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Paper #33

Comparison of Patient-Specific Instrumentation (PSI) versus a Conventional Technique in Medial Opening-Wedge High Tibial Osteotomy (HTO)

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Summary:
Opening Wedge Hight Tibial Osteotomy performed with in-house manufactured patient specific instruments is safe, reliable and accurate compared to the conventional cable technique

Abstract:

Objectives

Although high tibial osteotomy (HTO) is a valid and frequently used procedure to correct the malalignment of the lower limb, it remains difficult to accurately achieve the preoperatively planned correction when using conventional techniques. The aim of this study is to evaluate the safety and reproducibility of a novel PSI technique. Furthermore, the accuracy in the coronal and sagittal plane of the novel technique is compared to the conventional cable method.

Methods

A retrospective analysis of two consecutive HTO cohorts was performed. From August 2016 to August 2017, patients underwent a medial opening-wedge HTO performed by a single experienced surgeon. After applying the in- and exclusion criteria, 21 patients (21 operations) could be enrolled in this study. Ten operations were performed using patient-specific instruments (PSI). Patients in the PSI cohort received Computed Tomography (CT) images of the hip, knee and ankle pre-and postoperatively to simulate the alignment in medical imaging software programmes. Once the operation was planned, a personalized wedge and cast was printed in biocompatible resin to achieve the desired correction intraoperatively. In the 11 conventional operations, a cable under fluoroscopy was used to obtain the planned correction. Surgical accuracy in each cohort was defined as the mean difference between the postoperative and planned weight-bearing line (WBL) in percentage of the tibial plateau. For statistical analysis, the Mann-Whitney U test and the Moses test of extreme reactions were performed comparing the PSI to the conventional cohort for surgical accuracy and tibial slope changes.

Results

The surgical accuracy was -5% (-13 to 5, SD 5) in the PSI cohort and -1% (-5 to 7, SD 4) in the conventional cohort. Statistical analysis showed no significant difference in distribution (p = 0.061) nor range (p = 0.392) between both cohorts. For the tibial slope, the mean difference in the PSI cohort was -1.3° (-3.5 to 0.3, SD 1.3) whereas in the conventional cohort, it was -0.4° (-3.7 to 3.2, SD 2.6). Statistical analysis showed no significant difference in distribution (p = 0.397) nor range (p = 0.405) between both cohorts. Four lateral hinge fractures and two delayed unions were identified in the postoperative phase, but were resolved spontaneously at one year radiological

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assessment.

Conclusion

We confirmed that this PSI technique is a valid and safe method in performing medial opening-wedge HTO. However, no statistical difference in accuracy could be observed between this novel PSI technique and the conventional cable method.