Comparative Analysis of Coronal Plane Alignment Kinematics of the Knee Before and After Image-Free Total Knee Arthroplasty

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INTRODUCTION: The coronal plane alignment of the knee (CPAK) classification system can help guide implant placement in total knee arthroplasty (TKA). Utilization of image-free navigation systems has allowed for improved accuracy and precision in achieving desired joint line obliquity (JLO) and phenotype preservation. The clinical implications of these measures have not been fully investigated using non-disease specific patient-reported outcome measures (PROMs).

METHODS:

A total of 123 TKA were retrospectively reviewed. TKA was performed using an image-free system; pre, intra and postoperative coronal plane alignment measures were recorded. Each patient was classified into one of nine CPAK phenotypes. Patient reported outcome measures, including physical function (PFS), depression, and pain interference scores were recorded. PROMs were compared between patient with preserved and non-preserved CPAK and JLO.

RESULTS: Of the 123 patients studied, the most common preoperative CPAK phenotype was I, 74 patients (60%), followed by type III (30 patients, 24%). The most common postoperative phenotype was type II (55 patients, 45%). Nineteen patients (15%) had a preserved CPAK phenotype pre-to postoperatively, 68% of these patients had an implant with asymmetric joint line. A total of 70 patients (57%) had preserved JLO, 58(83%) of these patients had an implant with an asymmetric joint line. Of the 53 patients without preserved JLO, 44 (83%) had an implant with a symmetric joint line. There were no significant differences in PROMIS PFS, pain interference, or depression scores regardless of CPAK or JLO preservation.

DISCUSSION AND CONCLUSION: Using an image free navigation system for TKA, there was no significant difference in preservation of JLO or CPAK classification based on implant type. Utilization of generic PROMs instruments may not have the sensitivity to detect disease specific outcomes related to JLO and CPAK preservation. Importantly, there were no significant differences in PROMIS scores among patients with and without preserved JLO.

