Low-friction arthroplasty of the hip using alumina ceramic and cross-linked polyethylene
A 17-YEAR FOLLOW-UP REPORT

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We report the results of our continued review of 11 total hip arthroplasties using 22.225 mm alumina ceramic femoral heads on a Charnley flanged stem, articulating with chemically cross-linked polyethylene. There was an initial bedding-in of up to 0.41 mm at the articular surface in the first two years. This had not progressed further, at a minimum follow-up of 15 years. Radiographically no femoral or acetabular component showed loosening or osteolysis.

In 1996, we presented the results of a prospective clinical and joint simulator study using a Charnley 22.225 mm diameter alumina ceramic head on a Charnley flanged stem (DePuy International, Leeds, UK), in combination with a cross-linked polyethylene cup for total hip replacement. There was an initial bedding-in of 0.2 to 0.4 mm within two years or 1.5 million cycles, followed by a penetration rate of 0.022 mm per year. In 1999, ten- to 11-year results of the remaining 14 arthroplasties showed a total penetration of 0.2 to 0.41 mm.

We now present a further update with a mean follow-up of 17 years (15 to 18.1).

Patients and Methods
Of the original 17 patients, 12 were men and five were women. Two men had bilateral arthroplasties. Five patients had been lost to follow-up before the start of this report. Four patients had died and one had been confined to a wheelchair because of multiple sclerosis.

Since the last publication, one patient has undergone revision for deep infection which followed bladder surgery for neoplasia 17 years after the total hip replacement. At the time of revision the total penetration of the acetabular component was 0.4 mm.

Two other patients could not attend follow-up because of cardiac problems. Their last radiographic follow-up was at 11 and 15.2 years, respectively, with total penetration of the cup of 0.4 mm in both patients.

The remaining nine patients (11 arthroplasties) continue with regular follow-up.

Results
The mean age of the patients was 47.2 years (26 to 58) at the operation and is now 64 years (42 to 73). Clinical results remain excellent with activity levels appropriate to the patients’ age and gender.

The mean total penetration of the acetabular component for this group of patients was 0.31 mm.
mm (0 to 0.41) with a mean penetration rate of 0.019 mm per year (0 to 0.026).

One patient who had a ceramic-on-polyethylene arthroplasty on the left side followed a year later by conventional metal-on-ultra-high-molecular-weight polyethylene on the right side, had a tenfold difference in total penetration; 0.41 mm compared with 4.1 mm (Fig. 1). There have been no problems that could be attributed to the design or the materials used.

Radiographic appearances. None of the components showed loosening or osteolysis on the latest radiograph. One patient with bilateral arthroplasties, had demarcation of both acetabular components. This was less than 1 mm, was present at one year and had not progressed. This was within the limits of normal.5

Discussion
The results in this prospective study remain excellent both clinically and radiographically. After the initial bedding-in period, there was no further penetration of the acetabular component. The potential benefits of this ceramic-on-polyethylene bearing may be greater than previously reported.3

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References