

10 Year follow-up of Highly Cross-Linked Polyethylene using Radiostereometric Analysis (RSA)

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Introduction: HXLPE was introduced to decrease osteolysis and increase survivorship of total hip arthroplasty (THA). 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, and 10 years postoperatively. The Wilcoxon signed-rank test determined differences in penetration over time ($p \leq 0.05$).

Results: 23 patients were followed at 6 months, 24 at 1 year, 19 at 2 years, 17 at 3 years, 9 at 5 years and 8 at 10 years. Head penetration used the postoperative film and steady state wear used the 1 year film as the baseline for comparison. At 10 years, the median \pm standard error head penetration into the HXLPE liners and steady state wear rate was 0.18 ± 0.03 mm and 0.06 ± 0.02 mm/year, respectively, for the 28mm cohort and 0.10 ± 0.06 mm and -0.04 ± 0.01 mm/year, respectively, for the 36mm cohort. No change in steady state wear or penetration was found after bedding-in at any time.

Discussion: The results indicate that the two cohorts show low penetration and steady state wear of HXLPE at 10 years. There was no significant difference in the steady state wear or penetration over time. The results of our study, using the most accurate method of RSA to assess wear, are consistent with other THA populations with HXLPE. This suggests that the use of larger femoral heads is a viable option due to the low rates of HXLPE wear.