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The effect of external transpedicular fixation test on musculoskeletal functions in patients with severe low back pain—an analysis of 25 patients with pain relief

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Our prospective study comprised 30 consecutive patients with severe chronic low back pain and suspected instability. 5 of the 30 patients experienced no pain relief, or increased symptoms during the test. In these cases the external frame was removed and measurement of musculoskeletal functions could not be done with the installed device. The final study group consisted of 25 patients (18 women, 7 men). All of these patients experienced considerable pain relief during the external fixation test and underwent subsequent anterior interbody fusions. The mean age of the patients was 43 (27–52) years. The mean duration of low back pain was 5 (0.5–12) years and that of leg pain 3 (5–12) years. The Oswestry disability index was on average 47.7/100 (range 22–64). The most frequently tested segments were L4–S1 and L4–L5. The mean duration of the fixation test was 22 (15–34) days.

The following physical parameters were performed before the external fixation test and at the end of the test period: isometric lifting, isokinetic lifting with velocities of 50 and 100 cm/sec, repetitive upper extremity lifting with a load, repetitive squatting and a walking test on a treadmill.

No mean values of the tested parameters decreased. The most prominent increase was found in the walking distance. 9 out of 11 subjects having initial values below 300 meters were able to walk more than 900 meters with external fixation. The differences between the pairs were statistically highly significant. No complications due to the measurement procedure were recorded.

Operative treatment of symptomatic lumbar spondylolysis or mild spondylolisthesis in young patients—direct repair of the defect or segmental spinal fusion?

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A retrospective study comparing the clinical and radiographic results of 2 different operative procedures used for treatment of lumbar spondylolysis and mild olisthesis in adolescents is presented.

28 patients, who underwent direct repair of the lytic defect (secclusion) using bonegraft and cerclage-wiring, and 28 patients who were treated by segmental posterolateral fusion were invited to follow-up examination 2–8 (mean 4.5) years after operation. 23 patients of the secclusion group (S) and 25 patients of the fusion group (F) followed the invitation. The 2 groups were comparable as to age at operation (17.4 ± 5.7 vs 15.6 ± 2.6 years), follow-up time (54 ± 8 vs 54 ± 25 months), gender, and preoperative subjective symptoms. The preoperative slip was slightly greater in the fusion group (13.1 ± 4 vs $7.2 \pm 8.4\%$, $p = 0.003$).

The follow-up assessment, done by an independent observer, included interview, Oswestry index, pain scale, physical examination, plain radiographs (standing lateral view, flexion/extension films), MRI, and functional testing (lumbar spine mobility, lifting).

There was no statistical difference in the subjective, clinical and functional outcome between the 2 groups. The results were good or satisfactory in 21/23 of the secclusion group and in 24/25 of the fusion group. There were 2 reoperations in the S-group (1 cerclage removal, 1 segmental fusion) and 1 spondylolysis in the F-group. Complications occurred in the S-group: 1 deep infection, 1 transient L5-root irritation and 1 hemolytic anemia related to blood transfusion. In both groups there was 1 postoperative urinary tract infection.

Plain radiographs showed in both groups a significant loss of disc height in the operated segment during follow-up indicating progression of disc degeneration. Flexion/extension views showed significantly better mobility in the region L3–S1 in patients of the S-group.

On MRI there was no statistical difference in the hydration index of the 3 lowermost discs between the 2 groups. The con-

dition of the adjacent disc above the segmental fusion was not worse as compared to the corresponding disc in the S-group.

It is concluded that in a small group of young patients with symptomatic lumbar spondylolysis or mild isthmic olisthesis after mean follow-up of 4.5 years, the results were satisfactory in the majority of patients after direct repair of the defect as well as after segmental fusion. No statistical difference was found in the clinical outcome between the 2 treatment groups. Direct repair does not save the lytic-olisthetic disc from further degeneration. The disc above the fused segment did not show signs of increased degeneration.

National data base in orthopedics and traumatology

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In Finland a national data base has been gathered about patient discharges from hospitals since 1967. The modern data processing has now made it possible to analyze this information with details about age, time of treatment, diagnoses and operative treatment.

To obtain the information concerning orthopedics (and other surgical subspecialties) we examined both the grouping of diagnoses and that of operational procedures. The diagnoses were grouped according to the ICD-9 coding in 59 different categories. Some of them correspond well to the division into subspecialties (e.g. fractures and orthopaedics and traumatology, some do not (e.g. arthropathies are distributed among many different specialities).

The NOMESKO classification is divided into 130 different groups of operative procedures. The main drawback in that classification is that according to it, the most common procedures are various other operational procedures.

We have developed a modification of this classification where the groups have been coined with useful names. Accordingly, the 12 most common operative procedure groups in Helsinki University Central Hospital are shown in Table 1. The proportion of orthopaedic operative procedures is about 40% of all surgical procedures.

Cytogenetic study of bone tumors

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Introduction: The characterizing of chromosome aberrations in bone tumors is a promising field and may provide a prognostic and diagnostic tool like in hematological malignancies.

Patients and methods: Chromosome analysis was performed on 304 samples from 249 patients examined for a bone tumor from 1988 to 1992 at Helsinki University Central Hospital.

Cell suspension was obtained mechanically and/or enzymatically. Part of the material was exposed directly to colcemid; part was cultured for various lengths of time. For staining trypsin-Giemsa-banding was used; at least 20 metaphase cells were examined from each patient. For some samples chromosome painting and interphase cytogenetics by the means of *in situ* hybridization were applied.

Results: In non-neoplastic lesions 1 sample from an infectious process demonstrated a clonal aberration. Simple clonal abnormalities occurred in 7 out of 75 successfully cultured benign tumors as 21 out of 54 malignant primary tumors had clonal aberrations, most of which were of chaotic nature; Ewing's sarcomas demonstrated the characteristic t(11;22)(q24;q12). 9 out of 21 other bone malignancies had a clonal abnormality.

Conclusion: The cytogenetics, apart from providing a clinical tool, will expand our understanding of the pathogenesis of bone tumors and could also lead to studying the molecular genetic changes in these tumors.

Table 1. 12 most common procedures in orthopedics and traumatology

Procedure	Number	Procedure	Number
Open reduction of fracture/dislocation	2978	Local bone procedure	849
Arthroscopy, not meniscus	2408	Muscles, tendons, fasciae	840
Surgery of the hand	1393	Endoscopic removal of meniscus	819
Correction of toe deformity	1349	Ankle injuries	635
Removal of osteosynthesis material	1007	Primary hip endoprosthesis	614
Closed reduction of fracture/dislocation	856	Knee injuries	592

Long-term results of ventralization for severe patellofemoral pain

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Introduction: The results of ventralization of the tibial tubercle in severe patellofemoral pain are controversial. There have been a number of operative complications reported. To evaluate long-term results of tibial tubercle ventralization a retrospective follow-up report is presented.

Patients and methods: Severe patellofemoral symptoms due to chondromalacia or arthrosis were treated with a Maquet-Bandi type of ventralization (n 25) or using an oblique osteotomy to achieve ventromedialization (n 9). Mean age of the patients (19 women and 15 men) at the time of the operation was 39 years. The follow-up time was 7.3 years.

Results: No major differences were observed between the 2 groups with respect to preoperative parameters or results of operative treatment. There was no difference in the results of treatment with regard to the indication: chondromalacia or arthrosis. No operative complications were noted. The amount of ventralization was 13.7 and 12.1 mm, respectively (N S). The postoperative Lysholm scores were 67.1 (fair) and 59.2 (poor), respectively (N S). Correspondingly, the Tegner activity levels were 1.9 and 2.1 (N S). The subjective pain evaluation according to visual analogue scale (0–100) was 38.5 and 50.7, respectively (N S). Working ability was reduced postoperatively, 6 patients were retired and 4 transferred to a lighter work ($p < 0.01$). Problems in kneeling was a frequent complaint. The isokinetic muscle power (peak torque, ft-lb) for quadriceps performance at 60°/s was 87.1 and 64.2, respectively (N S). The corresponding values for the 2 groups in hamstring torque at 60°/s were 64.8 and 43.4 (N S). The operation could not prevent development of patellofemoral arthrosis in the medial or lateral facet ($p < 0.001$ and $p < 0.05$, respectively).

Conclusions: Conservative treatment has usually failed in these patients. However, because operative results were not encouraging a prospective, randomized study comparing conservative and operative treatment should be performed.

An absorbable self-reinforced polylactide plug in the fixation of distal rabbit femoral osteotomies

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Introduction: To extend the field of application of absorbable osteofixation devices an absorbable plug, measuring 4.5 mm

in diameter and 30 mm in length, was constructed of poly-L-lactide using a self-reinforcing fibers-in-matrix manufacturing technique. For the rotary stability and to secure the grip of the device the plug has deployable distal fins.

Materials and methods: In this experimental study the plug was used in the fixation of a transverse distal femoral osteotomy in 20 rabbits. The consolidation of the osteotomy and the short-term biocompatibility of the implant were investigated histologically, histomorphometrically and microradiographically in groups of 5 rabbits followed for 3, 6, 12 or 24 weeks.

Results: 15 osteotomies showed bony union. In 5 rabbits no bridging trabeculae across the osteotomy had developed but these rabbits belonged to the groups with the shortest follow-up times. No mechanical failures of the plugs were encountered, and the short-term biocompatibility of the implant was excellent with no accumulations of inflammatory cells at the plug.

Conclusions: The absorbable polylactide plug seems to be a promising implant for the fixation of cancellous bone fragments.

Use of hydroxyapatite blocks reinforced with resorbable fibers in bone defects

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Introduction: The porous hydroxyapatite (HA) blocks reinforced with resorbable polyglycolide (PGA) or poly-DL-lactide (PDLLA) fibers were implanted into the proximal and diaphyseal tibiae of rabbits in order to study bone ingrowth into the implants.

Material and methods: Coral based reinforced HA blocks (Interpore 200) were 2 x 3 x 4 mm in size. Bone defects of equal size were created in the tibiae of 23 rabbits, proximally into the cancellous bone and diaphyseally into the cortical bone. Both tibiae were operated, 1 with PGA-HA implants and the other with PDLLA-HA implants. The rabbits were killed after 6, 12, 16 and 24 weeks follow-up, and histological, histomorphometrical and microradiographical studies were performed.

Results: Outside the implants modest foreign body type reactions around the fibers were seen. In spite of that a direct contact between the implant and host bone was possible in some places and abundant bone ingrowth was seen already at 6 weeks. Thereafter the amount of bone ingrowth remained constant up to the end of 24 weeks follow-up period. In the cortical defects the PDLLA reinforced HA blocks showed more bony ingrowth as compared to that of the PGA reinforced blocks but in the cancellous defects no clear difference between the 2 implants was found. In all, the percentual new bone are fraction as measured with histomorphometry was 17.1% in the cortical implants and 12.9% in the cancel-

lous implants ($p < 0.01$). Also in the cortical ends of the implants the bone ingrowth was greater than in the ends facing the medulla.

Conclusions: It seems that the PGA or PDLA fiber reinforcement does not prevent bone ingrowth into the coralline hydroxyapatite implants. The maximal bone ingrowth was observed already at 6 weeks, thereafter the bone ingrowth remained constant. The bone ingrowth into the reinforced HA blocks was more abundant in the cortical defects than in the cancellous bone defects.

Revision indication in 1/5 of PCA unicompartmental knee arthroplasties after 3-year follow-up

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Introduction: Unicompartmental knee arthroplasty is a solution in cases where osteotomy is no longer possible and total knee arthroplasty would not be considered. Controversial early results after cementless PCA arthroplasties have been reported previously.

Patients and methods: Unicompartmental PCA arthroplasty was performed on 58 patients, of which 49 (52 knees) were available for a follow-up after a mean 3 (1.8-5) years. There were 37 women and 15 men with a mean age of 66 years. 46 primary and 6 posttraumatic arthroses were treated. In 42 medial arthroplasties preoperative tibiofemoral angle was 2.3° ($\pm 4.7^\circ$) varus and in 10 lateral arthroplasties 17.1° ($\pm 5.2^\circ$) valgus on weight bearing radiographs. In 35 femoral and 28 tibial components cementless fixation was used.

Results: Postoperatively the tibiofemoral angle was 5.1° ($\pm 3.6^\circ$) valgus in medial arthroplasty and 7.7° ($\pm 3.8^\circ$) valgus in lateral arthroplasty. There were indications for revision in 11 cases. Conversion to total arthroplasty has been performed in 4 patients and 1 tibial as well as 1 femoral component have been revised. The main reason for revision was plastic wear which resulted in increasing varus or valgus deformity. 2 femoral components were loose and 1 had been fractured. At operation severe plastic wear was seen frequently.

Conclusions: It seems that the material properties of PCA unicompartmental prosthesis are not adequate to withstand long standing load bearing.

Survivorship of total hip replacement patients

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Materials and methods: Kaplan-Meier survivorship analysis was performed for 1128 total hip replacement patients (THR) (262 McKee-Farrar, 505 Brunswik and 361 Lubinus patients). The series was based on 2067 THR-patients operated on at the Orthopaedic Hospital of the Invalid Foundation in 1967-85. Only patients with primary coxarthrosis or posttraumatic arthrosis were included into the series. Survivorship of this material was compared 1) with that of an age-sex matched control material and 2) with that of a normal population. The control material was obtained from the 7063 patients operated in 1973-85 at the same hospital for other orthopaedic reasons. Data on the normal population were based on the life tables 1981-85 of the Central Statistics Office of Finland. Survivorship after the 65th birthday was used for the comparison of the THR patients and the normal population. The analysis was started from the first surgical procedure (date and type of prosthesis) and was ended at 31.12.1990.

Results: No practical differences existed between the survivorship of the THR- and control patients. 10-year survivorship for the McKee-Farrar patients was 85% (95%CI 0.819-0.864); for the Lubinus patients 82% (95%CI 0.819-0.864) and for the control patients 84% (95%CI 0.819-0.864). 10-year survivorship of the men with THR was 75% (95%CI 0.703-0.794) and that of the women 86% (95%CI 0.856-0.828). 10-year survivorship after the 65th birthday for men with THR was 67% (95%CI 0.584-0.740) and for the women 81% (95%CI 0.765-0.853). The corresponding figures of the normal population were 62% for men and 80% for women.

Conclusions: The survivorship of the patients with cemented THR are comparable with that of other orthopedic patients and somewhat better than the survivorship in the normal population.

Revision measures following 597 total knee arthroplasties

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The aim of this study was to evaluate all revision measures following primary total knee arthroplasties in the present material.

Patients and methods: During 1976 through 1991 597 total knee arthroplasties were operated in Oulu University Central Hospital, mean age of which at the time of the primary arthro-

plasty was 66 years. During the same period revision measures were performed in 89 knees. 66 of the knees were primarily operated in our hospital. 55 of these patients were women and 11 were men, the indication for the primary arthroplasty being arthrosis in 52 cases, rheumatoid arthritis in 13 cases and secondary arthritis in 1 case.

Results: 6 knees had soft tissue surgery only, 2 because of limitation of the range of movement, 2 because of infection, 1 because of instability and 1 because of other reasons.

40 knees had one-staged revision arthroplasty, the indications being instability (10), infection (7), loosening of the components of the prosthesis (12), application of the patellar prosthesis (7), limitation of the range of movement (2) and other reasons (2). 5 knees had 2 staged revision arthroplasty because of infection. Revision arthroplasty failed in 6 cases resulting in knee fusion.

The reasons for arthrodesis were infection in 8 cases, instability in 3 cases, limitation of the range of movements in 1 case, loosening of the tibial component in 1 and loosening of the tibial and femoral components in 1 case. In 1 knee only removal of the prosthesis was performed.

Conclusions: The incidence of revision measures was 11% of the knees primarily operated in Oulu University Central Hospital and the incidence of secondary arthroplasty was 7.7% indicating that a part of the complications may or have to be treated by other means than revision arthroplasty. The functional result was satisfactory in 21 cases.