

Can They Run? Comparing Highly Crossed-Linked Polyethylene Wear with Functional Activity in Young Total Hip Arthroplasty Patients

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INTRODUCTION:

The incidence of primary and revision total hip arthroplasty (THA) is increasing in the United States. Total hip arthroplasty has become a feasible option in increasingly younger patients using current implant technology and surgical techniques. Limited data exists regarding long-term radiographic and clinical outcomes of modern THA in patients under the age of fifty. Studies available at present are limited by small numbers and short-term follow up. This study investigates polyethylene wear compared to perceived activity level in young patients with long-term clinical and radiographic outcomes following contemporary total hip replacement.

METHODS:

With prior Institutional Review Board (IRB) approval, we identified 909 patients between 18-50 years-old undergoing primary THA with a highly cross-linked polyethylene (HXLPE) liner from 1999-2008 using our institution's total joint registry. Functional activity questionnaires including the HOOS Jr score, UCLA activity scale, HAAS score, and AAHKS activity recommendations after THA were sent to patients between 2018 and 2019. Patients were excluded from the study if they did not fill out the questionnaire, had a ceramic liner in place, underwent revision THA, or had less than 10-year follow up. We measured linear wear from the immediate postoperative x-ray and most recent x-ray at least 10 years apart using the Roentgen Monographic Analysis Tool (ROMAN). Linear wear rates were then compared to patient age at the time of surgery, femoral head size, and functional activity scores.

RESULTS:

There were 479 patients included for final analysis, with a mean age of 43 years-old (SD +/- 6) and 48.4% were female. Regarding femoral head size, 1.6% were 22 mm, 43.5% were 28 mm, 37.1% were 32 mm, and 17.7% were 36 mm. The median linear wear rate was 0.06 mm/year, interquartile range (IQR) 0.032 to 0.098 mm/year. The median functional activity scores (IQR) for walking (0-5), running (0-4), stair climbing (0-3), and activity level (1-11) were 5 (2 to 5), 1 (0 to 2), 2 (1 to 3), and 6 (3 to 7) respectively. There were no statistically significant factors associated with increased wear, including age at surgery ($p= 0.073$), femoral head size ($p= 0.292$), walking ($p= 0.978$), running ($p= 0.400$), stair climbing ($p= 0.155$), and activity level ($p= 0.922$).

DISCUSSION AND CONCLUSION:

Patients undergoing primary total hip arthroplasty with a HXLPE liner between 18-50 years of age at the time of surgery did not have significant linear wear at least 10 years after surgery. Linear wear was not associated with functional activities, age at the time of surgery, or femoral head size. Wear data related to activity level may serve as a valuable tool for patient education and counseling before and after surgery.