

Publication

Using the anatomical tibial axis for total knee arthroplasty alignment may lead to an internal rotation error

JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)**ID** 4406217**Author(s)** Forster-Horvath, Csaba; Kremo, Valerie; Muller-Gerbl, Magdalena; Nowakowski, Andrej Maria**Author(s) at UniBasel** [Müller-Gerbl, Magdalena](#) ;**Year** 2015**Title** Using the anatomical tibial axis for total knee arthroplasty alignment may lead to an internal rotation error**Journal** International Orthopaedics**Volume** 39**Number** 12**Pages / Article-Number** 2347-2353**Keywords** Arthroplasty, Replacement, Knee/*adverse effects/methods; Biomechanical Phenomena; Bone Malalignment/*diagnostic imaging/*etiology/physiopathology; Cadaver; Humans; Knee Joint/diagnostic imaging/physiopathology/surgery; Rotation; Tibia/*diagnostic imaging/physiopathology/*surgery; Tomography, X-Ray Computed; Anatomical tibial axis; Tibial component alignment; Tibial component malrotation; Total knee arthroplasty; Total knee replacement; Transverse tibial axis

INTRODUCTION: Despite intensive research, current total knee arthroplasty (TKA) designs do not always provide the correct kinematics for the native joint and thus further optimisation is necessary. Several studies support the importance of malrotation of the tibial components in the failure of TKA. We hypothesise that using the anatomical tibial axis (ATA) to align tibial component rotation on the resected tibial surface may lead to an internal rotation error due to relative anterior shift of the lateral articular surface centre compared to the medial one. The aim of this study was to compare the anatomical tibial axis of the physiological tibial joint surface to the resected one. **METHOD:** Twenty formalin-fixed cadaveric knees were obtained for study. After computed tomography scanning the data of each specimen were entered into a standardised coordinate system and virtual bone cuts were performed with 6, 8 and 10 mm resection depths. The positions of the articular surface centres were determined at each resection depth. **RESULTS:** The lateral articular surface centre had moved anteriorly after the resection by a mean 1.475 mm, while the medial one had not changed significantly. Resecting the tibia at a 6-mm cut and using the transverse tibial axis to align the prosthetic tibial plateau will result in a mean 4.0 degrees (95 % confidence interval, 2.5-5.5 degrees) of internal rotation compared to the uncut tibia. **DISCUSSION:** The ATA lies in 6 degrees of external rotation compared to the perpendicular to the posterior tibial condylar axis (PTCA). Graw et al. suggest aligning the tibial component in 10 degrees of external rotation to the latter. Thus, if we accept the above suggestion, the ATA is 4 degrees internally rotated compared to the same line on the resected proximal tibia. These prior studies appear to be in accordance with our findings. **CONCLUSIONS:** We conclude that using the ATA on the resected tibial surface may contribute to an internal rotation error.

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