

Minimum 20-Year Results of Alumina Ceramic-on-Highly Cross-Linked Polyethylene Bearing in Cementless Total Hip Arthroplasty in Young Patients with Osteonecrosis of Femoral Head

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INTRODUCTION:

Despite an overall performance showing ultra high molecular weight polyethylene (UHMWPE) was successful in the short-term after total hip arthroplasties (THAs) in patients with osteonecrosis (ON) of femoral head, there is a paucity of long-term study (> 20 years) to determine the prevalence of UHMWPE wear and osteolysis. We asked whether cementless long-term THAs using alumina ceramic-on-highly cross-linked polyethylene (HXLPE) bearings would improve hip score and functional activity and reduce incidence of polyethylene wear, osteolysis, and aseptic loosening.

METHODS:

Consecutive primary THAs were performed in 166 patients (187 hips) with osteonecrosis of femoral heads. There were 112 men and 54 women. The average age at the time of the index arthroplasty was 36.9 years (range, 20–50 years). The average body mass index was 24.9 kg/m² (range, 18.8–30.5 kg/m²). All hips had Ficat and Arlet stage III or IV osteonecrosis of femoral head. The presumed cause of osteonecrosis was ethanol abuse in 115 patients (69 %), idiopathic in 46 patients (28%), and steroid use in 5 patients (3 %). The average follow up was 23.1 years (range, 20–24 years). Clinical (Harris hip score, WOMAC score, and UCLA activity score) and radiographic follow ups were performed at 3 months, 1 year, and 2-3 years thereafter. Polyethylene liner wear measurement was performed using a software program. Osteolysis was evaluated using radiography and computer tomography.

RESULTS:

The mean preoperative Harris hip score was 44.3 points (range, 6–55 points), which was improved to 95 points (range, 80–100 points) at 23.1-year follow up. Preoperative WOMAC score was 65.3 points (range, 52–82 points), and it was improved to 15 points (range, 9–18 points) at 23.1-year follow up. The preoperative UCLA activity score was 2 points (range, 1–3 points), which was improved to 6.2 points (range, 5–9 points) at 23.1-year follow up. No hip had aseptic loosening of acetabular or femoral component. All acetabular and femoral components were fixed by bone ingrowth. Calcar rounding off was observed in all hips but no hip had stress-shielding-related proximal femoral bone resorption. No hip had ceramic femoral head fracture. The mean total amount of highly cross-linked polyethylene linear penetration was 0.381 ± 0.298 mm (range, 0.000–1.296 mm), and mean annual penetration rate was 0.033 ± 0.002 mm per year (range, 0.000–0.111 mm per year). No hip had osteolysis. With the numbers available, univariate regression analysis showed the age, gender, weight, activity of patients, cup inclination, or cup anteversion had no influence on polyethylene linear penetration or osteolysis.

DISCUSSION AND CONCLUSION:

The current generation of cementless acetabular and femoral component with alumina-on-HXLPE bearing has been functioning well without osteolysis at a 20-year minimum and an average of 23.1-year follow up in young patients with osteonecrosis of femoral head. While the longer-term survival of implants, prevalence of polyethylene wear, and osteolysis remain unknown, the long-term (mean 23.1 years) data are promising.