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Bone transplantation in total hip replacement for protrusio acetabuli

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Sixty-five total hip replacements in 62 patients were combined with a bone graft. The indication was protrusio acetabuli secondary to rheumatic disease, arthropathy, trauma and aseptic loosening of a previously implanted total hip prosthesis. The operation was performed under standard aseptic precautions using a posterolateral approach. Any defect in the medial wall of the acetabulum was filled with autologous cortico-cancellous bone chips. The wall was further reinforced with autologous and homologous cancellous bone. This cancellous layer was impacted with the aid of a fitted prosthesis for the acetabular component. The graft was covered with a metal wire-net, whereupon a polyethylene protrusion cup was cemented in. Postoperative medication comprised antibiotics, indomethacin and prophylactic anticoagulants. After 6 weeks' bed rest, the patients were allowed up with the aid of English canes (partial weight-bearing). Complete weight-bearing by the hip involved was allowed 3 months after the operation. Clinical and radiographic check-ups focused mainly on incorporation of the graft and fixation of the acetabular component.

The follow-up period averaged 2 years. Clinical results were good in all cases. Radiographic assessment of the graft revealed adequate incorporation without signs of resorption in all cases.

Nephrotoxic and pharmacokinetic aspects of treatment with gentamicin-PMMA beads

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Gentamicin-PMMA beads were implanted for 10–14 days in five patients. Blood and urine samples were frequently taken during this period (a total of 700 samples). The creatinine, gentamicin and beta-2-microglobulin concentrations were determined in each sample, and their renal excretion rates were determined. The serum gentamicin concentration was very low: 0.03–0.10 µg/ml in four patients with osteomyelitis (48–90 beads) and 0.4 µg/ml in one patient with a hip replacement revision (360 beads). The renal excretion rate proved to be constant throughout treatment: plateau values of 3–40 µg/min were found. The beads are slow-release vehicles of gentamicin. A total of 20–70 per cent of the amount of gentamicin implanted was excreted in the urine. The *in vivo* halftime was 5–10 days. Gentamicin was better absorbed by soft tissues than by bone.

The constant gentamicin treatment did not influence renal function. The function of the proximal tubule cell (expressed as beta-2-microglobulin absorption capacity) and the glomerular function (expressed as GFR for creatinine and gentamicin) remained unchanged.

Results of brace treatment in progressive idiopathic scoliosis

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The effect of brace treatment was studied in 169 patients with documented progressive idiopathic scoliosis (with a total of 232 progressive curvatures). Indications and methods of treatment were clearly defined. The average follow-up period was 40 months (minimum 12 months). At the time of follow-up the treatment of 99 curvatures had been completed, while 133 curvatures were still being braced. The results were calculated per group, by skeletal age and dimensions of the curvature. Complications were recorded.

The ultimate result of carefully conducted conservative therapy (bracing plus exercises) was that further progression of the curvature was definitively prevented.

Conclusion: Well-timed and consistent bracing of documented progressive idiopathic scolioses gives good results in the vast majority of cases (95 per cent). The curvature is confined to limits which ensure that no untoward consequences develop in adulthood.

The rigid spine syndrome

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The rigid spine syndrome was first described by Dubowitz in 1970. Its characteristic features are severe restriction or abolition of spinal flexion, extreme fixation in hyperlordosis and possibly scoliosis. The spine itself shows no radiological evidence of kyphosis or bone destruction.

Muscle biopsy specimens reveal signs of a myopathy. Some well-known myopathies are characterized by excessive rigidity of the spine as a result of extensive fibrosis of the extensor muscles. Four patients (one male and three female) with the characteristic symptoms are discussed. In two, the findings were consistent with the rare rigid spine syndrome described above; the rigidity of the vertebral column in the other two patients was symptomatic of a classifiable myopathy.

A comparative follow-up study of the results of Zielke's spondylodesis and Dwyer's spondylodesis in the treatment of severe deformities of the spine

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A follow-up study was performed of 100 patients: 50 consecutive patients treated according to Dwyer and 50 consecutive patients treated according to Zielke.

The postoperative correction was 70 per cent for the Zielke procedure and 61 per cent for the Dwyer procedure. After a follow-up period ranging from 8 months to 4½ years, the respective correction percentages were 64 and 51.

There were fewer perioperative complications in the Zielke group: no rod fracture (8 cable fractures in the Dwyer group) and no screw fracture (4 screw fractures in the Dwyer group). In both groups the screws broke away from the vertebral body in five cases.

There were three postoperative rod fractures in the Zielke group and 15 postoperative cable fractures in the Dwyer group. Pseudarthroses developed in 12 per cent of the Zielke and 20 per cent of the Dwyer patients.

The Zielke procedure was superior in all cases except those of congenital scoliosis and spina bifida kyphosis. Superiority was apparent in idiopathic scoliosis, spina bifida scoliosis and spastic and paralytic scoliosis. In all groups there was less postoperative loss of correction after Zielke's spondylodesis.

The acetabulum-inducing effect of intertrochanteric derotational varus osteotomy in congenital dysplasia of the hip

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During the period 1967–1978, all patients with congenital hip dysplasia were treated in accordance with a protocol in which an intertrochanteric derotational varus osteotomy of the Bernbeck type had a prominent place.

In a follow-up study the radiographic results were assessed according to Severin (J.B.J.S. 32-A, 1950) and the clinical/functional results according to Ponseti (J.B.J.S. 41-A, 1959). It was found that, given the same ultimate result, the acetabular angle according to Hilgenreiner (Tönnis and Brunken, *Arch. Orthop. Unfall-chir.* 64, 1968) scored less well than

the CE-angle according to Wiberg (*Acta Chir. Scand.* 83, 1939).

Eighty-three hip-joints were corrected by operation. Of the 76 hips with acetabular dysplasia, seven were still dysplastic (i.e. a good result in 91 per cent of cases).

The acetabulum-inducing effect of an intertrochanteric derotational varus osteotomy proved such as to diminish asymptotically after the age of 2 years.

Since the protocol was slightly modified in 1978, the number of operative interventions has diminished substantially. This was achieved by perfecting conservative measures and by preferring an acetabulum-improving procedure to intertrochanteric derotational varus osteotomy.

If an intertrochanteric derotational varus osteotomy is to be performed, the actual antetorsion has to be corrected to 20° and the actual CCD-angle to 115°.

For surgical treatment of acetabular dysplasia, an acetabulum-improving procedure as described by Pemberton, Van der Heyden, Tönnis or Salter is to be preferred.

Wagner's resurfacing arthroplasty of the hip

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On the basis of a follow-up study of 84 Wagner double-cup prostheses implanted during the period 1976–1981, 28 revised hips are analysed and discussed with special reference to the histology of the femoral neck remnant obtained during the revising operation.

Assessment of the sagittal sections through the femoral head revealed that a layer of pannus had developed which consisted of poorly vascularized fibrous tissue and old fibrosing tissue arranged parallel to the cup. Apart from fibroblasts and fibrocytes, this layer contained histiocytes, giant cells, and osteoclasts which resorbed both viable and unviable bone. Due to the aggressivity of the pannus, bone resorption prevailed at the edges, whereas the bone in a more central position beneath the cup reacted by remodelling. The result was a thin superficial cortical layer. In the weight-bearing part this led to sclerosis. In the course of time, foreign body particles increased in the pannus and to a lesser degree in the medulla, and these were phagocytized by the histiocytes and giant cells.

We conclude that failures with this prosthesis are in part due to this histopathological reaction.

Experiences with cementless hip prostheses according to Mittelmeier and Lord

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Between March 1979 and November 1983, 127 cementless hip prostheses were implanted: 48 ceramic prostheses according to Mittelmeier and 49 madriporique prostheses according to Lord. There were 116 patients with a mean age of 53 years. The main indication was coxarthropathy, dysplasia being more prominent in the women and femoral head necrosis in the men. The follow-up period ranged from 1 to 5 years. Results were assessed by means of the Harris hip score (80 points or higher indicating a good or excellent result).

Results were good or excellent in 32 patients (67 per cent) of the ceramic group, and in 53 (74 per cent) of the madriporique group. The most common complication was a femoral shaft fracture (in 7 instances). Re-operation was required in 8 cases in view of infection (1 case), separation (2 cases) ectopic calcifications (1 case), separation (2 cases) ectopic calcifications (1 case) and so-called mid-thigh pain (3 cases).

Although the follow-up period was short, the impression was gained that the cementless hip prosthesis – with its good mechanical stability and optimal contact between prosthesis and bone – is a valuable aid in the treatment of young, active patients. It can also be used to revise loosened cemented prostheses, if necessary in combination with a cancellous bone graft. In view of the results and the design of the prosthesis, we now prefer the madriporique to the ceramic hip prosthesis.

Retrospective comparison of the uncemented Judet hip prosthesis with cemented prostheses

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The results of 92 uncemented Judet total hip prostheses were compared with those of 42 cemented total hip prostheses in patients younger than 70 years. The follow-up period ranged from 1 to 3 years. Results were assessed on the basis of clinical and radiological findings and correlated to the Harris hip

score. The two groups did not differ significantly in diagnosis, sex and body weight.

The Judet group had a slightly younger average age, the duration of the operation was longer and the blood loss greater. The hospital period was the same as that in the control group. Fissures or fractures developed in 22 cases in the Judet group.

The control group averaged better in ADL score, pain score and gait score:

ADL score controls 10; Judet group 9 (maximum 14). Pain score controls 37; Judet group 33 (maximum 44).

Gait score controls 24; Judet group 22 (maximum 33).

The total Harris hip score averaged 79 in the control group and 70 in the Judet group (maximum 100).

X-rays revealed a negative correlation between the anteversion angle of the acetabulum and the Harris score. No significant correlation was found between the position of the prosthesis and the ultimate result. The patients in the Judet group were evidently less satisfied (64 per cent) than those in the control group (86 per cent).

In August 1982, we stopped implanting Judet prostheses. Time will show whether the Judet prosthesis does indeed carry a less grave risk of aseptic separation than cemented prostheses.

A comparative biomechanical study of some hip prostheses

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A standardized finite elements model was developed in order to gain some impression of the force-inducing mechanism of specific hip prostheses (femoral components). Although it is schematic, this model can be used for relatively rapid and simple comparison of various types of prosthesis. It was applied to several types, of which the Müller "straight stem", the Exeter, the Isoelastic and the Müller "curved stem" prosthesis will be discussed.

Factors studied in these types were various stress situations, the effects of calcar resorption, and the comparative merits of titanium and cobalt-chromium steel as prosthesis material.

The results show substantial differences in degree of cortical stress-shielding, stem stress, cement stress, shearing stress and tensile stress on the implant/bone interfaces as well as in other important

mechanical aspects. It is interesting to note that the Müller "straight stem" and "curved stem" prostheses represent two extremes in terms of virtually all mechanical criteria. The former is characterized especially by proximal stress-shielding and high distal interface stress, as compared with the high proximal cement/interface of the latter.

Calcar resorption proved to have a very unfavourable effect on interface stresses (and thus also on potential micro-motions) in several types, the Müller "straight stem" being an exception in this respect.

Titanium alloys seem to have advantages as prosthesis material in some, but not in all types.

A number of the results obtained agree strikingly well with clinical findings reported in the literature.

Operation of talipes equinus in cerebral palsy

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A follow-up study at the children's rehabilitation centre Franciscusoord (Valkenburg) showed that, of 60 children suffering from cerebral palsy 31 underwent surgery (a total of 58 operations) for talipes equinus which interfered with standing, walking or a firm wheelchair seat. Two techniques were generally used: distal Achilles tendon extension (34 operations), and more proximal selective gastrocnemius muscle extension (24) in the case of a positive Silfver-sköld test (dorsal flexion of the foot abolished on extension of the knee).

The relapse rate after distal Achilles tendon extension was 20.6 per cent (literature: about 10 per cent) versus 41.6 per cent after gastrocnemius extension (agrees with the literature). There are two reasons for this: in the gait pattern the soleus muscle is much more spastic than it was assumed to be; and there are extensive postoperative adhesions between the gastrocnemius and the soleus muscle.

The risk of postoperative talipes calcaneus is not inconceivable, and in fact is almost predictable when in the postural reflex chain – triceps surae, quadriceps, hip adductors and gluteus maximus – two muscles are extended, e.g. Achilles tendon extension with adductor release (4) or with selective gastrocnemius release (2). This causes the entire chain to collapse. Cerebral palsy involves so-called overrunning reflexes: contact of the foot with the ground gives rise to spastic talipes equinus, and this triggers contraction of the other muscles mentioned. This is why Achilles tendon extension as such is often sufficient to abolish spastic hip flexion contracture.

The findings of this study and data from the liter-

ature seem to warrant the conclusion that talipes equinus in cerebral palsy, if it requires surgery, is best treated by the simple, economic (maximum dorsal flexion under anaesthesia 10°) procedure of distal Achilles tendon extension.

Double osteotomy of the knee in rheumatoid arthritis

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Between 1976 and 1981, 29 patients with rheumatoid arthritis (RA) were treated by double osteotomy in view of a therapy-resistant painful knee. A follow-up study was performed of 28 patients with 30 double osteotomies, the mean follow-up period being 5½ (range 2–8) years.

Six months after the operation, 20 knees showed good results (satisfied patient and marked reduction

of pain). At the time of the follow-up only 10 knees (in 8 patients) showed good results. Of the remaining 20 knees (in 20 patients), 14 were replaced with a total prosthesis an average of 2.4 years after the double osteotomy. Of these 14 patients, 10 (without preceding double osteotomy) received a contralateral knee prosthesis. These 10 contralateral knee prostheses gave no problems. Of the 14 knee prostheses following double osteotomy, however, 8 gave problems: loosening in 2, restricted movement in 2, perioperative femoral fracture in 1 and a less good subjective results than the contralateral prosthesis in 3 instances.

Our short-term results are comparable with those reported in the literature; our longer-term results, however, are significantly less good, and the results of total knee prostheses following double osteotomy are less good than those of total knee prosthesis without previous double osteotomy. This is why we think that, at this time, double osteotomy of the knee is not advisable in RA.