Fixation and Wear with Contemporary Acetabular Components and Cross-linked Polyethylene at 10-years in Patients Age 50 and Under

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Disclosures:

Introduction: Bearing surface wear was reported as the major long-term problem in patients undergoing total hip arthroplasty (THA) age 50 and under. Moderately cross-linked polyethylene was developed to reduce bearing surface wear and thus help alleviate this long-term problem. Most long term follow-up studies of cross-linked polyethylene have been performed in cohorts that included both older and younger patients. 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 in patients age 50 and under.

Methods: We prospectively followed 100 THAs in 86 patients age 50 and younger at the time of surgery who underwent primary THA using a third generation cementless modular acetabular component with moderately cross-linked polyethylene liners (5 Megarad re-melted). Average age at surgery was 41.9 years with surgeries being performed at two institutions. Hips were evaluated clinically for revision and by SF-36, WOMAC, Tegner, and UCLA questionnaires. In addition, patients wore accelerometers (pedometers) to assess functional activity. Radiographs were evaluated for wear, loosening and osteolysis. Serial wear measurements were performed using edge detection techniques. These results were compared to a group of 115 hips performed in patients 50 and under by the same surgeons with gamma in air or gas plasma sterilized polyethylene that were also followed for 10 years with the same methodology.

Results: At minimum 10-year-old follow-up six patients (6 hips) were deceased, two patients (2 hips) withdrew from the study, and five patients (5 hips) were lost to follow-up. No hips were revised for loosening at minimum 10 years. All acetabular and femoral components were bone ingrown and there were no cases of osteolysis. Average UCLA score was 5.5 and average Tegner score was 3.9 (moderate to heavy labor). Calculated mean steps per year was 1.90 million (range: 0.33 to 4.36 million). Mean linear and volumetric head penetration rates were 0.05 mm/yr and 15.24 mm3/year in this active population. These results were significantly better (p<0.001) than the results with polyethylene that was not moderately crosslinked where the average linear wear rate was 0.252 mm/yr, the volumetric wear averaged 80 mm3/year, and 10% of cases were revised for linear wear. In addition, the wear rate in these cross-linked polyethylene liners were no different than the report from our institution which includes older patients where cross-linked polyethylene was also utilized.

Discussion: THA using a third generation cementless modular acetabular component with moderately cross-linked polyethylene liners in a younger population proved durable at minimum 10 years. Bearing surface wear in this younger cohort was similar to an older cohort even with their increased activity and were far superior to this age group in patients with polyethylene that was not moderately crosslinked. These results support the use of a third generation cementless acetabular component and moderately cross-linked polyethylene in THA for patients age 50 and under. Neither fixation nor polyethylene wear was a clinical problem at minimum ten year follow-up in this active patient population (which was verified by activity monitoring through the use of pedometers).

Significance: THA using a third generation cementless modular acetabular component with moderately cross-linked polyethylene liners in a younger population proved durable at minimum 10 years. Bearing surface wear in this younger cohort was similar to an older cohort in which moderately cross-linked polyethylene was used, despite the younger cohort having increased activity.

Acknowledgments:

References:

ORS 2014 Annual Meeting
Poster No: 0911