

Correlation Between Asymmetric Resection of Posterior Femoral Condyles and Femoral Component Rotation in Total Knee Arthroplasty; A Morphometric Study

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Objectives: Pertaining to peculiar designs of current knee prostheses, more bone is removed from posteromedial femoral condyle than posterolateral condyle to obtain desired femoral component rotation. The aim of our study was to evaluate whether there is a correlation between the asymmetry of the cuts and the femoral component rotation in total knee arthroplasty.

Methods: We built a model to simulate anterior chamfer cut (ACC) performed during total knee arthroplasty for measuring posterior condylar offset (PCO). Right knee axial MRI slices of a total 290 consecutive patients (142 male, 138 female, and mean age 31.39 ± 6.6) were examined. A parallel line to surgical transepiphyseal axis was drawn, and placed at the deepest part of trochlear groove. Posteromedial and posterolateral condylar offsets were measured by drawing perpendicular lines to ACC beginning from the intersection points of both anteromedial and anterolateral cortices to posterior joint line (PJL), respectively. Differences between posteromedial and posterolateral PCO were calculated, and femoral rotation angles (FRA) relative to PJL were measured.

Results: The mean surgical FRA was 4.76 ± 1.16 degrees and the mean PCO difference was 4.35 ± 1.04 mm for the whole group and there was no statistically significant difference between genders. There was a strong correlation between surgical FRA and PCO difference ($p < 0.0001$, $r = 0.803$). Linear regression analyses revealed that 0.8 mm of difference between the anteroposterior dimensions of medial and lateral PCO corresponds to 1 degree of surgical FRA ($p < 0.0001$, $R^2 = 0.645$).

Conclusion: Correlation between the asymmetry of posterior chamfer cuts and achieved femoral component rotation can verify the accuracy of desired rotation, intraoperatively. However, further clinical investigations should be planned to test the results of our morphometric study.

The Orthopaedic Journal of Sports Medicine, 2(11)(suppl 3)

DOI: 10.1177/2325967114S00140

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