directed toward restoring natural knee kinematics, thereby improving the gait parameters and targeting better patient-reported outcomes. However, it has also been considered that correcting the full varus by kinematic alignment may lead to more stress on the medial tibial insert in severe varus-aligned knees, increasing the chances of early failure. The restricted kinematic alignment (rKA) technique is thus a midway between true kinematic and conventional mechanical alignment. Restoring some amount of varus alignment by the rKA technique will allow the patient a native feel of the joint without the expense of excess stress on the implants and thus may improve the overall outcomes after knee arthroplasty. This study aims primarily to compare patient-reported outcome measures (PROMs) for conventionally Mechanically Aligned (MA-TKA) with restricted Kinematically Aligned (rKA-TKA). Methodology: A prospective double-blinded split body, non-inferiority trial was conducted following CONSORT protocol among 38 patients (76 knees) undergoing simultaneous bilateral TKA. Each blinded patient had one knee operated by crKA-TKA and the contralateral knee by MA-TKA. The trial was registered in the clinical trial registry of India. The institutional ethics board approved the study, and all patients consented to participate before enrolling. Group 1 had 38 knees operated by crKA-TKA, and Group 2 had 38 knees operated by rKA-TKA. A blinded observer collected all patient-reported outcome measures. We used MediCAD Hectec GmbH (Germany) software for pre-operative planning for all our patients before randomisation. A single orthopaedic trainee resident doctor performed all pre-operative planning on the software, with each knee being planned for both MA and rKA protocols. Tibial cuts and femoral alignments were planned using this software so that coronal angular alignment can be achieved post-operatively. The randomisation plan and the allotment sequence were concealed from the operating surgeon until the procedure started. We established that the method of callipered technique in TKA using a routine digital templating software and standard instruments is an alternative low cost method of achieving rKA in an era of sophisticated technologies like computer aided navigation systems or robotics with accuracy.

Category: Knee - Arthroplasty

Robotic-Assisted TKA Allows for Accurate Prediction of Balance Prior to Bony Resection

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Summary:
Pre-resection balancing with robotic arm assisted technology is an accurate and reproducible technique, with balance achieved prior to bony cuts being maintained at the completion of the procedure despite the posterior osteophytes remaining in situ at the time of initial balancing.

Data:
Introduction: Total knee arthroplasty (TKA) traditionally relied on the surgeon’s judgement to determine soft tissue balance. Recent papers have shown inaccuracies in these subjective techniques when compared to objective measures of soft tissue tension using technology. Robotic-assisted TKA (RATKA) allows for prediction of soft tissue balance prior to bony resection in addition to the ability to accurately execute a surgical plan. This study aims to determine the accuracy this pre-resection balancing technique. Methods: A consecutive prospective cohort of 2028 TKAs utilising Triathlon Knee system with the Mako robotic-assistance (Stryker, Kalamazoo, MI) was assessed. Following removal of medial and lateral osteophytes and optimisation of component position, virtual gap measurements were recorded at 10° and 90° of flexion. Soft tissue releases were performed if imbalance of greater than 2mm observed. Balance was assessed post implantation. The final values were then compared to the pre-resection values to determine the accuracy of this pre-resection balancing technique. Results: Of the 2028 TKAs performed 50.1% were female, with a mean age of 67 and BMI of 31. In terms of alignment philosophy 83.1% utilised functional alignment (FA), and 16.9% adjusted mechanical alignment(aMA). The pre-resection technique achieved virtual balance in extension within 1mm by alteration of virtual component position in 83% of cases (86% of FA and 69% of aMA) and 95% had < 2mm difference in extension balance. 99% of TKAs had final extension balance within 2mm. Of those that were able to be virtually balanced within 1mm, 98% of TKAs maintained balance within 1mm at the completion of the procedure without soft tissue release. Being unable to virtually balance a TKA prior to bone resection resulted in a significantly greater requirement for soft tissue release (p<0.001). The absolute values of the final gaps achieved were a mean of 1.3mm greater than virtual gaps predicted for both medial and lateral gaps in both flexion and extension. There were no clinically significant differences in ability to maintain pre-resection balance post execution based on alignment philosophy with FA having a mean absolute difference in extension balance of 0.3mm and MA resulting in 0.5mm. Discussion: Pre-resection balancing with robotic arm assisted technology is an accurate and reproducible technique in this patient cohort. Balance achieved prior to bony cuts is maintained at the completion of the procedure despite the posterior osteophytes remaining in situ at the time of initial balancing. Both aMA and FA-TKAs can be accurately performed by this technique.

Category: Knee - Arthroplasty

Smartphone-Based Step-Count Measures Correlate with KOOS-12 Function and UCLA Activity Proms During Early TKA Recovery

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Summary:
High step count led to improved PROMs scores compared to low step-count across all time points.

Data:
Introduction: Passive smartphone-based apps are becoming more common for measuring patient progress after total knee arthroplasty (TKA). Optimum activity levels during early TKA recovery haven’t been well documented. Correlations between step-count and patient-reported outcome measures (PROMs) during early recovery were explored. This study also investigated how demographics impact step-count during early post-operative recovery. Methods: Smartphone capture step-count data from 456 TKA patients was retrospectively reviewed. Mean age was 68±8 years. 61% were female. Mean BMI was 31.6±kg/m2. Mean daily step count was calculated over three time-windows: 60 days prior to surgery (preop), 5-6 weeks postop (6wk), and 11-12 weeks postop (12wk). Linear correlations between step-count and KOOS12-function and UCLA activity scores were performed. Patients were separated into three step-count levels: low (<1000steps/day), medium (1500–4000steps/day), and high (>4000steps/day). Age >65years, BMI >30kg/m2, and sex were used for demographic comparisons. Student’s t-tests determined significant differences in mean step-counts between demographic groups, and in mean PROMs between step-count groups. Results: UCLA correlated with step-count at all time-windows (p<0.001). KOOS12-Function correlated with step-count at 6wk and 12wk (p<0.05). High step-count individuals had improved PROMs scores compared to low step-count individuals preoperatively (UCLA: delta = 1 [p<0.001]), at 6wk (UCLA: delta = 0.8 [p<0.01], KOOS12-Function: delta = 6 [p<0.05]), and at 12wk (UCLA: delta = 0.8 [p<0.01], KOOS12-Function: delta = 6.5 [p<0.05]). Younger patients had greater step-count preoperatively (3.6±2.8k vs. 2.6±2.4k, p<0.001), and at 12wk (3.8±2.6k vs. 2.7±2.3k, p<0.001). Males had greater step-count preoperatively (3.7±2.7k vs. 2.5±2.5k, p<0.001), at 6wk (3.5±2.6k vs. 2.1±2.3k, p<0.001), and at 12wk (3.7±2.1 vs. 2.7±2.6k, p<0.01). No differences in step-count were observed between low and high BMI patients preoperatively, at 6wk, or at 12wk.

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