



## Differential Effect of Total Knee Arthroplasty on Valgus and Varus Knee Biomechanics During Gait

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**Introduction:** Total knee arthroplasty (TKA) improves function in knee osteoarthritis (OA). Its relationship with gait abduction or adduction moment has yet to be fully described. Pre and postoperative knee biomechanics were compared in TKA patients.

**Methods:** Gait analysis was performed on 27 knees prior to, at 6 months, and at 1 year after TKA. Reflective markers on lower extremity collected motion data at 60 Hz using six infrared cameras. Ground reaction forces were recorded at 960 Hz with a force plate. Stance phase was divided into braking and propulsive phases. Frontal plane knee angles and moments were calculated for each trial. Repeated-measures ANOVA was used to compare these results.

**Results:** In varus knees, static knee alignment was corrected from 2.2° varus to 3.3° valgus ( $p=0.001$ ). In the braking phase, knee adduction impulse decreased from 0.145 to 0.111 Nm/kg\*s at 6 months, but increased to 0.126 Nm/kg\*s ( $p>0.05$ ) at 1 year. The propulsive phase knee adduction impulse changed from 0.129 to 0.085 and persisted at one-year follow-up. Valgus knee static alignment decreased from 16.5° to 2.5° valgus ( $p<0.001$ ). Total frontal plane impulse changed significantly from 0.01 (abduction) to 0.10 Nm/kg\*s (adduction) at 6 months ( $P = 0.01$ ) and persisted at one-year follow-up.

**Conclusion:** Varus knee parameters measured improved at 6 months, but showed reversion back to preoperative levels at 1 year. This suggests that restoration of anatomic axial alignment and soft tissue balance do not change medial loading conditions following TKA. In valgus knees, significant change in impulse from abduction to adduction occurred, which also remained at 1-year follow-up. These findings suggest that restoration of anatomic axial alignment and soft tissue balancing changes the lateral loading conditions valgus knees undergoing TKA.