Fixation and Wear with Contemporary Acetabular Components and Cross-linked Polyethylene at 10-years

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Disclosures:

Introduction: Moderately cross-linked polyethylene was developed to reduce bearing surface wear in the total hip arthroplasty (THA) construct. The purpose of this study was to evaluate the minimum ten-year results of a third generation cementless modular acetabular component using moderately cross-linked polyethylene liners.

Methods: We prospectively evaluated 150 consecutive primary THAs performed by two surgeons in 139 patients who received a third generation cementless acetabular component and a moderately cross-linked polyethylene liner (5 Megarad re-melted). Average age at operation was 56 years (range: 25-91 years). Patients were evaluated clinically for need for revision and with WOMAC, Tegner and UCLA activity-level scores. In addition, patients wore accelerometers (pedometers) to assess functional activity. Radiographic evaluation included assessment of wear, osteolysis and loosening. Serial wear measurements were performed using edge detection techniques, and bedding in and steady state wear rates were calculated. This cohort was compared to three previously reported cohorts of THA studied by the same authors using the identical methodology.

Results: At final follow-up, 115 patients (126 hips) were living, 19 patients (19 hips) were deceased, and 5 patients (5 hips) were lost to follow-up. All acetabular components were bone ingrown on follow-up radiographs. There were no cases of acetabular osteolysis and one case (0.7%) of femoral osteolysis detected on radiographic analysis. The calculated average steps per year was 1.59 million (range: 109,000 to 4.4 million). Average UCLA score was 5.4 and average Tegner score was 3.8 (moderate to heavy labor). Mean linear and volumetric head penetration rates were 0.05 mm/yr and 16.23 mm³/year, respectively, when including the initial two year bedding-in period (Figure I). The rates were 0.042 mm/yr and 13.63 mm³/year, respectively, when excluding the bedding in period. Head penetration rate was significantly lower than three previously reported cohorts with gamma irradiated in air polyethylene (p<0.005).

Discussion: THA using a contemporary cementless acetabular construct and moderately cross-linked polyethylene liner demonstrated durability at minimum 10 year follow-up. There were no reoperations for wear or loosening and only one case of osteolysis (0.7%) was detected. These results support the use of a third generation cementless acetabular component and moderately cross-linked polyethylene in THA.

Significance: At minimum 10 year follow-up using a contemporary cementless acetabular construct and moderately cross-linked polyethylene liner, excellent fixation and low bearing surface wear has been demonstrated.
Acknowledgments:
separate regression lines with scatter points