

Cement Viscosity Impacts Risk of Mechanical Loosening After TKA: An Analysis of the American Joint Replacement Registry

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INTRODUCTION:

High-viscosity (HVC), medium-viscosity (MVC), and low-viscosity (LVC) cements are all used in total knee arthroplasty (TKA), with many surgeons selecting viscosity based on familiarity or perceived handling advantages. Despite concerns about early tibial debonding with HVC, no formulation has been shown to improve implant survivorship. This study examines the risk of revision based on cement viscosity in primary TKA.

METHODS:

All primary cemented TKAs reported to the American Joint Replacement Registry (AJRR) from January 2012 to December 2021 in patients ≥ 65 old with minimum 2-year follow-up were analyzed. Patients receiving hybrid, reverse hybrid, or cementless fixation, as well as those requiring stems or constrained components were excluded. TKAs were categorized as using HVC, MVC or LVC. Inverse probability weighted cause-specific Cox models were used to determine the risk of (1) all-cause revision, (2) revision for mechanical loosening, and (3) revision for infection, accounting for age, sex, BMI, operative time, implant constraint (minimally constrained vs posterior stabilized), Charlson Comorbidity Index (CCI), and the addition of antibiotics.

RESULTS:

A total of 472,922 TKAs were analyzed, including 195,234 (41.3%) with HVC, 56,221 (11.9%) with MVC, and 221,467 (46.8%) with LVC. HVC was associated with a significantly higher hazard of revision for mechanical loosening (HR 1.27, 95% CI 1.12–1.44; $p=0.0002$) and all-cause revision (HR 1.13, 95% CI 1.05–1.22; $p=0.0016$) compared to LVC. MVC also demonstrated a greater risk of mechanical loosening compared to LVC (HR 1.98, 95% CI 1.70–2.31; $p<0.0001$), although there was no difference in all-cause revision risk. No significant differences were observed among cement viscosities for revision due to infection.

DISCUSSION AND CONCLUSION:

In the AJRR, HVC and MVC in primary TKA were associated with significantly increased revision rates for mechanical loosening compared to LVC. Orthopedic surgeons should consider the use of LVC to improve implant survivorship when performing TKA.