the size of coronal or sagittal plane deformity correction. Conclusion Patient outcomes 2 years after TKA correlated with trochlea recreation. The effect of medializing the trochlea groove and increasing the height of the lateral trochlea apex by more than 5mm from the native bone was associated with significantly poorer outcomes. These findings have implications for implant design and alignment philosophy.

Category: Knee - Arthroplasty

Differences In Functional, Radiological and Gait Outcomes Using Kinematic Versus Mechanical Alignment in TKA: A Randomized Controlled Trial

Abstract ID# 23187
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Summary:
Improved functional and gait parameters in kinematic alignment when compared to mechanical alignment in bilateral total knee arthroplasty

Data:
BACKGROUND: Neutral mechanical alignment (MA) has been traditionally used in total knee arthroplasty (TKA) to aim at position femoral and tibial components perpendicular to the mechanical axis of the limb. However, many authors have researched the wide individual and racial variation in anatomy of arthritic knees. It is a subject of debate that if mechanical alignment is used in all knees, it may require extensive soft tissue balancing which in turn may lead to higher rates of dissatisfaction and suboptimal functional outcomes. In contrast to MA-TKA, Kinematic Alignment (KA) aims to match the net operational implant position to the highly variable pre-arthritis anatomy of the individual patient in accordance with the three kinematic axes of the knee. Quality research and comparative data between the two techniques are lacking, especially in Indian population. QUESTIONS/PURPOSE: The purpose of this randomized controlled trial is to determine and compare the functional and radiological outcomes, joint awareness and complications in TKA with Mechanical alignment (MA) and Kinematic alignment (KA). METHODS: We performed a prospective randomized controlled trial in 27 patients(54 knees). All recruited patients meeting the inclusion criteria underwent Bilateral simultaneous total knee replacement by highly experienced senior arthroplasty surgeons. One knee was randomized to Kinematic Alignment group and the second knee in the same patient simultaneously underwent Mechanically Aligned TKA to overcome bias associated with patient related factors. Pre operative, Intraoperative and post operative data was recorded meticulously. Primary outcome was assessed by the Forgotten Joint Score (FJS) with a minimum of 6 month follow up. Secondary Outcomes were assessed using intra operative parameters, limb preference, Knee Society Score, and radiographic parameters in long leg x - ray films. RESULTS: Clinical, Radiological and Gait Parameters were compared in the RCT. The mean Forgotten Joint score (FJS) at 6 month follow-up was 70.9 for the KA group and 66.88 for the MA group (p<0.04). A significantly more number of patients preferred the KA knee as compared to the the MA knee on the preference questionnaire for better appearance and ease of rehabilitation. KA technique resulted in significant net varus of the proximal tibia (MPTA 86.4 SD=–2) and valgus of the distal femur (LDFA= 87.2 SD=–2.2).The KSS scores and Overall Limb alignment (femoral-tibial alignment ) showed no significant difference. Intra-operative parameters such as surgical time and blood loss showed similar outcomes. The KA technique resulted in a fewer number of soft tissue releases required for balancing, and the total bone resected in the KA group was lesser than the MA group. Gait Parameters showed significantly less Knee Adduction moment in the KA group as compared to the MA group. CONCLUSION: We found that KA and MA techniques achieved similar and comparable functional and radiological outcomes, with more people preferring the KA technique at early follow up. Kinematic alignment was not associated with increased complication rate or catastrophic failure at early (at 6 months) follow up. This RCT suggests that KA is an acceptable and alternative alignment to MA, Since KA inserts the tibial component in varus, aseptic loosening might be a potential long term concern. Multi-centre trials with a larger cohort and a longer follow-up should be done to rule out long term survivorship concerns.

Category: Knee - Arthroplasty

Deviation From Native Knee Anatomy After Total Knee Arthroplasty Depends on the Technique Of Coronal Alignment Used. Simulation by a Navigation System

Abstract ID# 21329
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Summary:
The different alignment techniques induce significant changes in the pre-arthrosis anatomy of the TKA patient.

Data:
Introduction: The implantation of a TKA can significantly alter the native anatomy of the operated patient. To date, there are several philosophies regarding the anatomical goals of TKA implantation in the coronal plane. The classic goal of systematically restoring a neutral mechanical axis of the lower limb is currently being challenged by proponents of kinematic alignment, which is believed to individually restore the native alignment of the surgical patient; The aim of the present study was to analyze the modification of the native coronal alignment of a population of TKA patients according to different alignment goals. Methods Five hundred and twenty TKAs were analyzed. The following angles were measured using an image-free navigation system prior to prosthetic implantation: medial femorotibial mechanical angle without constraint and with maximum angular constraint to reduce deformity, medial distal femoral mechanical angle, medial proximal tibial mechanical angle. The native angles were derived from the osteoarthritic knee angles using a validated correction technique. Femoral and tibial angular data before TKA were pooled for the same patient and transformed into categorical data according to the frontal alignment phenotype. Data after TKA implantation were calculated by simulating five different coronal alignment techniques: mechanical alignment, restricted mechanical alignment, anatomical alignment, kinematic alignment and restricted kinematic alignment. Femoral and tibial angular data after TKA were pooled for the same patient and transformed into categorical data according to the frontal alignment phenotype as before. The overall phenotype, combining both femoral and tibial phenotypes, as well as the femoral and tibial phenotypes individually were compared before and after TKA. The primary endpoint was the binary endpoint of whether or not TKA restored the natural global phenotype. Secondary endpoints were the binary criterion of whether or not the natural femoral phenotype and the natural tibial phenotype were restored by TKA. Results: The global phenotype was restored significantly differently by the five alignment techniques (figure 1.), and there was a significant difference between each of the pairs of techniques, except for the pair mechanical alignment - restricted mechanical alignment. The femoral (figure 2.) and tibial (figure 3.) phenotypes were restored significantly differently by the five alignment techniques, and there was a significant difference between each pair of techniques for both phenotypes. Conclusion: Apart from the kinematic alignment technique, the different alignment techniques induce significant changes in the pre-arthrosis anatomy of the TKA patient. The surgeon must be aware of these modifications. The clinical relevance of this alteration remains to be defined.

Category: Knee - Arthroplasty

Alignment Philosophy Influences Trochlea Recreation In Total Knee Arthroplasty: A Comparative Study Using Image Based Robotic Technology

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Summary:
Choice of alignment philosophy in TKA lead to significant differences in trochlea groove recreation using a standard femoral component. The findings of this study may explain why patellofemoral aetiology is the most common cause for revision of kinematically aligned total knee arthroplasty.