



Does Use of a Variable Distal Femur Resection Angle Improve Radiographic Alignment in Total Knee Arthroplasty?

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Introduction: The distal femur resection in total knee arthroplasty (TKA) is commonly made using a fixed angle relative to an intramedullary (IM) rod. However, the angle between the femoral mechanical and anatomic axes is variable and up to 35% of femoral components fail to achieve a neutral alignment. This study's purpose was to assess if a variable distal femur resection angle technique improves femoral component alignment in TKA.

Methods: This was a review of primary TKAs performed by two surgeons. One surgeon used a fixed resection angle of 5° for varus and 3° for valgus knees ("fixed" cohort). The second used hip-knee-ankle (HKA) radiographs to measure the angle between the femoral anatomic axis and a line perpendicular to the femoral mechanical axis, which was used as the resection angle for each patient ("variable" cohort). Femoral component and HKA alignment were measured from standing HKA radiographs by two, independent, blinded observers. 290 patients were needed for power to detect a 15% difference in femoral component "outliers" (target of 0° + 2°; $p < 0.05$ = significant).

Results: 320 consecutive patients (160 variable, 160 fixed) were included with no differences in age, body mass index, or preoperative deformity ($p = 0.3$ to 0.8). A 5° resection angle was used in 46.3% of the variable and 80.0% of the fixed cohort patients. 80.2% of femoral components in the variable and 63.1% in the fixed cohort were within 0° + 2° ($p = 0.002$; 84.6% of variable and 56.3% of fixed for valgus knees, $p < 0.001$). The mean HKA alignment was improved in the variable cohort (-1.4° + 3.3° vs. -2.6° + 3.3°, $p = 0.001$), but the difference within 0° + 3° did not reach significance (73.8% variable vs. 62.5% fixed, $p = 0.09$).

Conclusion: Use of a variable distal femur resection angle improves femoral component alignment following TKA vs. a fixed angle technique. should guide patient expectations, critical evaluation of registry data, and evaluation of TKA outcomes.