Abstract ID# 22687
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Summary: The presence of a Varus thrust, which is a biomechanical marker characterized by a sudden lateral shift of the knee during walking, pre- and post-total knee arthroplasty, may influence clinical outcome measures after surgery.

Data: The Varus thrust, a biomechanical marker characterized by a sudden lateral shift of the knee during the loading phase of gait, has been largely studied in knee osteoarthritis patients. This dynamic marker is associated with faster disease onset and progression, poorer functional scores, and greater pain levels. While the varus thrust is of great interest in conservative management, little is known about its impact in total knee arthroplasty (TKA). Thus, the aim of this study was to assess if a varus thrust pre- and/or post-surgery influences clinical outcome measures post-TKA. Methods: This was a secondary data analysis from a TKA prospective study on nineteen patients (63.2% of women, mean age of 61 years). Varus thrust was objectively quantified during gait before and 1-year after surgery with a knee kinesiography exam (KneeKG® system, Emovi inc.). Knee Injury and Osteoarthritis Outcome Score (KOOS) was completed 1-year post-surgery. Scores on this questionnaire range from 0 (extreme symptoms) to 100 (no symptoms). T-tests for independent samples were performed between patients who present with a varus thrust post-surgery (i.e., > 2.5°) and those who did not, on all five KOOS subscales. Additionally, comparisons on the KOOS were performed between patients who corrected their varus thrust with the surgery (i.e., varus thrust pre-surgery > 2.5° and varus thrust post-surgery < 2.5°), and those who developed one after surgery (i.e., varus thrust pre- < 2.5° and varus thrust post- > 2.5°). Results: Five (26.3%) patients presented with a varus thrust post-TKA. They reported significantly (i.e., statistically and clinically) poorer KOOS scores on pain, function during daily living activities (ADL), sport-recreation, and quality of life (QOL) subscales compared to those who did not present a varus thrust post-TKA (respectively 53.0 vs 74.9, 59.0 vs 77.4, 16.0 vs 46.1, 37.6 vs 68.9; all p < 0.05). Four patients (21.1%) had their pre-surgery varus thrust corrected with TKA while four others developed a varus thrust after surgery. Patients with varus thrust correction showed significantly (i.e., statistically and clinically) better KOOS scores post-TKA in terms of pain (80.0 vs 50.3), ADL (81.3 vs 56.5), and QOL (65.6 vs 31.3) compared to patients who developed a varus thrust (all p < 0.05). Conclusions: The presence of a varus thrust post-TKA is characterized with poorer patient reported outcome measures. Furthermore, the evolution of this biomechanical marker with the surgery (i.e., correction or development) may influence pain, function, and quality of life one year after TKA. Results support the need to objectively assess the varus thrust pre-surgery and integrate this measure in surgical planning to achieve better clinical outcomes. Furthermore, assessing varus thrust post-TKA is clinically valuable since it can be corrected through rehabilitation programs including targeted conservative interventions.

Category: Knee - Arthroplasty

Robotic Handpiece-Assisted Total Knee Arthroplasty - Analysis of the Learning Curve for Operative Time and Alignment Accuracy

Abstract ID# 22689
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Summary: Imageless robotic handpiece-assisted total knee arthroplasty is associated with a learning curve for operative time that might be longer than reported in current literature and implementation of the intra-operative plan is accurate for implant placement and limb alignment except for the tibial component’s sagittal slope.

Data: The adoption of any new step in surgery is associated with a learning curve and potentially associated with extra complications. The aim of this study was to determine the learning curve necessary to minimize the time of surgery and to evaluate the accuracy of component and limb alignment after imageless, robotic handpiece-assisted TKA. Materials and methods: In a prospective case-control study, the first 100 consecutive robotic-assisted (RA) TKAs performed by a single surgeon were analysed and compared to 100 consecutive conventional TKAs operated in the same period. Operative times, implant and limb alignment (comparing intra-operative plan with post-operative alignment) and robot-related complications were evaluated. Cumulative summation (CUSUM) analyses were used to assess learning curves for operative time and implant alignment in RA TKA. Results: 4 RA TKA cases had to be completed with conventional instrumentation due to challenges faced in the RA system workflow, including registration errors. The learning curve for operative time when using the imageless robotic system for TKA was completed after 16 cases. Complete normalization of operative times, equaling conventional TKA time was not seen even after 100 cases. The learning curve did not influence the accuracy of component or limb alignment. The coronal HKA, LDF, MPTA and sagittal femoral component placement showed an average deviation of 0.90 (SD 2.1), 0.40 (SD 1.4), 0.60 (SD 1.1) and 0.50 (SD 2.7) from the intra-operative plan. The post-operative tibial component sagittal placement showed a significant deviation of 1.60 (SD 2.4) from the intra-operative plan. No minor or major robot-related complications were observed. Conclusion: Imageless robotic handpiece-assisted TKA is associated with a learning curve for operative time that might be longer than reported in current literature. Implementation of the intra-operative plan was accurate for implant placement and limb alignment except for the tibial component’s sagittal slope.

Category: Knee - Arthroplasty

Comparison of Early Postoperative Pain Between Same-Day Bilateral and Staggered Bilateral Total Knee Arthroplasties In Centrally Sensitized Patients

Abstract ID# 22925
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Summary: If medical comorbidity is not a matter, performing same-day bilateral TKA is more advantageous in postoperative pain control in CS patients.

Data: Introduction: The purpose of this study was to compare the early postoperative pain patterns in both knees after same-day and staggered bilateral total knee arthroplasty (TKA) in Central sensitization (CS) patients. Methods: Thirty-six patients in each group corresponding to CS were compared. For staggered bilateral TKA, only those with a one-week interval were included. CS was assessed using a Central Sensitization Inventory preoperatively. Postoperative pain was investigated 1st, 3rd, 7th, and 1st postoperative day using pain visual analogue scale (VAS) in resting, walking, night, and 24 hours average. The amounts of patient-controlled analgesia (PCA) were also investigated. The first and second knees in staggered bilateral TKA were compared with the knee on the first and second operating side in simultaneous bilateral TKA. Results: There was no significant difference in pain VAS between the first knee of staggered TKA and the knee of the same surgical site in same-day TKA (all p > 0.05). All pain VAS scores were higher in the second knee of the staggered TKA compared to the same side in same-day TKA (all p < 0.05). The amount of PCA usage was also significantly more in 2nd knee of staggered bilateral TKA patients even compared to patients with simultaneous TKA. (p < 0.05). Conclusion: When staggered bilateral TKA was performed in CS patients, early postoperative pain in the 2nd knee was more severe than the pain amount of the same side knee in same-day bilateral TKA. If medical comorbidity is not a matter, performing same-day bilateral TKA is more advantageous in postoperative pain control in CS patients.

Category: Knee - Arthroplasty

Can Varus-Valgus Constrained Implants Provide Sufficient Stability in the Presence of Complete Medial Collateral Ligament Insufficiency?

Abstract ID# 23081
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Varus-valgus constrained implants were able to satisfactorily address one third of the evaluated knees with complete MCL insufficiency, with all dislocations in the remaining two thirds presenting only under maximum valgus manual stress at 90° flexion, a scenario which is unlikely to happen during activities of daily living.

**OBJECTIVE**: The main purpose of the present study was to evaluate if a varus-valgus constrained TKA can provide sufficient stability in the presence of a complete MCL insufficiency. Secondly, we aimed to evaluate which are the main parameters related to stability in the setting of a varus-valgus constrained TKA performed at complete MCL insufficiency. MATERIALS AND METHODS: Forty-two experienced knee surgeons performed a TKA and subsequent revision TKA in 42 fresh frozen cadaver knees. After revision TKA, trials were assembled and introduced. The following data was collected: femoral size, tibial size, and polyethylene trial insert size. The polyethylene trial insert was then removed and gap measurements data were collected using two spreaders with femoral and tibial trials positioned. A complete transverse mid-substance MCL lesion was made and valgus stability under maximum manual stress at 30° and 90° degrees was applied to evaluate stabilization. Consecutively thicker constrained inserts were tested until valgus stability was obtained or the knee exhibited 15 degrees or more of flexion due to overstiffening of the extension gap by the insert. Student tests for quantitative variables and chi-square or Fisher tests for categorical variables were conducted. A power analysis was performed resulting in a minimum sample size of 26 specimens for a power of 80%, considering a fixed type I error at 5%. RESULTS: Upon maximum valgus manual stress testing of the MCL-deficient revision TKA knee, 31% of constructs (13 specimens) presented sufficient stability without unacceptable flexion contracture. All the dislocations with the thickest polyethylene insert without unacceptable flexion contracture happened at 90° degrees with concurrent extensor mechanism lateral displacement. The most notable finding was the absence of resulting stable constructs from specimens with a previously unbalanced flexion gap. When assessing for differences between stable and unstable final constructs, stable constructs displayed significantly (p = 0.015) smaller polyethylene insert size after MCL lesion. No statistically significant differences were found for femoral component size, tibial component size, femoral-tibial component size ratio or polyethylene insert size before MCL transection. CONCLUSION: Varus-valgus constrained implants were able to address one-third of the evaluated knees with complete MCL insufficiency, with all dislocations of the remaining two-thirds presenting only under maximum valgus manual stress at 90° flexion. These findings suggest that a varus-valgus constrained implant can be sufficient to address a complete MCL insufficiency in a considerable number of cases as it is unlikely the patients in the clinical settings will be submitted to similar stress at 90° as the maximum manual valgus test at daily living activities.

**Category**: Knee - Arthroplasty

**Out-Patient Total Knee Arthroplasty Exchange. A Feasibility Study**

**Abstract ID**: 23437

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**Summary**: TKA exchange is feasible as an out-patient procedure, by selected patients, even in cases of periprosthetic infection, without increasing the risk of complication.

**Data**: Introduction Out-patient total knee arthroplasty (TKA) is an effective and validated procedure, even if many surgeons are afraid of an increased complication rate or delayed treatment of complications. Out-patient TKA exchange may be more challenging than primary cases, and may lead to increase the complication rate. The goal of this study was to assess the feasibility of an out-patient TKA exchange procedure in an academic setting and to control that the complication rate is not dramatically increased in comparison to in-patient TKA exchange. Methods A prospective, observational study was conducted. 150 consecutive TKA exchanges were included. Out-patient procedure was selected if the patient was not living alone at home, had a maximal ASA score of 2, and have his consent to this procedure. In-patient procedure was applied for other patients. All cases were operated on by two senior surgeons experienced with primary and revision TKA. Surgical and anesthetic procedures were standardized. The postoperative pain treatment algorithm was identical for all patients. All patients followed a fast-track rehabilitation process with ambulation and full weight bearing on the day of surgery and use of crutches on request. All patients were discharged home with supervised physiotherapy. All patients were followed up to three months. Complications, rehospitalizations and reoperations were collected, and their rates were compared in the two groups by appropriate statistical tests. The severity of the complications was assessed according to the Clavien-Dindo classification and compared in the two groups by appropriate statistical test. Results 150 case were included. There were 84 women and 66 men with a mean age of 71.4 years. The reason for TKA exchange was infection in 86 cases, aseptic loosening in 44 cases, instability in 12 cases and patella maltracking in 8 cases. 32 cases were eligible to out-patient procedure (21%) and 128 cases were operated as in-patients. No patient refused this proposal. No failure of the outpatient procedure leading to unplanned patient stay was observed. No difference was observed in the two groups when analyzing complication rate, Clavien-Dindo score, rehospitalization rate and reoperation rate. No complication related to the out-patient antibiotic treatment was observed by septic cases, and all cases were infection free after three months. Conclusion TKA exchange is feasible as an outpatient procedure, by selected patients, even in cases of periprosthetic infection, without increasing the risk of complication.