Impact of Alignment Strategy on Forgotten Joint Score Outcomes Following Total Knee Arthroplasty: Tibia First vs. Femur First

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Abstract

Introduction: Up to 15% of patients who receive Total Knee Arthroplasty (TKA) are dissatisfied with their TKA. Multiple outcome measurement systems have been developed to identify factors that can improve post-operative outcomes. One of the most common is the Forgotten Joint Score, which is based on a patient's ability to forget the joint while performing daily activities. As efforts have been made to improve a patient's FJS, techniques have evolved with the purpose of improving patient satisfaction by restoring a patient's natural alignment. The most effective way to do that remains a debate. The purpose of this study was to examine the outcomes (as measured by the FJS) of two alignment techniques, kinematic versus inverse kinematic.

Methods: This is a retrospective review of 312 patients (146 Tibia first versus 166 Femur first patients) who underwent a primary TKA and had at least 1 year post-operative follow-up. The tibia group underwent an inverse-kinematic approach (tibia first) while the femur first group underwent a kinematic approach (femur first). The tibia first group had 67/146 (45.9%) males and 79/146 (54.1%) females with an average age of 67.4 ± 9.7 and a BMI of 32.1 ± 5.5. The femur first group had 81/166 (48.8%) males and 85/166 (51.2%) females with an average age of 66.6 ± 8.4 and an average BMI of 31.7 ± 4.9.

Results: There was a significant difference in the 1-year postoperative FJS score between the tibia and femur first groups (60.0 ± 30.4 vs 66.6 ± 27.4, p=0.04) with the femur first group score statistically significantly higher than the tibia first group (60.0 ± 30.4 vs 66.6 ± 27.4, p=0.04). Both groups saw an increase in their 1-year post-operative FJS scores (47.5 ± 31 vs 48.9 ± 28.9, p=0.68) for the tibia first and femur first groups, respectively. Regression analysis showed that the femur first technique was statistically significant in predicting a higher postoperative FJS score (p=0.04). The femur first group scored statistically significantly higher in Q1: *In bed at night*, Q4: *Taking a bath or shower*, Q5: *Traveling in a car*, and Q10: *Doing housework or gardening.*

Discussion: Improved durability of TKA implants has allowed surgeons to develop techniques to better align with the patient's native alignment more closely. The femur-first method attempts to restore the native joint line based on the distal femur, which in this study resulted in higher postoperative FJS scores. Additionally, the femur first cohort had statistically significant differences in 4 of the 12 FJS questions. More studies are needed to determine if the femur-first method of functional alignment is superior to the tibia-first method.

Significance/Clinical Relevance: Achieving a “forgotten joint” is a challenging endeavor with multiple confounding factors contributing to its outcome. Technical methods that improve alignment may contribute to enhancing a patient's FJS score and achieving the “forgotten joint”.

Table 1: Preoperative and Postoperative Forgotten Joint Scores With Sub-item Analysis: Tibia First versus Femur First

	Tibia First n=146		Femur First n=166		
Metric	Mean	Standard Deviation	Mean	Standard Deviation	p
FJS Preop	12.43	11.87	17.69	18.34	0.00
FJS Post-Op	60.00	30.46	66.65	27.43	0.04
FJS Delta	47.57	31.02	48.96	28.96	0.68
Q1: In bed at night?	2.5	1.4	2.1	1.3	
Q2: When you are sitting on a chair for 1 Hr	2.3	1.4	2.2	1.3	0.03
Q3: When you are walking for 15 min.?	2.4	1.4	2.1	1.3	0.85
Q4: When you are taking a bath/shower?	2.0	1.2	1.7	1.1	0.09
Q5: When you are traveling in a car?	2.5	1.4	2.1	1.2	0.01
Q6: When you are climbing stairs?	2.9	1.5	2.6	1.4	0.01
Q7: When walking on uneven ground?	2.8	1.5	2.6	1.3	0.11
Q8: When you are standing up from a low-sitting position?	2.9	1.5	2.6	1.3	0.17
Q9: When you are standing for long periods of time?	2.6	1.4	2.5	1.3	0.17
Q10: When you are doing housework or gardening?	2.8	1.4	2.4	1.3	0.67
Q11: When you are taking a walk or hiking?	2.6	1.4	2.4	1.3	0.04
Q12: When you are doing your favorite sport?	2.9	1.4	2.7	1.4	0.15