The Effect of Different Alignment Philosophies on Femoral Rotation in Total Knee Arthroplasty; Results from a Randomised Controlled Trial

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Introduction

- Total knee arthroplasty (TKA) works well for most patients, however different philosophies exist regarding knee alignment goals and the literature is mixed regarding the strategy for optimising patient outcome.
- The aim of our study was to compare implant positioning outcomes of the Unity[®] (Corin, United Kingdom) TKA system for two philosophies for knee alignment; mechanical alignment using measured resection (MR) and personalised alignment using a ligament balancer (LB).

Materials and Methods

- We devised and registered a randomised controlled trial to compare mechanical alignment against individualised alignment in TKA.
- In our surgical protocol we used a measured resection (MR) technique for mechanical alignment and a ligament balancing (LB) technique, utilising an intra-operative ligament balancer to guide femoral cuts in flexion and extension, balanced from a tibial cut.
- We undertook preoperative computed tomography scans (CTS) to assess limb alignment and native knee geometry.
- Approximately 6 weeks after TKA surgery we repeated the CTS to assess the difference in alignment and knee geometry, comparing the MR and LB groups.
- Independent observers analysed both pre- and post-op imaging modalities.
- The primary outcome measure was the inter-observer reliability between the relationship of the Anatomical Trans Epicondylar Axis (ATEA) and the Posterior Condylar Axis (PCA) on both pre and post-operative computed tomography scans (CTS) between two blinded assessors.
- The second outcome measure was to compare the differences in external femoral rotation post-operatively between the two groups.



Results

- Pre- and post-operative CTS and LLR were analysed for 92 patients.
- Inter-observer Pearson Correlation Coefficient were high (all >0.97) for ATEA and PCA measurements.
- There was no significant difference between the ATEA and PCA pre-operatively between the MR and LB groups (5.770 Vs 5.520; p=0.492 respectively).
- Post-operatively the implant was more externally rotated with the MR technique (median 2.60 IQR 3.4, 2.1) in comparison to the LB technique (median 2.00 IQR 3.5, 0.9) although this was not statistically significant.

Conclusion

- ATEA appears to be a reliable landmark to measure femoral rotation on CT.
- The MR and LB alignment techniques produced similar femoral rotation in the axial plane postoperatively.

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