Early Wear Rates of Oxidized Zirconium Femoral Heads on Highly Cross-linked Polyethylene

Kevin L Garvin1; Jimmi Mangla2; Curtis Hartman1; Connie Feschuk1; Nathan Murdoch1, John M Martell2

1. Department of Orthopaedics, The University of Nebraska Medical Center, Omaha, NE
2. The Orthopaedic Biomedical Imaging Institute, Section of Orthopaedic Surgery and Rehabilitation, The University of Chicago, Chicago, IL

Introduction

- Polyethylene wear with its resultant osteolysis and loosening for total hip arthroplasties have led to the development of alternative bearing surfaces.
- Oxidized zirconium (Oxinium, Smith & Nephew, Memphis, TN) and highly cross-linked polyethylene are new bearing materials developed to reduce polyethylene wear. Oxinium (Figure 1), a niobium alloy of zirconium (Zr.2.5Nb) has been shown to reduce conventional UHMWPE wear rates substantially under ideal and abrasion-damaged conditions in hip simulators 1.
- To date, no data have been published on the in-vivo wear rates of oxidized zirconium bearings articulating with cross-linked polyethylene. We present the linear wear rates in our series of Oxinium on cross-linked polyethylene.

Hypothesis

We hypothesize that linear wear rates in our series of Oxinium on highly cross-linked polyethylene will be lower than published wear rates of traditional metal on polyethylene and comparable to CoCr on highly cross-linked polyethylene.

Patients and Methods

- Fifty-four patients (29 males, 25 females) having fifty-six primary total hip arthroplasties with an Oxinium femoral head on a highly cross-linked polyethylene bearing surfaces show a true wear rate of 5 microns/year by the regression method (95% confidence intervals = +/- 56 microns/year) (Figure 2). The average Harris Hip Score was 51 pre-operatively and 97 at two-year follow-up.
- There was no radiographic evidence of osteolysis. There were no adverse events related to femoral bearing or taper junction in our series.

Conclusion

- The results of the current study show that Oxinium femoral heads articulating with highly cross-linked polyethylene have an excellent safety profile at a mean follow up of 30 months and demonstrate a low wear rate of 5 microns/year (95% confidence intervals = +/- 56 microns/year) that is comparable to published rates for CoCr bearings on highly cross-linked polyethylene (Manning).
- Long term follow up with larger numbers of patients will be needed to detect reduction in wear for Oxinium compared to CoCr femoral bearings on highly cross-linked polyethylene.

References