Does Patient Specific Factors or Alignment Influence Total Knee Arthroplasty Clinical and Functional Outcomes?

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Objectives: Knee alignment following total knee arthroplasty (TKA) may be the most important factor determining the long-term survival of the prosthesis. Despite proper alignment of implants being strongly associated with greater stability and a lower rate of loosening, literature still finds conflicting results regarding the influence of TKA alignment in patients clinical scores. The present study sought to address what is the optimal postoperative TKA alignment.

Methods: We retrospectively selected 100 consecutive primary knee replacements performed for primary knee osteoarthritis. Pre-operative full length weight bearing x-rays were used to evaluate native knee anatomic alignment, as well as proximal tibial and distal femoral coronal alignment. Pos-operative full length weight bearing x-rays were also used to evaluate TKA alignment, tibial and femoral components coronal alignment, tibial position, tibial slope and femoral flexion angle. Extension anteroposterior (AP) and profile at 30º of flexion x-rays were used. Functional assessment was conducted including the VAS, the Oxford Knee and the Kujala scores, as well as range of motion (ROM).

Results: Regarding ROM, only 8 patients didn't presented full range of motion. Regarding the native knee, the average anatomical angle was 174 ± 4º. The average femoral distal coronal angle was 88±4º and the average tibial proximal coronal angle was 89±6º. The average post-operative angles were: 175±3º for the TKA tibia-femoral coronal angle, 88±6º for the coronal femoral angle and 89±3º for the coronal tibial angle. Regarding tibial tray position, when referring to the medial cortex of the proximal tibia, our sample had a tray in average 1±1mm more lateral than the medial cortex, with the worst positioned tibial components being 3,2mm medial or lateral to the medial cortex. When considering the proximal tibia lateral cortex, our patients had in average a tibial tray 1±2mm more medial than the lateral cortex, with the worst positioned tibial components being 4,2mm medial or 2,2mm lateral to the lateral cortex. Regarding the TKA sagittal alignment, the average TKA tibial slope was of 3±4º, and the average femoral flexion angle was 10±3º. Gender, IMC or age didn't seem to influence TKA clinical results, either regarding pain (VAS) or function (Kujala or Osxford Scores).

Comparing patients with post-operative alignment within of 5º of the native knee anatomical alignment, with patients with greater differences, no significant differences were obtained regarding pain or function.

Also comparing patients with post-operative coronal femoral or tibial angle within 85-95º, with patients with greater differences, no significant differences were reached regarding clinical outcomes. Besides that, tibial tray coronal position also didn't seem to influence patient results.

In regard to sagittal alignment, neither the femoral flexion angle or the tibial slope showed correlation to post-operative outcomes. Regarding TKA size, the tibial tray or polytene size didn't seem to influence clinical outcomes, however the femoral component size showed correlation with the functional scores, with smaller femoral sizes associated with greater Oxford scores (p=0,0029).
**Conclusion:** Most patients of our sample seem to have well aligned TKA, with an difference of only 1° between the native knee anatomic angle and the TKA alignment. Regarding tibial tray position, most surgeons opted for a tibial tray smaller than the tibial plateau, however these differences were of 1 millimeter medially and laterally, which probably is not clinically significant. The tibial slope is also within the desired values of 0-7°. We verified that most errors in tibial tray regard positioning it more medially than laterally, however we can assume that the tibial tray is, in most patients, correctly sized and positioned. Regarding femoral sagittal alignment, our sample showed a greater femoral flexion than previously described, however the clinical relevance of this measurement is sill controversial. Despite some papers describing an association between greater femoral flexion angle and patellofemoral instability, in our sample this angle didn't seem to influence the Kujala score. No differences in pain or functional results were obtain in regard to TKA alignment, however this can be explained by the fact that most patients presented well aligned TKAs.

The Orthopaedic Journal of Sports Medicine, 9(6)(suppl 2)
DOI: 10.1177/2325967121S00186
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