Achieving Sufficient Valgus Alignment is Essential to Ensure Low Residual Pain in Short to Mid-term Follow-up After High Tibial Osteotomy in K-L Grade IV Osteoarthritis Patients

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INTRODUCTION:
High tibial osteotomy (HTO) is a well-established surgical procedure to treat medial compartment osteoarthritis (OA) of the knee. However, the effectiveness of HTO in patients with advanced OA, specifically those with Kellgren-Lawrence (K-L) grade IV, remains debated. This study aims to evaluate the clinical outcomes of HTO in patients with advanced OA and to assess the impact of postoperative alignment on outcomes depending on the severity of OA.
METHODS:
Patients who underwent medial open-wedge HTO from 2010 to 2022 and were followed for a minimum of 2 years were retrospectively reviewed. They were divided into two groups according to preopreative K-L grades: non-K-L grade IV and K-L grade IV group. Patients with extreme undercorrection and overcorrection (weight-bearing line [WBL] ratio>75% or <50%) were excluded to accurately compare outcomes according to OA severity. Clinical outcomes were assessed using several patient-reported outcome measures (PROMs): pain visual analogue scale (VAS), Lysholm knee score, and Knee injury and Osteoarthritis Outcome score (KOOS). Comparative analysis of the outcomes was performed between the groups, and additional subgroup analyses were performed whethre outcomes differed based on postoperative WBL ratio within each group.
RESULTS:
A total of 313 patients were included in this study. Based on inclusion and exclusion criteria, 141 patients were selected and divided into two groups: non-K-L grade IV (110 patients) and K-L grade IV group (31 patients). The mean follow-up period was 37.5 months and did not differ between the groups. Baseline demographic characteristics were also not different between the groups. The K-L grade IV group had significantly larger medial femoral condyle cartilage defects and more severe preoperative varus (p<0.001; p=0.007). Both groups showed significant improvement in PROMs at the final follow-up (p<0.001), with no significant difference in PROMs or improvement between the groups. In the K-L grade IV groups, patients who achieved a postoperative WBL ratio ≥62.5% demonstrated better PROMs compared to those with a WBL ratio <62.5% (VAS, 17.1±19.1 vs. 33.9±18.3, p=0.032; KOOS ADL, 78.7±9.9 vs. 69.3±13.8, p=0.041). However, in the non-K-L grade IV group, PROMs did not differ based on the WBL ratio. Further ROC curve analysis revealed that a WBL ratio of 62.2% was the cut-off value to predict the achievement of low residual pain (VAS <18, median of K-L grade IV group) in K-L grade IV patients.
DISCUSSION AND CONCLUSION:
Comparable clinical outcomes can be obtained after HTO in patients with K-L grade IV OA, similar to those in patients with lower grade OA. However, achieving sufficient valgus alignment (WBL ratio>62.2%) is essential to ensure low residual pain in the short to mid-term follow-up.