

Osteolysis after ceramic-on-ceramic hip arthroplasty

A case report

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A patient with rheumatoid arthritis operated on with insertion of an uncemented ceramic-on-ceramic Mittelmeier total hip developed an extensive, rapidly evolving osteolysis around the prosthetic stem,

which in turn fractured spontaneously after 5 years. Aggressive bone resorption cannot be prevented by exclusion of polyethylene and bone cement from hip arthroplasty.

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Adverse reactions to methyl methacrylate (Linder 1976, Horowitz et al. 1986), commonly called cement disease (Jones and Hungerford 1987) or aggressive granulomatosis (Tallroth et al. 1989, Eskola et al. 1990, Santavirta et al. 1990), and reactions to polyethylene wear debris (Howie et al. 1988) have been alleged to cause prosthetic loosening. Recently, metallosis, caused by fretting of titanium femoral components, has been identified as an occasional cause of clinical failure of a hip endoprosthesis (Agins et al. 1988, Black et al. 1990).

We report on a patient who suffered severe osteolysis 4 years after the insertion of an uncemented Mittelmeier ceramic hip prosthesis.

Case report

A 40-year-old woman with seropositive rheumatoid arthritis of 11 years' duration had an uncemented Mittelmeier total hip inserted in 1984. The prosthesis had a threaded, ceramic acetabular component and a femoral component made of cobalt-chrome with a 32-mm ceramic head. At the operation the femoral head was transplanted into an acetabular defect and fixed with two screws. The femoral component was fixed with the press-fit technique, and homologous spongy bone was used to fill the indentations in the stem. There was good primary fixation (Figure 1).

In April 1986, the patient (Case 10, Table 1, Snorrason et al. 1989) had moderate pain. A radiographic examination disclosed proximal migration of the acetabular component with fractures of the screws used to fix the transplanted femoral head. No migration of the femoral component or bone resorp-

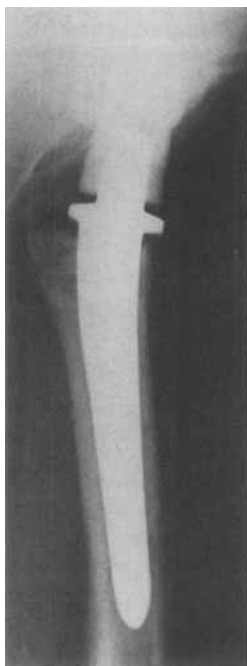
tion of the proximal femur were seen. ^{99m}Tc -MDP scintimetry showed an increased activity around both components and an uptake ratio of 1.5 at the tip of the femoral component. In January 1988, radiographs were unchanged. In September 1988, the pain had increased, and radiographs showed extensive resorption of medial cortices. Revision was recommended, but the patient refused. The osteolysis progressed during the following year; and in November 1989, a spontaneous subtrochanteric fracture was detected. Aspirated fluid from the hip and aerobic and anaerobic cultures were negative.

At revision, an enlargement and intense metallosis of the trochanteric bursa were found. Both components were loose. Marked synovitis and a thick membrane surrounding the prosthetic components were observed—all darkly stained from metallosis. Tissue cultures from the membranes in the acetabulum and femur were negative. A cemented acetabular component on an allograft and an uncemented Bias femoral prosthesis were inserted.

Upon examining the retrieved prosthesis, a small area of gritty surface was found on the top of the ceramic head corresponding to a similar area in the ceramic cup; in addition, a grating sound was evoked when the head was moved to and fro inside the acetabulum, indicating wear of the ceramic components. The surface of the femoral component was macroscopically intact.

Discussion

Initially occurring micromovements might stimulate the formation of fibrous tissue (Goldring et al. 1983)



Two months postoperatively. The femoral stem appears to fill out the medullary canal. There is a good fit at the isthmus.

After 2 years, sclerotic lines proximally adjacent to the femoral component probably indicate prosthetic tilting. There was no measurable sinking and no osteolysis of the proximal femur. The acetabular component has migrated proximally breaking the screws.



^{99m}Tc-MDP scintigraphy after 2 years showed increased uptake around both components, especially at the tip of the stem, indicating loosening.



After 4 years, there is an extensive osteolysis of the medial femoral cortex. The femoral component has subsided 10 mm.

After 6 years, the osteolysis has progressed and a subtrochanteric fracture has occurred. Subsidence of the femoral component has increased to 15 mm.

Figure 1. Osteolysis after ceramic hip arthroplasty in a 40-year-old woman with rheumatoid arthritis.

and also initiate bone resorption (Linder et al. 1983). When the movements are small, bone remodeling might be able to maintain bone stock. In the present case, radiographs did not show signs of osteolysis at first, whereas scintigraphy demonstrated increased bone metabolism. It is known that cyclic loading of a poorly fixed prosthesis can induce necrosis of the interface between bone and prosthesis (Linder et al. 1983) and osteolysis (Vaes 1988). Huddleston (1988) believed that particulate polymethyl methacrylate was the most significant cause of osteolysis around cemented prostheses, but he did not rule out that cystic lysis could be a tissue response to particulate material regardless of origin. Wear or corrosion has been recognized as a cause of failure of cemented titanium (Black et al. 1990), and porous-coated cobalt-chrome (Buchert et al. 1986) prostheses and aggressive granulomatosis have been reported in a patient with an uncemented Moore hemiarthroplasty (Tallroth et al. 1989).

Ceramic (AIO) or metallic wear particles reaching the joint and the bone-prosthesis interface in the femoral shaft from cup-screw impingement can have been of importance in our case. The occurrence of osteolysis in the absence of bone cement and polyethylene probably reflects degradation of foreign material, which, regardless of origin, may be a part of the loosening process.

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