Matching Coronal Plane Alignment of the Knee Phenotypes Does Not Improve Postoperative Patient-Reported Outcomes

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INTRODUCTION:

The Coronal Plane Alignment of the Knee (CPAK) classification system identifies several knee phenotypes through coronal plane measurements and provides guidelines for intraoperative soft tissue balancing. It has been hypothesized this system can be used for "personalization" of total knee arthroplasty (TKA), and ultimately reduce dissatisfaction rates after TKA. The impact of matching pre- and postoperative CPAK phenotypes on patient-reported outcomes (PROs) has yet to be evaluated. This study evaluated the effect of matching pre- and postoperative phenotypes on PROs.

METHODS:

This is a retrospective study of 244 patients who underwent traditional TKA from 2018-2021 at a tertiary academic institution. Pre- and postoperative CPAK phenotypes I-IX were determined by arithmetic mechanical hip-knee-angle and joint line obliquity measurements from bone length radiographs. Patients were stratified by pre- and postoperative matching of CPAK phenotype. Patient demographics, pre- and two-year postoperative PROs, and all-cause reoperations were compared between cohorts. Linear regression analyses evaluated the effect of matching CPAK phenotypes on postoperative PROs.

RESULTS:

Of the 244 patients, 43 (18%) had matched pre- and postoperative CPAK phenotypes. There was no difference in age, gender, ASA score, and BMI between cohorts. There was a significant difference in percentage of matched phenotypes ($p<0.01$), with the highest percentage of matching seen type IV knees (38%). There was no difference in incidence of all-cause reoperation ($p=0.09$), or change in two-year postoperative Physical Function (PF) ($p=0.87$), and Pain Interference (PI) ($p=0.45$) scores between cohorts. Linear regression analysis controlling for age, gender, BMI, and ASA score showed no association with matching CPAK phenotype and improved PF ($p=0.98$) or PI ($p=0.26$) scores.

DISCUSSION AND CONCLUSION:

Matching of CPAK phenotypes was uncommon in this cohort of traditional TKAs. Furthermore, patients with matched phenotypes showed no significant improvement in PROs at two-year follow up.