European Knee Society

BRITISH ASSOCIATION FOR SURGERY OF THE KNEE

EKS Closed Meeting
EKS - BASK Combined Meeting

5-6 December 2019
London, UK

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The European Knee Society Board 2019

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2014   Jean-Noël Argenson

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2016   Jan Victor

2017   Chris Dodd

2018   Andrea Baldini

Dear Colleagues,

It is our pleasure to welcome you to the **European Knee Society Closed Meeting and EKS-BASK Combined Meeting** in London.

We received more than 50 abstracts and sincerely thank all EKS members for their contributions. We hope having succeeded in putting together an interesting scientific programme with a balance between free papers and the EKS-BASK Consensus Meeting.

We already wish to thank the speakers in advance to keep to the time and the moderators who accepted to implement the time schedules.

We also hope the meeting will be the place for exchange between members during the social events with a welcome dinner on Wednesday and the EKS-BASK gala dinner on Thursday.

This closed meeting will be an excellent occasion to socialise with your peers during the meeting and dinners.

Welcome to London!

With our very best regards,

Emmanuel Thienpont   Andrew Price
EKS President   BASK President and Local Host

Wednesday, 4 December

Arrival of the EKS Members

19.45 hrs   Meet Sophie in the lobby of the Pullman London St Pancras Hotel

20.00 hrs   EKS Dinner at Camino
Address: The Regent Quarter 3 Varnishers Yard, London N1 9FD

Thursday, 5 December
EKS Closed Meeting

08.30 hrs	Registration	**Nobel Suite 1**

08.45 hrs   Welcome by the EKS President and local hosts

Free Paper Session I – Revision Surgery
Moderators: Fabio Catani and Andrew Price

09.00 hrs   **Tantalum cones in revision Total Knee Arthroplasty at minimum 10-year follow-up**
Ivan de Martino

09.06 hrs   **Low hospital volume increases re-revision rate following aseptic revision Total Knee Arthroplasty: An analysis of 23.644 cases based on German insurance data**
Andreas Halder

09.12 hrs   **Does the RKCC (Revision Knee Complexity Classification) predict clinical and functional outcome of Revision Knee Arthroplasty? Analysis of a cohort of revised TKAs with 5 year clinical outcome**
Andrew Porteous

09.18 hrs   **Extensor mechanism allograft reconstruction is safe and reliable both in septic and aseptic revision of Total Knee Arthroplasty**
Alfredo Lamberti

09.24 hrs   **A new laboratory-based α-defensin measurement for the diagnosis of periprosthetic knee infections**
Giovanni Balato

09.30 hrs   Discussion

Free Paper Session II – Robotic Surgery
Moderators: Andrea Baldini and Andrew Porteous

09.45 hrs **Decreased rate of femoral under-sizing with robotic-assisted surgical technique compared to conventional technique in the medial unicompartmental knee arthroplasty**
Sebastien Lustig

09.51 hrs **Cost-effectiveness of robotic arm-assisted TKA**
Bernhard Christen

09.57 hrs **Robotic-arm assistance restores posterior and distal lateral femoral offset in anatomically aligned Total Knee Arthroplasty**
Fabio Catani

10.03 hrs **Learning curve of robot-assisted Total Knee Arthroplasty**
Thomas Luyckx

10.09 hrs **Early experience of robotic assisted patella-femoral Arthroplasty: correlation of preop planning and intraop implant position**
Jonathan Phillips

10.15 hrs Discussion

10.30 hrs Coffee Break

Free Paper Session III – Partial and Bi-Compartmental Arthroplasty
Moderators: Jonathan Eldridge and Gijs van Hellemondt

11.00 hrs   **A 5-year comparison of Cementless and Cemented Unicompartmental Knee Replacement**
Chris Dodd

11.06 hrs   **Bi-Unicondylar Arthroplasty: The gait, PROMs and biomechanics of an alternative to Total Knee Arthroplasty**
Justin Cobb

11.12 hrs   **Medium term results of PFR for isolated PFOA secondary to dysplasia**
Emmanuel Thienpont

11.18 hrs   **Early results of a fixed bearing unicompartmental knee replacement designed for the lateral compartment**
William Jackson

11.24 hrs   **Patello-femoral arthroplasty for treatment of isolated patella-femoral OA-analysis of 76 knees with 1-12 (mean 5.7) years follow-up**
Kjell G. Nilsson

11.30 hrs   Discussion

Free Paper Session IV – Enhanced Recovery and Peri-Operative Care
Moderators: Andrew Price and Emmanuel Thienpont

11.45 hrs **Why still in hospital after fast-track unilateral unicompartmental knee arthroplasty**
Kirill Gromov

11.51 hrs **Recovery in fast-track Total Knee Arthroplasty is not influenced by a modern use of tourniquet**
Andrea Baldini

11.57 hrs **Cardiac impact of high-volume local infiltration anesthesia in TKA and BSTKA**
Christian Skovgaard Nielsen

12.03 hrs **Patient satisfaction and risk of falls with the use of intermittent pneumatic compression devices following total joint arthroplasty**
William Macaulay

12.09 hrs **Full component revision total knee replacements have similar recoveries compared with**
David Dalury

12.15 hrs Discussion

12.30 hrs Lunch

Free Paper Session V – Kinematic Alignment
Moderators: Francesco Benazzo and Will Jackson

14.00 hrs   **Relation between joint line restoration, morphotype and joint line orientation to the floor and clinical results after mechanical aligned Total Knee Arthroplasty**
Ate Wymenga

14.06 hrs   **Kinematically versus mechanically aligned medial pivot design TKA: Case control study**
Charles Rivière

14.12 hrs   **Lower-limb alignment is strongly explained by femoral and tibial abnormalities but not related to demographic and ethnic parameters - A machine learning analysis of a 3D CT database automated extraction**
Matthieu Ollivier

14.18 hrs   **Utilization of computed tomography to determine differences in mechanical and kinematic alignment in patients undergoing primary Total Knee Arthroplasty**
Martin Roche

14.24 hrs   **Population-based effect of post-operative alignment on tibial bone remodelling following TKA**
Nico Verdonschot

14.30 hrs   Discussion

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Free Paper Session VI – Knee Arthroplasty
Moderators: David Barrett and Nick London

14.45 hrs   **Asymmetric vs symmetric polyethylene inserts in mobile bearing TKA, a clinical and biomechanical study**
Bernardo Innocenti

14.51 hrs   **Lack of correlation between knee symptoms, radiographic and gross findings among patients undergoing TKA for osteoarthritis**
David Dalury

14.57 hrs   **Knee arthroplasty system with medialized keel: Follow-up at 5 years of a pioneer cohort**
Francesco Benazzo

15.03 hrs   **Clinical outcome of posterior stabilized total knee replacement using an increased flexion gap in patients with preoperative stiffness**
Friedrich Boettner

15.09 hrs   **Use of two tibial hemi-trays in anterior cruciate retaining Total Knee Arthroplasty**
Philippe Massin

15.15 hrs   Discussion

15.30 hrs   Coffee Break

16.00 hrs   **Briefing for EKS and BASK Consensus Meeting**

16.30 hrs   **EKS General Assembly**

17.30 hrs   End

19.00 hrs   EKS / BASK Gala Dinner at Renaissance Hotel
Address: Euston Road (next to the Pullman Hotel)

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Friday, 6 December
Combined EKS and BASK Consensus Meeting

08.30 hrs   Welcome by the Presidents of BASK and EKS   **Nobel Suite 1**

08.35 hrs   Outline of the day – Aims and process
Andrew Price

Session I – Revision: Revisions knee surgery – How do we improve provision of care

08.45 hrs   Andrew Porteous (BASK)

08.55 hrs   Gijs Van Hellemondt (EKS)

09.05 hrs   Discussion

Session II – Increasing usage of UKA – How do we prepare for and maintain safe UKA practice?

10.00 hrs   Andrew Price (BASK)

10.10 hrs   Anders Troelsen (EKS)

10.20 hrs   Discussion

11.15 hrs   Coffee Break

Session III – Patello-femoral: Key-issues in performing patello-femoral joint replacement?

11.30 hrs   Andy Metcalfe (BASK)

11.40 hrs   Jonathan Eldridge (EKS)

11.50 hrs   Discussion

13.00 hrs   Lunch

14.00 hrs   Summary of outputs from morning sessions and steps to publication

15.00 hrs   End

Social Events

4 December 2019   EKS Dinner

19.45 hrs   Meet Sophie in the lobby of the Pullman London St Pancras Hotel

20.00 hrs   EKS Dinner at Camino
Address: The Regent Quarter 3 Varnishers Yard, London N1 9FD

5 December 2019   EKS-BASK Gala Dinner

The Gala Dinner on Thursday, 5 December will be held at the Renaissance hotel.

Please join us at 19.00 hrs at the Renaissance Hotel.
The hotel is located on your left side when walking to the St. Pancras Station (3 min walk).

Cancellation Policy
Dinners of partners can be cancelled until 18 November 2019. No refunds will be made after this date.

Booking Procedure and Cancellation Policy

EKS Members can choose to stay at the Pullman London St Pancras hotel. Members having booked a room in another hotel will not receive a refund.

Availability
The hotel has a limited number of rooms and rooms are allocated on a first-come, first-served basis. We strongly advise to book your room as soon as possible.

Extend your stay
If you wish to extend your stay before or after the proposed dates, you can contact the EKS Secretariat (Astrid) by email on eks@medicongress.com or by telephone on +32 (0) 9 218 85 84.

What does EKS cover?
The EKS covers the gala dinner for the EKS Members and a maximum of 2 nights hotel accommodation. The additional cost for partners (£10,00/ night) must be paid by the participant himself upon check out.

Liability
The EKS cannot be held responsible if the hotel no longer has availability when registering.

Insurance
Participants should organise their own health, travel and personal insurances.

Payment
Social events must be paid through the online registration form provided by the EKS within 30 days and before 18 November, 2019.
Hotel accommodation must be booked through the online registration.
A credit card number will be requested upon registration to serve as a guarantee for your participations and hotel booking. The cancellation policy is mentioned below.

Cancellation Policy
Registration
Cancellations are accepted until 22 October 2019. Cancellations received after this date will be charged in full. Cancellations must be done in writing to eks@medicongress.com and are valid upon confirmation by the Secretariat.
The cancellation fee is **€ 500,00** for the costs made by the EKS (dinners, meeting room rental, coffee breaks,…)
A credit card will be asked upon registration to serve as a guarantee for your participation into the EKS Closed Meeting - Combined with BASK.

By registering for the EKS Closed Meeting - Combined with BASK in London on 5-6 December 2019 you agree to the above mentioned procedure and policies.

Accessibility

- **London Heathrow Airport**
  From London Heathrow, the easiest way to get to the venue is to take a taxi (26 km) or to use the underground line.

Heathrow terminals - Hatton Cross Station - Green Park Station - London King's Cross
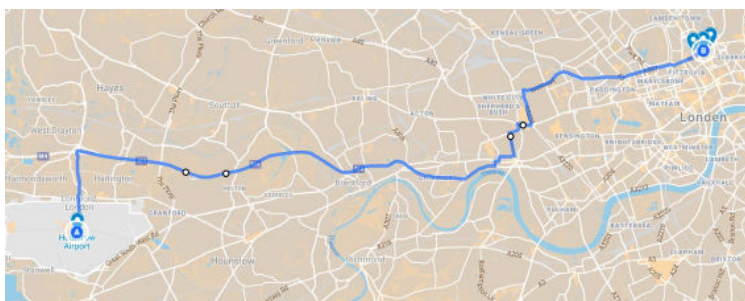
- **King's Cross Underground station (0.2 km)**
  From the train station to the hotel it will take only a few minutes to get to the Pullman. You will arrive in the same street of the venue.

- **Euston train station (0.5 km)**
  The train station is at a 5 minute walk of the Pullman London St Pancras hotel.

Abstracts of the Free Paper Sessions

SESSION I: Revision Surgery

Tantalum cones in revision Total Knee Arthroplasty at minimum 10-year follow-up

Ivan De Martino[1,2], Fabio Mancino[1], Rocco D'Apolito[4], Peter K. Sculco[2], Vincenzo De Santis[1], Giorgio Gasparini[3]

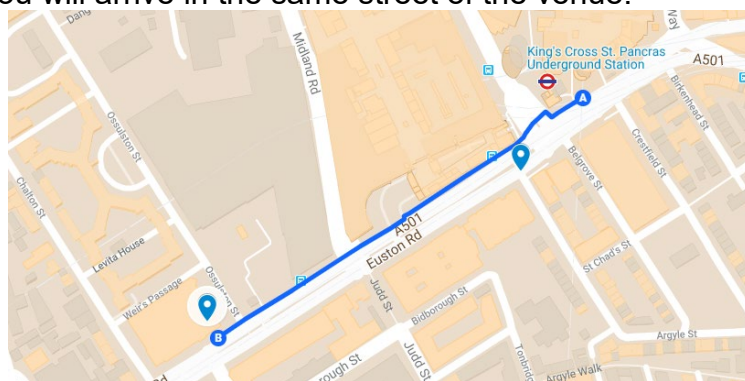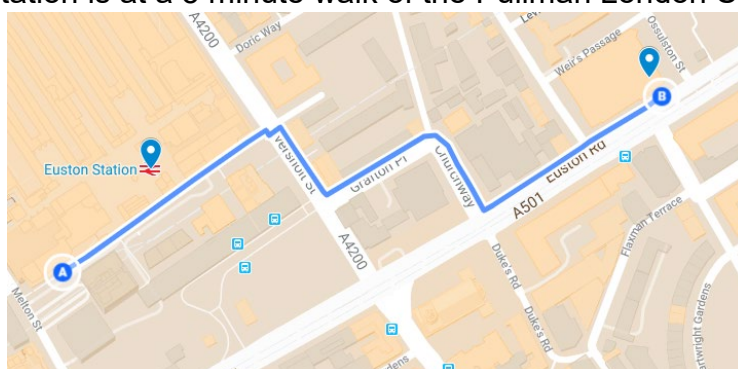[1]Fondazione Policlinico Universitario Agostino Gemelli IRCSS, Roma, Italy; [2]Complex Joint Reconstruction Center, Hospital for Special Surgery, New York, USA; [3]University of Catanzaro Magna Grecia,Catanzaro, Italy; [4]Istituto Ortopedico Galeazzi IRCCS, Milano, Italy

Aim:
Multiple studies have reported favorable mid-term results using tantalum cones in massive bone defects reconstruction during revision TKA. Longer-term follow-up is missing. The purpose of this study was to assess the minimum 10-year clinical and radiographic results of tantalum cones implantation.

Methods:
Eighteen patients who underwent reconstruction of massive bone defects (AORI Type 2B and 3) with tantalum cones in revision TKA were reviewed at a minimum 10-year follow-up. After the exclusion of patients who died (4 out of 18) and patients lost to follow-up (2 out of 18) 12 patients were left for evaluation (67%). Two patients underwent reoperation for recurrent infection after 8 and 36 months from index surgery. This left 10 patients for further evaluation with 13 total cones (8 tibial and 5 femoral). Survivorship and re-revision rate were observed. Knee Society Score was assessed.

Results:
Two patients had a revision because of aseptic loosening and infection. The cones that were removed showed osseointegration. Cone survivorship at 10-year was 69% (9 of 13 cones). The mean KSS score was 71 points.

Conclusion:
Tantalum cones for reconstruction of massive bone defects provided secure fixation with good results at minimum 10-year follow-up.

Low hospital volume increases re-revision rate following aseptic revision Total Knee Arthroplasty: An analysis of 23.644 cases based on German insurance data

Andreas M. Halder[1], Thorsten Gehrke[2], Christian Günster[3], Karl-Dieter Heller[4], Hanna Leicht[3], Jürgen Malzahn[5], Fritz Uwe Niethard[6], Peter Schräder[7], Joseph Zacher[8], Elke Jeschke[3]

[1]Dept. of Orthopaedic Surgery, Sana Kliniken Sommerfeld; [2]Dept. of Orthopaedic Surgery, Helios ENDO-Klinik Hamburg; [3]Research Institute of the Local Health Care Funds, Berlin; [4]Dept. of Orthopaedic Surgery, Herzogin Elisabeth Hospital, Braunschweig; [5]Federal Association of the Local Health Care Funds, Berlin; [6]German Society of Orthopedics and Orthopedic Surgery, Berlin; [7]Dept. of Orthopaedic Surgery, Kreisklinik Jugenheim, Jugenheim; [8]Dept. of Orthopaedic Surgery, Helios Kliniken GmbH, Berlin, Germany

Background:
With the number of primary total knee arthroplasty (TKA) the amount of revision TKA (R-TKA) increases. R-TKA is a complex procedure requiring special instruments, implants and surgical skills. Therefore it is likely that hospitals with more R-TKAs have more experience with this type of surgery and therefore fewer complications. The purpose of this study was to evaluate the relationship between hospital volume and re-revision rate following R-TKA.

Methods:
Using nationwide healthcare insurance data for inpatient hospital treatment, 23,644 aseptic R-TKAs in 21,573 patients treated between January 2013 and December 2017 were analyzed. Outcomes were 90-day mortality, 1-year re-revision rate, and in-house adverse events. The effect of hospital volumes on outcomes were analyzed by means of multivariate logistic regression. Adjusted odds ratios (OR) and 95% confidence intervals (CI) were calculated.

Results:
Hospital volume had a significant effect on 1-year re-revision rate (≤ 12 R-TKA/a: OR 1.44, CI 1.20-1.72; 13-24 R-TKA/a: OR 1.43, CI 1.20-1.71; 25-52 R-TKA/a: OR 1.13, CI 0.94-1.35; ≥ 53 R-TKA/a: reference). 90-day mortality and major in-house adverse events decreased with increasing volume, but after risk-adjustment this was not statistically significant.

Conclusion:
We found evidence of higher risk for re-revision surgery in hospitals with fewer than 25 R-TKA per year, respectively. To improve patient care, complex elective procedures like R-TKA which require experience and a specific logistic background should be performed in specialised centers.

Does the RKCC (Revision Knee Complexity Classification) predict clinical and functional outcome of revision knee arthroplasty? Analysis of a cohort of revised TKAs with 5 year clinical outcome

Andrew Porteous
Southmead Hospital, Bristol, UK

Introduction:
The RKCC was developed to stratify complexity of revision TKA cases to aid triage to appropriate units.

Methods:
A cohort of 85 revision TKA cases from 2012, were retrospectively classified according to RKCC. Complexity of surgery and outcome were assessed prospectively at with: Oxford Knee, WOMAC and American Knee Society (AKS) Scores, prior to revision, and at one, and five years.

Results:
The majority of revisions were due to aseptic loosening (34 %), followed by malposition (17 %), then instability and infection. 36 cases (47%) were classified as R1, 28 cases (37%) as R2, and 12 cases (16%) as R3.
Cases classified as R2 and R3 required significantly more complex prostheses than R1, with more than 80 % patients in the R3 group requiring constrained prosthesis (hinged or CCK), versus 40 % in R2 and 19 % in R1.
There was a significant difference of the AKS between R1 &R2 versus R3 at pre- op, one year and five years follow up (R3 worse).

Conclusion:
This study helps validate the RKCC's ability to predict the complexity of the operative procedure and post-operative outcomes.

Extensor mechanism allograft reconstruction is safe and reliable both in septic and aseptic revision of Total Knee Arthroplasty

Alfredo Lamberti[1], Pierpaolo Summa[1], Francesco Traverso[2], Andrea Baldini[1]
[1]Institute for Complex and Revision Arthroplasty-IFCA Clinic, Florence; [2]Istituto Clinico Humanitas, Rozzano, Italy

Aim:
The purpose of this study was to assess the survival and functional outcomes of allograft reconstruction of the extensor mechanism (AREM) in the case of septic and non-septic failure following total knee arthroplasty (TKA).

Method:
From 2005 to 2017, 35 TKA patients underwent an AREM. Thirteen patients had a periprosthetic joint infection (PJI group), and they were all managed with a two-stage revision. In twenty out of the twenty-two non-infected cases (non-PJI group) the implant was revised. Preoperatively the range of motion and the degree of extensor lag were measured, and the Knee Society clinical rating score (KS) was recorded. At each follow up clinical outcomes, including survivorship, Knee Society Score (KSS) results, and complications, were assessed.

Results:
Twenty-six reconstruction were well functioning at the last follow-up, 8 in "PJI group" and 18 in "non-PJI group". At 10 years, the overall survival was 57.7% in "PJI group" and 68.2% in "non-PJI group". Survivorship free of extensor mechanism failure was 80 % in "PJI group" and 68.2% in "non-PJI group". Survivorship free of failure for causes non-related to the extensor mechanism was 71.4% in "PJI group" and 100% in "non-PJI group". No recurrence of infection was observed in "PJI group". The mean KSS improved from 27 to 79 points in "PJI group" and from 36 to 86 points in "non-PJI group". The mean extensor lag improved from 56° to 6 ° in "PJI group" and from 47° to 4° in "non-PJI group".

Conclusions:
AREM is safe and reliable both in septic and aseptic revision of total knee arthroplasty. The use of an extensor mechanism allograft in a two-stage revision of septic TKA does not increase the risk of re-infection.

A new laboratory-based α-defensin measurement for the diagnosis of periprosthetic knee infections

Giovanni Balato[1], Fiamma Balboni, Paola Pezzati, Riccardo Dall'Anese, G. Bartolini, Andrea Baldini
[1]Dept. of Public Health, Orthopedic Section, Federico II University, Naples, Italy

Aim:
The diagnosis of PJI still represents a clinical challenge even new biomarkers have been proposed. The synovial fluid alpha-defensin detection, may play crucial role in this field. This prospective study was undertaken to evaluate the diagnostic accuracy of high performance liquid chromatography coupled to mass spectrometry to detect alpha-defensin in synovial fluid in patients with painful total knee arthroplasty.

Method:
All patients who underwent revision total knee arthroplasty (TKA) from October 2016 to September 2018 were included. The Musculoskeletal Infection Society (MSIS) modified diagnostic criteria were used to classify 44 PJIs and 74 aseptic joints. Mass spectrometry (MALDI-TOF) was subsequently performed to discover a characteristic neutral loss to finally determine alpha-defensin. Sensitivity, specificity, positive predictive value, and negative predictive value were calculated using 2 × 2 contingency tables. Area under the ROC curve (AUC) was assessed to better evaluate the diagnostic accuracy of the test.

Results:
ROC curve showed that the cut-off value of SF concentration of alpha defensin was retrieved to be 0.73µg/L. The AUC of alpha-defensin was 0.96 (95%; CI: 0.92 – 1,0). The sensitivity of α-defensin was 100% (95%; CI: 96- 100), the specificity was 92% (95% CI: 85- 96), the positive predictive value 88% (95% CI: 80- 93), and negative predictive value was 100% (95% CI: 96- 100).

Conclusions:
The present study confirms the adequate ability of MALDI-TOF to detect alpha-defensin in synovial fluid in patients with PJI. Further studies are needed to evaluate the performance of this laboratory method to define its accuracy and its role in the diagnosis of infected arthroplasty.

SESSION II: Robotic Surgery

Decreased rate of femoral under-sizing with robotic-assisted surgical technique compared to conventional technique in the medial unicompartmental knee arthroplasty

Sébastien Lustig, Elvire Servien, Cécile Batailler
Lyon Croix Rousse University Hospital, Lyon, France

Aim:
Achieving the ideal component size is difficult in unicompartmental knee arthroplasty (UKA), especially for the femoral implant. Anatomical variance, incremental implant sizes, and minimal surgical exposure leads to over or under-sizing of components.
The purpose was to compare the accuracy of UKA sizing in a study of robotic-assisted surgical technique versus conventional technique.

Methods:
We performed 295 medial UKAs between 2011 and 2018 (159 robotic-assisted UKA, 136 conventional UKA). There were no demographic differences between groups. The mean age was 67.6 years old. We measured and compared seven parameters on postoperative radiographs to assess UKA sizing. Incorrect sizing was defined by an overhang or under-sizing of 3mm to the superior, anterior, posterior or medial cortex.

Results:
There was a higher rate of femoral undersizing in the conventional group than in the robotic-assisted group, mainly for the posterior portion of the femoral implant (23.9% in control group versus 6.9% in robotic group; p<0.001). The posterior femoral under-sizing was mean 3.8mm in robotic group versus 4.9mm in conventional group. There was no significant difference on the tibial implant sizing between both groups.

Conclusion:
Robotic-assisted surgical technique for medial UKA decreases the risk of femoral undersizing.

Cost-effectiveness of robotic arm-assisted TKA

Tilman Calliess[1], Benjamin Wüthrich[2], Bernhard Christen[1]
[1]Articon Specialists for Joint Surgery, Berne; [2]Berne University of Applied Sciences, Berne, Switzerland

Introduction/Aim:
Recently, we have shown the additional costs for robotic arm-assisted TKA (RA-TKA) with 2´794 $ compared to manual standard procedure (EKS Closed Meeting Megève 01/19). Now, the question is if said technology could save costs by reduction of early revision after primary TKA and/or improved quality of live for the patients.

Methods:
The methodology is based on the Markov-Modell analyzing the costs per QUALY (quality-adjusted life-years), which is a generic measure of disease burden. In literature, it has been used to assess the value for money of medical interventions. Basic assumption is, that cost per additional QUALY of less than 58´000 $ are cost-effective for the community.
In our calculation, the prior evaluated costs for TKA, RA-TKA and Revision-TKA are included. The actual demographics and numbers for TKA and age-adjusted revision rate are derived from of the Swiss Implant Register (SIRIS). Data regarding the life-quality is taken from the Swedish Knee Arthroplasty Register.
The influence of following variables are evaluated regarding the cost-effectiveness: hospital volume, patient age, reduction of revision rate, and improvement of life-quality compared to standard TKA.

Results:
Even a maximum imaginable reduction of the revision rate in TKA by -66% within the first 2 years and 36% afterwards does not lead to an economic benefit of the RA-TKA. The QUALY improvement per case is calculated with +0.004 points in the best-case scenario (high volume unit and young female patient), still resulting in a value of 213´562 $ per additional QUALY. Taking the life-quality as the variable, the analysis shows, that a slight additional QUALY improvement is necessary to achieve cost-effectiveness. This can be achieved if the amount of unicondylar prosthesis is increased by only 3% in young male and up to 40% in old men.

Conclusion:
Our analysis shows, that improving the patients' quality of life has a much larger impact on cost-effectiveness of technology used to implant knee prosthesis, than has the sole reduction of revision rate. As a larger amount of unicondylar prosthesis is the easiest way to achieve higher quality of life in today's patient collective, the main story for robotic-assisted knee arthroplasty is to make this operation safer and to get better confidence for the surgeon to go for a UNI solution.

Robotic-arm assistance restores posterior and distal lateral femoral offset in anatomically aligned total knee arthroplasty

Fabio Catani[1], Andrea Ensini[1], Francesco Zambianchi[1], Andrea Illuminati[1], Marco Pavesi[2]
[1]Dept. of Orthopaedics and Traumatology, University of Modena and Reggio-Emilia, Modena; [2]Ab Medica, Cerro Maggiore (MI), Italy

Aim:
To evaluate the restoration of posterior and distal lateral femoral offset in patients undergoing robotic arm-assisted total knee arthroplasty (TKA) after fine-tuning according to soft tissue tensioning, aiming for TKA anatomical alignment.

Methods:
Fifty-nine consecutive patients undergoing robotic arm-assisted TKA between September 2018 and October 2019 were included. Cuts were planned based on radiographic and CT epiphyseal anatomies and respecting ±3° boundaries from neutral coronal alignment. The tibial and femoral cuts were performed based on the intra-operative fine-tuning, aiming symmetric medial and lateral gaps in flexion/extension. Bone cut and residual cartilage thicknesses were recorded and compared with prosthetic implant thicknesses.

Results:
Only varus knees, 43 cases, were taken into account. On average, the Δ between component thickness and the sum of residual cartilage and resected bone resulted 0.6mm±2.0 and 0.8mm±2.1 on the distal lateral and medial condyles respectively. Relative to posterior cuts, the Δ between implant and resection thickness was 1.0mm±1.8 laterally and -2.1mm±2.7 medially. As for the tibial cut, the Δ between implant and resection thickness was on average 0.9mm±1.9 laterally and 4.9mm±1.6 medially.

Discussion:
The soft-tissue guided robotic-arm assisted TKA technique, aiming for ligaments' preservation and anatomical alignment, restored the distal and posterior lateral femoral offset within 1 mm, after implant positioning.

Learning curve of robot-assisted Total Knee Arthroplasty

Hannes Vermue[1], Philip Winnock de Grave[2], Alexander Ryckaert[2], Peter Stuer[2], Paul Gunst[2], Jan Victor[1], Thomas Luyckx[2]
[1]Ghent University Hospital, Gent; [2]AZ Delta, Roeselare, Belgium

Aim:
The aim of this study was to evaluate the learning curve of robot-assisted total knee arthroplasty (TKA) in a non-teaching hospital.

Method:
A retrospective analysis of total knee surgeries after the introduction of the MAKO robotic platform (Stryker, Michigan, USA) was performed. In total, TKA cases of six fellowship-trained knee surgeons were included. Cumulative summation (CUSUM) analyses were used to assess incremental changes in operative time and implant positioning during progression of the robotic TKA learning curve.

Results:
A clear inflexion point was observed in three out of six surgeons after 11, 21 and 43 cases. Two surgeons performed 8 and 20 cases respectively, without an explicit learning curve. The operative time showed no obvious learning curve in one surgeon with over 40 cases.
No clear learning curve was seen regarding preoperative versus postoperative LDFA, MPTA, PDFA or tibial slope for all surgeons.

Conclusions:
The operative time of a TKA with robotic-assistance shows a learning curve. Individual femoral and tibial implant positioning in the coronal and sagittal plane was not affected by a learning curve.

Early experience of robotic assisted patello-femoral arthroplasty: Correlation of preop planning and intra op implant position

Veenesh Selvaratnam, Andrew Cattell, Keith Eyres, Andrew Toms, Jonathan Phillips, Vipul Mandalia
Nuffield Health Exeter Hospital, England

Aim
Robotic-assisted knee arthroplasty may improve implant positioning and alignment. This study reports the early outcomes and compares the Mako pre-operative implant planning to the intra-operative PFA implant position.

Methods
Prospective data was collected for 25 patients who underwent Robotic Assisted PFA from 2017 to 2019.

Results
19 female and 6 male patients with a mean age of 66 (41-92) years at a mean follow-up of 22 (range:13-31) months. Nineteen patients had evidence of trochlear dysplasia. The anterior trochlear line was mean 7.71°(3.3°-11.3°) internally rotated to the surgical transepicondylar axis and on average 2.9°(0.2°-6.5°) internally rotated to the posterior condylar line. The 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) and 0.34(-0.7 to 1.9) mm for proudness(r=0.80).
The mean pre-operative OKS was 17(7-42) and the mean post-operative OKS was 41(13-48).
No patients have demonstrated radiological loosening or undergone revision surgery.

Conclusion
Our early results of robotic PFA are promising. Mako planning correlates closely with intra-operative positioning. Longer follow-up is needed to assess long-term patient outcomes and implant survivorship.

SESSION III: Partial and Bi-compartmental Arthroplasty

A 5 year comparison of cementless and cemented unicompartmental knee replacement

B. Martin, Cathy Jenkins, Stephen Mellon, Karen Barker, Chris Dodd, William Jackson, Andrew Price, David Murray

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Aim:
To compare the outcome of cementless and cemented medial Unicompartmental Knee Replacement (UKR) at five years follow-up.

Methods:
267 Cemented and 278 Cementless Oxford UKR implanted by four high volume surgeons were reviewed by independent physiotherapists at 5 years. The assessment included: revision, re-operation, complications, Oxford Knee Score (OKS), American Knee Society score (AKS), EQ-5D and two pain scores, Pain Detect (PD) and Intermittent and Constant Osteoarthritis Pain (ICOAP). The cemented cohort was mainly implanted before the Cementless. To explore whether differences were due to progressive improvement in surgical practice with time each cohort was divided into early and late subgroups, and all subgroups were compared.

Results:
There were no significant differences between the devices for: revision rate (0.8%), re-operation rate (2.2%) or medical complication rate (4%). The Cementless had significantly better OKS (43 v 41), AKSS and EQ5D (p<0.05). It also had significantly less unexplained pain (2.3% v 6%), less 'strongest' and 'average' pain (PD) and less 'chronic' and 'intermittent' pain (ICOAP). Subgroup analysis suggested the differences were due to fixation method, as opposed to improving surgical technique over time.

Conclusion:
Cementless UKR is associated with better function and less pain than cemented UKR.

Bi-Unicondylar Arthroplasty: The gait, PROMs and biomechanics of an alternative to total knee arthroplasty

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Introduction:
Medial and lateral tibiofemoral arthrosis may be treated by Bi-Unicondylar Arthroplasty (Bi-UKA). Little is known of the functional outcomes or biomechanics of this procedure.

Methods:
Sixteen subjects with a Bi-UKA were measured on an instrumented treadmill at self-selected Top Walking Speeds, compared with healthy controls (n=16) and primary TKA subjects (n=16). Bi-UKA and then TKA were also performed on eight fresh frozen cadaveric knees to investigate knee extensor mechanism efficiency under controlled laboratory conditions.

Results:
Bi-UKA walked at 6.6m/sec, while TKA patients walked 20% slower at 5.4m/sec. Bi-UKA patients also exhibited nearer-normal Ground Reaction Forces, and stride lengths, along with higher OKS and EQ-5D (all $p<0.05$). In the cadaveric model, Bi-UKA generated the same extensor moment as native knees at flexion angles within a typical gait range of motion, whereas the extensor mechanism following TKA was less efficient than both the native and Bi-UKA ($p<0.05$).

Discussion:
The higher function in gait during early stance following Bi-UKA compared to TKA can be explained in part by the improved extensor mechanism efficiency following this procedure. Bi-UKA can result in superior function and higher satisfaction than TKA in treatment of medial and lateral tibiofemoral arthrosis and warrants further investigation.

Medium term results of PFR for isolated PFOA secondary to dysplasia
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Background:
Patellofemoral (PF) dysplasia often leads to isolated PFOA at middle age with active patients asking for a high-performance solution. The PFJ-gender implant (Zimmer Biomet) is a third generation, fully instrumented, onlay prosthesis.
The research question of this retrospective study was whether the functional outcome of PFR was better than treatment with TKR. The secondary outcome was revision for all causes.

Materials & Methods:
During a 10-year period (2008-2017), 106 PFR were performed by one surgeon (ET) for isolated patellofemoral OA, due to dysplasia and of those 77 were PFJ-gender implants (Zimmer Biomet). Four patients died, leaving 71 knees available for retrospective analysis.
Seventeen patients (18 knees) replied not to have been revised and refused to fill in questionnaires and participate in the study, leaving 53 knees available for retrospective study (response rate of 75%). The PFR group was compared with a group of 57 patients (65 knees) undergoing TKA for patellofemoral OA because of signs of beginning OA in other compartments. The mean age of the PFR group was 60.5 (12) years with a BMI of 25. The mean age of the TKR group was 70 (8) years with a mean BMI of 29.
Outcome was measured with Oxford Knee Score, FJS 12 and Kujala score as joint evaluations and the SF-12 as a general outcome measure. Revision for any cause was studied as a secondary outcome and the preoperative Kalkman score (pain score) was correlated to evaluate patients at risk for revision for unexplained pain.

Results:
Functional Outcome Scores

Outcome Score		PFR	TKR
		Mean (SD)	Mean (SD)
SF-12	PCS	38 (9)	40 (9)
	MCS	47 (9)	46 (11)
Kujala		71 (19)	74 (19)
FJS 12		62 (33)	70 (27)
OKS		38 (9)	38 (9)
Kalkman		6 (1)	6 (1)

Revisions

	PFR N	%	TKR N	%
Revisions	3/77	4	3/65	4.5

Discussion:

Outcome scores are comparable for PFR and TKR, except for the FJS 12 who was statistically higher for TKR. Potentially, mean higher age of the TKR group, could explain this outcome since FJS 12 progressively decreases with age and the difference between both knees might be less obvious for the patient. It could also mean that the FJS 12 measures outcome of the patella better and that PFR are doing less well than TKR, but the Kujala score, which is a patella specific score, didn't observe that difference.

The causes for revision were 2 medial UKA for disease progression by the index surgeon and one revision to TKR for unexplained pain by another surgeon. In the TKR group, there were two poly exchanges by index surgeon and one patellar resurfacing by another surgeon.

Conclusion:

Functional outcome and revision rate are comparable for treatment of PFOA with isolated PFR and TKR at medium term follow-up.

Revision for disease progression remains an issue both in PFR and unresurfaced TKR.

If a younger, active patient wants a bone and central pivot conserving solution, PFR seems an acceptable solution according to this retrospective study.

Early results of a fixed bearing unicompartmental knee replacement designed for the lateral compartment.

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Aim:
The results of lateral unicompartmental knee replacement (UKR) have been mixed partly because the implants are usually designed for the medial compartment. We present the early results of fixed bearing UKR designed for the lateral compartment.

Methods:
186 Fixed Lateral Oxford UKR implanted between 2015 and 2019 were reviewed. 151 were primary UKR for osteoarthritis (143), osteonecrosis (3), and following fracture (5). 31 were for lateral arthritis following medial UKR, and four for revision of failed previous lateral UKR. The mean age was 73, mean BMI 28, 63% female, 58% left-sided and mean follow-up 2.8 years.

Results:
Six patients died from unrelated reasons. Two knees were revised: One required addition of a medial UKR at one year; One revision of a failed mobile lateral to a fixed lateral was revised to a total knee replacement (TKR). At four years the survival was 99% for primary lateral UKR, and 100% for lateral UKR implanted for lateral progression after medial UKR. At last review, the mean Oxford knee score was 41.

Conclusion:
These good early results suggest that UKR designed for the lateral compartment is a good alternative to TKR for primary lateral osteoarthritis or lateral osteoarthritis after medial UKR.

Patello-femoral arthroplasty for treatment of isolated patello-femoral OA analysis of 76 knees with 1 – 12 (mean 5.7) years follow-up

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Aim:
To present the results of a consecutive series of primary patella-femoral arthroplasty in patients with isolated patella-femoral OA

Patients & Methods:
76 knees (62 patients) were operated 2007-2018. Osteoarthritis (OA) secondary to patello-femoral (P-F) dysplasia was seen in 58 knees, posttraumatic PFOA in 12 knees, and isolated PFOA without dysplasia in 6 knees. Follow-up was performed 1 and 5 years postop. KOOS was used from 2011 and FJS from 2017.

Results:
3 knees (all men) were revised due to progressive tibio-femoral OA approximately five years postop. Patients with dysplasia and isolated PFOA improved KOOS up to 5 years reaching values for Symptom, Pain, and ADL of 78-87, and QoL 55-65. Patients with posttraumatic PFOA improved during the first year, but deteriorated between 1 and 5 year, mainly due to progression of tibio-femoral OA which, however, has not so far necessitated reoperation to TKA. In the dysplastic group FJS increased from 15 preop. to 64 at 1 years, and 69 at 5 years.

Conclusion:
PFA for treatment of PFOA secondary to dysplasia and isolated PFOA yields excellent results as regards PROMs such as KOOS and FJS. Posttraumatic PFOA reveals a higher risk of developing symptomatic tibio-femoral OA within 5 years postop.

SESSION IV: Enhanced Recovery and Peri-Operative Care

Why still in hospital after fast-track unilateral unicompartmental knee arthroplasty

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Aim:
To investigate factors prevent patients from being discharged on the day of surgery (DOS) and the first postoperative day (POD 1) following primary UKA in a fast track setting.

Methods:
We prospectively collected data on 100consecutive and unselected UKA patients operated in a fast-track setup with continuous evaluation of discharge criteria. A form screening all discharge criteria was filled out before 8pm on DOS and POD 1 and 2.

Results:
Median length of stay for the entire cohort was 1 day. 22% and 78% of all patients were discharged on DOS and the POD 1 respectively (27% and 80% respectively, when only considering patients operated as #1 and #2). Lack of mobilization only and pain only delayed discharge in 78% and 24% of patients, respectively. If mobilization alone was managed successfully, the discharge rate on DOS would increase to 55% and if pain alone was managed successfully, the discharge rate on DOS would increase to 40%, for patients operated as #1 and #2.

Conclusion:
22% of unselected UKA patients operated in a standardized fast-track setup are discharged on DOS. Pain and lack of mobilization were the major reasons for patients not being discharged on DOS.

Recovery in fast-track total knee arthroplasty is not influenced by a modern use of tourniquet

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Aim:
An observer-blinded, randomized, controlled trial has been performed to evaluate the effects of a modern tourniquet use on clinical and functional recovery in TKA performed under a fast-track protocol.

Methods:
One hundred patients undergoing TKA were randomized in two groups. Group A was treated with Tq inflated at 250 mmHg, deflated after bone cuts to allow accurate haemostasis and finally re-inflated for the cementation phase. Group B was treated without Tq for the entire procedure. Time to reach rehabilitation milestones, range of motion, knee swelling, pain, blood loss, surgical time, Knee Society Score and Oxford Knee Score were analyzed.

Results:
No statistically significant differences were observed between two groups at day 1 and 3 after surgery in time to reach rehabilitation goals ROM and swelling. Surgical time and self-reported surgical complexity were significantly higher for the non-tourniquet group. No differences were observed between the two groups in postoperative pain, estimated blood loss, postoperative KSS and OKS.

Conclusion:
Modern tourniquet use in TKA did not negatively influence rapid recovery, simplified the surgical procedure and reduced the surgical time in this prospective randomized controlled trial.

Cardiac impact of high-volume local infiltration anesthesia in TKA and BSTKA

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Aim:

High volume infiltration anesthesia using Ropivacain/adrenaline is an essential part of multimodal opioid-sparing anesthesia. While considered safe, no studies have evaluated cardiac impact of LIA using Ropivacain/adrenaline following unilateral total knee arthroplasty (uTKA) and bilateral simultaneous TKA (BSTKA).

The aim of this descriptive study was to measure differences in QTc and lactate for high-volume LIA in TKA and BSTKA, respectively.

Method:

16 TKA and 15 SBTKA were included (Fast-track, no drains/tourniquet).

Standard LIA technique was used with 200ml 0.2% Ropivacain (400mg) plus adrenaline 10 µg/ml in uTKA (800 mg Ropivacain in BSTKA). Based on ECG monitoring, Delta QTc (maximum-QTc minus preoperative-QTc), maximum-QTc and prolonged-QTc were measured. Lactate was measured perioperatively.

Results:

Delta QTc (73 (14;326)ms vs 15 (0;131)ms, p=0,001) and maximum-QTc (506 (477;800)ms vs 474.5 (447;705)ms, p=0,004) were both significantly higher during BSTKA compared to uTKA. Prolonged QTc (>500ms for 5 min) was demonstrated in 43% of BSTKAs versus 18% of TKAs.

Lactate-levels demonstrated no significant differences, though 4 patients demonstrated elevated lactate in the BSTKA perioperatively.

Conclusion:

QTc-changes occurred when using Ropivacain/adrenaline in LIA during TKA, with more pronounced changes occurring when administering a total of 800mg ropivacaine during BSTK. 43% of BSTKA had prolonged QTC during surgery.

Patient satisfaction and risk of falls with the use of intermittent pneumatic compression devices following total joint arthroplasty

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Aims:
1) To evaluate patient satisfaction with the use of home intermittent pneumatic compression devices (IPCs);
2) To evaluate the risk of self-reported falls secondary to the use of IPCs following TJA.

Methods:
This is a single-institution, retrospective study on patients who underwent TJA at an urban, academic orthopedic specialty hospital. On postoperative Day 14, patients were digitally pushed surveys regarding their use and satisfaction with their home IPCs, as well as any falls or near-falls they may have experienced. They were given 10 days to submit their responses. Patient demographic data were also collected.

Results:
Survey responses were collected from 424 patients who underwent TJA between August 2018 and January 2019. Approximately 79% of patients in the cohort were satisfied with their use of their IPCs compared to 21% of patients who were unsatisfied. During this time, 19.3% (82 patients) also reported at least one tripping episode at home while using the device, and 1.4% (6 patients) had at least one fall at home while using the device.

Conclusion:
These results suggest that patients are generally satisfied with their home intermittent compression devices, yet they may cause a significant number of trips or falls after surgery.

Full component revision total knee replacements have similar recoveries compared with primary total knee patients

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Aim:
Enhanced pain and rehabilitation protocols have significantly improved patient recovery following primary TKR. Little has been written on how the protocols have affected the revision TKR patient. We report on a matched group of revision and primary TKR patients treated with

Methods:
40 aseptic RTKR patients who underwent a full femoral and tibial revision were matched by age, sex, and BMI to a group of patients who underwent a cemented tri-compartmental primary TKR. All revision knees had uncemented stemmed femurs and tibias. All 40 patients had either a femoral or tibial or both metaphyseal sleeves used for fixation. Patients in both groups were treated with an identical post op pain protocol (Spinal anesthetic, local infiltrative analgesia and multimodal oral pain management along with rapid rehabilitation). All patients were mobilized on POD1 and allowed weight bearing as tolerated. Patients were followed for a minimum of 1 year.

Results:
There was no significant difference in length of stay between the RTKR and the primary TKR (1.4 days versus 1.2 days). There was 1 readmission in each group. There no were reoperations, wound healing problems, identified thromboembolic events or manipulations under anesthesia in either group. KSS for the RTKR group averaged 87.3 at 6 weeks (range 45 to 99) and 89.1 at 1 year (range 52 to100). KSS for the primary group averaged 89.9 (range 71 to 100) at 6 week follow-up and 93.2 (range 54 to 100) at minimum follow-up. At final follow-up ROM averaged1.2 (0-10) to 114.1 (55-135) for the RTKR group, and 1 (0-8) to 121.3 (85-140) for the primary group.

Conclusion:
Despite more complex surgery in the RTKR patient, enhanced pain and rehabilitation protocols have enabled the RTKR patient to have a similar recovery and outcome compared to primary TKR.

SESSION V: Kinetic Alignment

Relation between joint line restoration, morphotype and joint line orientation to the floor and clinical results after mechanical aligned total knee arthroplasty

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Background:
Leg orientation and alignment technique are still a matter of discussion in total knee arthroplasty (TKA). Therefore, the objectives of this study were to (1) examine if there is a correlation between the amount of alignment change of the hip-knee-ankle (HKA) angle and the clinical outcomes one year postoperatively, in a cohort of traditional implanted TKA's; (2) investigate if an overcorrection in femoral, tibial and/or mechanical joint line (change of morphotype) is related to the clinical outcomes and; (3) evaluate the relation between postoperative knee joint line orientation to the floor and the clinical outcomes.

Method:
Pre-operative and postoperative long-leg X-rays of 90 patients were used to determine the coronal alignment. The HKA angle, tibial and femoral angles were measured. The absolute difference between the pre-operative and postoperative measurements was determined and the measurements were categorized in whether or not the morphotype was changed. Finally, the orientation of the knee joint line relative to the floor was measured as described by Victor. Clinical outcomes were determined with the KOOS and KSS, one year postoperative.

Results:
The clinical outcomes postoperatively did not correlate with the absolute difference of the alignment measured. Comparing the clinical outcomes between the patients with and without a change in morphotype did not show significant differences between the patients. In 62 patients the joint line was oriented in varus relative to the floor. It appeared that the patients with a joint line medial open jointline relative to the floor obtained higher scores on the KOOS subscales ADL, Sport and QoL.

Discussion:
This study showed no correlation between clinical outcomes and joint line restoration of the femur, tibia or HKA in patients after TKA. Leaving the prosthesis with some degrees of under correction on the coronal plane maintaining the morphotype, was not associated to better clinical results compared to TKA overcorrection. The results showed that patients with a joint line medially opening relative to the floor obtained higher scores on the KOOS subscales ADL Sport and Qol. However, the reason for this finding is not clear.

Kinematically versus mechanically aligned medial pivot design TKA: Case control study

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Introduction:

The alternative kinematic alignment (KA) technique for total knee arthroplasty (TKA) aim to restore the pre-arthritic knee' anatomy and soft-tissue balance. Medial pivot TKA design and KA technique have been developed to enable a more physiological knee kinematics. The functional benefit of the KA technique and medial pivot TKA designs is still debated when compared to conventional practice. Our study aims to compare early outcomes of KA and MA TKAs, when performed with a medial pivot TKA implant design.

Methods:

Matched case-control study with prospective collection of data (patients part of ODEP study). The clinical and radiographical outcomes of 40 non-selected consecutive unrestricted KATKAs were compared the ones of 40 measured resection MATKAs. Patients were implanted with a medial pivot TKA design. OKS and EQ-5D scores were measured pre-operatively and at 1-year follow-up. Patients' satisfaction was recorded at 1-year follow-up using a visual analogic scale (VAS). Pre- and post-operative knee radiographs were analysed.

Results:

Post-operatively median OKS was 44 and 42 in the KA and MA groups, respectively. The mean EQ-5D improvement was 0.34 and 0.28 for KA and MA patients, respectively. The median satisfaction was 99% in KA group versus 90% in MA group. None of the clinical difference measured between groups were statistically significant (p-values 0.14 to 0.73). No reoperation or revision was recorded. KA TKAs had femoral and tibial components on average 3.5 degrees more valgus (p<0.05) and varus (p<0.05) oriented, respectively, and a 4 degrees of additional posterior tibial slope (p<0.05).

Conclusion/Discussion:

First study to assess the value of KATKAs performed with medial pivot TKA design. The 1-year functional outcomes were acceptable for both groups, with a trend for better performance for KA patients. Longer follow-up is warranted to assess longevity of results.

Lower-limb alignment is strongly explained by femoral and tibial abnormalities but not related to demographic and ethnic parameters - A machine learning analysis of a 3D CT database automated extraction

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Introduction:
Definition of lower-limb alignment "normality", as well as Tibial and Femoral coronal orientation are still debated. The primary purpose of the present study was to evaluate the effect of demographic, morphologic and ethnical parameters on lower limb alignment using an unsupervised machine learning process.

Methods:
Automated CT-scan modelling was used to examine of 378 healthy subjects (193 males), mean age 58 yr (SD 16.5), mean BMI=24 kg/m2 (SD 4.7). There were 219 Caucasian and 159 Asian subjects. Morphological evaluation of patients' lower-limb alignment was done using HKA, MPTA, mLDFA angles.
Four different unsupervised methods were used to define the clusters: hierarchical decision tree, K-mean clustering, Partitioning around Medoïds, and Clustering Large Application. These predictive variables correspond to the minimum number of randomly selected predictors for the best model accuracy.

Results:
The decision tree based on MPTA (cutoff-value=85.3°) and mLDFA (cutoff-value=85.8°) provided an accuracy and Kappa of 0.91 and 0.85, respectively, while demographic data were minimally predictive.
In the Varus Knees, MPTA explained 70% of the Deformity when mLDFA explained 27% (all remaining demographic parameters explaining 3%).
In the Valgus Knees mLDFA explained 48% of the Deformity when MPTA explained 47% (all remaining demographic parameters explaining 5%).

Discussion:
While demographic data were minimally predictive, a logic association was found between MPTA, mLDFA, and Lower-limb alignment among the 378 healthy subjects of this cohort. Two third of the cases of Varus Knees were imputable to Isolated Tibial deformities, when Valgus Knee were equally explained by Mixed Femoral and Tibial deformities.

Utilization of computed tomography to determine differences in mechanical and kinematic alignment in patients undergoing primary Total Knee Arthroplasty

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Introduction:
There is a paucity in the literature regarding changes in femoral alignment and rotation utilizing anatomic alignment (AA) compared to traditional mechanical alignment for patients undergoing primary total knee arthroplasty (TKA). Therefore, the purpose of this study was to determine changes in alignment and rotation utilizing AA. Specifically, we evaluated changes in: 1) femoral alignment; 2) transepicondylar axis (TEA); 3) posterior condylar axis (PCA); and 4) differences in lateral distal femoral angles (LDFA).

Methods:
A retrospective review of our institution's own database from January 2018 to December 2018 was performed. The inclusion criteria consisted of all patients who underwent robotic-assisted TKA (RATKA). The query yielded 184 patients. KA was determined by utilizing a graphical user interphase (GUI) and changing distal femoral resections to 6mm. Primary outcomes analyzed and assessed included changes in femoral alignment, femoral rotation as assessed by TEA and PEA, and LDFA. Statistical analysis was primarily descriptive. A p-value less than 0.05 was considered statistically significant.

Results:
Placing patients in kinematic alignment demonstrated femoral components being positioned in a valgus (3.45° for native varus knees; 5.15° for native valgus knees) alignment and being internally rotated relative to the TEA (0.26°) and PCA (2.49°). Preoperative coronal CT scout images demonstrated mLDFA and aLDFA to be more varus for those patients with femoral component alignments greater than 3° of valgus or 0° of varus utilizing kinematic alignment.

Conclusion:
The results of the study demonstrate the ability to determine femoral component alignment and rotation through the use of a graphical use interface.

Population-based effect of post-operative alignment on tibial bone remodeling following TKA

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Introduction:
Proper alignment is considered one of the important factors in determining successful TKA outcome. Alignment may affect bone remodeling. We performed a population based analysis in 47 tibial bones and assessed the effect of tibial positioning on bone remodeling outcome.

Methods:
Finite element models were generated of 47 subjects. Cemented fixed-bearing implants were placed and loaded according to the anatomical and mechanical alignments. Bone remodeling was predicted. BMD changes were considered at a time point of two years postoperatively over three regions-of-interest (ROIs); medial, lateral and distal.

Results:
The two proximal ROIs showed an average decrease in BMD in both alignments after two years; a shift in bone loss from lateral to medial was observed in mechanical alignment relative to anatomical post-operative alignment. Increased bone loss was found in the medial ROI (-7.0% to -24.8%) and distal ROI (-2.6% to -15.8%) of the mechanically aligned tibiae over the corresponding anatomically aligned models, while in 39 of the 47 cases a reduction of bone loss was encountered in the lateral ROI.

Conclusion:
The current computational study provides insight into the long-term effect of implant alignment on bone remodeling and the potential variation of bone remodeling within patient groups.

SESSION VI: Knee Arthroplasty

Asymmetric vs symmetric polyethylene inserts in mobile bearing TKA, a clinical and biomechanical study

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Aim:
This study aims at comparing the effects of symmetric and asymmetric insert in mobile-bearing total knee arthroplasty (TKA).

Methods:
The investigation was performed both clinically and biomechanically (through in-silico and in-vitro tests). The clinical study involved the retrospective analysis of 151 patients with a symmetric design (SD) insert and 152 patients with an asymmetric design (AD) one. For the finite-element study, a knee model was developed, implanted with the same TKA and analyzed during gait and squat activities. Implant kinematics and bone-stresses were compared for the two insert designs. For the experimental study, tibio-femoral and insert kinematics in 5 fresh-frozen cadaveric specimens were analyzed during 10 passive flexion-extension cycles up to 120° of flexion. The tests were performed in native and replaced configurations, using both insert designs.

Results:
Patients' average flexion improved from 105° to 120° (AD-group) and 115° (SD-group) at the latest follow-up. There was no post-operative extension deficit. No pain affected the AD-group, while antero-lateral pain was reported in some SD-group patients. Patients in the AD-group presented a better ability to perform certain physical activities. The finite-element results showed that the SD induces higher tibial-bone-stresses than the AD. Both designs led to similar kinematics but SD rotates less on the tray, increasing the relative motion between femoral and insert components.
Experimental tests result showed that the AD allows a better internal-external rotation: the rotation angle between tibia and insert matches the one found in the tibio-femoral while the SD insert returned lower results, implying a greater relative motion between femoral and insert components.

Conclusions:
The biomechanical analysis justifies the clinical findings: TKA kinematics is similar for the two designs, although the asymmetric solution shows less bone-stress, thus resulting as more suitable to be cemented and inducing less pain. Clinically and biomechanically, asymmetric mobile bearing inserts could be a valid alternative to symmetric ones.

Lack of correlation between knee symptoms, radiographic and gross findings among patients undergoing TKA for osteoarthritis

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Aim:
The anatomic causes for knee pain remain largely unknown. Only modest associations have been found between radiographic disease, gross and arthroscopic findings and pain severity experienced by patients with knee osteoarthritis (OA). The purpose of this study is to systematically examine these relationships among patients undergoing total knee arthroplasty (TKA).

Methods:
Information was collected preoperatively from seventy-two patients (100 knees) undergoing primary TKA for knee OA. Pain severity, stiffness, and function were assessed by the Western Ontario MacMaster (WOMAC) questionnaire. Patient reported pain was recorded on a standardized drawing of the knee. Radiographs were reviewed and assigned an overall Kellgren-Lawrence grade (K/L) and joint-space narrowing grade (JSN) for each compartment. At the time of surgery, the severity of cartilage defects were graded.

Results:
Severe medial compartment disease (JSN 3 – 4) was present in 86 knees, and varus deformity was present in 78 knees. Spearman Rank correlation coefficients were significant as follows: inferomedial pain and medial compartment JSN on weight bearing AP radiograph (0.17; p=0.04); inferomedial pain and medial tibial cartilage degeneration (0.15; p=0.07) or medial femoral cartilage degeneration (0.17; p=0.04). The strongest association was between WOMAC total stiffness scores and superolateral pain (0.38; p=0.001).

Conclusion:
Despite a preponderance of medial compartment disease the correlation between medial JSN, gross medial cartilage degeneration and medial knee pain was weak. When systematically studied, the pathologic lesions as seen with conventional radiography and by gross examination do not correlate well with the severity, quality, location, or character of the pain experienced by patients with knee OA. This may be a particularly important consideration when evaluating surgical treatment and outcomes in isolated uni-compartmental disease.

Knee arthroplasty system with medialized keel: Follow-up at 5 years of a pioneer cohort

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Background:
In the last years the number of total knee arthroplasty has constantly increased, but despite this quantitative increase and the supposed innovations in prosthetic design and instruments, the rate of dissatisfaction of the patients still remain high.

Purposes:
In this clinical investigation, a new design with a progressive increased keel medialization according to the size has been implanted. The medialized keel was conceived to exploit the fixation in the best quality bone of the tibial metaphysis and the cohort of patient followed up to five years, with the purpose to observe the clinical results of this new design, and to investigate the radiological aspects of the tibial metaphyseal bone.

Patients & Methods:
From May 15th 2012 to November 20th 2012 we have implanted 70 Persona total knee arthroplasties with tibial keel medialization in 69 patients. The series involves two surgeons, and technique was measured resection and anterior referencing. The mean age of the patients was 69 years. We have evaluated the patients at 6 and 60 months after surgery by Patient Reported Outcome Measures. Three patients died at follow up, and one patient had a periprosthetic fracture, and therefore he was excluded them from the study.

Results:
The OKS increased from a pre-op mean value of 21.6 to 39.5 at 6 months and to 40.12 at 5 years.
EQ-5D increased from a pre-op mean value of 0.222 to 0.838 at 6 months follow-up and at 0.709 at 5 years follow-up.
EQ-VAS increased from 39 to 75,6 at 6 months and to 72,2 at 5 years.
The patients defined the surgical results as excellent in 58 % of the cases, very good in 25 %, good in 6 % (89% of total).
In 1 case there was a minimal impingement of the medialized keel with the cortical tibial bone but without bone fracture.
3 patients have been re-operated: one arthroscopic lavage for synovitis, 1 capsular breakage and 1 aseptic implant loosening treated by revision TKA, so the implant survivorship at 5 years is 98,2%.
X-rays remained silent in terms of bone densification, demarcation line, with no evidence of abnormal loading on the bone.

Discussion and Conclusion:
The results showed an excellent outcome of this design, which fulfils the expectations of the patients already in the early postoperative time and at 5 years follow-up. OKS is a specific knee score and the mean value remains at high level, instead EQ-5D and EQ-VAS are influenced by general health condition and show a little bit decreasing in mean values. The medialization of the tibial keel showed good bone fixation and component alignment with an excellent survivorship at medium follow-up.

Clinical outcome of posterior stabilized total knee replacement using an increased flexion gap in patients with preoperative stiffness
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Aims:
The study compares patients with 80° or less range of motion (ROM) operated with a 2mm increase in the flexion gap to optimize flexion to matched non-stiff patients with at least 100° of preoperative ROM.

Material & Methods:
In a retrospective cohort study 93 TKAs (86 patients) with a preoperative ROM of 80° or less were examined. Mean follow-up time was 52 months (range 24-112). All TKAs in stiff knees were performed with a 2mm increased flexion gap. Data were compared to a matched control group of TKAs with preoperative ROM of at least 100 degrees.

Results:
Overall mean ROM in stiff knees increased from 68° (range 0-80°) to 115° (range 65-135°)(p<0.001). Mean knee flexion improved from 82° (range 0-110°) to 116° (range 65°-135°) and mean flexion contracture decreased from 14° (range 0°-50°) to 1° (range 0°-10°)(p<0.001). Seven TKA (8%) required MUA and none of the knees had flexion instability. The control group had a mean follow up of 42 months (range 24 to 89). Mean knee flexion improved from 117° (range 100-140°) to 123° (range 100°-130°) and mean flexion contracture decreased from 2° (range 0°-15°) to 0° (range 0°-5°)(p<0.001). None of the knees in the control group had flexion instability or required MUA. Mean ROM improvement was higher in knees with preoperative stiffness (47° (range 10°-110°) compared to the control group (6° (range -15° to 30°)) (p<0.001).

Conclusion:
TKA utilizing an increased flexion gap provided a significant improvement of ROM in knees with preoperative stiffness. While the improvement in ROM was greater, the absolute post-operative ROM was less than in matched non-stiff knees.

Use of two tibial hemi-trays in anterior cruciate retaining total knee arthroplasty

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Aim:
Anterior Cruciate Ligament (ACL) conservation in total knee arthroplasty has been tried for a long time without offering superior results in terms of mobility or function. We propose a new technique based on the use of cemented tibial hemi-plateaus.

Technique:
Eleven active patients (12 knees) were operated on this technique after giving informed consent. The technique consisted of primary femoral cuts in a kinematic alignment but preserving an external rotation of 3°. Tibial preparation was then performed using an extra-medullary guide. Balancing was done by varying the thickness of the trial implants to control the anteroposterior (AP) laxity in flexion and extension.
Patients were assessed with the IKS and FJS scores and with standard AP, lateral and long leg standing X-rays, and reviewed with a 13-months average follow-up (3-40 months).

Results:
The result was excellent in 11 cases with an average flexion of 120°±18°. One patient complained of a 90°- flexion stiffness. In varus knees (n = 8), mean final HKA was 4°(1-9°). X-rays showed no radiolucency below the tibial components.

Discussion:
The persistence of a millimetric drawer with open knee is recommended to avoid postoperative stiffness. Particularly at risk is the internally operated genu valgum with excessive tightening of the lateral compartment.

Conclusion:
The use of two tibial hemi-trays facilitates equilibration of the knee while preserving the insertion of the cruciate ligaments and does not seem to pose short-term functional or fixation problems.

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