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Paper #34

Biplanar Ascending Opening-Wedge High Tibial Osteotomy Lateralizes Knee Extensor Mechanism Alignment and Decreases Patellar Height

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Summary:
MRI assessment of the patellofemoral joint shows a significant lateralization of the extensor mechanism and decrease of the patellar height after an ascending biplanar opening-wedge hight tibial osteotomy.

Abstract:

Background

The influence of ascending biplanar opening-wedge hight tibial osteotomy (OWHTO) on patellofemoral alignment is still uncertain. No previous study comprehensively evaluated the influence of an ascending biplanar OWHTO on the PF joint alignment using magnetic resonance imaging (MRI).

Purpose

The purpose of the study is to assess the impact of a biplanar ascending OWHTO on the alignment of the knee extensor mechanism and patellar height utilizing pre- and postoperative MRI.

Methods

Medical records of all patients submitted to ascending biplanar OWHTO between July 2008 and March 2017 were retrospectively assessed. Four parameters of the extensor mechanism - tibial tubercle-trochlea groove distance (TT-TG), tibial tubercle-posterior cruciate ligament distance (TT-PCL), patellofemoral axial engagement index (AEI), and lateral patellar tilt (LPT) – and four patellar height indices - Insall-Salvati index (ISI), modified Insall-Salvati index (MISI), Blackburne-Peel index (BPI), and Caton-Deschamps index (CDI) – were measured by two blinded independent observers on both pre- and postoperative MRIs. Interobserver reliability was assessed with the intraclass correlation coefficient (ICC). Paired T-test was performed to compare pre- and- the postoperative measurements. Bivariate regression analysis was used to investigate the association of the amount of HTO opening and the assessed PF joint parameters.

Results

A total of 26 patients that underwent ascending biplanar OWHTO were enrolled in this imaging analysis. Interobserver reliability for all measurements ranged between 73.3% and 89.3%. Postoperatively, TT-TG distance significantly increased by 2.06 mm ($p < 0.001$), and TT-PCL distance increased by 0.95 mm without reaching significance ($p = 0.063$). Patellar height significantly decreased when evaluated by the BPI ($p < 0.001$) and CD ($p =$

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0.001). The amoubetween nt of the osteotomy opening positively correlated with the postoperative MISI (p = 0.033), BPI (p = 0.023) and CDI (p = 0.013).

Conclusion

This is the first study that comprehensively shows the significant lateralization of the extensor mechanism after an ascending biplanar OWHTO utilizing MRI. This may be beneficial for patients with small cartilage defects on the medial patellar facet, but caution is advised in the indication of ascending biplanar OWHTO in patients with already increased preoperative TT-TG distance.