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Souter-Strathclyde total prosthesis in the treatment of chronic arthritis of the elbow joint

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Elbow joint is affected in about two thirds of the patients with rheumatoid arthritis. The total joint prosthesis offers a method in improving function and relieving pain. The purpose of the present study was to analyze the results obtained in the non- and semi-constrained Souter-Strathclyde total arthroplasty in one-year follow-up.

Patients and methods: 32 Souter total elbow arthroplasties were performed in 31 patients due to chronic arthritis. Larsen grade for the elbows was IV in 16 cases, and V in 16 cases. Non-constrained components were used in 28 cases, and semi-constrained components in 4 cases.

Results: There were neither post-operative superficial or deep infections nor ulnar nerve complaints in the patients. One patient had a postoperative luxation, which was stabilized with a snap-fit olecranon component in a secondary operation. The range of motion had increased markedly in 1-year follow-up. The Ewald score (max. 100) increased from the pre-operative value 47.1 to the post-operative 94.4. No radiologically loose components were seen in the 1-year follow-up. Subjectively the patients evaluated their operated elbows as excellent or good in 94% of the cases. There were no poor subjective results.

Discussion: The Souter-Strathclyde total arthroplasty seems to be accompanied with only minor early complications, and is thus comparable with the arthroplasties of the other joints. Improvement of the function and relief of pain is remarkable after the operation.

The natural course of 91 nonoperated patients with lumbar spinal stenosis

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There is a tough-life opinion that the natural course of lumbar spinal stenosis (LSS) is deteriorating. Appreciation of LSS has increased with the availability of CT and MRI imaging. Because of the increasing of LSS rates of surgery for LSS have also increased very much. However, the natural course of this condition is poorly known although it is very important to appropriate selection of therapy. This follow-up study was undertaken in order to analyze the natural course of non-operated patients with LSS.

Patients and methods: There were 91 patients with a mean of follow-up time of 7.9 ± 3 years (41 women and 50 men, mean age 62 years). The patients' subjective disability was based on the Oswestry questionnaire, physical condition on clinical examination, and walking capacity on a treadmill test (1 m/s, max walking time of 15 minutes = 900 meters). The quantity of pain in back and legs before and after the walking test, was assessed using VAS (visual analogue scale).

The radiological diagnosis of LSS was based on CT in patients, on CT and myelography in 41 patients, and on myelography in 11 patients. The patients were classified according to the radiological findings into four groups: block stenosis ($n=11$), the AP-diameter of the dural sac under 10 mm (moderate stenosis) ($N=40$), the AP-diameter 10–12 mm (mild stenosis) ($n=18$), and lateral stenosis ($n=22$).

Results: The mean Oswestry score of all 91 patients was 31.6 ± 16 (women 31.3, and men 32.7). This score was 29.6 when the follow-up time was less than 5 years, 30.7 when the follow-up time was 5–10 years, and 35.4 when the follow-up time was over 10 years. However, there was no statistical correlation between the Oswestry score and follow-up time. In block stenosis the Oswestry score was 34.9, in moderate and mild stenosis it was 30.2, and in lateral stenosis it was 33.7. Twenty-seven patients (30%) felt that their condition was same after LSS diagnosis, 41 patients (45%) felt

that it was better, and 23 patients (25%) felt that it was worse.

The mean walking capacity of all 91 patients was 485 ± 380 meters. In block stenosis 380 m. Altogether 36 patients (40%) walked the full 900 meters. The physical condition was excellent in 53%, good in 37%, and poor in 10%.

The pain in back and legs before or after the walking test did not differ between the stenosis groups.

Conclusions: The natural course of 91 non-operated LSS patients was benign and their subjective and physical condition was quite unchanging. Conservative treatment and observation of LSS patients seems to be real management in patients with moderate symptoms.

Long-term clinical and MRI follow-up of lumbar spinal stenosis patients after laminectomy

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Surgical treatment of lumbar spinal stenosis (LSS) is based on the compression seen in radiological images of neurovascular structures in the vertebral canal, but the success of surgical decompression and its correlation with clinical observations has very seldom been monitored by postoperative radiological imaging.

Patients and methods: 56 patients (31 men and 25 women with a mean age of 54 years; the follow-up time was 10.9 years) operated on for LSS were re-examined clinically using the Oswestry disability questionnaire, a walking capacity was evaluated by the treadmill test, and severity of pain in the back and legs before and after the treadmill test was investigated using a visual analogue scale (VAS).

According to the MRI findings, the patients were classified into no stenosis ($n=15$), central stenosis ($n=4$), lateral stenosis ($n=18$) or central-lateral stenosis ($n=19$) groups. Further, according to the MRI degeneration findings (disc degeneration, disc herniation, facet joint arthrosis, and degenerative spondylolisthesis) the patients were classified into mild ($n=8$), and severe ($n=9$) degeneration groups.

Results: 41 patients had a current stenosis in MRI imaging. The mean Oswestry score of all 56 patients was 30.5 ± 18 (33.9 in women and 27.8 in men, ns.). The mean walking capacity of these patients was 485 ± 395 meters (450 in women and 510 in men).

There was no significant correlation between the MRI stenosis groups and the Oswestry score, walking capacity, or severity of pain, whereas between the MRI degeneration groups there was a tendency for patients of the severe degeneration group to have worse results in the Oswestry score and walking capacity.

Conclusions: Postoperative MRI stenotic findings did not indicate long-term surgical outcome in patients operated on

for LSS. The MRI degeneration findings of the lumbar spine seen in MRI seemed to have a greater impact on the patients' disability. The clinician must be cautious reconciling the subjective disability and severity of pain with postoperative MRI findings in patients operated on for LSS.

A femoral endosteal anatomy detection method

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A computed tomography-based image processing computer program was developed for three dimensional femoral endosteal cavity shape modelling. In the CT-imaging 30 axial slices were taken above and below the lesser trochanter area from each cadaver femur. During the development phase of border detection system several basic image analysis methods were tested. In the femoral shaft area simple thresholding methods succeeded but in the problem areas of the metaphyseal femur edge detection operators and local thresholding were required. Thus the optimal method for femoral cavity detection depends on the structure of the processed slice.

The accuracy of the border detection system was properly tested. 10 cadaver femora were sawed into stipulated horizontal slices after CT-scanning. The a-p and m-l dimension were measured with a caliper ruler. These manual measurements were compared to the corresponding diameter data of the border detection system. CT-based image processing yielded a peak distribution of dimensions with a negative difference to those obtained in manual measurements. The mean difference of the image processing and the manual measurements were 1.1 mm (± 0.7 mm, ± 1 SD). The difference was highest in the proximal slices of the femora of group I (with lowest cortical thickness), i.e. 1.3 mm (± 0.8 mm) and lowest in the distal slices of the femora from group III (with highest cortical thickness), i.e. 0.9 mm (± 0.6 mm). The results are acceptable for further use of the program to study endosteal anatomy for individual femoral component selection and designing basis.

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, microradiographically, and using oxytetracycline fluorescence studies. The follow-up periods of the groups consisting of five to ten operated rats and 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 3 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 for-

mation was seen close to the implant profile at one week in both groups. At 12 weeks the mean fractional 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 groups was 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 behavior 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 polyesters. 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 at 12 weeks postimplantation. The biocompatibility of polyglycolide and polylactide proved to be good.