The Effect of Altering the Coronal Plane Alignment of the Knee (CPAK) on Total Knee Arthroplasty Outcomes

Nicholas Kolodychuk¹, Richard Alex Ruberto, Zachary Leblanc, Luisa Taverna, Winnie Xu, Roshan P Shah² ¹Columbia University, ²Columbia University Medical Center

INTRODUCTION:

The optimal targets for coronal plane alignment of total knee arthroplasty (TKA) remain controversial. Historically, mechanical alignment has been the gold standard, however, recently other alignment targets have gained popularity. The CPAK classification has been used to categorize alignment of knees in the coronal plane. The aim of this study was to examine changes in CPAK classification before and after TKA and compare patient reported outcomes based on change in CPAK classification. We hypothesized that changing CPAK classification would result in worse patient reported outcomes.

METHODS:

This is an IRB approved, retrospective study of 489 patients who underwent TKA at a single institution from 2018 to 2022. Radiographs were used to categorize patients based on the CPAK system pre- and post-operatively. Knee society knee function (KSKFS), Western Ontario and McMaster Universities Osteoarthritis Index score (WOMAC), and short form 12 (SF-12) were collected prior to surgery and one year after TKA. Outcomes were compared between patients with and without altered pre- to post-operative CPAK class. Statistical analysis was performed using t-test for continuous variables. Significance was set at p<0.05.

RESULTS:

Eighty-three (17.0%) patients remained in the same CPAK class pre- to post-operatively; 406 (83.0%) patients did not. Both groups demonstrated improvement in KSKFS, WOMAC, and SF-12 scores post-operatively. Mean improvement in KSKFS (29.20 vs 23.28, p=0.04), WOMAC pain (9.33 vs 7.23, p<0.001), WOMAC stiffness (2.87 vs 2.17, p<0.001), WOMAC function (31.38 vs 21.35, p<0.001), and total WOMAC (43.88 vs 30.28, p<0.001) was greater for patients with unchanged CPAK class compared to changed CPAK class. SF-12 physical scores improved by 10.66 in the CPAK same group compared to 6.25 in the CPAK changed group (p<0.001).

DISCUSSION AND CONCLUSION:

Maintaining preoperative coronal plane alignment of the knee as defined by the CPAK classification when performing TKA is associated with greater improvement in patient reported outcomes.