

Finnish Orthopedic Association

Helsinki, May 19–20, 1989

Editor: Seppo Seitsalo

Liinasaarenkuja 3–5 D7
SF-02160 Esbo, Finland

Experimental orthopedics

The effect of gradual physal distraction on the vascular supply of the epiphyseal area

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In gradual as well as in continuous distraction of the physis, hyperplasia of the hypertrophic zone has been noted (Sledge and Noble 1978, De Bastiani et al. 1986). Experimentally produced metaphyseal ischemia has led to transient thickening of the hypertrophic cartilage cell layer (Yabsley and Harris 1965). The similarity of the changes in the physis led us to try to investigate the effect of distraction on the vascular supply of the epiphyseal area.

Material and methods: In 6 growing rabbits, physal distraction of the distal femur was performed with an external unilateral fixator. The distraction time was 5–15 days at a rate of 0.5 mm or 1 mm once daily. The unoperated on femur served as a control. Microangiography was performed with barium sulfate (10 percent Micropaque® in physiologic saline). The distal femurs were fixed in formalin and decalcified. Serial sections of 500 µ were placed in contact with photographic emulsion.

Results: In the control specimens, capillary filling was good on both sides of the physis, while in the distracted specimens, irregularities and focal defects could be seen, especially on the epiphyseal side and in the more distracted specimens.

Discussion: On the basis of our preliminary results, physal distraction seems to impair the capillary circulation in the epiphyseal area. Whether this phenomenon is reversible remains to be determined.

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Immobilization arthrosis in rabbits is characterized by early inflammation not caused by wear and tear

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The kinetics and composition of the primary cellular inflammatory process was studied in the synovial fluid (SF) and synovial tissue (ST) compartments of a rabbit-knee immobilization arthrosis model.

Immobilization induced rapid migration of neutrophils (59 ± 26 percent cells) into the SF in 3 days, which was accompanied by nonspecific esterase-positive monocytes (71 \pm 8 percent of all the mononuclear cells). This finding suggests that nonspecific inflammation mediated by phagocytic leukocytes predominates in the cellular response in the SF compartment.

In contrast, morphometric analysis of the ST proper showed an inflammatory mononuclear cell response, the intensity of which diminished over time during the study period from day 3 (416 \pm 59 cells per 0.049 mm² ST tissue) through day 10 (305 \pm 32 cells, $P < 0.05$) to day 35 (174 \pm 36 cells, $P < 0.01$). This phenomenon clearly shows that the primary inflammatory cell response is not mechanically induced. The ST response in situ was predominated by tissue macrophage, although infiltrates rich in T lymphocytes were present in the immediate sublining stroma. There was a correlation ($r =$

0.774, $P < 0.05$) between the intensity of the SF response (total recovery) and the percentage of neutrophils, but there was no such correlation between the intensity of the ST response and the proportion of T lymphocytes ($r = 0.336$, $P < 0.05$). These findings suggest that interleukin-1-like activity may be involved in the initial phases and in the primary inflammation following immobilization of a rabbit knee and resulting in arthrosis. Immobilization leads to panarthrosis at an early stage.

Neuropeptides involved in nociception and neurogenic inflammation in arthrosis and rheumatoid arthritis

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Arthrosis (A) is often a painful disease. According to the current point of view, it mainly affects the avascular, aneural articular cartilage, but a lot of evidence favors the idea that there is no strictly anatomically compartmentalized involvement. In this work, we tried to find out whether or not synovial tissue proper is innervated by presumably nociceptive neuropeptide nerve fibers.

Methods: For this purpose, specific heterologous affinity purified antisera raised in rabbits against synthetic human neuropeptide antigens were applied in the avidin-biotin-peroxidase complex (ABC) method. In addition, antiserum against 150 kD triplet protein of natural avian neurofilament was applied to assess the presence of neurofilament containing neural elements.

Results: All the samples (5 A patients, 8 RA patients) studied had neurofilament containing neural elements in their synovial tissue proper. Further, we found substance P and calcitonin gene-related peptide containing nociceptive nerves in arthrotic synovial tissue proper. This suggests the presence of C-type unmyelinated nociceptors responding to firm pressure, chemical injury, and heat in arthrotic synovium.

Conclusions: It is concluded that pain in A and RA may originate in synovial tissue proper. Due to their well-known effects in inflammation, caused by the release of neuropeptides by antidromic stimulation, neuropeptides may also be involved in so-called neurogenic inflammation and may form an important link in neuro-immunology and mental stress and diseases. Further, the very presence of nociceptive receptors and fibers, sensitized by inflammatory mediators like PGE2 and bradykinin, suggests a possible new avenue in the treatment and modulation of chronic pain in joint diseases.

Immunobiologic response to polyglycol acid implant material in vivo and in vitro

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Routine cytologic analysis of material aspirated from effusions occasionally developing around polyglycol acid (PGA) implant material disclosed a predominance of inflammatory monocytes and in particular lymphocytes. We therefore studied whether or not PGA is immunologically inert.

Material and methods: Density-gradient, isolated, peripheral-blood mononuclear cells were cultured in 0.2 mL of 10 percent FCS-RPMI 1640 culture medium supplemented with 10 mg PGA.

Phytohemagglutinin (PHA) lectin, purified protein derivative of tuberculin (PPD) antigen, and culture medium alone were used as positive and negative controls. Lymphocyte activation kinetics on culture days 0, 1, 3, and 5 was studied. Major histocompatibility complex locus II antigen (MHC locus II antigen) and interleukin-2 receptor (IL-2R) expression were analyzed using the avidin-biotin-peroxidase complex (ABC) method and lymphocyte DNA synthesis by using ^3H -thymidine incorporation and beta-scintillation counting.

Results: No PGA-induced lymphocyte DNA synthesis was seen, but PGA-induced MHC locus II antigen and IL-2R activation marker expression were greater than seen in the negative controls, but less than that seen in PPD antigen-driven lymphocyte response. Especially on culture days 0 and 1, lymphocytes and monocytes studied under a light microscope were seen attached to PGA particles.

Conclusions: These results suggest that PGA is an essentially immunobiologically inert material, but it seems to induce inflammatory mononuclear cell migration and adherence leading to a slight nonspecific lymphocyte activation. This activation is lower than that seen in mitogen- and antigen-driven lymphocyte responses.

HPLC and ^{125}I -HABP found to be useful in determination of HA in RA

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The significance of hyaluronate (HA) concentration and the degree of polymerization in synovial fluid (SF) is unknown. In inflamed SF the molecular size of HA is decreased. The mechanism of HA degradation may be the generation of oxygen-derived free radicals (ODFR) by phagocytic cells.

Material and methods: The concentration and degree of polymerization of HA were measured using HPLC (high performance liquid chromatography) and ^{125}I -HABP assay (hyaluronic acid binding protein). A hypoxanthine/xanthine oxidase system was used for the generation of continuous oxygen radical flux. Univariate and forward stepwise multiple linear regression analyses were used for statistical evaluation.

Results: In serum, basal S-HA correlated ($P < 0.05$) with the clinical activity of RA, but the multifactorial analysis selected S-Zn and S-Se ($P < 0.001$) were the only independent significant predictive variables. In patients with RA (rheumatoid arthritis) and morning stiffness, S-HA was low and polydispersed when compared with normal SF-HA, but resembled SF-HA exposed to ODFR, that is, to hydroxyl radical. In contrast, superoxide did not shift the HA peak in HPLC, and no degradation products detectable with the ^{125}I -HABP method were formed.

Conclusions: S-HA is a marker of disease activity and originates from inflamed joints. Morning stiffness in RA is probably caused by the accumulation of low MW HA in the diseased joint. HA concentration and MW are probably the most useful marker for ODFR-induced joint damage. The combination of HPLC and ^{125}I -HABP assay may be a useful tool in the study of arthritis.

The distribution of bone mass in long bones of the lower extremity: A cadaver study

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Using quantitative computed tomography, we found significant correlations between the ultimate strength of the femur in axial loading with fracture at the neck and the mass-related measures in different femoral locations (Alho et al. 1988).

Material and methods: QCT measurements were made in 13 lower limb specimens (7 females and 6 males), median age 73 (56–91) years.

Results: The mass-related measure of the femoral condylar level was $6,394 \pm 2,299 \text{ HU} \times \text{cm}^3$ ($M \pm \text{SD}$). The mean tibial values varied between 2,561 and 3,398 and the fibular values between 621 and 1,048. The tibial condylar mass correlated significantly with the femoral condylar mass ($r = 0.65$, $P < 0.005$). The proximal metaphyseal tibial or fibular masses alone did not correlate, but their sum did ($r = 0.85$, $P < 0.001$). In the mid-shaft, the tibial mass ($r = 0.79$, $P < 0.003$) and fibular mass ($r = 0.75$, $P < 0.006$), and their sum ($r = 0.80$, $P < 0.003$) correlated with the femoral condylar mass. The distal tibial metaphyseal mass correlated with the femoral condylar mass ($r = 0.91$, $P < 0.001$), while the fibular mass did not.

Conclusions: The long bones of the lower extremity form

a biomechanical continuum where the distribution of the mass and strength correspond to the functional demands. In the proximal and mid-shaft lower leg, the fibula shared a significant part of load bearing.

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Upper extremity

Complications of operative treatment of "Y" fractures of the distal humerus

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Y-type fractures of the distal humerus present a difficult problem in operative fracture treatment. The fracture is often comminuted. Osteoporosis in older people and associated severe soft-tissue injury as a result of high-energy injuries make the management of these fractures even more unrewarding. Much controversy is found in the literature with regards to the treatment. Müller et al. (1979) recommend operative treatment with restoration of the joint surfaces and rigid osteosynthesis to allow early mobilization. Horne (1980) advocated, at least in selected cases, nonoperative treatment.

The aim of this study was to analyze the complications of surgical treatment of this fracture in an unselected patient group.

The material consisted of 61 consecutive cases of distal humeral fractures of "Y"-type.

The classification system proposed by Riseborough-Radin was used. Six fractures represented type II, 14 type III, and 41 type IV. The complication rate was not unexpectedly high.

Postoperative infection was recorded in 6 patients. The osteosynthesis was inadequate in 18 cases. Thirteen postoperative neural injuries were observed.

The stability of the osteosynthesis is dependent on the comminution of the fracture. Special plates (Henley 1987, Waddell et al. 1988) can possibly offer a more rigid fixation. In the prevention of neural injury, an adequate exposure seems to be essential, and if a bloodless field is used, the tourniquet should be deflated within 2 hours. In very osteoporotic bone, conservative management should be readily considered.

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Reconstruction of large tears of the rotator cuff using carbon fiber

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During the years 1983-1985, 7 patients with large tears of the rotator cuff were operated on using carbon fiber at the Central Military Hospital. The mean age of the patients was 55 (48-62) years, and the mean follow-up period was 2.5 (1-3.5) years. Strover's carbon fiber was used in 1, Jenkins' in 1, and Integraft carbon fiber in 5 cases. Neer's anterior acromioplasty was combined with the operation. The rupture was closed in a shoe-laced manner with carbon fiber that was fixed to the major tuberosity through a drill hole. Subacromial bursa was sutured over the carbon fiber to provide gliding tissue under the resected acromion. The tear was larger than 3 cm in 6 cases, and a complete closure of the tear was not possible in these patients, so that a 0.5-1-cm gap remained between the rims of the tear.

For all the patients a postoperative clinical and sonographic examination was performed. The results were good or excellent in all the cases. Four patients returned to their previous work 3-9 months after surgery. One patient retired because of her age, 1 patient because of multiple arthrosis, and 1 patient was retired before the operation. Two of the patients could continue a demanding sports activity. According to the sonographic examination, the supraspinatus tendon augmented by carbon fiber was thickened with uneven boundaries in all the cases. The gap remaining in the supraspinatus tendon at the operation was supposed to be closed by the postoperative hypertrophy of the carbon fiber due to connective tissue ingrowth.

Spine

Pain reproduction at discography: Evidence of involvement of peridiscal neuropeptide nerves

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Back pain can be reproduced at discography. The exact mechanism for this reproduction of pain is not known, however. Previous studies have suggested neural structures that could be involved in such pain mainly in the outermost parts of the annular ring and in the posterior longitudinal ligament.

Material and methods: First, the correlation between disc degeneration as classified by Adams et al. (1986) and pain reproduction at discography of 100 patients (total of 227 discs) was studied. Then, 23 tissue samples of disc and peridiscal tissues, removed at disc prolapse operations from 11 patients, were studied immunohistochemically with neurofilament triplet protein and the neuropeptides substance P and calcitonin gene-related peptide (CGRP) antisera for detection of sensory nerves.

Results: The correlation between pain reproduction and disc degeneration is presented in Figure 1.

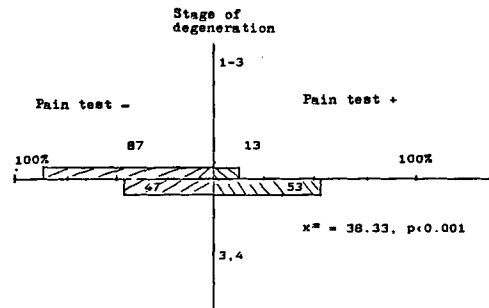


Figure 1. Reproduction of pain in different stages of disc degeneration. Discography of 227 discs.

In the histologic tissue samples, either one or both substances P and CGRP immunoreactivity was present in nerves demonstrable with the neurofilament triplet protein antiserum. Such sensory nerves were present in all the posterior longitudinal ligament samples, in one of the annulus fibrosus samples, but not in the nucleus pulposus samples or in prolapsed tissue.

Discussion: With the present classification of disc degeneration, fissures reaching the outer annulus or completely penetrating the annular ring were the most painful, while milder stages of degeneration with fissures reaching the inner annulus at the most were only painful in 13 percent of the discs. This was in accordance with the peridiscal distribution of sensory neuropeptide nerves and suggests that these might be excited at discography and perhaps also in discogenic pain.

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Cauda equina syndrome and root compression as a complication of free epidural fat grafting: A report of 4 cases

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Recently, it has become common practice to insert a free graft of subcutaneous fat over the dura after laminectomy to minimize postlaminectomy scarring. Only a few complications directly caused by this method have been reported previously. Four patients with serious complications requiring reoperation and removing of the transplant are reported. The transplant compressed the whole cauda (1 case), the root previously operated on (1 case), the contralateral root (1 case), the root one segment below (1 case). The new symptoms began 1–10 days after the primary operation. In 1 case the transplant was indurated. In 3 cases a soft graft caused the compression. All the transplants were found in the laminectomy hole without significant dislocation. Is it not time for risk-benefit analysis of this technique?

Discography combined with CT scanning: A prospective clinical study of 100 patients

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Two recently introduced classifications of different discogram types were used in the present prospective study based on 279 injected discs in 100 patients. A five-stage classification according to Adams et al. disclosed increased disc degeneration in lower lumbar segments ($P < 0.001$). Exact pain reproduction upon injection was more common in fissured or ruptured discs than in discs showing less degeneration, with 81 percent sensitivity and 64 percent specificity of the discogram for pain. A comparison between the discograms and the axial view seen in the CT scans disclosed that CT revealed marked disc degeneration in only 1 percent of the discs defined as normal in discography. Four percent of all the discs classified as pathologic in discography showed no degenerative changes in CT scanning. The additional information obtained from CT combined with lateral and anteroposterior discograms alone was minimal, and it would appear to be unnecessary to combine CT routinely with discography. Discography seems to be useful in the evaluation of chronic low back pain in some patients who have had normal findings in ordinary CT, myelography, and flexion-extension radiographs. In spondylolysis and spondylolisthesis, discography can disclose a need to extend the fusion above the lytic level or it may show the discogenic nature of the pain in patients previously treated with posterolateral fusion.

Hip

The results of revision for aseptic loosening after total hip replacement

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Between January 1972 and December 1987, 980 total hip arthroplasties (THA) were performed at Kuopio University Central Hospital. From January 1975 to December 1988, 35 hips had revision for aseptic loosening. The preoperative diagnoses included arthrosis ($n = 24$), rheumatoid arthritis ($n = 4$), fracture ($n = 3$), congenital dislocation ($n = 2$), and miscellaneous other conditions ($n = 2$). The average age of the patients at primary arthroplasty was 63 years and at revision 66 years. The revision arthroplasties represented 3.5 percent of the 980 primary total hip arthroplasties.

After a mean interval of 34 months, the functional and radiographic results of revision were assessed using the Mayo hip score. The mean score after revision was 81.3. Fifty-seven percent were assessed as excellent and 20 percent as fair. The functional rating did not seem to correlate with the radiographic rating suggesting that the final assessment of a revised THA cannot be made according to the radiographic findings alone. Although disappointing results after revision arthroplasty have been reported, the present study indicated that an asymptomatic hip with probable radiographic loosening is not a clinical failure. On the other hand, better preoperative planning to obtain more anatomic reconstruction, better surgical and cementing techniques, as well as uncemented prostheses may have brought about a lengthening of the time between the revision and failure.

Peripheral bone density in primary coxarthrosis and in geriatric femoral neck fractures

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Clinical observations of decreased fracture frequency of the femoral neck in geriatric patients with arthrosis of the hip and vice versa the low rate of coxarthrosis associated with femoral neck fractures implies a general reduction of skeletal mass as a factor preventing arthrosis.

Patients and methods: Totally, 22 female patients (mean age 78 yrs) operated on for femoral neck fractures and 35 females (72 yrs) who had undergone total hip replacements for arthrosis were examined with regard to bone mineral density (BMD) by dual photon absorptiometry using a Studsvik bone scanner (Atomenerg, Sweden) with 50 mCi J-125 and 40

mCi Am-241 sources. The middle part of the calcaneus was selected as the measuring site. BMD was calculated as weight per volume unit of bone (g/cm^3). Statistical analyses were performed to eliminate the effect of age.

Results: A linear correlation was observed between age and bone mineral density in both arthrosis ($r = -0.390$, $P < 0.05$) and fracture ($r = -0.645$, $P < 0.001$) groups. The values proved to be significantly higher in the arthrosis group than in the fracture group, but after age-related correction by covariance analysis, no significant difference between the groups remained with regard to BMD of the right calcaneus.

Discussion and conclusions: The present results would seem to contradict earlier investigations (Foss and Byers 1972, Roh et al. 1974, Dequeker et al. 1984). It is evident that the age of the patients, the selection of groups, and the site of measurement can interfere with the results. According to our observations, BMD alone as a representative of skeletal mass does not assert the hypothetical suggestion.

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Total hip replacement by cementless fixation in diastrophic dysplasia

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Diastrophic dysplasia is a rare recessively inherited disorder producing a short limb dwarfism recognizable at birth. Although rare in other countries, this disease seems to be more common in Finland, where about 200 cases have been diagnosed. Clinically, the flexion contractures of hips and knees primarily cause problems in walking and painful secondary coxarthrosis develops usually before the age of 40.

Patients and methods: Totally, 11 patients (15 hips) with diastrophic dysplasia were operated on because of coxarthrosis at our hospital during the years 1983-1988. There were 7 females and 4 men. The mean age at the time of operation was 38 years and the mean height of the patients was 133 cm. The Lord endoprosthesis was used in 10 hips and the Biomet in five. Autogenous bone grafting to the acetabulum was performed in six hips. Simultaneous corrective osteotomy of the proximal femur and transposition of the greater trochanter was performed in 3 cases. Soft-tissue release and adductor and/or rectus femoris and sartorius tenotomies were performed in 8 hips. The mean follow-up time was 3 (1-6) years. The results were evaluated clinically and radiographically.

Results: The primary stability of the endoprosthesis was

good in all the cases. Relief of pain was obvious in all the patients. The overall clinical results were good, although the range of movement remained relatively limited. The mean postoperative lack of extension was 15° . The mean flexion was 80° . Radiographically, no aseptic loosening was noted. As complications, two femoral nerve palsies and two peroperative fractures of the proximal femur occurred, which all healed.

In conclusion, total hip replacement in diastrophic dysplasia is technically difficult due to joint deformities and the relatively thin and short femur of the patients. However, the good clinical and radiographic results are encouraging and favor the use of cementless fixation of the endoprosthesis in these patients.

Revision of aggressive granulomatous lesion in hip arthroplasty

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Thirty patients had revision for aggressive granulomatous lesions around the cemented stem of total hip prosthesis during 1981-1986. Fourteen patients had revision with cemented total hip arthroplasty in 16 hips on an average 8 (6-13) years after the primary arthroplasty. The patients were followed up for an average of 5 (4-7) years after revision, and 2 had recurrence of aggressive granulomatosis at the original sites 4.5 and 6.5 years after revision. Eleven patients who had been treated with cemented revision arthroplasty had, according to the Mayo classification, good or excellent results after revision.

Sixteen patients had revision with an uncemented Lord prosthesis on an average 9 (4-14) years after the primary hip replacement, and at that time their average age was 64 (42-81) years. At revision, large cavities were filled with cancellous bone grafts. At the follow-up, on an average 3.5 (2-6) years postoperatively, there were no recurrences, and 14 patients had a good or excellent result.

Aggressive granulomatosis should be recognized at an early stage; and at the moment, we suggest revision with an uncemented prosthesis and cancellous bone grafts.

Natural history and immunopathology of aggressive granulomatosis in hip arthroplasty

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Nineteen patients who presented the radiographic appearance of aggressive granulomatosis around the femoral stem after cemented hip replacement underwent revision hip arthroplasty on an average 9 (6–14) years after the primary operation. When first detected, the granulomatous lesions were multifocal, in 13 patients. Planimetry on radiographs revealed a doubling of the area of the granulomatous lesions during an average of 2 (0.5–5) years. In the revision operation, five stems were found fixed.

The local immunopathologic response that occurred in 6 patients who underwent total hip revision for aggressive granulomatous lesions and the response observed in 6 comparable patients who had revision for common prosthesis stem loosening were compared. The histologic appearance of the aggressive granulomas consisted of histiocytic-monocytic and fibroblast reactive zones. Most cells found in granulomatous tissue were C3 bireceptors and nonspecific esterase-positive macrophages.

Knee

Arthrodesis of the knee with intramedullary nailing as a primary or secondary procedure

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Reports of 31 knee fusions with a long intramedullary nail are presented. Fusions without previous surgical interference with joint surfaces are referred to as primary procedures, and the rest as secondary fusions.

There were 11 patients in the primary group and 20 in the secondary group. The indications for fusion in the primary fusion group were primary arthrosis with severe valgus in old patients (*n* 5), secondary arthrosis (*n* 3), traumatic knee luxation (*n* 1), infected condylar fracture (*n* 1), and chronic purulent arthritis (*n* 1).

The secondary fusions were performed for loosening of a prosthesis (*n* 7), for infected arthroplasty (*n* 7) for a fracture near the femoral component of an arthroplasty (*n* 2), and for a nonunion after compression arthrodesis with EF (*n* 4). The primary diseases in these cases were arthrosis (*n* 11), rheumatoid arthritis (*n* 7), patellar fracture (*n* 1), and a meniscal tear (*n* 1).

The groups were comparable regarding age, sex, and follow-up.

Results: Ten out of 11 knees united within 4 months in the primary group, the average shortening being 2.0 cm. Ten patients were completely free from pain. All except 1 used a single cane as a walking aid. Eighteen of 20 knees united primarily in the secondary group. The average shortening was 2.4 cm. Seventeen were free from pain, and 3 had minor pain. Fif-

teen patients used a single cane, and 5 used two canes or crutches.

Complications: There were three delayed unions, two in the later group. In these 2 cases the nails fractured. The basic reason for delayed union and nail breakages was poor contact in the fusion line due to technical error. All of these knees united after trimming the contact surfaces and changing the nails. One of the nails was also too thin (9 mm in diameter). An 11-mm nail should be routinely used.

One nail migrated proximally in the secondary group. It was removed when union was complete. One patient in the secondary group had a wound margin necrosis exposing the bone and the nail for 2 to 3 cm. Local revision and plasties failed twice. Despite this, union occurred normally; the nail was removed 5 months after the operation, after which the defect closed spontaneously. One preexisting fistula in this group had to be revised. The union occurred normally even in this case. The nail has not been removed.

Discussion: The rate of union after fusion with an intramedullary nail seems to be high in all the cases, whether primary or secondary, provided that good contact is achieved between the fusion surfaces. This also eradicates possible infection from the knee and permits soft tissues to heal. If the contact is poor, delayed union and/or nail breakage will ensue. It is also noteworthy that failed compression arthrodeses were successfully treated with this method. The functional results are comparable to any other method and between the groups when cumulation of multiple joint disease in the secondary fusion group is considered.

Total arthroplasties of the knee in Middle-Finland Central Hospital between 1977 and 1984

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Between January 1977 and December 1984, 251 patients had 284 arthroplasties using five types of total prostheses (Geometric (11) Townley (256), Spherocentric (9), Attenborough (6), and Kinematic Rotating Hinge (3)). Fifty-four patients (58 knees) died during the follow-up period. Sixteen patients (17 knees) were unable to attend the review because of poor general health or other diseases. Three patients could not be traced. The remaining 157 patients (185 knees) were followed for an average of over 6 (4–11) years. Seventy-one patients had rheumatoid arthritis and 82 patients had arthrosis. The average age at the time of the operation was 65 years.

The clinical results were evaluated according to the HSS Knee Score System. Eighty-nine percent had good or excellent results. Six percent had satisfactory and 4 percent poor results. Aseptic loosening was observed in 14 knees. At the time of the latest examination, 21 had had rearthroplasty or arthrodesis. The rate of infection was 0.7 percent.

We conclude that total arthroplasty is very effective in eliminating pain and restoring the function of the knee joint. The durability seems satisfactory according to the intermediate-term results. We believe that stable constrained-type prostheses are very seldom needed in primary arthroplasties.

Krogius and Roux-Goldthwait operations for recurrent patellar dislocation

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Roux (1888) Goldthwait (1895), and Krogius (1904) presented two different solutions for the treatment of recurrent dislocation of the patella. The purpose of this study was to compare these commonly used methods with special reference to the rate of postoperative recurrence.

Patients and methods: Seventy-three Krogius tenoplasties and 22 Roux-Goldthwait alignments were followed-up. The two groups of patients were comparable in terms of age, sex, and duration of preoperative symptoms. The operations were performed according to the original principles (Figures 1 and 2). Active movement therapy was initiated early. Full-range movements were gradually permitted, beginning 4 weeks after the operations.

Results: Recurrence was seen in 31/73 knees with the Krogius operation and in 3/22 with the Roux-Goldthwait operation. The patient's general satisfaction with the operative result was more favorable despite occasional recurrences, being 49/73 and 20/22, respectively. In 5 recurrent cases, Krogius plasty was later completed with the Roux-Goldthwait procedure. No conspicuous complications were encountered with either method.

Conclusions: A significantly lower recurrence rate was seen after the Roux-Goldthwait procedure compared with Krogius tenoplasty in the treatment of recurrent patellar dislocation. This finding accords with results recently reported in the literature.

References

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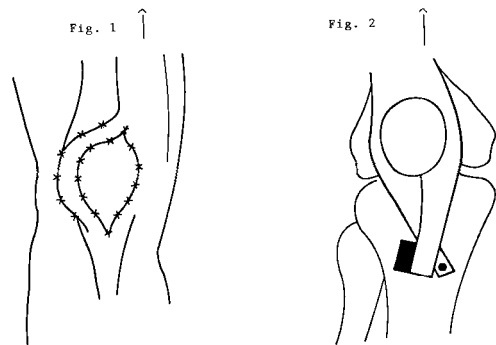


Figure 1. Proximal realignment (m/Krogius). Schematic drawing.

Figure 2. Distal realignment (m/Roux-Goldthwait). Schematic drawing.

Preliminary results of Miller-Galante total knee arthroplasty

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During the years 1987 and 1988, a total of 153 patients (160 knees) were operated on because of arthrosis (n 108) or rheumatoid disease (n 43) of the knee. Two patients had hemophilia A. There were 115 women and 38 men in the present series. The age of the patients was 65 (31-82) years. Cementless fixation was used in 118 knees and cement fixation (tibial and/or patellar components) in 42 knees. Bone grafting due to tibial defects was performed on eight knees. Postoperatively, partial weight bearing was allowed during the first 2 to 3 months. The results were evaluated clinically and radiographically. A pain scoring scale from mild (1) to severe (4) was used. The follow-up period of 53 patients was more than 1 year (12-22 months).

Results: The postoperative pain scoring averaged 1.3 (scale 1-4). The mean preoperative value was 3.5. The range of extension-flexion motion increased from the mean preoperative values of -11° to 94° to -2° to 104° postoperatively. In postoperative radiographs (standing AP projections), three fourths of the knees were within 3° of the ideal femorotibial valgus angle (5° - 7°). The deviation from the ideal valgus angle was 4° - 6° in 10 knees, and in 3 knees it was within 7° - 10° of the ideal value. Complications included patellar luxation in four knees, ligamentous laxity in three knees, and technical failure in two knees. Deep infection developed in three knees, and aseptic loosening was evident in one knee. The total complications were 8 percent of the 160 operations. Two knees were reoperated on because of ligamentous imbalance. In these cases the tibial plate was changed to a thicker one.

The preliminary results in the present series are good concerning the relief of pain and increased extension-flexion motion. The average flexion of 104° is sufficient for most daily activities. The patellar complications are apparently due to iatrogenic patellar vertical or mediolateral dislocation, which must be avoided during the operation. Although a slight liga-

mentous laxity is not harmful, it is important to pay attention to the ligamentous balance both in extension and in flexion to avoid marked laxity, which may lead to eccentric loading and loosening of components.

Kinematic total knee arthroplasty: A follow-up study in 85 patients

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The series comprised 103 Kinematic total knee arthroplasties in 92 patients performed between 1982 and 1985 in our hospital. Of these, 95 knees in 85 patients were followed up at a minimum of 2 years (range 2–5.1, mean 2.7). The clinical assessment was based on Hungerford scoring, and the result was excellent in 59 percent, good in 25 percent, fair in 10 percent, and poor in 6 percent. Radiographically, there was no loosening of the tibial and femoral components, but loosening of the patellar component was observed in 3 cases. All of these three knees were asymptomatic and good or excellent in function and associated with high functional level and good power of the quadriceps muscle. Postoperatively, three patellar luxations and one subluxation necessitated further surgery. No deep infection was observed. Two superficial infections were successfully treated with antibiotics. Our overall results were good and comparable with earlier reports. However, more attention should be paid to the proper application of the tibial and patellar components to achieve good femoropatellar alignment.

Varia

Survival and prosthetic rehabilitation of lower extremity amputees

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In Finland about 1,500 lower extremity amputations are performed annually. Most of these amputations are performed on geriatric patients with vascular disease. It is predicted that the number of amputations will increase in the future, because an increase in elderly age groups is expected.

To assess the current situation regarding the survival and rehabilitation of amputees, we collected data on all lower extremity amputations carried out by all 16 operative units of the Helsinki University Central Hospital during 1984 and 1985, as well as data from every prosthetic workshop and rehabilitation unit in the hospital catchment area.

Amputation of the lower extremity at a level potentially requiring a prosthesis was performed on 577 patients. The most common site of amputation was above the knee (50 percent). The majority of amputations (94 percent) were performed for vascular diseases. About 26 percent of the amputees died within 2 months of amputation, 61 percent were alive after 1 year, and 43 percent after 2 years. Of a total of 577 patients, 27 percent were fitted with a prosthesis. Of below-the-knee and above-the-knee amputees surviving over 2 months, 62 percent and 27 percent, respectively, were fitted with a prosthesis. There were markedly fewer prosthetic fittings in the over-60 age group. Diabetic patients of both sexes were fitted with a prosthesis more often than arteriosclerotic patients. Among tumor patients, 82 percent received a prosthesis.

Transphyseal fracture fixation with biodegradable polyglycolic acid rods in children: Early results

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Biodegradable implants have been successfully used for osteofixation of cancellous bone fractures since 1985. Thorough experimental studies on transphyseal fixation of physeal fractures with biodegradable self-reinforced pins preceded the prospective study, the results of which are to be presented.

Twenty-six consecutive children with 9 displaced supracondylar fractures of the humerus and 17 other physeal fractures necessitating open reduction and internal fixation were treated by transphyseal fixation with biodegradable polyglycolic acid (PGA) rods. In 3 patients with unstable supracondylar fractures of the humerus, a loss of reduction occurred 1 week after the primary operation, and they were successfully repinned with conventional K-wires. The postoperative course was uneventful in the remainder of the cases. No signs of impairment of the function of the growth plate were seen within the relatively short follow-up time of a mean 4 month.

In conclusion, the transphyseal biodegradable fixation seemed to be suitable for the rapid healing of physeal fractures abolishing the need for a second operation.