Fourth vs. third generation ceramic-on-ceramic primary total hip arthroplasty has reduced complications

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INTRODUCTION:
Total hip arthroplasty (THA) with ceramic-on-ceramic (CoC) bearings is not a popular option despite the low wear properties. The risk of ceramic breakage with third generation alumina ceramics and the difficulty of removing ceramic liner (facilitating any cup revision) have historically been the reasons to favor alternative bearing surfaces. This study aims to assess safety and outcome (revision and PROs) of CoC THA and compare outcomes between third- and fourth generation CoC bearings.
METHODS:
This was a retrospective, regional, cohort study from a regional arthroplasty registry. A total of 4680 primary THAs with CoC bearings were included over a period of 20 years. Institutional data and registry data were merged to validate data quality. Outcomes of interest included revision indications/ rates and patient reported outcomes. Endpoints were death and revision for any cause. Analysis of variance was assessed to determine differences between groups.
RESULTS:
Mean age and BMI were 66(±12) years-old and 27(± 5) kg/m² respectively. Mean follow-up was 8(±6) years. Ten- and 15-year survival rates were 94% and 92%. The most common indications for revision were peri-prosthetic fracture (1.4%), component loosening (1.1%) and infection (1%). Bearing fracture was seen in 10 cases (0.2%) and only in 3rd generation Ceramics. WOMAC improved from 51 to 12 ($p<0.001$). Revision rate for third generation (7.4% (97/1220) was greater than fourth generation 4.3 % (182/4229) ceramics ($p<0.001$). No differences in WOMAC were seen between 3rd and 4th generation CoC ($p=0.7$).
DISCUSSION AND CONCLUSION:
The evolution of ceramics has further increased safety and efficacy of CoC bearings as no bearing fractures were seen with fourth generation mixed dispersion ceramics. Survival and outcome were of high standards. This large in vivo study compliments in-vitro reports, which further supports the use of 4th generation CoC bearings in all forms of hip arthroplasty, including resurfacings.