Comparative Safety Analysis of Thin Polyethylene Liners with Large Femoral Heads in Total Hip Arthroplasty Based on Polyethylene Types

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INTRODUCTION: The use of a large femoral head in total hip arthroplasty (THA) to stabilize and reduce the incidence of dislocation is on the increase, but concerns arise when combining them with small acetabular components due to potential mechanical failures in thin polyethylene (PE) liners.

METHODS: A single-institution, retrospective cohort study was conducted on 116 patients with minimum 2-year follow-up who received 36-mm femoral heads and acetabular components ≤ 52 mm, using either remelted highly cross-linked polyethylene (remelted HXLPE) or vitamin E-infused HXLPE (VEPE). Patients were followed up at 6 weeks, 3 months, 6 months, and 12 months postoperatively, and annually thereafter. We obtained radiographs and evaluated mHHS scores at each visit. Standard radiographs, including anteroposterior radiographs and cross-table lateral images of the hip, were used for radiographic evaluation. We compared the images obtained immediately postoperatively with those taken at the last follow-up to assess osteolysis and implant loosening.

RESULTS:

Osteolysis and implant loosening were not observed in either group. Although a fracture of the PE liner was observed in each group (1.7%), the clinical outcomes were excellent, as the mean modified Harris Hip Score (mHHS) at the last follow-up was 93.5. Moreover, the mean linear wear rates measured by digital imaging software in both groups were low, with 0.035 mm/y in remelted HXLPE and 0.030 mm/y in VEPE.

DISCUSSION AND CONCLUSION: In conclusion, The use of a large femoral head on a thin PE liner can be a viable treatment option in patients who need to prioritize stability; however, careful attention should be paid to mechanical fractures of the PE liner.