



No Improvement in Two-year Functional Outcomes Using Kinematic vs. Mechanical Alignment in TKA – A Randomized Controlled Clinical Trial

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Introduction: Mechanical Alignment (MA) in total knee arthroplasty (TKA) positions femoral and tibial components perpendicular to the mechanical axis. In contrast, Kinematic Alignment (KA) technique attempts to match implant position to the pre-arthritic anatomy of an individual patient. Recent studies suggest functional outcomes may be improved with KA, but prospective data is lacking. The aim of this study was to compare the two-year functional outcome between KA and MA in primary TKA.

Methods: One hundred patients undergoing primary TKA for osteoarthritis were randomized to either MA (n=50) or KA (n=50) groups. Full-length MRI scans assessed pre-op alignment in all patients. Computer Navigation was used in the MA group to ensure mechanical alignment accuracy. In the KA group, patient specific cutting-blocks were manufactured using individual pre-op MRI data. Alignment was assessed with post-operative CT scans in all patients. Functional outcome scores were assessed pre-operatively and at 6 weeks, 6 months, 1 and 2 years post-operatively.

Results: There was no difference in 2-year change scores (post-op minus pre-op score) in KA vs. MA patients for the Oxford Knee Score (21.9 vs 20.0, p=0.4), Western Ontario & McMaster Universities (WOMAC) score (17.8 vs 19.5, p=0.32), Forgotten Joint score (29.2 vs 26.7, p=0.8), EQ-5D (0.4 vs 0.3, p=0.4), and Knee Society Pain (51.9 vs 52.2, p=0.6) or Function scores (29.1 vs 24.0, p=0.3). Post-operative hip-knee-ankle axis was similar between groups (KA 0.4° vs MA 0.7° varus), but in KA femoral components were in more valgus (2.0° vs 0.6°, p=0.003) and tibial components in more varus (2.8° vs 0.7° p <0.001). Complication rates were similar between groups.

Conclusions: We found no difference in two-year functional outcome scores in TKAs implanted using the KA compared to the MA technique. Currently, it is unknown if the alterations in component alignment with KA will compromise long-term survivorship of TKA.