

Abstract AAOS 2018

Feasibility of Correcting Mechanical Axis in Large Varus Deformities with Unicompartamental Knee Arthroplasty

Introduction: Due to disappointing historical outcomes of unicompartamental knee arthroplasty (UKA), Kozinn and Scott proposed strict selection criteria, including preoperative varus alignment of $\leq 15^\circ$, to improve the outcomes of UKA. The rationale is that it is less feasible to restore mechanical axis angle (MAA) to neutral or close to neutral in patients who not fulfill these criteria. A consequence of excessive residual varus alignment is increased compartment forces by overloading medially, which can ultimately lead to UKA failure from polyethylene wear or aseptic loosening. No studies to date, however, have assessed the feasibility of correcting large preoperative varus deformities with UKA surgery. Therefore, it would be important to develop radiographic predictors of deformity correction with UKA, especially since several studies showed better outcomes in patients with postoperative MAA $\leq 7^\circ$ of varus.^{4,10,11} The study goals were therefore to (1) assess to what extent patients with large varus deformities ($\geq 7^\circ$) could be corrected, and (2) determine radiographic parameters to predict adequate correction.

Methods: A total of 499 medial UKA patients were identified from a prospective surgical database between November 2008 and November 2013, of which 245 were excluded for preoperative MAA $< 7^\circ$, 44 for lack of preoperative and/or postoperative HKA radiographs, 9 for ipsilateral THA or TAA, and 1 for a history of lower extremity fractures. All patients underwent a robotic-assisted medial UKA, during which the medial collateral ligament was carefully preserved. Of all patients with a large preoperative varus deformity ($\geq 7^\circ$), the mechanical axis angle (MAA), mechanical-lateral-distal-femoral-angle (mLDFA), medial-proximal-tibial-angle (MPTA), and joint-line-convergence-angle (JLCA) were determined on hip-knee-ankle radiographs (Figure 1). It was assessed what number of patients were corrected to optimal ($\leq 4^\circ$) and acceptable (5° - 7°) alignment, and if the feasibility of this correction could be predicted using an estimated MAA (eMAA, preoperative MAA-JLCA) using regression analyses.

Results: A total of 200 consecutive medial UKA patients were included, with a mean age of 64.7 years (SD 10.1, range 43.3 - 86.6), mean BMI of 30.4 kg/m² (SD 5.9, range 18.6 - 52.9), and of which 124 patients (62%) were male. Mean preoperative MAA was 10° of varus (range 7°-18°), mean JLCA was 5° (1°-12°), mean postoperative MAA was 4° of varus (-3°- 8°), and mean correction was 6° (1°-14°). Postoperative optimal alignment was achieved in 62% and acceptable alignment in 36% of the patients; however, differences were noticed between alignment groups (Figure 2). The eMAA was a significant predictor for optimal postoperative alignment, when corrected for age and gender (p<0.001). The odds of achieving an optimal postoperative MAA, when the eMAA is ≤4°, was 3.62 higher in comparison to an eMAA >4° of varus (p<0.001) when correcting for age and gender. In patients with eMAA>4°, extra-articular tibial deformities were more frequent (70%) compared to patients with an eMAA≤4° (31%, p<0.001).

Conclusion: Patients with large preoperative varus deformities (≥7°) could be considered candidates for medial UKA, as 98% can be corrected to optimal or acceptable alignment. Furthermore, it was noted that the feasibility of achieving optimal alignment could be predicted using the eMAA, based on preoperative MAA and JLCA. When the eMAA exceed 4° of varus, extra-articular deformities could be assessed preoperatively.

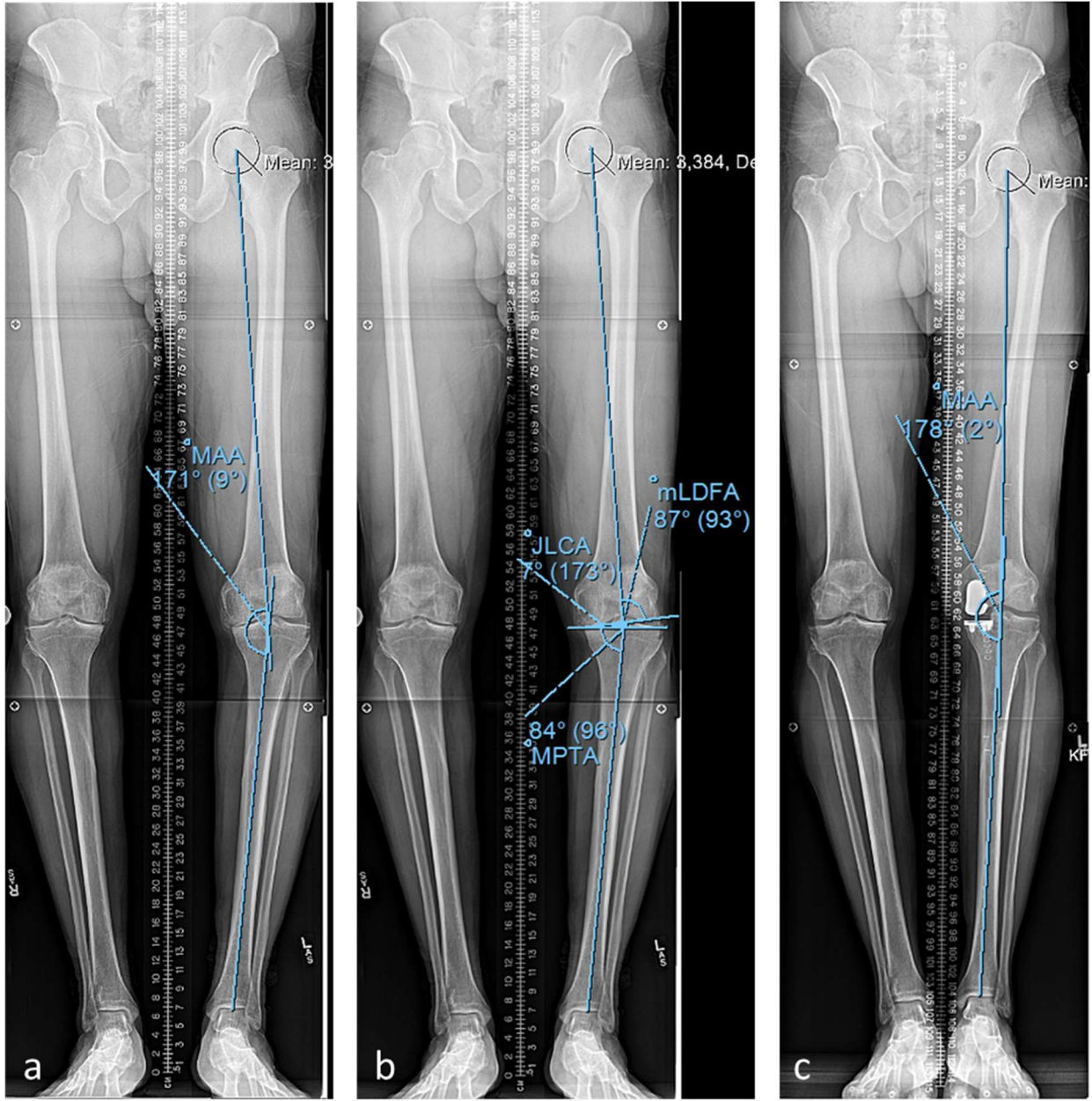


Figure 1

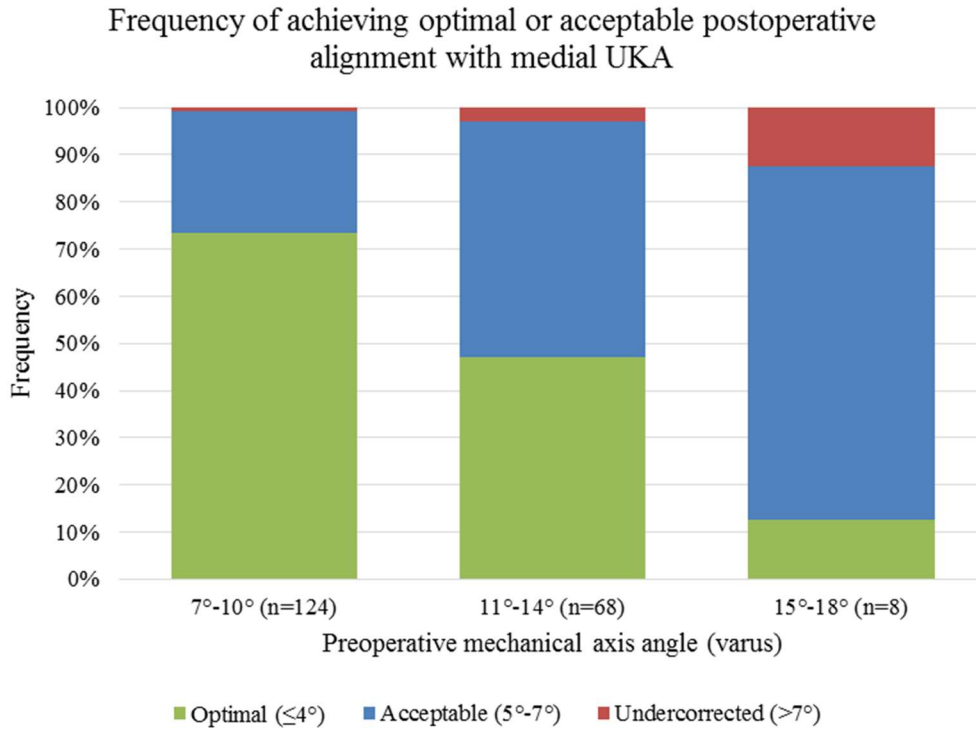


Figure 2

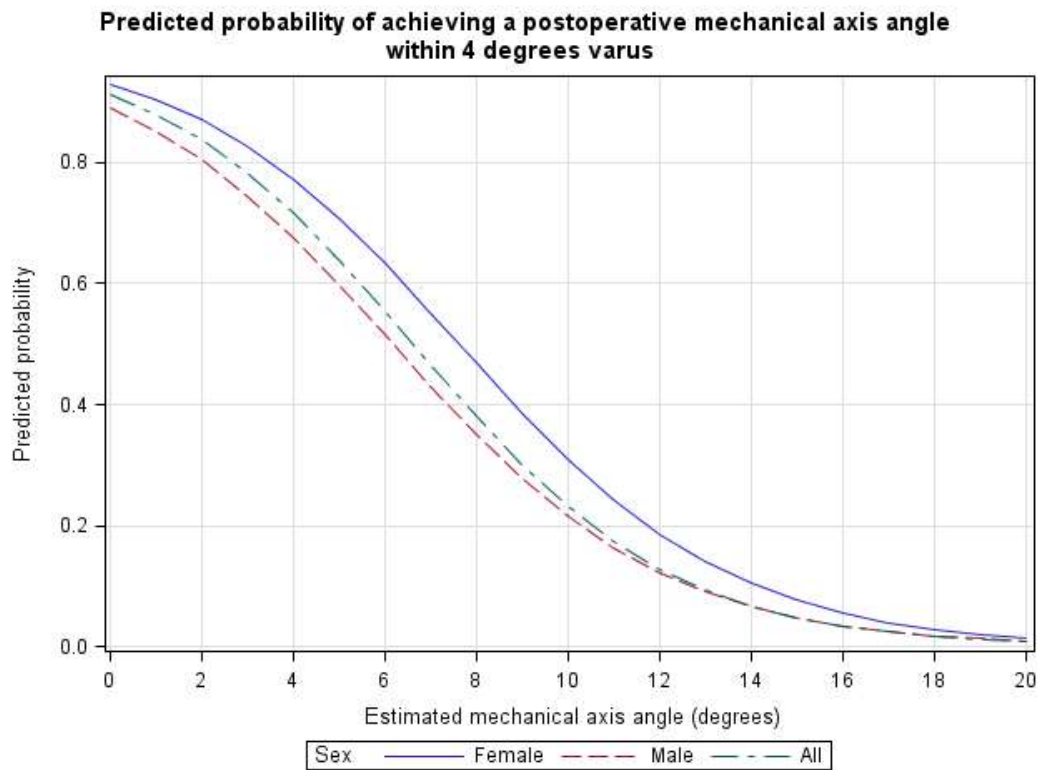


Figure 3