## No Difference in Aseptic Loosening Between Kinematic vs. Mechanically Aligned Cementless Total Knee Arthroplasty

Hillary Elizabeth Mulvey<sup>1</sup>, Alexander J. Volkmar<sup>1</sup>, Jacob Fox<sup>2</sup>, Jacob D Schultz, Logan Michael Locascio, Stephen Matthew Engstrom<sup>3</sup>, Gregory G Polkowski<sup>4</sup>, John R Martin

<sup>1</sup>Vanderbilt University Medical Center, <sup>2</sup>Vanderbilt University Orthopaedic Surgery, <sup>3</sup>Vanderbilt Univ-Vanderbilt Ortho Inst, <sup>4</sup>Vanderbilt Orthopaedics

## INTRODUCTION:

Kinematic alignment (KA) in total knee arthroplasty (TKA) is gaining interest, but previous studies on cemented TKA have raised concerns about fixation durability when neutral mechanical alignment (MA) is not achieved. The applicability of these concerns to cementless TKA is unknown. This study compares the outcomes of kinematically versus mechanically aligned cementless TKAs.

## METHODS:

Patients undergoing TKA with a contemporary cementless design at a single institution from 2018-2022 were identified. The study included 252 knees (177 MA, 75 KA) with at least 1-year clinical and radiographic follow-up, and 82 knees (55 MA, 27 KA) with a minimum of 2-year follow-up. All implants were the same cruciate-sacrificing congruent polyethylene design. A retrospective chart review and radiographic evaluation were conducted, and non-parametric testing compared radiographic and clinical outcomes between the MA and KA cohorts (Figure 1). The mean patient age was 58.4 years, mean BMI was 34.2 kg/m<sup>2</sup>, and 51% of the population was male (Table 1).

RESULTS:

KA and MA groups were similar in gender and BMI, though KA patients were older (60.2 vs 57.7 years, p=0.03). The postoperative proximal tibial angle differed significantly (MA:  $1.8^{\circ}$  [2° valgus – 6° varus] vs. KA:  $4.1^{\circ}$  [4° valgus – 9° varus], p<0.01). At one year, there were no significant differences in manipulation under anesthesia (MA:  $6.8^{\circ}$  vs. KA:  $9.3^{\circ}$ , p=0.60), all-cause reoperation rates ( $4.5^{\circ}$  vs.  $6.6^{\circ}$ , p=0.54), or revision rates ( $1.7^{\circ}$  vs.  $4.0^{\circ}$ , p=0.37) (Table 2). This remained consistent at two years (Table 3). Radiolucent lines were present in 48% of knees, with only two MA and no KA cases requiring revision for loosening.

## DISCUSSION AND CONCLUSION:

KA in cementless TKA had similar complication and reoperation rates compared to MA with a contemporary design from a single implant manufacturer. This study indicates KA can be safely used in cementless TKA designs.

Figure 1. Radiographic analysis of pre- and post-operative radiographs assessing fenseotihini		radiographic follow-up				Table 2. Clinical and radiographic findings at minimum 1-year follow-up				Table 3. Clinical and radiographic findings at minimum 2-year follow-up			
angle (FTA), distal femeral angle (DFA),	and proximal tibial angle (PTA)						MA (n=177)	KA (n=75)			MA (n=55)	KA (n=27)	
Konsek Algunos		Age (years; mean, SD) Sex (male; n, %) BMI (kg/m²; mean, SD)	All (n=252) 58.4 (6.3) 129 (51%) 34.2 (6.0)	MA (n=177) 57.7 (8.6) 85 (48%) 33.9 (6.2)	KA (n=75) 60.2 (7.3) p=0.03 44 (58.7%) p=0.13 344.8 (5.3) p=0.35	Radiographic Post-op faronothial angle (*; mean, SD) Post-op Posicial Billia denouil angle (*; mean, SD) Post-op Possiral Billia angle (*; mean, SD) Radiotacent lines of thio my component (n, %) Radiotacent lines of filmur (n, %) Radiotacent lines any component (n, %)	1.5°valgas (3.0) 3.3°valgas (2.3) 1.8° varus (1.6) 89 (50.2%) 54 (30.5%) 112 (63.2%) 12 (6.8%)	0.1°valgas (3.2) 5.6°valgas (2.6) 4.1° varus (2.3) 34 (45.3%) 22 (29.3%) 41 (54.7%) 2 (2.7%)	p=0.01 p=0.01 p=0.49 p=0.49 p=0.88 p=0.21 p=0.24	Radiographic Post-op ferrorotobial angle (*; mean, SD) Post-op diraid ferroral angle (*; mean, SD) Post-op Proximal tibial angle (*; mean, SD) Radiolocent lines of this (n, %) Radiolocent lines any component (n, %) Obiologistis are component (n, %)	1.6°valgas (3.0) 3.3°valgas (2.4) 2.0° varus (1.5) 21 (38.2%) 17 (30.9%) 31 (56.4%) 4 (7.3%)	1.5° valgus (3.4) 6.5° valgus (2.6) 3.5° varus (2.8) 16 (59%) 8 (29.6%) 17 (62.9%) 1 (3.7%)	p=0.61 p<0.01 p=0.01 p=0.10 p>0.99 p=0.64 p>0.99
Programmin Pro-Prime Pro-Prime Pro-Prime Pro-Prime Pro-Prime Pro-Prime	The sporting Projection Strength Streng					Clinical Any complication Maripulation under anesthesia (n, %) Any revision (n, %) Any revision (n, %) Revision for composent lossening (n, %)	25 (14.1%) 12 (6.8%) 8 (4.5%) 3 (1.7%) 2 (1.1%)	11 (14.1%) 7 (9.3%) 5 (6.6%) 3 (4%) 0 (0%)	p>0.99 p=0.60 p=0.54 p=0.37 p>0.99	Clinical Any complication Manipulation under anesthesia (n, %) Any reoperation (n, %) Any reoperation (n, %) Benvision for commonset loaseming (n, %)	12 (21.8%) 5 (9.0%) 8 (14.5%) 2 (3.6%) 1 (1.2%)	5 (18.5%) 2 (7.4%) 4 (14.8%) 2 (7.4%) 0 (0%)	p>0.99 p>0.99 p>0.99 p=0.6 r>0.99