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Detection of Tibiofemoral Malrotation Using Sensors to Define Implant Congruency During Total Knee Arthroplasty

Primary Author: Martin Roche

Institution: Holy Cross Hospital

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Optimized tibial tray rotation during Total Knee Arthroplasty (TKA) is critical for tibiofemoral congruency as it affects soft tissue tension, implant stability, and patellar tracking through full range of motion. Utilization of embedded sensors may enable the surgeon to more accurately assess and adjust tibiofemoral contact points during surgery to maximize implant congruency. In an IRB approved study, the malrotation error tibiofemoral congruency when utilizing the mid to medial 1/3 of the tibial tubercle for tibial rotation was evaluated in 100 posterior cruciate ligament-retaining TKAs performed by three experienced, high-volume surgeons. Sensors were embedded in the tibial trials; the rotation of the tibial tray was defined, and the femoral contact points in each compartment were captured. The surgical procedure was performed to size and then appropriately position the tibial tray to maximize tibial coverage. The anterior medial tray was pinned to control anterior-posterior and medio-lateral displacement, and allow internal/external rotation of the tray. With the capsule closed and patella reduced, the knee was reduced with trial implants. The femoral contact points and medial-lateral soft tissue tension were documented from full extension into deep flexion. Patellar tracking and changes in soft tissue tension were also documented. In 60% (n = 60/100) of cases, further external rotation (average 5 degrees) was required. No further rotation was required in 10% (n = 10/100), and 30% (n = 30/100) required further internal rotation for optimized congruency. Patellar tracking was confirmed to be centralized in the trochlea. Changes in soft tissue tension based on tibial rotation showed significant changes when initial optimized congruency was not achieved. The use of sensors to define the femoral contact points on the tibia enabled the surgeon to adjust the tibial tray to optimize tibiofemoral congruency.

Utilization of Sensors during Total Knee Arthroplasty to Define Sagittal Plane Kinetics

Primary Author: Martin Roch

Institution: Holy Cross Hospital

Co-Authors: Gregory Golladay (Orthopedics Associates of Michigan), Patrick Meere (NYU Hospital for Joint Disease)

Ligament balancing in Total Knee Arthroplasty (TKA) has traditionally been performed using spacer blocks and surgeon feel. A significant percentage of early knee revisions are performed to address instability or stiffness. The ability to optimize femoral rollback and flexion gap stability in a quantitative manner may help to improve outcomes and to diminish early revisions. A surgical technique is presented which utilizes micro sensors embedded in the tibial trial insert to provide quantitative assessment of inter-compartmental loads, center of load, and kinetic tracking during trialling of the knee implant.

In an IRB approved study three experienced, high-volume surgeons performed TKAs utilizing sensor-enabled trials in 100 posterior cruciate ligament (PCL)-retaining total knee replacement cases. Quantitative assessment of intercompartmental load and center of load, were documented in full extension, 45 degrees of mid-flexion and 90 degrees of flexion before and after ligament balancing. Posterior drawer and stability stress testing were also documented. Final load measurements were recorded after soft tissue balancing was completed.

The surgeon's subjective "feel" compared well to the sensor data as they related to gross flexion stability and posterior drawer testing. However, the sensor data frequently identified residual imbalances not readily appreciated subjectively. Flexion tightness, characterized by excessively posterior center of load or excessively high loads was found commonly, even in the absence of visible liftoff. Minor adjustment of tibial slope by 2-3 degrees reliably corrected this. Residual extension space imbalance was less frequently observed, and adjustment of tibial rotation plus additional release on the side of the deformity was necessary to achieve quantitative balance.

Quantitative data provided by the sensor trials identified imbalance that was not subjectively observed by the surgeons in this study.

Use of Fluoroscopy With Direct Anterior Approach Decreases Variability Of Acetabular Component Placement

Primary Author: Parthiv A. Rathod

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Co-Authors: Ajit J. Deshmukh (LenoxHill Hospital), Sean Bhalla (LenoxHill Hospital), Jose A. Rodriguez (LenoxHill Hospital)

Introduction: Acetabular cup orientation is an important element of Total Hip arthroplasty (THA). The purpose of this retrospective case-control study was to compare variability of acetabular cup placement between THA performed via Direct Anterior Approach (DAA) with fluoroscopy in supine position and posterior approach(PA) in lateral position without use of fluoroscopy.

Methods: Radiographic and clinical records of THAs performed by a single, high volume arthroplasty surgeon at one institution were reviewed. Patients with similar design of uncemented acetabular cup, femoral component and bearing surface were included to form two groups. PA group consisted of 300 THAs performed from May 2006 to June 2009. DAA group consisted of 300 THAs performed from Oct 2009 to Oct 2011 excluding first 100 cases to eliminate the influence of learning curve. Radiographic analysis was done by two independent blinded observers to determine cup inclination and anteversion (Liaw et al) on standardized,6 week postoperative, standing anteroposterior pelvic radiographs using Picture Archiving and Communication System software (PACS).

Results: Both groups were comparable in terms of age, sex and BMI. Mean inclination in both groups was similar; PA (41.2 degrees; range, 23 to 63) and DAA (40.36 degrees; range, 29 to 51). Mean anteversion was lower in DAA group(13.29 degrees ; range, 6.2 to 32) as compared to PA group (24 degrees; range, 2.3 to 48.8). Variances for cup inclination (49.7 PA vs 19.1 DAA) and anteversion (75.1 PA vs 16.1 DAA) were significantly lower in the DAA group as compared to the PA group as per the F- test for equality of variances (p=0.001).

Discussion: Acetabular cup placement in PA relies predominantly on internal landmarks. Utilization of fluoroscopy with supine position during DAA THA helps in intraoperative assessment of cup orientation and making adjustments for pelvic tilt, thus resulting in decreased variability.

Similar Improvement In Gait Parameters With Direct Anterior And Posterior Approach Total Hip Arthroplasty

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Introduction: Direct anterior approach (DAA) total hip arthroplasty (THA) has been reported to be a muscle sparing approach. The purpose of this study was to compare gait patterns over time between patients undergoing THA via DAA and posterior approach (PA).

Methods: 22 patients with unilateral primary hip osteoarthritis were prospectively enrolled and gait analysis was performed prior to and 6 months after surgery. All PA THA's were performed by a single surgeon from January 2008 to February 2009; all DAA THA's were performed by the same surgeon from January 2010 to May 2011 with similar design of uncemented acetabular, femoral components and bearing surfaces. Reflective markers were placed on the lower extremity and motion data with level walking collected using six infrared cameras (Qtrac, Qualysis). Ground reaction forces were recorded with a multicomponent force plate (Kistler). A repeated-measures ANOVA (Time by Surgical Approach) was used to compare changes in gait parameters over time. Harris Hip Score was used to quantify pain and function from preoperative to 6 months.

Results: There were 11 patients in both groups with similar age, sex and BMI distribution. At 6 months

follow-up, both groups demonstrated improvement in flexion/extension range of motion (ROM)(p=0.003), abduction/adduction ROM (p<0.001), and peak extension moment (p=0.006). Internal/ external ROM improved significantly over time in the DAA group (p = 0.005), but not in the PA group (p=0.898). Gait velocity improved significantly from preoperative to 6 month values in PA group (p=0.001) and were similar to the DAA group at 6 month follow-up (p= 0.207). Pain and function scores were also similar.

Discussion and Conclusion: THA performed via DAA and PA offer similar improvement in gait parameters at 6 months follow-up with the exception of internal/external ROM. This might be related to release and repair of external rotators during PA THA

Hip Strength Recovery with Direct Anterior and Posterior Approach Total Hip Arthroplasty: Are There Any Differences?

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Differences in hip muscle strength recovery between DAA and posterior approach (PA) THA.

Methods: Patients with unilateral hip osteoarthritis undergoing THA at a single institution from January 2011 to May 2011were enrolled. All DAA THA's were performed by one surgeon, and all PA THA's were performed by another surgeon with similar design of components , pain management and rehabilitation protocols. Hip muscle strength was measured with a handheld dynamometer in all planes by a single observer preoperatively, at 6 weeks, 3 months and 1year. Functional recovery was assessed with the motor component of Functional Independence Measure , UCLA activity score, Harris hip score, SF-12 score.

Results: There were 36 patients (18 per group) with similar age, sex, BMI and preoperative functional scores. There was a significant difference between groups in ER strength recovery pattern(p=0.03) with greater mean deficit in PA group from preoperative to 6 weeks(37%) , 3 months (28%) and 1 year(25%); whereas DAA group demonstrated 3% mean deficit at 6 weeks, mean improvement of 2% at 3 months and 25% at 1 year from preoperative values. There was a significant difference between recovery of flexion strength at 6 weeks between two groups (p=0.04). Flexion strength decreased in DAA group by a mean of 12% at 6 weeks but improved by a mean of 12% at 3 months and 18% at 1 year as compared to preoperative values. In PA group, flexion strength improved by a mean of 4 % at 6 weeks, 13% at 3 months and 23% at 1 year. There were no differences in recovery pattern of other hip movements between groups. Functional recovery scores between groups were similar.

Discussion: Both DAA and PA THA offer similar recovery in hip muscle strength up to 1 year with exceptions of persistent ER strength deficit in PA group and flexion strength deficit at 6 weeks in DAA group. This may be related to the release of external rotators in PA group and hip flexor irritation in the DAA group.

The Effect of Deformity Correction on Knee Kinematics in Both Medial and Lateral Unicompartmental Arthroplasties

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Background: It has been suggested that unicompartmental knee arthroplasty (UKA) should be limited to patients with passively correctable deformities. Ligament release could result in abnormal kinematics or instabilities that exceed the stability of UKA.

Objectives: This study was to evaluate the in vivo kinematics of both compartments after medial

(MED) or lateral (LAT) UKA. Secondarily, the effect of soft tissue release was observed.

Methods: With IRB approval, 14 MED-UKA and 8 LAT-UKA patients were recruited. 11 MED-UKA and 2 LAT-UKA required ligament releases for deformity correction. A CT was obtained for generating CAD model of the knee joint for tracking kinematics. A step up task was recorded using videofluoroscopy. Joint angles and contact trajectories of the condyles of the knees were calculated. Angular and linear displacement (DISP) variables were compared between groups using ANOVA. Results: No difference was found between groups for any variable. Both the reconstructed and normal compartment dsiplayed movement patterns close to normal as established in the literature. The MED-UKA group exhibited 11.4±6.6º maximum internal rotation (IR) DISP and 6.1±2.3º maximum adduction (ADD) DISP. LAT-UKA group had 6.5±3.6º IR and 4.7±1.6º of ADD-DISP. MED-UKA exhibited posterior translation (PT) 10.6±8.8 mm on the medial condyle and 13.2±6.9 mm on the lateral condyle. LAT-UKA exhibited PT 13.8±6.0 mm on the medial and 9.7±7.7 mm on the lateral.

Conclusion: Both UKAs displayed well-reconstructed joint kinematics. Ligament release required for deformity correction had no demonstrable effect on kinematics. In the LAT-UKA, there were no differences noted compared to the MED-UKA, but the lateral approach used in these cases may have precipitated a trend toward reduced lateral rollback, perhaps as a result of expected scar formation. The kinematics of both UKAs in association with soft tissue releases resulted in near-normal movement patterns on both sides of the knee.

Functional Recovery after Bicompartmental Arthroplasty, Navigated TKA and Traditional TKA

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Background: Traditional Total Knee Arthpolasty (TKA) replaces all 3 compartments of the knee for patients diagnosed with OA. There might be functional benefit to replacing only damaged compartments, and retaining the normal ligamentous structures. There is a long history of well performing multi-compartment arthroplasty with discrete components, Laskin 1976, Stockley 1990, Confalonieri 2005, Banks 2005. These reports suggest that a modular approach to resurfacing the knee can be successful and achieve satisfactory clinical and functional results.

Objectives: This study compares the functional outcomes of three patient groups treated for osteoarthritis with TKA, computer-assisted TKA or modular uni- or bicompartmental knee arthroplasty with robotic-arm assistance.

Methods: Subjects received either a modular, multicompartment knee arthroplasty (MKA), n=14, implanted with robotic-arm assistance, a computer assisted TKA (TKA CAS), n=11, or a TKA implanted using traditional manual instrumentation (TKA T), n=14. Patients that were indicated for a TKA were randomly selected to receive TKA CAS or TKA T and blinded to the type of TKA surgical technique utilized. Average age for the MKA, TKA CAS and TKA T groups were 59.9, 68.5, 67.3, respectively. We report functional outcomes including Range of Motion (ROM), Single Leg Stance(SLS), and Quad strength at the pre-op visit and 2 weeks, 6 weeks, 3 months and 6 months post-op.

Results: Patients that underwent MKA saw significant increase in ROM, quad strength and SLS time post-operatively when compared to TKA CAS patients and TKA T patients. There was no statistical significance seen between the two TKA groups for any functional measure.

Conclusions: Initial findings indicate a short term improvement in functional outcomes for MKA patients when compared to TKA patients. This study is ongoing.

Two Year Survivorship of Robotically Guided Unicompartmental Knee Arthroplasty

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Background: Successful clinical outcomes following unicompartmental knee arthroplasty (UKA) depend on component positioning, soft tissue balance and overall limb alignment which can be difficult to achieve using manual instrumentation. A new robotically guided technology has been shown to improve post-operative implant positioning and limb alignment in UKA.

Objectives: This study examines the two year survivorship of an anatomically designed UKA implant using a new robotically guided technology that has been shown to improve implant positioning and alignment.

Methods: 154 patients (160 knees) in an initial series of an IRB approved study underwent robotically guided surgery to receive a medial UKA from two surgeons at separate institutions. All patients received a fixed bearing metal backed onlay tibial component. Patients were the first series of patients using the implant system and consecutive for each respective surgeon. Each patient was contacted at a minimum two year follow up and asked a series of 5 questions to determine implant survivorship and patient satisfaction. 29 patients were either lost to follow up or deceased. 125 patients (134 knees) were successfully enrolled. There were 68 male and 57 female patients; the average age was 72±9.2 years and the average BMI was 29.3±4.2 at the time of the index procedure. The average follow up was 32±5.1 months.

Results: One knee was reported as revised for an overall two year survivorship rate of 99.3%. The revision was reported due to mechanical failure and occurred 12 months after the index procedure; the patient returned to the same surgeon for the revision procedure. 89% of patients reported feeling either "Very Satisfied" or "Satisfied".

Conclusion: Excellent survival and satisfaction outcomes were noted in this subset. This procedure shows promise of improved survivorship rates for UKA compared to currently reported registry data and comparative studies. This study remains ongoing.

Outcomes Following Total Knee Revision With Trabecular Metal Cones

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Introduction: Trabecular metal (TM) cones are a relatively new, theorized to achieve stable, biologic fixation in knees with severe bone loss, leading to long-term survival of implants. TM cones are neither implant nor bone defect specific and can be utilized to fill patient specific bone loss patterns along with virtually any implant design.

Objectives: The purpose of this study was to evaluate the outcome of revision total knee arthroplasty using trabecular metal cones.

Methods: Between May 2008 and Dec. 2011, we identified 91 consecutive knees (84 patients) that underwent revision total knee arthroplasty using TM cones. 34 patients were male, 50 were female. Mean age was 62.8 years. Mean BMI was 32.7. 39 knees have reached minimum 2 year follow-up. Cones were utilized in 38 tibial revisions and 3 femoral revisions. Pre-operative defects included 24 type II tibial defects and 14 type III tibial defects. There were 2 type IIb femoral defects and 1 type III femoral defect. Final follow up X-rays were reviewed for alignment, loosening, and radiolucent lines.

Results: Average follow up was 2.6 years. **Patients** improved significantly in terms of pain and function. At latest follow-up, no patient had required revision for aseptic loosening. One knee required reoperation; manipulation under anesthesia was performed for arthrofibrosis. Radiographically, none of the implants demonstrated progressive

radiolucent lines around the trabecular metal cone. Radiolucent lines were seen around the tibial stem in one case and at the bone cement interface of the tibial plateau in 5 cases. Average tibiofemoral alignment was 4.6 degrees valgus.

Conclusion: In the setting of moderate to severe bone loss, trabecular metal cones provided reliable fixation at short term follow-up. We found minimal radiolucent lines suggestive of stable, biologic fixation. Longer follow-up is needed to demonstrate the survival rate of total knee revision in conjunction with the use of TM cones.

Continuous Intra-articular Analgesic Infiltration for Pain Management After Total Hip Arthroplasty

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Background: Pain after Total Hip Arthroplasty (THA) can delay recovery and slow rehabilitation leading to prolonged hospital stays and increased complications. The use of a continuous infusion pain pump has been shown to decrease narcotic usage in total knee arthroplasty.

Objectives: The purpose of this study was to determine if the use of a continuous infusion pain pump could decrease patient pain, length of stay, narcotic usage and complications after THA.

Methods: After IRB approval, we retrospectively reviewed 200 patients who underwent THA by one surgeon through a direct lateral approach. The second 100 patients were given a continuous infusion pain pump filled with Bupivacaine 0.50% and Ketrolac and placed in the intra articular space. All patients were administered VAS pain questionnaires on POD #0-3. All patients were tracked for complications and narcotic consumption as well as hospital length of stay.

Results: The use of the pain pump decreased pain on post-operative day one by 1.13 points on the VAS (std error of 0.428, p= 0.0088). No significant change was noted on post-operative day zero, two, or three. Linear regression showed a 20.80% decrease in length of hospital stay (95% CI 13.57-27.58%; p =4.47e-7) in the group receiving the pain pump. The pain pump group also had a substantial decrease in narcotic use with an odds ratio of 7.17 (95% CI 0.89-328.33; p = 0.06508). There was no difference in the complication rate for the two groups.

Conclusion: We found the use of a continuous infusion intra-articular pain pump lead to a decrease in pain on POD #1 by 1.13 points after THA. More importantly, we showed that use of the pump decreased hospital length of stay by 20% and lead to a decrease in narcotic usage. Routine use of a pain pump after THA could translate to a decreased incidence of narcotic associated complications.

Intraoperative Use of X-ray Fluoroscopy During Total Hip Arthroplasty: Does Component Positioning Improve?

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Introduction: Recent difficulties with alternate surface bearings have highlighted the essential nature of correct positioning of total hip arthroplasty (THA) components. It is unknown whether newer technologies improve upon the highly variable position of components described in previous literature. The objective is to examine the effectiveness of simple intraoperative fluoroscopy in improving THA component positioning. Methods: We identified 469 cases of primary THA done by a single senior surgeon. 248 procedures were done without the use of fluoroscopic guidance (Group A), and 221 procedures were done with the use of fluoroscopy (Group B). After exclusion, 165 patients in Group A (mean age 64.6) and 171 patients in Group B (mean age 63.9) were included. Two independent observers evaluated postoperative AP radiographs for acetabular cup inclination angles, leg length discrepancy, and restoration of femoral offset. Mean measurements and post-

operative complications were compared between the two groups for all parameters.

Results: Observer 1 and 2 reported patients in Group A having greater mean LLD (0.46 vs. 0.19; 0.92 vs. 0.68 mm) and smaller cup inclination angle (42.8 vs 43.5; 43.2 vs. 44.1 degrees). Observer 1 and 2 differed with respect to femoral offset discrepancy: (1.82 vs. 2.19; 1.49 vs. 1.05 mm). Only cup inclination angle demonstrated statistical significance between the groups for both observers. There was no significant difference in inter-observer measurements or in postoperative complications between groups

Conclusion: From our results, use of intraoperative fluoroscopy did not significantly improve cup inclination angles, LLD, or restoration of femoral offset compared to controls. Although the percentage of cups in the "safe zone" was improved in both groups compared to historical controls, the use of intra-operative fluoroscopy may be an important tool in helping non-high volume arthroplasty surgeons improve positioning of THA components.

Risk Factors for Iliopsoas Impingement Following Total Hip Arthroplasty

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Introduction: Groin pain following THA is a significant complication, and may be due to many etiologies including periprosthetic joint infections, fractures, mechanical failure, and iliopsoas impingement, among others. Iliopsoas impingement is an important complication to recognize following THA, as it has a effect on patient quality of life, and may require revision surgery to resolve. Understanding the risk factors that may predispose patients to iliopsoas impingement will help to minimize risk.

Methods: 4,872 cases of primary and revision THA were performed at our institution between Jan. 2007 and Dec. 2010. 78 patients of the 4,872 patients(1.6%) reported pain at postop visits were evaluated using ultrasound of the ipsilateral groin. 51 patients were diagnosed with iliopsoas bursitis, tendinosis, and/or tendinitis. Each patient with iliopsoas pathology was matched to three controls without iliopsoas pathology that underwent THA, by date of surgery and Charlson Comorbidity Index. Patient charts were reviewed for demographic and intraoperative variables.

Results: Age and BMI in the iliopsoas pathology group was not significantly different between the two groups. Gender was not associated with iliopsoas pathology. In the pathologic group and controls, cup size was an average of 53.1 mm and 53.4 mm respectively and head size an average of 32.5 mm and 31.7 mm respectively. Decreased head to cup ratio was a risk factor for iliopsoas impingement, at an average of 1.6 in the pathologic group compared to 1.7 (range: 1.1 to 2.4) in the control group. Only three hips in the study were replaced with metal on metal components, two of which developed iliopsoas tendinitis.

Discussion: Iliopsoas impingement is a common cause of groin pain following THA. Our study suggests that large implant head size is a risk factor for iliopsoas impingement. Particularly, an oversized implant head size compared to acetabular cup size may predispose patients to developing this complication.

Total Joint Arthroplasty Can be Safe in the Super Morbidly Obese

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Introduction: Studies have suggested that morbid obesity is associated with an increased complication rate following TJA. However, institutional experience suggests that morbid obesity does not directly lead to increased complications. The purpose is to compare the complications in super morbidly obese patients (BMI >40)

undergoing TJA to the rate of complications in non-morbidly obese patients(BMI <35). Methods: We retrospectively reviewed 2056 primary TJA cases performed between January 2009 and January 2011. Medical records were reviewed to identify patient demographics, comorbidities, and complications. We recorded readmissions, venous thromboembolism, acute peri-prosthetic joint infections, inadequate pain control, and transfusions. All cardiovascular, pulmonary, neurovascular, gastrointestinal, and mechanical complications were recorded as well. Chi-square and t-test analyses were used to compare complication rates between the two groups.

Results: We identified 454 super morbidly obese and 1602 non-morbidly obese patients. Average BMI in the morbidly obese group was 44.7 and 31.6 in the non-morbidly obese group. Morbidly obese patients were significantly younger at time of surgery (61.5 vs 64.6 years) and had a greater drop from preoperative to postoperative hemoglobin (3.3 vs. 1.8 points) ($p<0.05$). However, Charlson Comorbidity Index (CCI) and length of stay were not significantly different between the two groups ($p>0.05$). Arthrofibrosis requiring manipulation under anesthesia was significantly more common in the non-morbidly obese group ($p<0.001$). There was a higher incidence of pulmonary complications ($p=0.047$), inadequate pain control ($p=0.025$) and transfusions ($p<0.001$) in the morbidly obese patient group. There was no significant difference in VTE or PJI.

Conclusion: TJA in the super morbidly obese can be safe in otherwise healthy patients with a low CCI. However, extra effort may be necessary to prevent pulmonary complications and minimize blood loss.

Delta TT Revision: A New Cup for Hip Revisions

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Background: One of the greatest problems associated with hip implant revisions is the mechanical failure of the acetabular component, with concurrent loss of bone stock. Trabecular Titanium (TT) cups, with their highly porous structure and low rigidity were conceived to rich the goals of high bone ingrowth and physiological load transfer.

Objectives: The aim of this prospective study is to evaluate the short to mid-term clinical and radiographic outcomes of acetabular revision cups in Trabecular Titanium.

Methods: We prospectively assessed the clinical results of hip prosthesis revisions that were performed from December 2008 and June 2011 with the Delta TT Revision system as acetabular component. We evaluated 35 cases of prosthesis revision of the acetabular component.

The mean age of patients was 72 years old (range 30-83 aa). Causes of revision were aseptic loosening in 22 cases (63%), periprosthetic fractures in 7 cases (21%), infection in 4 cases (10,5%) , wear in 2 cases (5,2%). In 29 cases, screws were used to increase primary stability. Stem revision was performed in 19 cases (53%). In 6 cases bone impaction grafting was used to to fill in cavitary defects (Paproski 2B-3A); in 2 cases TT augments were used with the same aim.

The average follow-up was 16,8 months (range 3-33 months).

Results: The Harris Hip Score (HHS) pre-operative average was 39.9 (17-60); mean score at last follow-up was 89.4 (65-94). We had no intraoperative complications. We had one case of dislocation with no need of surgical reduction. No radiographic evidence of demarcation lines was noticed at follow up, neither any evidence of aseptic loosening.

Conclusion: Trabecular Titanium showed high capacity of osseointegration, providing excellent results in short-medium term follow-up. Further studies and long-term follow-up are necessary to compare the clinical results of TT with those obtained with other cups validated yet.

Clinical Outcomes of DELTA-TT Cup in Hip Arthroplasty

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Background: Trabecular Titanium (TT) is open-cell regular structure composed by hexagonal cells of controlled pore size and characterised by high open porosity (65%). It has been demonstrated that TT structure is able to induce a high bone ingrowth and to ensure a physiological load transfer.

Objectives: The aim of this prospective study is to evaluate the short-term clinical and radiographic outcomes of acetabular cups in TT.

Methods: Between September 2007 and August 2011, 295 patients with an average age of 57.4 years (range 20-93). underwent hip arthroplasty with Lima DELTA-TT acetabular cups.

The diagnosis was osteoarthritis in 191 hips, DDH in 51, avascular necrosis in 24, subcapital fractures of the hip in 13, post-traumatic arthritis in 14, outcome of slipped capital femoral epiphysis in 1 and cut-out nail of femur nail in 1 case. Delta TT cup was implanted in 16 (5,4%) cases of acetabular revision. Hip reinforcement screws were used in 68 (23%). Cup were associated to straight stems in 173 cases and to modular conical stems in 113 cases. Clinical evaluation with the Harris Hip Score (HHS) was performed after 3, 6, 12 and 24 months as well as radiographic analysis.

The average follow-up is 22.4 months, with a maximum of 48 months.

Results: The average HHS significantly increased from 44.2 (range 35-52) preoperatively to 95.3 (range 88-100) at the last follow-up. 99.7% of the implanted cups were stable and osseointegrated at the last follow-up with no radiolucent lines nor osteolysis. One case of aseptic loosening occurred in a Crowe 4 DDH patient 9 months after surgery, due to high dislodging forces of the lengthened abductors muscles. The patient underwent a

revision with another Delta TT cup with excellent results at 2 years of follow-up.

Conclusions: DELTA-TT acetabular cup provided a high primary and secondary stability. Short term clinical results were very good but long term evaluations are necessary to confirm these good outcomes.

Investigation of an Early Intervention (EI) Tibial Component for Medial Osteoarthritis

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Background: Conventional medial unicompartmental arthroplasty (UKA) produces good results; however due to the strong bone at the tibial surface being resected, loosening is more likely.

Objective: This study demonstrated the advantages of a thin all-metal unicompartmental tibial component, used with a plastic distal femoral component, compared to traditional UKA designs.

Methods: Preoperative CT scans from 2 patients with early osteoarthritis (OA) were used as models to analyze 3 tibial components using finite element methods. An all-metal tibial component, called an Early Intervention (EI) component, was placed at a 2 mm resection level in the tibial model. An all-plastic inlay was placed at a 4 mm resection level. A metal-backed onlay was placed at a 6 mm resection level. Interface stresses were used to assess load distribution, strains indicated possible loosening and bone failure while strain energy density (SED) was used as an indication of bone remodeling.

Results: From the stress, strain and SED plots, an EI component and a metal-backed onlay produced similar values, but significantly higher values were observed with an all-plastic inlay.

Conclusion: An all-plastic inlay showed high stresses, strains and SED which may be associated with loosening, bone remodeling and pain reported clinically. An EI component and a metal-backed onlay performed similarly, but an EI component would require only a 2 mm resection, such that, the stronger and denser bone would be preserved. This is a major advantage over traditional UKA for stronger fixation and should a revision be necessary. To investigate this further, 33 CT scans from patients later treated with UKA were analyzed. Sectional plots showed bone density patterns with a concentration of dense bone on the medial side and near the surface while quantitative data showed the benefit of minimizing bone resection. This study has shown the advantages of a 'reverse materials' UKA over traditional UKA.

Simple and Inexpensive Fluoroscopy Grid for Total Hip Arthroplasty

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Introduction: The use of fluoroscopy in total hip arthroplasty can be a valuable tool in determining appropriate size and proper position of both femoral and acetabular components. It can be useful in re-establishing femoral offset and avoiding leg length discrepancy. However, intra-operative fluoroscopy measurements can be subjective. We devised a transparent grid to allow more accurate use of fluoroscopic guidance to position THA components.

Methods: All patients are positioned supine on a radiolucent table. A direct lateral or a direct anterior approach is used. A transparent grid(purchased from a local office supply)was created using 1-inch squares oriented in 10 columns and 10 rows. Vertical and horizontal reference lines were drawn at the center of the grid with a 45-degree reference line drawn in the right upper quadrant. During surgery the transparent grid is placed directly on the screen of the fluoroscopy machine. The vertical line is placed over the pubic symphysis. The horizontal

line is placed so it just touches the inferior portion of both ischial tuberosities.

Results: We have found use of the fluoroscopy grid to be a helpful guide during total hip arthroplasty. It allows for more accurate positioning of the acetabular component by providing a visual 45-degree reference to guide cup angle. The boxes of the grid allow objective measurement of femoral offset to ensure restoration of normal anatomic position. The horizontal guide in combination with the grid is extremely useful for determining leg length discrepancy and making corrections if necessary.

Conclusion: The use of the fluoroscopy grid in total hip arthroplasty is an inexpensive tool which can help surgeons determine proper position of the acetabular component, restore femoral offset and avoid leg length discrepancy.

Activity Participation in Young Total Knee Arthroplasty Patients

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Purpose: It is no longer uncommon for total knee arthroplasty (TKA) patients to be younger than 55. Our post-operative instruction for this group (age<55) has been to encourage physical activity. The purpose of this study was to assess our youngest TKA patients to determine their satisfaction, level of function and identify factors that affect their participation in activity.

Methods: After IRB approval, we reviewed all TKA patients at our center from 2005-2010. We excluded any patient with a history of major medical comorbidities affecting function. We identified 60 patients who were under the age of 55 at time of procedure. Mean age was 46.6 and mean BMI was 34.6. Average follow up was 36.6 months. Each patient was surveyed by phone. Patient satisfaction was determined by Likert scale. High-Activity-Arthroplasty-Score (HAAS) and UCLA scores were collected. Physician activity recommendations were compared to patient reported activity participation. If patients had discontinued an activity they were asked to report why.

Results: Ninety-three percent of patient's were "very satisfied" with their surgery. UCLA and HAAS were 6.1 and 10.5, respectively. Physician recommended activities increased by 42% and discouraged activities decreased by 80%, postoperatively. Elevated BMI (>30) and joint pain in the replaced joint and/or distracting joints correlated with decreased function, satisfaction, and activity levels. Activity discontinuation from pre-op to post-op was due to: Fear of injury (30%), knee pain (30%), physician recommendation(25%), early fatigue(12%), and decreased interest(12%).

Discussion and Conclusion: TKA restores function in young total knee patients and is associated with high satisfaction and increased postoperative activity levels. There are many reasons why young TKA patients do not participate in recommended activities, but physician recommendations appear to play an important role in maximizing function and increasing activity participation.

Arthroscopic Lysis of Adhesions for the Stiff TKA: Overall Results and Reliability of Gravity Flexion as a Prognostic Indicator of Ultimate Knee Flexion

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Introduction: Arthrofibrosis following TKA is a rare but potentially devastating complication. Manipulation has been shown to improve motion in arthrfibrosis after TKA. The purpose of this study is to report the results of arthroscopic lysis of adhesions in combination with manipulation for arthrofibrosis after TKA. Additionally, we aimed to determine whether unassisted gravity flexion, measured intra-operatively after release, correlated significantly with ultimate knee flexion.

Methods: All patients who underwent arthroscopic lysis of adhesions between 2007 and 2011 after TKA were identified from a database. Data was collected via review of medical records and patient interviews. Knee flexion angles were recorded with goniometer measurements by three fellowship trained orthopaedic surgeons. Two fellowship trained sports medicine surgeons performed all arthroscopic procedures. Patients were followed until they reached maximal improvement after arthroscopy.

Results: 39 patients (21 women, 18 men) were identified. The average pre-op arc of motion was 62 degrees (mean flexion contracture: 16 degrees; maximum average flexion angle: 79 degrees). Average total arc of motion at surgery was 129 degrees. The average post-op total arc of motion was 98 degrees (mean flexion contracture: 4 degrees; maximum average flexion angle: 103 degrees). The average time from the index procedure to arthroscopic release was 224 days (range 19-2433). The average follow up was 8.7 months. The increase in total arc of motion from preoperative status to post-operative status was statistically significant($p<.001$). Gravity flexion attained intra-operatively was statistically superior to final flexion($p=.047$).

Conclusions: Arthroscopic lysis of adhesions with manipulation is a useful aid in treating arthrofibrosis after TKA. Patients can reliably expect an improvement in range of motion; however, gravity flexion attained intra-operatively did not correlate with final outcome in this series.

Total Joint Arthroplasty Patients with Atrial Fibrillation Increase Hospital Burden

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Introduction: More than 3 million people suffer from Atrial fibrillation (AF) in the United States, most of who are on anticoagulation therapy for life. No current literature describes the increased hospital burden from this subset of TJA patients. The goal of this study is to examine the effect of chronic anticoagulation for AF on patients undergoing TJA.

Methods: We retrospectively reviewed all patients undergoing primary or revision TJA at our facility from March 2007 to August 2011. 161 patients with AF (Group A) were compared to 161 matched controls (Group B) (total of 112 hips and 210 knees; 239 primaries and 83 revisions). Groups were compared using multivariate logistic regression (diagnosis of AF, hip vs. knee, revision vs. primary, age, gender) for length of stay, post-operative Hgb levels, transfusion requirements and readmissions.

Results: Preoperative (1.7 vs. 0.2 days; $p<.0001$), postoperative (3.2 vs. 4.6 days; $p=.004$) and total length of stay (6.3 vs. 3.4 days; $p<.0001$) were significantly longer for patients in Group A. Hgb levels were lower for Group A at baseline (13.1 vs. 13.8), POD2 (10.1 vs. 10.6), POD3 (9.8 vs. 10.2), POD4 (9.6 vs. 10.1), POD5 (9.7 vs. 9.9), and at discharge (9.9 vs. 10.3). Group A had a significantly higher incidence of blood transfusion (15.5% vs. 3.7%; $p=.002$) and periprosthetic joint infection (5.6% vs. 0.62%; $p=.001$). Diagnosis of AF(OR 4.6, 95% CI 2.2-9.9) and revision type procedure(OR 2.0, 95% CI 1.0-4.1) significantly increased odds of TJA complication and readmission.

Discussion: Patients with AF undergoing TJA have increased length of stay along with increased post-operative anemia and transfusion requirements. These patients have an increased risk of complications and readmission. In an environment where complications and readmissions can negatively affect hospital and physician reimbursement, we recommend increased surveillance of these patients to appropriately manage expectations and decrease complication rates.

Warfarin for Thromboprophylaxis Following Total Joint Replacement: Are Patients Safely Anti-coagulated?

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Institution: Rothman Institute

Co-Authors: Michael Aynardi, Benjamin Brown, Zachary Post (Rothman Institute). Fabio Orozco (Rothman Institute), Alvin Ong (Rothman Institute)

Introduction: Discrepancy between currently accepted clinical guidelines has caused resurgence in the debate for the ideal method of thromboprophylaxis following total joint arthropalsty. Furthermore, many patients receiving warfarin are discharged with a nontherapeutic INR. The purpose of this study was to investigate whether any correlation exists between INR level at discharge and postoperative complications or readmission rates.

Methods: From 2010-2011, 441 patients undergoing primary total joint arthroplasty were retrospectively reviewed. INR levels on discharge were recorded as well as all complications and readmissions within 30 days of the index surgery. Patients were subdivided and analyzed according to INR level at the time of discharge: subtherapeutic <2.0, therapeutic 2.0-2.5, and supratherapeutic >2.5.

Results: 80% (352 of 441) patients had a subtherapeutic INR level at discharge. 56 patients were therapeutic and 33 were supratherapeutic. The mean INR level at discharge was 1.61. The average hospital stay was 2.79 days. The overall complication rate was 15% with an 8.6% readmission rate. A supratherapeutic INR level at discharge was associated with both higher readmission rate as well as increased number of complications posteroperatively ($p < .048$). Risk factors for supratherapeutic INR at disharge were an elevated BMI ($p=0.001$), younger age ($p<0.001$), and male sex ($p=0.01$).

Discussion and Conclusion:The findings of this study demonstrate that a large number of patients are discharged with nontherapeutic INR levels following TJA. Importantly, patients discharged with supratherapeutic INR levels appear to be those at highest risk for complications and readmission after surgery.

Dedicated Clearance Protocols Improve Length of Stay and Decrease Complications in Hip Fracture Patients

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Introduction: Preoperative medical clearance by practitioners familiar with the risks of surgical treatment of hip fracture is important to optimize patients and minimize complications. At our institution we utilize a "joint center" team of medical physicians who specialize in pre-operative optimization and postoperative management. The aim of this study is to investigate the differences in LOS and perioperative complications in hip fracture patients cleared by our joint center physicians compared to hip fracture patients cleared by traditional hospitalists.

Methods: We retrospectively reviewed a prospectively collected database and identified 337 patients who sustained hip fractures between December 2001 and March 2012. Group I contained 203 patients admitted to a "joint center" medical service with a defined hip fracture protocol. Group II contained 115 patients admitted to a medical service covered by several independent hospitalist physicians utilizing no set protocol for perioperative management. T-test and chi-square were utilized to compare the perioperatve complications and length of stay of these two groups.

Results: Group I had a statistically significant shorter length of stay compared to group II (7.2 days vs. 9.6 days; $p=0.005$). Complication rate was similar between the two groups (9.7% in group I vs. 10.6% in group II). However, there was a higher incidence of wound infection in group 2 (2.7%) compared to group 1 (0.5%). Incidence of VTE, cardiovascular, pulmonary, and gastroinstestinal complications were similar between the two groups ($p>0.05$).

Conclusion: Protocol-driven clearance and postoperative medical management of hip fracture patients by a team of dedicated medical specialist

led to fewer wound infections and shorter length of stay. As the population ages and the number of hip fracture patients increase, standardized protocols, similar to the one used at our center, could be used to decrease hospital burden and improve patient outcomes.

Outpatient Total Hip Arthroplasty as a Method to Decrease Healthcare Cost

Co-Authors: Zachary Post, Michael Aynardi, Alvin Ong, Fabio Orozco, Dean Sukin

Introduction: Advancements in analgesia, rehabilitation, and standardization of postoperative protocols after total hip arthroplasty (THA) have led to shorter length of stay and early mobilization postoperatively. Additionally, impending financial constraints in the healthcare industry will demand higher quality at a fraction of the cost of current rates. The aim of this study is to compare outcomes and cost-effectiveness of traditional inpatient THA with the same procedure done at an outpatient surgery center.

Methods: From 2008-2011, 119 patients underwent THA through a direct anterior approach at an outpatient surgery center owned by a parent inpatient hospital. All patients done at the surgery center were required to be discharged or transferred to the hospital by 23 hours post-op. Outpatients were then compared with 147 controls done at the parent inpatient hospital. Under IRB approval, a retrospective case-control was performed analyzing complications, length of stay, demographic data and overall cost.

Results: There was no difference with respect to complications between the two groups, ($p=0.520$). Outpatients had a much shorter average length of stay, 24.4 hours versus 59.2 hours ($p<0.0001$). A total of 4 outpatients required transfer. The outpatient group was younger, 58.97 years versus 68.33 years ($p<0.001$), and had a lower BMI, 28.1 versus 30.2 ($p=0.0047$). The average cost of THA for patients done in the outpatient setting was significantly lower, $24,529 compared to $35,480 ($p< 0.0001$).

Discussion: Innovative methods to safely decrease cost, including accelerated discharge following THA, are growing in popularity. This study suggests that appropriately selected patients can undergo THA in an outpatient setting with no increase in complications, a much shorter length of stay, and at a substantial savings to the healthcare system. This work could be the foundation for decreasing length of stay and costs for all patients in the future.

Postoperative Fever after Total Joint Arthroplasty: Use of a Simple Medical Workup to Avoid Delayed Discharge

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Introduction: Postoperative fevers are a common occurrence following total joint arthroplasty (TJA). With more emphasis on accelerated recovery and shorter length of stay (LOS), postoperative fever has implication for discharge planning and cost. The aims of our study were to determine which patients were at risk of developing postop fever and to investigate the usefuleness of a simple, relatively inexpensive, fever workup.

Methods: Under IRB approval we retrospectively reviewed all TJA patients between June 2010 and June 2011. 745 patients were identified. Of these, 137 patients were 55 or younger (Group A), 353 were 56-69 (Group B), and 258 were 70 or older (Group C). There were 455 females and 290 males. The surgical technique, anesthesia, and postoperative management of all patients was identical. Fever workup was performed in all patients with Temp>100.4. Workup included surgical site examination, chest x-ray, urinalysis, blood culture, and venous duplex. Patients were allowed discharge if the workup was negative. Incidence, findings on workup and LOS were analyzed.

Results: 251 patients developed a postoperative fever for an incidence of 34%. Group B had a significantly higher incidence of postop fever

(p=0.01652). Accounting for all patients, males were more likely to develop fever (p=0.02591). There was no association between postop fever and complications. There was no correlation between fever and findings on the medical workup. LOS was not increased by the occurrence of fever in any group. Conclusion:

We found an increased incidence of postoperative fever in the middle age range for joint patients and in males. Postoperative fever was not associated with infection or any other postoperative complication. The use of our simple workup likely prevented increased length of stay secondary to postoperative fever after TJA.

Is the Posterior Cruciate Ligament Destabilized in CR-Total Knee Replacement? An Anatomical Study

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Summary: 80% of patients undergoing CR-TKA had more than 50% of their PCL tibial attachment damaged during a standard transverse tibial cut.

Introduction/Purpose: Cruciate retaining total knee replacement has been shown to effectively improve pain and quality of life. Successful outcomes depend on many factors, including the maintenance of a competent posterior cruciate ligament. This study sought to anatomically analyze the percentage of PCL injured during a full transverse, tibial cut, thus altering normal function.

Material and Methods: 135 knee magnetic resonance images (MRIs) taken from 2006 to 2011 were randomly selected from a single surgeon's database. The optimal view of the PCL's tibial attachment was observed using the sagittal view of the knee, with a T1 signal. 122 usable images were viewed electronically, and measurements were made using the standardized transverse cut guidelines. The percentage of PCL remaining following the cut was categorized into five different groups: 0% (no PCL undermined), 1-49%, 50-74%, 75-99% and 100% (PCL undermined entirely).

Results: Overall only 9.0% (n=11) would have not endured any damage to the PCL with a transverse tibial saw cut, while 79.6% (n=98) would have had 50% or more of the PCL undermined. Of the 98 patients with more than 50% resected, 52.1% (n=51 patients) presented complete destabilization of the PCL. The percentage of PCL destabilized was not significant across age groups (p=0.280), gender (p=0.586), or operative side (p=0.460).

Conclusion: Independent of age, gender, and operative side, a majority of PCLs are more than 50% destabilized following the standard transverse tibial cut.

Factors That Lead to Poor Outcomes Following Unicompartmental Knee Arthroplasty: Redefining the "Classic" Indications for Surgery

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The indications for unicompartmental knee arthroplasty (UKA) for isolated osteoarthritis of the knee remains controversial. Patient selection is considered an important factor in optimizing outcome; however factors associated with poor results have not been well established.

229 UKA that were performed at our institution were evaluated for which factors led to a poor outcome including continued pain, revision to total knee arthroplasty (TKA) or post operative complications. All patients were evaluated prospectively using the Knee Society Score (KSS), in addition to clinical and radiographic examination; preoperatively as well as at 3 months, 1 year, and 2 years following surgery.

The mean KSS improved from 53 preoperatively to 81 at 2 years follow-up. Overall, older age group and higher body mass index (BMI) was associated with a poorer outcome. Patients with a BMI greater than 35 had lower average KSS at all time points, and had a statistically significant lower improvement in KSS at 1 year. Patients older than 60 years old had a lower average overall and smaller improvement in KSS score at 2 years (77.7) than patients younger than 60 years (93.3).

BMI of 35 and greater was correlated with lower KSS scores than patients with BMI less than 35. This difference was statistically significant at 1 year, but was not statistically significant at 2 years suggesting that these patients may need longer time to reach maximum improvement. In contrast to prior reports, younger age rather than older patients correlated with higher KSS scores, specifically patients younger than 60 years old had higher scores than patients 60 years and older at 2 years. The popularity for UKA has increased, and a more in depth investigation of predictors of poor outcomes demonstrates that younger patients appear to have better results than older patients. Obese patients continue to improve up to 2 years after surgery and should not be precluded from undergoing UKA.

Early Failure Following Femoral Transcondylar Pin Fixation for ACL Reconstruction

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Background: Bioabsorbable transcondylar fixation is a popular femoral fixation option for anterior cruciate ligament (ACL) reconstruction using hamstring graft.

Objectives: We report the incidence of failure and complications related to this fixation device in a single surgeon consecutive series of 56 patients.

Methods: Fifty-six consecutive arthroscopic ACL reconstructions using hamstring autograft done by single surgeon between March 2010 and Dec 2011 were reviewed retrospectively after IRB approval. Transcondylar femoral fixation was achieved using Bio-Transfix (Arthrex, Naples, FL) pin in all patients. Mean follow up was 18.2 months. Intra-operative and post-operative follow up data were reviewed to assess failure. Failure was categorized as either graft failure due to re-injury or implant related failure due to persistent pain at pin insertion site and or pin breakage.

Results: 13 (23.2%) patients were deemed as failures following surgery. Five patients needed revision surgery (persistent pain at pin insertion site n= 2, and pin breakage n=3). Two additional patients had a pin breakage and refused surgery and five additional patients had pain at the transfix pin site but opted for conservative treatment. One patient had a mid-substance graft failure due to sports injury unrelated to implant type. Remaining 43 patients did not report any symptoms of pain and or instability following surgery.

Conclusions: This single surgeon consecutive series of ACL reconstruction using transcondylar pin fixation device demonstrates a slightly higher failure rate (23.2%) as compared to previous isolated reports of pin breakage or pain at insertion site in literature. Further radiographic studies are necessary to understand natural history of osteointegration of this bio-device to notice implant thinning, tunnel widening by osteolysis, points of stress risers in implant and possible modification in routine accelerated rehabilitation following this implant as

Time to Diagnosis in Femoroacetabular Impingement and Labral Tears

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Background: Femoroacetabular impingement (FAI) and labral tears are common causes of hip pain that are often not promptly diagnosed.

Objectives: This study investigates the time, healthcare dollars, extraneous procedures, and pain endured by patients before a correct diagnosis of labral tear secondary to FAI is made.

Methods: We prospectively surveyed 80 patients diagnosed with labral tear or FAI. A standardized questionnaire asked patients about time to diagnosis, symptoms, health care providers visited, imaging tests, and treatments prior to diagnosis. Costs were calculated based on 2012 national Medicare data.

Results: Patients in our cohort saw an average of 4.1 health care providers, had an average of 3.4 diagnostic imaging tests, and tried an average of 3.1 treatments (activity restriction, anti-inflammatory medication, narcotic medication, trochanteric cortisone injection, intra-articular steroid injection, physical therapy visit, manual manipulation) prior to diagnosis. The average total amount spent per patient prior to diagnosis was $2560.84. The calculated minimum cost of diagnosis, including a visit to an orthaopedic surgeon as well as a plain radiograph and one MR arthrogram, is $650.46. The average duration between onset of symptoms and diagnosis of FAI or labral tear was 31.7 months (range 0.3-360 months). The most common location of pain reported by patients in this cohort was in the groin, followed by the trochanteric region

Conclusion: The average extraneous healthcare dollars spent during diagnosis of labral tear or FAI was $1910.38 per patient. The costs and pain associated with this time along with the potential long-term degradation of the hip joint make it important for all healthcare professionals to recognize, and appropriately manage or refer the patient.

Verification of an Magnetic Resonance Imaging Algorithm to Recreate the Anatomic Contours of the Femoral Condyles with Bony Defects for Total Knee Arthroplasty

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Background: MRI maybe useful in determining the location and size of the area that is damaged and recreating the joint line as a reference to align the femoral component. These MRI's may be used for femoral component planning and alignment for custom guides.

Objectives: The purpose of this study was to quantify the accuracy of an alogrithm to reconstruct a patient's boney anatomy boundary in the distal condylar regions of the femur when defects/erosion is present compared to the native anatomy.

Methods: MRI's were obtained from 12 cadaver knee specimens. For each MRI image, the subchondral and cortical bone boundaries were identified and traced using the PerFrom imaging software (Stryker, Alameda, CA). The computer developed models represent the specimens normal anatomy and an anatomic model is generated. A separate defect model was created using the Dicom editor (Sente Dicom Editor, Version 3.1.20, Santesoft Corp, Germany) in which each of the MRI slices was altered in order to create a consistent defect in the distal condyle. Repeating the process, each modified MRI image are segmented and an algorithm used to estimate the boney anatomy boundary where boney defects are present. Computer models created with the algorithm represent the specimens' reconstructed anatomy (defect model).

Comparisons between the normal anatomy and defect models were compared using a software (Geomagic Qualify Version 2012, Morrisville, North Carolina) to quantify the differences between the two models. Measurements were obtained from color contour plots of the models with colors

corresponding to the dimensional differences betweeen the two models.

Results: The differences between the models did not exceed 1mm. The largest variation between the two models occured in the lateral condyle (0.48mm ±0.23) as when compared to the medial(0.32mm± 0.18).

Conclusions: Results indicate that the algorithm and model verfication were able to recreate femoral anatomy within 1mm.

Joint Line Orientation in Non Diseased Population

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Background: Achieving a neutral mechanical axis either by classical or anatomic alignment has been the traditional standard in total knee arthroplasty (TKA). An alternate alignment philosophy is to individualize the alignment to restore the patient's native joint line. New technologies such as highly cross-linked polyethylene, better fixation, and custom cutting guides, may allow us to accurately achieve the alignment target that is individualized to the patient.

Objectives: The purpose of this study was to identify the limb varus/valgus axis of non-diseased cadavers and to compare the alignment to an individuals joint line compared compared to classical alignment.

Methods: A cadaveric study included 17 eviscerated torsos for a total of 34 limb specimens. Specimens included intact femoral heads, knees, and ankles. Cadavers were skeletally mature and had no prior surgeries at the hip, knee, and ankle. All cadavers received a MRI obtaining a multi-slice high resolution scan of the knee with the use of a knee coil and a scout single slice low resolution scan of the hip, knee, and ankle performed with a full body coil.

Results: Overall, 73.5% had an overall tibiofemoral limb alignment of 0°±3°. 79.4% of femur varus/valgus was within 0°±3° and 47% of the tibia within 0°±3°. The split for the femoral varus/valgus angles with respect to the mechanical axis of the femur was 5 subjects had 0° alignment, 7 subjects had 1°, 7 subjects had 2°, 8 subjects had 3°. Only 20.8% of subjects had a femoral and tibial varus/valgus orientation greater than 3° (range: 3-7°). Two subjects were symmetrically aligned between right and left sides.

Conclusions: The alignment was widely variable between cadaveric specimens and even between limbs of the same specimens. Newer alignment hypotheses suggest that individualizing alignment and the joint line orientation may lead to improved function, kinematics, and patient satisfaction.

Value of New Technology: Surgeon Satisfaction of Custom Cutting Guides in TKA

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Background: Hospitals are currently facing increased pricing pressures and the advent of new technology must demonstrate value to the healthcare system.

Objectives: The purpose of this study was to determine the surgeon level of satisfaction with custom cutting guides in comparison to traditional instruments in TKA.

Methods: A qualitative survey was designed to evaluate the surgeon satisfaction with using custom cutting guides. To eliminate bias, data was collected using an electronic survey to surgeon attendees immediately after using the custom cutting guides.

Results: A total of 56 surgeons out of 100 surgeons responded to the survey for a 56% response rate. Of these, 27% of surgeons classified themselves as joint reconstructive surgeons, 33% were sports medicine surgeons, and 35% were general orthopaedists. The majority (59%) of the surgeons were not fellowship trained. Half of the joint reconstruction and sports medicine surgeons were fellowship trained. The majority of the general orthopaedic surgeons were not fellowship trained. There were 79% of the surgeons in a private practice, 20% in an ambulatory surgery center, 7% in academic institutions, and 18% indicating other. 91% of surgeons indicated that they were satisfied with this custom cutting guide in comparison to conventional instruments, 6% neutral, 4% dissatisfied. There were 85% responding that they were satisfied with the fit of the guide, 12% neutral, 4% dissatisfied. 96% were satisfied with the execution of the cuts, 2% were neutral, and 2% were dissatisfied. Compared to other custom cutting guides, 70% were satisfied with this guide. 82% indicated that these custom cutting guides would enable them to do more cases in a day.

Conclusions: The results of this study indicated that surgeons perceived a high value for this custom cutting guide in producing efficiencies, execution of the cuts, and overall satisfaction compared to traditional instrumetation.

Comparison of Alignment Values Between Short and Long Leg Images

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Objectives: The purpose of this study was to document the accuracy of estimating overall limb alignment on simulated short leg films compared to long-leg alignment technologies (long films or MRI of the knee with scout scans of the hip and ankle). Further, short leg radiographs using the anatomic tibiofemoral angle have documented a 2-10° range of acceptability. Assuming the anatomic tibiofemoral angle of subjects is 5-7°, 2-10° anatomic tibiofemoral angle correlates to ±3° of long limb alignment.

Methods: Subjects were prospectively scanned into a SOMA (Stryker Orthopaedics, Mahwah, NJ) software platform which is a collection of body computed tomography (CT) scans from subjects collected globally with a specified CT protocol.

For each CT scan, the following axes were identified: mechanical axis of the femur (MAF); mechanical axis of the tibia (MAT),femoral shaft axis. The overall limb alignment was generated (equivalent to long films) by calculating the medial angle of the tibial joint line to the MAT, the lateral femoral joint angle to the MAF, and assuming under weight bearing parallell association. The short leg film calculation was performed by limiting the field of view of the bones to 11x17 mm and measuring the MAT to the femoral shaft axis to calculate the anatomic Tibiofemoral Angle(equivalent to short films).

Results: A total of 797 subjects (males n=393; females n= 399) were evaluated. Overall, 72.6% of the subjects had limb alignment ±3° and a TF angle within 2-10°. There were 15.9% of patients with limbs outside ±3°, but still maintained a TF angle of 2-10°. There were 10.7% of patients with limb alignment outside ±3° and with a TF angle outside 2-10. By gender, 19.8% of females and 15.9% of males had a limb outside ±3° and a TF angle of 2-10°.

Conclusions: The tibiofemoral angle seen in short films does not correlate approximately 25% of the time to the actual mechanical axis as determined via the long leg alignment technologies.

The Differences Between the Medial and Lateral Femoral Condyles and the Incidence of Lateral Femoral Hypoplasia

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Background: Restoring normal knee kinematics is an important objective in total knee arthroplasty(TKA). The difference between the radii between the medial and lateral femoral condyles may impact component design and positioning in TKA, especially in the presence of condylar hypoplasia. Lateral femoral hypoplasia may be seen in severe valgus knees but the incidence of lateral femoral hypoplasia has not been reported in the literature. Hypoplasia was defined as three times the standard deviation of the difference (or 3x1.3=3.9mm)

Objectives: The purpose of this study was to report the difference in radii between the medial and lateral condyles and to document the incidence of lateral femoral hypoplasia.

Methods: Non-diseased subjects were prospectively scanned into a SOMA database(Stryker Orthopaedics, Mahwah, NJ) software platform. This database is a collection of body computed tomography (CT)scans from subjects collected globally. Only CT Scans that met the following qualifications were accepted: ≤1mm voxels and with slice thickness that was equal to the spacing between the slices(≤ 1.0mm).

For each CT scan, the medial and lateral spherical radii were measured using a cloud of points on the outer boundary of the femoral condyles on the CT image. The difference between the medial vs the lateral condylar radius were recorded. A difference of 1mm or less was deemed acceptable for radial equivalence.

Results: CT scans from 1696 knees (left =n= 859 and right n= 837) were studied. The average difference between the medial versus lateral condylar radius was 0.9±1.3mm. There were only 8 knees that had a difference >3.9 mm between the medial and lateral femoral condyles. The incidence of lateral femoral hypoplasia was 0.5%. Of note, 23% of subjects had lateral condyles larger than medial condyle.

Conclusions: The incidence of lateral femoral hypoplasia as defined was 0.5% and over 23% of subjects had a lateral condyle larger than the medial.

Thrombosis Prevention Using a Portable Compression Device in Hip and Knee Arthroplasty

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Background: Thromboembolic event is a common complication in patients undergoing total knee arthroplasty (TKA) or total hip arthroplasty (THA). The purpose of this study was to evaluate the effectiveness of a portable compression device with or without ASA as the sole means of venous thromboemoblism (VTE) prophylaxis, including both deep vein thrombosis (DVT) and/or pulmonary embolism (PE) in patients undergoing primary total joint arthroplasty.

Methods: A multicenter registry was established to capture the rate of VTE occurring following elective primary unilateral lower extremity arthroplasty; 3060 patients from 10 sites were included in the registry after undergoing primary TKA (1551) or THA (1509). All patients were older than 18 years without known history of prior VTE, coagulation disorder, or major operation in the previous three months. The use of the compression device began intraoperatively and continued for a minimum of 10 days. Patients with clinical suspicion of DVT underwent duplex ultrasonography of both legs. Patients with clinical suspicion of PE were evaluated with spiral CT of the lungs. All patients were clinically evaluated three months after surgery documenting whether there was any evidence that a DVT or PE event had occurred postoperatively.

Results: Of 3060 patients, 28 (0.92%) had VTE (20 distal DVT, 3 proximal DVT, and 5 PE).

Conclusion: When compared to current pharmacologic protocols, the use of a portable compression device for patients undergoing primary total joint arthroplasty provides a non-inferior risk

for developing VTE without the risk of bleeding.

Summary: Use of a portable compression device after primary total joint arthroplasty provides a non-inferior risk for developing symptomatic thromboses compared to current pharmacologic protocols.

Reduction of the Learning Curve for Hip Resurfacing Utilizing Plain Radiographic Templating

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Co-Authors: Lance Maynard (Grant Medical Center)

Introduction: Despite an outstanding success rate at long term follow-up, hip resurfacing arthroplasty (HRA), is currently underutilized due to published reports of procedural difficulty, learning curve issues, and a high rate of early failure due to component malposition. We report here on the development and utilization of a plain radiography technique of templating for hip resurfacing that assists highly accurate femoral and acetabular component positioning as well as elimination of the learning curve and early failure issues.

Methods: The first 100 consecutive HRA's were performed by a single surgeon utilizing a plain x-ray PACS radiography based templating method that was developed by this surgeon were examined for early surgical complications, early failures, radiographic component position, and clinical outcomes. Postoperative radiographic measurements included varus/valgus and anteversion/retroversion femoral component positioning, acetabular inclination/version, femoral comp neck notching, combined anteversion fracture.

Results: Forty-eight of the first 50 femoral components were placed in relative valgus compared to the native neck shaft angle. In no cases of the 100 did the femoral stem of the HRA contact the femoral cortex. In the second 50 cases, no femoral components were in relative varus. All acetabular components were placed with less than or equal to 55° of inclination with a mean of 41°. Combined anteversion was less than 45 degrees in 85 patients and greater than 45 degrees in the remainder (range 30-55). There were no instances of femoral neck notching or fracture throughout the series at average 24-month follow up.

Conclusions: Meticulous PACS based plain radiography preoperative templating can result in excellent component acetabular and femoral component positioning and virtually eliminate early learning curve issues and surgical complications that are associated with HRA.

Comparison of outcomes of robotic and manually implanted unicompartmental knee arthroplasty

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Institution: Doctors Hospital, Dept. of Orthopedic Surgery (DCH, RMP); Grant Medical Center, Dept. of Orthopedic Surgery (KB, RCW, SKK).

Background: Medial unicompartmental knee arthroplasty (UKA) for isolated medial knee arthritis is a highly successful procedure. However, UKA is a very technically demanding procedure in which surgical errors can result in high early failure rates. Haptic robotic systems have recently been developed under the premise that they can improve surgical accuracy, reduce complications, and improve outcomes when compared to manually instrumented medial UKA.

Objective: The goal of this study was to compare clinical and radiographic data for matched cohorts who received robotic-arm assisted UKA or standard instrumentation UKA.

Method: This study was a non-randomized, retrospective review of 30 robotic-arm assisted, and 32 manual instrumentation medial UKA performed by a single fellowship-trained joint arthroplasty over 2.5 years. Average follow-up was 10.1 months. Full chart review and radiographic evaluation was performed. Statistical analyses were performed to evaluate differences between groups as well as variability of component placement on radiographs.

Results: The two groups did not differ in any

demographic measure. Operative time was significantly longer in the robotic group. There were very few differences between groups in post-operative clinical measures. There were few serious complications overall. A greater number of robotic group patients reported continued medial-sided knee pain.

Radiographic analysis showed minimal differences. The robotic group was more accurate at recreating femoral axis. There was no difference between groups in coronal tibial component alignment, but the manual group showed significantly less variability. Medial tibial overhang and depth of tibial bone resection were significantly less in robotic group.

Conclusion: There were little to no clinical and radiographic differences between techniques. The data suggests that the purported benefits of robotic UKA may be obviated in the hands of a surgeon with training and experience in manual UKA implantation.

TKA Utilizing Surgical Navigation w/ an Automated (Robotic) Cutting Guide

Primary Author: Louis Keppler

Institution: Spine & Orthopaedic Institute at St. Vincent Charity Medical Center

Co-Authors: Timothy McTighe (Joint Implant Surgery & Research Foundation)

Introduction: Automated cutting guides are the next progression for surgical navigation. The accuracy and efficiency of automated cutting guides in CAS systems has been FDA approved and is now entering the market place. As with any new technology technique is key to the overall success. This video poster addresses, the specific techniques that are encountered to successfully prepare and implant a conventional cemented total knee with the use of automated cutting guides. Rationale for changing from a standard analog instrumentation system is the improved accuracy with Navigation, the ability to perform provisional cuts to ensure that the femoral component is placed optimally without fear of notching the anterior cortex. The ability to document preoperative kinematics and make intraoperative adjustments accordingly to achieve either a classic mechanical alignment or a kinematic measured resection approach.

Material and Methods: For video production one female patient under the age of sixty years with osteoarthritis was selected for TKA. Patient consent for educational purposes was achieved in standard operative consent form.

The device selected is an intelligent instrument allowing intraoperative customization in TKA using real time virtual planning technology followed by automated placement of the cutting guides. An ultra congruent insert was used to substitute the sacrificed PCL and both tibial and femoral components were cemented in place.

Clinical Observations: The use of surgical navigation with the use of automated (Robotic) cutting guides allows for virtual surgical preparation and evaluation prior to making bone cuts. The precision and speed of the automated gutting guide is accurate and allows for fine-tuning of cuts that were not possible in the past by hand held guides. The surgical outcomes of the technique reveal it to be effective in providing desired alignment of the prosthesis. Postoperative rehabilitation protocol is unchanged from convention

Functional Results of Cruciate-Retaining TKA for Valgus Deformities of the Knee

Primary Author: Jeffrey A. Geller

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Co-Authors: Todd A. Morrison (New York Presbyterian at Columbia University Medical center)

Background: Total knee arthroplasty (TKA) in patients presenting with a valgus knee deformity has been challenging for physicians. Not only does the surgeon need to realign the articulation but also obtain adequate balance and stability of the reconstructed knee.

Objective: The purpose of this study was to test the hypothesis that treatment of these less common arthritic deformities with a cruciate-retaining (CR) total knee arthroplasty results in a successful reconstruction.

Material and Methods: This was a prospective observational study of patients receiving a CR TKA prosthesis between 2005 and 2011. Inclusion criteria were primary degenerative arthritis and >5º of valgus deformity. Patient completed Short-Form 12 (SF-12) and Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) assessment, which were collected preoperatively and at 3 months, 1 year, 2 years and at most recent follow up postoperatively. In addition to outcomes assessments, coronal alignment and range of motion were assessed preoperatively and at all follow-up visits.

Results: The preoperative angle of valgus knees in our patients ranged from 5 to 25 degrees (mean= 10.4º). Out of 83 patients, 25 had a <10º valgus, 33 a <15º and 25 had a 15º or more valgus. Our results revealed a significant increase of the SF12 physical ($p=0.001$) and WOMAC pain, stiffness and function ($p<0.001$) scores 2 years after surgery for all patients. The range of motion was also significantly increased throughout the 1st postoperative year for all the patients ($p<0.01$).

Conclusion: This series of cruciate-retaining total knee arthroplasty showed excellent results in patients with valgus knees presenting with an angle ≤ 15º, similar to prior posterior stabilized series. Patients presenting with a larger deformity had improved results, but gains were more modest in this cohort, suggesting that a constrained condylar knee may be advisable for all patients with this degree of deformity.

Mobile Bearing Medial Unicompartmental Knee Arthroplasty (UKA)- Mid-term Results of 465 Knees and Analysis of Predictors of Failure: Results from an Independent Center

Primary Author: Stephen Burnett

Institution: Royal Jubilee Hospital

Co-Authors: Rajesh Nair (Royal Jubilee Hospital), Duncan Jacks (Royal Jubilee Hospital), Megan McAllister (Royal Jubilee Hospital), Christine Hall (Royal Jubilee Hospital)

Background: The Oxford Phase III medial UKA implant and technique have been reported by the implant designers and by non-implant –design centers for treating isolated medial compartment osteoarthritis (OA) with different clinical outcomes in the literature ranging from a 3%-11% revision rate, utilizing similar indications and surgical technique.

Objectives: To assess the clinical results of Oxford UKA's performed at an independent center and evaluate predictors of failure.

Methods: A retrospective review of 465 UKA's (388 patients) with a mean follow-up of 5-years. KSCRS, Oxford Knee Scores, SF-12, WOMAC, satisfaction, and analysis of multiple independent predictors of revision (gender, BMI, age, previous surgeries, implant sizing, poly thickness, surgeon experience, cement type & technique, MIS vs standard incision) were evaluated using statistical analysis.

Results: The mean age at surgery was 69 years (range, 40-88). There were 224 women (58%) and 164 men (42%). There were significant improvements in KSCRS and Oxford Knee Scores ($p<.05$). At final follow-up SF-12 was 43.9 (SD, 10.5) and WOMAC was 80.1 (SD, 18.1). Thirty knees (6.5%) were revised, at a mean of 30 months, most commonly for lateral compartment OA (10), tibial (8) and femoral (4) component loosening. Revision implants included PS 12 (50%), CR 9 (38%), cruciate substituting/dished two (8%), and one (4%) constrained. Augments were required in 21%, while one short cemented tibial and six short stubby tibial stems were utilized. The mobile bearing polyethylene dislocation rate (three) was 0.65%. Eighty-eight percent of patients were satisfied. We found no statistically significant independent predictors of revision.

Conclusion: Our revision rate and mobile bearing dislocation rate is comparable to other independent centers but not as good as the originators. Progression to lateral compartment OA was the most common reason for revision. We could not find any independent predictors of failure.

UCA Arthroplasty in Middle-aged Patients: A long Term Follow-up

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Objectives: Interaction of the age and activity level with the outcome of UCA arthroplasty.

Methods: In a retrospective study, 251 patients receiving Genesis UCA arthroplasty between 1993 and 2004 were younger than 60 when operated.

Twenty-eight patients were lost to follow-up. 223 patients could be personally reviewed or included in this study given their file was adequately documented.

Mean age: 53.7 years old (30-60); mean follow-up: 10.8 years (5-17 years).

An insufficient ACL was present in 25 knees. From this group nineteen knees have been operated with a Lemaire extra-articular reconstruction, 3 with an intra-articular ACL reconstruction and no compensation has been done in three cases.

Conventional MIS approach was regularly used but extended when necessary especially in case of previous scars.

Femoral resurfacing has been preferred to bone resection for middle-aged patients in order to decrease the risk of condylar loosening (2 cases) and to preserve the bone stock in view of a later TKR revision.

Results: Survivorship analysis was calculated with Kaplan Meir analysis. Survivorship for the entire cohort was 93% at 10 years, 86.3% at 15 years.

Survivorship for medial UCA was 94.1% at 10 years and 85.1% at 15 years, this latter being inferior to lateral UCA with 91.8% at 10 and 15 years.

For women survivorship was 91.7% at 15 years, being superior to men with 79.9% at 15 years.

For All poly tibial components the survivorship was 93.3% at 10 and 15 years, compared to 88.7% at 10 years and 82.4% at 15 years for cemented metal backed tibial components. Survivorship for uncemented HA coated tibial components was 97.3 % at 10 years and 90.4% at 15 years.

Conclusions: Survival rate of 91,3% with the Genesis uni at 12yrs follow-up in middle-aged patients. Surgical technique and implant choice: resurface - don't destroy the femoral bone stock; prefer an Allpoly or HA coated tibial component.

3-Tunnel Versus 4-Tunnel Double-bundle ACL Reconstruction with the Minimum of Four Years Follow-up

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Background: Double-bundle ACL reconstruction is a widely accepted procedure.

Objectives: The aim of this prospective study was to evaluate early functional results and stability of the knee joint after anatomical (4-tunnel reconstruction, hamstrings) and semi-anatomical ACL reconstruction (3-tunnel reconstruction, quadriceps graft [2 tunnels in the femur and bone block in the tibia]).

Methods: 40 patients (26 men and 14 women) in mean age of 27 years (range, 16 – 44 years) underwent isolated ACL reconstruction in 2007 and 2008. The minimum follow-up was 4 years (range, 48 – 63 months). Group I included 20 cases after anatomical reconstruction, Group II 20 cases after semi-anatomical reconstruction. The ventral stability was measured by means of KT-1000. Pivot-shift test was used to evaluate the rotational stability.

Results: The mean Lysholm score was in Group I 87.9 ± 11 points (range, 62 – 100 points) and in Group II 88.9 ± 12 points (range, 76-100 points), without statistically significant difference. The mean functional IKDC score was identical in both groups (8 ± 1). Knee joints after semi-anatomical reconstruction were more stable, but without statistical significance; average comparison value in Group I was 1.98 mm and in Group II 1.45 mm. The pivot- shift phenomenon wasn´t present in any case of both groups. The mean operating time was nearly the same in both groups (96 minutes in Group I and 93 minutes in Group II). Fracture of the patella (stabilized by 2 lag screws) occured in two cases during the graft harvest in Group II. No other complication was observed in both groups.

Conclusions: Clinical results of both techniques are similar, without any statistical difference. It is necessary to wait for long-term follow-up studies to confirm this contention. We prefere the semi-anatomical reconstruction in cases with unfavourable anatomical conditions (narrow intercondylar notch, short tibial foot-print, and insufficient hamstring tendons).

Computer Navigation Analysis of Valgus Knee Kinematics Just Before TKR

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Background: In a "true" valgus knee the lateral femoral condyle is smaller in both the vertical and anteroposterior dimensions and lateral soft tissue structures are contracted. In a "false" valgus knee there is no mismatch between anteroposterior dimensions of both condyles.

Objectives: The aim of the study was to preoperatively analyse patterns of passive movement of valgus knees with imageless navigation system to optimise surgical approach during subsequent total knee replacement (TKR).

Methods: TKR were prospectively performed in 50 valgus knees. After the data registration process the kinematic analysis was performed by passive movement of the knee. The mechanical axis was recorded at 0°, 30°, 60°, 90°, and 120° of flexion. The valgus deformity persistent through the whole range of motion was called "true" and the valgus deformity passing into varus with flexion was called "false".

Results: The pre-operative valgus deformity in extension ranged from 13° to 4° (mean 7.8°). We observed "true" valgus type deformity during passive range of movement in 34 cases (68 %) and "false" type of kinematics in 16 cases (32 %). The average value of valgus deviation in extension in "true" group was 7.9° (range, 13° to 4°) and in "false" group 7.5° (range, 9° to 6°). The mean difference between axis deviation in 0° and 120° of flexion was 5.5° (range, 10° to 1°) in the "true" valgus group. In the "false" valgus group the varus deviation was observed in 90° of flexion in all cases and mean difference between axis deviation in 0° and 120° of flexion was 12.0° (range, 14° to 10°).

Conclusions: Computer navigation can easily help to identify the character of valgus deformity ("true" or "false") just before skin incision. In "true" valgus deviation lateral approach may be necessary for appropriate soft tissue balancing during TKR surgery.

Large Knee Defects Treated with Fresh-frozen Massive Osteochondral Allografts; Case Reports

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Co-Authors: Adel Safi (Dept. of Orthopaedics and Traumatology, Znojmo, Czech Rep.)

Background: Treatment of large and deep knee defects still remains controversial. Massive osteochondral allografts have a long clinical history and represent one of treatment options with success rate greater than 75%. Freezing has the advantage of decreasing the antigenity of the allograft. Moreover, the chondrocyte surface cell antigens are isolated from the host immunologic cells. Chondrocyte

survival is only partially diminished after fresh freezing. The transplant can be unipolar (one surface is transplanted) or bipolar (two reciprocal articulating surfaces are transplanted).

Objectives: To evaluate long-term results of such reconstruction cases in the knee.

Methods and Results:

1) Femoral condyle transplantation

    a) large lateral femoral defect after trauma in young female with the follow-up of 10 years after surgery - very satisfied, no degenerative changes on X-ray

    b) large lateral femoral defect after trauma in middle-aged male with the follow-up of 7 years after surgery - very satisfied, no degenerative changes on X-ray

2) Tibial condyle transplantation

    c) large medial tibial defect after trauma in young male with the follow-up of 6 years after surgery - satisfied, no degenerative changes on X-ray

3) Bipolar patellofemoral transplantation

    d) lateral femoral trochlear and patellar hypoplasia with chronic patellar instability and arthrosis in young female with the follow-up of 7 years after surgery - very satisfied, no degenerative changes on X-ray

Conclusion: Fresh-frozen massive osteochondral allografting is a salvage operation aimed at young, active patients with isolated large and deep knee defects to prevent or postpone the joint replacement.

Effect of Both ACL Bundles on the Stability of the Knee

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Background: Anterior cruciate ligament (ACL) consists of the anteromedial (AM) and the posterolateral (PL) bundle.

Objectives: The purpose of this study was to evaluate the influence of both bundles on anterior translation (AT) and internal (IR) rotation.

Methods: All measurements were performed using an image-free computer navigation system OrthoPilot (Aesculap, Tuttlingen, Germany), KT-1000, a rollimeter (2.5 Nm) attached to the iron shoe.

The experimental part of the study was performed on 48 knees of 24 fresh whole-body cadavers. Testings were done in the ACL intact condition, in the AM bundle-deficient condition (after AM bundle cut), in the PL bundle-deficient condition (after PL bundle cut) (bundles were cut on both sides of each cadaver alternatively at random), and in the ACL-deficient condition (after both bundles cut).

The clinical part of the study was performed during 60 ACL reconstructions in time “zero”. 20 patients had their ACL replaced by “anatomic” single-bundle (SB) reconstruction, 20 by double-bundle (DB) with AM bundle being reconstructed first and 20 by DB with the PL bundle first.

Results: The experimental part: in 30° of flexion: In the intact knee AT was 6.3 mm on average. After AM cut AT increased to 9.1 mm and after PL cut AT increased to 6.4 mm. After AM and PL cuts mean AT was 10.2 mm.

In the intact knee IR was 11.1° on average. After AM cut IR increased to 13.9° and after PL cut IR increased to 13.1°. After AM and PL cuts mean IR was 15.7°.

The clinical part: in 30° of flexion:

In the ACL-deficient knee the mean AT was 18.7 mm, after only AM reconstruction 8.9 mm, after only PL 13.1 mm, after DB 6.1 mm and after SB 8.5 mm.

In the ACL-deficient knee the mean IR was 19.1°, after only AM reconstruction 13.9°, after only PL 15.3°, after DB 10.4° and after SB 14.5°.

Conclusions: The PL bundle has only an additive effect on the AP and rotational stability of the knee.

The Effect of the Platelet-rich Plasma on the Knee Cartilage

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Background: Cartilage regeneration capacity is very limited. Optimal approach could be a delivery of natural growth factors. Autologous platelet-rich plasma (PRP) contains many proliferative and chemoattractant growth factors.

Objectives: The objective of the present study was to confirm or refuse two hypotheses: 1) PRP enhances tibiofemoral cartilage regeneration and 2) PRP improves knee function.

Materials and Methods: Fifty consecutive and strictly selected patients with a mean age of 58 years were enrolled in the prospective study. All underwent arthroscopy between January and June 2009 with diagnosis of isolated Grade II or III tibiofemoral chondromacia. Patients underwent one year treatment - 9 injections of 6 ml of autologous PRP with 2.0 to 2.5-fold platelets concentration. First 6 injections were applied at 1-week intervals starting 6 weeks after the arthroscopy. Last 3 injections were applied at 3-months intervals.

Outcome measures included the Lysholm, IKDC, and Cincinnati scores. Magnetic resonance (MR) imaging was used to evaluate cartilage thickness and degree of degeneration at the beginning and after 1 year in the end of the study.

Results: The study demonstrated significant improvement in Lysholm, Cincinnati, and IKDC subjective scores. The IKDC objective score remained without significant difference. MR cartilage assessment revealed no significant cartilage regeneration. There were no adverse events observed.

Conclusions: MR imaging didn´t confirmed any significant cartilage condition improvement. We had to refuse the 1st hypothesis. PRP treatment significantly reduces pain and improves quality of live in patients with low degree of tibiofemoral cartilage degeneration. We have confirmed the 2nd hypothesis.

Dyamic Soft Tissue Balance In TKA

Primary Author: Dougas G. Nuelle

Institution: Fannin Regional Hospital

Co-Authors: Justin Creel

Background: On spite of advances in the development of implants and guides to assist the surgeon in performing Total Knee Arthroplasty, soft tissue balancing remains a subjective evaluation of the tracking and "tightness" by the surgeon's visual a proprioceptive senses.

Objectives: This is a study that determines the quantitative dynamics of the soft tissue envelope during TKA.

Methods: Fifty consecutive patients undergoing primary TKA were studied using a simple tensioning device that correlated the flexion and extension gap distances with the amount of force applied.

Results: We found that he mechanical properties of the soft tissue envelope dramatically changes when more than 60 lbs of force is applied.

Conclusions: Choosing a tibial spacer that applies 40 to 60 lbs. of force to the soft tissue envelope in flexion and extension will achieve a stable and physiologically normal knee.

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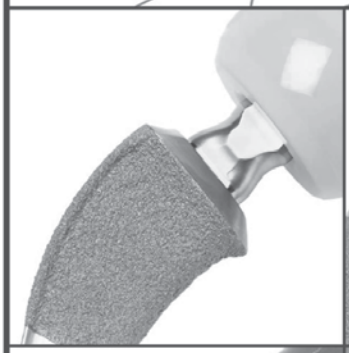

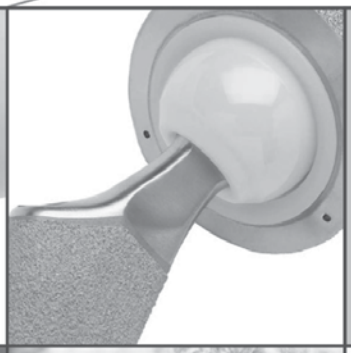

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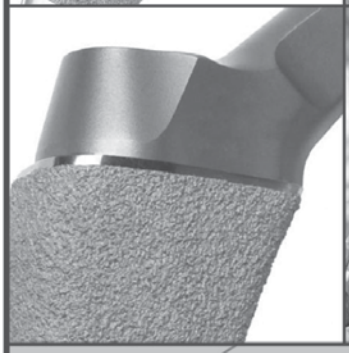

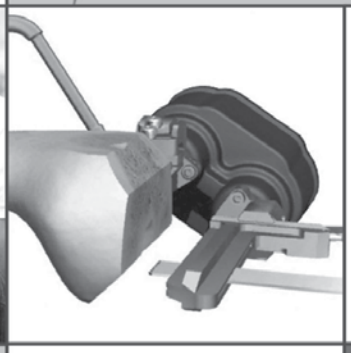

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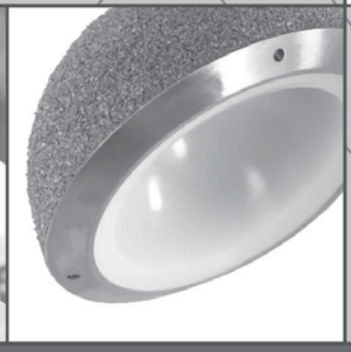

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