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 align- ment. 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 by MA- TKA. The trial was registered in the clinical trial registry of India. The institu- tional 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 cMA-TKA. A blinded observer collected all patient-reported outcome measures. We used MedCAD Hectec GmbH (Germany) software for pre- operative planning for all our patients before randomisation. A single ortho- paedic trainee resident doctor performed all pre-operative planning on the software, with each knee being planned for both MA and rKA protocols. Tibial cut and the implant 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 morning of surgery. All patients received Attune Cemented PS implants (Depuy Synthes) without patellar resurfacing. PROMs for each patient were analysed according to either knee being in MA or rKA protocol. The minimum follow-up duration was six months post-surgery. Results: No statistically significant difference between PROMs like VAS score for knee pain (p = 0.609), ROM (p = 0.501), knee society score (p = 0.08), OHS (p = 0.645), WOMAC (p = 0.18), FJS-12 score (p = 0.66), and Satisfaction level Scale between the two knees (p = 0.194). Post-operatively UCLA activity score (p = 0.02) and Quality of life score like SF-36 (p = 0.014) showed statistically significant improvement from its pre-operative values. Conclusion: This present clinical trial highlights non- inferior patient reported outcomes of rKA-TKA when compared to standard conventional MA-TKA at a short-term follow-up of six months. The study further establishes 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

Abstract ID# 22518

All Authors:
Jonathan R Manara MBBS, FRCS (Tr & Orth) UNITED KINGDOM
Matthew Goomatallake MBBS, MTRAUMA AUSTRALIA
Dermot M Collopy FRACS AUSTRALIA
Gavin William Clark MBBS, FRACS AUSTRALIA

Summary:
Pre-resection balancing with robotic arm assisted technology is an accurate and reproducible technique, with balance achieved prior to bony cuts being main- tained 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 measure- ments 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 pro- spective 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 re- assessed post implantation. The final values were then compared to the pre- resection values to determine the accuracy of this pre-resection balancing tech- nique. 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 (MA). The pre- resection technique achieved virtual balance in extension within 1mm by alter- ation of virtual component position in 83% of cases (86% of FA and 69% of MA) 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 differ- ences 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 main- tained at the completion of the procedure despite the posterior osteophytes remaining in situ at the time of initial balancing. Both MA 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

Abstract ID# 22537

All Authors:
Corey E. Ponder MD UNITED STATES
John M. Rege MD UNITED STATES
Eric M. Slotkin DO
Paranjee Gill MD UNITED STATES
Simon Coffey MBBS, FRACS(Orth) AUSTRALIA
Stephen McMahon FRACS AUSTRALIA
Edgar A Wakelin PhD UNITED STATES
Christopher Plaskos PhD UNITED STATES
Alexander Orsi PhD UNITED STATES
Jeffrey Michael Lawrence MD UNITED STATES

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 ± 8years. 61% were female. Mean BMI was 31.6 ± kg/m2. Mean daily step count was calculated over three time-windows: 60 days prior to sur- gery (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 (<1500steps/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 < 0.01). 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.
Conclusion: High step count led to improved PROMs scores compared to low step-count across all time points. Early post-operative step-count was significantly impacted by age and sex. Generic recovery profiles may not be appropriate across a diverse population.

Category: Knee - Arthroplasty

Arthroscopic Procedures in the Year Preceding Total Knee Arthroplasty: Incidence, Costs and Outcomes

Abstract ID# 22557
All Authors:
Eric L. Smith MD UNITED STATES
Darren Z Nin PhD UNITED STATES
Ya-Wen Chen MD, MPH UNITED STATES
Ruija Niu MPH UNITED STATES
Carl T. Talmo MD UNITED STATES
Brian L. Hollenbeck MD UNITED STATES
David C. Chang PhD, MPH, MBA UNITED STATES
David A Mattingly MD UNITED STATES

Summary:
5.2% of patients underwent knee arthroscopy in the year prior to TKA despite literature support and clinical recommendations against its use.

Data:
Introduction: The cost-effectiveness of arthroscopic knee procedures has been found to be similar to several nonoperative treatments for knee osteoarthritis. However, the utilization rate of arthroscopic knee procedures preceding total knee arthroplasty (TKA) remains high, and may result in poor postoperative outcomes when performed in the year prior to TKA. The purpose of this study is to describe the prevalence and costs of knee arthroscopic procedures performed in the one-year period prior to a primary TKA procedure, and the impact of arthroscopic procedures on TKA outcomes. Methods: An observational cohort study was conducted using the IBM Watson Health MarketScan databases from January 1, 2017, to December 31, 2019. Knee arthroscopic procedures performed in the one-year period before a primary TKA were identified. The primary outcomes of interest were cost of these procedures, and the risk of 90-day postoperative complications. Results: 2,904 patients, representing 5.2% of the analyzed cohort underwent arthroscopic procedures in the year prior to TKA. The most common procedure and diagnosis were meniscectomy and meniscal tear respectively, with procedures performed an average of 7.2 ± 3.0 months before TKA. Average per patient costs were $9716 ± 5500 in the highest payment quartile, versus $1789 ± 636 in the lowest payment quartile. No differences were found in the risk of 90-day postoperative infection between patients with and without a history of knee arthroscopic procedures. Conclusion: 5.2% of patients underwent knee arthroscopy in the year prior to TKA despite literature support and clinical recommendations against its use. While no association was seen with PJI risk, the costs associated with these procedures are high and may increase the overall cost of management of knee osteoarthritis.

Category: Knee - Arthroplasty

Comparison of Patient Reported Outcome Measures Between Bicruciate-Stabilized and Posterior-Stabilized Total Knee Arthroplasty in the Same Patients: A Randomized Controlled Trial

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All Authors:
Sung cheg Yu Yang MD KOREA, REPUBLIC OF
Min-Soo Kim MD, PhD KOREA, REPUBLIC OF
Dongho Kwak MD KOREA, REPUBLIC OF
Hyujlin Jang MD KOREA, REPUBLIC OF
Ryu Kyoungh Cho MD KOREA, REPUBLIC OF
Yong In MD, PhD KOREA, REPUBLIC OF

Summary:
A prospective, randomized controlled trial revealed that there was no significant differences in radiological outcomes and PROMs including preference and WOMAC scores between groups with UC and PS inserts at 1 year postoperatively. Data:
Introduction: The purpose of this study was to compare not only the radiological results, but also postoperative patient-reported outcomes measures (PROMs) of Bicruciate stabilized (BCS) and posterior stabilized (PS) total knee arthroplasty (TKA) in the same patients. Methods: A prospective, randomized controlled trial was performed in 48 patients who received bilateral TKAs. One knee was randomly assigned to receive a BCS TKA, and the other knee was scheduled for a PS TKA from the same company knee system. The anteroposterior (AP) stability was evaluated using 20° flexion radiographs with anterior and 90° flexion radiographs with posterior drawer stress at 1 year postoperatively. Postoperative PROMs were compared using Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) score and preference of operation side. Forgotten joint score (FJS) was also evaluated in both group. Results: There was no significant difference with regard to the demographics and preoperative measures. No significant difference in static AP laxity was seen (8.2mm in the BCS group vs 8.7mm in the PS group, p > 0.05). There were no significant differences in the all WOMAC subscores between the two groups at preoperatively and 1 year postoperatively (all p > 0.05). There was no difference of preference (p > 0.05) and FJS (53.5 in the BCS group vs 50.4 in the PS group, p > 0.05) between BCS and PS group. Conclusion: Despite theoretical advantages of BCS prosthesis, there was no significant differences in radiological outcomes and PROMs including preference and WOMAC scores between groups with UC and PS inserts at 1 year postoperatively.

Category: Knee - Arthroplasty

Combining Load Sensors and a Robotic Arm to Balance TKA: Clinical Results at One Year