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## A distal ulnar wedge osteotomy in the wrist for inflammatory arthritis—description of a new technique and 1 year follow-up results

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Wrist joint is involved early in the rheumatoid arthritis, and in case of destruction impairment of hand function occurs. Darrach type of resection of the distal ulna is the most common procedure combined with the wrist arthrodesis. However, in some cases painful posteroperative snapping of the ulna may occur, and in the most extreme situations ulna can perforate the joint capsule leading to extensor tendon ruptures.

*Purpose of the present study:* We performed a distal ulnar wedge osteotomy together with partial or total wrist arthrodesis and conducted a prospective 1 year follow-up study to analyse the effect of the new technique on the hand function, pain, range of radioulnar motion and grip power.

*Patients and methods:* There were 26 arthrodeses of the wrist, 4 partial and 22 total, performed after destruction of the joint and impairment of the hand function due to chronic inflammatory arthritis. A new technique was used in the radioulnar joint, where a wedge osteotomy was performed. Preoperatively and 12 months after the operation pro-supination was measured with a goniometer, pain was analysed with visual analogous scale (VAS), grip power was measured with a Jamar dynamometer and functional tests were performed.

*Results:* 12 months after the operation 22 osteotomies were radiologically united and 4 showed fibrous union. Pro-supination remained in the pre-operative range or improved in most of the patients. In general pain was alleviated, grip power increased and improvement in the hand function occurred. There were no complications in the present series and the overall patient satisfaction was good.

*Discussion:* A distal ulnar wedge osteotomy together the wrist arthrodesis for inflammatory arthritis seems to give promising functional results. Also the cosmetic appearance of the wrist postoperatively is favourable when the shape of the distal ulna often remains near the original.

## The effect of the success of surgical decompression seen in CT scan clinical outcome in patients operated on for lumbar spinal stenosis

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The aim of surgical treatment in lumbar spinal stenosis (LSS) is to decompress the stenotic area determined in radiological examinations in order to relieve pressure on the neurovascular structures. However, very seldom has the success of this decompression been confirmed by postoperative radiological imaging. The aim of this study was to analyze the effect of the success of surgical decompression seen in CT scans on clinical outcome in patients operated on for LSS.

*Patients and methods:* There were 92 patients (48 women, mean age at the time of operation 53 years, and 44 men, mean age 51 years) with a mean follow-up time  $3.5 \pm 0.6$  years. Patients with prior back surgery were excluded. The patients' subjective disability was based on the Oswestry questionnaire, physical condition on clinical examination and walking capacity on the treadmill test (1 m/s, max time 15 min = 900 m).

The preoperative radiological diagnosis of LSS and the postoperative radiological evaluation of the operated area was based on the CT scans. The postoperative evaluation of the CT scan findings aimed at determining how successful the surgical decompression had been: I) decompression of all stenotic levels were fully successful ( $n=35$ , 38%), II) decompression of some stenotic level(s) had not been decompressed at all ( $n=27$ , 29%), and III) all stenotic levels have been decompressed, but there was some residual stenosis ( $n=30$ , 33%). The time interval between the preoperative CT scan and the operation was 0.29 year, and between the operation and postoperative CT scan it was 4.0 years.

*Results:* According to the success of surgical decompression the mean Oswestry score of the patients in the first group was 28.4, in the second group it was 25.0, and in the third group it was 27.6. The mean walking capacity of the patients was 706 m, 655 m, and 555 m, respectively (ns), and

the physical condition was excellent in 77% and good in 17%, in 70% and 22%, and in 60% and 37%, respectively.

**Discussion:** Only in 38% of the 92 patients the aim of the surgical decompression was achieved. However, the time interval between the operation and CT scan was four years, and consequently CT scan results did not reveal fully the immediate success of surgical decompression, because the bone regrowth may have taken place to some extent.

**Conclusions:** The successful surgical decompression of the stenotic area seen in CT scan seemed to be not necessary to achieve satisfactory results in patients operated on for LSS. In subsequent prospective studies it would be useful to investigate using CT or MRI the relation between appropriate surgical decompression and satisfactory clinical results.

### Bioabsorbable fixation devices in orthopedics and traumatology

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This is a report of the first 3050 operations based on our clinical experience when using totally bioabsorbable implants in orthopedics and traumatology. Totally bioabsorbable fixation devices were clinically introduced by us in the fixation of fractures in the extremities in the mid 1980's. Prior to and parallel with clinical trials and the use of the totally absorbable fracture fixation implants, over 6000 animals (mostly rats and rabbits) were operated in our experimental studies to investigate e.g. strength, strength retention, biodegradation, bone changes, healing of fractures, and the fixation properties of the implants.

**Series:** The causes of the operations with bioabsorbable implants at our department from November 5, 1984 to December 31, 1996 have been trauma in 2370, orthopedic disease in 705, totally in 3075 operations.

**Results:** The postoperative clinical course was uneventful at least in 85% of the patients. There was wound infection in 3.9% and failure of fixation in 3.7%. A noninfectious foreign-body reaction was encountered 2 to 3 months postoperatively as sinus formation in 2.9% of the patients operated on in patients operated with polylactide implants. These inflammatory tissue responses required needle aspiration or minor surgical procedures but did not influence the ultimate functional or radiographic result of the fracture treatment. Then incidence of deep venous thrombosis was 1.2%.

**Conclusion:** Due to the biodegradability of the developed fixation devices implant removal procedures were avoided. Consequently, these facilities could be directed to other operations on the waiting list. Avoidance of removal procedures results in financial and psychological advantages. The bone itself heals better when using bioabsorbable devices as compared with metallic devices.

### Preoperative three-dimensional measures of periacetabular osteotomy

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Periacetabular (Ganz) osteotomy allows for correction of acetabular orientation in all three dimension. Preoperative conventional radiographs are of limited value in planning. The purpose of this study was to introduce a CT based method.

**Patients and methods:** The series consisted of 42 female and 8 male patients, median age 34 (17–49) years. Preoperative planning of periacetabular osteotomy was performed using conventional radiographs in 37 patients and computed tomography in 13 patients. Postoperative CT images were produced on all hips 4 months postoperatively or later.

**Results:** The acetabular index angle changed from  $23^\circ \pm 8^\circ$  to  $11^\circ \pm 9^\circ$  ( $p < 0.01$ ) and anterior coverage from  $21^\circ \pm 11^\circ$  to  $28^\circ \pm 7^\circ$  ( $p = 0.058$ ). The transaxial acetabular anteversion ( $19^\circ \pm 8^\circ$ ) did not change. For cases without preoperative CT evaluation the postoperative values were:  $-5^\circ \pm 19^\circ$ ,  $32^\circ \pm 12^\circ$  and  $17^\circ \pm 24^\circ$ , respectively. A negative acetabular index angle is undesirable. The main cranial part of the osteotomy showed union in 48 of 50 cases. However, consolidation of the medial osteotomy had occurred in only 12 of 49 cases.

**Conclusion:** We conclude that preoperative three-dimensional assessment improves the accuracy of preoperative planning of the periacetabular osteotomy.

### Cementless Biomet hip arthroplasty—7 years of follow-up

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Controversy exists regarding long term results after cementless arthroplasties.

**Materials and methods:** 349 cementless total hip arthroplasties with threaded acetabular cup (Bi-Metric®, Biomet, Warsaw, IN, USA) were implanted at the Orthopaedic Hospital of the Invalid Foundation, Helsinki, during February 1987–May 1988. Based on radiographic evaluation, 169 hips representing primary arthrosis and other non-traumatic conditions, similar concerning the operation technique, were enrolled into the study. 89 women and 64 men attended the follow-up studies. Their median follow-up time was 7 (1–8) years. All radiographs were evaluated including 14 deceased patients.

**Results:** At the latest radiographs with the cup in situ, late loosening of the cup was detected in 131 hips (78%). 65 of them had already been revised. Further 39 patients were referred to revision because of migration and 27 were recommended a frequent follow-up. Only one femoral stem had been revised one year after the arthroplasty. At 7 years, no aseptic loosening of the stem were detected.

**Conclusion:** Patients with a hip arthroplasty with smooth threaded acetabular cup should be carefully followed clinically and radiologically.

### Tissue response to polyglycolide and polylactide pins in cancellous bone

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An absorbable self-reinforced polyglycolide (SR-PGA) pin and self-reinforced polylactide (SR-PLLA) pin was implanted in the distal femur of the same rat and tissue reaction was examined and compared with each other.

**Materials and methods:** An absorbable self-reinforced polyglycolide (SR-PGA) pin with a diameter of 2.0 mm was implanted in the trabecular bone areas of the distal femur of 51 rats and a biodegradable self-reinforced poly-L-lactide (SR-PLLA) pin with the same diameter was inserted into the distal femur of the other hind leg of the same rats. The intact femora of eight non-operated rats were used as controls. Tissue response to the implants was examined within standardized sample fields radiographically, histologically, histomorphometrically, mikroradiographically, and using oxytetracycline fluorescence studies. The follow-up periods of the groups consisting of five to ten operated rats had one intact control rat were one, three, six, 12, 24, 36, 48 and 52 weeks.

**Results:** The first signs of degradation of the SR-PGA pin were seen at three weeks and the pin was totally degraded by 36 weeks. No signs of degradation of the SR-PLLA pin were observed during the follow-up period. Active new bone formation osteoid formation surface showed a statistically significant difference ( $p < 0.01$ ) between the groups: the highest value, 39% was seen in the SR-PGA group, whereas the value in the SR-PLLA group was at 12%. At this time there was also a statistically significant difference ( $p < 0.05$ ) between the groups in the number of phagocytizing macrophages, approximately 14.8 in the SR-PGA group and 1.0 in the SR-PLLA group, which is in concordance with the degradation behaviour of both implants. The inflammatory response to these polymers was quite mild.

**Conclusion:** Both SR-PGA and SR-PLLA pins seem to induce transient osteostimulatory response around their profile after implantation into cancellous bone, but this phenomenon showed different patterns to these two absorbable polylactides. During 48 weeks the response to SR-PLLA implant gradually faded, but the clearing process of SR-PGA debris by macrophages resulted in remarkable osteostimulatory response 12 weeks postimplantation. The biocompatibility of polyglycolide and polylactide proved to be good.

### The fixation of patellar tendon bone graft in 24 patients with totally absorbable self-reinforced polylactide (SR-PLLA) screw and bolt

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Totally absorbable implants made of polyglycolide and polylactide have been used successfully in treating cancellous bone fractures and osteotomies. They also are suitable for patellar tendon bone fixation because they don't cause artefacts to MRI picture and they are absorbed in a few years.

**Patients and methods:** 24 patients with anterior cruciate ligament rupture were operated in years 1990–1994. The graft was fixed in 12 patients with SR-PLLA screw (diameter 6.3 mm) and in 10 patients with SR-PLLA expansion bolt (diameter 6.0 mm). The average age of the patients was 27 years (16–43). The follow-up time was 3.2 years on average. 19 of the patients attended at the follow-up and subjective, clinical, arthrometer and radiological evaluation was made.

**Results:** There were 2 deep venous thromboses. No synovitis or sinus formations occurred. 14 of the follow-up patients estimated their knee excellent or good 2 moderate, and 3 poor. 7 patients had "giving way" symptoms. In arthrometer with manual 20lb. (9 kg) anterior force the side to side difference in anterior laxity was in 10 patients  $\leq 2$  mm, in 3 patients  $>2 \leq 3$  mm, in 6 patients  $>3$  mm. In 9 patients the pivot shift sign was negative. 9 of the patients could return to the sport activity level that they had before the injury. The patients with positive pivot shift had steeper angle of the femoral bone channel against the tendon graft than pivot shift negative knees.

**Conclusion:** Although in all cases the graft was not functional, in this preliminary series the results are promising. With improvements in fixation technique the results will be improved.