HOW WELL DOES A NEW DEVELOPED PIVOT TKA RESTORE THE NATIVE KINEMATICS: A CADAVERIC STUDY

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Introduction

Ensuring a better outcome for the patients after total knee arthroplasty (TKA) is still a concern. With increasing number of procedures, further development is needed due to the dissatisfaction of 20% of patients after TKA [1, 2]. A cause for this dissatisfaction is seen in individual native kinematics, which is not supported with standard TKAs. One of the latest developments in TKA is the use of pivot implants, which are designed to support natural rotational and translational kinematics [1]. To date, its use as a cruciate retaining or cruciate sacrificing system is still subject of research and more companies want to include it in their product range [6]. The aim of this study was, therefore, to determine which newly developed TKA better restores the native translation and rotation.

Methods

Eight fresh frozen knee specimens (4 male, 4 female; Ø age: 80.1 ± 4 Years) were tested in a well-established, weight-bearing knee-rig (Fig.1) [3-5].

Figure 1: Knee rig with native knee and optical markers for kinematics tracking.

Femurotibial kinematics of the native knee was recorded with an optical tracing system (GOM, Braunschweig, Germany) while performing a squat of 30° - 130° of flexion (50N ground reaction force). Afterwards, a newly developed TKA (oneKNEE®-, Aesculap, Tuttlingen) was implanted. The oneKNEE® TKA allows a simple change of inlays into the different unconstrained systems: cruciate retaining/cruciate sacrificing (CR/CS) and medial stabilized (MS). These systems were analyzed with and without PCL against the native kinematics.

Results

The femoral rollback until 90° flexion with the CR/CS (with and without PCL) and MS designs was not significantly different from the native situation (Fig.2 a). After 90° of flexion, the different TKA designs showed significantly different kinematics compared to the native. No differences were seen with and without PCL. The tibia rotation of the MS system (with and without PCL) was not significantly different from native rotation in flexion over 90° (Fig.2 b). The CR/CS implant showed significantly different rotation over the whole flexion cycle with and without PCL

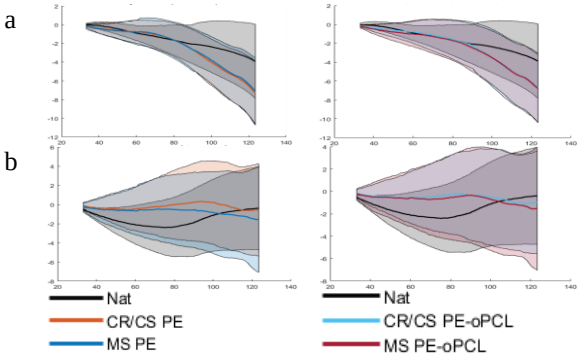

Figure 2: Mean values and 95 % confidence interval of a) femoral rollback, b) tibia rotation for native state, CR/CS and MS with (left) and without (right) PCL.

Discussion

This study shows that the new TKA system restores native translation and rotation. The MS design seems to benefit in high flexion as seen in the tibial rotation results. The cruciate retaining option shows no significant influence in the pivot systems.

References

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Acknowledgements

This study was supported by Aesculap AG.