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The Norwegian Orthopedic Society arranged its annual meeting at Ullevål Hospital, Oslo, October 27–28, 1989. The meeting was organized as part of a joint meeting for all the Norwegian Surgical Associations.

The orthopedic papers considered experimental orthopedics, fractures, shoulder and spine, hip, knee, infections, and some other topics

Experimental orthopedics

The effect of activated muscle on leg-loading capacity

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Previous studies of the strength of the lower leg of anesthetized rats revealed an increase in the ultimate bending moment of 40 percent compared with the dissected contralateral tibia. The ultimate energy absorption increased by 85 percent. The anesthetics relaxed the muscles; and to study the effect of activated muscle on leg-loading capacity, the experiment was repeated during electrical stimulation of the ischiadic nerve.

Materials and methods: Five male Wistar rats, weighing 320–380 g, were tested. Two unipolar electrodes were ligated around the proximal ischiadic nerve, and tetanic contraction was induced with a nerve stimulator. The right lower leg was loaded to failure in a static three-point bending test during tetanic contraction. The dissected left tibia was tested correspondingly as a control.

Results: The ultimate bending moment increased by 100 percent, the ultimate energy absorption by 314 percent, and the ultimate deflection angle by 106 percent ($P < 0.05$). The bending stiffness decreased 1 percent.

Conclusion: Tibial fracture strength in rats is doubled by tetanic contraction in the lower leg.

Effects of exercise and nonweight bearing on fracture healing

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Biomechanical effects of exercise and nonweight bearing on the healing of femoral osteotomies in rats were studied. A transverse osteotomy of the left midshaft of the femur was made and stabilized by intramedullary nailing. The rats were randomly allocated into three groups: one group underwent a 4-week training program 4 weeks after the osteotomy. In the second group, tenotomy of the left achilles tendon was performed; thus, the limb was fully mobile, but was unable to bear any weight. The third group served as a control, as the rats were moving freely in their cages. At 60 days after osteotomy, the production of callus, bending moment, bending rigidity, and energy expenditure were evaluated.

There were no significant differences in callus production between the three groups. The bending moment was significantly less in the nonweight bearing rats as compared with the other groups, but there were no significant differences between these. Similar results were found in energy expenditure. The bending rigidity in the exercised rats was about twice the values in the two other groups.

The results indicate that normal function of the muscles and joints, including weight bearing, promotes fracture healing. Additionally, increased activity above normal function is of less importance in accelerating the process of healing.

Strength of the rat femur 1 year after fracture

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In 26 anesthetized rats an elastic steel wire was peroperatively passed through the greater trochanter and into the medullary canal of the femur. In 20 animals closed midshaft fractures were performed, while the remainder served as controls. The wires were removed after 36 days. Radiographs were obtained at intervals. Six animals died before the end of the study.

The maximal transectional callus area decreased gradually between the 5th and the 55th postoperative week, when the animals were killed. At this time, the fracture areas were still not fully remodeled. Three-point bending tests showed that medullary nailing alone resulted in no permanent change in mechanical properties. The strength of the fractured femora was reduced by 5 percent (P = 0.065) as compared with the contralateral side, while stiffness was reduced by 11 percent (P = 0.006), deflection by 23 percent (P = 0.001), and energy absorbed before failure by 40 percent (P = 0.001).

Even after 1 year, the fractured femora thus had a decreased ability to withstand forces that might produce fracture.

Stability of osteosyntheses used in femoral neck fractures: An experimental study comparing the strength of five different osteosyntheses

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Thirty human cadaver femora (15 pairs) were randomly divided into five groups. A subcapital osteotomy was performed and thereafter fixed with a hip compression screw (HCS; Zimmer; 10 femora), two Olmed screws (five femora), two Tronzo VLC screws (5 femora), two cannulated Richards screws (five femora), or three Steinmann pins (2.4 mm; five femora).

The specimens were subjected to a continuous vertical load until breakdown (max. strength). We continuously measured the dislocation of the osteotomy. The maximal strengths (median) were HCS 260 kp, Richard screws 135 kp, Tronzo VLC screws 120 kp, Olmed screws 125 kp, Steinmann pins 100 kp. The HCS pins were significantly stronger than the Steinmann pins (P < 0.05). Among the others, no significant differences were found.

The median rigidity of the five different groups was found by measuring the slope (in the elastic area) of each test curve. There were no statistical significant differences in rigidity.

With an applied force of 100 kp, the dislocation of the osteotomy was less than 1 mm in the Tronzo VLC, Olmed, and HCS groups. In the groups with Richards screws and Steinmann pins, the dislocation was about 2 mm. These differences were not statistically significant.

The results of the present study indicate that all the methods except the Steinmann pins may be used in the treatment of hip fractures, but do not indicate which of the osteosyntheses should be preferred.

Effect of continuous local injection of somatomedin C on experimental bone repair

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Somatomedin C is a growth factor for mesenchymal stem cells in vitro. This peptide hormone also stimulates mitosis and differentiation of primitive chondroblasts and osteoblasts in vitro, and increases matrix formation. In vivo, the proliferation and differentiation of osteogenic cells form the basis of bone repair. Thus, there is substantial theoretical support for the hypothesis that somatomedin C might enhance this process. Earlier, we have been unable to show that systemic administration of somatomedin C has any effect on bone repair in an osteotomy model in the rat (Kirkeby and Ekeland 1990). The present study reports on the effect of somatomedin C administration directly into the osteotomy site.

Material and methods: A total of 20 adult Wistar rats (450–500 g) were operated on. The right femur was osteotomized followed by intramedullary nailing. A needle was inserted into the osteotomy site and connected to a subcutaneous osmotic minipump delivering somatomedin C (110 µg/100 g per day) or placebo. All the animals were killed 4 weeks postoperatively.

Results: No effect was found in the treatment group as compared with controls as regards torsional strength, deformation, or stiffness. Radiographic healing was similar in both groups. Neither was there any effect on callus weight, callus vascularization, or mineralization. The results do not suggest that local administration of somatomedin C promotes the early phase of diaphyseal repair in long bones.

Reference

Kirkeby O J, Ekeland A. Effect of continuous subcutaneous infusion of somatomedin C on experimental bone repair. Acta Orthop Scand 1990; 61, Suppl 235: 11–12.

Fractures

Expenditure of hospital resources in the treatment of closed tibial fractures in adults

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Fifty patients treated in 1982–86 for closed, displaced tibial fractures with functional orthosis (*n* 25) or locked nailing (*n* 25) were selected for this study. The groups were matched according to the fracture type, age, and sex. There were 17 females and 33 males (median age 36 (16–83) years) included.

	Operation group	Conservative group
Total hospitalization, days	13 (4–26)	7 (3–19
Time in operation room, minutes	195 (115–280)	90 (35–185)
Sick leave, days	48 (14–236)	82 (14–375)

The number of outpatient and radiographic controls did not differ. There were no infections in the operation group, and one superficial infection in the conservative group. There was one reoperation for malalignment in the operated on group and one delayed union in the orthosis group. There were 21 excellent or good results in the operation group and 16 in the conservative group. The number of fair and poor results was 4 and 9, respectively.

We conclude that locked intramedullary nailing of closed tibial fractures implies a higher expenditure of treatment resources than conservative treatment, but allows for an earlier mobilization and gives a better guarantee for a favorable result.

Slotted versus nonslotted locked intramedullary nail for femoral shaft fractures

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We compared the properties of the slotted and the nonslotted locked intramedullary nail for femoral shaft fractures in a series of 46 patients. The fractures were selected and randomized to nailing with 24 slotted and 22 nonslotted Grosse-Kempf nails. Thirty-six of the fractures were sustained in high-energy injuries. Two fractures in both groups were open type I–II. Nineteen fractures were of Hansen Type III–IV. Thirty-three fractures were operated on within 24 hours, and the latest on Day 24. The nailings were done closed with the patient supine on a traction table. We experienced four complications in the slotted group and three in the group with nonslotted nails; the complications were not considered to be dependent on the choice of nail, and they did not affect the final result. But in three elderly patients treated with nonslotted nails, splintering of the distal fragment occurred during the operation. Static locking solved the problem in 1 patient. Another patient was reoperated on with distal cerclage and a change of screws. In the third patient the distal splintering precluded the use of an intramedullary nail, and the case was salvaged with an AO condylar plate. This was the only failure in the series. The results were evaluated at 12 (12–24) months according to Thoresen et al. (1985). Twenty-five results were excellent, 15 were good, 5 fair, and 1 poor.

The main advantage of the locked femoral nail is the prevention of rotary malalignment and shortening. A slotted nail allows for satisfactory healing of femoral shaft fractures. The increased stiffness of the nonslotted nail does not seem advantageous, and it may cause splintering of the bone, especially in older age groups even when the reaming is 2 mm above the diameter of the nail.

Open fractures in patients with multiple injuries

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The aim of this study was to investigate the special problems in open fractures in patients with extensive trauma and to analyze the effect of a standardized wound regimen. From January 1987 to July 1989, we treated 34 patients with open fractures and multiple injuries. They had a total of 47 open fractures. Sixteen fractures were located in the upper extremities, 14 in the femur, and 17 in the lower leg. Twenty-one fractures were open Grade I, 14 were Grade II, 4 were Grade IIIA, 4 were Grade IIIB, and 4 were Grade IIIC. Twenty-eight fractures were treated according to the previous wound regimen. Wounds that could not be sutured primarily were treated with nonocclusive dressing, repeated change of bandages moistened in physiologic saline, and wound debridement as necessary. Delayed primary closure was used in noninfected cases. Since August 1988, 19 fractures were treated according to the new regimen (Table 1).

There were six infections among the first 28 first fractures and two infections among 19 fractures during the second period. There were four amputations, two of which were due to infection.

Open fractures require special care, especially in

patients with multiple injuries. If the treatment is started early, internal fixation, usually by locked intramedullary nailing is preferred in open fractures Grade I–II and external frames in Grade III open fractures.

Table 1. Treatment of open fractures with a soft-tissue defect

- Immediate thorough debridement, copious irrigation, gentamycin PMM pearls, Sorbact®, occlusive wound cover.
- Fracture stabilization with external frame or medullary nail.
- Systemic antibiotic therapy (dicloxacillin or cephuroxim).
- Wound revision 24–48 hours after injury and as needed thereafter.
- Delayed primary closure at 5–7 days or secondary closure.
- Bone grafting 3–6 weeks after injury.

Should syndesmosis screws be removed?

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Seventy patients had a transfixion syndesmosis screw in connection with operative treatment of ankle fractures at Haukeland Hospital in 1985. This year, syndesmosis screws were not removed routinely, and patients had to contact the hospital if symptoms in the operated on ankle occurred. Fifty-eight patients, 30 women and 28 men, median age 47 (17–74) years, were seen at follow-up after a median of 30 (24–34) months. Radiographs in standard projections were taken together with a clinical examination.

Results: Twenty-four patients had already had their syndesmosis screw removed. Two screws were removed because of low age— one because of professional occupation (diver), and one was planned to be removed 6 months after the operation. The other 20 were removed because of pain, stiffness, and swelling. Of the 24 patients who had had the screws removed, 4 had synostosis, 5 fracture of the screw, and 11 loosening of the screw. Of the 34 who still had the screw in situ, 4 had synostosis, 4 fracture of the screw, and 21 radiographic signs of loosening of the screw. Altogether, 8 patients had synostosis, 9 patients had fracture of the screw, and 38 had clinical and/or radiographic loosening of the syndesmosis screw. Twenty out of 58 patients contacted the hospital because of complaints at 16 (3–24) months after the operation. Patients with synostosis had low mobility and most pain, while patients with loosening of the screw or fracture of the screw had nearly normal mobility and less pain.

Conclusion: Syndesmosis screws should be removed within 12 weeks postoperatively

Shoulder and spine

Staple capsulorrhaphy for recurrent anterior dislocation of the shoulder

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The use of screws or staples in shoulder surgery has the potential disadvantage of neurovascular complications or impingement problems caused by faulty placement, secondary dislocation, or breakage of the implant or recurrent instability. Faulty placement can be avoided, and if the implant does not break or loosen, the remaining hardware problem would be impingement due to recurrent instability.

Patients and methods: Sixteen shoulders in 15 patients with recurrent anterior dislocations had refixation of the detached anterior capsular ligaments with a ligament staple ("Richards fixation staple system"). The average follow-up time was 19 (8–36) months with clinical and radiographic evaluation.

Results: No redislocations or subluxations occurred. One patient experienced apprehension in the provoking position. According to the Rowe score system, the result was excellent in 13 shoulders and good in three shoulders. Two shoulders had between 25 and 50 percent limitation of external rotation. None of the staples has dislocated or broken.

Conclusions: After this short follow-up, the method had given excellent stability, and we have not seen any problems related to the staple. The results are superior to the published results of arthroscopic stapling techniques.

Severe spine injuries in Trondheim

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During the period 1984–1986, 41 of 49 fractures of the thoracolumbar spine were operated on. In a prospective study, 35 patients were followed up up to 33 (21–45) months. There were 20 men and 15 women with a mean age of 29 (16–62) years. Most frequent were fractures of L 1 (17), L 2 (6), and Th 12 (5). The cause of injury was a fall from a height in 13 and a traffic accident in 12 cases.

Thirteen were occupational injuries. The most frequent injuries were burst fractures (15) and flexion fractures (15). Seventeen patients had other injuries.

Harrington's technique was used in all but 2, with distraction in 21, compression in 8, and both in 4 fractures. Harri-Luque was used in the remaining 2. Twenty-six patients had an intraspinal bony encroachment, and posterior decompression was performed in 17 cases. Time in bed was 13 (5–30) days. There were 9 urinary tract infections and 1 case of pulmonary embolism.

Compression preoperatively was 46 (2–86)percent, postoperatively 11 (–11–4) percent, after 4 months 18 (2–42) percent, after 12 months 19 (2–45) percent, and after 33 months 19 (4–47) percent. Kyphosis preoperatively was 17 (–14–46) percent, postoperatively –1 (–17–7) percent, after 4 months 5 (–16—21) percent, after 12 months 8 (–17–30) percent, and after 33 months 11(–7–32) percent. The Frankel grade preoperatively was 4A, 3C, 14D, and 14E, and after 33 months 4A, 7D, and 24E.

At the last follow-up, 17 patients had back pain; and of these, 9 had thigh/leg pains. Twenty-four had normal neurologic findings. Among the 4 patients with total paraplegia, 2 could walk with braces and crutches, 1 could drive a car, and 3 used uridom or self-catherization. All the patients with partial paralysis could walk and drive a car, and only 1 used a catheter. Twenty-three had full-time jobs, 6 were being rehabilitated to work, and only 2 were on welfare.

Conclusion: The compression of the vertebral body did not increase after 4 months postoperatively, while the kyphosis increased steadily during 33 months postoperatively. The majority of the patients are employed.

Hip

Dynamic ultrasound in the primary evaluation of late-discovered congenital hip dislocation

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The aim of the present study was to evaluate the potential for dynamic ultrasound in the primary examination and treatment of late-discovered congenital hip dislocation.

Patients and methods: In the 3-year period 1986–1988, 16 patients were treated for congenital subluxation (7 patients, mean age 6 months) and dislocation (9 patients, mean age 12 months). On the longitudinal ultrasound scan from the lateral aspect, the distance from the lateral tangent of the ossification center of the femoral head to the lateral bony rim of the acetabulum was measured (lateral head distance, LHD). Dynamic ultrasound was applied to observe whether the hip could be reduced by gentle manipulation.

Results: The mean LHD in the neutral position was 7.6 mm in subluxation and 14.3 mm in dislocation. By flexion, abduction, and varying degrees of internal rotation, closed reduction guided by ultrasound was achieved at the initial examination in all the patients with subluxation and 6 of the 9 patients with a dislocation. Primary reduction was not achieved in the 3 oldest patients (25, 26, and 49 months of age).

Conclusions: Important information with regard to decision making in congenital hip dislocation is obtained, even at the initial examination, by dynamic ultrasound. The technique is suitable for guiding closed reduction and for assessing the effects on the stability of various positions in children under 2 years of age. In older children, this assessment is less reliable.

Slipped capital femoral epiphysis: Prophylactic fixation of the contralateral hip?

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The percentage of bilaterality in slipped capital femoral epiphysis has been reported from 14 to 80 percent. The purpose of this study was to compare radiographic methods in detecting asymptomatic slipping.

Patients and methods: The radiographs of 36 patients were evaluated by three different methods: according to Hansson (1987), Murrey (1965), and a third method where the central femoral neck axis (FNA) in the lateral view was determined by drawing a line perpendicular through the center of the most narrow part of the neck, measuring the angle between this line and the line through the epiphyseal axis.

Results: Twelve patients had already been treated bilaterally because of symptomatic slipping. Of the remaining 24 patients, we found bilateral involvement according to Hansson, Murrey, and FNA in 53, 61, and 44 percent, respectively. Only 2 patients had slipping according to all three methods. True slipping was assumed to be present when at least two methods indicated slipping. This occurred in 5 cases in addition to the 12 patients already treated; thus, 47 percent of the patients had bilateral slipping. Five patients were extremely obese (height/weight < 1.5 cm/kg), and 3 patients were very tall and thin (h/w > 2.8 cm/kg). These patients represented a high-risk group, as 4 had been operated on for bilateral slipping, and the other 4 had slipping according to our criteria.

Conclusions: The correlation between three different radiographic methods used to indicated asymptomatic slipping was poor. Prophylactic fixation of the contralateral hip is recommended in extremely obese and very tall/thin patients.

Shelf operation and femoral osteotomy in dysplastic hips

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Persistent acetabular dysplasia causes a diminished weight-bearing area and increased stress of the hip joint. In 1891, König first described the construction of a shelf of bone in dysplastic hips to form a buttress against the femoral head. In 1950, Pauwels introduced the varus intertrochanteric femoral osteotomy to improve the weight-transmitting area of the joint. In symptomatic dysplastic hips, we have combined the shelf procedure and intertrochanteric osteotomy in one operation. The short-term results of such combined operations have been compared with the short-term results of femoral osteotomy only.

During the years 1983 to 1987, in all 21 patients (23 hips) underwent a combined operation, while 14 patients (15 hips) underwent intertrochanteric varus osteotomy only. The age of the patients ranged from 16 to 49 years, and none of them had radiographic signs of arthrotic changes in the joint. All the patients followed the same postoperative rehabilitation regimen, i.e., crutches for 3 months and increasing weight bearing during this time.

All the patients have been followed for 2 to 3.5 years. At follow-up, the results were good in 17 hips, fair in four hips, and poor in two hips of those who had been operated on with a combined procedure. The evaluation was based on symptoms of hip instability, pain, and fatigue. The centrum edge angle was increased from 13° ± 9° to 41° ± 11. An average varisation of 18° had been achieved, which had caused a shortening of the limbs between 1 and 4 cm. There was a gluteal insufficiency in 10 of the 23 hips.

The results were good in 10 hips, fair in four hips, and poor in one hip of those who had been operated on with varus femoral osteotomy only. The varisation was on an average 19°, which had caused a limb shortening between 1 and 4 cm. There was a gluteal insufficiency in 6 of the 15 hips. There were no differences in hospitalization, morbidity, or rehabilitation period between the two groups.

In conclusion, in symptomatic dysplastic hips a combined operation with the hip shelf procedure and femoral osteotomy can be carried out without increased morbidity as compared with varus intertrochanteric femoral osteotomy only.

Norwegian national register for total hip replacement: A report of 8,857 operations

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The Norwegian National Register was established in September 1987. All 60 hospitals performing total hip replacements in Norway are reporting to the Register.

Materials and methods: Until September 1989, 8,857 total hip replacements were reported. Of these, 7,635 were primary hip replacements and 1,222 were revisions.

Results: The lateral approach was used in 60 percent and the posterolateral approach in 30 percent of the cases. A trochanteric osteotomy was used in 30 percent of the operations. Cementless acetabular components were chosen in 18 percent of primary operations and in 24 percent of revisions. In the femur, cementless femoral components were used in 12 percent of the primary operations and in 19 percent of the revisions. The Charnley prosthesis constituted 48 percent of the implants. In the acetabulum, 35 different prostheses were used, and in the femur 33 types. Of head components, 23 different types were used. Peroperative complications were seen in 3 percent of the primary operations and in 9 percent of the revisions. The reason for reoperation was loosening of the acetabular part in 57 percent, loosening of the femoral part in 67 percent, infection in 4 percent, femoral fracture in 4 percent, and luxations in 3 percent. The Christiansen prosthesis constituted 28 percent of the removed prostheses. Of the revisions, 68 percent were performed with cementless prostheses.

Allografts in the repair of bony defects in hip revision surgery

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After repeated hip prosthesis surgery, the fixation of the new prosthetic components can be very difficult, often resulting in a Girdlestone hip. This increasing problem is encountered in both rheumatoid and arthrotic patients. Thus, material from our bank for osteoarticular allografts have been employed to reconstruct the bone-deficient pelvis and proximal femur.

Patients: Six patients with a mean age of 65 years were operated on. The mean observation time was 6 (1–15) months. Two patients had defects chiefly in the pelvis, 3 in the proximal femur, and 1 on both sides.

Methods: The pelvic defect was replaced with an alloacetabulum configured to match the defect, screwed to the pelvis, and a standard polyethylene cup was cemented into the alloacetabulum. The deficient femoral bone was replaced with an allofemur, in 2 cases plated to the distal femur, and in 2 cases placed inside a big, egg-shell-like cavity. A long-stem femoral component was cemented into the construction.

Results: One patient had secretion from the wound for

4 weeks, but no bacteria could be cultured. All the hips were radiographically stable. The function of the hips was good.

Conclusions: The methods described are good alternatives to a Girdlestone end-stage procedure. The short-term results are encouraging.

Peripheral neuropathies after total hip arthroplasty

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The incidence of peripheral nerve lesions in clinical reviews varies from 0.53 percent to 3.0 percent in primary hip replacement and from 2.9 percent to 7.6 percent in revision arthroplasty.

From January 1980 to December 1988, we found 11 patients with peripheral nerve damage in 1,289 total hip replacements, i.e., 0.85 percent. Seven patients had sustained injury to the sciatic nerve, 2 to the femoral nerve, and 2 had sustained an injury to both the sciatic and the femoral nerve. Two thirds of our patients were permanently disabled.

Sequential intrapulmonary thrombin generation and monomethyl-methacrylate (MMA) extraction during hip arthroplasty

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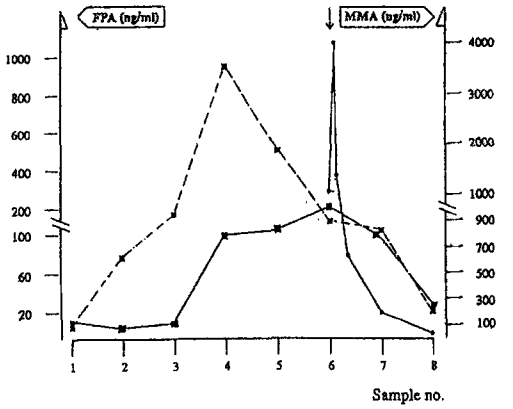
During acrylic hip arthroplasty, cardiorespiratory collapse (CRC) may occur following the femoral implantation. The purpose of the present study was to correlate the sequential profile of MMA and coagulation parameters in mixed venous (MVB) (——) and arterial blood (AB) (– – –).

Patients and methods: Eight patients with coxarthrosis were investigated with frequent, simultaneous MVB and AB samples, analyzed on Fibrinopeptide A (FPA) (■) (1), Thrombin-antithrombin III complex (TAT) (●) (2), and MMA 3. *Statistical method:* The Area Under the Curve.

Results: EPA and TAT-III followed a rather similar pattern. Preparation of bone induced a slow increase in



MVB and a steep rise in AB values ($P < = 0.05$). After implantation, MMA reached a maximum concentration within 0.5–1 minute, with a marked veno-arterial gradient ($P < 0.05$). The highest concentrations followed the femoral impaction (↓). There were large interindividual variations.

Conclusions: A massive intrapulmonary thrombin generation was detected during and after bone preparation, prior to the femoral implantation. MMA reached its peak concentrations immediately after femoral implantation, indicating minor or no procoagulant effect, but coinciding with the time for CRC to occur. The measured a-v difference indicates partial pulmonary elimination of the monomer.

References

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Knee

Posterior cruciate insufficiency operated on with LAD augmentation

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Since 1986, we have used the Kennedy LAD for augmentation in reparation or reconstruction of the posterior cruciate ligament.

Ten patients, 8 males and 2 females, were examined retrospectively. The median age was 24 (21–47) years. Two patients had chronic posterior cruciate insufficiency, whereas the others had fresh injuries of their posterior (6 patients) or both (2 patients) cruciate ligaments.

Direct suture a.m. Palmer was augmented with LAD in five of the acute injuries, while three had an additional augmentation with a strip of the patella tendon a.m. Marshall. The 2 patients with chronic insufficiency had patellar tendon plasties a.m. Clancy with LAD augmentation. Eight patients had "olecranization" with a 3.5-mm-unthreaded Steinmann pin through the patella into the upper part of the tibia. One patient did not have "olecranization" due to cartilage injuries on the patella, and 1 was operated on before the procedure was introduced in our treatment.

All the patients were mobilized primarily with assisted active movements from 20°–40° until removal of the Steinman pin 2 months postoperatively. Thereafter free mobilization without orthosis.

Results: One patient had antibiotics due to a postoperative fever and suspicion of a deep infection without verification of this diagnosis. Other complications were not recorded. At follow-up 30 (9–32) months postoperatively, the patients' subjective evaluation was excellent in 2, good in 4, and fair in 4. Lysholm's knee score was 93 (80–100) points. Maximal instability measured with KT 1000 as difference from normal in either 10° or 70° of flexion was 2 mm in 3 patients, 3 mm in 1 patient, 4 mm in 2 patients, 5 mm in 2 patients, and 7 mm in 1 patient. The 2 patients with chronic insufficiency were the most unstable in manual testing, with a sagittal difference from normal of 5 and 7 mm. Clinically, these 2 revealed relapse of full instability.

Conclusion: Short-term results in operative treatment of acute injuries seem acceptable, although full stability was not obtained in any patient.

Infections

Infection after operation for fractures in the upper end of the femur

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The records of 2,018 patients treated in the period 1977 to 1985 for fracture in the upper end of the femur were reviewed. Postoperative infection was recorded in 3.4 percent: viz., 1.8 percent were superficial and 1.6 percent were deep. The infection rate was related to the type of fracture, as those with femoral neck fracture had infection in 4.2 percent, those with trochanteric fractures 1.6 percent and those with subtrochanteric fracture 7.4 percent.

Infections were also related to the type of fixation device. For the femoral neck fractures, reoperation had to be performed because of infection in 0.3 percent when two von Bahr screws were used and in 3.5 percent when a hip compression screw was used. Those with a trochanteric fracture had to be reoperated on because of infection in 0.4 percent when Ender nails were the fixation device and in 1.7 percent when the hip compression screw as the device.

In patients given antibiotic prophylaxis (cloxacillin), an infection rate of 1.7 percent was found in those operated on with the hip compression screw, while 7.0 percent was seen in those without prophylaxis ($P < 0.01$). Two-dose prophylaxis, one given at the introduction of the anesthetic and one dose 4 hours later was as effective as a prophylaxis of several days' duration. Increasing operating time was related to increasing infection rate.

In sum, the infection rate after fracture of the proximal end of the femur is related to the type of fracture and to the type of fixation device. Antibiotic prophylaxis reduces the infection rate.

Postoperative infection in orthopedic operations

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A retrospective study of the infection rate after total hip surgery in a conventional surgery department with a separate unit for orthopedic surgery, with an air exchange 20/h, and without special exhaust systems, showed an infection rate of 1.7 percent. The rate of deep infections was 1.1 percent. To follow the infection rate continuously, to maintain a good hygienic standard, and to get a baseline for improvements in the operating room construction, a data-based prospective study was planned. An aspiration sample is taken from any operation wound before starting antibiotic treatment. In January–March 1989, 420 orthopedic operations were registered and corresponding microbiologic data collected. Three positive bacterial cultures (1 *Staphylococcus aureus*, 1 *S. albus*, and 1 *Micrococcus* sp.) were recorded, giving an infection rate of 0.7 percent. Finally, 20 negative cultures were recorded, and in none of these cases did an infection develop.

Miscellaneous

Giant-cell tumors of bone

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Giant-cell tumors of bone are rare. The prevalence is one to two in a million. They constitute about 8 percent of all the primary bone tumors. There is a great variation in clinical behavior and microscopic appearance from the quiescent to the aggressive type. Local recurrence is high, up to 40 percent using curettage and bone grafting. Distant metastases occur in about 2.5 percent.

Patients: We treated 18 cases with active or aggressive giant-cell tumor from 1970 to 1988, 15 during the last 6 years of the period. There were 11 males and 7 females with a variation in age from 17 to 65 years (median 39 years). The anatomic site was distal femur (7), proximal tibia (4), metatarsus (2), proximal humerus (1), distal radius (1), metacarpus (1), lumbar spine (1), sternum (1).

Treatment: The primary surgery was resection and allograft replacement, condylar or hemijoint (7), curettage and filling with bone cement (5), curettage and autogenous/homologous bone grafting (3), resection and reconstruction with massive autogenous graft (2), and resection only (1). Adjunctive therapy with phenol, liquid nitrogen, or alcohol was not employed.

Results: The observation time varied from 1 to 9 years (median 2.5 years). Three major complications occurred. One recurrence after curettage and bone grafting. The original histologic diagnosis in this case was an aneurysmal bone cyst. The second procedure in this patient was resection and allograft replacement. One allograft was infected and a knee amputation had to be done. In 1 case, necrosis of a femoral condyle developed after curettage and filling with bone cement. This patient was treated with a high tibial osteotomy.

The final grading according to Enneking was excellent (15, good (1), fair (1), and poor (1).

Fibrous dysplasia: A review of 19 cases

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During the years 1950–1989, 19 patients (12 women, 7 men) with fibrous dysplasia were diagnosed at our hospital. Eleven revealed the monostotic and 8 the polyostotic form. The mean age at diagnosis was 7 and 21 years, respectively, in the polyostotic and the monostotic group. The follow-up was 2–31 years. An operation was performed in 14 of the patients (8 monostotic, 6 polyostotic).

Three of the patients had lesions in both the upper and lower extremities. Three patients revealed the disorder in the upper extremities only. Among the 16 patients with the affections in the lower extremities, 12 had abnormalities situated in the proximal femur.

Pain was the initial symptom in 8 patients, whereas spontaneous fractures were seen in 5 cases. Three patients presented with a palpable mass. No malignancy developed in any of the patients.

A total of 19 surgical interventions were performed in 6 patients suffering from the polyostotic form: three interventions were due to relapses. In the 8 patients with the monostotic form, 12 operations were performed, three of which were due to relapses. Indications for operation were intractable pain, impending spontaneous fracture, or increasing malalignment.

Conclusions: Older patients were more often affected by the monostotic than by the polyostotic form. Patients suffering from the latter were subjected to more operations. There was a preponderance of females in the present material, and the proximal femur was a predilection site.

Reproducibility and effect of learning in isokinetic testing of muscle forces by Cybex 340

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Objective testing of muscle forces is dependent on many factors that are difficult to control, and the results may show great interindividual and intraindividual variations. Despite the fact that isokinetic muscle testing using different angular velocities has gained wide use as supplementary information in orthopedic diagnostics and rehabilitation, the reliability of objective measurements has not been well documented.

Methods: Nineteen voluntary healthy persons (9 women, 10 men), aged 18–31 years and with ordinary level of activity, were tested four times during a 3-month period in knee extension and flexion with five repetitions of 60°/sec (strength) and 25 repetitions of 180°/sec (endurance).

Results: The difference between one test and the former decreased on an average with repeated testing. However, due to a wide dispersion of individual results, no significant effect of learning was found for the most common parameters. Based on estimations of confidence intervals, a difference greater than 6 percent could be interpreted as significant after four times of testing.

Conclusion: Following adequate instructions, knee testing by use of Cybex 340 provides objective and reproducible measurements of muscle force.

Snowmobiling—a dangerous recreational activity

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In Finnmark, the northernmost county in Norway, snowmobiles are used extensively both in traditional reindeering and for recreational purposes. Recently, there has been a public discussion on the issue of safety and regulations of snowmobiling. During the winter season 1988/89, every injury that required medical care was recorded prospectively in a population of 47,500.

Sixty-one persons were involved in 58 accidents (4/5 males). No deaths were recorded, but several persons sustained life-threatening injuries. Twenty-eight fractures were recorded, mostly in the lower extremities. Sixteen person suffered from injuries to the head; 10 of them had been unconscious. Lacerations, rupture of ligaments, low back pain, luxations, rupture of the small bowel, lesion of the pancreas, and hypthermia were also recorded.

Thirty-three patients were treated by general practitioners. Twelve were outpatients at the hospital, and the remaining 16 were hospitalized. Fourteen of the hospitalized patients were admitted to the orthopedic department.

A temporal variation was disclosed, with more injuries being reported on weekends. Of the injured persons, 6 appeared to be inebriated.

The rate of injuries per registered snowmobile was over three times the rate of road traffic injuries during the same period.

The majority of the injuries occurred during recreational use of snowmobiles.

Better training, stricter regulations and more surveillance may reduce the high injury frequency. Helmets also can reduce the severity of head injuries. Last but not least, the use of alcohol when snowmobiling must be strongly discouraged.

Surgery of rheumatoid arthritis in Norway—cooperation surgeon/ rheumatologist

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A committed appointed by the Norwegian Society for Rheumatology and the Norwegian Society for Surgery of Rheumatoid Arthritis has prepared a report concerning the treatment of rheumatic patients in Norwegian hospitals.

In general, the care of rheumatologic disorders is characterized by a low capacity due to restrictions and inadequate resources. There are great variations between counties. Two counties rest their care upon the neighboring county, and one has no such service.

At five of the 21 hospitals that offer a rheumatologic service there is no or only insufficient rheumatoid surgery. Twenty senior consultants, but only 5 junior doctors, are mainly assigned to rheumatoid surgery. Why is the cooperation between surgeon and rheumatologist important, and on which conditions? Who should have the superior professional responsibility in such teamwork? Should the patients be moved back and forth between the rheumatologic and surgical departments or should the surgeons be more closely associated with the rheumatologists in a "combined unit"? Should rheumatoid surgery, as a profession, be better organized during the education in orthopedic surgery?

Unfortunately, the care of rheumatologic disorders still has low priority in Norwegian orthopedic surgery, but the aim ought to be that when the indications are clear, operative treatment should be carried out without delay.