



Paper #18

5 Year RSA Evaluation of Vitamin E Infused Polyethylene Wear and Stability of Acetabular and Femoral Components

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Introduction: In vitro studies show the anti-oxidative properties of vitamin E UHMWPE stabilize free radicals while retaining the properties of UHMWPE. A porous-titanium coated surface for acetabular shells was developed for improved bone in-growth fixation. The purpose was to evaluate vitamin E infused polyethylene (VEPE) wear and stability of acetabular and femoral components using RSA.

Methods: 58 patients (64 hips), with osteoarthritis, consented to participate in a 5 year RSA study. Each patient received a VEPE liner, a PTC shell, and an uncemented stem. Tantalum beads were inserted into the VEPE, pelvic bone, and femoral bone to measure head penetration into the polyethylene, and shell and stem stability using RSA. The Wilcoxon signed-ranks test determined if changes in penetration or migration were significant.

Results: 47 hips were followed at 3 years and 18 at 5 years. The median± standard error (SE) superior head penetration into the polyethylene was 0.05 ± 0.01 mm at 3 years and 0.05 ± 0.02 mm at 5 years. The acetabular components had a median± SE cup translation in the proximal direction of 0.04 ± 0.04 mm at 3 years and 0.06 ± 0.06 mm at 5 years. There were no significant differences in translation or head penetration. The median± SE stem distal migration was 0.05 ± 0.23 mm at 3 years, and 0.02 ± 0.17 mm at 5 years, with a significant difference between 6 months and 3 years ($p=0.029$).

Conclusion: The VEPE liners show low head penetration at 5 years. The early head penetration, probably due to creep, is lower relative to that reported for non-vitamin E stabilized UHMWPE measured by RSA. At 5 years, all acetabular components were stable. This study documents the longest-term evaluation of in vivo wear performance of vitamin E stabilized UHMWPE. The stability of the Regenerex™ shell and femoral stem shows promise for long-term survivorship.