

# **Fifteen-Year Results of Total Hip Arthroplasty with Alumina Ceramic Femoral Heads on Highly Cross-Linked Polyethylene in Patients 50 Years and Less**

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## **INTRODUCTION:**

Highly cross-linked polyethylene (HXLPE) is a widely used bearing surface in total hip arthroplasty (THA) but long-term results in young patients are limited. Identifying the optimal coupling in these patients will allow us to reduce revision surgeries which remains a large concern. We have previously demonstrated excellent wear and 97.8% survivorship in HXPLE on cobalt-chrome femoral heads at average 15 year follow up. The purpose of our study is to investigate polyethylene wear rates, implant survivorship, wear-related revisions, and patient-reported outcomes in a young patient cohort with an alumina ceramic on HXPLE coupling at 15-year follow up and to compare this to our cobalt-chrome on HXPLE group at similar timepoints.

## **METHODS:**

We performed a retrospective study of 154 consecutive hips who underwent primary THA with an HXLPE acetabular liner and an alumina ceramic femoral head between 3/1/2004 and 12/30/2008 at a tertiary care center. All patients were minimum 15 years postop. The mean age at the time of surgery for the cohort was 38.4 years (range 13-50). All patients received cementless acetabular and femoral components as well as HXPLE liners and alumina ceramic heads through a posterior approach. We obtained University of California, Los Angeles Activity, and modified Harris Hip Scores. We utilized the Martell Hip Analysis Suite (Version 8.0.4.3) for wear calculations.

## **RESULTS:**

At average 15.35 years (range 15.1-18.2), aseptic revision survivorship was 93.3% and osteolysis/wear survivorship was 99.2% for the HXPLE on ceramic cohort. There was only 1 revision for aseptic loosening of a femoral component. We observed a mean linear wear rate of 0.0286 mm/y (standard deviation 0.11) after accounting for a 1-year bedding-in period. The mean volumetric wear rate was found to be 20.83 mm<sup>3</sup>/y (standard deviation 36.88). These numbers are registered as clinically undetectable and are comparable to steady state wear rates in the same cohort of patients at earlier timepoints. We found no radiographic evidence of osteolysis. We observed excellent patient-reported outcomes at this timepoint with improvements in modified Harris Hip Scores (43.6 [14.0] to 87.4 [16.0],  $P < .0001$ ) and University of California, Los Angeles Activity Scores (median 4.0 to 6.0,  $P < .0001$ ). No statistically significant differences were noted between the alumina ceramic and previously reported cobalt-chrome groups in terms of patient-reported outcomes or wear rates.

## **DISCUSSION AND CONCLUSION:**

At 15-year follow up, we demonstrated that HXLPE bearings in this young cohort had excellent wear properties, maintained superior clinical improvements, and underwent no wear-related revision operations. Results were comparable to that of the HXPLE and cobalt-chrome cohort previously published. The HXLPE and alumina ceramic bearing couple continues to be extremely effective 15 years after primary THA in patients less than 50 years.