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Proliferative activity in the hypertrophic zone of the physes after distraction—a study in rabbits

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Introduction: Physeal distraction usually results in hyperplasia and separation of the physis. It is still unclear whether lengthening by this method is a result of stimulation of the physeal growth or merely a consequence of elongation at the separation site. We studied the distraction effect on the proliferative activity of the physis in rabbits, using 5-bromo-2'-deoxyuridine (BrdUrd) cell labelling.

Material and methods: Distraction of the distal femoral physis was performed at a rate of 0.7 mm daily in 12 rabbits for 3 to 14 days using a circular external fixation device. The contralateral femur served as a control. Proliferating cells were labeled with BrdUrd 1 hour prior to killing and localized in decalcified histologic sections using a monoclonal antibody (Grazner 1982). The labeled cells were counted by using an eyepiece graticule in the ocular of a light microscope.

Results: A fracture separation through the hypertropic zone (HZ) was seen in 11 physes. Labeled cells were encountered almost exclusively in the proliferative zone, occasionally in the reserve zone and none in the HZ in all controls and after 14 days of distraction. After distraction of 3 to 7 days, labelled chondrocytes were seen close to the separation gap in the HZ, too. There was no difference between the total number of labeled chondrocytes in the distracted physes and controls.

Conclusions: Proliferative activity in the HZ has not been reported in any circumstance. However, hypertropic chondrocytes apparently have the capability of proliferation if normal differentiation is disturbed. In our study physeal distraction did not stimulate cell proliferation of the physis.

References: Grazner H G. Monoclonal antibody to 5-bromo and 5-iododeoxyuridine: A new reagent for detection of DNA replication, Science 1982; 218: 474-6.

The use of autogenous osteoperiosteal grafts in the biological reconstruction of fresh or late full-thickness defects of the knee

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Altogether 6 fresh osteochondral fractures, not possible to be fixed by fragment fixation due to extensive fragmentation, were treated by an osteoperiosteal resurfacing arthroplasty of the defect area. Our late cases included 8 knees with osteochondritis of the femoral condyle and 3 knees with grade IV chondromalacia of the patellofemoral joint. The follow-up time ranged from 6 months to 6.5 years. In 2 knees another operation was later necessary for a menisceal injury in sports, in 1 knee a secondary operation was made for recurrent dislocations of the patella and in 1 case the loose graft was removed arthroscopically 4 years after the primary surgery.

Excluding the case with the loose graft, the results of the operation were generally good, although in only 2 cases the result was graded as excellent. The use of fibrin glue for intimate contact of the graft to the recipient site is recommended. The joint should be mobilized by controlled motion as early as possible.

Surgical treatment of severe spondylolisthesis in adolescents—reduction or fusion in situ?

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Material and methods: 22 adolescent patients with severe (>50%) slip were treated operatively. 11 were reduced with the Dick/Magerl transpedicular screw device and fused posterolaterally from L4 to S1, and 2 weeks later anteriorly from L5 to S1. The other 11 were fused in situ L4–S1 (6 cases) or L5-S1 (5 cases) using circumferential (6 cases), anterior (4 cases)

or posterolateral (1 case) technique without instrumentation. The 2 groups were comparable regarding age at operation, age at follow-up, follow-up time and preoperative grade of slip, lumbosacral kyphosis and clinical findings. The mean follow-up time was 5 years.

Results: In the reduction group an improvement in the slip of 36% was achieved as compared with 8% in the in situ fusion group. The sagittal rotational angle improved by 11 degrees in the reduction group and increased by 2.8 degrees in the in situ fusion group. There were no differences between the groups in the functional tests or clinical findings concerning pain. Subjective assessment was good in both groups at follow-up, i e the pain had disappeared. Mean operation time and intraoperative blood loss were significantly higher in the reduction group. Reduction procedures were also associated with a higher number of complications and reoperations. No neurological complications, however, occurred in the reduction group.

Conclusion: Based on this study, in situ fusions are to be preferred in adolescents with severe spondylolisthesis.

Stress osteopathy of the femoral head

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Like any spongious bone structure of the lower extremity the femoral head can be injured due to excessive physical exertion. We characterized this rare injury in young military recruits.

Patients and symptoms: All 10 patients were young conscripts with a mean age of 20 (19–26) years. 8 of them suffered from hip pain during marching, 1 during a battle exercise and 1 while running. 3 hips were clinically normal, painful rotation was observed in 7 cases and tenderness in the groin and trochanteric area in 2 cases. 7 patients were prescribed crutches for 2–9 months. Median duration of the symptoms was 4 (1–10) months.

Radiological findings: All patients had an increased bone scan tracer activity of the femoral head; the uptake varying from weak to intense. 8 hips were normal on ordinary radiographs. Subcortical osteoporosis and cysts were observed in 2 cases. In 1 of these a lateral osteophyte of the femoral head developed during 4 years of follow-up indicating an early coxarthrosis. According to Ficat the radiological findings corresponded to the grade I of the avascular necrosis of the femoral head A low field MRI examination was performed in 6 cases. In 5 of these a decreased signal intensity (in T1 weighted images) of the femoral head was demonstrated showing bone marrow oedema. The signal loss was followed in 1 case with 3 consecutive MRI examinations. Signal of the femoral head became normal in 10 weeks.

Conclusions: Cyclic, excessive physical stress can injure the femoral head and also cause a stress osteopathy. Stress osteopathy differs from avascular necrosis of the femoral with a good prognosis and from the transient osteoporosis of the hip with radiological findings and shorter duration of symptoms.

Arthroscopic repair of the medial retinaculum in acute patellar dislocation

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Acute patellar dislocation is the most common cause for hemarthrosis of the knee in young military recruits. Arthroscopy is useful in confirming the diagnosis, in removing blood and blood clots and osteochondral fragments and in shaving the cartilaginous injuries. Arthroscopic repair of the medial retinacular tear is thus a natural continuation of the arthroscopic debridement of the knee.

Patients and methods: Arthroscopic repair of the medial capsular tear was performed in 8 20-year old conscripts. The tear was sutured after an arthroscopic shaving with 6 PDS sutures using outside-in technique through 3 small parapatellar incisions. An arthroscopic lateral release was added in 7 cases. 1 knee was postoperatively immobilized by a plaster cast for 3 weeks. No immobilization was used in the other cases. Active mobilization of the knee was started 3 weeks after surgery. Stability of the patella was tested by preoperative and postoperative axial stress radiograms.

Results: All patients could return to normal military servcie and sport activities in 2-4 months. No redislocations occurred, but the follow-up time averaged only 7 (3-15) months. Lateral shift of the patella decreased 7 (2-17) mm on an average compared with the preoperative axial stress radiographic examinations. Preliminary results of this series imply that an arthroscopic repair of the medial capsular tear is sufficient in treating acute patellar dislocations in young conscripts.

Density of lumbar muscles after 4 years after decompressive spinal surgery

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The results of decompressive surgery for lumbar spinal stenosis are variable. The aim of this study was to evaluate the density of lumbar muscles by computed tomography at the levels of L II to L V. Initially 178 patients were examined. 20 of these patients had an excellent outcome clinically and 16 patients had a very poor outcome. The residual stenosis and density of lumbar muscles in Hounsfield units (H) were measured from CT images. The clinical evaluation included Oswestry questionnaire, walking test and clinical examination. The density of the psoas muscle at the level of L II was 44.9 H in the excellent outcome group, but only 34 H in the poor outcome group ($p < 0.01$). The density of lumbar extensors showed marked decrease at the operated area in both groups, but there were significant differences between the excellent and poor outcome groups on the levels from L III to L V. At the level of L

V the difference between excellent and poor outcome was 14.5 H. These results suggested that partially the decrease of muscular density can be explained by disuse or inactivity as "deconditioning syndrome." The decreased density at the operated area suggested that injury to the innervation of the muscles at the operated area can lead to muscular atrophy with general immobilization and inactivity.

Reconstruction of the anterior cruciate ligament with the middle third of the patellar tendon (BTB)

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We have used a bone-patella tendon-bone autograft as a reconstruction material in chronic anterior cruciate ligament (ACL) insuffiency since 1987. We report a follow-up of 30 patients (18 men and 12 women, mean age 27 years) who were operated using this method between September 1987 and June 1990. The study consisted of a questionnaire, clinical examination, laxity tests with KSS (Acufex) and isokinetic and isometric muscle strength testing (Cybex II).

Initially 15 patients were classified as competitive athletes and the other 15 were recreational athletes. The injury was sustained in soccer in 12 of the cases.

On an average 2 years after the reconstruction 20 patients were subjectively satisfied with their end results. According to our objective functional criteria 26 patients were classified as excellent or good. According to the Lysholm score 16 patients were excellent or good (over 82 points).

In the Lachman test 12 patients were completely stable, 17 were mildly positive (12axl+ and 5ax2+ laxity) and 1 patient had a 3+ laxity with a hard end point. The total antero-posterior laxity measured with the KSS averaged 9.8 ± 4.5 mm in the injured and 7.0 ± 2.4 in the uninjured knee. The pivot shift test was completely negative in 22 patients, 1+ positive in 6 patients, 2+ positive in 1 patient and 3+ positive in 1 patient.

Compared with the uninjured knee the operated knee showed in the isokinetic test a 25% strength deficit in extension and an 8% deficit in flexion at the speed of 60°/sec. The thigh circumference deficit averaged 1.0 ± 0.5 cm.

From the 15 patients who were initially competitive athletes but who all had had to give up sport after the injury, 8 were able to return to sport after the reconstruction.

Prevention of deep venous thrombosis in total hip replacement—a randomized comparison of low-molecular and unfractionized heparin

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167 patients undergoing total hip replacements were randomly given low-molecular weight heparin (LMWH) enoxaparin or unfractionized heparin UH as a thrombosis prophylaxis. 40 mg LMWH was injected subcutaneously 12 hours before operation and subsequently once in the morning, UH correspondingly 5000 i u 2 hours before operation and the same dosis every 12 hours. Spinal anesthesia was mostly used.

There were 4 cases (5%) of proximal DVT in the UH-group and 1 case (1%) in the LMWH-group verified either by venography or ultrasonography and 1 pulmonary embolism in the UH-group. No statistical difference in per- or postoperative haemorrage was observed between the groups. There were no major bleeding complications or wound infections in the material.

A prospective study of wound infections in orthopedic operations

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A total of 3,666 elective orthopedic operations were performed during the years 1986–90. The aim of this study is to review the wound infection rate in these operations. We had 35 wound infections which were classified in 4 categories. Minor suture infection, superficial infection, deep infection and sepis. The overall infection rate was 0.85%. The rates were highest in back operations, 2.1%. The patients suffering from rheumatoid arthritis had a higher risk for infection (0.9%). The most common cause of bacterial infection was *Staphylococcus aureus.*

The angle between the femoral neck and diaphysis (CD-angle) in patients with total hip implants

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In this study we measured the CD-angle of 100 consecutive hips, in which total arthroplasty had been performed. Indication for operation was arthrosis in 74, rheumatoid arthritis in 19 and acetabular dysplasia in 7 hips. We divided these hips in 3 categories: normal (CD-angle 128°–135°),

varus hips (CD-angle below 128°) and valgus hips (CD-angle over 135°). Our aim was to estimate the occurrence of varus hips in a normal arthroplasty material and the possible medialisation effect to the femur when using a valgus type prosthesis in varus hips.

The average CD-angle was 129° ± 9°. There was no difference between men and women. There were 38% varus hips in the whole material.

We found a medialisation effect after total hip arthroplasty with valgus type femur component in varus hip; the average medialisation was not very remarkable, but in a few cases it was moderate.

Does smoking delay bone union of conservatively treated tibial shaft fractures?

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A total of 245 tibial shaft fractures were initially treated conservatively, 39 of these were later operated because of delayed union. A questionnaire concerning smoking was sent to 172 patients (39 fractures operatively treated and 133 fractures conservatively treated). The patients' smoking habits during approximatively the past 3 years were asked already in the department. The smoking habits of 126 patients (73%) were found out. Two thirds of the patients whose fracture was treated operatively because of delayed union were smokers, whereas only less than one half of the patients whose fracture was treated conservatively to bone union were smokers.

The mean clinical union time of smokers was longer than that of non-smokers in the whole patient material (172 fractures) and in all the subgroups studied. Delayed union was more common in smokers, smoking men, smoking women, smokers with fracutre because of low energy injury and closed fracture compared with corresponding fractures of non-smokers.

The survival of the Lubinus total hip implant

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We have analyzed 444 Lubinus arthroplasties with a survivorship method (Kaplan-Meier). The overall survival of the Lubinus implants was 87.1% at 10 years. It was 88.0% in cases with arthrosis and 90.7% in cases with rheumatoid arthritis.

We also studied the effect of 6 variables on the durability of THPs: diagnosis, sex, age, weight, size of the cup and model of the stem (straight and anatomic).

In this series only age had an effect on the durability of THPs. The survival of THPs was 86.0% in patients under 65 years and 92.6% in patients over 64 years. The difference was statistically significant. There was no deep postoperative infection in this series. The revision rate was 11.5%.

Survivorship analysis of Lord's cementless total hip prosthesis

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Survivorship analysis with the Life Table method was used to estimate the survival of 89 primary arthroplasties with Lord endoprosthesis from 1983–1988 in Middle-Finland Central Hospital. The mean follow-up period was 5.3 years. During this time the acetabular component was exchanged 4 times, the stem once and both components once.

The survival probability at 5 years was 93.6%, comparable with other reports on cementless hip prostheses. Nearly all loosenings occurred with the threaded cup. The survival of the femoral stem seems to be good, whereas the cup is the weakest point.

Absorbable pins of poly-L-lactic acid in the fixation of fractures and osteotomies

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32 patients with small-fragment fractures or osteotomies were treated by internal fixation with absorbable self-reinforced poly-L-lactic (SR-PLLA) pins. The two most common indications were Chevron osteotomy of the first metatarsal bone for hallux valgus and displaced fracture of the radial head.

The clinical recovery and radiographic results could be studied prospectively in 27 patients, the follow-up time ranging from 8 to 37 months. No redisplacements occurred, and no signs of inflammatory foreign-body reactions were seen. In 2 patients a biopsy of the implant region for histological examination could be taken at a reoperation performed 20 and 37 months after the original operation, respectively. No polymeric material could be found in the biopsy specimens.

SR-PLLA pins seem to be a useful alternative in some small-fragment fixations in orthopaedic surgery. A reoperation for removal of the metallic implants can thus be avoided.

Autopsy findings in traffic accidents and prevention of traffic deaths in Middle-Finland 1985–1987

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The purpose was to find out the causes of death in traffic accidents and the possibilities of emergency care to save lives

All coroners documents and autopsy findings of 93 lethal traffic accident cases were examined in 1985-87 in the district of Central Finland. There are 250,000 inhabitants, 22 health centers, 1 local hospital and a central hospital in this area.

Of the victims, three fourths were men, one fourth women; the mean age was 41 (6–82) years and 47 (5–81) years respectively. 27% were pedestrians, 14% cyclists, 8% motor cyclists, 28% car drivers and 20% car passengers. 20% of the victims had raised alcohol levels at autopsy.

52% died at the scene and thus 48% had time for emergency care. 10% of all victims died in a health center, 13% in an ambulance and 25% in the central hospital.

Brain damage was the cause of death in 22%, rupture of the aorta in 14%, rupture of the heart in 6% and disruption of the cervical medulla in 14%. Other causes were hemorrhagic shock, hemo-pneumothorax, pulmonary complications, m o f and pulmonary embolism.

Based on a retrospective analysis the author concludes that with optimal emergency and hospital care 23% of the deaths could have been prevented.