Comparable Wear Performance of First- and Second-Generation Highly Cross-Linked Polyethylene in Young THA Patients

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INTRODUCTION: Younger patients who undergo total hip arthroplasty (THA) often exhibit higher activity and functionality. After the 1 st generation highly cross-linked polyethylene liners (HXLPE), there was advancement with the development of the 2nd generation Vitamin E-infused highly cross-linked polyethylene (VEPE) for polyethylene liners. However, there is limited research comparing these advancements, especially in younger patients. Therefore we did a retrospective comparative study aiming to determine: 1) the wear rate, 2) survivorships of the 1 st and 2nd generations of HXLPE in patients aged <30 years who underwent THA.

METHODS: From 2008-2019, we selected 121 patients, 150 hips of ceramic-polyethylene articulation THA in patients aged <30 years at least 5 years of follow-up. These patients were divided into two groups: 80 hips for 1 st generation HXLPE and 70 hips for 2nd generation VEPE. Both groups had no significant difference regarding age, gender, BMI, and the indication for THA. We compared the wear rate of polyethylene in both groups using PolyWare 7 software and assessed the 5-year THA survival rate.

RESULTS: In both groups, there was no significant difference in linear and volumetric wear, as measured using PolyWare 7 software. Linear wear rate was 0.0365 ± 0.0187 mm/yr in the 1 st generation HXLPE and 0.0351 ± 0.0171 mm/yr in the 2nd generation VEPE groups. Volumetric wear rate was 20.848 ± 11.319 mm3/yr in the 1 st generation HXLPE and 18.679 ± 7.933 mm3/yr in the 2nd generation VEPE groups. The overall 5-year survival rate post-surgery was 98.7%; no significant difference in the survival rates between the 1 st and 2nd generation groups (98.8 and 98.6% for the 1 st and 2nd generation groups).

DISCUSSION AND CONCLUSION: In young patients, there was no significant difference in the wear rates between the 1 st generation HXLPE and 2nd generation VEPE when using ceramic-polyethylene bearing surfaces. Based on the analysis of complications, survival rates, and functional scores post-surgery, the results of THA using ceramic-any HXLPE articulation were satisfactory in patients aged <30 years.