HIP ARTHROPLASTY IN HAEMODIALYSIS PATIENTS

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We retrospectively reviewed 17 hip arthroplasties in 15 patients having haemodialysis for chronic renal failure. The duration of haemodialysis before the operation averaged 8.6 years and the average age of the patients was 61 years. All patients were followed for more than two years (mean 4.6 years).

Six arthroplasties in four patients had failed due to loosening, and one of these patients died from undiagnosed infection of both hips at 7.6 years after the operation.

General skeletal abnormalities caused by maintenance haemodialysis may explain the high incidence of loosening and it is important to be aware of the danger of postoperative infection. The risk-to-benefit ratio of hip arthroplasty is high in patients on haemodialysis.

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Many patients on maintenance haemodialysis for chronic renal failure have had prolonged corticosteroid treatment. Some develop aseptic necrosis of the femoral head and eventually require hip arthroplasty. Metabolic changes in bone may develop in patients on long-term haemodialysis (Chan et al 1985), and amyloidosis of bone is a frequent complication after more than ten years of such treatment (Brown, Arnold and Gower 1986). These changes may lead to pathological fractures (DiRaimondo et al 1986; Campistol et al 1990; Kurer, Baillod and Madgwick 1991) or osteoarthritis (Bardin et al 1987; Muñoz-Gomez et al 1987) or both.

We could find no previous study of the long-term results of total hip replacement in haemodialysis patients,

and therefore report a retrospective study of 17 hip arthroplasties in 15 haemodialysis patients with a minimum two-year follow-up.

PATIENTS AND METHODS

Between 1978 and 1990 we performed a total of 19 hip arthroplasties in 17 patients who had had haemodialysis for chronic renal failure. Two patients died within two years of THR for reasons unrelated to the arthroplasty and were excluded. The average follow-up for the remaining 17 hips in 15 patients was 4.6 years (2 to 13); there were nine women and six men. None of the patients was significantly overweight. The duration of haemodialysis before operation averaged 8.6 years (1 to 19.8). The mean age of the patients at the time of THR was 61 years (39 to 81).

Many patients had other joint symptoms. By the time of latest follow-up, ten of the 15 patients had pain and stiffness of the shoulder, seven had required surgery for carpal tunnel syndrome, and four had the characteristic findings of destructive spondyloarthropathy (Kuntz et al 1984).

The initial diagnosis was femoral neck fracture in nine hips (Fig. 1), aseptic necrosis of the femoral head in five, impending fracture due to a massive lytic lesion in two (Fig. 2), and osteoarthritis in one.

Of the nine femoral neck fractures, four were considered to be pathological, due to lytic lesions. Of these four patients, two had internal fixation elsewhere and developed nonunion (see Fig. 1).

Of the three patients with aseptic necrosis of the femoral head, two had bilateral involvement and required consecutive total hip arthroplasties. Both these patients had been taking high doses of corticosteroids for more than a year and had pain in both hips before starting maintenance haemodialysis. The other patient with aseptic necrosis had had no history of taking steroids, but developed changes in the femoral head six years after starting maintenance haemodialysis.

Prophylactic antibiotics were given routinely in the perioperative period. Each patient was dialysed on the day before operation and was not dialysed again for at least 36 hours after THR, to avoid the possibility that the heparinisation needed for dialysis would cause bleeding at the operative site. Suction drains were removed 36 hours after operation and the patients were allowed to walk with support on the fourth day.

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Fig. 1a

Fig. 1b

Fig. 1c

Radiographs of a 54-year-old woman who had 14 years of haemodialysis. Figure 1a – Nonunion of a neck fracture with a large lytic lesion shown to contain amyloid deposits. Figure 1b – Three months after insertion of a bipolar femoral prosthesis. Figure 1c – Five years postoperatively, there is varus displacement of the prosthesis and the arthroplasty was classified as a failure.

Fig. 2a

Fig. 2c

Fig. 2d

Fig. 2b

Radiographs of a 69-year-old man who had 16 years of haemodialysis. Figure 2a – There are large lytic lesions of the femoral neck and acetabulum. Figure 2b – Axial CT shows bilateral lytic areas in the femoral necks with an impending fracture on the left (white arrow). Figure 2c – The postoperative radiograph after a hybrid hip arthroplasty, using a cementless socket, a cemented femoral stem, and an acetabular bone graft. Figure 2d – Three years postoperatively, there is a radiolucent line present at the superolateral cement-bone interface and absorption of the acetabular bone graft.

RESULTS

All the patients had severe hip symptoms before arthroplasty. The Harris (1969) score in the six hips which could be assessed averaged 19 points (5 to 28). Three types of hip prosthesis were used. Before 1983, four cemented Charnley-Müller prostheses were implanted. From then until 1989, ten cementless bipolar prostheses were used. After 1989, we used three hybrid total hip arthroplasties with a cementless socket and a cemented femoral stem (Harris and Maloney 1989).

There were no major complications. The average Harris score at latest follow-up was 66 (4 to 96). Eight hips were rated as having an excellent (90 to 100) or good (80 to 89) result; two had a fair result (70 to 79) and seven a poor result (under 70). The Harris rating for pain was slight in four hips, mild in five, moderate in two, marked in two, and severe in four.

The six arthroplasties with marked or severe pain all showed definite migration. These were four cemented Charnley-Müller prostheses in two patients and two bipolar prostheses in two patients. For these four patients, the average age at operation was 53 years and their average follow-up was 6.9 years. All four Charnley-Müller hips showed massive osteolysis of the femur, and one patient required two crutches all the time at six years (Fig. 3) and became wheel-chair-dependent 12 years after arthroplasty.

The other patient with bilateral Charnley-Müller hips developed a low-grade fever 7.6 years after arthroplasty, and was admitted to the renal centre for investigation. She had been treated with high-dose corticosteroids before starting maintenance haemodialysis. There were no obvious signs of inflammation such as abscess or sinus formation around the hips, and infection was not diagnosed, although radiographs were suggestive of septic loosening (Fig. 4). The patient died of septicaemia three

days after admission and at post-mortem, pus found around both hips grew *Staphylococcus aureus* on culture.

Three patients have excellent or good results more than two years after hybrid total arthroplasty, but in two of them radiographs show a lucent line at the superolateral cement-prosthesis interfaces of the femoral component.

Fig. 3

Radiograph six years after a Charnley-Müller arthroplasty, showing massive osteolysis with endosteal scalloping of the proximal part of the femur.

Fig. 4a

Fig. 4b

Radiographs of a 39-year-old woman after four years on haemodialysis. Figure 4a – Bilateral cemented Charnley-Müller arthroplasties immediately after surgery. Figure 4b – Seven years later there is distal migration and massive osteolysis on both sides. The patient died from septicaemia at 7.6 years and a post-mortem showed much staphylococcal pus around both hips.

The other shows partial absorption of a bone graft which had been used in the arthroplasty to fill a lytic lesion (see Fig. 2).

The overall results of hip arthroplasty in haemodialysis patients were poor: there was a 35% failure rate. None of the failed arthroplasties has been revised because of the general condition or the unwillingness of the patient.

DISCUSSION

Three patients showed aseptic necrosis of five femoral heads. Two of these had long-term corticosteroids before haemodialysis and the third may have had amyloidosis associated with dialysis.

Patients undergoing haemodialysis may have various skeletal abnormalities such as osteomalacia or hyperparathyroidism (Chan et al 1985), and recently the intraosseous deposition of beta-2-microglobulin amyloid has been added to the list. Amyloid deposition increases in proportion to the duration of haemodialysis because it does not pass through cellulose dialysis membranes and is not removed (Hauglustaine et al 1986). Musculoskeletal syndromes caused by amyloidosis include carpal tunnel syndrome, pain and stiffness in the shoulder, lytic bone lesions, and destructive spondyloarthropathy (Brown et al 1986; Bardin et al 1987; Muñoz-Gómez et al 1987; Kurer et al 1991; Naito et al 1992). Most of our patients were affected by at least one of these disorders; amyloidosis and other skeletal abnormalities caused by maintenance haemodialysis may weaken bone and help to explain our high incidence of loosening.

The cemented Charnley-Müller prosthesis failed in all the four hips in which it was used. We have also used it in 16 non-uraemic patients and seven of these showed aseptic loosening at eight years (44%). In general, the failure rate of cemented total hip arthroplasty was more than doubled in haemodialysis patients.

Many patients with chronic renal failure have had steroid therapy, and most of those undergoing long-term haemodialysis develop anaemia and hypoproteinaemia. These specific problems, as well as decreased immunity (Raska et al 1983), increase the rate of postoperative infection. In addition, their reduced immune response may mask the clinical symptoms of infection, making early diagnosis difficult. In one of our patients, a staphylococcal infection of both hips was diagnosed only at post-mortem. Bradley, Evans and Calne (1987) also reported that infection, particularly with *Staphylococcus*

aureus, was an important cause of late mortality in haemodialysis patients. They suggested that infection took place during the insertion of needles into arteriovenous fistulae. The increased danger of postoperative infection must be considered when chronic dialysis patients require an arthroplasty.

Conclusions. Haemodialysis patients have a high failure rate after hip arthroplasty (35%), and there is also an increased risk of aseptic loosening. Septic loosening may be disastrous unless diagnosed early. Patients on haemodialysis should be informed of the considerable risks of arthroplasty and surgeons must be aware of all the complications, and be prepared to deal with them.

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