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Hip replacement in acetabular protrusion

The medial defect in acetabular protrusion makes it necessary to construct a strong implant bed for the cup prosthesis. Autogenous spongiosaplasty of the floor of the acetabulum combined with wire reinforcement of the cemented plastic cup has given good results in 28 patients followed for 3 (1–6) years.

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In total hip replacement in acetabular protrusion we have reinforced the deficient floor of the acetabulum with autogenous spongiosa. We usually combine osseous reconstruction of the acetabulum with wire reinforcement of the cemented plastic cup.

We report 28 patients followed for 3 (1–6) years.

Patients

Between 1978 and 1983, we used this method to implant 31 total endoprostheses in 28 patients with acetabular protrusion. Three patients were operated on bilaterally. The average age of the patients, 24 women and 4 men, was 58 (39–69) years. There were 12 cases of primary protrusion, and in 19 cases the protrusion was secondary to massive destructive arthrosis (3 cases), rheumatoid arthritis (7 cases), central fracture dislocation (3 cases), and medial migration of a loosened acetabular prosthesis (6 cases) after total hip replacement in osteoarthrosis (4 cases) or in rheumatoid arthritis (2 cases).

Pre-operatively the anatomical degree of severity of the acetabular defect on the medial side was documented in an average protrusion of 10 (5–18) mm, which was estimated according to the method of Hubbard (1969) by measuring the distance between the Köhler line and the line of the inner base of the acetabulum.

Operation

Twenty-four Müller standard prostheses and seven prothecast ceramic composite prostheses (VEB Keramische Werke Hermsdorf, GDR) were implanted.

The operation was performed using the standard technique of Müller (1970). After resection of the femoral head, the acetabulum was carefully reamed, leaving the proximal subchondral cortex intact, and on the upper side several anchorage holes were drilled. For reimplantation, careful total removal of the granulation tissue was necessary. If the floor of the acetabulum was still intact, it was covered with a thick layer of small blocks of autogenous spongiosa taken from the resected head-neck segment; if additional bone was necessary, or in revision, this was taken from the crest of the ilium. If the acetabular floor was damaged, we first covered up the defect in the bone with a large slice of spongiosa. Subsequently two Kirschner wires were crossed and bent to form a hemisphere, with their ends bent back into hooks, and inserted into the acetabulum. The wires were driven in until they hooked firmly onto the acetabular margin. The normal technique was used for cementing, so that the acetabular prosthesis was held in the correct position by the wire reinforcement.

Except for one early infection, which was controlled without any consequences by revision and irrigation-suction drainage, there were no complications. On the first day after operation, the patients were mobilized with partial weight-bearing for the first 3 months.

Results

All 28 patients had a radiographic and clinical follow-up. The average period of postoperative observation was 3.4 (1–6) years.

All radiographic findings revealed that the position of the reinforcement wires was unchanged and the acetabular prostheses were correctly situated. The average inclination of the cups was 45° (40°–50°), i.e. the normal

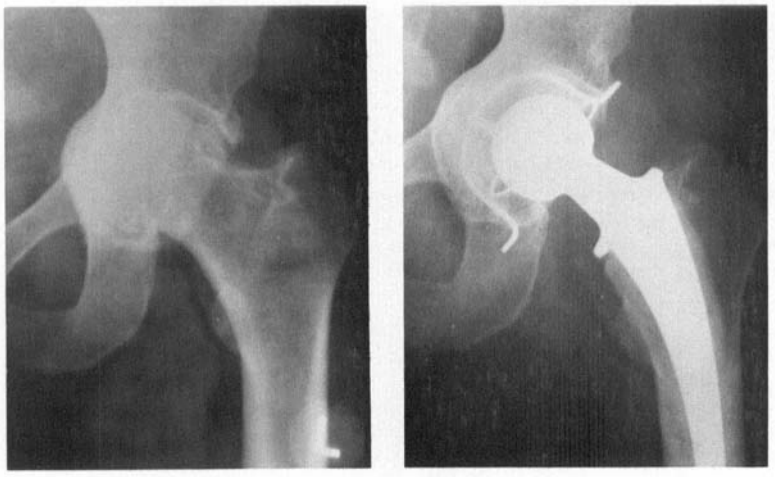

Figure 1. Primary acetabular protrusion, pre- and postoperatively.

range. To date, neither instability of an implant nor recurrence of the protrusion have been detected. In all cases it could be seen that the osseous material inserted had completely united to form a solid floor to the acetabulum. Its average radiographically estimated width was 16 (11–20) mm. Radiographic follow-up revealed a restructuring and renewal of the grafted spongiosa between the 6th and 9th months after operation, which was taken as a sign that the medial acetabular wall had begun to consolidate (Figure 1).

We evaluated the clinical results of the operations according to Merle d'Aubigné & Postel (1954), as modified by Charnley (1979) (Table 1).

Table 1. Clinical follow-up findings in 31 total hip replacements (28 patients) for protrusio acetabuli (Charnley's classification).

Grade	1	2	3	4	5	6
Preop.						
Walking ability	4	20	7	0	0	0
Range of hip motion	10	14	7	0	0	0
Pain	15	13	3	0	0	0
Postop.						
Walking ability	0	0	1	9	12	9
Range of hip motion	0	0	1	10	11	9
Pain	0	0	1	2	11	17

Discussion

In acetabular protrusion, various techniques are available for constructing a solid counterbed to support the plastic cup. According to the long-term observations of Sotelo-Garza & Charnley (1978), cup anchorage can be guaranteed by a cement base which completely fills the depth of the acetabulum. Harris & Jones (1975) used cemented metal nets, intended to prevent extrusion of bone cement into the pelvis, to stabilize the floor of the acetabulum and to close defects. McCollum & Nunley (1978) reported similarly good experience using metal nets and rings to reconstruct the acetabular implant bed; in especially difficult situations they used special cups with wide margins, which support themselves on the roof of the acetabulum like the metal ring developed by Eichler (1973). If there is extensive destruction of the acetabulum, reinforcement rings for the roof of the acetabulum and antiprotrusio-reinforcement cages (Schneider 1980) can be used.

Compared with these procedures, some of which are technically very demanding, our technique for implanting acetabular cups requires only relatively simple intra-operative manoeuvres. We can also confirm previous reports that intra-acetabular grafts of autogenous spongiosa unite without any problems (McCollum & Nunley 1978, Heywood 1980, Schuhmacher et al. 1980, Bereiter & Morscher 1982, Johnsson et al. 1984, Tauber et al. 1984).

Moreover the acetabular cup can be implanted with only a thin layer of cement, since the central acetabular defect is filled up with spongiosa. Thus the quality of the anchorage is not affected by shrinkage, a destabilizing factor which is a risk when large quantities of cement are used (Münzenberg 1976).

It may be assumed that the physiological form of the acetabulum, restored through osseous reconstruction, has a favourable influence on the longevity of the artificial joint owing to the load-dependent horizontal deformation of the acetabulum. Therefore we have recently increasingly narrowed down our originally more comprehensive indication for the implantation of acetabular supporting rings, acetabular roof reinforcement rings and anti-protrusio-reinforcement cages. As long as the long-term effect of massive rigid reinforcement elements on the deformative behaviour of the acetabulum has not been definitively clarified, we consider their use to be justified only in cases of the most severe damage to the acetabulum.

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