

**COA Paper Session 10: Knee Reconstruction 1 •**  
Moderators Eric Bohm, MB, and Michael Dunbar, NS

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**Patient Satisfaction After TKR: Who is Happy and Who is Not?**

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**Purpose:** The purpose of this study was to determine why some TKR patients are satisfied and others are dissatisfied. **Method:** 2,481 primary TKR patients who had completed a decision date WOMAC were randomly identified within the Ontario Joint Replacement Registry (OJRR) database. One year post-operatively, these patients were mailed a survey to determine satisfaction/expectations, willingness to undergo surgery again, Jaeschke self-reported clinical improvement, WOMAC scores and complications. The satisfied and not satisfied patient groups were identified, statistical analysis employed to determine variables that individually affect satisfaction and logistic regression used to identify significant factors which might lead to patient dissatisfaction. **Results:** Only 70% of primary TKR patients felt that their expectations had been met and 15% reported that they had no expectations. Only 81% of patients reported that they were satisfied with their TKR. When asked whether they would have their surgery again, 96% of the satisfied patients reported that they would do so as compared to only 63% in the dissatisfied group ( $p < 0.0001$ ). Using the Jaeschke self-reported clinical improvement scale, 87% of TKR patients reported that they were improved, but only 75% reported that they were a good, great or a very great deal improved. There was a high correlation with the WOMAC change score and the Jaeschke self-reported improvement and willingness to undergo surgery again questions. Significant differences were found between the satisfied and dissatisfied TKR patients in terms of a pre-operative WOMAC score of  $< 20$  ( $p < 0.004$ ), the WOMAC change score ( $p < 0.0001$ ), expectations ( $p < 0.0001$ ), complications ( $p < 0.0001$ ), age ( $p < 0.002$ ), referral status ( $p < 0.0005$ ), living alone ( $p < 0.01$ ) and comorbidities ( $p < 0.05$ ). Logistic regression suggested that the most important predictive factors were a pre-operative WOMAC  $< 20$  ( $p < 0.004$ ), the WOMAC change score ( $p < 0.0001$ ), expectations met ( $p < 0.0001$ ) and complications ( $p < 0.0001$ ). **Conclusion:** Only one in five primary TKR patients are satisfied with their operative procedure. Significant risk factors for patient dissatisfaction after primary TKR include a pre-operative WOMAC  $< 20$ , a WOMAC change score of less than 33 points, expectations that were not met or a complication.

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**Joint Perception After Hip or Knee Replacement Surgery**

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**Purpose:** The goal of this study is to compare patients' perception of their hip or knee joint following joint replacement surgery. **Method:** A total of 357 patients who underwent hip or knee joint surgery were included in the study. Of the patients who had knee replacement surgery, 46 had uni-compartmental knee replacement (UKR) and 119 had total knee replacement (TKR). In the group of patients who had hip replacement surgery, 98 underwent hip resurfacing (SRA) and 97 had total hip replacements (THR). The perception patients had of their replaced articulation as well as functional outcome scores such as the WOMAC and SF-36 were measured at one year post-surgery and compared between the four groups. **Results:** Although global satisfaction and clinical outcome scores were excellent in all four groups, WOMAC scores at 1-2 year follow-up were significantly different between hip or knee replacement surgery ( $p < 0.0001$ ). Also, the perception that patients had of their reconstructed joint was significantly different between the hip and knee groups ( $p < 0.001$ ). Half of patients from the hip group considered their replaced hip "as a natural joint" and 76% considered their joint as having no functional limitations compared to only 19% and 39% respectively for the knee group. Of patients with knee joint surgery, 14% (20/165) considered their joint as "artificial with important limitations" as opposed to only 1% (2/195) of those who had hip joint surgery. There were no significant differences in Womac scores or perception when comparing TKR and UKR or THR and SRA patients. Perception was strongly correlated to Womac scores for all four groups ( $R^2 = 0.951$ ). **Conclusion:** Hip and knee joint replacement surgery are recognized as highly effective medical interventions in terms of cost/benefit ratio in current medical practice. It is remarkable to see that replacement of each of these articulations can yield vastly different results in terms of patient function, perception and satisfaction. From this study, it is clear that research in prosthetic development and surgical techniques should be focused on the interventions such as knee joint replacement, which are not yet capable of offering both a high level of function and satisfaction to patients.

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### **Total Knee Arthroplasty: Does a Difference Between Genders Exist?**

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**Purpose:** Recently an orthopedic manufacturer has introduced a gender specific knee design implying that there is a substantial anatomical difference between the genders. If such concept is true then TKA prosthesis implanted in the female population over the last decades, by definition, must have suboptimal outcome when compared to the male patients. The purpose of this study was to examine the functional outcome, the incidence of complications, and the need for revision between the two genders receiving the same knee design. **Method:** The study selected a matched group of 150 men and 250 women undergoing TKA at our institution. The patients were matched for age, BMI, pre-op diagnosis, comorbidities, race, mode of

fixation, and the type of implant. Other demographic, surgical, and medical factors between the two genders were similar. Both pre-op and post-op functional scores were compared between the two groups. Pre-op and post-op radiographic images were assessed for implant fit. **Results:** There was a significant improvement in functional outcome as measured by Knee Society score, WOMAC, and SF-36 for all patients. The improvement in functional outcome was not different between the two groups. The incidence of complications, reoperations, and need for revision between the two genders was also not significantly different. **Conclusion:** Total knee arthroplasty continues to be an effective surgical procedure. Both genders appear to enjoy relief of pain and improvement of function equally. Based on this retrospective study the use of non-gender specific knee prosthesis did not seem to result in suboptimal outcome in female patients. There appears to be little merit in introduction of gender specific knee designs when previous non-gender specific prosthesis appeared to function well in both genders.

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### **The Relationship Between Body Habitus and Leptin in a Knee Osteoarthritis Population**

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**Purpose:** Synovial fluid (SF) leptin has been shown to have an association with cartilage degeneration. Our objective was to examine the relationship between different measures of body habitus and SF leptin levels in an end stage knee osteoarthritis (OA) population. **Method:** Sixty consecutive patients with knee OA were surveyed prior to surgery for demographic data. Body habitus was assessed with the body mass index (BMI), waist circumference (WC) and waist-hip ratio (WHR). SF and serum samples were analyzed for leptin and adiponectin using specific ELISA. Non-parametric correlations and linear regression modeling was used to identify the relationship between the measures of body habitus and SF leptin levels. **Results:** Females had greater levels of leptin than males in both the serum and SF. Significant correlations were found between SF leptin levels and BMI and WC (  $R^2$  0.44 and 0.38 respectively,  $p < 0.05$ ). Regression modeling showed that female gender and WC were independent predictors of a greater SF leptin level independent of age, BMI, and presence of diabetes. ( $p < 0.05$ ) **Conclusion:** WC may be a more accurate measure of body habitus than BMI in the relationship between the metabolic effects of adipose tissue and OA.

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### **BMI Specific Total Knee Replacement Outcomes: An Analysis Using Prospectively Collected Clinical Patient Data**

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**Purpose:** The growing trend of morbidly obese (BMI 40+) patients requiring a total joint replacement is becoming major concern in total knee Arthroplasty (TKA). The purpose of this study was to investigate the affects that BMI may have on implant longevity and clinical patient outcome using historical patient data. **Method:** A consecutive cohort of 3083 TKA's in 2048 patients since 1995 (minimum 2 years follow-up) were evaluated. Pre-operative scores, latest scores, and change in clinical outcome scores (KSCRS, SF12, WOMAC) were analyzed using ANOVA and Kaplan-Meier (K-M) survivorship was determined. **Results:** K-M cumulative survival at 10 years by BMI group was  $0.951\pm 0.033$  for Normal and Underweight (<25, n=277),  $0.944\pm 0.024$  for Overweight (25-29.9, n=915),  $0.882\pm 0.032$  for Obese (30-39.9, n=1460) and  $0.843\pm 0.076$  for Morbidly Obese (40+, n=352). Cumulative revision rates were 1.8% for Normal and Underweight, 1.9% for Overweight, 2.9% for Obese and 2.8% for Morbidly Obese. All pre-operative clinical scores were significantly different between the Morbidly Obese and all other BMI groups ( $p<0.05$ ), with the non-morbidly obese having higher scores in all cases. Significant difference was found in the change in WOMAC domain scores and the KSCRS knee score ( $p<0.05$ ) between the morbidly obese group and all other BMI groups, with the morbidly obese having the greatest improvement in all domains. **Conclusion:** The morbidly obese patient cohort (BMI > 40) undergoing TKA demonstrated the most significant improvement in clinical outcome scores; however also had the lowest cumulative 10 year survivorship. This risk/benefit information is important in pre-operative discussions with this challenging, and increasingly prevalent, patient population.

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### **Cardiovascular Disease is a Contraindication to Bilateral TKA Under a Single Anesthetic**

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**Purpose:** Single anesthetic bilateral total knee arthroplasty (SABTKA) is a controversial procedure with a questionable safety profile. The purpose of this study was to determine if specific, individual preoperative medical comorbidities can predict perioperative complications in patients undergoing SABTKA. **Method:** The records of all SABTKA performed between 1997 and 2007 at 1 large community hospital and 1 academic, university hospital were retrospectively reviewed. Complete demographic data, preoperative comorbidities (cardiovascular disease, COPD, diabetes, and hypertension), and perioperative complications for 156 patients were collected and analyzed using logistic multivariate regression analysis. Comparison was made to an age, gender, and co-morbidity matched cohort of patients treated with unilateral TKA. **Results:** In the SABTKA group only 11% of patients had

a preoperative history of cardiovascular disease yet 89% of all post operative myocardial infarctions (MI) occurred in this population ( $p < 0.001$ , Odds Ratio 57.8). Cardiovascular disease also predicted need for admission to ICU ( $p < 0.001$ , Odds Ratio 50.8), and number of days spent in the ICU ( $p < 0.001$ ). In those patients without preoperative cardiovascular disease or COPD the rate of MI was only 0.64%. All differences were significant when compared to the matched unilateral TKA cohort. Age, gender, diabetes, and hypertension did not predict perioperative complications in the SABTKA cohort. **Conclusion:** The literature indicates there are certain populations of patients at higher risk for perioperative complications after SABTKA. This study clearly identifies a subpopulation of patients that have cardiovascular disease and are at an unacceptably high risk of perioperative MI. Cardiovascular disease should likely be considered an absolute contraindication to SABTKA.

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### **Reducing Total Hip and Knee Surgical Wait Times: A Model that Works**

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**Purpose:** Reducing wait times for total hip (THA) or knee (TKA) joint arthroplasty is a Canadian health care priority. Models that maximise the capacity of advanced practice clinicians (nurses, physical therapists, sports medicine specialists) have been established to streamline care. Hospitals across the Hamilton Niagara Haldimand Brant Local Health Integration Network in Ontario collaborated to establish a Regional Joint Assessment Centre (RJAC). This study was designed to profile patients deemed suitable for surgical review, and to examine wait times for THA or TKA in RJAC patients compared to those referred directly to an orthopaedic surgeon's office. **Method:** Patients referred to the RJAC between July 2007 and August 2008 with knee or hip OA were included. Self-reported function was evaluated using the Oxford Hip and Knee Score that is scored out of 60 (higher scores reflect greater disability). Time to surgery was measured as the number of days from initial review to surgery. Group one consisted of patients that were referred to the RJAC while group two was comprised of patients who were referred directly to a surgeon's office. Patient characteristics were examined using univariate analyses. Independent t-tests were used to examine between group differences. **Results:** One hundred thirty-six patients (mean $\pm$ sd: 68 $\pm$ 2 years, body mass index 31 $\pm$ 6 kg/m<sup>2</sup>, 83 females) with 150 hip and/or knee joint problems were reviewed in the RJAC. Of those, only 33% (45/136 patients) were deemed suitable for

surgical review. Self-reported function (Oxford Scores) in the group requiring surgical review was significantly worse ( $40\pm 7$ ,  $p=0.03$ ) than in those patients deemed unsuitable for surgical review ( $37\pm 9$ ). The RJAC group waited on average 130 days for THA and 129 days for TKA (below the provincial target of 182 days) while those referred directly to the surgeons' offices waited significantly longer (194 days for THA and 206 days for TKA,  $p<0.001$ ). **Conclusion:** Patients with hip and knee OA who require surgical review have worse self-reported function than those triaged to conservative care. Wait times for THA or TKA were significantly shorter for patients referred to the RJAC under the new model of care than for those referred directly to an orthopaedic surgeon's office.

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### **Medial Opening Wedge HTO, Medial UKA, or TKA for the Treatment of Antero-medial Knee Osteoarthritis: A Prospective Cohort to Evaluate Joint Kinematics and Health Related Quality of Life**

**Douglas Naudie**, London Health Sciences Center, University Hospital; Dianne Bryant, Fowler Kennedy Sports Medicine Center; Trevor Birmingham, Fowler Kennedy Sports Medicine Center; Ian Jones, Fowler Kennedy Sports Medicine Center; J. Robert Giffin, Fowler Kennedy Sports Medicine Center

**Purpose:** Medial compartment osteoarthritis (OA) is the most common primary osteoarthritis of the knee, but the treatment of this disease in young patients remains controversial. High tibial osteotomy (HTO), medial unicompartmental knee arthroplasty (UKA) and total knee arthroplasty (TKA) are all viable options. Gait analysis is one tool available to clinically assess knee kinematics, and may prove to be a good way of predicting functional outcomes of these different surgical procedures. The purpose of this study was to compare the knee kinematics, function, and quality of life of patients that underwent either a medial opening wedge HTO, UKA, or TKA for primary medial compartment OA. **Method:** A matched prospective cohort study of patients between the ages of 45 and 65 who had undergone an HTO, UKA, or TKA for primary medial compartment knee OA was undertaken over a 3-year period. Primary outcome measures were gait variables, namely knee adduction moments, as measured through gait analysis. Secondary measures included quality of life (WOMAC), functional performance tests (six minute walk and timed-up-and-go), self-reported functional ability (LEFS), and general health (SF-36). Gait and functional performance tests were evaluated preoperatively and at 6, 12, and 24 months postoperatively. Self-reported quality of life, function and general health were assessed preoperatively and at 3, 6, 12, and 24 months post-operatively. **Results:** Twenty HTOs, 19 medial UKAs, and 17 TKAs were matched for Kellgren-Lawrence grade of medial OA, age at surgery, and body mass index. Significant differences were observed between the three groups in step length and peak adduction moments at 24 months. Significant differences were observed in preoperative WOMAC pain and function scores, KOOS pain scores, and LEFS, but no significantly different outcome measures were observed postoperatively. Lateral Blackburne-Peel and

modified Insall-Salvati ratios were the only significant radiographic differences observed between groups at 24 months. **Conclusion:** To our knowledge, no gait analysis study exists comparing the medial opening wedge HTO to UKA or TKA. The results of this study suggest that most gait variables except step length and knee adduction moments are similar between groups. Moreover, except for patellar height, there were no major functional or radiographic differences between these groups.

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### **Outpatient Unicompartmental Knee Arthroplasty with Femoral Nerve Block**

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**Purpose:** Unicompartmental replacement for medial compartment arthrosis of the knee has become popular with eligible patients because of the shortened recovery time, decreased tissue damage and easier future revision. Contemporary multimodal anesthesia has added the potential to safely perform this as outpatient surgery reducing inpatient bed burden. We describe our initial pilot experience with this approach. **Method:** The first 25 patients who fulfilled the criteria developed underwent same day surgery for unicompartmental arthroplasty for medial (19) or lateral (3) compartment replacement with either the Oxford knee (20) or the Uniglide (2). All patients were treated with an indwelling femoral nerve catheter supplied by Ropivacaine through a constant release pump (Stryker) which was discontinued at 48 hours. Home care support was made available in first 72 hours by way of RN and physiotherapy visits and mandatory use of walker or crutches for the first 48 hours. **Results:** Patients in this cohort were universally very satisfied with the model of post-op care as described and particularly pleased to avoid a hospital stay. Eighty percent of those who were offered this model chose it. The use of narcotic oral medication was consistently about 50% less than that observed to similar inpatients treated without catheter, and eight patients had complete opioid sparing experience. There were no complications related to the catheter, in particular serious falls or longer term neurologic sequelae. The clinical results were very good and equal to those who were in patients. **Conclusion:** Outpatient unicompartmental replacement can be performed safely recognizing the decreased surgical trauma and pain stimuli associated with UKR and a relatively younger and healthier cohort screened for this alternative. These patients are amongst the most satisfied with their perioperative course and all would do the same again if given the chance. Other models of analgesia could be considered, though the catheter does seem to have a large opioid sparing effect that likely contributed to patient well being and satisfaction.

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### **Minimal Incision Surgery as a Risk Factor for Early Failure of Total Knee Arthroplasty**

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**Purpose:** A study was undertaken to determine the current prevalence of revisions of total knee arthroplasty (TKA) following minimal incision surgery (MIS) and to compare revisions of MIS TKA procedures to revisions of TKA performed following a standard surgical approach. **Method:** A consecutive series of revision TKA performed at three centers by five surgeons over a three year time period was reviewed. Revisions performed for infection and re-revisions were excluded. Review of clinical and radiographic data determined incision type, gender, age, time to revision, and primary diagnosis at time of revision. **Results:** Two hundred and thirty-seven first time revision TKAs were performed of which 44 (18.6%) had been a MIS primary TKA and 193 (81.4%) had been a standard primary TKA. Patients with MIS were younger (62.1 years versus 66.2 years,  $p=0.02$ ). There was a trend towards a higher percentage of females in the MIS group (75% versus 63%), although this difference was not significant ( $p=0.12$ ). Most striking was the difference in time to revision which was significantly shorter for the MIS group (14.8 months versus 80 months,  $p<0.001$ ). The MIS group was much more likely to fail at <12 months (37% versus 5%,  $p<0.001$ ) and at <24 months (81% versus 22%,  $p<0.001$ ). **Conclusion:** MIS TKA accounted for a substantial percentage of revision TKA in recent years at these centers. The high prevalence of MIS failures occurring within 24 months is disturbing and warrants further investigation.