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Arthroplasty

Total hip replacement with an uncemented acetabular cup

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Thirty-three patients were operated on with an uncemented, porous coated titanium cup, and a cemented femoral stem (Müller straight stem). Eighteen men and 15 women, with a median age of 60 (37–76) years, were evaluated clinically and radiographically after a median of 17 (12–24) months. The clinical and radiographic findings were compared with an age- and sex-matched group of 33 patients operated on with a conventional cemented Müller straight-stem prosthesis. The inclination and the anteversion of the cup in the two groups showed no differences, as did the frequency of ectopic ossification and subchondral bone changes. Two patients in the uncemented group were reoperated on, one because of immediate displacement of the cup and one because of late infection. In the cemented group, one hip dislocated and another was reoperated on owing to aseptic loosening.

The clinical evaluation according to Merle d'Aubigné and Postel gave equal results in both groups. We conclude that the clinical and radiographic results after 1.5 years in patients with an uncemented acetabular cup were as satisfying as after conventional cemented total hip replacement.

Revision of uncemented total hip replacement

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In a series of 213 consecutive cemented total hip replacements a.m. Lubinus, the clinical course after 72 revisions and 141 primary procedures was compared. The revised THRs were uncemented Ring prostheses. Mean follow-up time was 4.5 and 5 years, respectively. The patients were evaluated according to the hip score described by d'Aubigné. In the revision group, pain, mobility, and walking ability scored 5.5, 4.9, and 5.0, respectively. The corresponding figures in the primary group were 5.7, 5.2, and 5.4.

Dislocation and peroperative fracture were more common in the revision group ($P < 0.05$). Two failures due to aseptic loosening were encountered in the revision group and three in the control group. Furthermore, three reoperations were performed in the revision group because of recurrent dislocations. None of the patients ended up with excisional arthroplasty and no infection was encountered. Radiographic evaluation of component loosening and positioning, calcar resorption, and paraarticular ossification disclosed only slightly inferior results in the revision group. Our study indicates that revision of uncemented THR is not associated with increased risk of infection, but a higher rate of dislocation and peroperative fracture, however, not interfering with the final clinical results.

Progression of heterotopic bone formation during the first year after total hip arthroplasty

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The aim of the present investigation was to establish whether heterotopic bone formation (HBF) progresses during the first year after total hip arthroplasty (THA), and to evaluate the influence of indomethacin on a possible progression.

The study included 253 hips in 253 patients. All the patients took part in a randomized, double-blind clinical

trial of indomethacin versus placebo for prevention of HBF after THA. HBF was graded on AP radiographs of the hip after 6, 12, and 52 weeks, and according to DeLee et al. (1976).

Sixteen hips were excluded from the study because of absence of first quality radiographs, leaving 237 hips to evaluate. In all, 102 patients were treated with indomethacin (Confortid®, 25 mg three times daily) for 6 weeks, commencing on the day after arthroplasty, and 16 patients had indomethacin in the same dosage, but for a shorter period. The remaining 119 placebo-treated patients had no anti-inflammatory drugs during the first 6 weeks after the arthroplasty.

In placebo-treated patients, progression of HBF was shown in 24 hips (20 per cent). Sixteen hips (13 per cent) had a progression between the 6th and the 12th postoperative weeks, while the remaining eight hips did progress between the 12th and 52nd week. In patients treated with indomethacin for 6 weeks, progression was shown in five hips (5 per cent), all between the 12th and the 52nd week. In patients treated with indomethacin for 6 weeks, progression was shown in five hips (5 per cent), all between the 12th and the 52 week and from a grade 0 HBF to a grade I HBF.

The study has shown that HBF may progress during the first year after THA, generally between the 6th and 12th postoperative week. Only in 1 patient did HBF progress more than one grade. Indomethacin-treated patients had significantly less progression in HBF during the first postoperative year than placebo-treated patients ($P < 0.001$).

Reference

DeLee, J., Ferrar:, A., Charnley, J. Ectopic bone formation following low function arthroplasty of the hip 1976:121:53–59.

Thrombosis prophylaxis in elective hip surgery

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We present a prospective, double-blind, controlled study that compares the antithrombotic efficacy of low-dose heparin/dihydroergotamine (LDH/DHE), low molecular weight heparin/dihydroergotamine (LMWH/DHE), and placebo.

Totally, 356 patients undergoing total hip replacement (THR), were randomly placed in the three groups. All the thrombi were diagnosed by ascending phlebography. Twenty-nine per cent of the patients in the LDH/DHE group and 32 per cent in the LMWH/DHE group developed deep-vein thrombosis (DVT), both differing significantly from 55 per cent in the placebo group. There was no significant difference in the incidence of DVT between the DDH/DHE and the LMWH/DHE groups. The operative blood loss in the LMWH/DHE group was significantly higher than that in both of the other groups. However, the number of patients needing blood transfusion and the amount of blood given did not differ. Severe hemorrhagic complications were observed in 2 patients, 1 in the LMWH/DHE group and 1 in the placebo group. No patient died during the study.

Our study indicates that prophylactic treatment against postoperative DVT with low molecular weight heparin + DHE once daily is as effective and safe as conventional low-dose heparin + DHE twice daily in patients undergoing THR. The once daily regimen has the advantage of better patient acceptance and less nursing time.

Occupational ability before and after total hip arthroplasty

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Working ability was evaluated in 221 patients below aged 65 years before and 1 year after total hip arthroplasty. Preoperatively, 82 per cent of the men and 58 per cent of the women were working. Of these, 89 per cent were still working 1 year after the operation, while only 2 patients of those totally disabled prior to the operation were working 1 year after surgery.

Among the working patients, 35 per cent were sick listed preoperatively on an average for 11 months. At follow-up, 1 patient was sick listed. Preoperatively, 50 per cent of the patients received a pension. Another 25 per cent of those not receiving a pension preoperatively became pensioners during the first postoperative year, resulting in 62 per cent receiving a pension at follow-up. There was no difference in the clinical result of the operation, estimated by walking ability and pain score, between patients working and not working at follow-up.

Medial modular knee arthroplasty a.m. Marmor for arthrosis

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Between 1977 and 1983, 43 unicompartmental arthro-

plasties were performed in 36 patients (median age 68 years). The length of follow-up was 3 to 9 years. The stage of medial arthrosis according to Ahlbäck was Stage I, no knees; Stage II, 18 knees; Stage III, 23 knees; and Stage IV, 2 knees. Concomitant lateral arthrosis was found in 6 knees (Stage I) and patellar arthrosis in 16 knees. Before surgery, 4 patients had mild pain, 33 moderate, and 6 severe pain on walking.

At follow-up, 28 patients had no pain, 14 mild pain, and 1 patient moderate pain on walking. Of the 14 patients with mild pain, 9 had a preoperative varus deformity of 15 to 20° and/or a flexion contracture of 15 to 25°. This deformity and contracture was seen in another 9 knees, but these were painless. For the remaining 6 patients with pain at follow-up, concomitant arthrosis had developed in three knees and progressed in three knees in the lateral compartment. There were five superficial skin necroses. No other complications were seen.

It is concluded that unicompartmental arthroplasty is valuable in the treatment of medial arthrosis, even in cases with nonfixed varus deformity less than 20°, flexion contracture less than 25°, and concomitant moderate patellar arthrosis.

Peripheral blood pressure after total hip replacement

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Twenty-nine consecutive patients had their arm, ankle, and toe pressures measured (strain gauge) bilaterally before total hip replacement and 1 and 6 weeks after operation. Preoperatively, 6 patients had a peripheral pressure below normal values, but none had signs of ischemia at rest. One week after the operation, a decrease was found in the ankle and toe pressures bilaterally, but they correlated with the systemic systolic blood pressure. In the group with a lowered pressure, a significant fall was found in the arm-toe gradient ($P < 0.05$) and in the ankle-toe gradient ($P < 0.02$) on the operated on side after 1 week. After 6 weeks the pressures had returned to the preoperative values. In all the patients a significant rise was found in the ankle-toe gradient on the operated on side from week 1 to week 6 ($P < 0.03$).

We conclude that in patients with a normal pressure, no changes will be found apart from those caused by changes in the systemic pressure, whereas in patients with a lowered distal blood pressure a transient decrease in pressure can be found in the operated on leg.

Lower extremity

Leg length discrepancy measured with computed axial tomography

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Routine methods for determining limb lengths are full of potential for error. A method for measuring leg length with computed tomography equipment was evaluated for accuracy, efficiency, cost effectiveness, and radiation exposure levels.

The precision and accuracy of CT scanogram bone-length measurements were compared with conventional orthoroentgenogram using in vitro models. Applicability in the presence of joint contractures, interobserver accuracy, and radiation dosage were compared between the two methods. We found that orthoroentgenogram and CT scanogram provided equally accurate and precise measurements. However, when the distance between bone and table top was increased due to soft-tissue accommodation, CT scanogram was more accurate than orthoroentgenogram. When flexion contractures were present, the CT scanogram was accurate, but the orthoroentgenogram was not. Radiation dosage using the CT scanogram was less than 50 per cent of orthoroentgenogram dosage.

The cost of the two methods was the same. The CT scanographic examination took 15 min and was easily accommodated without any prior scheduling between major scheduled studies in the the CT scan room.

Conclusion: The CT scanogram has, to date, been found to be more accurate, delivers less than one half of the irradiation dosage, and takes no longer or costs no more than an orthoroentgenogram.

Supracondylar femoral fracture following total knee arthroplasty

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Ipsilateral suparacondylar femoral fracture is a serious complication in patients with total knee arthroplasty. During the period 1978–1985 inclusive, we treated 12 women and 4 men with this complication. Ten fractures were stable and only slightly displaced. They were treated in a cast and united within 12 weeks without any complications. Six fractures were unstable and displaced. They were treated with AO-plate fixation in 4 cases

and Rush pinning in 2 cases. Of four patients treated with an AO osteosynthesis, three developed serious complications (deep infection and/or loosening of the internal fixation device). The 2 cases treated with closed reduction and Rush pinning united uneventfully.

Fracture of the intercondylar eminence of tibia in children

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Fracture of the intercondylar eminence of the tibia is relatively uncommon, and usually occurs in children. The purpose of this study was to present the criteria of treatment for this particular fracture.

Fifteen children with a median age of 12 (8–15) years were treated between 1979 and 1986. According to Meyers' classification, there were two Type 1, eight Type 2, four Type 3a, and one Type 3b fractures. The two Type 1 fractures, six Type 2 and two Type 3a fractures, and one Type 3b fracture were treated by immobilization, whereas two Type 2 and three Type 3a fractures were treated by open surgical reduction and fixation of the fragment by resorbable sutures. The follow-up period was 54 (6–96) months.

In the conservatively treated group, the results were excellent in six, good in one, fair in two (Types 2 and 3a) and poor in one (Type 3b). In the operatively treated group, there were three excellent, one good, and one poor result (Type 3a, operated on after 1 year).

We conclude that Type 1 fractures can be treated by simple immobilization, whereas Type 3 fractures require open surgical reduction and fixation of the fragment.

Proximal tibial epiphyseal fractures

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During a 12-year period, we treated 15 patients with proximal tibial epiphyseal fractures (PTE). According to the Salter-Harris' classification there were four Type II, four Type III, six Type IV and one Type V fractures. Six patients, all with Types IV and V lesions, had concomitant avulsion fractures of the tibial spine.

Twelve patients were treated conservatively, whereas 3 were operated on. At the follow-up, 8/12 patients had complaints. Two patients had subjective and clinical instability of the knee, while another two showed isolated anterior laxity. Two patients had major angular deformity, and in 1 of these, a wedge osteotomy had been performed. One patient had a significant leg-length discrepancy. One patient with an unstable knee had panarthrosis, while 2 other patients showed signs of slight medial arthrosis.

In the treatment of PTE, attention must be drawn to concomitant ligamentous injuries, as well as to growth disturbance.

Results after operative treatment of fractures of the lateral tibial condyle

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The indications for surgical treatment in the 26 fractures in this series were clinical instability of the extended knee joint and/or severe depression of the tibial plateau without associated osteoporosis. All the patients were treated by open reduction and internal fixation with an AO compression screw, but bone grafting was not used as a standard procedure. All 26 patients were examined clinically, but 2 patients did not attend the radiographic examination. The mean follow-up was 62 months.

Radiographically, in 8 knees the result was excellent, in 15 good, and in 1 the result was poor. Seven patients had developed arthrosis. Clinically, 24 patients had no pain or only slight pain. Five patients had greatly reduced walking ability. All the patients had a total range of motion exceeding 90°, but 4 had a slight valgus instability of the extended knee joint. The overall results were excellent in 16 patients and good in 10 patients.

Knee laxity and meniscal injury

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Twenty-seven patients with unilateral isolated traumatic meniscal injuries were tested by stress radiography for anteroposterior (AP) laxity in both knees. Sixteen of the patients were also tested for valgus-varus laxity. Follow-up time was 3 (0.5–5-5) years. Seventeen of the patients had undergone medial meniscectomy, and 10 patients had undergone lateral meniscectomy. A control group consisting of 14 persons with no history of knee trauma were tested for AP laxity in both knees. For statistical analyses, the two-tailed Pratt, Mann-Whitney, and Wilcoxon tests were employed.

A significant increase in varus laxity ($P < 0.01$) as

compared with the contralateral knee was found in the patients who had undergone medial meniscectomy. No change in varus-valgus laxity was found following lateral meniscectomy.

We found no increase in AP laxity in the meniscectomized knees when compared with the contralateral knees. However, both knees in the patients who had undergone medial meniscectomy had significantly greater AP laxity than the control group ($P < 0.001$). We conclude that meniscectomy does not cause increased AP laxity, but medial meniscectomy does cause increased varus laxity. It seems that AP hyperlaxity predisposes to injury of the medial meniscus.

Patellectomy in the treatment of chondromalacia patellae

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The purpose of this study was to evaluate the long-term results of patellectomy performed for severe chondromalacia patellae. Twenty patellectomies were carried out in 18 patients (mean 31 years). At follow-up, 17 patellectomies in 15 patients were evaluated with the knee scoring scale by Pinsky and Olson (1978). The average follow-up time was 5.5 years. No knees were rated as excellent, five as good, nine as fair, and three as poor. In 12 cases the patients were satisfied with the operation, but all the patients still had some complaints.

Patellectomy in advanced cases of chondromalacia patellae seems to relieve the pain at the expense of the normal function of the knee.

Reference

Pinsky, H. A. and Olson, D. R. (1978) The results of excision of the patella. *J. Am. Orthop. Assoc.* 78, 286–289.

Nonoperative treatment for complete rupture of the medial collateral ligament of the knee

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A 2-year follow-up investigation is presented in order to evaluate conservative treatment of complete ruptures of the medial collateral ligament of the knee.

Twenty-five consecutive patients were followed in a prospective study. The diagnosis was verified by stress radiographs. The knee was immobilized in 30° of flexion in a plaster cast for 2 weeks followed by a cast brace for 4 weeks allowing knee motion from 30 to 80°.

All the patients were reviewed 4 and 24 months after the injury using the Marshall's knee injury score test and gonylaxometry.

Results:	4 months	24 months
Marshall's knee score	46.2 (35–50)	48.5 (42–50)
Medial laxity (mm)	2.0 (0–9)	1.4 (0–8)
Anteroposterior instability	2 patients	3 patients
Atrophy of quadriceps >1 cm	4 patients	0 patients
Feeling of knee instability	5 patients	2 patients
Limitations in sports	3 patients	0 patients

After 2 years, 2 patients still had unacceptable medial instability; both had stopped using the cast brace 3 weeks after the injury. None of the 25 patients had clinical signs of meniscal lesions.

Displaced tibial shaft fractures treated with AO compression osteosynthesis

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Fifty-one displaced tibial shaft fractures in patients more than 15 years of age treated with the AO compression osteosynthesis were reexamined 3 to 5 years after their injury. A high frequency of complications was found. Twenty-five patients had complications, such as refracture (6), osteomyelitis (1), delayed union (5), pseudarthrosis (4), sequester (4), angulation 5–10° (7), skin necrosis (2), superficial infection (11), and deep infection (9). The high numbers of deep infections could not be related to a high or low energy fracture, a closed or open fracture, the experience of the surgeon, the operating time, or whether or not the fracture was operated on within 6 hours after the accident.

We concluded that the AO compression osteosynthesis should not be used in our department at present.

Conservative treatment of severe ankle sprains

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In a prospective study, 186 patients with severe ankle

sprains were randomly allocated to treatment with a below-the-knee walking cast (WC) or early mobilization with either Barfod's bandage (BB) (Barfod 1948) or Couman's bandage (CB) (van Moppes and van den Hoogenband 1982). All the bandages were used for 5 weeks. Six patients did not complete the originally instituted treatment (WC 1, BB 2, CB 3).

After a mean of 20 weeks, 151 patients were evaluated clinically (WC 53, BB 46, CB 52). Patients treated with Barfod's or Couman's bandage had been able to resume daily activities (WC mean 4.0, BB 2.2, CB 2.1 weeks) and sports (WC mean 10.7, BB 5.8, CB 6.3 weeks) earlier than patients treated with a walking cast ($P < 0.05$). The patients treated with Couman's bandage were more satisfied with the course of treatment than were the two other groups. There was no difference between the groups concerning the occurrence of pain, feeling of instability, or clinically demonstrable instability or tenderness.

After a mean interval of 3.4 years, 153 patients (WC 53, BB 50, CB 50) responded to a questionaire regarding late symptoms. There was no difference between the groups concerning working or sporting ability or the occurrence of pain or feeling of instability, but the patients treated with a walking cast had had fewer repeat sprains (WC 15, BB 32, CB 39 per cent of patients; $P < 0.05$).

We concluded that treatment of severe ankle sprains with early mobilization with Barfod's or Couman's bandage allows a shorter absence from work and sports than does treatment with a walking cast. Couman's bandage provided the more comfortable course of treatment. In long-term follow-up, the patients treated with a walking cast had fewer repeat sprains.

References

Barfod, B. (1948) Hefterplasterbandage ved distorsio pedis (Adhesive tape bandage for treatment of ankle sprains). *Ugeskr Læger* 110, 44.

Moppes, F. I. van and Hoogenband, C. R. van den. (1982) Diagnostic and therapeutic aspects of inversion trauma of the ankle joint. Bohn, Scheltema and Holkama, Utrecht/Amsterdam.

The rectus abdominis flap for repair of defects of the extremities

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The rectus abdominis flap based on the inferior epigastric vessels transplanted by microvascular surgery is suitable for repair of soft-tissue defects in the extremities. This applies especially to defects in the lower part of the legs, where local flaps are not appropriate. An approach through the anterior rectal sheath allows the muscle flap to be raised on its pedicle.

Free transfer of rectus flaps was used in 13 cases for compound fractures (2), infected compound fractures (8), simple soft-tissue defects (2), and chronic osteomyelitis (1). Ten flaps healed completely and bone union was seen in 8 cases. Two of these had an additional fibula graft from the opposite leg. There was no weakness of the abdominal wall or herniation in the donor sites.

In the management of patients with compound fractures with insufficient blood supply or osteomyelitis, this treatment substantially improves the results.

Reference

Taylor, G. I., Corlett, R. J. and Boyd, J. B. (1984). The versatile deep inferior epigastric (inferior rectus abdominis) flap. *Br. J. Plast. Surg.* 37, 330.

Arthroscopy

Arthroscopy of the knee joint in the outpatient clinic

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The purpose of the study was to evaluate arthroscopy under local anesthesia in the out-patient clinic.

From August 1985 through December 1986, 205 arthroscopies were performed. Acute knee injuries were excluded. The mean age of the patients was 34 (16–77) years. The arthroscopic examination was performed with a 5-mm arthroscope and a standard anterior lateral portal. A probe for testing the intraarticular structures was used in all the cases.

In 56 patients intraarticular lesions necessitating hospitalization were found. Forty patients had arthroscopic operations performed under local anesthesia as an outpatient procedure. In 106 patients the arthroscopy was diagnostic only, but it provided information in the planning of further treatment. The predictive values of the clinical examination in the diagnosis of meniscal lesions were 0.43 (lateral) and 0.45 (medial).

Diagnostic arthroscopy under local anesthesia is a safe and reliable method in the diagnosis of knee disorders and is well tolerated by the majority of patients. However, 28 per cent of the patients required another arthroscopic or operative procedure.

Meniscectomy under local anesthesia in the outpatient clinic

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During a 9-month period, I planned to perform arthroscopic resection of flap tears and bucket-handle lesions of the menisci in direct continuation of a diagnostic arthroscopy under local anesthesia. Thirty-eight patients with 40 meniscal lesions were included in the study. The patients were premedicated with 10 mg of diazepam, and lidocaine (with adrenaline) was infiltrated corresponding to an anteromedial and an anterolateral approach. In 31 patients the arthroscopic surgery was completed, whereas in 7 cases the surgery had to be stopped due to pain or a tight knee. The functional results after 18–26 months were comparable to other reports on arthroscopic meniscal surgery.

Bloodless field in arthroscopy: A prospective randomized trial

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A prospective randomized trial was set up to investigate if routine use of a bloodless field during diagnositic and operative arthroscopy of the knee was preferable.

The trial was approved by the local scientific ethics committee. After informed consent, 31 patients underwent arthroscopy with a tourniquet and 31 without. Consumption of time and flushing fluid were measured, and the field of vision was estimated. Sixteen patients in each group were treated by operative arthroscopy. No difference in time or fluid consumption during diagnostic arthroscopy was measured. With a bloodless field, a median of 1.3 liters of saline was consumed and a median of 35 minutes was used to perform the operative part of the arthroscopy, whereas 3 liters of saline and 58 minutes were necessary without a bloodless field (Mann-Whitney's rank sum test, $P < 0.05$). For both diagnostic and operative arthroscopy, the field of vision was found clearer when a tourniquet was applied ($P < 0.001$). The groups were equal regarding sex, age, and the character of the arthroscopic surgery. There were no complications in any of the groups.

In arthroscopic surgery a bloodless field reduces the time needed, the fluid consumed, and gives a clearer field of vision.

Hemangioma of the knee diagnosed by arthroscopy

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In 6 patients with a hemangioma of the knee, 2 could be operated on at once with the same anesthesia when a localized intraarticular synovial hemangioma was diagnosed by arthroscopy. In 3 patients the localization of an intermediate hemangioma was diagnosed by arthroscopy, but an angiography was done before the final operation. The last patient had had no intraarticular bleeding, and arthroscopy was not done.

In 4 of 5 patients, a previous arthroscopy had not disclosed the hemangioma.

We recommend that video equipment and tourniquet should not be used in cases where a hemangioma is suspected.

Amputations

Skin perfusion pressure measured by photoelectric technique

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In 222 extremities (92 with diabetes) needing major amputation for ischemic gangrene, the skin perfusion pressure (SPP) was measured below the knee by a standardized photoelectric technique. If the SPP was less than 30 mmHg below the knee, SPP was also determined above the knee. The diabetic group had a higher SPP at the BK level than nondiabetics ($P < 0.001$). The primary below knee (BK): above knee (AK) amputation ratio for diabetics and nondiabetics was 3.8 and 1.3, respectively ($P < 0.001$). The healing rates among 140 BK amputations in relation to SPP at the amputation level were 50 per cent when SPP = 21–30 mmHg, 85 per cent when SPP = 31–40 mmHg, and 89 per cent when SPP was > 40 mmHg. The healing rates for 68 AK amputations were 64 , 92, and 97 per cent within the same SPP categories. The trend of increasing healing rate with increasing SPP values was significant among BK as well as among AK amputations ($P < 0.05$). The overall healing rates were 86 per cent in BK and 90 per cent in AK amputations. In all, 73 per cent of diabetics and 47 per cent of nondiabetics retained their knees, where SPP guided level selection.

In conclusion, the standardized photoelectric techni-

que is a reliable method for preoperative assessment of the chances for healing and for level selection in amputation surgery. The healing rates obtained by the photoelectric technique are identical to those found with radioisotope technique for determining SPP. The photoelectric technique should replace the radioisotope method for determining SPP, as it is simple, very rapid, and does not cause the patient any discomfort.

The incidence of phantom pain in amputees after preoperative lumbar epidural blockade

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The aim of this study was to investigate whether it was possible to reduce postoperative phantom pain by giving lumbar epidural blockade (LEB) for 72 hours prior to the operation. Twenty-five patients were interviewed before leg amputation about their limb pain and 1 week, 6 months, and 1 year after amputation about their phantom limb pain. Eleven patients with a median age of 77 (52–93) years received a LEB so they were free of pain for 3 days preoperatively. The control group, 14 patients with a mean age of 73 (53–86) years, all had preoperative limb pain.

Results: One week postoperatively, 4 patients in the LEB group and 11 patients in the control group had phantom pain ($P < 0.01$). After 6 months, all the patients in the LEB group were free of pain, whereas 6/13 patients in the control group 6 had pain ($P < 0.02$). After 1 year, all 8 survivors in the LEB group were still without pain, and 6/11 in the control group ($P < 0.01$).

Conclusion: Preoperative lumbar epidural blockade reduces the incidence of phantom pain during the first year after amputation.

Antibiotic prophylaxis in lower limb amputation

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The efficacy of prophylactic antibiotic therapy in the prevention of postoperative wound infections after amputation of the lower extremity was studied in a prospective, randomized trial of cephalothin versus methicillin. Ninety-four patients received cephalothin 2 g×4 on the day of operation and 93 patients received methicillin 1 g×4. The frequency of wound infection was 14 per cent in the cephalothin group versus 13 per cent in the methicillin group. The frequency of deep infections was 10 and 4 per cent, respectively ($P = 0.25$). The reamputation frequency was 17 per cent in the cephalothin group versus 12 per cent in the methicillin group, and the frequency in below-the-knee amputation was 18 and 7 per cent, respectively ($P = 0.21$).No Clostridial infections were found. We found no statistical difference between cephalothin and methicillin and concluded that there is no advantage in using a first generation cephalosporine instead of a narrow spectrum beta-lactamase-resistant penicillin in prophylaxis after lower limb amputation.

Hand

Consequences of late immobilization of scaphoid fractures

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In order to determine the correlation between delay of treatment and complications such as delayed union and nonunion, 285 fractures of the carpal scaphoid have been analyzed from records and radiographs. There were 16 nonunions and 27 fractures that had delayed union defined as union later than 12 weeks after injury. Fractures in children united without complications, and fractures in adults located in the distal third of the scaphoid including the tubercle showed 2 cases of delayed union, but no nonunions. In adults, fractures located in the proximal pole and the waist were analyzed separately. Of 118 fractures immobilized without delay, six had nonunions, whereas 36 fractures immobilized between 1 and 28 days after injury had no nonunions, and 22 fractures treated with more than 4 weeks of delay had 10 nonunions. The mean time to bony union for fractures immobilized without delay was 9 weeks; with a delay of 1–14 days, it was 9 weeks (28 fractures); with a delay of 14–28 days, it was 8 weeks (8 fractures); with delay exceeding 4 weeks, it was 17 weeks. The frequency of delayed union increased with the length of delay.

Complications were thus more frequent only when delay of immobilization exceeded 4 weeks. The reputation of the scaphoid bone that successful treatment of fresh fractures depends on prompt immobilization (Soto-Hall and Haldemann 1941, Dunn 1972) was not confirmed in our study.

References
Soto-Hall and Haldemann (1941) *J. Bone Joint Surg.* 23, 841–850.
Dunn (1972) Surg. Clin. North Amer. 52, 1513–1538.

Late complications in scaphoid fractures

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Introduction: Lindström reported in 1975 that 18 per cent had residual symptoms 10 years after a scaphoid fracture.

Patients and methods: A questionnaire concerning late subjective symptoms was sent to 292 patients with a scaphoid fracture 6–16 years earlier and to 249 patients with a carpal trauma without fracture, used as a control group.

Results: One third of the patients claimed that disability in the wrist joint was still present. There was no difference between the fracture group and the control group. Pain and tenderness was the most common complaints, followed by decrease in grip power and restriction of movement.

In children there were fewer sequelae than in adults. With fractures in the distal third of the scaphoid, 21 per cent had disability, in the middle third, 34 per cent, and in the proximal third, more than half of the patients had disability. When complications had been noted during the treatment period, the frequency of disability was more than doubled.

In the fractures without complications, there were fewer sequelae than in the control group.

Technical problems and short-term results in fractures and pseudarthroses of the scaphoid bone treated with Herbert's compression screw

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Forty-one scaphoid fractures were treated using Herbert's method. There were five fresh fractures, one delayed union, and 35 pseudarthroses. At follow-up, 39 patients were examined 6 (3–18) months after surgery. Bony union was found in 28 of 34 patients. Five pseudarthroses were not treated with a bone graft and three of these did not unite. We now use bone grafting routinely in the treatment of pseudarthroses. In cases with a small proximal fragment, the screw chosen was often too short, and we now add 2 mm to the length read on the scale of the centering jig. The method offers a high percentage of bony union, a short immobilization time, but is technically demanding.

Kienböck's disease – the influence of arthrosis on ulnar variance measurements.

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In 38 patients with unilateral Kienböck's disease, the ulnar variance in the contralateral healthy wrists were measured. The mean ulnar variance value was compared with the mean value of 100 normal wrists, and no difference was found. However, in a previous work, it has been shown that the mean ulnar variance value in the patients' diseased wrists was significantly more negative than the mean value in normal wrists.

The individual difference in ulnar variance measurements between diseased and nondiseased wrists in each patient was determined and related to the degree of arthrosis in the wrists with Kienböck's disease.

In patients without arthrosis, there was no difference in measurements. With increasing arthrosis, there was a percentage increase in patients with individual difference – up to 50 per cent in the group with severe arthrosis. When a difference in ulnar variance was encountered, the wrist with Kienböck's disease represented the more negative value.

It is concluded that the surplus of the so-called "ulnar minus variant" in Kienböck's disease is due to arthrotic changes in the wrist, resulting in a pseudolengthening of the distal radius, and that this surplus is a consequence of the disease. "The ulnar minus variant" seems to have no bearing on the cause of Kienböck's disease.

Early mobilization after tendon grafting for isolated profundus tendon lesions

Tune Ipsen

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After reconstruction of the flexor profundus tendon with a free graft passed through or around the intact superficialis decussation, poor results are obtained if adhesions develop. In an attempt to avoid adhesions, early mobilization by Kleinert's method was applied in

20 grafts. At follow-up (average 3 years after operation), all the patients had improved in ROM except 1 with tendinous infection 1 year postoperatively. The gain in DIP-joint flexion was on an average 34°. Six patients had a loss of 17° in PIP-joint motion and 12 patients had an average gain of 22°. Only 9 patients required occupational therapy for a few weeks.

It is concluded that early mobilization a.m. Kleinert after tendon grafting is a safe method to prevent loss of PIP-joint motion due to the formation of adhesions.

Treatment of trigger finger with hydrocortisone

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During the years 1972–1984 inclusive, 121 patients with trigger fingers were treated in our department. Children were primarily operated on. In adults, 114 triger fingers were treated by injection of a solution of hydrocortisone and a local anesthetic in a proportion of one to three. In cases of incomplete effect, the injection was repeated after 3 weeks. If no effect at all ensued, the finger was operated on.

At follow-up in January 1987, 91 patients with 104 trigger fingers were reexamined. After up to three injections, 76 fingers were asymptomatic, whereas 25 had been operated on and three (all injected) had a trigger episode from time to time. The healing rate was found to be independent of sex, age, duration of symptoms and which finger was affected. No complications were observed after injection treatment or operation.

Experimental orthopedics

Subcutaneously and transcutaneously measured oxygen tension in graded limb ischemia

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Determination of tissue oxygen tension is becoming accepted as a method of evaluating gangrene-threatened extremities.

We have studied the oxygen tension measured subcutaneously and transcutaneously on the lower limb of pigs and related these parameters to the femoral blood pressure at graded tissue ischemia.

Material and methods. Under general anesthesia, 6 pigs were intubated and ventilated with 25 per cent oxygen and 75 per cent N_2O. Oxygen tension was determined transcutaneously with a heated (44° C) noninvasive oxygen sensor and subcutaneously with a nonheated Clark electrode system, placed in a Silastic® oxygen tonometer in the subcutis. The oxygen monitoring systems were placed over the left anterior tibial muscle, 3 cm apart. Blood pressures were recorded in the common carotid artery and the right femoral artery. Values of peripheral arterial blood pressures between 110 and 20 mmHg were obtained by an adjustable external stenosis on the abdominal aorta. Eight values of blood pressure and oxygen tension were registered in each pig.

Results. Both types of oxygen tension measured as a percentage of baseline values correlated significantly with the femoral blood pressure. However, the subcutaneously measured oxygen tension was higher (r = 0.90) than the transcutaneous one (r = 0.51). Values and regression lines are shown in the figures below.

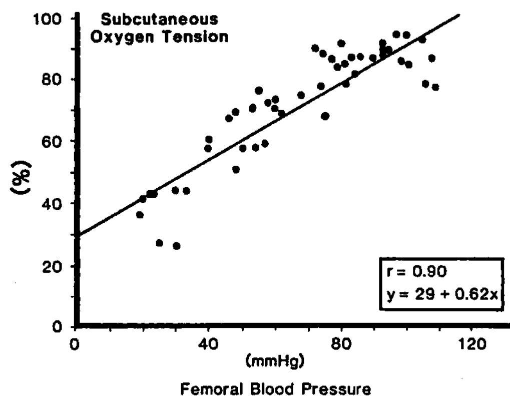

Figure 1

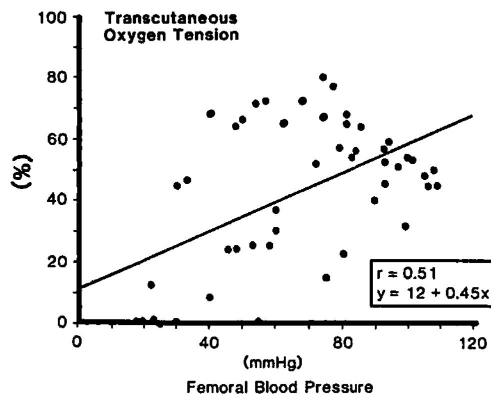

Figure 2

Conclusion. In resting anesthetized pigs, the subcutaneous oxygen tension reflects graded tissue ischemia more closely than the transcutaneous tissue oxygen tension.

Interleukin 1: A possible cellular mediator in prosthetic loosening

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It is known that the interface membrane in prosthetic loosening contains large numbers of inflammatory cells, e.g., macrophages and monocytes. These cells are known producers of interleukin 1, an important mediator in the inflammatory reaction.

In mouse calvaria, cultured as paired halves, interleukin 1 caused a significant increase in the release of previously incorporated calcium-45 comparable to 1,25 vitamin D. A dose-dependent curve was registered with a decrease in effect at high concentrations corresponding to curves obtained with receptor-bound substances. This effect was enhanced by lowering of the control level, with indomethacin blocking the effect of internally formed prostaglandin and aborted by calcitonin.

There was a slightly higher alkaline phosphatase activity suggesting a primary stimulation of the osteoblasts.

In vitro interleukin 1 is a potent stimulator of bone resorption, and it may be one of the cellular mediators responsible for loss in bone stock around prostheses.

Capsular compliance in the hip joint and the relation to the juxtaarticular intraosseous pressure: An experimental investigation in dogs

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In order to evaluate the capsular compliance dV/dP, 10 hip joints in 5 dogs were investigated under different intraarticular pressures from 0–300 mmHg, with a stepwise increase in intraarticular pressure of 50 mmHg. Simultaneously, the juxtaarticular intraosseous pressure was recorded under the different intraarticular pressures. The relationship between intraarticular volume and pressure was determined during both injection of saline into the empty joint and during subsequent withdrawal of 0.5 ml/min. The animals were monitored continuously, as it was the aim to keep blood pressure, arterial blood gas values, and body temperature at steady state.

It is concluded that the capsular compliance in the initial stages of infusion into the joint was 0.04 ml/mmHg up to 50 mmHg intrarticular pressure, after which the compliance significantly decreased rapidly to 0.004 ml/mmHg.

The intraosseous pressure in the femoral head was significantly increased at maximum intraarticular pressure (ΔP, median 6 mmHg, $P < 0.05$), whereas the corresponding acetabular intraosseous pressure was constant during the experiment. The increased intraosseous pressure in the femoral head was fully reversible.

Synovial blood flow and leukotriene B-4 in chronic nonspecific arthritis

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Leukotriene B-4 (LTB_4) is a potent inflammatory mediator known to produce chemotaxis, chemokinesis, and an increased vascular permeability. LTB_4 has been demonstrated in synovial fluid from patients with rheumatoid arthritis, arthrosis, and gout; and LTB_4-like chemotactic activity has been found in plasma from children with chronic arthritis.

The purpose of this study was to investigate the relationship between synovial fluid LTB_4 and synovial blood flow in an experimental model of juvenile chronic arthritis.

A unilateral gonarthritis was induced in 6 mongrel puppies by weekly intrarticular injections of 1% Carragheenan. After 10 weeks, synovial fluid was aspirated from arthritic joints, and LTB_4 was identified by high-performance liquid chromatography and chemokinesis. Synovial blood flow was determined after 12 weeks using the radioactive microsphere method.

LTB_4 was found in biologically active concentrations in all the arthritic joints except one. Synovial blood flow was elevated by a factor of almost 60 in arthritic knees. Synovial fluid LTB_4 and synovial blood flow ratio between arthritic and control knee correlated positively ($r = 0.73$, $P < 0.01$).

In conclusion, we found evidence of a relationship between synovial fluid LTB_4 and synovial blood flow in Carragheenan-induced arthritis. Further studies employing selective leukotriene inhibitors will be needed to elucidate the possible pathogenetic role of LTB_4 in chronic arthritis.

Experimental posterior dislocation of the elbow

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The purpose of the study was to evaluate the kinesiology of experimental posterior elbow dislocations and to describe the ligamentous lesion in cadaver elbows. First, the stability of the specimens was assessed in a standard experimental set-up. After cutting of the anterior part of the collateral medial ligament (ACL) and the annular ligament (AL), the movement patterns were calculated and plotted. Combined cutting of the ligaments produced a posterior and lateral dislocation after valgus and external rotatory stress, but the specimens were stable in varus and internal rotatory stress.

Finally, a posterolateral dislocation was created in 5 specimens by applying a gradually increasing combined valgus and external rotatory torque to the specimens. All the preparations dislocated at about 30° of flexion. The medial lesions consisted of a constant proximal ACL tear, and in 3 cases tears of the posterior part of the ligament and the medial capsule. On the lateral side, we found a posterolateral tear of the AL in all the cases, but no lesions of the lateral collateral ligament or the posterior capsule. We observed only minor lesions in the anterior capsule. In 2 cases the AL lesion was a buttonhole-like lesion with the radial head locked in the ligament.

Mechanical strength of tibial fractures in rats

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In 90-day-old male Wistar rats, a closed tibial fracture was produced at the tibiofibular junction by three-point loading. Closed intramedullary nailing was performed, and the bones were left to heal for 10, 20, 40, and 80 days prior to testing. After removal of the nail, mechanical testing was carried out in fractured bones and in the corresponding intact bones by three-point bending. Load and deformation curves were recorded continuously.

After 80 days, the stiffness and maximum load had reached the level of intact bones; but the healing fractures broke immediately after the maximum load was reached during deformation. Intact bones sustained further bending before failure. Thus, the energy absorption of the fracture before failure was only 13 per cent of that of intact bones.

Energy absorptive properties and stiffness of trabecular bone from the upper tibial epiphysis

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Trabecular bone specimens (n=121) were obtained from the proximal tibial epiphysis of 9 cadavers devoid of macroscopic pathology of the knee and tested mechanically for estimation of correlation between energy-absorptive properties and stiffness.

Methods: Specimens with cylindric geometry (7.5 mm×7.5 mm) were carefully machined using a cutting/grinding machine and a core drill so that parallel end surfaces were obtained. The specimens underwent non-destructive cyclic compression to 0.6 per cent strain (strain rate: 0.01 sec^{-1}). Load-deformation recordings were obtained simultaneously. The elastic energy storage (EA_{clas}) was computed from the area below the relaxation curve, and the viscoelastic energy dissipation (EA_{visc}) was computed from the area between the compression and the relaxation curve. The stiffness was derived from the slope of the compression curve at 0.6 per cent strain.

Results and conclusion: There was a strong positive correlation between EA_{clas} and stiffness ($r = 0.89$, $P < 0.001$), and between EA_{visc} and stiffness $r = 0.75$, $P < 0.001$). The viscoelastic-to-elastic energy ratio correlated negatively with the stiffness ($r=-0.32$, $P < 0.001$). Although this study demonstrated that both elastic energy storage capacity and viscoelastic energy dissipation capacity increased with increasing stiffness, it also showed that trabecular bone stores more energy rather than dissipates more energy by increasing stiffness.

Trabecular bone strength at the distal tibia measured with the osteopenetrometer

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Previous studies on bone strength at the distal end of the tibia with the osteopenetrometer were done on ankle specimens from below-the-knee amputations and by compression tests of bone cylinders from ankle specimens obtained at autopsy. Comparing the bone-strength profiles from these studies, a dissimilarity in the characteristics of the profiles was seen. In order to investigate if this was a real difference or a consequence of the measuring technique, we decided to use the osteopenetrometer to measure bone strength on autopsy ankle

specimens. Eight grossly normal ankle specimens from relatively young patients were examined (mean = 45 years, SD = 19 years). After resection of the joint surface just above the subchondral bone, penetration tests were done in a 5×5 matrix to a depth of 14 mm. Penetration force was averaged in three intervals of 2 mm corresponding approximately to the first level of a conventional compression test (intraspecimen variation of a bone cylinder). Bone strength profiles were relatively uniform between individuals, with a high-strength area at the anterolateral area and a slightly weaker area crossing the central part towards the posteromedial area. The strength profile was nearly identical through all levels of a specimen.

The findings in this and previous studies indicate that the selection of material has a major influence on the results. The results of these studies were meant for stress analysis in the designing phase of endoprostheses. Therefore, to recognize the limitations of a model, it is of major importance to know the variation between different populations.

The influence of cancellous bone on fracture strength of the femoral neck

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Twenty specimens of the proximal femur from 10 females aged 75 (67–79) years were acquired at autopsy. The bone mineral content (BMC) of the femoral neck was determined. The cancellous bone of 1 specimen from each cadaver was removed with a curette through a window in the greater trochanter. The BMC was determined again. The difference in BMC between the first and second measurement represents the BMC of the cancellous bone.

The specimens were plotted in a polyester mould, including the trochanteric region, but leaving the femoral neck free. Fracture strength was then studied in a testing machine, with the long axis of the femur in the horizontal plane, thus simulating a fall on the hip.

All the specimens fractured in a characteristic two-step fashion. First, an impacted valgus fracture appeared followed by dislocation of the fracture. Removal of the cancellous bone resulted in a reduction in BMC of 23 (15–31) per cent, whereas the reduction in fracture strength was 40 (7–61) per cent. There was no correlation between reduction in BMC and reduction in fracture strength. Correlation between BMC and fracture strength was poor ($r = 0.43$, $P > 0.01$).

Conclusions: The magnitude of the energy applied seems to determine whether an impacted or a dislocated fracture appears. The great variation in reduction of fracture strength following removal of the cancellous bone, and the lack of correlation between this parameter and reduction of BMC, indicates that the cancellous bone is of varying importance for the fracture strength of the femoral neck.

Heat generation during drilling in cancellous bone

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Drilling in cortical bone can generate temperatures that cause thermal damage to the bone. The threshold limit of irreversible thermal damage has been found to be 50° C applied for 1 min (Ericsson 1984). There are no reports on the temperature rise in cancellous bone during drilling.

We have performed in vivo temperature measurements in the cancellous bone of the femoral head during sliding screw osteosynthesis of 15 femoral neck fractures. A 10-mm cylinder-shaped reamer was used. The temperatures were measured with a copper-constant thermocouple connected to a digital precision thermometer.

We measured temperatures beyond the threshold limit of irreversible thermal damage within a distance of 3–4 mm from the reamer. There was an exponential fall of the temperature with increasing distance to the reamer. Thus, during sliding screw osteosynthesis of femoral neck fractures, temperatures sufficiently high to cause irreversible thermal damage can develop in the cancellous bone beyond a distance of the width of the sliding nail thread.

Reference

Ericsson A. R. 1984. Heat-induced bone-tissue injury. Thesis, University of Gothenburg

Epidemiology

The incidence of extremity fractures in women

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In women, previous investigations have demonstrated

exponetially rising incidence rates of hip and proximal humeral fractures through the last decades of life. In contrast, the incidence rates of Colles' fractures reach a maximum at the age of 55–65 years and remain stable thereafter. This difference has been used as an argument for the existence of two different entities: postmenopausal osteoporosis (Type 1) and senile osteoporosis (Type 2).

Materials. At Hvidovre Hospital, extremity fractures in adult women were registered, including Colles' (n 1,683) and proximal humeral (n=670) fractures (1976–1985), as well as cervical (n=907) and trochanteric (n=640) hip fractures (1976–1984).

Results. The incidence rates of hip fractures and humeral fractures rose exponentially with increasing age. The incidence rates of humeral fractures exceeded that of hip fractures until the age of about 70 years, after which age the incidence rates of hip fractures increased dramatically. The incidence rates of Colles' fractures rose in every decade from 20–29 to 90–99 years, and exceeded those of the other fractures until the age of about 80 years.

Conclusion. The incidence of extremity fractures reported in this study do not support the subdivision of female osteoporosis into Type 1 or 2.

The epidemiology of the proximal humeral fracture

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The aim of this study was to investigate the epidemiology of proximal humeral fractures and the effect on the hospital workload. During a 5-year period, 730 fractures entered the study. The incidence rate was 73/100,000, which is higher than previously seen. Totally, 210 patients required hospitalization, 75 per cent of whom were more than 60 years old. The majority of admissions were for social reasons. Only 44 patients were operated on. A total of 583 bed days were used each year in the Aarhus area (250,000 inhabitants).

The majority of the fractures resulted from falls on level ground. The elderly fell at home (or in institutions), whereas the younger patients fell in public areas. The accidents occurred most often around midday and before midnight, and in December and January. Half of the fractures were two-part collum chirurgicum fractures while fractures of the great tubercle and three-part fractures accounted for 21 and 17 per cent, respectively.

The epidemiology of shoulder dislocation

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In order to describe the epidemiology of shoulder dislocations, I have for a 5-year period reviewed the 279 cases of shoulder dislocations treated in Aarhus, Denmark. Aarhus is, with its population of 250,000, epidemiologically representative for Denmark as such.

The median patient age was 53 years. The age and sex distribution had a maximum in the age-group of 20–30 years (mostly men) and another maximum in the age-group 60–80 years (mostly women). The anterior dislocations comprised 97 per cent. Sixty-three patients had fracture dislocations, and 9 per cent of the patients had associated nerve lesions.

In connection with the dislocation, 23 per cent of the patients were hospitalized, spending an average of 3 (1–85) days in the hospital. There was a tendency towards older people having their dislocations in their own home, whereas younger people more frequently had their dislocations at work or during sports. We found an incidence rate of 22/100,000 per year. This is somewhat higher than reported by others. Thus, about 1,150 shoulder dislocations can be expected per year in Denmark.

Hip fractures in the municipality of Aarhus 1970–1985

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During the years 1970 through 1985, a total of 4,342 hip fractures in patients aged 40 years and above occurred in the municipality of Aarhus, Denmark. The female: male ratio was 2.8. The overall age-specific incidence rates increased from 1.6 in 1970 to 4.0 per 1,000 inhabitants in 1985. The incidence rates increased exponentially with age in both sexes, and 62 per cent of the fractures were found in patients 80 years and above. While the incidence rates increased by 159 per cent, mostly in men, the populations 40 years and above increased by 11 per cent. Thus, during the period of study, the number of fractures increased almost threefold.

Provided the increase in incidence rates prevails, another threefold increase in the number of hip fractures can be expected over the next 21 years according to linear regression analysis.

Injury pattern in multitrauma patients

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The aim of the study was to define the group of multitrauma patients and to give a description of their injury pattern, since only a few authors have described more exact definitions of this patient category. In previous works on the subject, the importance of lesions in several body regions, as well as the severity of the lesions, has been described generally using a scoring system, for instance, trauma score Abbreviated Injúry Scale (AIS) and Injry Severity Score (ISS).

Based on a prospective study of all road traffic accident victims treated during the period 1981 to 1985, a group of patients with lesions weighed AIS 3 or more in at least two different body regions were sorted out. During the 5-year period, 288 such patients were treated. Forty-one patients were dead on arrival and another 90 patients died after admission. The multitrauma patients had a mean of 4.8 lesions in different body regions, hereof brain lesions (24 per cent), lesion of the lower extremities (18 per cent), thoracic lesions (16 per cent), and injury of the face (14 per cent) Of the abdominal lesions, 58 per cent had a severity of AIS ≥ 4 compared with 43 per cent of the brain lesions and 45 per cent of the thoracic lesions.

Conclusion. A definition of a multitrauma patient as a patient having lesions graded AIS ≥3 in at least two or more different body regions can be used in a standardized description of trauma victims.

Incidence of injuries during a jogging race

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An epidemiologic study of incidence of acute injuries to runners during a popular jogging race was done. All the injured were examined, the cause of the lesion was sought, and the incidence and lesion were related to training. The injured was followed to cessation of symptoms.

Among 9,324 runners, (70 per cent men), 42 were injured and 3 collapsed. Totally, 27 had superficial lesions (blisters and skin lesions), 7 lesions of ligaments, and 8 muscle lesions. Only 10 had injuries requiring more than 2 weeks rehabilitation. The causes of injury in 33 injured were shoe/clothes (15), other runners (11), and the state of the track (7). The injured were significantly younger and had lesser weekly mileage than the overall average participant. The 3 collapsed runners had significantly lesser weekly mileage than the other injured runners.

Miscellaneous orthopedics

Sarcoma of the extravisceral soft tissue

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In a 5-year period from 1979, 135 patients with extravisceral soft tissue sarcomas were treated at the Tumor Center, Orthopedic Hospital, Aarhus. There were 75 males and 60 females. The median age was 61 years. Using the three-grade system of histologic grading, 26 tumors were classified as Grade 1, 17 as Grade 2, and 92 as Grade 3. Eighteen patients had compartmental excision, 29 a radical amputation, 54 wide excision, and the rest had no surgery at the tumor center. With Grade 1 tumors, the rate of local recurrence was 2/26; with Grade 2, 3/17; and with Grade 3, it was 22/92. The rate of metastases was with Grade 1 tumors 2/26, with Grade 2 tumors 1/17, and with Grade 3 tumors 46/92. The 5-year corrected survival rate was 100 per cent with Grades 1 and 2 tumors and 62 per cent with Grade 3 tumors. No adjunctive treatment had been given.

Internal fixation devices from infected and noninfected patients: An electron microscopic study

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Recent studies suggest that the resistance of internal fixation device- (IFD) related infections to host defense mechanisms and to antimicrobial therapy is explained by the ability of bacteria to form adherent microcolonies on the surface of biomaterial.

Using scanning electron microscopy and transmission electron microscopy (TEM), the surfaces of IFDs from the following groups were investigated: I. 15 patients without infection, II. 9 infected patients – 7 with positive

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cultures and an average duration of symptoms of 100 (7–223) days, and III, as controls, six unused IFDs.

Forty electron microscopic investigations were performed. In Groups I and II, the IFD was in all the cases covered with a thin biofilm consisting of fibrin, erythrocytes, and granulocytes. In 1 case (Group II) TEM demonstrated macrophages. Adherent bacteria (cocci) were demonstrated in relation to the biofilm in three of seven IFDs with positive cultures. In these 3 cases the average duration of symptoms was 170 (116–223) days.

Prophylactic treatment of postmenopausal osteoporosis: Effect on bone turnover

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The effect of two different estrogen/gestagen treatments and 24R,25-$(OH)_2$-cholecalciferol on bone turnover was studied in a randomized trial with 144 healthy postmenopausal women. Urinary excretion of 99m-technetium-diphosphonate and serum alkaline phosphatase was determined before and then once a year for 2 years of treatment. Both estimates of bone turnover showed a significant decrease ($P < 0.001$) from normal premenopausal levels in women receiving unopposed estradiol or in sequential combination with progestagen, whereas unchanged high values were found in the groups receiving 24R,25-$(OH)_2$-D_3 and placebo.

The data showed that bone turnover increased in early postmenopausal women concomitantly with the loss of bone mass, and that hormonal substitutional therapy normalized the total skeletal turnover and prevented bone loss.

Lymphoscintigraphy of the knee in chronic synovitis

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The aim of the study was to demonstrate the lymphatic flow pattern from human joints by intraarticular lymphoscintigraphy. Five patients with chronic synovitis underwent intraarticular lymphoscintigraphy with 99mTc-nanocoll. Scintigrams from the anterior and lateral view of the knee and of the iliac region were taken at 1, 2, 4, and 22 hours after the injection.

The results were very uniform. The inguinal and iliac lymph nodes were visualized after about 2 hours. Furthermore, the activity in the lymph nodes was measured at time intervals. Thus, this method makes it possible to demonstrate lymphatic drainage from the knee joint, as well as to estimate it quantitatively. The method was without complications and discomfort for the patients, and it is concluded that intraarticular lymphoscintigraphy may be a useful method to study the resorption of synovial fluid in many joint diseases.

Open versus closed treatment of thermal burns

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Closed treatment of second degree thermal burns has for some years been replaced by open treatment with Nobecutane at a few hospitals. In order to evaluate the two methods, a multicenter prospective randomized clinical investigation was set up.

After informed consent was obtained, 130 patients entered the study and were randomized to open or closed treatment. In closed treatment, blisters were cut off and the burns covered with sterile gauze bandages. In open treatment, blisters were sprayed with hydrocortisone and Nobecutane, which could be repeated as often as required. All the patients were seen in the out-patients clinic by a blinded observer on the 12 day.

No significant difference was found between the groups with regard to infections, initial pain and pain during treatment, scarring, and the patients' subjective assessment of the treatment methods. A trend in the results was found in favor of the open treatment.

Conclusion: We find that the open ambulatory treatment of second degree thermal burns represents an alternative to the conventional closed treatment.