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Summary:
Continuous femoral nerve block after total knee arthroplasty was associated with reducing pain, but may increase the risk of inpatient falls. Since quadriceps muscle weakness due to nerve blocks also limited rehabilitation, a nerve block technique to preserve muscle strength should be considered to prevent inpatient falls.

Data:
Background: Postoperative anesthetic management in total knee arthroplasty (TKA) has been reported to be important not only in contributing to patient satisfaction and clinical outcomes, but also in reducing hospital stay and medical costs. The effectiveness of periarticular multimodal drug injection (PMDI) and femoral nerve block (FNB) in pain management after TKA has been reported. While continuous FNB can be expected to relieve pain, reduced quadriceps muscle strength due to FNB often limits a patient’s ability to participate in rehabilitation program. The purpose of this study was to investigate the effects of different anesthetic management methods on postoperative functional recovery and falls following TKA.

Methods: This retrospective cohort study included 186 patients with unilateral TKA (54 males, 132 females, age 75.1 years). Patients were divided into three groups depending on postoperative anesthetic management: PMDI alone (PMDI group; n=56, 13 males, 43 females, age 74.0 years), continuous FNB with PMDI (cFNB group; n=80, 28 males, 52 females, age 75.6 years), and single-shot FNB with PMDI (sFNB group; n=50, 13 males, 37 females, age 74.0 years). The following data were extracted: gender, age, body mass index, comorbidities, side of surgery, preoperative walking ability, dose of postoperative opioid, postoperative complications, postoperative delirium, postoperative Falls episode, numerical rating scale of pain (NRS) at 2, 6, 12, 24 hours, 1, 2, 7 days after surgery and discharge, days from surgery to initiate walking with a cane, length of hospital stay, and knee range of motion and walking ability at discharge. In order to compare variables among the three groups, Kruskal Wallis test and Chi-square test were used for statistical analysis.

Results: There were no significant differences in patient demographic data among the three groups. The mean postoperative NRS was not significantly different at each time point among the three groups, but there were significantly more patients in the cFNB group who showed NRS of 3 or less on the first postoperative day than PMDI and sFNB groups (p=0.04). There was no significant difference in postoperative opioid requirements among the three groups. Patients in the cFNB group were more likely to fall after surgery compared to patients in the PMDI and sFNB groups (cFNB; n=8 (10.0%), PMDI; n=1 (1.8%), sFNB; n=1 (2.0%), p=0.05). Also, patients in cFNB group demonstrated a significantly delayed initiation of walking with a cane compared with other groups (cFNB; 8.0 days, PMDI; 6.4 days, sFNB; 6.3 days, p=0.01). There were no significant differences in knee range of motion and walking ability at discharge, and length of hospital stay among the groups (p=0.93, 0.34 and 0.45, respectively). Conclusion: This study suggested that FNB after TKA was associated with reducing pain, but may increase the risk of falls as well as show delayed gait recovery due to quadriceps muscle weakness. Therefore, preservation of quadriceps muscle strength is a key for safe and quick functional recovery when using a nerve block for pain management after TKA. An appropriate nerve block technique to preserve muscle strength including adductor canal block should be considered to prevent inpatient falls.

Category: Knee - Arthroplasty

Summary:
Significant differences in joint balance were observed between CPAK groups; A component alignment target based solely on pre-operative boney anatomy may not be sufficient to balance the joint.

Data:
Introduction The Coronal Plane Alignment of the Knee (CPAK) is a recent method for classifying knees using the hip-knee-ankle angle and joint line obliquity to assist surgeons in selection of an optimal alignment philosophy in total knee arthroplasty (TKA). This classification method however is based on bone geometry and does not consider the soft tissue envelope. Intra-operative joint tensioning devices allow surgeons to characterize the joint balance before femoral resections, allowing the patient specific soft tissue envelope to be a factor in selecting final component placement. It is unclear however, how pre-operative joint balance is impacted by CPAK classification. Our objective was to characterize the joint imbalance and identify differences between CPAK categories.

Methods A retrospective review of TKA’s performed using the OMNIBotics platform and BalanceBot (Corin USA, MA) for measuring joint balance using a tibia first workflow were included. Lateral distal femoral angle (LDFA) and medial proximal tibial angle (MPTA) were defined by landmarking after exposure. Joint gaps were measured under a load of 70-90N after the tibial resection throughout flexion. Resection thicknesses were validated to recreate the pre-tibial resection joint balance. Balance was defined as the medial gap minus the lateral gap. Landmarks were corrected for cartilage and bone wear using a similar method to Jenny et al. [3] in which varus outliers were corrected for medial wear (2 mm medial femur and tibial) and valgus outliers for lateral wear (2 mm lateral femur and 3 mm lateral tibia). No posterior femoral wear was corrected. Knees were subdivided into 9 categories based on the arithmetic hip-knee-ankle angle (aHKA), MPTA/LDFA) and the joint line orientation angle (JLO) (MPTA+LDFA). aHKA thresholds were defined as >2° Varus, ±2° Neutral and >2° Valgus. JLO thresholds were defined as >3° with a medial distal slope termed ‘Distal Apex’, ±3° from Neutral and >3° lateral distal slope termed ‘Proximal Apex’. Differences in balance at 10°, 40° and 90° were determined using a one-way 2-tailed ANOVA test with a critical p-value of 0.05. Results 1124 knees satisfied inclusion criteria. The highest proportion of knees (43.0%) are CPAK I with a varus aHKA and Distal Apex JLO, 80.8% report a Distal Apex JLO and 49.2% report a varus aHKA. Greater medial gaps are observed in varus knees (I, IV, VII) compared to neutral (II, V, VIII) and valgus knees (III, VI, IX) (p<0.05 in all cases) as well as in the Distal Apex groups (I, II, III) compared to the Neutral groups (IV, V, VI) (p<0.05 in all cases). Reliable comparisons could not be made with the Proximal Apex groups due to low frequency (<1.5%). Conclusions Significant differences in joint balance were observed between CPAK groups. A component alignment target based solely on pre-operative boney anatomy may not be sufficient to balance the joint.

Data:
The tibial anteroposterior axis “original Akagi’s line” defined on CT was not replicated intraoperatively and the intraoperative poor detection of Akagi’s line could be the reason for the tibial component rotational error and worse post-operative clinical outcomes in total knee arthroplasty.
Background: Malrotation of the tibial component can cause revision, lead to altered joint kinematics, and likely produce clinical issues in total knee arthroplasty (TKA). Many surgeons decide on the tibial component’s rotational angle with reference to the tibial anatomical anteroposterior (AP) axis, and they have adopted Akagi’s line, which is originally defined on computed tomography (CT) as the line connecting the middle of the posterior cruciate ligament to the medial border of the patellar tendon attachment, as the most important tibial AP axis intraoperatively. However, some surgeons experienced intraoperative difficulty in detecting Akagi’s line. The accuracy of the intraoperative identification of Akagi’s line and the effect of accuracy on postoperative clinical outcomes are unknown. Therefore, we evaluated the intraoperative reproducibility of the tibial AP axis “Akagi’s line,” which is originally defined on CT, and the effect of the reproducibility on postoperative clinical outcomes. Methods: This prospective study included 171 knees of 160 patients who underwent TKA. We measured the difference between the intraoperative Akagi’s line and the original Akagi’s line defined on CT. The difference was measured by the tibial component rotation angle relative to the two kinds of Akagi’s line. In CT analyses, the original Akagi’s line was defined on preoperative CT and the tibial component rotation was measured on postoperative CT, which projected the preoperative Akagi’s line using a 3D software program. In intraoperative analyses, the intraoperative Akagi’s line was registered in the navigation system and the tibial component rotation was measured using the navigation system. The value and absolute value of the angular divergence of the intraoperative Akagi’s line relative to the original Akagi’s line were measured. Additionally, the effect of the angular difference on postoperative clinical outcomes (Knee Injury and Osteoarthritis Outcome Score: KOOS, 2011 New Knee Society Score: NKSS) was evaluated. Results: The absolute value of the angular difference of the intraoperative Akagi’s line to the original Akagi’s line was 5.5°. The range of the intraoperative Akagi’s line relative to the original Akagi’s line was internally rotated 22° to externally rotated 16°. Intraoperative Akagi’s line outliers (difference to original Akagi’s line >5° and >10°) occurred in 46% (78 knees) and 14% (24 knees). In the outlier analysis (>5°), the tibial component rotation angle was externally rotated 5.3° in the outlier group (>5°) and externally rotated 3.2° in the non-outlier group (<5°) and, there was a significant difference; however, there was no difference in the clinical outcomes between two groups. In the outlier analysis (>10°), the tibial component rotation angle was externally rotated 6.5° in the outlier group (>10°) and externally rotated 3.7° in the non-outlier group (<10°) and, there was significant difference. Additionally, the outlier group (>10°) showed lower pain scores in KOOS and lower symptom scores in NKSS. Conclusion: The original Akagi’s line defined on CT was not replicated intraoperatively. The intraoperative poor detection of Akagi’s line could be the reason for the tibial component rotational error and worse postoperative clinical outcomes.

Category: Knee - Arthroplasty

Patient Specific Balanced TKA: A Five Year Outcome, Patient Satisfaction and Survival Study

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Summary:
This study demonstrates excellent outcome scores, high patient satisfaction and a low failure rate with a patient specific navigated balanced TKA technique.

Data:
Aim: Recent studies have shown wide variation in the bony anatomy and soft tissue envelope of the knee and a neutral mechanical axis is not necessarily required for long term TKA survival. In response a patient specific navigated balanced TKA technique has been developed enabling bounded anatomical implant placement with small positional changes made to implant a TKA optimally within it's natural soft tissue envelope. The aim of this study is to report the five year patient outcome, satisfaction and survival of this technique.
Method: A single surgeon prospective study of 1180 consecutive Attune TKA’s was performed with Brainlab 3. Outcome scores: Oxford, WOMAC, KOOS, Forgotten Knee scores and patient satisfaction were collected at one, two and five years and an implant survival analysis was performed. The five year data is presented in this study Results: The mean Oxford score was 44.1. The mean Forgotten Knee score 73.1. The mean WOMAC score was 8.2. KOOS Joint Replacement score was 87.4. Patient satisfaction was 97.1% and 95.3% would have the operation again. The survival at six years was 99.1% Discussion: This study demonstrates excellent outcome scores, high patient satisfaction and a low failure rate with a patient specific navigated balanced TKA technique.

Category: Knee - Arthroplasty

Functionally Aligned Total Knee Arthroplasty Restores Native Medial Pivot More Frequently Than Mechanically Aligned Total Knee Arthroplasty – A Prospective Randomized Trial

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Summary:
Functionally aligned TKAs more reliably produced a medial pivot pattern than mechanically aligned TKAs, without medial implant constraint.

Data:
Introduction A medial pivot pattern has been found in native knees and is desirable in total knee arthroplasty (TKA). But whether it is achieved in TKA is debated and not well understood. Mechanical alignment (MA) and functional alignment (FA) are both recognised techniques for TKA. As a part of an ongoing prospective randomized trial, we assessed whether there was a difference between FA and MA primary cruciate retaining TKAs in producing a medial pivot pattern as measured by pressure sensors. Methods 60 patients (29 FA TKAs and 31 MA TKAs) were consented to participate in a prospective, randomized controlled trial. At the end of the procedure, MA and FA TKAs were determined to be balanced with equal medial and lateral gap measures as determined with robotic assistance. Then an intra-operative pressure sensor was used to collect (with surgeons blinded) medial and lateral pressures and contact points between the femoral component and the insert through the range of motion (determining medial pivot or lateral pivot patterns). Results Both alignment techniques achieved balanced TKAs, with no significant difference in balance measured by the sensors at 10° (p=0.475), 45° (p=0.466) or 90° (p=0.644) of flexion. Soft tissue releases were required more frequently to achieve balance in MA TKAs (36% MA vs 3% FA; p<0.01). FA TKAs produced a medial pivot pattern more consistently (76% FA vs 41% MA; p<0.01). Conclusion Intra-operative results from this trial suggest that different alignment philosophies may lead to different contact patterns and kinematics, despite being well-balanced. It is possible to recreate a medial pivot following TKA without medial implant constraint. Functionally aligned TKAs more reliably produced a medial pivot pattern than mechanically aligned TKAs.

Category: Knee - Arthroplasty


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Summary:
When comparing robotically assisted functionally aligned TKA with robotically assisted UKA, the UKA group had superior results in the first-year post-operative but there was no difference in outcomes between the two groups at 24 months.

Data:
Introduction Medial UKA and TKA are both effective treatments for osteoarthritis of the knee. Many studies have compared the outcomes of the two treatments but less so with the use of robotics or comparing UKA to individualised TKA alignment techniques. Functional alignment is a novel technique for performing a TKA and shares many principles with UKA. This study compares a case-matched series of robotic-assisted UKAs (RA-UKA) and robotic-assisted TKAs (RA-TKA) performed using functional alignment. Methods Patients within the Perth Hip and Knee Clinical Registry who underwent a RA-UKA were case-matched with...