Acta Orthop. Scand. *58*, 337–346, 1987

Proceedings of the Norwegian Orthopedic Society

Oslo, October 24–25, 1986

Editor: Bernhard Paus

Via Nova 5C, N-1162 Oslo 11, Norway

Fractures

Experimental fracture healing: A comparison between conventional plaster cast treatment and functional treatment

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The aim of the present study was to find whether there were any differences between a conventional plaster cast and functional treatment in the pattern and the speed of bone healing.

Unilateral, midshaft tibial osteotomies were performed on 16 rabbits. The osteotomies were fixed by an intramedullary Kirschner pin and a long plaster cast from the toes to the midthigh. The Kirschner pin was removed after 1 week. In half the animals, the long plaster cast remained until the animals were killed at 6 weeks. In the other half, the cast was changed to a short plaster cast after 3 weeks. Thus, the animals of the latter group had a functional treatment during the last 3 weeks, permitting full weight bearing and almost normal mobility of the ankle and knee joints.

Radiographs after death showed bony union in five osteotomies with conventional plaster casts and in 7 cases with functional treatment. A moderate angulation of the fragments (0–20°), and abundant periosteal callus occurred in both groups. Although no significant differences in the mechanical properties of the healing bones occurred, there was an obvious trend towards greater strength and stiffness after functional treatment. The median strength and stiffness were 75 per cent and 117 per cent, respectively, in bones with functional treatment, compared with 50 per cent and 47 per cent after a conventional plaster cast.

The results indicate that the speed of bone healing was more rapid after functional treatment than after treatment with a conventional plaster cast, whereas there was no difference between the methods in the pattern of bone healing.

Rigidity of external pelvic frames

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We studied the rigidity of Hoffmann pelvic frame constructions in a cadaver model where one sacroiliac (SI) joint and the symphysis were disrupted. The variables in the constructions were 4- vs. 5-mm predrilled half pins, neutral fixation vs. compression, and single vs. double trapezoid (double "A") frame. The compression in the inner transverse rods was applied to such an extent that the disrupted SI joint started to open caudally. The disrupted hemipelvis was loaded with an increasing force cranially and the deflections were recorded. In the neutral frames the deflections increased gradually with increasing load, indicating unchanged stiffness at a wide range of loads. A 40-mm deflection was used at the end point (loads 25–80 N). In the compressed frames, the stiffness was high until the construction failed abruptly at a 45–130 N load. Sixteen experiments were performed. The following differences were found between the constructions: 5-mm pins gave a more rigid fixation than 4-mm pins (P=0.06, Fisher), compression was superior to neutral fixation (P=0.06), the double "A" frame with compression gave the strongest fixation (P=0.04).

Supracondylar humeral fractures in children

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Thirty-seven children were treated for a supracondylar fracture of the humerus at our hospital between 1976 and 1984. All the cases first underwent reduction and casting. When the reduction was not satisfactory, traction was applied with a Kirschner pin through the olecranon. In this series, 10 children had olecranon traction and none was operated on.

Another 3 children had no pulse in the radial artery after reduction and therefore underwent traction. One child has fasciotomy because of a compartment syndrome. None of the fractures was operated on. At follow-up, 3 children had a varus deformation of the elbow (mean 11°).

We conclude that conservative treatment of supracondylar fractures gives a satisfactory result.

Ender nailing of femoral shaft fractures

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A series of 25 patients with different types of femoral shaft fractures were treated with Ender nailing.

In 4 cases the fixation was inadequate, and these patients were reoperated on with additional pinning of the medullary cavity. After the operation the patients used crutches for some months. There was uneventful healing of all the fractures. Clinical and radiographic examinations revealed malrotation between 10 and 20 degrees in 4 cases and more than 20 degrees in 2 cases.

We conclude that Ender nailing of femoral shaft fractures is a simple and safe procedure that gives acceptable results.

Fractura colli femoris – a clinical study of three fixation methods

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Three different osteosynthesis methods for fractura colli femoris were analyzed. One group was operated on with three Gouffon screws (G group, n=95); another group had three Mecron screws (M group, n=120). These patients were analyzed prospectively for 12 weeks. A third group operated on with the Thornton nail (Th group, n=112) was reviewed. The median age was 81 years; 75 per cent of the patients were living at home and 60 per cent were fully ambulatory before the fracture. Totally, 75 per cent of the fractures were displaced (Garden III+IV). The median hospitalization time was 13 days and was equal in the three groups. The infection rate was 2.5 per cent and the general complications were 9 per cent; both were approximately equal in the three groups. The mortality rate was 7 per cent in the M group, somewhat higher in the G and Th groups (13% and 12%). The reduction results in the Gouffon and Mecron groups were similar and superior to the results in the Thornton group. The number of reoperations in the Gouffon group were 19 (1 compression screw, 17 hemiprostheses, and 1 total hip) and in the Mecron group 11 (3 compression screws, 5 hemiprostheses, and 3 total hips). There were 26 early fixation failures (within 3 months) in the Thornton group, and all were reoperated on (1 compression screw, 23 hemiprostheses, and 2 total hips). The difference between the groups was significant ($P<0.01$ chi square). In the Mecron group, 71 per cent were at home 3 months postoperatively as compared with 50 per cent in the other groups ($P<0.001$).

We conclude that in addition to reduction the method of fixation is of importance. Three Mecron screws with a 5-mm core diameter gave a lower frequency of early fixation failures and better social rehabilitation than 3 Gouffon screws with a 4-mm core diameter and the Thornton nail.

Better general health among the elderly: A reason for the rising incidence of hip fractures?

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Both hip fracture incidence and life expectancy are known to have increased during the last few decades. Seventeen studies of hip fracture incidence from Scandinavia and Great Britain were collected from the literature. It was found that there was a good correlation for both men and women between the incidence of cervical, but not trochanteric, fractures in the 75–79-year age-group and the mean life expectancy at 70 years of age at the time in the country concerned. It is suggested that an increase in the life expectancy among the elderly also entails better general health at any particular age, and that this may lead to a higher level of physical mobility, which increases the risk of falling. If this is correct, every improvement in the health of the elderly will further increase the hip fracture incidence unless more effort is made to prevent accidents among the elderly.

Upper extremity

Functional results following hand replantation/recirculation

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In the period October 1983 to October 1986, replantation/recirculation was performed in 16 patients with

17 totally/subtotally amputated upper extremity parts from the metacarpal to distal forearm level. The mean age of the patients was 38 (17–59) years, and 15 were males. The right hand was injured in 8 patients and the left in 7. One patient had a subtotal double amputation at two different levels of both hands. Seven hands were injured at the level of the metacarpals; another seven hands were injured through the carpal bones near the wrist, whereas three hands were amputated through the distal forearm.

All the replants healed, but in six hands, 12 fingers were not replanted or became gangrenous owing to serious damage distal to the level of the main injury.

The functional and cosmetic results in 13 patients with 14 replanted hands were analyzed 20 (8–34) months after the injury. Four patients had an excellent functional result, with normal extrinsic and intrinsic motor function and just a slight sensory loss. All of these patients were back in their former jobs. Another 4 patients had a good functional result with some reduction in motor function and/or obvious sensory loss. Two of these patients were back in their former jobs. Five patients with six hands had a poor functional result. These patients were just able to use the amputated hand as a supporting hand. The main reason for the reduced hand function was stiffness of the finger joints. Four of these patients were the eldest in the series (51–59 years), and the fifth patient was a 20-year-old schizophrenic man who was not able to follow the rehabilitation program. The cosmetic result was good in all 13 patients. No one had significant discomfort from the replanted hand.

The functional alternative to hand replantation is a working prosthesis and the cosmetic alternative is a cosmetic prosthesis. The 5 patients in this series who were classified as having poor functional results were in fact doing better with the replanted hand than they would have been with a prosthesis. The cosmetic and psychologic problems following a hand amputation is eliminated when the patient is treated by replantation. We conclude that replantation/recirculation is indicated in all cases of hand amputations.

The lateral upper arm flap

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This free flap, first described by Katsaros et al. in 1984, gets its blood supply from the posterior radial collateral artery (PRCA), which is the most constant terminal branch of the profunda brachii artery. PRCA vascularizes the skin of the lateral upper arm, the lateral aspect of the elbow, and the upper part of the forearm. The posterior cutaneous nerve of the arm and the forearm accompanies the PRCA, giving the possibility of a neurosensory flap. Bone from the distal lateral humerus can be incorporated in the flap, and a strip of the triceps tendon can be taken with the skin as a vascularized tendon graft.

We have seen the great potential of the lateral upper arm flap in hand surgery. The flap can be raised from the ipsilateral arm in a bloodless field using plexus anesthesia. We have used this flap in 3 cases of skin loss of the hand/fingers. The PRCA was anastomized to the radial artery in the tabatière. For venous drainage, two dorsal veins were used. Sound healing occurred in all 3 cases, and the patients were able to start training their injured hands a few days after surgery. The donor defects were closed primarily, and no donor site problems were seen. To us, this new flap seems to be very useful in reconstructive procedures of the hand.

Acromioplasty for chronic shoulder pain

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Acromioplasty according to Neer with division of the coracoacromial ligament was performed in 35 cases because of chronic shoulder pain and subacromial impingement syndrome. At follow-up the results were good in 30 of the 35 cases. In cases where medical and physical treatments are unsuccessful, surgical treatment should be considered within 3 months to avoid a long-lasting situation of being out of work.

CDH

Ultrasound examination of the hip joints in newborn infants

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The diagnosis of congenital hip dysplasia in newborn infants is mainly based on clinical examination. The reliability of the Ortolani test varies with the experience of the examiner, and false positive, as well as false negative, results occur. Thus, there is a need of improved diagnostic procedures.

In order to evaluate the use of ultrasound in the diagnosis of congenital hip dysplasia, 1,300 newborn infants were examined. They were examined by a pediatrician on the first day of life, and a positive

Ortolani test was found in 30 infants (23‰). The hip instability could be clinically confirmed in 10 cases on the third day by the orthopedic surgeon, and the diagnosis was confirmed by ultrasound in 8 of the 30 cases. One child was found to be clinically normal on the first day, and hip instability was diagnosed by ultrasound on the third day. Thus, hip instability was shown by ultrasound in 9 infants (7‰). The instability was demonstrated by pushing the femur dorsally, and it was most obvious in the transversal scan as a dorsal subluxation of the femoral head.

The following conclusions were drawn:

1. The great majority of newborn infants with neonatal hip instability are diagnosed by clinical examination provided that the Ortolani test is carried out by experienced examiners.

2. Hip instability could not be confirmed by ultrasound in a large number of the children with a positive Ortolani test, and it is assumed that these were false positive.

3. Total dislocation of the hip joint at birth is very infrequent.

Late diagnosed dislocation of the hip (CDH) in Sør-Trøndelag County

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A high frequency of late diagnosed dislocation of the hip has been reported in Sør-Trøndelag County. Whether this is due to a real high incidence or too wide diagnostic criteria is unknown. The aim of this study was to estimate the real incidence of late diagnosed CDH in our county and to evaluate the factors leading to diagnosis.

During the period 1981–1985, 122 children (7‰) were treated for late diagnosed CDH in our department. The radiographs of 13 patients were not available, and these patients were excluded. Thus, 97, girls (89%) and 12 boys were included in the study. The radiographs of the hip joints were classified into four groups: total dislocation (10 patients), subluxation (16 patients), dysplasia (23 patients), and normal (60 patients). The incidence of radiographically certain CDH was 3‰.

In 49 children with pathologic radiographs (group A), CDH was first suspected by the parents in 39 per cent, by the doctor in 49 per cent, and by other health personnel in 8 per cent. In 60 children with presumably normal radiographs (group B), the corresponding figures were 28, 48, and 13. The delay between the time of suspicion of CDH and the beginning of the treatment averaged 2.4 (0–12) months in group A and 1.6 (1–10) months in group B. The treatment was started before the age of 6 months in 69 per cent in group A and after the age of 1 year in 16 per cent. The corresponding percentages were 92 and 3 in group B. There was approximately the same family loading of CDH in both groups.

The study led to the following conclusions:

1. Based on strict radiographic criteria, CDH seems to have been overdiagnosed.

2. Even after excluding those with presumably normal radiographs, the incidence of late diagnosed CDH is high in Sør-Trøndlag.

3. CDH is still not diagnosed till after 1 year of age in some cases.

Late diagnosis of congenital hip dislocation in northern Norway

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A series of 142 children with late diagnosis of hip dislocation in northern Norway was analyzed. The incidence was abut 3‰, but in the period from 1975 to 1984, the incidence showed an increasing tendency. The age of the children was 6 (1–20) months. In 50 per cent of the cases, there was subluxation; in 40 per cent there was acetabular dysplasia; and in 10 per cent there was luxation. The reason for diagnosis was a family history in 24 per cent. On this basis, we suggest that in cases with a family history of congenital dislocation of the hip, but with normal clinical findings, special controls should be performed.

Open reduction in CDH patients

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In a 10-year period, 1976–1986, 22 CDH patients (26 hips) had open reduction performed because reduction by traction failed. Seventeen were girls and 5 were boys, 14 cephalic presentations and 8 breech cephalic. In 9 cases the left side was dislocated; in 7 the right. Six had bilateral dislocation, 4 of these needed open reduction on both sides. Only 6 of the 22 patients started treatment at our hospital. The others were referred because of treatment failure. The diagnosis was made in the newborn period in 12 of the cases; 6 of these were treated by Frejkas pillow, 3 by von Rosen splint, 2 by traction and plaster casts, and 1 by traction and surgery. Five were diagnosed between 1 and 2 years, and 2 were more than 4 years old. Eight patients (nine hips) had had open reduction before admittance to our hospital.

Our treatment for hip dislocation is skin traction and plaster cast. If the hip is not reduced after 4 weeks in traction, we do an open reduction through a transverse incision 1 cm distal to the spina iliaca anterior superior. In 23 of the hips, we achieved a good centering of the femoral head and subsequently a satisfactory development of the hip joint. In three hips that had all been operated on before and in which the acetabulum was very shallow, we did not succeed in getting a stable reduction.

Our conclusion is that open reduction for hip dislocation is seldom needed and very few orthopedic surgeons will gain the experience necessary for treating these cases. They therefore should be referred to special hospitals.

Hip arthroplasty

Results of the Lord cementless total hip prosthesis

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In 1983 and 1984, the Lord cementless total hip prosthesis was used in 27 patients (30 hips) aged 30 to 59 years. Follow-up examination was performed in 26 patients (28 hips) 24 to 38 months after the operation. The clinical results were evaluated according to the Charnley hip score. In 16 cases the results were excellent, and in 12 cases the results were good. The radiographic examination revealed ectopic bone formation in 13 cases. In 20 cases there was reactive cortical bone formation around the femoral stem, indicating nonphysiologic weight transmission from the prosthesis to the bone.

The early results with uncemented total hip replacement are promising, but the follow-up is too short for conclusions.

Cement or no cement, that is the question! Preliminary results of a prospective comparison between a cemented and an uncemented hip prosthesis

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A prospective comparative study was made of patients in the age-group 60–72 years with arthrosis of the hip treated with the cementless Zweymüller/Endler prosthesis (n=60) and the cemented Landos Titan prosthesis (n=60). The patients were comparable regarding sex, mean age, and body weight. All the prostheses were inserted via the direct lateral approach.

The mean operating time of the uncemented group (88 min) was significantly shorter than that of the cemented group (100 min). The operative blood loss was the same in the two groups. No deep infection occurred. One cemented hip dislocated.

All the hips were graded according to the Merle d'Aubigné/Postel numerical rating system. Preoperatively, no difference in the ratings for pain, walking ability and hip motion was seen. Four months after surgery the ratings in the uncemented group were 5.7, 4.6, and 4.2, respectively. The corresponding figures in the cemented group were 5.8, 4.9, and 4.6 ($P<0.05$). The significantly better functional results in the cemented group became more evident 1 year after the operation. The typical thigh pain reported in patients with uncemented hips was seen in 13 per cent of the patients in our uncemented group and in 3 per cent of the patients in our cemented group 1 year postoperatively. One uncemented hip prosthesis had to be revised a few days after the operation because a too small femoral prosthesis had been inserted. No other revision operations were carried out. Radiographically, no signs of prosthetic loosening were seen in either group 1 year after surgery.

We conclude that the short-term clinical results of an uncemented hip prosthesis are inferior to the results of a cemented prosthesis.

Endler's acetabular cup in revision arthroplasty of the hip

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Since Endler's acetabular cup was introduced in our clinic as part of a cementless hip prosthesis in January 1985, it has been used in 27 cases of revision arthroplasty. Twenty of the patients have been observed for more than 4 months and have been allowed full weight bearing. The sexes were equally represented, and the mean age was 60 years.

All the patients had a mechanical loosening of a total prosthesis. The ICHL and Christiansen prostheses dominated in number.

Transplantation of bone was necessary in 13 of 20 patients.

At follow-up, all the patients judged the result as good or excellent concerning the pain-reducing effect and function of the hip. We did not detect any migration or

change of cup position. Bone of good quality was built up around the cup and condensed in contact with the threads.

A soft-tissue plasty in recurrent posterior dislocation of the hip joint after total hip arthroplasty

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Moore described the posterior approach to the hip joint when he introduced the hemiprosthesis in the treatment of fractures of the neck of the femur in the elderly. The reconstruction of the capsule and the reinsertion of the tenotomized external rotators provide the stability of the joint. In total hip arthroplasty the joint capsule is removed and the reinsertion of the tenotomized external rotators is frequently not possible or not attempted. Thus, the stability of the joint depends on the positions of the two components of the prosthesis and their orientation. The stability of the hip after arthroplasty seems to be a minor problem using the anterolateral or the straight lateral transgluteal approach when the position of the prosthetic components is optimal. When using the posterior approach, however, there is reported, in spite of optimal positioning of the two components, a recurrent dislocation of the hip up to 6 per cent in different materials.

In a recurrent dislocation of the hip joint after arthroplasty when both the socket and the femoral stem are correctly positioned and when there is no evidence of loosening of the components, the revision arthroplasty with new implantation of an "antiluxation" model in the old patient is a challenge.

Based on anatomic studies and a small patient material, a soft-tissue plasty using the fascia lata to stabilize the hip joint has been developed. The stabilization is fulfilled by a rectangular flap of the fascia lata stalked on the tensor muscle. The fascial flap is led just distally to the insertion of the lateral vastus muscle beneath the muscle from anterior to posterior and then fixed in a fan form to the posterior acetabular rim with two or three standard cancellous bone screws and tagged plastic washers.

In 4 patients operated on with this technique, stable joints have been achieved. A recurrent posterior dislocation of the hip joint after total hip arthroplasty in old patients thus may be solved without revision of the components.

Knee

A 4- to 8-year follow-up of primary suture of rupture of the anterior cruciate ligament

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Reports from several knee centers suggest that the results of primary suture of acute ruptures of the anterior cruciate ligament of the knee using the Palmer technique are disappointing. Before starting a prospective, randomized study of three different surgical procedures for the primary treatment of ACL ruptures, we wanted to evaluate our results with the Palmer technique.

Methods. Eighty-four patients with acute rupture of the ACL were treated with primary suture ad modum Palmer in the 6-year period 1977–1982. The follow-up time was 4 to 8 years. Functionally, the patients were evaluated with Lysholm's functional score and Tegner's activity score. The stability was evaluated with Lachman and pivot-shift tests and instrumentally with a KT-1000 arthrometer. A Cybex II machine was used to evaluate muscular strength. AP projections in a standing position were used to evaluate the knees for arthrosis.

Results. In the function test, 75 per cent of the patients had a "good" or "excellent" result, and 25 per cent a "fair" or "poor" result. Twenty-five per cent had grade 2 or 3 instability in the Pivot shift tests, and this is characterized as unstable. When using the KT-1000 arthrometer, which measures anterior-posterior instability, 74 per cent of the patients had side-to-side differences within 3 mm, which is regarded as a normal difference. Forty-nine per cent of the patients had a Cybex II score of less than 90 per cent of the normal knee as regards the quadriceps muscle, and 56 per cent of the patients had less than 90 per cent of the normal knee as regards the hamstrings. Four patients had developed gonarthrosis according to Ahlbäck's classification, and 11 patients had reduced articular space when compared with the normal knee of more than 3 mm.

Conclusions. In this follow-up study of 4 to 8 years, every fourth patient had a bad result functionally. Every fourth knee was unstable. So far, only a minority has developed gonarthrosis. With this background it is concluded that the Palmer technique does not seem to be a suitable method for primary treatment of acute ruptures in the ACL.

Four- to 8-year follow-up after primary suture of anterior cruciate ligament tears in children

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Rupture of the anterior cruciate ligament of the knee in children is very unusual. Instead, they sustain fractures of the tibial eminence because the ligament itself is stronger than the epiphysis. The treatment of ligament ruptures in children is very seldom discussed in the literature, and consequently there is no agreement on method of treatment. In our department, the ACL ruptures have been treated the same way as we have been treating adults, that is, primary suture using the Palmer technique.

Patients and methods. Eight children with open epiphyses were treated with primary suturing ad modum Palmer of an ACL rupture in the period 1977–1982. The follow-up time was 4 years for 5 children, 7 years for 1 child, and 8 years for 2 children. The patients were evaluated with Lysholm's functional score and Tegner's activity score. The clinical evaluation consisted of Lachman and Pivot shift tests, an instrumental test of anterior-posterior laxity with KT-1000 arthrometer, as well as Cybex II tests for muscular strength and AP projection radiographs in the standing position.

Results. Three patients had a good functional result, and 5 patients had a fair result. Half the group had grade 2 or 3 Pivot shift scores and are characterized as unstable. At the KT-1000 test, 4 of 7 patients tested had a side difference of more than 3 mm. Of the 5 patients tested with Cybex II, only 1 had a significant decrease in muscular strength. The radiograph did not show gonarthrosis in any of the patients.

Conclusions. In this follow-up study 4 to 8 years after primary suture of ruptures of the ACL in children, only 3 of 8 patients had a good functional result. Half the knees were unstable. We conclude that the use of the Palmer technique is not sufficient in children.

Valgus osteotomy for medial gonarthrosis

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We have retrospectively evaluated the results of valgus osteotomy for arthrosis of the knee in patients operated on between 1976 and 1982. The material comprised 41 women and 26 men. Eleven patients were operated on bilaterally. Information was obtained from the hospital charts and radiographs. In addition, a questionnaire was sent to the 50 patients alive at the present time.

The hospital charts showed that 87 per cent of the patients were without pain at the last follow-up, on the average, 1 year and 11 months postoperatively. The questionnaire was distributed 6 (4–10) years postoperatively. We obtained answers from 26 women and 16 men, with totally 51 operated on knees. Four fifths of the patients were satisfied with the results of the operation, and three fifths of the patients had insignificant or no pain.

We have also tried to characterize the patients who had an unsatisfactory long-term result. Women and patients more than 70 years old had less satisfactory results ($P<0.01$). Patients with preoperative knee flexion less than 110 degrees did worse in the long term than patients with greater flexion range ($P<0.01$). There was a tendency for patients with preoperative rest pain, flexion contracture, or severe arthrosis to be more dissatisfied than others, but this was not statistically significant.

In conclusion, valgus osteotomy for medial arthrosis of the knee is a procedure with good short- and long-term results. Patients more than 70 years old, female patients, or patients with low flexion range tend, however, to have less satisfactory long-term results than other patients.

Benum's operation in the treatment of anterolateral rotatory instability of the knee joint

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Benum, after a suggestion by Lanny Johnson, has introduced a method for the operative treatment of anterolateral rotatory instability of the knee joint, wherein the lateral third of the patellar ligament is used as an extraarticular transplant. The ligament retains its distal attachment to the tibial tuberosity, while it is led with a bit of patellar bone proximally, underneath the lateral collateral ligament. It is then secured to the lateral femoral condyle with a staple, with the knee flexed and the leg in maximal external rotation (Benum 1982).

Since May 1983, 23 patients with incapacitating symptoms, unimproved by conservative treatment, were treated according to Benum. Twenty-two of them were available for a retrospective study; 14 of them had had operations on the same knee at an earlier stage, 7 for acute ligamentous injuries (ACL, MCL). Three patients

had previously been treated operatively for chronic instabilities. The Slocum test for lateral pivot shift appeared to be the most reliable one, because it would confirm the instability in the nonanesthetized knee in 21 of the cases.

Fifteen of the patients have been observed for more than 1 year after the operation (mean 28 months). The 12 patients with clinically stable knees at the time of the last examination were very satisfied with the results of the operation, whereas the remaining 3 patients without symptomatic relief all still had knees with lateral pivot shift.

Probably many of the operations for acute ligamentous injury either give insufficient stability primarily or they fail secondarily. Combined lateral and medial instabilities and earlier operations for chronic instabilities do not seem to preclude a favorable result. A persisting straight sagittal instability ("drawer sign") does not seem to affect the end result.

Only long-term observation can determine whether this method in the end will give better results than other operations designed to help the patient with a torn anterior cruciate ligament.

1. Benum, P. (1982) Anterolateral rotatory instability of the knee joint. Results after extraarticular transposition of the lateral part of the patellar ligament. A preliminary report. *Acta Orthop. Scand.* **53**, 613–617.

Synovectomy of the knee joint in patients with rheumatic diseases

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Methods. A retrospective study was started including all patients operated on with synovectomy of the knee joint during the years 1967–1969. Patients without subsequent surgery of the knee joint were reexamined during 1985.

Material. A total of 118 synovectomies in 95 patients were performed; 54 patients with 68 knee joint synovectomies were included in the study. Average age was 44 (8–65) years. The diagnosis was rheumatoid arthritis in 53, juvenile rheumatoid arthritis in 5, psoriatic arthropathy in 4, ankylosing spondylities in 4, and hemophilia in 1.

Results. Subsequent surgery was necessary in 26 knee joints on an average 8 years after primary surgery. The results were poor in 4, acceptable in 13, good in 15, and excellent in 10 knee joints without subsequent surgery. The results were best in patients with small or no radiographic changes and with a short duration of knee joint involvement prior to surgery. Poor preoperative function was likely to improve following synovectomy. Patients with serious radiographic changes and knee joint symptoms over a longer period prior to surgery had benefit from synovectomy, but must expect subsequent surgery at a later date. A postponement of more radical surgery for an average of more than 8 years was considered as a good result.

Lower extremity

Lower leg muscle strength 2 years after proximal epiphyseal distraction of both tibiae: Case report

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A 15-year-old female with a skeletal age of 14 years presented with hypochondroplasia and disproportionately short stature. She had a standing height of 126 cm (−5 SD). Using a Hoffmann-type external device (Jaquet L-401) in a bilateral configuration with four transfixation pins, she underwent epiphyseal distraction (1.5 mm/day) of both tibiae. After 9 weeks of distraction, lengthening of 8.5 cm (32%) was achieved bilaterally. Bilateral Achilles tendon lengthening of 2.5 cm was performed during the distraction period. The external fixator was removed 4 months after distraction and an orthosis was used for 10 months bilaterally. The girl was very motivated for intensified muscular training.

Twenty-two months after removal of the left fixator, the patient felt no reduction in muscular strength compared with preoperative status. However, she had a sensation of stiffness in both ankle regions after hard physical exercise and a slight feeling of diminished muscular coordination and balance control in the right leg.

Maximum isometric strength tests of ankle muscles in flexion and extension were performed preoperatively, 22 and 24 months following removal of the left tibial distraction apparatus. No obvious deficit in muscular strength was found on the left side, whereas right side muscle strength showed a reduction of 15 per cent in both test directions. The decrease in strength was not significant, given the measurement variability. When the second set of tests were repeated 2 months later to check the reproducibility, the mean results varied less than 5 per cent from the earlier results.

Lengthening of the ovine femur by callutasis

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Limb lengthening of the left femur by callutasis was performed in 12 sheep, 7–8 months of age. After corticotomy and osteoclasis of the bone in the proximal diaphyseal part, the bone segments were fixed in the reduced position using a unilateral external fixation device (Orthofix®, small limb lengthener 5 cm). The fixator was left in the neutral position for 10 days postoperatively when lengthening started. By means of distraction at a rate of 1 mm daily for 3 weeks, an average lengthening of 1.9 cm (12%) was obtained.

Two weeks after distraction had been discontinued, solid bony union in the lengthening zone was confirmed radiographically in all the animals. At this time dynamic axial loading of the elongated bone was allowed in half the animals. The external device was retained until 5 weeks after the end of distraction when the animals were killed.

Both femora of all the animals were tested mechanically with the contralateral bones as controls. The average ultimate torsional strength of the elongated femur was 65 and 71 percent of that of the control bone in the nondynamized and dynamized bones, respectively. No difference in strength of the tested bones in the two groups was found.

Syme, Boyd, and Pirogoff amputations

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The aim of this study was to collect our experience with the Syme, Boyd, and Pirogoff amputations, and if possible to clarify which patient groups are most suitable for these types of amputations.

Material. Twenty-nine amputations in 28 patients, 19 males and 9 females, aged 44 (4–75) years. In 12 cases the reason for amputation was arteriosclerosis, often combined with diabetes. A variety of different developmental anomalies were the background for 10 amputations, and 7 patients had posttraumatic problems or chronic infections of the foot.

Results. Mean healing time, frequency of reamputation, mean total hospital stay (included inpatient training with the prosthesis) were recorded in these groups:

	N	Healing time (days)	Hospital stay (weeks)
Circ/diab.	12	108	26
Devel. anom.	10	94	6
Trauma/inf.	7	78	9

Seven patients had to be reamputated later – all belonged to the group with circulatory problems.

Function: 16 patients could walk without support; 2 walked with 1 cane/crutch and 1 used two crutches; and no data were recorded in 2 cases. Thirteen patients were able to walk longer distances; 4 could walk short distance. None had unlimited walking distance. Seventeen patients had a completely nontender stump; three stumps were slightly tender, and 1 patient gave no information on this point.

Conclusion. The high frequency of reamputation in the circulatory group (58%) suggests that these types of amputation are unsuitable for these patients. The good functional results with nontender weight-bearing stumps can probably compensate for the long healing time and long hospital stay.

Imaging applications

Ultrasound in orthopedic diagnosis

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Ultrasound has recently been introduced in orthopedic diagnosis. The method is appropriate in synovitis, bursitis, abscesses, and hematomas, as well as in cysts and other fluid-containing tumors. Ultrasound is particularly promising in diagnosing congenital hip dislocation. In our hospital, ultrasound is now routinely used in the examination of the hip joints in newborn and infant children. The main advantages are that cartilage and soft tissues, as well as bone, are visualized, that the examination is dynamic, and that the exposure to x-rays can be reduced.

In the diagnosis of coxitis, ultrasound represents a simplification and improvement compared with conventional methods. By ultrasound-guided puncture of the hip joint, the intraarticular pressure can be measured and exudate or pus aspirated. Thus, the exposure to radiation to the patient and the doctor, associated with fluoroscopy-guided puncture can be eliminated. Ultra-

sound is also appropriate in measuring the anteversion angle of the femur, and the results are sufficiently accurate for routine clinical use.

It is concluded that ultrasound is a rapid and painless procedure that has already proved to be of great value in the diagnosis of various orthopedic diseases. In other conditions, ultrasound is at present in the trial phase and represents an interesting research area. It is assumed that ultrasound will gain an important position in orthopedics in the near future and that ultrasound equipment will be available in all orthopedic departments.

Operative localization of small cystic bone processes with computerized tomography guidance

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Three, 5–20 mm in diameter, bone processes (one benign supraacetabular bone cyst, one supraacetabular Brodie's abscess, and one osteoid osteoma of the femoral shaft) were localized by inserting a Kirschner wire with CT guidance into the lucent process under epidural anesthesia. The cyst and abscess were biopsied for histologic examination and bacteriologic studies by drilling a core biopsy bore along the K wire into the process. The osteoid osteoma, diameter 5 cm, was exactly localized with the K wire and chiseled out through a small muscle-splitting incision. In conclusion, CT improves the accuracy in locating small intraosseous lesions for biopsy and treatment.

DNA flow cytometry in chondrosarcoma

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Seven chondrosarcomas were analyzed. Histologically six of them were originally designated as low-grade and one as high-grade malignant tumor. The DNA histograms showed normal (euploid) populations of nuclei in low-grade tumors. Aneuploid populations were present in three tumors. Two of the latter, as well as a tumor with high tetraploidy and octoploidy (24% of all the nuclei) recurred. The tumor designated as high-grade had large populations of aneuploid nuclei and recurred. In two tumors, one low- and one high-grade, a hypodiploid cell population was found, which is rare in bone tumors. In one tumor, graded as low-grade and recurring twice, an increasing number of aneuploid populations with high C values were found. In connection with recurrence, a 2.2 C population had vanished and been replaced by a 4.4 C population. We conclude that tumors with aneuploid cell populations are suspect of high-grade malignancy. DNA flow cytometry is therefore an important adjunct to the difficult histologic grading or chondrosarcomas.