Be Wary of Severe Tibial or Femoral Varus in Primary TKA: A Long-Term Analysis of Over 19,000 Cases

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INTRODUCTION: Alignment in total knee arthroplasty (TKA) is increasingly debated and its impact on long-term outcomes remains unclear. This study evaluated the impact of pre- and postoperative coronal and sagittal alignment, including changes between them, on implant survivorship and clinical outcomes in primary TKA.

METHODS:

We identified 19,379 primary TKAs at a single academic institution from 2000 to 2022. A deep learning model was trained to calculate coronal and sagittal alignment parameters including hip-knee axis (HKA), posterior tibial slope, posterior condylar offset, medial proximal tibial angle (MPTA), and lateral distal femoral angle (LDFA). Alignment congruence was evaluated and correlated with implant survivorship and Knee Society scores. Mean was age 68 years, 58% of patients were female and mean BMI was 33 kg/m^2. Mean follow-up was 8 years**.**

RESULTS:

Overall 15-year survivorship free of any aseptic revision was 95%. When analyzed by postoperative alignment, the 15-year survivorship exceeded 90% for TKAs in varus or neutral mechanlical alignment, however preoperative valgus knees that remained in valgus postoperatively had 84% survivorship. Femoral component varus with a LDFA>90° (HR 2; p=0.02) and tibial component varus with a MPTA<85° (HR 1.3; p<0.01) were associated with an increased risk of aseptic revision. Tibial component varus with a MPTA<85° was also associated with increased risk of revision for aseptic loosening (HR 1.9; p<0.01). Postoperative Knee Society Scores remained higher than preoperative scores at 2, 5, and 10 years (p<0.01)

DISCUSSION AND CONCLUSION: The 15-year survivorship of over 19,000 primary TKAs was excellent regardless of alignment strategy. However, severe varus positioning of both the femoral component (LDFA>90°) and tibial component (MPTA<85°) were associated with an increased risk of aseptic revision. Preoperative valgus knees left in valgus postoperatively were also at increased risk of revision. As alternative alignment strategies emerge, surgeons should consider boundaries in implant positioning to decrease revision risk.