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Knee Free Papers
08:30 – 10:00
Hall 3A

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ROBOTIC ASSISTED PATELLO-FEMORAL ARTHROPLASTY: DOES PRE-OPERATIVE PLANNING CORRELATE TO INTRA-OPERATIVE IMPLANT POSITION?

A. Cattell[1], V. Selvaratnam[1], K. Eyres[2], A. Toms[2], V. Mandalia[2]
[1]*Royal Devon and Exeter Hospital, Exeter Knee Reconstruction Unit, Exeter, United Kingdom*
[2]*Nuffield Health Hospital, Exeter, United Kingdom*

Background: Patello-femoral arthroplasty (PFA) is successful in a selective group of patients, yielding good functional outcome. Robotic assisted knee arthroplasty can provide better implant positioning and alignment. We report our early outcomes and compare MAKO's pre-operative implant planning position to intra-operative PFA implant position.

Methods: Prospective data collection for 25 patients who underwent robotic assisted PFA between April 2017 and September 2018.

Results: Nineteen female and 6 male patients; mean age 66 years (range 41 - 92); median follow-up: 10 months.

Nineteen patients had evidence of trochlear dysplasia (Dejour A:4,B:7,C:7,D:1).

The anterior trochlear line was on average:

- 7.71°(3.3° - 11.3°) internally rotated to the surgical transepicondylar axis
- 2.9° (0.2° - 6.5°) internally rotated to the posterior condylar line.

Pre-operative planning range was 4° internal to 4° external rotation, 4° varus to 6° valgus and 7° flexion to 3° extension.

The average difference between pre-operative planning and intra-operative implant position was:

- 0.43°(2° internal - 3° external) for rotation (r = 0.93)
- 0.99°(3° varus - 3.8° valgus) for varus/valgus (r = 0.29)
- 1.26° (5.1° flexion - 0.1° extension) for flexion/extension (r = 0.83)
- 0.34 (-0.7 to 1.9) mm for proudness (r=0.80).

Six patients had a different size component from their pre-operative plan (r = 0.98). Mean OKS was 17 (range 7 - 42) pre-operatively and 41 (range 13 - 48) post-operatively. No patient had implant related revision surgery or any radiological evidence of implant loosening at final follow-up.

Conclusions: Early results of robotic PFA are promising. Pre- and intra-operative MAKO planning correlate closely. To our knowledge, this is the only study which has correlated pre-operative and intra-operative implant position.

Implications: Performing PFA is challenging. There is a learning curve in performing robotic assisted PFA surgery. The early results in our centre are good. There is good correlation between the planned and actual intra-operative prosthesis position achieved.

Disclosure: Professor Toms, Mr Eyres and Mr Mandalia all have educational contracts with Stryker.

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THE LINK™ HINGE TOTAL KNEE ARTHROPLASTY: MEDIUM TERM OUTCOMES

O. Blocker, D. Searle, K. Walmsley, K. Eyres, A. Toms, J. Phillips
Royal Devon and Exeter Hospital, Exeter Knee Reconstruction Unit, Exeter, United Kingdom

Background: Our department has used the Endo-Model LINK™ hinge total knee device for trauma, complex primary and revision arthroplasty. We report the largest known series of LINK™ devices from the UK. This study aimed to report the two- to seven- year survival of the LINK™ hinge device, in a large series of patients.

Methods: We prospectively collected data between 2011 and 2016, included patient demographics, device characteristics and patient reported outcome measures. We retrospectively reviewed electronic patient records and imaging systems. Data were analysed using spreadsheets and statistical software.

Results: There were 211 LINK™ devices implanted in 191 patients.

- The best survival was seen in older patients (> 80 years); no revisions
- Very good results were in trauma (n = 32), primary arthroplasty (n = 18), both 94% survival and first time revision surgery (n = 127), 91%
- Revisions for infection (n = 19) had good survival, 84%
- In total, 21 Link™ devices were revised. The most common reason was loosening (n = 13) followed by infection (n = 5). The commonest postoperative problem was extensor mechanism failure (n = 5) The mean Oxford Knee Score improved following surgery and EQ5D scores improved postoperatively up to one year.

Conclusions: We have a large, comprehensive series with minimum two-year follow-up of the LINK™ hinge in complex knee trauma and arthroplasty patients. Our results show excellent to good survival for all indications with improvement in patient reported outcome measures.

Implications: We recommend use of this implant particularly in complex primary TKR, as well as in the elderly patient after trauma requiring TKR or first time revision TKR.

Disclosure: Professor Toms, Mr Eyres and Mr Phillips all have an educational contract with LINK.

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MENISCAL ALLOGRAFT TRANSPLANTATION AS A BIOLOGIC TREATMENT OF THE MENISCAL DEFICIENT KNEE: A PROSPECTIVE SERIES WITH MEAN 33.7 MONTH FOLLOW UP

A. Mannan, K. Walmsley, P. Schranz, V. Mandalia
Royal Devon and Exeter Hospital, Exeter Knee Reconstruction Unit, Exeter, United Kingdom

Background: The meniscal deficient knee often exists in the setting of associated pathology including instability, malalignment and chondral injury. Meniscal allograft transplantation (MAT) is an established, reliable option in restoring function and treating symptoms. This study therefore, aimed to establish the role of MAT as part of a staged approach to treatment of the previously menisectomised knee.

Methods: Prospective study of all patients that underwent arthroscopic MAT at our institution between 2010 and 2017. Fresh frozen allograft was utilised using a soft tissue fixation technique. Data collected:

- Index surgical procedures before and after MAT
- Pre and post-operative knee injury and osteoarthritis outcome scores (KOOS), Tegner scores, graft survival, reoperation rates, patient satisfaction and MRI extrusion measurements
- Details of any further surgical intervention and / or complications.

Results:

- Twenty-seven MAT procedures were performed in 26 patients (16 male, 10 female)
- Mean age 31 years
- Follow-up 12 - 88 months (mean 33.7)
- Sixteen patients underwent lateral MAT and 11 patients medial
- Ten patients underwent ACL reconstruction, three had Autologous Chondrocyte Implantation and two underwent tibial osteotomy in the pre-MAT phase
- Seven patients underwent ACI within the post-operative phase
- Post-operative mean KOOS and Tegner scores improved significantly
- Graft survival 100%; satisfaction rate 92%
- Mean meniscal extrusion 3.04mm
- Post operatively, three patients required meniscal repair, two arthroscopic arthrolysis and one partial menisectomy of graft.

Conclusions: This series highlights the multifactorial profile of the meniscal deficient knee outlining MAT as a safe and reliable technique in the staged and comprehensive biologic treatment available to minimise symptoms and maximise outcomes.

Implications: Outcomes for the patient with a meniscally deficient knee can be improved with MAT.

Disclosure: Nothing to disclose.

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CHONDROGENESIS WITH STEM CELLS IN MASSIVE CHONDRAL DEFECTS - A RANDOMISED CONTROLLED TRIAL

K.-Y. Saw[1], R.C.S. Ng[1], C.S.Y. Jee[1], A. Anz[2]
[1]Kuala Lumpur Sports Medicine Centre, Kuala Lumpur, Malaysia, [2]Andrews Institute, Sports Medicine Orthopedic Surgery, Gulf Breeze, United States

Background: Knee joints with massive chondral defects in the younger population do not have a satisfactory treatment. We hypothesize that combining arthroscopic subchondral drilling with an autologous stem cell technology, post-operative intra-articular injections of autologous peripheral blood stem cells (PBSC), can address massive chondral defects of the knee joint. This is an on-going multicenter randomised controlled USFDA-Phase2B study, assessing clinical and radiological scores of chondrogenesis with stem cells as compared to the standard of care for massive chondral defects.

Methods: One hundred and twenty patients from two sites age 18-55 years with ICRS grade 3 and 4 chondral lesions (size ≥ 3cm^2) of the knee joint were recruited. Patients were randomised equally into (i) control group receiving intra-articular injections of HA plus physiotherapy (standard of care) and (ii) intervention group receiving arthroscopic subchondral drilling into chondral defects with post-operative intra-articular injections of PBSC combined with hyaluronic acid. Clinical IKDC and KOOS scores and radiological MOCART score were obtained pre and post-operatively.

Results: Thirty-one patients have reached two years follow-up at one of the sites with 15 in intervention group and 16 in control group. The early results show significantly higher mean IKDC, KOOS pain subdomain and MOCART scores at two years follow-up in intervention group when compared to control group ($p < 0.001$). There were no notable adverse events.

The results confirmed our hypothesis that chondrogenesis with stem cells has the ability to address massive chondral defects of the knee joint.

Conclusions: A combination of arthroscopic subchondral drilling into massive chondral defects followed by intra-articular injections of PBSC + HA showed a significant improvement of clinical and radiological scores as compared to the standard of care.

Implications: This method of chondrogenesis with stem cells has the potential to address other joints with massive chondral defects.

Disclosure: Nothing to disclose.

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DOES ROBOTIC TOTAL KNEE ARTHROPLASTY HAVE A LEARNING CURVE FOR ACCURACY OF IMPLANT POSITIONING? A PROSPECTIVE COHORT STUDY

B. Kayani, S. Konan, S. Huq, J. Tahmassebi, F.S. Haddad
University College London Hospital, Trauma and Orthopaedics, London, United Kingdom

Purpose: The primary objective of this study was to determine the effect of cumulative robotic total knee arthroplasty (TKA) experience on accuracy of implant positioning and limb alignment. Secondary objectives were to determine the learning curve of robotic TKA with respect to operative times, surgical team comfort levels, and postoperative complications.

Methods: This prospective cohort study included 60 consecutive conventional jig-based TKAs followed by 60 consecutive robotic-arm assisted TKAs performed by a single surgeon. Independent observers recorded surrogate markers of the learning curve including accuracy of implant positioning, limb alignment, operative times, stress levels amongst the surgical team using the state-trait anxiety inventory (STAI) questionnaire, and complications within 30 days of surgery. Cumulative summation (CUSUM) analyses were used to assess study outcomes.

Results: Cumulative robotic experience did not affect accuracy of implant positioning ($p = 0.45$), limb alignment ($p = 0.21$.) posterior condylar offset ratio ($p = 0.79$) posterior tibial slope ($p = 0.13$) and joint line restoration ($p = 0.62$). Robotic-arm assisted TKA was associated with a learning curve of seven cases for operative times ($p = 0.01$) and surgical team anxiety levels ($p = 0.02$) with no additional risk of complications compared to conventional jig-based TKA.

Conclusions: Implementation of robotic-arm assisted TKA does not have a learning curve for achieving the planned implant positioning or limb alignment but does lead to increased operative times and heightened levels of anxiety amongst the surgical team for the initial seven cases.

Clinical relevance: The findings of this study will enable clinicians and healthcare professionals to better understand the impact of implementing robotic TKA on the surgical workflow, assist the safe integration of this procedure into surgical practice, and facilitate theatre planning and scheduling of operative cases during the learning phase.

Disclosure: Nothing to disclose.

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CLINICAL RESULTS AND 12-YEAR SURVIVORSHIP OF THE PHYSICA ZUK UNICOMPARTMENTAL KNEE REPLACEMENT

J. Gill, P. Nicolai
West Suffolk Hospital NHS FT, Trauma and Orthopaedics, Bury St Edmunds, United Kingdom

Background: The Physica ZUK is a fixed bearing unicompartmental knee replacement. The purpose of this prospective cohort study was to determine the mid-term clinical outcomes and survivorship of the Physica ZUK.

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Patients and methods: From 2005 to 2017 a total of 466 Physica ZUK prostheses were implanted in 398 patients by a single surgeon. The series consisted of 452 medial and 14 lateral unicompartmental knee arthroplasties (UKAs). Three hundred and sixty-seven medial UKAs with a minimum follow-up of two years (median 5.4 years) and 14 lateral UKAs with a minimum follow-up of 18 months (median 5.3 years) were analysed using the Knee Society Knee Score (KS-KS) and Function Score (KS-FS) at latest follow up. Kaplan Meier survivorship analysis was performed with implant revision as the end point.

Results: Mean age at the time of surgery was 67 (range 42-88) and 58 (47-69) years for patients undergoing medial and lateral UKA respectively. For medial UKAs the KS-KS and KS-FS improved significantly compared to the pre-operative values from 53.6 and 54.0 to 93.4 and 91.0 respectively (p = 0.0001). For lateral UKAs the KS-KS and KS-FS improved significantly from 46.4 and 48.7 to 91.3 and 93.1 respectively (p = 0.0001). Six cases of medial UKA were revised to total knee arthroplasty. Medial implant survivorship was 97.9% (95% confidence intervals, 95.6-99.0%) at both five and 10 years. No lateral implants were revised.

Conclusions: This prospective cohort study shows encouraging short to mid-term clinical results and survivorship for the Physica ZUK unicompartmental knee replacement.

Disclosure: Nothing to disclose

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REVISION TOTAL KNEE REPLACEMENT: CAN GOOD OUTCOMES BE ACHIEVED AT LOW VOLUMES?

D. Haughton[1, 2], A. Wheelton[2], G. McLauchlan[1]
[1]Lancashire Teaching Hospitals, Preston, United Kingdom, [2]Health Education England - North West, Manchester, United Kingdom

Background: The 2018 NJR report demonstrates a survivorship of revision total knee replacement (TKR) of 90% at seven years. The 2015 GIRFT report highlighted that 58% of surgeons performing revision TKR had fewer than five cases per year. There is a move towards centralising these cases in high volume centres to improve outcomes. There remains no consensus on what defines high volume by surgeon or unit.

Methods: A retrospective review of all revision TKR surgery performed at our unit over 10 years to 2016 was undertaken. Primary outcome was survivorship. Basic demographics, length of stay and complications were also recorded. Hospital data as well as individual surgeon NJR data was used to ensure all re-revisions were accounted for.

Results: There were 211 revision TKR procedures performed by four surgeons; 116 females and 105 males. The mean (std dev) age at surgery was 69 years. Thirty patients had died at the time of review. There were 171 aseptic revisions, at mean of six years from the primary surgery. The majority (n = 84) were revised due to aseptic loosening. Eleven of these were subsequently re-revised, a further nine patients had complications requiring return to theatre. Forty patients were revised for infection (2-stage = 28, single stage = 2, DAIR = 10), with Staphlococcus Aureus the most common organism (n = 12). Three patients were re-revised or treated with antibiotic suppression due to ongoing infection (two from the DAIR group). Overall survivorship at ten years for aseptic revisions was 91.7%, septic revisions 92.3% with a combined figure of 91.8%.

Conclusions: Our survivorship compares favourably to the registry data. Revision TKR can be performed at low volumes with good results, as long as appropriate systems are in place. All our cases our discussed at a MDT preoperatively involving several orthopaedic consultants with the active involvement of microbiologists and radiologists.

Disclosure: Nothing to disclose.

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COMPARING MULTISITE COCKTAIL INJECTIONS WITH CANAL BLOCKS IN POSTOPERATIVE PAIN MANAGEMENT AFTER KNEE ARTHROPLASTY - IS THERE A WINNER?

V. Khanna[1], A.V.G. Reddy[2], S. Sankineani[2], D. Daultani[2], M. Shafeekh[2], K. Jhakotia[2], M. Sagi[2], K.K. Eachampati[3]
[1]Wrightington, Wigan and Leigh, NHS Foundation Trust, Edge Hill University, Wigan, United Kingdom, [2]Sunshine Hospital, Secunderabad, India, [3]Maxcure Hospital, Hyderabad, India

Background: Injections into periarticular structures have proved successful in postoperative pain management after total knee arthroplasty (TKA). Multisite infiltration analgesia (MIA) has emerged as a major pain-relief modality in this regard. Peripheral nerve blocks, such as the adductor canal block (ACB), have also shown promise in achieving similar results. We aimed to compare and contrast the efficacy of ACB versus MIA in postoperative analgesia and functional recovery after unilateral knee arthroplasty. It was our hypothesis that better overall results would be observed with MIA when compared to ACB.

Methods: Between July and December 2016, 200 patients undergoing unilateral TKA were recruited for this study after obtaining appropriate ethical clearance and informed consents. Patients were either administered MIA (Group MIA, n = 100) or ACB (Group ACB, n = 100). Pain scores were recorded using the visual analog scale (VAS) with 0 as the least and 10 being the worst imaginable pain. Measurements were done at eight, 24, and 48 hours postoperatively and knee range of motion (ROM) was recorded 48 hours after surgery. The statistical package for the social sciences (SPSS 19.0, SPSS Inc., Chicago, IL, USA) was used for descriptive and inferential analysis.

Results: Significantly better VAS scores at eight, 24, and 48 hours after surgery were seen in patients receiving MIA versus ACB (P = 0.004, P = 0.005, P = 0.005 respectively). MIA patients also enjoyed better ROM at 48 hours after surgery (74.10 versus 70.20; P = 0.047). The number of patients requiring rescue analgesia for breakthrough pain or the incidence of technique-related problems between both groups was not significantly different. Our hypothesis, therefore, proved correct.

Conclusions: MIA appears to be a safe technique ensuring effective analgesia at eight, 24, and 48 hours postoperatively. This leads to faster rehabilitation compared to ACB in patients undergoing TKA.

Implications: Excellent overall pain relief and comfort can be expected with MIA in total knee arthroplasty.

Disclosure: Nothing to disclose.

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MEDIAL BICOMPARTMENTAL ARTHROPLASTY RETAINS THE HIGH FUNCTIONING GAIT CHARACTERISTICS OF MEDIAL UNICOMPARTMENTAL ARTHROPLASTY FOR MULTI-COMPARTMENT GONARTHROSIS

A. Garner[1,2], R. Lambkin[1], J. Cobb[1]
[1]Imperial College London, London, United Kingdom, [2]Health Education Kent, Surrey and Sussex, London, United Kingdom

Introduction and aims: Medial bi-compartmental arthroplasty (BCA-M) is a bone and cruciate-sparing conservative alternative to total knee arthroplasty (TKA). Patients with medial and severe patello-femoral arthrosis but a functional anterior cruciate ligament (ACL) and healthy lateral compartment, undergo medial unicompartmental arthroplasty (UKA-M) and simultaneous patellofemoral arthroplasty (PFA). It is unclear whether this compartmental approach retains the known functional advantages in gait of UKA-M over TKA.

Materials and methods: Subjects whom had undergone BCA-M were measured on the instrumented treadmill and compared to matched UKA-M and TKA subjects. Standard metrics of gait were analysed in SPSS.

Results: Fourteen BCA-M patients, median 12 months post-surgery (range five to 62 months) were compared to matched UKA-M (n = 18) and TKA (n = 15) subjects. Median age of participants was 68yrs (48 - 83yrs), median BMI 28.4 (16.9 - 43.6). There were more females than males (BCA-M: 4:10, UKA 7:11, TKA 4:11).

Objectively, BCA-M walked as fast as UKA-M and 15% faster than TKAs (BCA-M 6.5m/s, UKA-M 6.4m/s, TKA 5.5m/s, p = 0.003). Twenty-nine percent of BCA-M (n = 4) and 28% of UKA-M (n = 5) walked faster than the fastest TKA. At top speeds, BCA-M demonstrated a significant functional advantage over TKA in ground reaction force (GRF) at heel strike (BCA-M Vs TKA p = 0.03) and mid-stance (BCA-M Vs TKA p = 0.03). BCA-M had longer stride lengths (BCA-M Vs TKA p = 0.04), contact time (BCA-M Vs TKA p = 0.02) and gait cycle time (BCA-M Vs TKA p = 0.03), similar to UKA-M. TKA failed to out-perform BCA-M or UKA-M in any metric of gait.

Discussion: BCA-M gait patterns mirrored UKA-M and were superior to TKA in this small study. The relevance of an intact ACL to gait is highlighted by faster speeds, near-normal GRFs and longer stride lengths.

Conclusions: This study details objective evidence of a functional advantage of conservative arthroplasty in the treatment of medial with lateral patellofemoral compartment arthrosis.

Disclosure: Nothing to disclose.

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ADDITION OF PARTIAL KNEE ARTHROPLASTY TO NEWLY DEGENERATE NATIVE COMPARTMENTS RETAINS A FUNCTIONALLY SUPERIOR GAIT COMPARED TO PRIMARY TOTAL KNEE ARTHROPLASTY

A. Garner[1,2], R. Lambkin[1], J. Cobb[1]

[1]Imperial College London, London, United Kingdom, [2]Health Education Kent, Surrey and Sussex, London, United Kingdom

Introduction and aims: Despite known functional advantages of partial knee arthroplasty (PKA), total knee arthroplasty (TKA) is often undertaken for single-compartment arthrosis, to avoid subsequent native compartment degeneration necessitating revision. Conversion to "combined partial knee arthroplasty" (CPKA) through the addition of a PKA to a newly degenerate native compartment in a knee with an existing PKA, is an alternative to revision to TKA. However, it is unclear whether there is a functional advantage of this "compartmental approach" compared to a primary TKA.

Materials and methods: Patients converted from PKA to CPKA were compared to matched primary TKA subjects on the instrumented treadmill, using standard metrics of gait.

Results: Sixteen subjects were measured following conversion of PKA to CPKA where the primary PKA was left untouched (UKA-M to Bi-UKA n = 6, UKA-M to BCA-M n = 1, UKA-L to Bi-UKA n = 5, UKA-L to BCA-L n = 3, PFA to BCA-M n = 1). Subjects were compared to matched primary TKAs (n = 16). Mean age 69yrs (p = 0.6), BMI 29 (p = 0.4); 44% male.

Objectively, CPKA walked 11% faster than TKA (top walking speed CPKA 6.3m/s, TKA 5.6m/s p = 0.009). Thirty-one percent of CPKA walked faster than the fastest TKA. At top speeds, CPKA demonstrated an advantage over TKA in terms of vertical ground reaction force at heel strike (p = 0.03), mid-stance (p = 0.03) and weight acceptance (p = 0.02). CPKA had median 5 centimetres longer stride lengths than TKA (p = 0.03) and approached significance for functionally advantageous push off force (p = 0.05).

Discussion: Addressing arthrosis "as and when" it occurs, retains the functional advantages of conservative surgery, despite additional procedures.

Conclusions: This small study suggests a compartmental approach results in functionally superior outcomes compared to a primary TKA.

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Abbreviations:
UKA-M: Medial Unicompartmental Arthroplasty
UKA-L: Lateral Unicompartmental Arthroplasty
BCA-M: Medial Bi-Compartmental Arthroplasty (UKA-M and PFA)
BCA-L: Lateral Bi-Compartmental Arthroplasty (UKA-L and PFA)
Bi-UKA: Bi-Unicondylar Arthroplasty (UKA-M and UKA-L).

Disclosure: Nothing to disclose.

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THE ADVANTAGES OF PROXIMAL FIBULAR OSTEOTOMY(PFO) IN TREATMENT PROTOCOLS FOR KNEE JOINT OSTEOARTHRITIS
A. Alkhuzai
Sulaimani University, Orthopaedic Department, Sulaymaniyah, Iraq

Background: Following the request at the 2018 BOA Annual Congress for clarification of the role of proximal fibular osteotomy (PFO) in the management of knee joint osteoarthritis, we have reviewed our experience using the osteotomy for correction of medial compartment compression in knees with a varus deformity.

Methods: 100 patients with different grades of knee joint osteoarthritis treated between January 2017 and January 2019 were identified. Patients were classified into two groups: group A, 50 patients with grade III, IV knee osteoarthritis who underwent PFO and group B, 50 patients underwent PFO with grade I, II knee joint OA. Both groups were followed up clinically, and radiologically to look at improvement of medial compartment OA. The modified Womac index, modified Lequesne´s index, and the American Knee Society activity scores were evaluated preoperatively and postoperatively.

Results: Pain relief was observed in almost all 100 patients with knee joint osteoarthritis of all grades for both groups. Most patients had improvement in gait postoperatively. The weight-bearing radiographs for both limbs showed increase in medial knee joint space postoperatively, plus correction of alignment for both patient groups. In both groups, A and B, there was a significant improvement in the mean of both modified Lequesne´s and modified WOMAC scores, and in gait as evaluated using the American Knee Society score. From baseline there were significant statistical, clinical plus functional outcome improvements at 12, 24 months for group A and group B (P-value < 0.0001). There was no major adverse event or complications notice post intervention.

Conclusions: This study confirms improvement in knee joint osteoarthritis, treated with a PFO, in terms of are pain relief, improved medial joint space, and improved functional outcomes with decreased stiffness rates in all grades of knee osteoarthritis.

Disclosure None

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THE RELATION OF GRAFT TYPE AND VANCOMYCIN PRE-SOAKING WITH RATES OF SEPTIC ARTHRITIS IN ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION: A META-ANALYSIS OF 185 STUDIES WITH 56,308 CASES
K. Kursumovic[1], C.P. Charalambous[2]
[1]West Suffolk Hospital NHS FT, Bury St. Edmunds, United Kingdom, [2]Blackpool Victoria Hospital, Trauma and Orthopaedics, Blackpool, United Kingdom

Background: Infection is a devastating complication in anterior cruciate ligament reconstruction (ACLR) surgery. Given its rarity, pooling individual studies via meta-analysis can allow more meaningful evaluation of factors influencing infection rates.

We aim to determine the relationship between graft type and vancomycin graft pre-soaking with rates of septic arthritis due to a bacterial infection following ACLR.

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Methods: A systematic literature search was conducted on PubMed, Ovid Medline, EMBASE, and CENTRAL. Included articles were those reporting on primary arthroscopic ACLR procedures using hamstring (HT) or bone-patella-tendon-bone (BPTB) autografts or allografts of any type, with reference to the outcome of deep infection or septic arthritis.

Meta-analyses were performed to estimate the overall infection rates in ACLR surgery according to graft type and to examine the effect of vancomycin pre-soaking of grafts on infection rates.

Results: We identified 258 bacterial infections in 56,308 grafts across 185 studies. The overall estimated ACL graft infection rate in our meta-analysis was 0.9% (95% confidence interval (CI) 0.8% - 1.0%). HT autografts were associated with a higher infection rate (1.0%, CI 0.9% - 1.1%) than BPTB autografts (0.6%, CI 0.5% - 0.8%) and allografts (0.6 %, CI 0.4% - 0.8%) ($Q = 15.74$, $P < 0.001$). Pre-soaking HT autografts in vancomycin reduced infection rates to 0.1% (CI 0.0% - 0.3%) ($Q = 12.66$, $P< 0.001$).

Conclusions: Septic arthritis following ACLR remains a rare but serious complication. There is a higher infection rate with HT autografts compared to both allografts and BPTB autografts, the reason for which is unclear and warrants further research. Pre-soaking HT autografts with vancomycin, however, reduces infection rates by an estimated tenfold.

Implications: The results of our study may aid informed discussions between surgeons and patients about the risk of infection after ACLR and graft choice. We recommend vancomycin pre-soaking of autografts as routine practice in ACLR surgery.

Disclosure: Nothing to disclose.