



13-year Evaluation of Highly Cross-linked Polyethylene Articulating with 28mm and 36mm Heads Using Radiostereometric Analysis (RSA)

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Introduction: HXLPE was introduced to decrease osteolysis and increase survivorship of total hip arthroplasty. Larger heads showed increased wear of conventional polyethylene. Since in vitro studies showed reduced wear of HXLPE with larger heads, their preponderance has increased. We aimed to evaluate head penetration and the steady state wear of HXLPE articulating with 28mm or 36mm heads using RSA.

Methods: 29 patients received tantalum beads in their liner to measure head penetration into the HXLPE. 16 patients received a 28mm head and 13 patients received a 36mm head. RSA and plain radiographic follow-up was scheduled 4-6 weeks, 6 months, 1, 2, 3, 4, 5, 7, 10, and 13 years postoperatively, with a CT scan taken at 13 years. The Wilcoxon signed-rank test determined differences in penetration over time ($p \leq 0.05$).

Results: 24 patients were followed at 6 months, 19 at 2 years, 17 at 3 years, 9 at 5 years, 10 at 10 years, and 9 at 13 years. CT scan analysis is in progress for all patients at 13 years. Head penetration used the postoperative film and steady state wear used the 1 year film as the baseline for comparison. At 13 years, the median \pm standard error steady state wear was 0.07 ± 0.04 mm for both the 28mm the 36mm cohorts. No change in steady state wear was found at any subsequent time point, either within the head groups or the overall cohort ($p \geq 0.09$).

Conclusion: The results indicate that the two cohorts showed low steady state wear of HXLPE at 13 years. There were no significant differences in the steady state wear over time. These results, using the most accurate method of RSA to assess wear, confirm that low wear of HXLPE is maintained in the long-term, and that the use of larger femoral heads is a viable option.