

Does distal femoral deformity affect the postoperative femoral component rotation and femoral anteversion after total knee arthroplasty?

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Introduction: Proper femoral component rotation in total knee arthroplasty (TKA) is critical for clinical outcomes. In the presence of the distal femoral deformity, TKA is more difficult to perform because of altered anatomical axis and distorted landmarks. We asked whether TKA using navigation-assisted gap technique in patients with distal femoral deformity would change femoral component rotation and investigated the correlation between distal femoral deformity and femoral anteversion (FA). Our hypothesis was that postoperative femoral component rotation and femoral anteversion in patients with distal femoral deformity would be significantly different from those in patients without distal femoral deformity.

Materials & Methods: We retrospectively reviewed 75 patients who underwent TKA. Patients were divided into two groups according to the preoperative posterior condylar angle (PCA); group A without distal femoral deformity (PCA < 7°), group B with distal femoral deformity (PCA > 7°). We evaluated the different angles on the CT scan: (1) PCA, (2) angle between the line which is perpendicular to the Whiteside's line and PCL (WLP), and (3) FA. All procedures were performed using a navigation system.

Results: The range of motion and the Knee Society scores did not differ between the two groups at 12 months postoperatively (p=0.534, p=0.648). Referencing the TEA, the femoral components were implanted with an average external rotation of $0.21^\circ \pm 2.75^\circ$ (range, 4.06° internal rotation - 5.37° external rotation) in group A and internal rotation of $4.48^\circ \pm 2.51^\circ$ (range, 8.66° internal rotation - 1.24° external rotation) in group B. There was significant difference between the two groups in postoperative femoral component rotation (p=0.001). Only 80% of the femoral components (64 knees) were rotated <5° from the reference transepicondylar axis in both group A and B, with alignment errors ranging from 4.96° of internal rotation to 4.94° of external rotation. Referencing the line which is perpendicular to Whiteside's Line, the femoral components were implanted with an average internal rotation of $0.37^\circ \pm 0.17^\circ$ (range, 6.18° internal rotation - 7.47° external rotation) in group A and internal rotation of $3.92^\circ \pm 0.15^\circ$ (range, 8.34° internal rotation - 4.21° external rotation) in group B. This difference was significant (p = 0.012).

There was no difference between the two groups in FA preoperatively. However, postoperative femoral anteversions were significantly different between the two groups (p=0.041). The mean preoperative and postoperative FA were similar (p = 0.645) in group A (Table 2). In group B, the mean preoperative and postoperative FA were $13.63^\circ \pm 4.84^\circ$ (range, 9.84° retroversion- 29.08° anteversion) and $9.77^\circ \pm 6.11^\circ$ (range, 5.44° retroversion- 19.95° anteversion) and this was significantly different (p=0.035) (Fig. 4).

Conclusion: The presence of distal femoral deformity can result in excessive internal rotation of the femoral component. Also, there was a secondary decrease in femoral anteversion of the lower extremity in patients with distal femoral deformity. The femoral anteversion should be taken into consideration when the rotational alignment of the femoral component is decided because significant change of femoral anteversion can occur after TKA. Our study thus suggests that preoperative CT-based studies can be a reasonable option to decide femoral components rotation during TKA.