Unintentional valgus malalignment in mechanically aligned total knee arthroplasty leads to higher prosthetic failure rates. A national registry survivorship analysis of coronal, sagittal and rotational alignment using computed tomography.

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INTRODUCTION:

Unlike coronal malalignment, little is known about whether sagittal and rotational malalignment increases failure rates in mechanically aligned (MA) total knee arthroplasty (TKA). This study assessed the relationship between unintentional malalignment in multiple planes and failure rates in MA TKA.

METHODS:

A national joint replacement registry analysis was undertaken on a consecutive series of 1,912 primary MA TKAs. Patients underwent post-operative computed tomographic analysis of hip-knee-ankle (HKA) angle, femoral coronal, sagittal and rotational angles, and tibial coronal and sagittal angles. The primary outcome was the difference in all-cause cumulative percentage revisions (CPR) between ± 3° inliers versus outliers. Secondary outcomes were differences in all-cause CPR between ± 2° inliers versus outliers, and type of revision when differences in all-cause CPR's were apparent.

RESULTS:

Mean follow-up was 8.3 years (SD 2.6) with maximum follow-up of 14.9 years. All-cause CPR for HKA inliers was 2.1% (95% CI = 1.5-2.9), varus outliers <-3° was 1.2% (95% CI = 0.3-4.8) and valgus outlier >3° was 5.9% (95% CI = 2.8-12). The adjusted hazards ratio of revision for >3° valgus outliers versus inliers was 2.92 (95% CI = 1.29-6.60; p = 0.010) with failures primarily due to loosening and instability. CPR for femoral coronal inliers was 2.8% (95% CI = 2.0-3.8), varus outliers <-3° was 0.0% (95% CI = 0.0-0.0) and valgus outlier >3° was 1.1% (95% CI = 0.2-7.5). CPR for tibial coronal valgus outliers was 8.1% (95% CI = 2.7-23.2), compared to varus outliers <-3° of 3.8% (95% CI = 0.6-24.3) and inliers of 2.5% (95% CI = 1.8-3.5). There were no differences in CPR for any other coronal, sagittal or rotational parameter comparing ± 3°, and ± 2° inliers to outliers.

DISCUSSION AND CONCLUSION:

Unintentional coronal, sagittal and rotational malalignment of implants in MA TKA did not increase prosthetic failure rates. The isolated finding of valgus outliers having increased failure rates should alert surgeons to excessive coronal valgus alignment. However, if individualised surgical plans require increased varus or alignment in sagittal or rotational planes beyond 3-degree boundaries, increased prosthetic failure rates are unlikely to eventuate.