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Modified Bankart reconstruction with a suture anchor for recurrent shoulder dislocation

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Introduction: The Bankart reconstruction can yield a high success rate, but is technically difficult. With the introduction of suture anchors, the surgical procedure is less demanding.

Material and method: 38 patients, 26 men and 12 women with recurrent shoulder dislocations were found to have Bankart lesion at surgery. Bankart reconstruction of the anterior joint capsule, using 3 or 4 suture anchors to attach the capsulolabral complex to the glenoid rim, was performed in all shoulders. The follow-up in this prospective study is 2 (1–3) years.

Results: 37/38 shoulders were stable at follow-up. One shoulder has been reoperated due to recurrent instability. 9/38 had reduced external rotation (<15°). There were no surgical complications.

Conclusion: Bankart reconstruction is a safe, however, technically demanding method. The use of suture anchors simplifies the operation without reducing its effectiveness. Minor modifications of the procedure and early range of motion training might further improve the functional results.

Scapular assymetries in patients with impingement of the shoulder with special reference to the effects of a specific training program

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Scapular configuration was studied in 12 consecutive patients with impingement of the shoulder before and after a 3 -week training program.

Methods: The configuration was assessed with visual inspection at rest and during flexion to 90° according to a four-grade scale and quantitatively with moiré topography at rest, before and after lifting 2 kilos 10 times to 90° of flexion. The treatment was designed to train strength and coordination of the scapulothoracic muscles. The patients were evaluated before and after the training program on the UCLA shoulder rating scale.

Results: 8 patients improved on the UCLA score. However, the average score for the whole group did not change significantly. It was 15.8 (11–22) points before and 18.2 (13–29) points after the treatment.

9 patients had an abnormal scapular configuration of the symptomatic side at visual inspection and 8 patients had an increased number of contour lines at the moiré topography. After the treatment six patients normalized their scapular asymmetries at visual inspection and two patients improved their moiré asymmetry.

Conclusion: A majority of our patients had an abnormal scapular configuration at the symptomatic side as well as an improvement of the UCLA score after the training program. However, there was no correlation between the clinical result and the changes of the scapular asymmetries. The role of scapular asymmetries in shoulder impingement remains unclear.

Strength of surgical repairs of tendon to bone after rotator cuff reconstruction

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Introduction: Rotator cuff tears (RcTs) are common, De Palma (1983) found a 37% incidence of partial and 9% full thickness RcTs in patients with a mean age of 59 years. The method used at surgical repair seems to be of great importance. The aim of this study was to develop new methods of surgical repair and to compare these with standard repairs.

Material and methods: 26 cadaveric human shoulders were harvested within 12 hours of death. A 30 mm wide RcT was made and 1 of 3 repairs was performed before strength was tested. Method 1: 10 specimen, standard repair (as described by Matsen and Arntz 1990). Method 2: 6 specimen as above but augmented with a polyethylene patch. Method 3: 10 specimen, as method 2 but with an increased number of sutures.

Results: As the repairs were tensioned there was stretching of the sutures, tightening of the sutures into the substance of the tendon and compression of the bone beneath the suture. Mean load at failure was for Method 1 275N, for Method 2 356N and for Method 3 605N. Method 3 showed a significant increase in both the gapping load and ultimate strength.

Conclusion: The use of a polyethylene patch and a greater number of sutures crossing the repair led to a reconstruction capable of initially withstanding the loads encountered in normal activity of an unloaded arm.

Variable quality of trauma care in Sweden

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On the European continent trauma hospitals provide care for patients with severe injuries and in North America a trauma care system is being developed. Trauma care is regionalized and certain hospitals are designated as trauma centers. In Sweden on the other hand trauma care is highly decentralized. The objective of this study is to assess the quality of the immediate emergency care of severely injured traffic victims in Sweden.

Material and methods: Organization and quality of trauma care has been studied in a pilot study during a 5-year period at 5 Swedish hospitals of different categories ranging from a university hospital to a small rural hospital. 4 types of injuries were selected for comparison. The medical records were reviewed and diagnostic procedures and treatment were assessed as acceptable, delayed or inappropriate.

Results: The medical care of patients with severe injuries was delayed in 30% and was inappropriate in 7%. Assessment of the quality showed great variation between the hospitals. The medical care was generally not best at the university hospital, instead it was demonstrated to be better at one well functioning small hospital. It is an effect of an on call system at the small hospital, which guarantees rapid participation of senior physicians in both general surgery and orthopedic surgery. Greatest problems in early diagnosis and treatment of bleeding were evident for abdominal injuries. This was due to lack of competence of the first on call in combination with late assessment by consultant on call. Fractures of the femoral shaft did in almost half of the cases not get definitive care until several days after the accident. Among them were several polytrauma patients amenable to immediate fracture fixation.

Conclusion: The result suggests that benefits in the quality of medical care of patients who have sustained severe road traffic injuries can be achieved by reorganizing the Swedish trauma care system. Above all there is a need for commitment to trauma care and a better structure and organization of the on call system including cooperation of physicians of different specialities within the hospital.

Internal fixation of femoral shaft fracture in children and adolescents—48 patients review 10 to 21 years after surgery

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Patients and methods: 1970–81, 68 diaphyseal fractures in femurs with open physis were internally fixed in the hospitals of Sönderburg, Esbjerg and Frederiksberg, Denmark. 50 fractures in 39 boys and 9 girls were reviewed 10 to 21 years after surgery (mean 16 years). 17 fractures were treated with plates (Lane, AO-, or Bagby), 23 fractures with broad intramedullary nails (Küntscher-, AO-, or Street-Hansson), and 10 with slender intramedullary nails (Rush-pins, all but one were inserted via the trochanter major). The mean time to union was 16 (6–70) weeks. At follow-up a clinical and a radiographic examination including an orthoroentgenographic measurement of the bone lengths was performed.

Results: Mean overgrowth in the plated femurs was 0.5 (-25 to 26) mm, in those nailed with broad nails -1.6 (-12 to 15) mm, and in those nailed with slender nails -8.7 (-39 to 6) mm, including shortening due to "overriding" of fracture ends; $p < 0.01$. Overgrowth was greater in children than in adolescents (mean: 4.7 mm versus -5 mm; $p < 0.01$). The neck-shaft angles increased following nailing with broad nails and decreased following nailing with slender nails (mean: 0.9° versus -1.5°, $p < 0.05$). One patient nailed with a Küntscher nail at the age of 14 years had developed arthrosis of the hip on the injured side. Complaints were scarse, and the range of motion of the hip and knee were generally normal. Minor rotational deformities were common.

The value of preoperative isometry measurements in ACL reconstruction—an in vivo correlation of length change to tension

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Introduction: Length change of a test ligament through passive motion of the knee is a common way to evaluate the deviation from isometry at ACL reconstruction. This study analyzes the correlation of the length change to the tension inflicted on the ligament, when it is fixed.

Material and methods: Measurements where performed on 10 patients during ACL reconstruction. The Stryker isometric drill guide was used, and the location of the drill channels was documented on lateral radiograms and classified in anterior, central and posterior femoral positions according to previous results (1). The length change of a test ligament was recorded from 0°–90° of knee flexion with a spring gauge (4 N/mm) and a liquid goniometer. Subsequent recordings of the tension

were performed using simultaneous computerized sampling of the knee flexion degree, using an electro goniometer fixed to the bone with Steinman pins, and a piezo electrical load cell connected to the test ligament. Classification of the curve patterns in anterior, central and posterior shapes was performed, in accordance with the results of an in vitro study (2).

Results: The curve patterns of the length change and the tension registrations yielded a strong correlation (R = 0.91–0.98) for 6 patients, a good correlation (R = 0.74–0.81) for 3 patients and a weak correlation (R = 0.67) for 1 patient. There was also a close visual similarity with the minima of the curves coinciding within 6.5° (0°–15°). The correlation between the maximal length change and maximal tension was poor (R = 0.67, R2 = 45%). In 8/10 patients the curve shape classification of the length change tallied with the one of the radiographic position.

Conclusion: The length change pattern of the test ligament is a good reflection of the tension distribution during passive ROM at time of surgery. This is helpful in planning at what flexion angle to fix the ligament in order to optimize stability and minimize the risk of restricting the range of motion. The absolute values of the length change cannot be used to predict the magnitude of the tension in the fixed ligament. A possibility to change drill channel location is offered by curve shape identification.

Refrences:
1. Good et al, Acta Orthop Scand 1987;58:658-61.
2. Good and Gillquist, SOF 1991.

Posterior internal compression arthrodesis of the ankle

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Introduction: Almost 30 surgical techniques of ankle arthrodesis have been described. There are several reports on good results but complications such as non-union, infection and poor foot position have been frequent. At the University Hospital in Nottingham the senior author (CLC) adopted a technique using internal compression fixation, modifying the technique described by White (1974). The aim of this study is to present the results of this technique.

Patients and methods: 19 ankles in 18 patients were treated by arthrodesis using posterior internal compression technique between 1979 and 1990 (7 women, 11 men). The mean age at operation was 48 (15–74) years. With the patient in the prone position the tibio talar joint is exposed. A deep slot is cut into the joint and packed with cancellous bone. The ankle is thereafter oriented in a desired position before the fixation with two cancellous screws. All patients were evaluated using the score system of Mazur et al (1979) and 15 of the patients were examined with standardized radiographs.

Results: Primary fusion was achieved in 16 of the 19 operated ankles in an average of 14 weeks. 3 were reoperated, 2 due to nonunion and 1 due to a screw fracture. Mean fusion position was in the sagittal plane 1.7° of equinus and in the coronal plane 0.8° of varus. According to Mazur's ankle score 5 were rated as excellent, 4 as good, 3 as fair and 3 as poor. Complications occurred in 6 of 19 operated ankles (32%).

Conclusion: Posterior internal compression arthrodesis of the ankle joint has been shown to be a good alternative to other reported methods.

Correction of foot deformities with the Ilizarov external fixator

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Introduction: The management of residual foot deformities in patients treated for pes equino varus (PEV) by one or several surgical procedures present a major challenge for the orthopedic surgeon. The Ilizarov external fixator (IEF) offers a new approach for correcting these feet as well as other severe foot deformities.

Material: 14 feet in 12 patients age: 6–24 years have been treated for residual foot deformities using the IEF at the Dept of Orthopedics, University Hospital, Uppsala, since 1990. 8 of these feet, which have been followed for more than one year, will be presented. The number of surgical procedures performed on each of these 8 feet prior to the application of the IEF was 2 (range 0-4). The foot deformities requiring correction included: 4 PEV with residual hindfoot and/or forefoot deformities, 2 equinus feet compensating for a short leg also lengthened), 1 rigid equinus foot in a patient with arthrogryphosis multiplex congenita and 1 short foot as a sequele after a compartment syndrome.

Technique: 2 rings are secured to the tibia by crossed K-wires. One half-ring is fixed to the calcaneus and 1 to the forefoot using 2 K-wires on each ring. The tibia rings and the two half-rings are joined together by threaded rods enabling correction of the deformities by successive distraction.

Results: The time in IEF was on average 2 months for correcting the foot deformities, but considerably longer for the patients who also underwent lengthening. The IEF's were well tolerated. When correction was completed and the IEF's removed the feet were immobilized in a cast for 8 to 12 weeks. In all cases the feet were brought to a plantigrade position. No serious complications were recorded.

Conclusions: Our preliminary experiences with the IEF for correcting foot deformities have been promising. Further studies and longer follow-up will, however, be necessary until more definite results can be presented.

Massive allograft for reconstruction of large femoral defects

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Massive allografts have been increasingly applied for the reconstruction of large bone defects in bone tumor surgery. We report our first experiences.

7 patients have had allograft reconstruction for bone tumors of the femur during 1990-91. The diagnosis was giant cell tumor in 3 patients, low grade sarcoma in 3, and 1 patient had a solitary metastasis of a neuroendocrine tumor of the pancreas. The mean age was 21 years and there were 4 males and 3 females. None hade adjuvant chemo- or radiotherapy. Reconstruction involved the proximal femur in 2 patients, the mid-femur in one, and the distal femur in 4.

The allografts were obtained from the St Luc Bone Bank in Brussels and were shipped and stored in -70°. After thawing in warm antibiotic solution, they were cut into appropriate size. The 2 cases involving the proximal femur were reconstructed by a composite allograft and conventional hip prosthesis. The mid-femur defect was reconstructed by a diaphyseal allograft and an intramedullary interlocking rod. Osteochondral allografts were used for the 4 defects of the distal femur. 3 were total condylar involving up to 23 cm of the distal femur and one involved only the lateral hemicondyle. The allografts were fixed by either an interlocking nail or by a DCS plate. The remaining capsule and ligaments were sutured to the soft tissues of the allograft. Autogenic bone grafts were placed at the osteotomy sites. Postoperatively, the patients were kept non-weight bearing for up to 6 months, and patients with knee reconstructions wore a leg brace for 3 months. The follow-up time is between 9 months and 2 years.

There were no immediate postoperative complications and there have been no local recurrences. However, 1 allograft became clinically infected at 6 months. The allograft had to be removed and the defect was temporarily filled with gentamicin augmented bone cement as a spacer. After a healing time of another 6 months, the knee was uneventfully reconstructed with a tumor endoprostesis. The reaming 6 allografts have been incorporated and there have been no non-unions. All patients are ambulating without support and have a function rated as good or excellent. Patients with reconstruction of the distal femur have moderate to major knee instability and a range of motion of 0°–90°.

Our impression from this small series is that massive allografts, with or without endoprosthetic composite, are very promising for reconstruction of large skeletal defects.

Change of moments about the hip, knee and ankle joints after correction of leg alignment in unilateral gonarthrosis

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The aim of this study was to assess the moments about the hip, knee and ankle joints of the involved and uninvolved leg in patients with moderate medial gonarthrosis before and 1 year after correction of leg alignment.

Material and methods: 17 patients with medial gonarthrosis grade I–III according to Ahlbäck's classification, and pain that justified surgical treatment constituted the study group. No patient had any symptoms from their hip- or ankle joints or the other knee. 8 patients were operated with high tibial osteotomy and 9 were operated with unicompartmental prosthetic replacement (Brigham model). The external moments about the hip, knee and ankle joints of the involved and uninvolved leg were calculated before and 1 year after corrective surgery and compared to the external moments in 10 normal controls. Clinical examination was performed and the Hip-Knee-Ankle (HKA) angle was determined from whole-leg weightbearing radiographs before and 1 year after surgery. The peak and mid stance moments about the joints in the coronal plane during gait were determined with a Kistler force plate and a video recording system.

Results: All patients improved after surgery and the mean HKA-angle changed from 11° of varus to 0°. In the hip joint the mid stance adduction moment was increased in the involved leg ($p < 0.05$), and in the uninvolved leg ($p < 0.01$) before surgery compared to normals and reduced after surgery to the level of normal controls. In the knee joint the mid stance adduction moment was increased in both legs ($p < 0.01$) compared to normals before surgery. After surgery, the peak and mid stance adduction moments were reduced to a subnormal level in the involved leg and to a normal level in the uninvolved leg. The moments about the ankle joints were not found to be changed by the knee deformity or by the corrective surgery.

Conclusion: In patients with unilateral medial gonarthrosis we have found that the mid stance adduction moments about both the involved and uninvolved hip- and knee joints in the coronal plane were increased compared to normal controls, and could be reduced after correction of leg alignment of the involved leg.

Bone loss after hip rearthroplasty

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Bone loss after trauma is a common condition. In an earlier study of femoral fractures after total hip arthroplasty we found an overrepresentation of femoral fractures among the patients who had been operated in the hip more than once before. We interpreted this observation as a result of an osteopenia caused by a repetitive trauma. We conducted this study to examine if a rearthroplasty causes a more pronounced osteopenia in the operated extremity.

Method: We measured the cortical bone mineral density, bone volume and bone mass of the middle femur and also the cancellous bone mineral density of the distal femur and the proximal tibia in 12 patients who had been operated with total hip arthroplasty 11 years before the measurements and who had also undergone a rearthroplasty operation because of aseptic prosthetic loosening 3 years before the investigation. We measured these parameters in both legs and further we measured the area of the musculature of the middle thigh. In order to distinguish the results from changes caused by the arthrosis disease or the primary operation we also included a control group who had been operated with total hip arthroplasty because of unilateral arthrosis 11 years before but not developed aseptic prosthetic loosening.

Results: We found a 19% decrease of the bone mass in the middle femur in the patients who had undergone rearthroplasty compared with a 9% decrease in the control group. The cancellous bone in the distal femur and proximal tibia showed a more marked decrease. These changes were also most pronounced in the reoperated group.

Conclusions: The marked decrease in femoral bone mass which was noted after rearthroplasty of the hip could cause an increased risk for femoral fractures and also an increased risk for future prosthetic loosening if the decrease in bone mass is an endosteal resorption.

Early results after hip revision arthroplasty using impaction cancellous grafting and cementing of the femoral stem

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Introduction: After loosening of a cemented hip prosthesis with bone resorption, the quantity and quality of the remaining bone is often insufficient to allow long-term stability of a new prosthesis implanted by direct cementing or by cementless fixation. We present the preliminary results of femoral stem revisions using impaction of cancellous bone graft and cementing.

Patients and method: 15 total hip arthroplasties with mechanical stem loosening and Gustilo Type II bone resorption were revised by this method from March 1989 through February 1991. The revision procedures included careful cleaning of the endosteal surface and distal plugging of the femoral canal. The grafts consisted of milled femoral heads from the bone bank. The femoral canal was packed with graft and a canal created centrally in this bone bed by impaction of a femoral stem. The canal was filled retrogradely with cement and a narrower stem was inserted.

Results: 13 hips in 13 patients aged 68 to 84 years have been followed for 14 to 36 months. 8 were women and 7 men. 4 patients had unilateral hip disease, 4 bilateral hip disease and 5 had other conditions inpairing walking. 5 patients were totally painfree, 3 had occasional and insignificant pain and 5 had slight pain during unusual activities. 1 patient walks without support, 3 use a cane occasionally and 4 regularly. 3 patients use 1 crutch and 2 patients need 2 walking aids. The radiographic evaluation revealed no migration or bone resorption in 10 hips, and subsidence 5–25 mm in 3 hips.

Conclusions: The short-term results appear promising. Special instruments for firm and homogeneous impaction of the graft and for securing a central position of the stem may be expected to reduce the incidence of early subsidence.

Blood salvage in total hip arthroplasty with solcotrans postoperative drainage

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Purpose: Investigate if use of Solcotrans postoperative drainage system could reduce the need for homologous blood transfusion after primary cemented total hip relacement surgery (THR).

Material and methods: In 1989 and 1990 the Solcotrans drainage system was used in a consecutive series of 181 patients, after primary cemented THR. The diagnosis was arthrosis in 149, rheumatoid arthritis in 9 and sequelae to hip fracture in 23 patients. The control group consisted of all 170 patients operated in 1987 and 1988 with a primary cemented THR. The diagnosis was arthrosis in 129, rheumatoid arthritis in 13 and sequelae to hip fracture in 28 patients. The operations were mainly performed by 3 surgeons, and all patients had the same pre- and postoperative treatment. Postoperative blood transfusion was indicated either when the Hb level was less than 90 g/L or when hypovolemia was evident.

Results: Preoperatively mean Hb level was 140 ± 14 g/L in the Solcotrans group and 138 ± 15 in the control group. The mean total blood loss was 1299 ± 448 ml in the Solcotrans group and 1352 ± 504 in the controls. The mean volume in the Solcotrans drainage was 437 ± 227 ml and 395 ± 252 was retransfused. In 36 patients all blood could not be retransfused, due to coagulation in 5, too small amount in 22, technical problems in 5 and misunderstanding in 4 patients. 1 patient had fever reaction during the autologous retransfusion. Homologous transfusion was given to 118 patients (69%) with an average of 1.7 units in the control group compared to 88 patients (49%), average 1.1 units in the Solcotrans group. On

discharge from the hospital mean Hb level was 115 ± 12 in the Solcotrans group and 117 ± 10 in the control group.

Conclusion: After 2 years' use of the Solcotrans postoperative drainage system we conclude that retransfusion of autologous blood is a safe procedure and reduces the number of patients needing homologous transfusion after THR.

Effects of isoxazylolpenicillins and hip surgery on renal function

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2 different isoxazylolpenicillins (cloxacillin and dicloxacillin) were compared regarding impairment of renal function after total hip arthroplasty. 85 patients received dicloxacillin and 93 patients received cloxacillin as antibiotic prophylaxis. A total dose of 6 grams was given during a 36-hour period in doses of 1 gram pre-, per- and postoperatively. Creatinine in serum and ß2-microglobulin in serum and urine were determined preoperatively and 2, 4 and 10 days after the operation.

Results: The dicloxacillin treated patients had an increase of creatinine and ß2-microglobulin in serum that was not seen in the cloxacillin group ($p < 0.001$). In both groups ß2-microglobulin in urine showed a 5 to 20-fold increase on day 2 and then slowly decreased, but there was still a significantly raised level on day 10. Serum ß2-microglobulin increased more gradually to a significant raise on day 10. A reference group of 20 patients with hip fracture, operated with closed reduction and osteosynthesis without any prophylaxis given was studied in a similar way showing a similar pattern concerning ß2-microglobulin in serum and urine, but no significant changes concerning creatinine.

Conclusion: There was an increase of creatinine in serum in the group of patients treated with dicloxacillin. The increase indicates a transcient injury in the process of glomerular filtration. Although the increase was transcient and subclinical, a dose reduction is nevertheless suggested for older patients.

Metal-backing improves the survival of the Wagner prosthesis

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Introduction: The resurfacing hip arthroplasty has been abandoned in Sweden because of rapid prosthetic loosening. We analyzed the survival rate of surface replacements with all-plastic (Wagner) or metal-backed (Wagner-Tillmann) acetabular components in patients with juvenile chronic arthritis (JCA).

Patients and methods: 19 patients (5 males and 14 females; age 15-31 years) with JCA had 29 resurfacing hip arthroplasties: 22 had the original all-plastic Wagner acetabular component and 7 the metal-backed Wagner-Tillmann component. All the patients were included in this follow-up study. The Wagner group was followed for 11 (8–13) years, and the Wagner-Tillmann for 7 (5–9) years. In all patients with surviving hip-prosthesis recent radiographs were examined.

Results: 19 of the 22 Wagner prostheses have been revised, and 10 of them were revised within 5 years postoperatively. The reason for revision was loosening of the acetabular component in 15 hips, fracture of the femoral neck in 3 hips, and loosening of the femoral component in 1 hip. 2 of the 3 surviving Wagner prostheses have a progressive bone resorption around the acetabular component. None of the 7 Wagner-Tillmann acetabular components have yet been revised, but 1 has a progressive bone resorption after 8 years.

Discussion: Our results confirm earlier findings as far as the original all-plastic acetabular component is concerned. However, metal-backing of the acetabular component did improve the prosthetic survival ($p = 0.012$, Lee-Desu log-rank test), and brought it in parity with conventional hip prostheses. Although slight loosening of the metal-backed acetabular components could not be excluded, only one did show any signs of progressive bone resorption. By contrast, all but one of the 22 all-plastic Wagner prostheses have been revised or were clinical failures. Deformation of the thin-walled unsupported acetabular component may cause a pumping action, and joint fluid may be pumped with high pressure into the bone-cement interface and cause bone resorption, and thus contribute to the rapid radiographic and clinical failure.

Reducing air contamination during total hip arthroplasty using electrostatic filters

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Introduction: Ultra clean air, less than 10 colony forming units per cubic metre (cfu/m^3), is obtained either by the use of laminar flow ventilation enclosures or the use of ultraviolet radiation. An alternative simple method could be the addition of electrostatic filters to a conventionally ventilated operating theatre.

Patients and methods: In a blind randomized study, air contamination in a conventionally ventilated operating theatre with 20 air changes/hour was measured during 20 total hip arthroplasties. The median air contamination in the operation field was measured as cfu/m^3 in 2 series. In 1 series electrostatic filters were used but not loaded, and in another the electrostatic filters were loaded.

Results: In the series with unloaded filters, the median air contamination was 8 cfu/m at the end of the operation. In the

series with loaded filters, the median air contamination was reduced about 3 times to 2.6 cfu/m^3.

Conclusion: During total hip surgery, the addition of electrostatic filters may make it possible to achieve ultra clean air in a conventionally ventilated operating theatre.

Multiple lumbar disc degeneration in women—relation with hip fracture risk and osteoarthritis development

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Several authors have reported an inverse relationship between osteoporosis and degenerative changes of the lumbar spine. Alterations in the quality of subchondral bone could have profound effect on the ability of articular cartilage to withstand compressive dynamic forces (Radin, E L et al, 1970). How will the presence of multiple lumbar disc degeneration (MLDD) influence hip fracture risk and development of OA of hip and/or knee? What is the prevalence of diagnosed MLDD in women aged 60 or more?

Material: 1) A cohort of 174 female residents of Medelpad County with MLDD. Mean year or birth 1917 (1893-1925). 144 of them represent all cases of diagnosed MLDD in the county in women aged 60 or more during 1984 and 1985. 2) A computer register of all Medelpad residents treated for first hip fracture after the age of 59 since 1943. 3) Data on Medelpad population size and composure 1943–1990.

Method: The accumulated risk for first hip fracture was calculated for the whole cohort to be 25.6 fractures. From the computer register the actual number of first hip fracture was obtained. The number of women with radiographically diagnosed OA—some treated with arthroplasty—of the hip and/or knee was obtained from archives of radiographic referrals.

Results: 9 out of 174 women had been treated for first hip fracture. SMR 9:25,6=0,35. 95% CI 0.19–0.64. OA of the hip had been diagnosed in 24 of the 144 women aged 60 or more = 17%. THR was performed in 9 (6%). Corresponding figures for OA of the knee were 22 (15%) with 4 (3%) knee arthroplasties. The prevalence of diagnosed MLDD was 10%.

Conclusion: MLDD is associated with a threefold reduction of hip fracture risk and a manyfold increase of the risk to develop OA of the hip - and probably also the knee. This can be explained by an increased bone density and impaired resilience of the subchondral bone in these women.

Spinal posture, sagittal mobility and subjective rating of back problems in former female elite gymnasts

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Introduction: Elite gymnastics demands a high degree of physical compliance from its performers. There are numerous previous reports relating to the prevalence of back complaints and spinal derangements in elite gymnasts, but few studies concerning long term effects. The aim of this study was to assess subjective back problems and objective evaluation of spinal posture and sagittal mobility in former female elite gymnasts and an age matched female control group.

Patients and methods: 64 former female elite gymnasts who had participated in the Swedish National Championships or on a higher level were included into the study. The control group consisted of 29 age-matched females who had not been active in gymnastics. A questionnaire concerning back complaints was performed in all subjects. Spinal posture and range of thoracic and lumbar motion were examined in all controls and in 35/64 former elite gymnasts. The measurements were performed with Myrin's inclinometer.

Results: The former gymnasts had less thoracic kyfosis than the controls (21° ± 9 versus 30° ± 8). No difference in thoracic range of motion was found. In the lumbar spine there was no difference as to either posture or sagittal motion. The former gymnasts reported present back problems in 27 %. In the controls the corresponding value was 38%. We did not find any correlation between posture or range of motion and subjective rating of back problems in either of the groups.

Conclusion: A history of participation in elite gymnastics was not associated with long-term subjective back invalidity compared to age-matched controls. The training exposure reported by the former gymnasts in this study was similar to that reported previously for gymnasts (10 hours versus 12.3 hours).

Effects of orthopedic consultation in sick-leave of patients with low-back pain

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Sick-leave data were studied in patients with low-back pain (LBP) referred to orthopedic consultation at a sick-leave of >6 weeks and a control group that was not referred.

Methods: Patients attending their care centres with a continuous sick-leave of >50% for >6 weeks were included. 8 out of 11 primary care centres participated and all patients with LBP were registered during the first 2 quarters of 1991. All patients with the inclusion criteria were referred to orthopedic consultation during the first quarter. During the second quarter, the control period, the handling of LBP patients returned to the

usual routine. Data on sick-leave were followed for a period of 6 months after the patients entered the study.

Patients: 39 patients were referred to orthopedic consultation. The control group consists of 17 patients.

Results: The mean sick-leave during the observation period was 54 days and 66 days respectively for the reference group and the control group. When also recurrence time is considered the sick-leave is 61 and 83 days, respectively. 25% and 53% respectively of the control and the reference group are continuously and still on sick-leave at the end of the observation period. The sick-leave including recurrencies after the patients entered the study, relative the sick-leave before, is 51% and 92%, respectively for the reference and the control group.

Conclusion: Sick-leave was significantly shorter for the reference group. An orthopedic consultation is recommended when the LBP patient has been on sick-leave for 6 weeks or more.

The accuracy and value of electrodiagnosis in patients with lumbosacral disc herniation: A pre- and postoperative study

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20 patients with sciatica, who underwent surgery because of CT-verified unilevel lumbosacral disc herniation were investigated with neurophysiological tests (EMGs, F-responses, dermatome-SEPs) preoperatively in 13 patients. In 5 only the indicated level corresponded to CT-findings.

Discordance between neurophysiological and radiological findings did not predict surgical success rate. If all neurophysiological tests were normal the outcome was significantly worse than if any of the tests showed an abnormality ($p < 0.01$). 4 postoperatively improved patients still had pathological neurophysiological findings.

Conclusion: Neurophysiology is not useful in diagnosing the exact level of a root lesion, but may reveal whether it is at all present. Electrodiagnosis is recommended if radiology and clinical testing conflict. If it is entirely normal, surgery may not be the first treatment alternative.

Open mechanical provocation under local anesthesia—a definitive method for locating the focus in painful mechanical disorder of the motion segment

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Introduction: When the treatment of a painful mechanical disorder of a lumbar motion segment calls for spinal fusion, this procedure should ideally be restricted to the affected segment. However, up to this point, no method has been successful in clearly demonstrating the existence of a painful mechanical disorder of a lumbar motion segment in a given patient, much less pinpointing the level of that segment.

Method: The provocation test described here is based on the following assumption: If pain emanates from a motion segment it should be possible to elicit that pain by moving the vertebrae that border on the affected segment. The patient is awake throughout the procedure. The spinous processes are dissected free under local anesthesia and can be moved in all directions or tapped with a punch and mallet. After each provocation, the patient reports his pain reaction.

Results and conclusions: The provocation test has been used on approximately 250 patients since 1988 and has proven to be very useful in selecting patients and locating the segment in question for spinal fusion. The patients recognize their genuine habitual pain, which most often occurs in a single defined segment. Patients were selected for this procedure only after clinical assessment, radiological examinations and discography with subsequent intradiscal injection of anesthetic strongly suggested the presence of a motion segment disorder. Still, up to 30% of the selected patients did not experience their genuine habitual pain during the procedure. Spinal fusion was thus avoided in patients who would not benefit from it.

The value of disc blocks for identification of the affected level in painful mechanical disorder of the motion segment

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Introduction: Patients with disabling low-back pain without pathoanatomical changes still present a great problem to orthopaedic and neurosurgeons. Various fusion operations have been tried, but the difficulty usually lies in finding the symptom-producing level and in achieving fusion.In segmental pain there are no specific radiological changes. Clinical evaluation can indicate a certain level, but should not serve as the only basis for identification of the affected segment prior to operation. This study addressed the question whether blocks with local anaesthetic into facet joints and into discs can reveal the pain-producing segment.

Patients and method: The study comprised 165 consecutive patients investigated between autumn 1987 and spring 1989. Under fluoroscopy with TV monitoring the discs were punctured through a posterolateral skin puncture. The needle tip was placed in the centre of the disc, and after injection of 0.5 ml Omnipaque to confirm the position and disclose any leakage, 2 ml Xylocain 20 mg/ml was slowly injected. In 22 patients the test was performed double-blind with NaCl. Facet joint blocks were similarly performed during TV monitoring.

Results: Facet joint blocks gave no positive effect in the selected group of patients. Injection into the disc gave marked pain relief in some patients. At that time we regarded this as conclusive, whereas increased pain on and after injection was found to be unspecific. The blocks were conclusive in 88 patients, of whom 78 underwent surgery, and not conclusive in 77 patients, of whom 4 were nevertheless operated on. Thus of the 165 patients 82 were treated surgically. The result was excellent in 41% after the primary operation and in a further 20% after reoperation on the same level undertaken because of pseudarthrosis; i e in a total of 61% of the patients.

Conclusion: Of the 165 patients, 50% were selected for operation. To judge by the surgical results, at least 61% of these patients were operated on at the correct level. Segmental blocks with local anaesthetic can therefore supplement clinical evaluation in patients with segmental pain and are a useful aid in identifying the pain-producing level but are not sufficient alone for this purpose.

Operatively treated patients with chronical symptoms after whiplash injury

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We studied a consecutive series of 20 patients with whiplash injury, who underwent discectomy and anterior cervical spine fusion.

Patients and methods: The study includes 20 patients, 7 males and 13 females with a mean age of 40 (23–62) years. All the patients had been exposed to a non-contact injury to the cervical spine, resulting from car accidents. Patients with head injury or fracture were excluded. The operation was performed by 1 surgeon and the procedure was the same in 18 cases with anterior cervical fusion according to the method described by Cloward. In 2 cases a discectomy without fusion was performed. The follow-up was done by an independent observer on average 3.7 years after the operation.

Results: None of the patients enjoyed a complete cure but 13 were satisfied with the operation. 11 patients were improved in their head and neck pain which are the major complaints, and their use of analgesics were reduced. Arm and hand numbness or pain were improved in 9 cases. Based on the criteria by Robinson for the evaluation of the surgical results, 2 patients had good, 9 had fair and 9 patients had poor results.

Conclusion: Anterior cervical spine fusion in patients with chronical symptoms after whiplash injury only in some cases gives good results.

Surgical versus conservative treatment in spondylolisthesis—a prospective randomized study

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Introduction: The treatment of adult spondylolisthesis is controversial and no controlled studies comparing the result of surgical versus conservative therapy have been reported. The purpose of the present study was to compare the effect of posterolateral fusion with or without transpedicular fixation (Cotrel-Dubousset) to conservative treatment.

Patients and methods: 22 patients with spondylolysis or spondylolisthesis and at least 1 year of low back pain with or without sciatica and severely restricted functional abilities were selected for the study. There were 10 women and 12 men. The mean age was 36 (18-56) years. 13 patients were randomly allocated to surgical and 9 to conservative treatment. Pain and functional disability were measured by VAS (visual analogue scales) before treatment and at 1-year follow-up.

Results: The surgically treated patients reported significant improvements in all 12 functional scores and for pain at the 1-year follow-up compared to pretreatment. The conservatively treated patients reported no significant improvements in any of the 12 functional scores. A significantly reduced pain, however, was reported at 1 year. At the 1-year follow-up all 12 functional scores were better, and 7 significantly better, in patients operated on compared to conservatively treated patients. The patients operated on reported less pain than conservatively treated patients (ns).

Conclusion: The preliminary results of this prospective randomized study show that the functional outcome after surgical treatment is superior to conservative treatment in spondylolysis or spondylolisthesis.

Anterior bone grafting and interbody fusion: A prerequisite for early mobilisation of patients with thoracolumbar fractures?

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During a 10-year period, 103 thoracolumbar burst fractures were operated on with Harrington distraction. The fuse short,

rod long technique was used. Patients were not allowed to sit and were kept in a plastic brace for 6 months. Due to implant or technical failure in 21% of the patients, however, most of the accomplished fracture reduction was lost and the regain of normal activity delayed. Therefore a completely new regimen was introduced while changing implant to the Internal Fixator. All patients were allowed to sit and walk as soon as possible after the operation, mostly the second postoperative day. No brace was used. In the first 9 patients the fracture was reduced and fixed with the Internal Fixator and a posterolateral fusion performed over the adjacent segments. Due to redislocation during the first weeks of ambulation, however, this procedure had to be abandoned and new technique introduced. Thus until now 25 patients have been operated on with transpedicular reduction, anterior bone grafting and interbody fusion fixed with the Internal Fixator. This has significantly brought down the postoperative loss of vertebral body height and the increase of kyphosis angle as followed during at least 1 year. In spite of the very active ambulatory regimen used, no implant failure has been observed.

Embolization of spinal metastases of renal cell carcinoma minimizes peroperative blood loss

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Introduction: The effect of preoperative embolization on peroperative blood loss at surgical treatment of thoracolumbar spinal metastases of renal cell carcinoma was evaluated. Operations not preceded by embolization served as control.

Material: The series consisted of 21 patients with. There were 10 women and 11 men with a mean age of 63 ± 9 years (range 47–78 years). 10 of the metastases were thoracic and 11 were lumbar. A total of 29 operative procedures, 20 posterior and 9 anterior were performed.

Methods: Preoperative embolization preceded 11 operations, 5 posterior and 6 anterior. Embolization was achieved by selective catheterization of the affected vertebral arteries. Gelfoam powder mixed with a non-ionic contrast agent was used as embolic agent. The blood loss was established by adding the blood volume collected in wound swabs, suction bottles, and in the operating field.

Results: No complication was noted after embolization, whereas after laminectomy and tumour removal without embolization two patients deteriorated neurologically. At posterior surgery the average blood loss was one third after embolization compared with when embolization had not been performed, 2.2 ± 2.2 and 6.4 ± 4.7 litres respectively ($p = 0.016$). The blood loss was also lower during anterior surgery although this difference failed to reach a significant level, 5.1 ± 2.8 and 8.2 ± 5.9 respectively ($p = 0.61$).

Conclusion: It is recommended that preoperative embolization should precede surgical treatment of spinal metastases of renal cell carcinoma where it can be anticipated that the operation will extend into the pathological tissue. Embolization decreases the blood loss and, thus, makes the surgical intervention safer.

Surgical treatment of breast cancer metastases in the spine

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Introduction: The spine is the most frequent site of skeletal metastasis in breast cancer. Osteolysis can result in vertebral collapse and kyphosis, causing pain and paresis. By reduction, decompression and stabilization of the involved vertebra, the symptoms can be relieved, thus enhancing the quality of life.

Material and methods: In a retrospective study of 40 patients, 39 women and 1 man were operated on during 1982–1991. The mean age was 55 (26–74) years. The localization was in 20 cervical, in 13 thoracal and in 7 lumbar. In 30 patients the vertebra had collapsed. 18 patients were paretic, 6 of which were bedridden. Paraparesis most commonly resulted from metastatic growth in the thoracal spine 11/13. Paresis was caused by anterior pressure by the kyphotic vertebra in 10/18 patients, by epidural metastatic growth in 4/18 patients and by a combination of both in 4/18 patients. The kyphotic deformity was reduced by a posterior transpedicular device. Stabilization in the thoracolumbar spine was early in the study by Harrington rod and later by the posterior transpedicular device. 8 patients needed an additional laminectomy. In the cervical spine, in 13 patients with kyphosis the anterior support was reconstructed by an anterior approach using bone cement.

Results: No major complications occurred peroperatively. All patients with neurological symptoms except 2 improved, regaining walking ability. Pain relief was universally accomplished. 8 patients are alive at an average of 22 months postoperatively. The average postoperative survival was 11 months for the 32 deceased patients. The cumulative chance of survival was 82% at 3 months and 50% at 1 year. 2 patients returned to work and all except 2 returned home from the hospital.

Conclusions: Surgical stabilization and decompression gives an excellent pain relief and neurological restitution enabling the patients in most cases to return home. The pathoanatomical changes causing pain and neurological symptoms need to be thoroughly analyzed preoperatively in order to carry out the correct surgical procedure. Although many patients have a short expected survival we feel that this surgery is very much worth while.

Surgical treatment of renal cancer metastases to the spine—clinical results

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28 patients, 15 female and 13 male, with spinal metastases from the kidney were treated. Mean age was 67 years. There were 2 metastases to the cervical, 16 to the thoracal and 9 to the lumbar spine. Most patients were operated on with a posterior approach but also anterior operations were performed.

Mean survival time was 6 (0.3–32) months. The Brice Maccissock score was evaluated retrospectively in 18 cases: 7 had improved, 8 were unchanged and 3 impaired. 10 patients out of 18 could walk postoperatively and of the rest only 2 were impaired.

Conclusion: Of 28 patients with renal cancer metastases to the spine, 50% were still alive 6 months postoperatively and after 1 year 35% were alive. Improvement in mobility was difficult to estimate, but a great proportion became better.

Distribution of bone sialoprotein at the articular osteocartilaginar interface

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Introduction: In bone, matrix mineral is by far the major constituent. Initial mineral deposition appears to occur at the collagen fibrils and the structure of the mineral is influenced by these fibrils. In addition to the macromolecular components, there are a number of low molecular glycoproteins that are thought to have regulatory functions. We have focused our interest on one of them, bone sialoprotein, BSP.

Material and methods: Proximal epiphyses of 21-, 32- and 84-day old rats were fixed by vascular perfusion using a fixative combination of phosphate buffered glutaraldehyde and paraformaldehyde followed by low-temperature dehydration and embedding. Ultrathin sections were incubated with a polyclonal antibody to rat BSP, and protein A gold was applied for detection. Electron micrographs of the osteocartilaginar area were taken with a stratified sampling technique and the number of gold particles per unit area was estimated in the osteoid, calcified cartilage, and at the interface between the 2 tissues according to conventional stereological principles.

Results: Inter- and intra animal variability of BSP labeling was low, and the distribution did not change during the experimental period.

Discussion: The peak of the concentration in the border region between bone and cartilage in the youngest animals may indicate that BSP may play a role in bone formation and mineralization. But the fact that the distribution of BSP does not change during growth supports the notion that BSP is one of the factors anchoring components of bone to the surface of calcified cartilage. The osteocartilaginar area has been discussed in the pathogenesis of osteoarthritis. In this context, the distribution of matrix constituents is highly relevant.

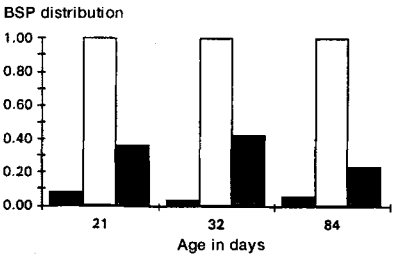

Figure 1. Distribution of BSP in the osteocartilaginar border in different age groups in rats. Black columns are cartilage, white border, and gray osteoid.

Interactions between collagen II and proteoglycans in articular cartilage—a quantitative ultrastructural study

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Introduction: The unique mechanical properties of articular cartilage can mainly be ascribed to the combined properties of collagen II and the large, aggregating proteoglycan. In the tissue, these macromolecules are so tightly bound that the matrix can be regarded as a giant molecular complex, the constituents of which are impossible to extract by non-denaturating means. Consequently, these intermolecular interactions responsible for the transfer of mechanical forces are still largely unknown. We used immunocytchemical methods to study the ultrastructural relation between collagen and two proteoglycan epitopes: fibromodulin and the second globule domain (G2) of the large aggregating proteoglycan.

Materials and methods: Tarsometatarsal joint cartilage from 5 cows was processed for electron microscopy. Using a stratified random sampling technique ultrathin sections were cut from the superficial, middle, and calcified parts of the cartilage. The sections were incubated with polyclonal antibodies to fibromodulin and the second globule of the core of the large aggregating proteoglycan; for detection protein A coated with 10-nm gold probes was used. Immunolabeling was estimated semiquantitatively and correlated to the collagen surface density (surface nm^2/nm^3), which was calculated stereologically.

Table 1. Surface density of collagen II, n 3, mean *SD*

	Compartment		
	Pericellular	Territorial	Interterritorial
Superficial zone	2.8 *0.9*	4.7 *0.5*	4.9 *0.8*
Middle zone	2.8 *0.7*	4.4 *0.9*	4.4 *0.9*
Calcified zone	3.5 *0.5*	4.5 *0.5*	4.3 *0.7*

Table 1. Mean fibril diameter, n 3, mean SD

	Compartment		
	Pericellular	Territorial	Interterritorial
Superficial zone	12.2 (3.1)	17.1 (4.3)	16.9 (4.3)
Middle zone	12.4 (3.1)	18.4 (4.6)	32.3 (8.0)
Calcified zone	11.7 (3.1)	20.9 (5.5)	38.0 (9.9)

Results: Interestingly, the collagen II surface density was of a similar order of magnitude throughout the tissue (Table 1), despite structural differences between the different parts of the tissue.

Both the large aggregating proteoglycan and Fibromodulin showed an increased concentration with increasing distance from the joint surface (Figure 1).

Discussion: The relatively constant surface density throughout the tissue might imply that the surface parameter is important for specific molecular interactions. Collagen II forms an enormous surface with a great potential for interactions with other matrix constituents. Such interactions are responsible for the mechanical properties of the tissue and they also play a role in the assembly of matrix. The non-random distribution of the two proteoglycans is probably also biologically important.

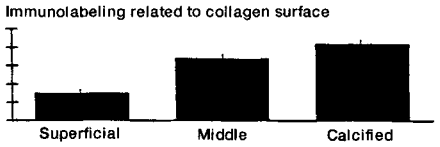

Figure 1. Immunolabeling of second globule domain related to collagen surface in superficial, middle and calcified zones (from left to right)

Collagen II fibril diameter in joint cartilage

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Introduction: Joint cartilage is a composite material, in which the quantitatively most important components are water, collagen II, and proteoglycans. Collagen forms fibrils, responsible for the tensile strength and functional integrity of the tissue. Moreover, the strength of the tissue is highly correlated to the orientation of the fibrils. Quantitative data on the molecular organization is needed for a better understanding of the correlation between structure and function.

Materials and methods: Tarsometatarsal joint cartilage from cows were processed for electron microscopy. From each of 3 animals 2 blocks were examined. Ultrathin sections were cut perpendicularly to the predominant fibril direction, i e, in the superficial zone perpendicular to the surface, and in the middle and calcified zones parallel to the surface. Random high-power micrographs were taken and the diameters of transversely cut fibrils were classified in the cartilage's different zones and compartments.

Results: Although mean collagen fibril diameter showed large differences between the interterritorial compartments of the zones (Table 1), there was a population of slender fibrils in all zones and compartments (Figure 1).

Discussion: Since the coarser fibrils—from a purely mechanical point of view—take up most of the load, the role of the slender fibrils might be to enhance the deformability of the tissue. Being just a few millimeters thick, joint cartilage has little capacity to act as a shock absorber. Rather, one of its main actions is to distribute load, and in this function the tissue's intricate fibril architecture appears to be decisive. This notion is indirectly supported by the lack of fibril organization in the mechanically insufficient fibrocartilage that is formed after injury and disease.

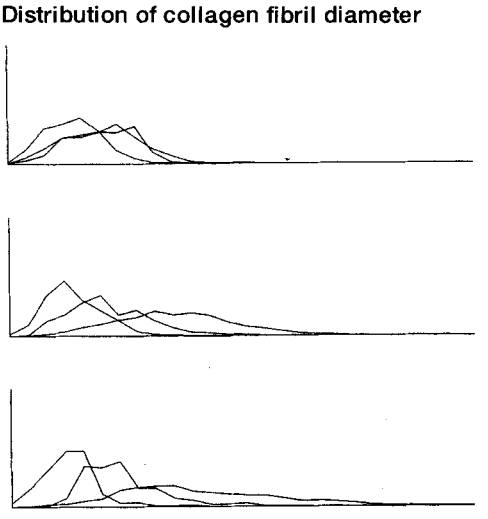

Figure 1. Distribution of collagen fibril diameter. From top: superficial, middle and calcified zones; from left to right: pericellular, territorial and interterritorial compartments.

Swedish multicenter hip fracture study

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A multicenter study of hip fractures in the elderly has been introduced in Sweden to compare different methods of surgery, mobilization and rehabilitation. Data concerning the hospital stay are prospectively registered on printed forms by the operating department. There is also a patient inquiry, which gives follow-up functional parameters at 4 months after the operation. Data are reported on data disks through a special program for personal computers. The project now covers more than half of the Swedish hospitals.

To exemplify, total data are given from fully participating hospitals in 1988 (n = 3956), 1989 (n = 4396), 1990 (n = 4762) and 1991 (n = 3204).The background parameters were very stable over the years. Three fourths (72–73%) were women. Mean age at fracture was 78, 78, 79 and 79 years. Half of the patients (47–52%) were living alone. One fourth (22–24%) had home help before fracture and then on average 6-8 hours per week. Three fourths (73-74%) managed ADL before fracture. Mean hospital time decreased during the period: 19 days in 1988, 18 days in 1989, 17 days in 1990 and 15 days in 1991. The median hospital time also decreased: 14, 13, 13 and 12 days. The mean time from fracture to operation was 1 day.

In 1988 (values for 1991 in parentheses) there were among these hospitals 9% (10%) operations with von Bahr screws and 10% (18%) with other screws. Hook-pins were used in 31% (24%). There were 31% (38%) operations with sliding screw-plate and 9% (1%) Ender nailing. During the time in hospital 3% (2%) reoperations were performed and the average mortality was 6% (4%).

Before fracture 65% (64%) of the patients were living in own home and 19% (19%) in old peoples' homes. The remainder lived in nursing homes or geriatric hospitals. Direct discharge from the orthopedic department to origin was 50% (53%). Of the patients originally coming from own home three fourths had returned there at 4 months after the fracture. The special graph showing daily changes in habitat for all patients showed a stabilized pattern at around 45 days after the fracture. Then most patients had returned to their original habitat.

Healing complications despite of a vascularized femoral head—an MRI study of femoral neck fractures

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MRI is an excellent method of diagnosing non-traumatic femoral head necrosis. A femoral neck fracture causes a variable extent of necrosis in the femoral head. Necrosis associated with vascular damage is considered to be the main reason for healing complications. The objective of the study is to assess the clinical significance of this imaging method after fracture fixation.

Material and methods: MRI imaging has been conducted in 15 patients with displaced femoral neck fractures 1 and 6 weeks after reduction and internal fixation with 2 Titanium screws. A 1.0 Thesla Siemens Magnetom with body coils was used for MR imaging. Registration was made of both femoral heads in the coronal plane with T1 weighted images (TR 600 msec and TE 23 msec), T2 weighted images (TR 1.5 sec and TE 23 msec) and proton weighted images (TR 1.5 sec and TE 70 msec). The femoral heads were assessed as predominantly necrotic, viable or intermediate. Patients were followed-up between 1 and 2 years with radiological and clinical examination.

Results: 4 of 5 fractures with redisplacement had viable femoral heads according to MRI. 2 fractures without redisplacement went on to non-union. 1 had a necrotic- and the other had an intermediate femoral head. A late segmental collapse of the femoral head was diagnosed in 1 patient. The MR image showed a necrotic area in the upper part of the head. 7 fractures had an uneventful union and no signs of femoral head collapse. 3 femoral heads were predominantly necrotic, 2 were intermediate and 2 were viable. In healed fractures with pathologic MR images the necrotic areas were located in the central part of the femoral heads.

Conclusion: MRI is a sensitive method of diagnosing necrotic areas in the femoral head after fracture. The location and extent of the necrosis seems to influence development of a clinically significant complication. Healing complications will, however, follow unstable fracture reduction and internal fixation in spite of preserved femoral head vascularity.

Posterior angulation in trochanteric fractures

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Introduction: Postoperative fracture stability is of vital importance in enabling early mobilization and full painfree weight-bearing in trochanteric fractures. We studied the angulation of trochanteric fractures after fixation with a sliding screw-plate using radiographic stereophotogrammetric analysis.

Patients and methods: 8 patients with trochanteric fractures were operated with a sliding screw device comprising a femoral plate and a lag-screw. At operation, 3–5 tantalum balls, 0.8 mm in diameter, were implanted on both sides of the fracture in the proximal femur. Radiographic stereophotogrammetric analysis was performed within 6 hours postoperatively (before weight-bearing), after 1 week, 2–3 months and after 1 year. Angulation of the femoral head around the longitudinal axis of the femur was recorded.

Results: In 6 of the 8 hips the proximal fragment angulated around the longitudinal axis mainly in the early period of weight-bearing, and in all the 6 cases the femoral head angulated posteriorly (range: 4°–28°) in relation to the femoral shaft.

Discussion: A considerable posteriorly directed force acts on the femoral head at heel-strike and in flexion, which may cause posterior angulation of the proximal fragment. In 3/4 of our cases the proximal fragment angulated posteriorly in the early period of weight-bearing. The sliding screw-plate is designed to allow concentric fracture impaction. However, the intended stability might not be the achieved if the proximal fragment is displaced posteriorly, thus causing an insufficient bone contact area in the fracture. In conclusion, posterior angulation may be an important mode of failure in trochanteric fractures, and the posteriorly directed stress deserves attention in biomechanical testing models of fracture fixation devices for the hip (1).

Reference: 1. Ebbinghaus S, Mjöberg B. Posterior angulation in trochanteric fractures detected with roentgen stereophotogrammetry, Upsala J Med Sci 1991; 96(3): 235-7

The Medoff sliding plate—a new class of fixation device for trochanteric fractures—the first European experience

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Doctor Robert Medoff from Hawaii has developed a new concept in compression screw system for use in high subtrochanteric fractures and selected unstable trochanteric fractures (1). Like the intramedullary nails, the device allows collapse and compression to occur in a direction parallel to the longitudinal axis of the femoral shaft, both at the time of surgery and in the postoperative period. The implant complements existing standard compression screw systems as an add-on plate and uses the same technique of insertion and instrumentation.

Theoretically, this device ought to be superior to the standard hip compression screws regarding transverse and reversed oblique fractures of the trochanteric region. Contrary to the inventor, we have used the Medoff plate in all types of multifragmented trochanteric fractures and even in dislocated intertrochanteric two fragment fractures, because sometimes during surgery, a change from a stable to an unstable fracture may take place, rendering the Medoff plate a better choice than the standard hip compression screw. In fact, the Medoff device may be an all-purpose fixation system for all trochanteric fractures. The surgeon can choose between static and dynamic compression in the axis of the femoral neck or in the longitudinal axis of the femoral shaft, or the surgeon may prefer a combined dynamic compression in both axes depending on the fracture type.

Reference: 1. J Bone Joint Surg (Am) 1991;73(8):1192-9