Aseptic Femoral Stem Revisions in Primary Total Hip Arthroplasty: An Analysis of 19,804 Cases

Tobenna Nwankwo, Nicholas Olson, Christopher M Jaicks, Jacqueline R Ray, Robert A Sershon

INTRODUCTION:

Femoral stem design in total hip arthroplasty (THA) has evolved substantially, yet comparative data on long-term aseptic survivorship remain limited. This study evaluates the aseptic revision risk of 15 commonly used femoral stems over a 35-year period at a high-volume institution.

METHODS:

A retrospective review of 19,804 primary THAs performed from January 1990 through April 2025 by nine high-volume surgeons was conducted. Only stem designs used for ≥ 50 THAs were included. Hazard ratios (HRs) from a multivariable Cox proportional hazards regression were used to assess the risk of aseptic femoral stem revision for any reason, accounting for patient gender, age at surgery, body mass index, surgical approach, preoperative diagnosis (osteoarthritis vs. other), surgeon, surgical approach, use of navigation, femoral head size, and stem design.

RESULTS:

A total of 99 aseptic stem revisions were identified (0.5%), with survivorship at up to 20 years exceeding 97.5% for all stem designs. Revision etiologies included stem loosening (42), femoral fracture (40), component failure (13), and other causes (4). Over time, the predominant failure modes transitioned from early stem loosening (1990s-early 2010s) to femoral fractures (post-2010). Multivariable analysis revealed that the presence of a collar significantly reduced the risk of revision (HR = 0.1, P =0.002). Of 15 stem designs, only the cylindrical, extensively porous-coated Prodigy stem was independently associated with higher revision risk (HR = 9.6, P < 0.001).

DISCUSSION AND CONCLUSION:

This large-scale analysis confirms excellent long-term aseptic survivorship among contemporary and historical stem designs. Stem failure modes have shifted from predominantly aseptic loosening to periprosthetic fracture. Modern design features, such as a collar, may enhance survivorship.