries in a similar patient population is not known, no firm conclusions can be drawn concerning the value of primary operative treatment.

Isolated tears of the anterior cruciate ligament

Torbjørn Strand & Anders Mølster

Department of Surgery, Haukeland Hospital, 5000 Bergen, Norway

Previously nearly all acute ACL injuries diagnosed in our hospital were combined ligament injuries, 1/2 of these caused by skiing accidents. During 1982–1984, however, 32 fresh isolated ACL tears were diagnosed, representing 1/3 of all ACL tears primarily operated during this period.

The patients, 17 females and 15 males, were 11–46 (median 22) years at injury. 17 patients were injured in contact sports, notably handball in females and soccer in males.

A retrospective study of results of the stability testing as performed by our staff with a varying level of experience was performed. Only cases with definite statements of the results of the actual test as positive, negative or indefinite were included.

The assessment of instability by the anterior-drawer (ADR) test in flexion was found to be of little

value; only 11 per cent were found to be unstable without anaesthesia, whereas 22 per cent were classified as definitely stable. A positive test in general or epidural anaesthesia was recorded in only 54 per cent. The ALRIs test without anaesthesia were found positive in only 9 per cent, increasing to 92 per cent in anaesthesia. The ADR in extension (Lachmann test) was graded as positive in 56 per cent, increasing to 96 per cent in anaesthesia.

False positive tests could not be evaluated. The sensitivity of the tests was probably overestimated as not all patients with haemarthrosis and negative tests underwent arthroscopy. Although the evaluation of stability by these tests may be better in the hands of experienced surgeons, the clinical diagnosis of isolated acute ACL injuries is unreliable without anaesthesia. A negative ADR test in flexion, even in general anaesthesia, permits no conclusions. Lachmann tests and ALRI tests in anaesthesia are recommended in acute haemarthrosis following a twisting knee injury with no apparent instability. Arthroscopy should probably always be performed in these cases.

Scintigraphy and radiographic survey for detecting bone metastases

Olav Reikerås

Regionsykehuset i Tromsø, 9012 Tromsø, Norway

In 68 patients with histologically proven carcinoma of the prostate or breast, bone scintigraphy and a radiographic survey were carried out to evaluate the progression of the disease and to compare the relative sensitivity of the diagnostic tools. Forty of the patients had scintigraphic evidence of skeletal metastases, whereas an abnormal X-ray survey was found in only 6 patients. Radiographic evidence of metastases was not found in any of the patients with normal scintigraphy. It is concluded that bone scintigraphy is far more sensitive than radiographic survey in the diagnosis of skeletal metastases.

The Mittelmeier ceramic cementless total hip system

Erik Rosenlund, Carl Erik Næss & Imre Gabor

Sophies Minde Orthopaedic Hospital,
Trondheimsvn 132, Oslo 5, Norway

Young patients with advanced primary arthrosis of the hip, or arthrosis secondary to dysplasia or CDH represent a therapeutical problem. The conventional

cemented total hip replacements (THR) will not satisfy the patient's desire for a permanent solution. Arthrodesis of the hip joint is only an alternative in the very young patient with unilateral disease. The Mittelmeier Ceramic Hip System ensures an immediate solid fixation of the prosthetic elements. The BioloX articulation combines low friction and low wear.

From December 1980 to February 1985, 80 hips in 74 patients were operated. Ten hips have been re-operated. Only one of these has been converted to a cemented THR.

Two patients suffered a fracture dislocation after falling down a flight of stairs. The remaining eight revisions were performed less than 12 months after primary surgery, and were due to a combination of faulty operative technique and insufficient insertion instruments.

Technique and instruments have been improved, and the rate of complications has been reduced. The Mittelmeier Ceramic Hip System is still the treatment of choice for young patients requiring THR.

Orthopaedic oncology in Health region 3 in Norway

Sigrun Solberg, Anders Walløe & Norvald
Langeland

5016 Haukeland University Hospital, 5000 Bergen,
Norway

A retrospective survey was made of 138 patients admitted for tumor investigation and treatment in the orthopaedic unit, Haukeland University Hospital, in the years 1979–1983. One third of the patients had a malignant tumor. Seven percent were not given any final diagnosis. The most common symptom of malignant soft tissue tumor was a lump and that of malignant bone tumor was pain. The average time from the first symptom until final diagnosis was 20 months.

Six patients had metastases at the time of diagnosis. Radical operation, by means of wide excision, compartmental excision or amputation, was considered in three fourths of the operated patients. Two thirds of all patients with malignant bone and soft tissue tumors were male.

Malignant bone and soft tissue tumors are rare. The diagnosis and treatment need close co-operation between pathologist, oncologist, radiologist and surgeon. It is our recommendation that treatment of these tumors should be centralized.

Assessment of extra cost imposed by delay in treatment in orthopaedic surgery

Geir Magne Hoddevik, Torstein Hole & Erik Sudmann

The Norwegian School of Economics and Business Administration and Hagavik Orthopaedic Hospital, University of Bergen, 5000 Bergen, Norway

A questionnaire was sent to all 280 patients waiting for hip surgery and 427 patients waiting for other types of orthopaedic surgery, 707 in all. In addition, another questionnaire was sent to 186 randomly selected, previously treated patients. Replies were received from 523 (74 per cent) out of 707 and 93 (50 per cent) out of 186, respectively. More patients waiting for a hip operation answered (86 per cent) than did other patient categories.

It was estimated that only 95 (14 per cent) out of the patients waiting for treatment would return to *paid* work after treatment; their contribution to the gross national product amounting to NOK 10 688 000/year after surgery. The economical benefit from the treatment of the remaining patients, about 600 (86 per cent), was estimated to be at least NOK 385 per patient. The total benefit to society of reducing the waiting period to close to zero was thus calculated to be NOK 10 688 000/year. If the benefit of treating the 600 patients not expected to return to the work force was increased to NOK 20 000/year per patient, the total benefit to society would amount to NOK 22 450 000/year.

The money transferred to the 700 patients waiting for treatment from the National Health Services and the reduced taxes totalled NOK 5 115 000/year.

Rationalizing orthopaedic waiting lists by microcomputer

Erik Sudmann

Hagavik Orthopaedic Hospital, University of Bergen, 5220 Hagavik, Norway

In Norway, patients waiting for orthopaedic surgery are usually listed consecutively in record books. Long queues of patients waiting years for surgery make this type of record inefficient. Using a standard CP/M programme and an 8-bit, single-user microcomputer, a waiting list of more than 800 patients was therefore revised. The microcomputer-programme permitted simple registration, retrieval, sorting, grouping, printing and analysis of information. After revision, the waiting list was transferred to an Altos multi-user microcomputer equipped with a standard Unix-based relational data base programme. This system also permitted automated printing of patient records for the manually kept waiting protocol, and name and address labels. In addition, it permitted printing of standardised letters, e.g. to groups of patients, confirming receipt of application for treatment, approximate waiting time before admission, and later additional standardised letters stating date and time of admission. Once a week, at night, the microcomputer printed sorted waiting lists. We intend to use the same microcomputer in the out-patient department as well. The cost of renting the microcomputer system with 3 terminals and 2 (cheap) printers, including tutorship and service, totalled NOK 100 000/year.