Increased Revision Risk with Rotating Platform Bearings in Total Knee Arthroplasty: An Analysis of the American Joint Replacement Registry

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INTRODUCTION:
Rotating platform (RP) bearings in total knee arthroplasty (TKA) have the potential to reduce polyethylene wear due to improved implant conformity and improve patellar tracking due to axial freedom of the polyethylene bearing. However, concerns for an increased risk of revision have been described due to the increased polyethylene wear from a second articulating surface, associated tibial component design, added complexity with balance, and risk of polyethylene bearing dislocation. We aim to utilize the American Joint Replacement Registry (AJRR) to examine the risk of revision with use of RP compared to fixed bearing (FB) designs in primary TKA.
METHODS:
An analysis of primary TKA cases in patients over the age of 65 years was performed with AJRR data linked to Centers for Medicare and Medicaid Services data from 2012-2019. Patient demographics and cause for revision were recorded. Analysis compared RP to FB designs using Cox proportional regression modeling for all-cause revision and revision for infection, adjusting for gender, age, and the competing risk of mortality. Event-free survival curves evaluated time to all-cause revision and revision for infection.
RESULTS:
We identified 485,024 TKAs, with 452,199 (93.2%) FB and 32,825 (6.8%) RP bearings. Compared to FB, the RP TKAs were at an increased risk for all-cause revision: HR 1.36 ([95% CI 1.24, 1.49], p<0.0001). There was no difference in revision for infection: HR 1.06 ([95% CI 0.90, 1.25], p=0.516). Event-free survival curves demonstrated an increased risk for all-cause revision for RP bearings across all timepoints, with a greater magnitude of risk as time elapsed out to 8 years.
DISCUSSION AND CONCLUSION:
Similar to other national registry investigations, RP TKA designs in this study demonstrated increased risk for all-cause revision compared to FB TKA designs. Given no difference in the risk of revision for infection, additional investigation is needed to determine if the increased failure rates could be related to unaccounted for patient selection factors, surgical technique, bearing issues, or implant related issues such as tibial baseplate fixation.