European Knee Society

Abstracts

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Does Age Matter? Clinical and Radiographic Outcomes of Fixed Bearing Partial Knee Arthroplasty Across Three Age Categories

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BACKGROUND. Medial unicompartmental knee arthroplasty (UKA) has demonstrated excellent survivorship and functional outcomes across a wide range of patient ages. However, limited evidence exists regarding the Persona Partial Knee system® (Zimmer Biomet, Warsaw, IN), particularly in octogenarians. Whether age independently influences outcomes or merely reflects differences in patient characteristics and comorbidity burden remains unclear. The aim of this study was to compare clinical and radiographic outcomes among patients younger than 70 years, 70–79 years, and ≥80 years, and to identify age-specific predictors of outcome.

METHODS. A prospective single-center study was conducted on consecutive patients undergoing medial Persona Partial Knee arthroplasty by a single surgeon for medial compartment osteoarthritis or osteonecrosis. Patients with a minimum follow-up of 1 year were included. Demographic, clinical, and radiographic data were prospectively collected preoperatively and at latest follow-up. Patients were stratified into three age groups (<70 years, 70–79 years, and ≥80 years). Clinical and radiographic outcomes were compared among groups. Multivariable regression analyses were performed to evaluate the independent association between age group and postoperative outcomes while adjusting for baseline characteristics.

RESULTS. A total of 299 patients met the inclusion criteria. Mean age was 71.5 ± 8.7 years, mean BMI was 27.0 ± 4.1 kg/m², and 55.4% were female. Patients were stratified into three age groups: <70 years (n=120), 70–79 years (n=131), and ≥80 years (n=48). Baseline characteristics were comparable among groups, with no significant differences in sex distribution or BMI. Clinical and radiographic evaluation demonstrated favorable postoperative findings across all age groups, with no apparent age-related deterioration in outcomes. Two patients required revision surgery, one due to tibial fracture and one due to aseptic loosening. One additional patient underwent surgery for a distal femoral fracture.

CONCLUSION. Chronological age alone should not be considered a contraindication to Partial Knee arthroplasty.

Topic: UKA – medial and UKA - lateral

Title: Is unicompartmental knee arthroplasty a safe treatment option in patients with rheumatic disease? A matched case-control study

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Presenter: Wenzel Waldstein

Introduction
Evidence on the outcome of unicompartmental knee arthroplasty (UKA) in patients with rheumatic disease (RD) remains limited. This study investigates survival and functional outcomes in a consecutive UKA series in RD patients versus matched controls.

Materials and methods
This retrospective 1:1 case-control study included 216 UKAs (178 medial,38 lateral; Oxford® Zimmer/Biomet) in RD patients and 216 matched controls (entire cohort: n=432; mean age 69±9 years; mean BMI 29±5 kg/m²; mean follow-up 5±2 years; minimum 2 years). Rheumatoid arthritis (RA) was present in 52% (112/216), psoriatic disease in 23% (50/216), polymyalgia rheumatica in 18% (39/216) and other RD in 7% (15/216). Patients were contacted via telephone to record implant survivorship, any reoperations and functional outcomes (Oxford Knee Score (OKS) and UCLA Activity Score). Cumulative survival was calculated using Kaplan–Meier analysis and compared using the log-rank-test.

Results
Cumulative 9-year implant-revision-free survival was 93.2% (95%CI: 87.5–98.9) in patients with RD and 96.5% (95%CI: 94.0–99.0) in matched controls (p=0.712). Reoperation-free survival was 87.8% (95%CI: 81.5–94.1) and 91.0% (95%CI: 86.1–95.9), respectively (p=0.404). There were 20 reoperations in the RD group and 16 in the control group. Disease progression was the most common reason for reoperation in both groups, occurring in 9 knees (4.2%) in the RD group and 8 knees (3.7%) in the control group (p=0.805). Periprosthetic joint infection was the second most common reason for reoperation (RD: n=3 (1.4%); control: n=4 (1.9%) (p=1.000)).
The functional outcome was excellent in both groups (OKS: 42.6±7.9 vs. 42.4±7.2, (p=0.030); UCLA Activity Score 6.1±1.7 vs. 6.2±1.5 (p=0.656)).

Conclusions
This matched case-control study demonstrates that UKA is a safe and highly effective treatment option for RD patients with isolated unicompartmental arthritis. The high survivorship, low complication rates and excellent functional outcomes support its use as an alternative to TKA in appropriately selected patients.

Topic: UKA Medial

Title: Not Coronal Alignment but Posterior Tibial Slope is a major predictor of Early Failure of Medial Fixed-Bearing Unicompartmental Knee Arthroplasty

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Presenter: Luyckx T

Abstract

Introduction: Aseptic tibial loosening is the dominant failure mode in fixed-bearing unicompartmental knee arthroplasty (UKA). Excessive posterior tibial slope (PTS) has been implicated as a modifiable risk factor, yet its association with time to revision, the role of intraoperative slope modification, and clinically actionable thresholds remain incompletely defined.

Materials and Methods: In this retrospective cohort study**,** sixty consecutive medial fixed-bearing UKAs revised to total knee arthroplasty (TKA) were compared with 120 unrevised matched controls. Coronal alignment and post-operative slope (PTS2), pre-operative slope (PTS1), and intraoperative steepening (ΔPTS) were measured on standard radiographs. Kaplan-Meier survival analysis, Spearman correlation, and ROC analysis were performed.

Results: PTS2 was significantly higher in revision cases than controls (9.5° vs 6.2°; $p < 0.001$). In the revision cases, the slope was increased intraoperatively by a mean of 2.3° versus a reduction of 2.8° in controls ($p < 0.001$). Kaplan-Meier analysis showed 57.6% vs 94.4% revision-free survival at 48 months for high vs low PTS2 groups (log-rank $p < 0.001$) (fig1). ROC analysis identified an optimal threshold of 8.2° for PTS2 (AUC = 0.847, Se 0.84, Sp 0.74, PPV 50.7%, NPV 92.8%) and 0.8° for intraoperative increase of PTS (AUC = 0.724, Se 0.86, Sp 0.71). Native slope and coronal alignment were not associated with failure.

Conclusion: Post-operative tibial slope and intraoperative increase in slope are modifiable predictors of early UKA failure. Surgeons should target a post-operative slope below 8.2° and avoid any net increase relative to native anatomy.

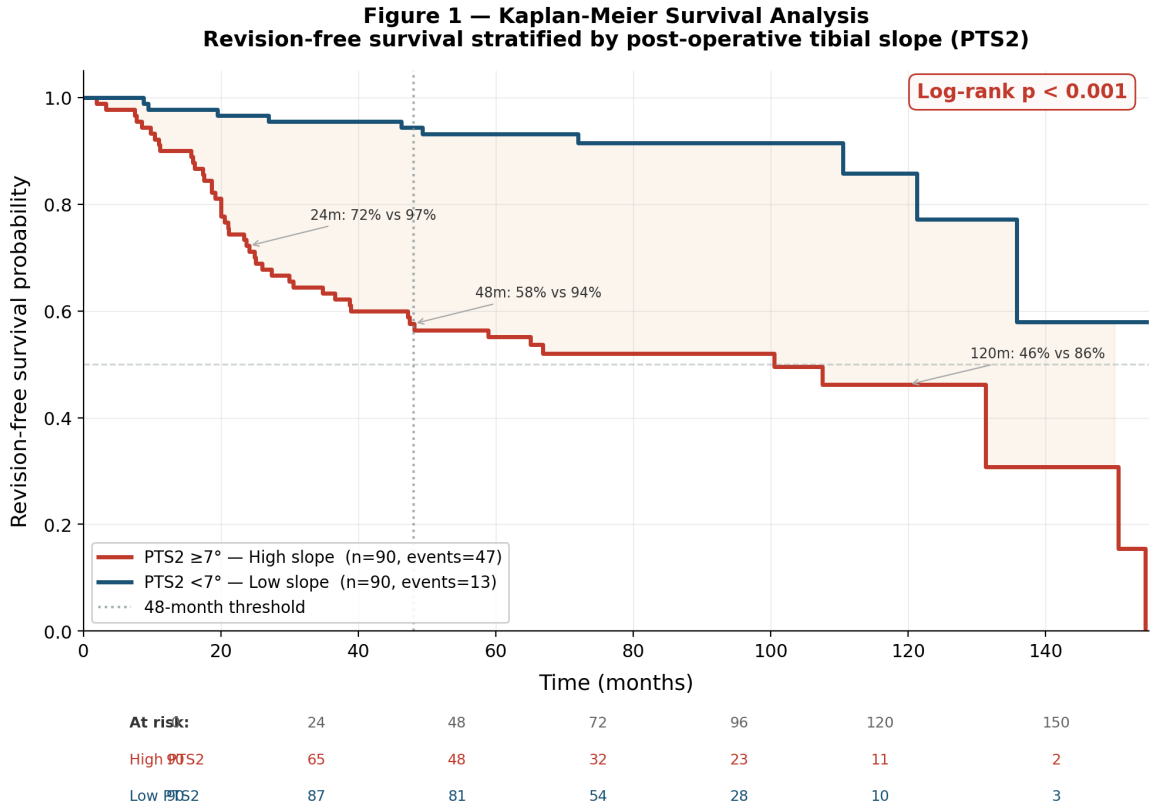


Figure 1. Kaplan-Meier revision-free survival curves stratified by post-operative tibial slope (PTS2). *The full cohort (n = 180) was stratified by median PTS2 (7°). High PTS2 (≥7°, n = 90, red) demonstrated markedly lower revision-free survival than low PTS2 (<7°, n = 90, blue) at all timepoints: 72.2% vs 96.7% at 24 months, 57.6% vs 94.4% at 48 months, and 46.2% vs 85.8% at 120 months. Log-rank p < 0.001. Numbers at risk are shown below the x-axis. The vertical dotted line denotes the 48-month early failure threshold.*

Topic: UKA - medial

Title: 'Wear Advantage' of Mobile-Bearing UKA is a Myth: Higher Volumetric Wear without Reduced Revision Rates compared to Fixed-bearing UKA. A Systematic Review and Meta-Analysis

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Presenter:
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Introduction
This systematic review and meta-analysis aims to comprehensively compare wear between mobile- and fixed-bearing unicompartmental knee arthroplasty (UKA) using clinical, in-vitro, and registry data.
Materials and methods
This study was conducted in accordance with PRISMA guidelines and registered with PROSPERO. PubMed, EMBASE, and Epistemonikos were searched. Clinical, registry, in-vitro, and in-silico studies reporting wear outcomes in mobile- and fixed-bearing UKA were included. Risk of bias was assessed using the Mixed Methods Appraisal Tool (MMAT), and pooled analyses were performed using mixed-effects models.
Results
The electronic literature search identified 5,688 studies, of which 64 met the inclusion criteria after screening (Table). For UKAs implanted after 2000, there were no statistically significant differences in clinical revision rates for wear between mobile- and fixed-bearing designs, either overall (<1% vs. 1%; p = n.s.) or at a follow-up of >10 years (2% vs. 1%; p = n.s.). A statistically significant difference in in vitro volumetric wear was observed ($p<0.001$), with mobile-bearing constructs demonstrating a higher wear rate (5.54 mm^3/MC) compared to fixed-bearing constructs (1.69 mm^3/MC).
Conclusion
This comprehensive review of all available data demonstrates that fixed- and mobile-bearing medial UKAs show no difference in the clinical incidence of revision for wear, but reveals a statistically significant advantage for fixed-bearing medial UKAs regarding volumetric wear, consistent with the original hypothesis of our study. Fixed-bearing implants show more uniform wear patterns, suggesting potentially more predictable long-term performance.

Femoral Neck Retroversion is Associated with Greater OA Severity in Patients Undergoing Robotic-Assisted Medial Unicompartmental Knee Arthroplasty

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Background
While varus alignment and increased adduction moment are well-recognized risk factors for the development of medial knee osteoarthritis (OA), the role of femoral axial torsion has been poorly investigated. Femoral anteversion has previously been associated with valgus knee deformity. This study aimed to evaluate proximal femoral torsion in patients who underwent robotic-assisted medial unicompartmental knee arthroplasty (RA-UKA) in relation to coronal knee alignment and OA severity.

Methods
This retrospective, single-center, observational study included 617 consecutive RA-UKA procedures performed between 2014 and 2025. Exclusion criteria were secondary OA, chronic cruciate ligaments deficiency, severe hip OA, ipsilateral total hip arthroplasty, previous femoral or tibial osteotomies, femoral fractures, and prior medial meniscectomy. Femoral neck version (FNV) was measured on preoperative CT scans at epiphyseal and metaphyseal levels. Coronal alignment parameters, including hip-knee-ankle angle (HKA), mechanical lateral distal femoral angle (mLDFA), medial proximal tibial angle (MPTA), and neck-shaft angle, were assessed on preoperative standing radiographs. OA severity was graded using the Ahlbäck classification. The relationship between FNV and coronal alignment parameters and Ahlbäck grade was assessed using linear and Poisson regression models.

Results
A total of 359 (58%) RA-UKAs were included. Mean epiphyseal FNV was 7.6°±8.1°. No significant relationship was found between FNV and any coronal knee alignment parameter ($p>0.05$). Both metaphyseal and epiphyseal FNV showed a significant inverse association with Ahlbäck grade ($p=0.006$ and $p=0.001$, respectively). Neck-shaft angle showed a slight positive effect on Ahlbäck grade ($p=0.034$).

Conclusions
Patients undergoing medial RA-UKA showed lower FNV values than the normal population. Although no association with coronal knee alignment was identified, femoral neck retroversion was associated with greater OA severity, suggesting it may represent a negative prognostic factor for the development of more advanced medial compartment OA. If confirmed prospectively, FNV assessment could provide useful information for patient counselling in the setting of medial knee OA.

Preoperative medial proximal tibial angle does not influence clinical outcomes following mobile-bearing unicompartmental knee arthroplasty

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Abstract

Background: The aim of this study was to evaluate whether preoperative medial proximal tibial angle (MPTA) influences clinical outcomes following mobile-bearing medial unicompartmental knee arthroplasty (UKA).

Methods: This retrospective study included 454 consecutive patients with anteromedial osteoarthritis who underwent mobile-bearing medial UKA performed by two surgeons at a single institution between August 2016 and May 2023. Patients were stratified into three groups according to preoperative MPTA: ≤83° (n = 84), 84°–86° (n = 229), and ≥87° (n = 141). Within each group, clinical outcomes were further compared according to postoperative tibial component alignment (TCA) using group-specific varus thresholds. Clinical outcomes were assessed using the Oxford Knee Score (OKS) preoperatively and at three months, one year, and two years postoperatively. Pairwise comparisons of changes in OKS were conducted using a general linear model with Bonferroni-adjusted post hoc tests, and adjusted mean differences were calculated after controlling for age, sex, and body mass index.

Results: Improvements in the OKS from baseline to three months, one year, and two years were comparable among the preoperative MPTA groups. Postoperative TCA also did not differ significantly between groups (P = .280). In the MPTA ≤83° group, varus TCA was associated with significantly greater improvements in OKS at each time point.

Conclusion: Preoperative MPTA did not significantly influence clinical outcomes following UKA, suggesting that increased proximal tibial varus may not adversely affect short-term outcomes. Alignment strategies tailored to preoperative MPTA may help optimize postoperative outcomes.

Early outcomes of kinematically aligned medial mobile bearing unicompartmental knee arthroplasty: retrospective cohort study based on institutional registry data

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ABSTRACT

Introduction:

Medial unicompartmental knee arthroplasty (mUKA) is increasingly performed using personalized alignment strategies, but evidence remains limited regarding the influence of native knee phenotype, prosthesis-induced anatomical changes, and tibial component orientation on clinical outcomes. This study aimed to report early clinical outcomes after kinematically aligned mobile-bearing cementless mUKA and to investigate whether final patient-reported outcome measures (PROMs) were associated with native knee anatomy, postoperative knee anatomy, prosthesis-induced anatomical modification, or frontal tibial component orientation.

Methods:

A single-center, single-surgeon retrospective cohort study was conducted using prospectively collected institutional registry data. Patients who underwent kinematically aligned cementless mobile-bearing medial UKA using the Oxford® implant between January 2023 and December 2024 for isolated severe anteromedial osteoarthritis were included. PROMs included the Oxford Knee Score (OKS), Forgotten Joint Score (FJS), visual analogue scale (VAS) pain and satisfaction scores, and Patient Joint Perception (PJP). Radiographic analyses included native and postoperative LDFA, MPTA, aHKA, JLOA, mPTS, CPAK and modified CPAK phenotypes, and tibial line-to-femoral line angle. Associations between anatomical

variables and final PROMs were assessed using correlation and subgroup analyses, with Holm–Bonferroni correction for exploratory multiple testing.

Results:
A total of 108 patients were included, with a mean age of 61.7 ± 8.5 years and mean BMI of 28.2 ± 4.2 kg/m². Mean follow-up was 2.36 ± 0.56 years. At final follow-up, median OKS was 44 [41–46], median FJS was 79.2 [54.2–93.8], median VAS pain was 10 [0–20], and median VAS satisfaction was 90 [80–100]. Satisfaction ≥50 was reported by 95.0% of patients, while MCID achievement rates were 97.7% for OKS, 94.4% for FJS, and 90.0% for VAS pain reduction. Three complications occurred: two mobile-bearing dislocations requiring bearing exchange and one aseptic tibial loosening requiring tibial revision, corresponding to an overall complication rate of 2.8%. Native anatomical parameters and n-mCPAK phenotype were not significantly associated with final PROMs after correction for multiple comparisons. In the paired EOS subgroup, prosthetic implantation produced small but measurable radiographic changes, including mean ΔMPTA of -1.2° ± 3.0° and ΔmPTS of −0.7° ± 2.9°. Modified CPAK phenotype changed in 61.4% of patients, but neither radiographic change magnitude nor phenotype transition was significantly associated with final PROMs. Frontal tibial component orientation was also not robustly associated with clinical outcomes after correction.

Conclusion:
Kinematically aligned mobile-bearing cementless mUKA provided favorable early clinical outcomes, with high satisfaction, substantial clinically meaningful improvement, and a low complication rate at a mean follow-up of 2.36 years. Native knee anatomy, postoperative phenotype, prosthesis-induced anatomical changes, and frontal tibial component orientation were not robust determinants of early PROMs. Larger comparative studies with longer follow-up are required to determine whether these anatomical factors influence long-term clinical outcomes or implant survivorship.

Level of evidence: Level IV, retrospective registry-based cohort study

Age-stratified 90-day adverse outcomes after primary knee arthroplasty: a nationwide population-based cohort study of the UK National Joint Registry

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Background: Age-stratified 90-day adverse event data following knee arthroplasty are limited. We assessed age-stratified 90-day outcomes following primary TKA and UKA in England and compared them with age-matched controls.

Methods: Using linked National Joint Registry (NJR), Hospital Episode Statistics (HES), and Civil Registration Mortality data, we identified 798,975 primary knee arthroplasties performed in England (02/2003–03/2021; 730,529 TKA, 62,173 UKA, 6,273 unclassified) with confirmed HES linkage. The primary outcome was serious 90-day complication (death, cerebrovascular accident, myocardial infarction [MI], or pulmonary embolism [PE]. Secondary outcomes comprised 20 individual complications including MI, PE, deep vein thrombosis (DVT) and 90-day re-operation. Complication rates with 95% CIs were calculated for TKA and UKA cohorts stratified by age, and compared with age-matched population rates to derive risk ratio (RR) and number needed to harm (NNH). Logistic regression estimated unadjusted and adjusted odds for serious complication, PE, MI, CVA, and death.

Results: Serious complications occurred in 10,499 TKA (1.44% [95% CI 1.41–1.46]) and 333 UKA procedures (0.54% [0.48–0.60]). Serious complication rates increased with age (TKA: 0.66% to 2.73%; UKA: 0.38% to 1.37%). Compared with age-matched general population controls, for TKA, PE risk was 30-fold higher (RR 30.31, 95% CI 27.65–33.22; NNH 219) in patients less than 60 years and remained 7-fold elevated (RR 7.07, 95% CI 6.50–7.68; NNH 134) at 80 years or older. Similarly, a 37-fold increase in DVT was observed in patients less than 60 years compared to age-matched controls (RR 36.97, 95% CI 34.07–40.12; NNH 172).

Conclusion: Serious medical complications after TKA/UKA increase with age. In contrast, risk of PE and DVT is disproportionately elevated in patients younger than 60 years relative to age-matched controls. This underscores the need for age-specific risk discussion to support informed consent, particularly in patients at either end of the age spectrum.

Topic: TKA

Title : Impact of the alignment strategy on the tibio-femoral and patella-femoral kinematics of the knee: results of a robotic cadaveric study

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Presenter : Sebastien Parratte

Introduction: Negative consequences on the patella-femoral (PF) kinematics have been described after kinematically aligned (KA) TKA. The goal of this study was to: 1) Compare the tibiofemoral (TF) kinematics between the mechanical alignment (MA) and KA kinematic alignment (KA) technique for medial congruent designs, 2) assess the consequences on the patella-femoral (PF) kinematics and 3) analyze the impact of the PCL preservation and the patellar-resurfacing.
Methods: 20 fresh-frozen paired human leg specimens (five male and five female donors), were mounted to a robotic device and tested according to a standardized protocol four times: 1) before implantation, 2) after implantation with retention of the PCL, 3) after resection of the PCL and 4) after patellar resurfacing. PF kinematics were recorded with using optical camera system. All specimens underwent TKA by an experienced surgeon using a contemporary medial congruent (MC) design implanted by applying MA to one knee of each pair and KA to the other knee using a validated robotic protocol. The kinematic and kinetic data were recorded for each phase of the testing.
Results: All translations and rotations during laxity testing were similar for MA and KA (RMSD $\leq$1.5mm for AP translations and $\leq$1.0° for IE rotations). For both MA and KA before resurfacing, the patella was significantly more medial compared to intact with a maximum medial offset approximately double for MA compared to KA ($p < 0.05$). Patellar resurfacing increased the medial offset compared to intact, more for MA than KA ($p < 0.05$). PCL's resection altered the kinematics of the TF joint for both techniques.
Conclusion: The results of this study demonstrated that both MA and KA can restore the kinematic of the TF and the PF using a modern MC implant. The PCL resection and patellar resurfacing had significant impacts particularly using MA.
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Topic

TKA primary

Title

Aligning Success: Insights from 85,000 CT scans on Trochlear Groove Positioning with Kinematic Alignment

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Introduction:

Patellar maltracking remains a significant cause of postoperative pain and dissatisfaction after total knee arthroplasty (TKA), often from femoral component internal rotation and trochlear groove (TG) malpositioning. While the Coronal Plane Alignment of the Knee (CPAK) classification evaluates coronal alignment, it doesn't account for three-dimensional anatomy. As newer alignment philosophies like kinematic alignment (KA) gain traction, risk of patellar maltracking may increase, especially when using implants designed for mechanical alignment. This study evaluates TG orientation in axial and coronal planes after virtual KA-based placement of a standard femoral component in 85,604 patients undergoing primary TKA.

Material & Methods:

We analyzed 85,604 CT scans of patients with arthritis. For each, we calculated CPAK classification, lateral distal femoral angle (LDFA), medial proximal tibial angle (MPTA), hip-knee-ankle (HKA) angle, and posterior condylar to transepicondylar axis (PCA to TEA). Using KA principles, we virtually implanted a femoral component with a 6° lateral TG relative to the native mechanical axis (MA). The average quadriceps line of force (QLF), defined as 3.2° lateral to the native mechanical axis, was considered ideal for tracking. TG orientation was then measured relative to the QLF and the standard 6° reference point.

Results:

Mean values were: LDFA 87.1°, MPTA 85.7°, HKA 176.7°, and PCA to TEA 3.2°. In the coronal plane, 49% had a TG medial to the QLF, and 86% of cases had a TG medial to the 6° reference point. CPAK types 2 (71%), 3 (100%), and 6 (58%) showed the highest internal rotation and medial TG orientation. To achieve KA, ~30% of patients required >3° of both internal rotation and valgus tilt and approximately 2% required > 5°.

Conclusion:

A large proportion of patients demonstrated TG malpositioning and excessive internal rotation when placing MA-designed implants in KA. These findings highlight the need for three-dimensional classification systems and alignment-specific implant designs to optimize TKA outcomes.

Mathematical Relationships Linking Femoral and Tibial Coronal Anatomy to Knee Joint Line Orientation During Single-Limb Stance

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Presenter: Gautier Beckers

Abstract

Introduction
Natural knee joint line orientation (JLO) relative to the ground during gait remains poorly understood. The relationship between the centre of mass (COM), lower limb alignment, and JLO may influence compartmental knee loading during stance. Although JLO is commonly believed to remain parallel to the floor during gait, the influence of femoral and tibial coronal anatomy on this relationship has not been clearly defined. The purpose of this study was to quantify the independent influence of the MPTA and LDFA on knee JLO relative to the ground during bipodal and single-limb stance using a mathematical model.

Methods
A two-dimensional mathematical lower-limb model was developed using representative anthropometric parameters. Simulations were performed during bipodal and single-limb stance while independently varying the MPTA and LDFA over a wide range of native varus and valgus anatomical configurations. Knee JLO relative to the ground and the theoretical COM displacement required to achieve a horizontal JLO were calculated for each configuration.

Results
Transition from bipodal to single-limb stance consistently reduced JLO by 2.7°, irrespective of coronal anatomy. Across all simulations, each one-degree modification of either the MPTA or LDFA changed JLO by approximately 0.5°, demonstrating quantitatively equivalent effects of tibial and femoral coronal anatomy on joint line orientation. However, MPTA and LDFA generated distinct geometric relationships, resulting in different JLOs despite identical HKA. Only a limited range of anatomical configurations produced a horizontal JLO without theoretical COM displacement. For all remaining configurations, the calculated mediolateral COM displacement required to restore a horizontal JLO ranged from 12.1 to 71.3 mm.

Conclusion
Femoral and tibial coronal anatomy independently and predictably influence knee JLO during single-limb stance. Although modifications of the MPTA and LDFA exert quantitatively equivalent effects on JLO, they generate distinct geometric relationships that cannot be inferred from the HKA angle alone. These findings provide a mathematical framework for interpreting native and postoperative JLO and may facilitate future investigations evaluating personalized alignment strategies in TKA.

Topic: Alignment / anatomy

Influence of positioning and acquisition factors on the accuracy of coronal lower limb alignment measurements: a systematic review and meta-analysis

Moya-Angeler J., Crespo-Cortés B., León-Muñoz V.J., et al.

Presenter: Moya-Angeler J.

Purpose: To systematically evaluate the influence of positioning and acquisition factors on the accuracy of radiographic measurements of coronal lower limb alignment obtained from long leg radiographs, with particular emphasis on the effect of lower limb rotation on hip knee ankle (HKA) angle measurements.

Methods: A systematic review and meta-analysis were performed according to PRISMA guidelines. Studies published between January 2010 and January 2026 evaluating positioning and acquisition factors affecting coronal lower limb alignment measurements were included. A random effect meta-analysis quantified the effect of lower limb rotation on HKA angle measurement error.

Results: Fifteen studies met the inclusion criteria, of which four were included in the quantitative synthesis. Meta analysis demonstrated a pooled increase in HKA measurement error of **0.025°** (95% CI, 0.008 to 0.043) per degree of lower limb rotation, although heterogeneity was substantial (I^2 = 99.3%). Sensitivity analyses confirmed the robustness of the findings. Isolated lower limb rotation produced relatively small measurement errors. However, exploratory modelling demonstrated that when rotation was combined with increasing knee flexion, HKA measurement errors increased considerably, reaching approximately **5°** at **10°** of knee flexion. Intermalleolar distance and stance width had minimal influence, whereas projection related errors depended on lower limb morphology and radiographic acquisition geometry.

Conclusions: Positioning and acquisition factors have different effects on the accuracy of coronal lower limb alignment measurements. Maintaining full knee extension together with reproducible rotational positioning appears more important than controlling isolated lower limb rotation alone. Standardized radiographic acquisition protocols should prioritize knee extension and consistent rotational positioning to improve the reliability of alignment assessment and support accurate preoperative planning and postoperative evaluation in knee arthroplasty.

Topic: Alignment / anatomy

Correlation between CPAK classification and radiographic frontal-alignment measurements obtained from goniometry and knee anteroposterior radiographs

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Presenter: Thienpont E.

Introduction
The Coronal Plane Alignment of the Knee (CPAK) classification, derived from full-length standing radiographs, is increasingly used to guide personalized alignment strategies in total knee arthroplasty. However, full-length radiographs carry limitations including increased radiation exposure and cost. This study investigated whether the CPAK classification can be reliably reproduced from standard weight-bearing anteroposterior (AP) knee radiographs.

Materials and methods
A single-center observational study was conducted on 329 osteoarthritic knees. The mechanical lateral distal femoral angle (mLDFA) was reconstructed from AP knee radiographs by combining the anatomical lateral distal femoral angle (aLDFA) with the anatomical–mechanical angle (AMA) obtained from same-day goniometry. The medial proximal tibial angle (MPTA) was measured on both modalities. CPAK classifications derived from goniometry and from AP knee radiographs were compared using Cohen's kappa coefficient. Spearman's correlation and Wilcoxon signed-rank tests were used for angular comparisons.

Results
No significant difference was found for mLDFA between modalities ($p = 0.805$), yet individual-level correlation was weak ($\rho = 0.209$). MPTA showed a significant systematic overestimation of 1–2° on AP radiographs ($p = 0.042$), with a moderately strong correlation ($\rho = 0.708$). Overall CPAK agreement was poor ($\kappa = 0.203$), with an exact concordance rate of 38.6%. Measurement reproducibility was excellent (ICC 0.93–0.99), and paired agreement within ±2° reached 48.6% for mLDFA and 78.7% for MPTA. Per-category concordance was highest for CPAK type I (58.4%) and lowest for types V and VI (15.4% and 18.8%), with frequent reclassification toward type IV.

Conclusion
Weight-bearing AP knee radiographs cannot reliably substitute for full-length standing radiographs in determining the CPAK classification. Full-length radiographs remain essential for accurate phenotype assessment and personalized alignment planning.

TOPIC

Tibiofemoral dwell point

TITLE

Native Femorotibial Relationship in Full Extension: A Weight-Bearing CT Analysis

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Presenter: Victor J

ABSTRACT

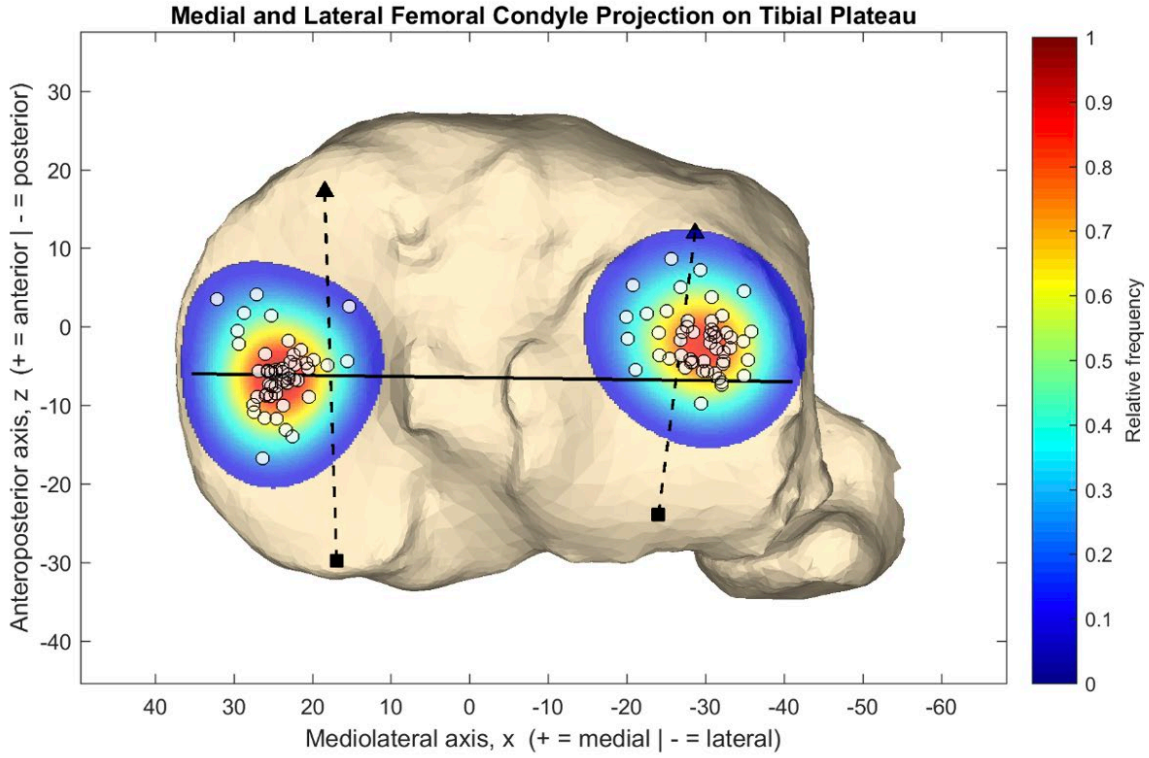
Introduction Medial pivot and medial congruent total knee arthroplasty designs are based on the concept of a stable medial compartment. However, the weightbearing position of the femur relative to the tibia in full extension remains poorly defined. This study aimed to determine the position of the projected femoral condylar centers using weightbearing computed tomography (WBCT) and evaluate their association with posterior tibial slope.

Materials and Methods In this retrospective study, WBCT scans of 25 healthy adults (50 knees) acquired in full extension were analyzed after excluding deformity and degenerative changes. Three-dimensional bone models were reconstructed, and femoral condylar centers were projected onto the tibial plateau along the normal of the medial or lateral tibial plateau. Anteroposterior position of the projected femoral condylar centers was expressed as a percentage of tibial plateau length and mediolateral position as a percentage of plateau width. Associations between posterior tibial slope and the anteroposterior position were assessed using Pearson correlation.

Results In full extension, the projected medial femoral condylar center was located at 50.6% (range, 27.7 to 72.1) of medial tibial plateau length from the posterior edge and 14.7% (range, 4.2 to 26.2) of plateau width from the medial edge. The projected lateral femoral condylar center was located at 61.9% (range, 39.5 to 97.7) of lateral plateau length and 15.6% (range, 6.8 to 27.7) of plateau width from the lateral edge. Posterior tibial slope was not associated with a more posterior condylar center location both medially (r = 0.06, P = 0.69) and laterally (r = −0.27, P = 0.06).

Conclusion The native medial femorotibial articulation was located at the midpoint of the medial tibial plateau during weight-bearing, whereas the laterally it was located more anteriorly. Posterior tibial slope was not associated with a more posterior femorotibial articulation. These findings provide quantitative reference values that may inform implant design and positioning, particularly when medial congruent or medial pivot designs are considered.

Fig. Heatmap of Tibiofemoral contact points in extension



Topic: Alignment / anatomy

Title: Neutral Coronal Knee Alignment Differs Across Populations and Disease States: A Multicohort Analysis in the aHKA-JLO Plane

Authors: Vicente J. León-Muñoz & Joaquín Moya-Angeler

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Introduction

Coronal knee alignment has traditionally been defined using fixed angular thresholds that presume a universal neutral alignment. However, substantial interindividual variability challenges this assumption.

(1) Does the COM of the aHKA-JLO distribution differ between independent populations?

(2) Do healthy and osteoarthritic populations differ in COM location?

(3) Do alignment distributions differ in dispersion between populations?

(4) To what extent do alignment distributions overlap?

Materials & Methods

A retrospective multicohort study was conducted using four independent datasets comprising 2,588 knees (914 healthy, 1674 osteoarthritic). Alignment was modeled in the aHKA-JLO plane. Differences in center of mass (COM) were assessed using Hotelling's T^2, dispersion was evaluated with Box's M test, and overlap was measured using Bhattacharyya distance.

Results

(1) COM location differed among cohorts (Hotelling's T^2, $p < 0.001$), with Euclidean distances ranging from 3.9º to 5.5º.

(2) Osteoarthritic populations demonstrated a more varus COM (−4.67º ± 3.82º vs

−0.35º ± 2.56º; mean difference −4.32º [95% CI −4.55 to −4.09]; $p < 0.001$).

(3) Dispersion was greater in osteoarthritic populations (ellipse area 326.5 vs 202.2; Box's M, $p < 0.001$).

(4) Distributions overlapped partially (overlap coefficient 0.67 to 0.84).

Conclusion

Neutral alignment appears to be population-specific and disease-dependent rather than universal. Distribution-based frameworks may better capture variability in coronal alignment.

Topic: Alignment / anatomy

Anatomical Determinants of the Quadriceps Tendon Axial Angle in Total Knee Arthroplasty

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Presenter: Stefano Campi

Introduction
The Quadriceps Tendon Axial Angle (QTAx) has recently emerged as a promising parameter for assessing extensor mechanism alignment and patellofemoral tracking. Although its clinical relevance has been increasingly recognized, the anatomical basis of QTAx remains incompletely understood. Specifically, it is unclear whether QTAx primarily reflects proximal femoral rotational anatomy or distal extensor mechanism alignment.
The aim of this study is to investigate the anatomical determinants of QTAx by evaluating its relationship with Femoral Neck Anteversion (FNA), Tibial Tubercle–Trochlear Groove distance (TTTG), and Quadriceps Tendon–Trochlear Distance (QTTD) in patients undergoing robotic-assisted total knee arthroplasty (TKA).

Materials and Methods
A retrospective analysis was performed on preoperative computed tomography scans of 105 patients scheduled for robotic-assisted TKA using a functional alignment philosophy. QTAx, FNA, QTTD, and TTTG were measured. Mean values were 13.3 ± 8.8°, 19.7 ± 14.4°, 19.6 ± 9.1 mm, and 16.8 ± 5.9 mm, respectively. Pearson correlation analyses were performed. Additional categorical analyses were conducted using thresholds of QTAx >14° and FNA >20°.

Results
QTAx demonstrated a moderate positive correlation with QTTD ($r = 0.41$, $p < 0.001$) and a weaker but significant correlation with TTTG ($r = 0.29$, $p = 0.004$). In patients with QTAx >14°, the association between QTAx and QTTD remained significant ($r = 0.36$, $p = 0.01$), whereas the correlation with TTTG was no longer significant ($p = 0.34$). No significant correlation was found between QTAx and FNA ($r = 0.077$, $p = 0.44$). Likewise, no significant categorical association was observed between QTAx >14° and FNA >20° (OR 2.04, 95% CI 0.73–5.74; $p = 0.26$).

Conclusions
QTAx appears to be more closely related to distal extensor mechanism alignment than to proximal femoral rotational anatomy. Its association with QTTD, together with the absence of correlation with FNA, suggests that QTAx primarily reflects quadriceps tendon alignment relative to the trochlea rather than femoral torsion. These findings provide further insight into the anatomical basis of QTAx and support its role as a complementary parameter for evaluating extensor mechanism alignment in patients undergoing TKA.

Topic: TKA

Title: Is a short-acting spinal anaesthesia instrumental for early recovery protocol after total knee arthroplasty?

Authors: Ricchi T., Risca G., Caparrini C., Brucoli A.,Ponti M., Bartoli D., Pieri L., Baldini A.

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Presenter: Baldini Andrea MD

Background

This prospective randomized single-center study compared early postoperative recovery following spinal anesthesia with a short-acting agent or a long-acting agent in patients undergoing primary knee arthroplasty within a standardized multimodal perioperative pathway. Our hypothesis was that a short-acting agent would reduce negative interferences on a rapid recovery pathway such as orthostatic hypothension, nausea and vomiting (PONV), urinary rentention, and physical therapy sessions delay.

Methods

Between January and May 2026, 150 consecutive patients undergoing primary total or unicompartmental knee arthroplasty were prospectively enrolled. Patients were randomized to received spinal anesthesia with either hyperbaric prilocaine 10-12 mg (n = 72) or hyperbaric bupivacaine 45-55 mg (n = 78). All patients followed identical surgical, analgesic, rehabilitation, and postoperative care pathways. Primary outcomes were symptomatic orthostatic intolerance during the first physiotherapy session and residual motor block (Bromage score >0). Secondary outcomes included pain during physiotherapy, rescue analgesia, PONV, urinary complications, bladder catheterization, and Oxford Knee Score (OKS).

Results

Baseline demographic characteristics were comparable between groups. Symptomatic orthostatic intolerance occurred less frequently after prilocaine than after bupivacaine (4.2% vs. 14.1%; p=0.049), as did residual motor block at the time of physioteraphy (4.8% vs. 21.7%; p=0.005). Mean pain scores during the first physiotherapy session were similar (VAS 2.44 vs. 2.15; p=0.307), and rescue analgesia requirements did not differ between groups (37.5% vs. 37.2%; p=1.000). Bladder catheterization was required in 7.7% of patients receiving bupivacaine and in none receiving prilocaine (p=0.029). No significant differences were observed in postoperative nausea, vomiting, dysesthesia, or postoperative OKS.

Conclusions

Within a standardized multimodal perioperative pathway, short-acting spinal anesthesia with prilocaine was associated with improved early motor recovery and better tolerance of early mobilization, and less urinary retentionwithout increasing postoperative pain or rescue analgesic requirements supporting its usein fast-track knee arthroplasty recovery protocols.

Topic:
TKA, TXA, Pharmacokinetics of intra-articular TXA

Title:
Population pharmacokinetics of intravenous and intra-articular tranexamic acid in total knee arthroplasty: evidence for slow, near-complete systemic absorption from the joint space

Authors:
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Presenter:
Christian Skovgaard Nielsen

Introduction:
Intra-articular (IA) tranexamic acid (TXA) is widely used in total knee arthroplasty (TKA), but it is unclear whether the joint acts as a slow-release depot or IA TXA is reabsorbed rapidly like an intravenous (IV) dose. We characterised the population pharmacokinetics (PK) of IV and IA TXA.

Materials and methods:
Sixty adults undergoing primary TKA received TXA intravenously only or with an IA dose. Serum TXA was measured by validated LC-MS/MS at 11 times over 24 h. A population PK model was built in Monolix, the IA dose modelled as a first-order extravascular input with bioavailability F. Body weight, estimated glomerular filtration rate (eGFR) and ASA status were tested as covariates.

Results.
A two-compartment model described the data. Typical estimates (70 kg, eGFR 90, ASA I) were clearance 11.3 L/h, central and peripheral volumes 5.6 and 11.2 L, intercompartmental clearance 52.4 L/h, absorption rate constant 0.154 h-1 and F 0.999. The IA absorption half-life (about 4.5 h) exceeded the disposition half-life (about 1.1 h).

Adding body weight, eGFR and ASA on clearance reduced between-subject variability in clearance from 37% to 11%. Simulated time above 10 mg/L was about 2.6 h after IV 1 g and about 10 h after IA 3 g, increasing as eGFR fell.

Conclusion.
IA TXA appeared near-completely bioavailable but slowly absorbed, a flip-flop pattern that may participate to prolonged antifibrinolytic effect and confirm renal function as an important determinant of exposure duration.

Topic: TKA

Title: Weight loss prior to TKA in obese patients significantly increases rates of postoperative infection and revision compared to obese patients who did not lose weight: A Systematic Review and Meta-Analysis

Authors:
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3. Clinique de la Hanche et du Genou, Bruges, FRANCE

Presenter:
Mo Saffarini M.Eng, MBA, FRSM

Introduction
This systematic review and meta-analysis aims to synthesise, critically appraise, and evaluate the available evidence comparing outcomes following primary total knee arthroplasty (TKA) in obese patients who achieved preoperative weight loss versus those who did not reduce weight prior to surgery

Materials and methods
A systematic review with meta-analysis was conducted according to PRISMA guidelines. Medline and Embase were searched in March 2026 for comparative studies evaluating outcomes following primary TKA in obese patients with and without preoperative weight loss, achieved through any intervention. Outcomes of interest included infections, wound-related complications, readmissions, reoperations, revisions, and patient-reported outcomes. Methodological quality was assessed using the Mixed Methods Appraisal Tool (MMAT). Random-effects meta-analyses were performed to calculate pooled odds ratios (ORs) with 95% confidence intervals (CIs).

Results
Eight studies met the inclusion criteria, including 10,340 knees in patients who underwent preoperative weight loss and 58,891 knees in patients who did not. Weight-loss interventions included bariatric surgery, dietary programmes, non-operative weight-management strategies, and unspecified interventions. Meta-analysis demonstrated that patients who underwent preoperative weight loss had significantly increased odds of infection (OR 1.76, 95% CI 1.54–2.00) and revision surgery (OR 4.46, 95% CI 1.12–17.81) (Figure). No consistent differences were observed in wound-related complications, readmissions, reoperations, or patient-reported outcomes. Limited evidence evaluating the timing and magnitude of weight loss did not identify a clear association with postoperative outcomes.

Conclusion
Weight loss prior to primary TKA in obese patients results in significantly greater rates of postoperative infection and revision compared to obese patients who maintained their baseline weight. Furthermore, there were no considerable differences between groups in terms of wound-related complications, readmissions, reoperations, and postoperative clinical scores. The findings of this meta-analysis challenge the current recommendations that encourage obese patients to lose weight before undergoing TKA.

Topic: ***TKA***
Title: Is Staging Necessary? A Comparative Analysis on the Superiority of Simultaneous Bilateral TKA in Ideal Candidates

Authors: Budhiparama N.C.[1,2,3], Lumban-Gaol I.[3], Vinayak I.[4], Sharma R.K.[5]*

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[4] Junior Consultant, Institute of Orthopaedics & Joint Replacement, Moolchand Medcity, New Delhi, India
[5] Chairman, Institute of Orthopaedics & Joint Replacement, Moolchand Medcity, New Delhi, India;

Presenter: Nicolaas C. Budhiparama

Introduction: Simultaneous bilateral total knee arthroplasty (TKA) aims to address both knees in a single hospital admission, with single anaesthesia procedure and single postoperative rehabilitation. Although it showed benefit in simultaneous bilateral TKA, concerns remain regarding perioperative morbidity and mortality, pulmonary embolism (PE), and deep vein thrombosis (DVT) compared to stage-bilateral TKA. This study ought to see the effectiveness of simultaneous bilateral TKA compared to stage-bilateral TKA, and identified which factors affect the success rate and complications.
Materials and Methods: A retrospective review of 3,595 patients (2,387 simultaneous; 1,208 staged) from centres in India and Indonesia (2018-2024) was conducted with a minimum 2-year follow-up. Variables analyzed included age, gender, comorbidities, preoperative Hb, ASA, surgical factors (assisted devices, time, blood transfusion, implants type, patellar fixation, stem extension, medications, length of stay), and clinical outcomes (KOOS, MCID achievement, and medical complications).
Results: At 2-year follow-up, patients undergoing staged bilateral TKA demonstrated lower KOOS Activity Daily Living (ADL) and Quality of Life (QoL) scores compared to those undergoing simultaneous bilateral TKA ($p<0.001$). In contrast, simultaneous bilateral TKA patients showed greater overall improvement (delta KOOS), and higher Minimal Clinically Important Difference (MCID) achievement in KOOS Sport and QoL categories ($p<0.001$). Interestingly, length of stay and type of implant were consistently correlated with KOOS outcomes, while preoperative NSAID use, anticoagulant use, and robotic-assisted surgery use were correlated with KOOS Sport. Notably, the staged group experienced higher incidences of superficial knee infection ($p<0.001$) and emergency department (ED) visits ($p=0.002$), which were correlated with surgical time and implant type.
Conclusion: In appropriately selected patients, simultaneous bilateral TKA yields superior functional outcomes and lower rates of superficial infection and ED visits compared to staged procedures. Success is highly dependent on patient-specific factors and surgical variables, necessitating precise candidate selection.

Measure, decide and cut. A new instrumentation to balance the Gaps before performing femoral cuts in TKR

Brivio A.[1], Ferrari M.[2]

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[2] Mechanical Engineer

Presenter: Brivio A.

Introduction

In this study, a new instrumentation is shown to balance the gaps in TKR before the femoral cuts are done. It is composed by different shims and angles and a distal femoral extramedullary cutting block.

Materials and methods

After the first tibial cut, the instrumentation allows to check gaps in flexion and extension. Data obtained: room created by the tibial cut (to accommodate the minimum thickness of the tibial base and the insert); degrees of external rotation of the femoral component; distal femoral angle to follow to perform the distal femoral cut; relation between the room in flexion and in extension; alignment of the lower limb.
Once the surgeon is satisfied with the shims chosen and the alignment, a dedicated jig is used to perform the distal femoral cut.
Once the cuts are determined and gaps balanced, the surgeon continues the surgery with the specific instrumentation attached to the brand of the implant used.

Results and discussion

This instrumentation has been designed to allow the surgeons to follow their own Credo in knee alignment whilst getting a wellbalanced knee in flexion and in extension. It enables to take a decision about how to align and balance the knee before the femoral cuts.
The guide may be employed independent of the knee implant brand selected.
It allows less blood loss without the intramedullary guide and avoids embolic phenomena associated with IM rods. A smaller incision is permitted as pin placement, mandatory for the robot, is not required. Complications associated with pin placement, such as infection or fracture are avoided. without a bigger incision needed to put pins, mandatory if using a robot.
It respects the joint line allowing an additional balancing of the third space of the knee. Financial cost and time loss in setting up and employing the robot are negated.

Conclusions

This instrumentation is simple, safe, blood sparing and universal to balance the first and second space of the knee, flexible to the third space, with no compromises related to the knee alignment philosophy.

Manual Instrumentation Provides Greater Precision Than Patient-Specific Instrumentation For Initial Tibial Resections In Unrestricted Kinematic Alignment Total Knee Arthroplasty : A Comparative Cohort Study

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ABSTRACT

Purpose

Accurate tibial resection is critical in unrestricted kinematic alignment total knee arthroplasty (uKA-TKA), as component positioning aims to restore the native joint line through anatomical resurfacing. This study compared the reproducibility of initial tibial resections performed with manual instrumentation versus patient-specific instrumentation (PSI) in uKA-TKA. The secondary objective was to compare tibial recut rates between techniques.

Methods

This retrospective comparative cohort study analyzed prospectively collected intraoperative measurements from 124 primary uKA-TKAs performed between June 2024 and January 2026. Tibial resections were performed using manual instrumentation in 83 cases and PSI in 41 cases. Target and measured tibial resection thicknesses were recorded intraoperatively at the medial (MTP) and lateral tibial plateaus (LTP) using an analog sliding caliper (0.5-mm resolution). Resection error (Δ) was defined as measured minus target thickness. Accuracy was expressed as mean signed error and precision as the standard deviation of signed error. Absolute error thresholds and tibial recut rates were also analyzed.

Results

Mean signed error did not differ significantly between techniques for either plateau (medial:

0.15 mm PSI vs −0.10 mm manual, p=0.158; lateral: 0.10 mm PSI vs −0.05 mm manual, p=0.378), indicating comparable average accuracy. However, medial precision was significantly greater with manual instrumentation (SD 0.64 mm vs 1.02 mm with PSI, p=0.002), with lower mean absolute error (0.38 mm vs 0.73 mm; p=0.007). Fewer medial resections exceeded the ±1.5 mm threshold in the manual group (2.4% vs 9.8%, p=0.024). No significant differences were observed laterally. Angular tibial recut was performed in 12.0% of manual cases and 22.0% of PSI cases (p=0.187).

Conclusion

Manual instrumentation and PSI achieved similar mean accuracy for initial tibial resections in uKA-TKA. However, manual instrumentation demonstrated greater medial reproducibility and fewer large resection deviations, with a lower recut rate. Within the sequential uKA workflow—including caliper verification and corrective recut when required—both techniques allow reliable convergence toward the predefined resurfacing target.

Level of evidence: III, retrospective comparative study.

Topic: TKA

Title: Femoral Condylar Sliding Osteotomy in Total Knee Arthroplasty with Severe Coronal Deformity

Authors

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Presenter: Liebensteiner M.

Introduction:
Total Knee Arthroplasty (TKA) with femoral condylar sliding osteotomy (FCSO) presents an alternative to constrained implants in cases with severe varus or valgus deformities. It was the aim of the study to determine the outcome of TKA with FCSO. It was hypothesized that patients would experience significant improvements in patient-reported outcome (H1). Moreover, acceptable revision rates were hypothesized (H2).

Materials & Methods:
The study design was a retrospective case series and was conducted on patients who underwent primary TKA with FCSO between 2002 and 2021. Hip-knee-ankle (HKA) angles were taken from whole leg radiographs, WOMAC scores and cumulative revision rate were provided from the arthroplasty registry.

Results:
A total of 63 cases with a mean age of 70.0 years (SD 10.2) were followed for a mean of 13.4 years. 52 knees had a preoperative valgus deformity of 11.5°±6.4 and ended up with a 1-year postoperative HKA angle of 0.9° ±4.7 valgus. Eleven knees had a preoperative varus deformity of 19.2° ±5.5 and resulted in a 1-year postoperative HKA angle of 6.6° ±8.7 varus.
With regard to hypotheses 1, the WOMAC score improved from 47.4 (SD 20.9) preoperatively to 18.0 (SD 17.8) at 1-year postoperative. Regarding hypothesis 2, three revisions occurred during the follow-up period, including two infections and one aseptic tibial loosening. Five-year and 10-year revision rates were low with 3.2% and 4.8%, respectively.

Conclusion:
On the basis of our findings it is concluded that TKA with FCSO leads to good patient-reported outcome and advantageous implants revision rates even over 10 years. The authors suggest to perform TKA with FCSO in clinical routine more often and also emphasize the potential for reducing costs when compared to TKA with constrained implants.

Gait speed as a novel outcome measure before total hip or knee arthroplasty: which is the best method to assess self-selected and maximal walking speed? Comparison between overground and treadmill assessment

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Presenter: Baldini A.

Background
Overground walking speed is an established indicator of physical function in patients awaiting total hip or knee arthroplasty, whereas treadmill testing offers a compact, standardized alternative. This study assessed agreement between treadmill and overground measurements at self-selected walking speed (SSWS) and maximal walking speed (MWS), and explored whether treadmill values could estimate overground performance.

Methods
In this observational method-comparison study, A total of 121 patients completed both overground and treadmill assessment at self-selected walking speed (SSWS), while 125 completed maximal walking speed (MWS) testing. Paired measurements were analyzed using Bland-Altman plots and Spearman correlation. Linear regression examined whether age, body mass index (BMI), or mean walking performance influenced between-method disagreement and generated exploratory equations for predicting overground speed from treadmill measurements.

Results
At SSWS, treadmill testing systematically underestimated overground speed, with a mean bias of -0.49 m/s and 95% limits of agreement from -1.00 to 0.02 m/s (Figure 1A). Correlation was moderate, and age was significantly associated with disagreement (p=0.003), with smaller differences in older participants. At MWS, correlation was strong and mean bias was smaller (-0.12 m/s), although the limits of agreement remained wide (-0.75 to 0.51 m/s) and disagreement increased at higher speeds (Figure 1B). BMI was not associated with bias. Exploratory regression showed that treadmill speed predicted overground performance at both walking intensities, despite significant differences in absolute values.

Conclusions
Although treadmill and overground gait speed are not directly interchangeable, treadmill assessment provides a standardized, reproducible, and space-efficient alternative when corridor-based testing is impractical. With appropriate prediction equations, treadmill measurements may offer clinically meaningful estimates of overground walking speed, supporting standardized preoperative assessment and longitudinal follow-up across different clinical settings.

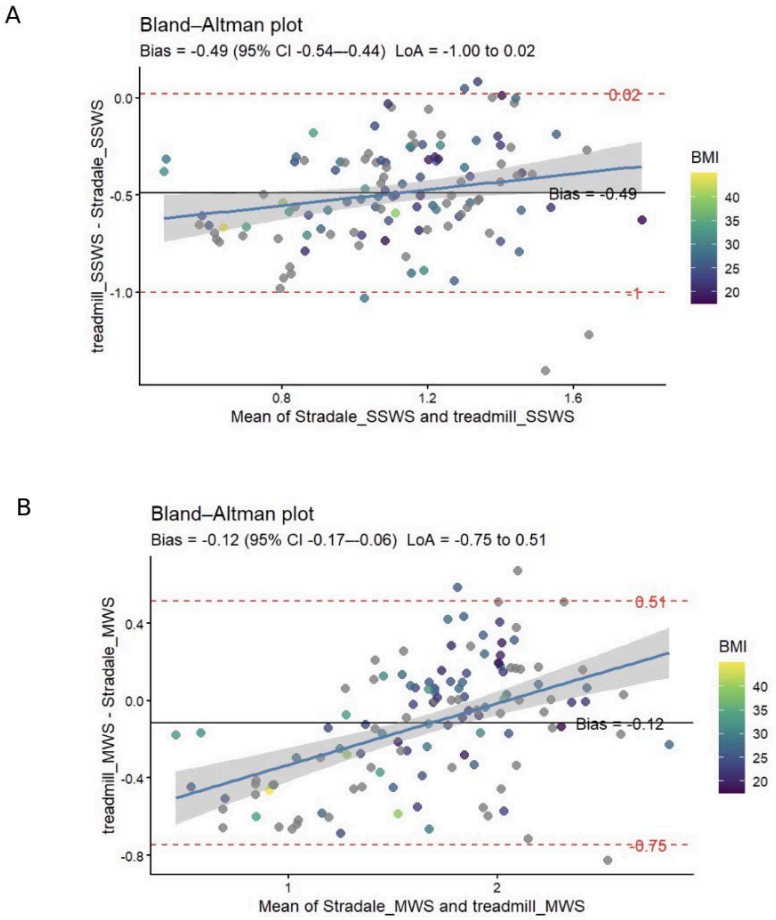


Figure 1. Bland–Altman analyses comparing treadmill and overground walking speed: (A) self-selected walking speed (SSWS) and (B) maximal walking speed (MWS). Negative values indicate lower treadmill speed; “Stradale” in the source plots denotes overground testing.

EKS abstract

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Topic: Kinematics/gait

Title sentence in **bold** with no full stop at the end

Blank line between the title and the authors/affiliations/presenter

Family name first followed by initials of authors

Maximum 1 figure OR table. Does not count towards the word limit. Figures embedded in abstract, underneath the abstract and cited in the abstract

Deadline: January 15, 2026

Topic: Kinematics / gait

Lower preoperative walking speed and younger age predict meaningful walking speed improvements after knee arthroplasty

Word count: 292

Authors: Bruning, F.J.[1], Defoort, K.C.[2], Van Der Horst-Bruinsma, I.E.[3], Van Den Ende, C.H.M.[1], Smulders, K.[1]

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Presenter: Defoort, K.C.

Introduction

Better walking is a key goal after knee arthroplasty. Yet, objective outcomes of gait after knee arthroplasty have only be reported in small-scale studies. Here we aimed to quantify recovery of walking speed in a large group undergoing knee arthroplasty, and evaluated which factors were associated with better postoperative walking speed.

Materials and methods

Wearable sensors (both feet, sternum, lower back) were used to quantify walking speed during a 2-min walk in 119 individuals undergoing knee arthroplasty (69 women, 67 ± 7.6 years). Participants were assessed preoperatively and at 2, 6, and 12 months postoperatively. Means (95%CI) at each timepoint, and mean differences (95%CI) between preoperatively and each timepoint were calculated. Associations between age, weight, number of painful joints, joint space width and preoperative walking speed with 12-month walking speed were examined using multiple linear regression models. Logistic regression with the same predictors estimated the probability of reaching the minimal clinically important difference (MCID; ≥0.1 m/s change) in walking speed at 12 months.

Results

Walking speed improved from 1.06 m/s preoperatively to 1.22 m/s at 12 months (mean difference: 0.15 m/s, 95%CI: 0.12-0.17, Figure 1A,B). At 12 months, 59/96 (61.%) patients showed improvements in walking speed beyond the MCID. Higher preoperative walking speed (B = 0.54, 95%CI: 0.38-0.69) and lower age (B = -0.01, 95%CI: -0.01--0.00) were associated with higher 12-month walking speed. Lower age and lower preoperative walking speed were associated with higher odds of achieving MCID (OR per 10 year-decrease = 4.81, 95%CI: 1.95-11.89); OR per 0.1 m/s decrease = 2.62, 95%CI: 1.55-4.41, Figure 1C).

Conclusion

Only 60% of patients achieved clinically meaningful gains after knee arthroplasty. Younger people and slower preoperative walkers were more likely to improve walking speed. These findings may help to inform postoperative expectations.

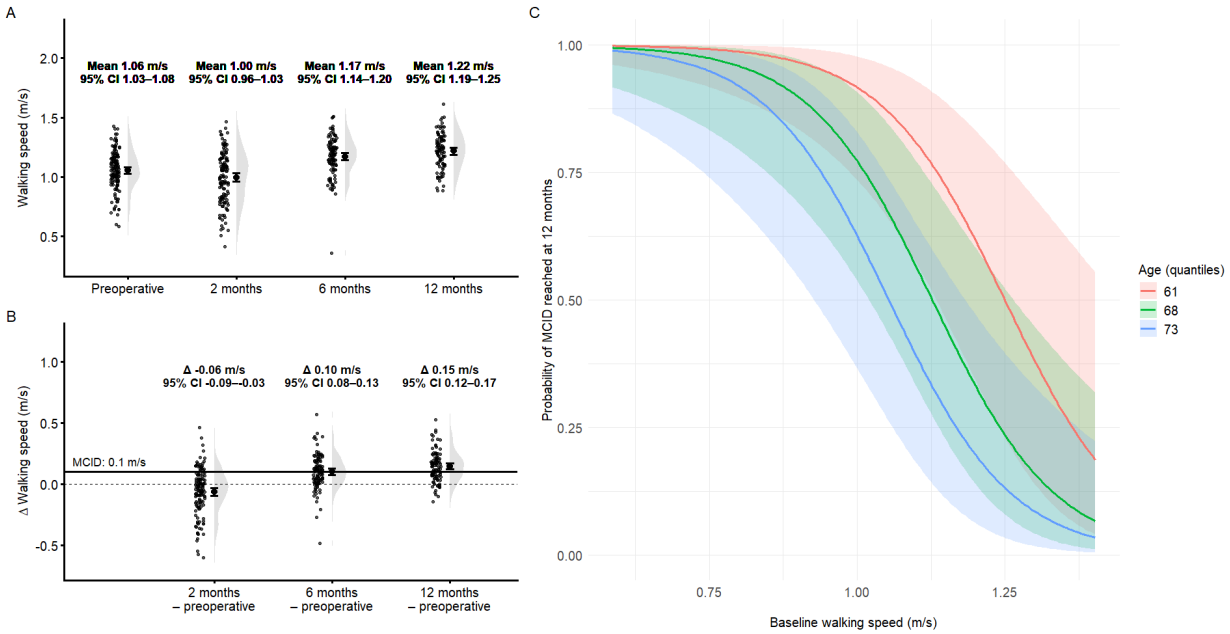


Figure 1 – (A) Means and 95%-confidence intervals (95%CI) of preoperative, and 2, 6, and 12 months postoperative walking speed, (B) Mean difference and 95%CI between 2, 6 and 12 months and preoperative walking speed, (C) Visualization of the association between preoperative walking speed (m/s) and the probability of reaching the minimal clinically important difference for walking speed at 12 months post-surgery, per age quantile.

Topic: TKA

Individualized versus Off-The-Shelf TKA: Preliminary results of a PRS with minimum 2 years Follow-Up

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Centre Orthopédique Santy, 24 Av Paul Santy, Lyon, France

Presenter: Bonnin M

Introduction: Individualized Origin® TKA (Symbios, Switzerland) is designed from a CT-scan to reproduce the native alignment (within boundaries), the radii of curvature, the trochlear orientation and to optimize the bone-implant fit. It is still unclear whether this “bone-based” design is safe and/or improves function.
The goal of this single-blinded PRS study (N° ID-RCB: 2020-A00075-34) was to compare the outcomes at 2 years FU, between Individualized TKA (iTKA) and Off-the-Shelf TKA (OTS-TKA).

Material and methods: Between October 2021 and 2024, 433 patients planned for TKA for primary OA were randomized to receive either an iTKA n=214 (Origin) or an OTS-TKA n=219 (Attune, DePuy-Synthes, or Persona, Zimmer). All prostheses were Postero-Stabilized, cemented and the patella was resurfaced (except in case of too-thin patella), the alignment strategy was a “restricted kinematic alignment”, and all patients had a preoperative CT-scan. Exclusion criteria were: post-traumatic deformities, previous osteotomy, Rheumatoïd Arthritis or Neurologic condition. Patients had a postoperative visit at 4 months, 12 months and 24 months post op, and filled questionnaires before each visit including Knee Society Self-Reported Score (KSSRS), KOOS and FJS. (Table).

Results: (Table) The KSSRS was significantly better at 4 months in the iTKA group, but the difference was not anymore significant at 1 and 2 years postoperatively. No difference was observed between the two groups at 2 years for any of the sub-scores. The objective KSS was significantly better in the individualized group, due to a better flexion angle (131°±9.6 versus 123°±11, $p<0.05$). Four prostheses were revised in the OTS group but none in the Individualized group, and 6 had a reoperation in the OTS group compared to 4 in the Individualized group.

Conclusion: This study demonstrates that iTKA is a safe and reliable concept, but do not demonstrate a clear superiority – in term of function – compared to OTS-TKA.

	Individualized (n=214)	OTS(n=219)	p-value
PREOPERATIVE			
Age (y)	72.2 (51-91)	70.5 (46-87)	n.s.
Female	66%	57.1%	0.009
BMI (kg/m^2)	28.3 (18.4 – 44.9)	29.4 (19.8 – 48.9)	0.034
Duration of symptoms(y)	10.3 (0.7 – 32)	10.6 (1.3 – 55)	n.s.
Right knee	52%	58%	n.s.
Medial OA (%)	74.4	74.9	n.s.
Lateral OA (%)	18	13.5	n.s.
Patello femoral OA (%)	5.2	7.9	n.s.
Global (%)	2.4	3.7	n.s.
Ahlback ≥ 3 (%)	96.7	95.2	n.s.
HKA (°)	175.1±7(157 – 194)	173.8±6 (160 – 192)	n.s.
Mech. Femoral angle (°)	91.3±3 (86-98)	91.4±2.6 (85-99)	n.s.
Mech. Tibial angle (°)	85.5±8.5	85.2±6.3	n.s.
SURGERY			
Surgical time (mn)	51±6.9 (38-90)	54±9 (35-119)	
Tourniquet time (mn)	39.7±6 (15-63)	42.9±15(8-219)	
Patellar resurfacing (%)	98.1%	99.1%	
Length of stay (d)	3.4±1.6 (1-9)	3.6±2.1 (1.9-14)	
POSTOPERATIVE (2 years postop)			
HKA (°)	178.4±3(169 –86)	177.9±4 (168 – 189)	n.s.
Mech. Femoral angle (°)	91.7±2 (86-97)	89.7±7 (81-98)	<0.0001
Mech. Tibial angle (°)	86.3±6.6 (83-92)	87.3±2 (81-92)	0.014
Max flexion at clinical exam (°)	131±9.6(90-150)	123±11 (179 – 145)	<0.0001
Knee Society Objective score	67.5±7.8	63.1±11.4	<0.0001
KNEE SOCIETY SELF REPORTED SCORE			
Global score 4 months	131.3±30.4	124.3±27	0.04
Global score 12 months	144.8±22	137.1±27	0.2
Global score 24 months	146.1±25.9	145.9±22.7	0.7
- “Symptoms” (max= 25)	21.9±4.7	21.6±4.4	0.13
- “Satisfaction” (max= 40)	32.4±7.8	31.9±7.9	0.5
- “Expectations” (max= 15)	10.1±2.7	9.9±2.6	0.7
- “Walking & standing” (max= 30)	24.5±7.3	25.9±5.9	0.2
- “Standard activities” (max= 30)	24±6.7	24.1±6	0.7
- “Advanced activities” (max= 25)	13.8±7.6	14.4±6	0.6
- “Discretionnary act^{ies}” (max= 15)	24±6.7	24.1±6	0.7
REOPERATIONS/REVISIONS			
Revisions	0	4 (1 for Stiffness, 1 for Loosenning, 1 for Pain, 1 for Infection)	
Reoperations	4 (2 DAIR, 1 scope, 1 Quad tendon repair)	6 (1DAIR, 1 scope for clunk, 3 MUA, 1 Patellar tendon repair)	

Table

Topic: TKA

Sagittal Spinopelvic Alignment Influences Patient Satisfaction Following Total Knee Arthroplasty with Residual Flexion Contracture

Authors:
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Affiliations::
[1]School of Human Health Sciences, Orthopaedic Department, University Hospital of Florence, Italy; [2] Orthopaedics Department, Hospital of Santa Maria Annunziata, Florence, Italy

Presenter: Innocenti Matteo

Introduction:
Stuck-sitting spinopelvic deformity has been identified as an independent predictor of residual flexion contracture following total knee arthroplasty (TKA). Whether this phenotype also influences patient-reported satisfaction in the presence of residual flexion contracture remains unknown. We aimed to assess whether patient-reported satisfaction differs across spinopelvic phenotypes in patients with residual flexion contracture greater than 5° following TKA.

Materials and Methods:
We performed a retrospective analysis of consecutive robotic-assisted TKAs at a single institution (2019–2023). Inclusion required full passive ROM >90°, residual flexion contracture >5°, and intraoperative confirmation of full extension at the end of the surgery. Patients with hip osteoarthritis, previous THA, windswept or preoperatively stiff knees were excluded. Patients were classified per the 2021 JAAOS Spinopelvic Classification. The primary outcome was satisfaction with residual knee extension, assessed via a binary question. Secondary outcomes were the Knee Society Score (KSS, Knee and Function components) and the Forgotten Joint Score (FJS-12). Multivariate logistic regression evaluated the association between spinopelvic class, degree of contracture, and satisfaction.

Results:
Forty-four knees met inclusion criteria (median age 75 years, IQR 71–80.75; 59% male; median flexion contracture 10°, IQR 7.25–14°). No patient was classified as Type IIA. Overall, 31/44 patients (70.5%) reported satisfaction. Type IIB showed a trend toward greater satisfaction compared to Type IA (B=2.426, 95% CI −0.034 to 4.886, p=0.053). Neither degree of flexion contracture (p=0.812) nor stratification above or below 10° (χ^2=0.018, p=0.892) predicted satisfaction. KSS and FJS-12 did not differ across spinopelvic classes (p<0.01).

Conclusions:
In patients with residual flexion contracture following TKA, stuck-sitting spinopelvic deformity showed a trend toward higher satisfaction independently of the degree of contracture. These findings suggest that residual flexion contracture may represent a functional adaptation rather than a surgical failure in this phenotype.

Topic : TKA

Title
Early arthrogenic muscle inhibition is the dominant predictor of persistent quadriceps inhibition after total knee arthroplasty

Marc Barrera Uso [1], Jean-Marie Fayard [1], Thais Dutra Vieira [1], Louka Bondoux [1], Tarik Ait Si Selmi [1], Michel Bonnin [1], Mohammad Alajji [1], Elliot Sappey-Marinier [1]

[1]Ramsay Santé, Hôpital Privé Jean Mermoz, Centre Orthopédique Santy, FIFA Medical Center of Excellence, Lyon, France.

Presenter : Elliot Sappey-Marinier

Introduction
The purpose of this study is to determine the prevalence of arthrogenic muscle inhibition (AMI) after total knee arthroplasty (TKA) and to identify independent risk factors associated with its persistence during the early post-operative period.

Materials and methods
This retrospective monocentric study included 229 consecutive patients undergoing primary TKA between January 2024 and May 2025. AMI was assessed pre-operatively and post-operatively at 30 and 60 days using the Sonnery-Cottet (SANTI) clinical classification by trained rehabilitation physicians. Although not specifically validated in TKA patients, this classification was used due to the absence of a validated alternative. Multivariate logistic regression analyses were performed to identify factors associated with AMI.

Results
51.1% were male with a mean age at surgery of 70.7±9.6. Preoperatively, 9.2% of patients showed signs of AMI. The post-operative prevalence was 44.5% at 30 days and decreased to 19.2% at 60 days. Independent risk factors for AMI at 30 days were body mass index ≥ 30 kg/m2 (odds ratio [OR] 1.97; p = 0.04), symptom duration ≥ 4 years (OR 2.60; p = 0.003), pre-operative AMI (OR 6.08; p = 0.003), post-operative morphine use (OR 2.15; p = 0.01) and pre-operative neutral limb alignment (hip–knee–ankle 175°–185°) (OR 0.38; p = 0.006). At 60 days, AMI persistence was associated with age ≥ 70 years (OR 3.67; p = 0.004), pre-operative AMI (OR 4.41; p = 0.022), Visual Analogue Scale ≥7 at Day 7 (OR 3.37; p =0.044) and AMI at 30 days (OR 15.6; p < 0.001).

Conclusion
AMI is a frequent issue after TKA, affecting 45% of patients at 1 month and 20% at 2 months. Its occurrence is associated with preoperative inhibition, obesity, chronic symptoms, post-operative pain and age.

Topic - TKA

Title: Static progressive stretch can be an effective treatment for knee stiffness following knee replacement and may reduce the need for MUA and re-operation

Authors: Jacobs L[1], Sinclair N[2], Toms AD[1], Phillips JRA[1], Kalson NS[2]

Affiliations:

1. Exeter Knee Reconstruction Unit, Princess Elizabeth Orthopaedic Centre, Exeter, UK
2. Northumbria NHS Foundation Trust, UK.

Presenter: Nick Kalson

Introduction

Stiffness remains a significant challenge following total knee replacement (TKR) with variable outcomes. Non-operative measures include physiotherapy, stretching and manipulation under anaesthesia (MUA). Static progressive stretch (SPS) aims to improve range of motion (ROM) by providing a sustained stretching stimulus, although evidence supporting SPS is limited. Here we analysed patients with knee stiffness (defined as flexion <100°) following primary TKA treated with SPS using a novel stretching device (STAK tool). The primary outcome measure was change in knee flexion, and secondary measures included need for further treatment (MUA, re-operation).

Materials and Methods

Sixty-six patients were treated using SPS (23 female, mean age 64±1.9 years, mean BMI 33±1.1). Thirty-five patients were treated within six months post-primary TKA (acute) and 31 more than six-months (chronic, 6m-5y).

Results

Mean flexion pre-SPS was 79±2° (range 45-100°), flexion post-SPS was 94±2° (range 45-130°, p=<0.0001, **Figure**). Improvement in flexion was seen in both acute (81±2° vs.97±2°, p=<0.0001) and chronic stiffness (80±2° vs. 93±2°, p=<0.0001). Improvement of flexion of 10-20° was achieved in 21/66 (32%) and ≥20° in 27 patients (41%). Eighteen patients (27%) achieved <10° increase in flexion; 14 subsequently underwent MUA of whom five also underwent operative intervention (three debridement, two revision).

Conclusion

Static progressive stretch may be a useful adjunct to conventional physiotherapy to improve flexion in stiffness post-TKA in both chronic and acute cases and may reduce the need for MUA. Further research is required to determine the optimal non-surgical management pathway for patients with flexion deficits following knee arthroplasty and to define selection criteria for patients in whom SPS is likely to be successful.

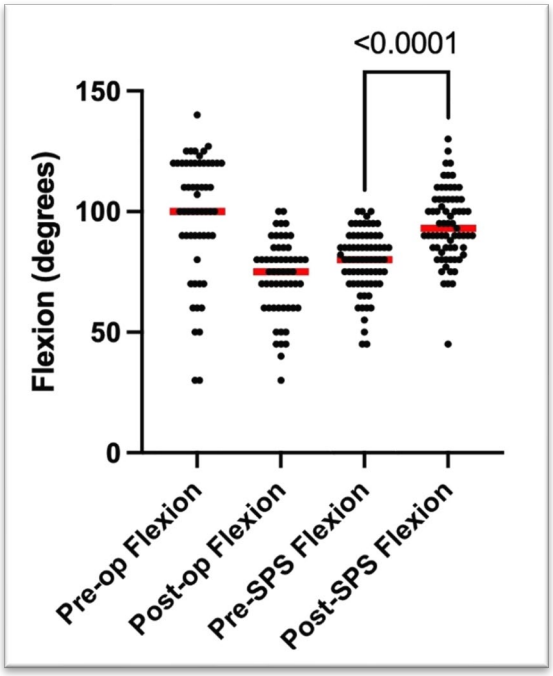


Figure. Knee flexion pre-operatively, post-operatively, pre-SPS and post-SPS treatment. A significant increase in flexion was achieved with SPS treatment (paired T-test, *p*=<0.0001).

Age Under 60 Independently Predicts Revision After Knee Arthroplasty Even After Clinically Meaningful Functional Improvement: *A UK NJR-HES Propensity Matched Analysis*

Authors: Price A., Jackson W., Rudran B., Alvand A.
Affiliations: Nuffield Orthopaedic Centre, University of Oxford
Presenter: Andrew Price

Background: The rising incidence of knee arthroplasty among patients under 60 raises questions about the independent effect of age on revision risk.

Methods: We conducted a propensity score-matched study using NJR-HES linked data from 2003–2021, comparing patients aged under 60 vs aged 60 or over. The propensity score incorporated sex, ASA, BMI, indication for surgery, deprivation, surgical approach, fixation, and thromboprophylaxis. The primary outcome was time to revision (Kaplan-Meier) with Cox proportional hazards regression with time-splitting at 2 years. Secondary outcomes included revision indications, 90-day complications, and the association between six-month Oxford Knee Score (OKS) and revision risk by age group.

Results: Of 1,122,136 knee arthroplasties, 176,527 were performed in patients <60 years. Following 1:4 propensity matching, a cohort of 54,369 aged under 60 and 217,476 aged 60 and over were analysed. Patients <60 years had a 35% higher revision risk (HR 1.346, 95% CI 1.281 to 1.414, p<0.001), with no significant difference in the first two years (HR 1.031, p=0.468) and a 61% higher hazard beyond two years (HR 1.613, 95% CI 1.515 to 1.724). At 10-years, patients <60 years had a 47% higher risk of revision (5.51% vs 3.76%; RR 1.47). Patients <60 were revised more commonly for stiffness (67%), component wear (37%) and instability (36%), whilst infection was the dominant indication in patients ≥60 years (61%). Among 103,792 patients with PROMs, achieving a minimally important clinical difference (MCID) in OKS did not protect patients <60 years from excess revision risk. Those who achieved MCID faced a 38% higher revision hazard than older patients with equivalent recovery (HR 1.377, 95% CI 1.221 to 1.550, p<0.001).

Conclusion: Age under 60 independently increases the risk of revision after TKA. Patients aged <60 years were revised for stiffness, component wear, and instability, whilst infection dominated in patients ≥ 60 years.

Transferability of Robotic Surgical Proficiency Across Platforms in Knee Replacement: Analysis of the Early Learning Curve in an Experienced Surgeon

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2. Department of Life Science, Health, and Health Professions, Università degli Studi Link, Roma

Abstract:

Background

Learning curves for robotic total knee arthroplasty (TKA) have been widely described during the initial adoption of robotic technology. However, it remains unclear whether robotic surgical proficiency is platform-specific or transferable between systems based on different modelling paradigms. The purpose of this study was to evaluate whether an experienced robotic surgeon demonstrates a measurable learning curve when transitioning from imageless to CT-based robotic TKA.

Methods

A senior surgeon with experience exceeding 1000 robotic knee arthroplasties performed using imagel-ess platforms transitioned to a CT-based robotic TKA system. The first 25 consecutive CT-based robotic TKAs were prospectively analysed. Operative time and postoperative radiographic alignment (HKA, LDFA, MPTA, tibial slope) were assessed. Learning curve dynamics were evaluated using cumulative sum (CUSUM) and segmented regression analyses. Radiographic outliers were defined as deviations greater than 2° from the planned target.

Results

Operative time decreased from 65 minutes in the first case to a steady-state mean of 55 ± 3 minutes (95% CI 53.8–56.2) by case 3, corresponding to a 15.4% reduction. Continuous CUSUM demonstrated an inflection point at case 2, confirmed by segmented regression ($p < 0.05$). Mean postoperative alignment was 0.7° ± 1.2° for HKA, 88.5° ± 1.1° for LDFA, 87.8° ± 1.2° for MPTA, and 4.8° ± 0.7° for tibial slope. No radiographic outliers (>2°) were observed after case 2.

Conclusion

In an experienced robotic surgeon, transition from imageless to CT-based robotic TKA was not associated with a clinically relevant learning curve. Operative efficiency stabilised rapidly and radiographic alignment accuracy was maintained from the earliest procedures. These findings

suggest that robotic TKA proficiency may be transferable across platforms, although confirmation through multicentre comparative studies remains necessary.

Tables

Table 1. Patient Demographics and Preoperative Characteristics

Variable	Value
Number of cases	25
Age (years)	69 ± 8
BMI (kg/m²)	28.5 ± 3.9
Preoperative HKA (° varus)	5.6 ± 3.2

Table 2. Operative Time Across Consecutive Cases

Case Range	Operative Time (min)
Case 1	65
Case 2	58
Cases 3–5	56 ± 2
Cases 6–25	55 ± 3

Table 3. Postoperative Radiographic Alignment with 95% Confidence Intervals

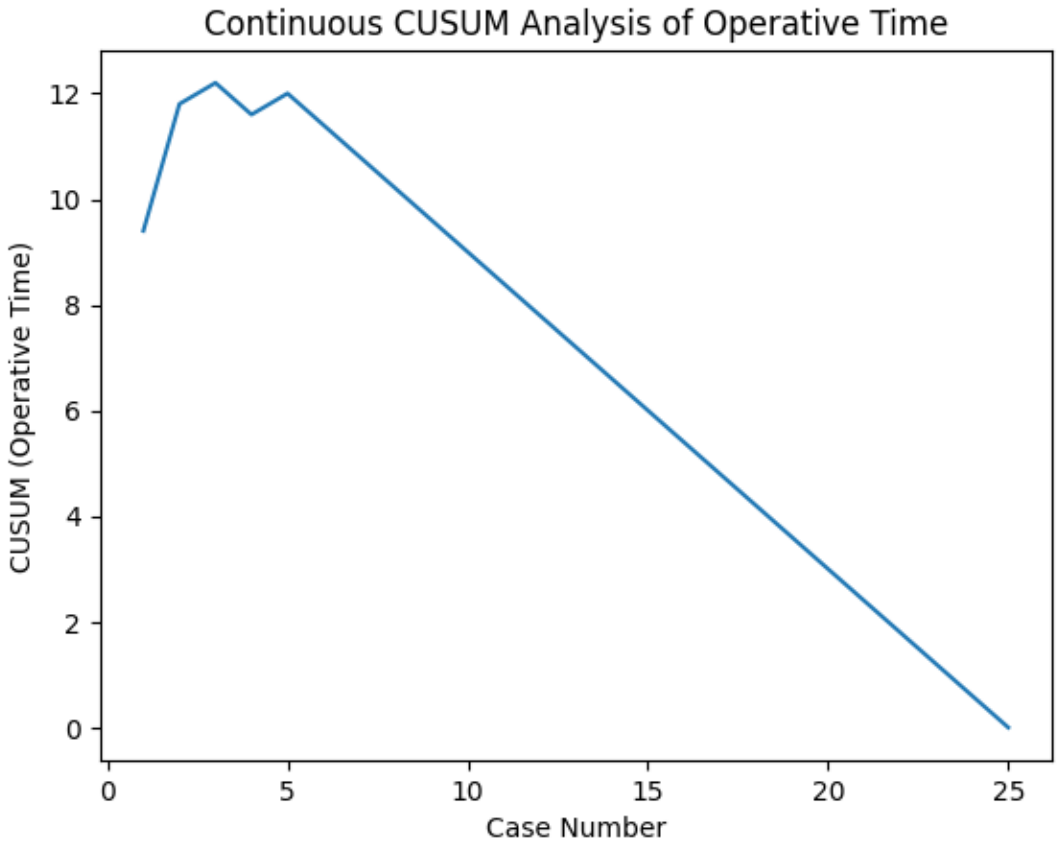
Parameter	Mean ± SD	95% CI
HKA (°)	0.7 ± 1.2	0.2 – 1.2
LDFA (°)	88.5 ± 1.1	88.1 – 88.9
MPTA (°)	87.8 ± 1.2	87.3 – 88.3
Tibial slope (°)	4.8 ± 0.7	4.5 – 5.1

Figure Legends

Figure 1. Continuous CUSUM analysis of operative time demonstrating an initial upward slope during the first two cases followed by a plateau, indicating rapid attainment of procedural stability.

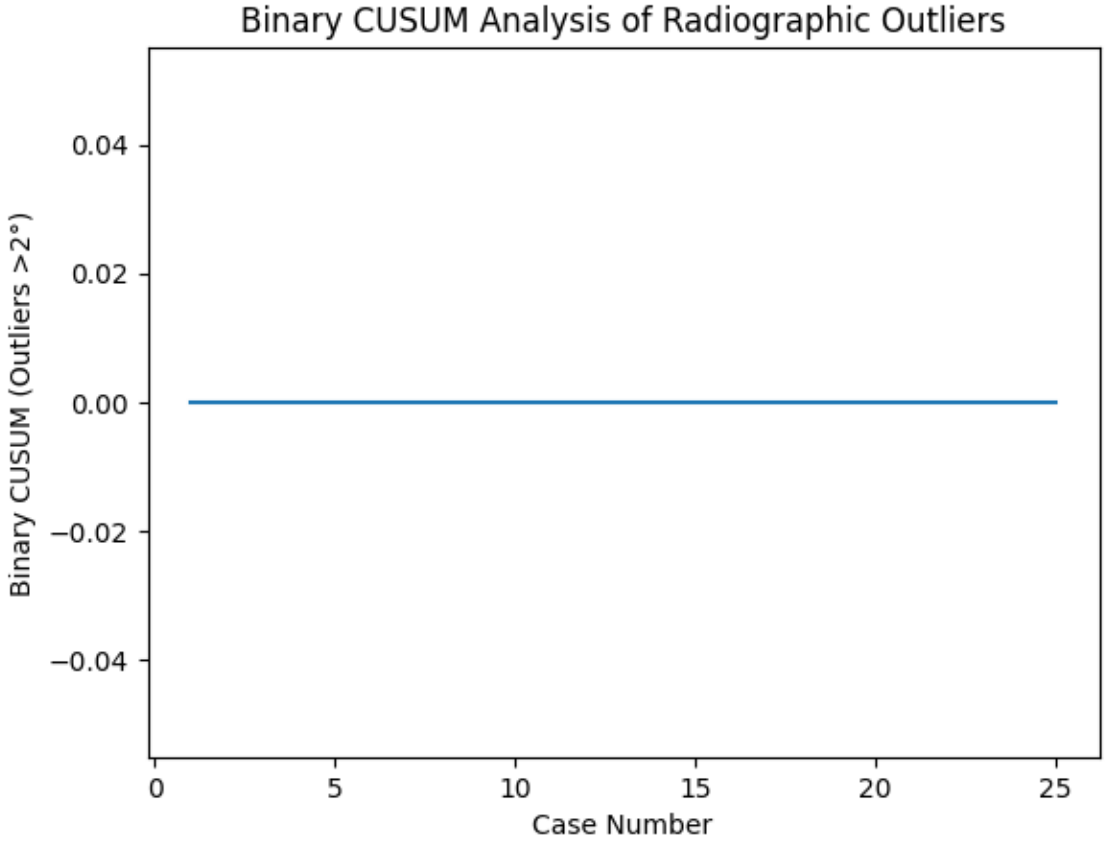
Figure 2. Segmented regression analysis of operative time confirming a statistically significant change in slope at case 2 ($p < 0.05$).

Figure 3. Binary CUSUM plot for radiographic outliers (>2° deviation), showing absence of a progressive alignment learning curve.




Operative Time with Segmented Regression Inflection Point
Operative Time (minutes)
64
62
60
58
56
0
5
10
15
20
25
Case Number

72


Binary CUSUM Analysis of Radiographic Outliers
Binary CUSUM (Outliers >2°)
0.04
0.02
0.00
−0.02
−0.04
0
5
10
15
20
25
Case Number

73

Topic: Robotic or other technology

Workload and ergonomic impact of robotic-assisted total knee arthroplasty across five surgeons: a multicentre European comparison with conventional surgery

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2 DEO.care, Beringen, Belgium

Presenter: Vandekerckhove P.J.

Introduction

Robotic-assisted total knee arthroplasty (TKA) is increasingly adopted to improve precision, yet its impact on OR team and surgeon workload and ergonomics remains less well characterised. Prior evaluations were confined to single surgeons, leaving generalisability untested. This is the first multi-surgeon, multicenter design testing whether effects are uniform or setup-dependent.

Methods

Five experienced knee surgeons across five European countries (Belgium, Austria, Switzerland, Germany, France), beyond their robotic learning curve, performed conventional and Velys Robotic-Assisted Solution (VRAS, Johnson & Johnson) TKA, contributing five to ten cases per technique. Intraoperative workflow was captured using an AI-backed process digital twin platform (DEO.care, Belgium). Objective workload was measured as power-tool, retractor and leg-holding times; subjective workload via a five-item NASA-TLX surgeon index; instrumentation as tray number and weight; and posture via RULA and REBA at three bone cuts. Given small per-surgeon samples, data were analysed descriptively; exploratory Mann–Whitney U comparisons (uncorrected for multiplicity) are reported for objective and NASA-TLX outcomes.

Results

Power-tool holding was lower with VRAS in all five surgeons (median -3.9 minutes), significant ($p<0.05$) in four of five. Retractor holding was lower in four of five (median -3.7 minutes; significant in three), as was tray weight (median -10.3 kg). NASA-TLX showed no additional workload overall (median 0.0), with significant ($p<0.05$) improvements in two of five surgeons, confined to frustration alone in one; leg-holding was largely unchanged (median -0.2 minutes; significant in one). RULA improved most consistently at the tibia cut, decreasing in all assessable surgeons. Effects were heterogeneous between surgeons rather than uniform (Table 1).

Conclusion

Robotic assistance reduced power-tool holding consistently and improved instrumentation load and ergonomics for most surgeons, but workflow and workload benefits were conditional on individual OR setup rather than universal. Multi-surgeon assessment reveals heterogeneity invisible to single-surgeon studies, supporting individualised rather than blanket adoption.

Table 1. Within-surgeon comparison of VRAS versus conventional TKA across five surgeons (descriptive summary; negative values favour VRAS). RULA/REBA n reduced by incomplete posture data. Comparator for surgeon 1 was navigation instead of conventional. Exploratory Mann–Whitney U, p<0.05, uncorrected for multiplicity; tested for the three objective workload outcomes and five NASA-TLX dimensions with case-level data. Each surgeon column shows the median difference VRAS-conv.

Parameter (unit)	VRAS lower (n/N)	Median change (range), (VRAS − conv.)	Surgeon 1	Surgeon 2	Surgeon 3	Surgeon 4	Surgeon 5
Objective workload							
Power-tool holding (min)	5/5	−3.9 (−5.0 to −1.1)	▼ −4.3 *p=<0.001*	▼ −2.6 *p=<0.001*	▼ −3.9 *p=0.008*	▼ −5.0 *p=0.036*	▼ −1.1 *p=0.329*
Retractor holding (min)	4/5	−3.7 (−7.9 to +5.9)	▼ −3.7 *p=<0.001*	▼ −7.6 *p=0.012*	▼ −7.9 *p=0.008*	▼ −1.5 *p=0.40*	▲ +5.9 *p=0.329*
Leg holding (min)	4/5	−0.2 (−1.8 to +3.2)	▼ −1.2 *p=0.035*	▲ +3.2 *p=0.105*	▼ −0.2 *p=1.00*	▼ −1.8 *p=0.690*	▼ −0.1 *p=0.931*
Subjective workload							
Mental demand (1-20)	2/5	0.0 (−4.0 to 1.5)	▼ −4 *p=<0.001*	0 *p=0.106*	▼ −1 *p=0.365*	▲ +1.5 *p=0.452*	0 *p=0.952*
Temporal demand (1-20)	1/5	0.0 (−3.0 to 0.5)	▼ −3 *p=0.001*	0 *p=0.859*	0 *p=1.00*	0 *p=0.635*	▲ +0.5 *p=0.548*
Physical demand (1-20)	2/5	0.0 (−2.0 to 1.0)	▼ −2 *p=0.004*	0 *p=0.501*	▼ −1 *p=0.167*	▲ +1 *p=0.738*	▲ +1 *p=0.476*
Effort (1-20)	2/5	0.0 (−4.0 to 0.5)	▼ −4 *p=0.001*	0 *p=0.377*	▼ −4 *p=0.270*	▲ +0.5 *p=0.889*	▲ +0.5 *p=0.738*
Frustration (1-20)	2/5	0.0 (−4.0 to 1.0)	▼ −4 *p=<0.001*	▼ −2 *p=0.002*	0 *p=1.00*	▲ +0.5 *p=0.500*	▲ +1 *p=0.897*
Instrumentation							
Tray number (count)	4/5	−2 (−2 to +1)	▲ +1	▼ −2	▼ −2	▼ −2	▼ −2
Tray weight (kg)	4/5	−10.3 (−14.5 to +0.6)	▲ +0.6	▼ −14.5	▼ −12.0	▼ −10.3	▼ −0.8
Ergonomic posture (RULA / REBA score)							
RULA, tibia cut	4/4	−1.5 (−3 to −1)	—	▼ −3	▼ −1	▼ −2	▼ −1
REBA, tibia cut	2/4	−1.0 (−4 to 0)	—	▼ −4	▼ −2	0	0
RULA, distal femur cut	3/3	−1.0 (−2 to −1)	—	▼ −1	—	▼ −2	▼ −1
REBA, distal femur cut	1/3	0 (−2 to 0)	—	0	—	▼ −2	0
RULA, AP femur cut	3/4	−1.5 (−2 to 0)	—	▼ −2	▼ −1	0	▼ −2
REBA, AP femur cut	2/4	−0.5 (−5 to 0)	—	▼ −1	▼ −5	0	0

Abbreviations: n/N: surgeons favoring VRAS /surgeons assessed. RULA: Rapid Upper Limb Assessment; REBA: Rapid Entire Body Assessment; NASA-TLX: NASA Task Load Index; —: not assessed.

Topic Alignment / anatomy

Title

Sex-specific optimal alignment targets in robotic-assisted total knee arthroplasty: machine learning analysis of 863 consecutive cases

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Presenter: Meftah M.

Introduction

Emerging evidence suggests sex-based anatomical and biomechanical differences may influence outcomes following total knee arthroplasty (TKA). However, most current alignment strategies are derived from mixed-sex cohorts, and sex-specific alignment targets remain poorly defined. The aim of this study was to identify sex-specific alignment parameters associated with improved outcomes following robotic-assisted TKA utilizing machine learning.

Materials and methods

We analyzed 863 consecutive robotic-assisted TKAs (Stryker MAKO) performed at a high-volume academic center. Coronal, sagittal, and rotational alignment parameters were recorded intraoperatively. A gradient-boosted machine learning model was trained to predict 1-year patient-reported outcomes (KOOS, KSS). SHAP (SHapley Additive exPlanations) analysis quantified the contribution of each alignment variable to outcomes, stratified by sex. Multivariable regression was used to confirm key predictors identified by machine learning.

Results

Female patients (n=521) demonstrated significantly different optimal alignment targets compared to males (n=342). Posterior tibial slope and femoral flexion angle were the highest-impact variables in females, while hip-knee-ankle mechanical alignment carried greater predictive weight in males. Sex-stratified alignment targets significantly improved predicted outcome scores compared with a uniform alignment strategy ($p<0.05$). These findings remained consistent across BMI and deformity subgroups.

Conclusion

Machine learning analysis of a large robotic TKA cohort identified sex-specific alignment targets associated with improved patient-reported outcomes. These findings support a more personalized, sex-stratified alignment strategy and challenge universal alignment benchmarks. Prospective validation and integration into AI-assisted preoperative planning are warranted.

Topic: *TKA*

Title: Rosenberg Views Show a Small but Significant Overestimation of Medial Proximal Tibial Angle Compared with Full-Length Standing Radiographs in Robotic TKA with CT-Based Planning

Authors: **Tecame A., Adravanti P.**

Affiliation: **Department of Orthopedics and Traumatology, "Città di Parma" Clinic, Piazzale Athos Maestri 5, 43123 Parma - Italy**

Presenter: **Andrea Tecame**

Introduction Radiographic assessment of coronal knee alignment varies by imaging modality; in preoperative TKA planning full-length standing radiographs (FLSR) are conventionally used to evaluate mechanical alignment, whereas Rosenberg views (RB) assess the degree of joint space narrowing. With robotic-assisted TKA increasingly relying on computed tomography (CT) planning, this study evaluated differences in mMPTA measurements among FLSR, RB views, and CT.

Materials and methods A retrospective analysis was performed on 53 knees (51 patients) undergoing robotic-assisted primary TKA for medial compartment osteoarthritis. All patients underwent standardized preoperative FLSR, RB (45° flexion weight-bearing), and CT scans used for robotic planning. mMPTA was measured independently by two blinded orthopedic surgeons. Agreement between radiographic techniques and CT was evaluated using Bland–Altman analysis, mean bias, limits of agreement (LoA), mean absolute error (MAE), and percentage of outliers (>2° and >3°). Intra- and inter-observer reliability were assessed using intraclass correlation coefficients (ICC).

Results The mean mMPTA was 86.79° ± 2.85° on CT, 87.10° ± 2.89° on FLSR, and 87.20° ± 2.13° on RB. FLSR did not significantly differ from CT (mean difference +0.31°, p = 0.089), whereas RB showed a small but statistically significant overestimation of mMPTA compared with CT (mean difference +0.41°, p = 0.020). Bland–Altman analysis demonstrated excellent agreement: FLSR bias +0.31° (LoA –2.21° to +2.83°) and RB bias +0.41° (LoA –2.03° to +2.85°). Absolute error >2° occurred in 11.3% of FLSR and 15.1% of RB measurements, with only one case >3° (FLSR). Intra- and inter-observer reliability were excellent for both modalities (ICC range 0.967–0.998).

Conclusion In patients undergoing robotic TKA, both preoperative FLSR and RB provide accurate and highly reproducible mMPTA measurements compared with CT-based robotic planning. A small but statistically significant overestimation of mMPTA was observed with RB.

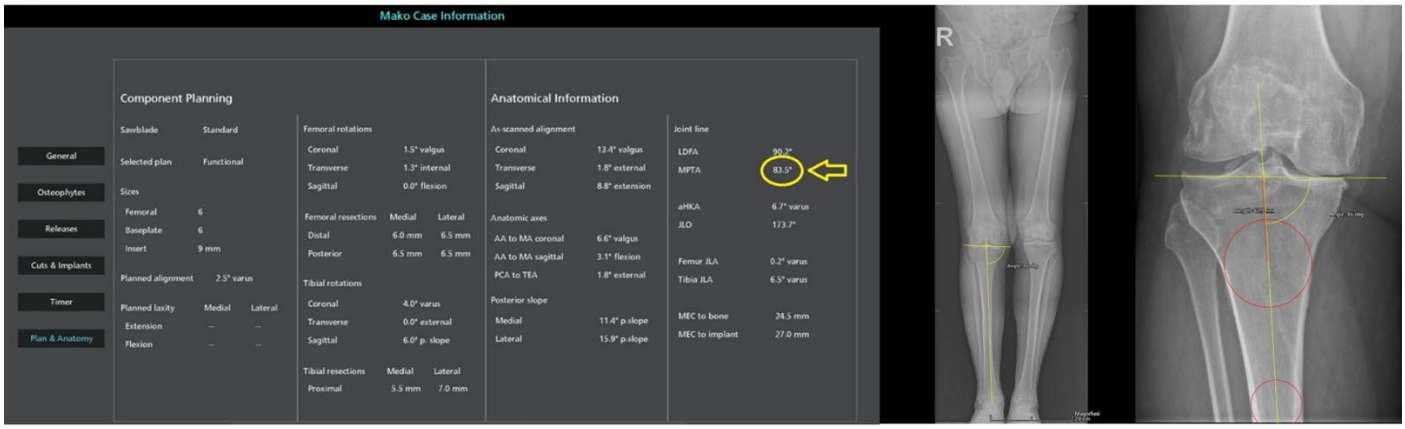


Figure 1. Measurement of the medial proximal tibial angle (MPTA) on computed tomography (CT), on full-length standing radiographs (FLSRs) and on Rosenberg view radiographs (RS)

Topic Robotic or other technology

Title
Validation of Adaptive AI implant positioning for preoperative planning in robotic total knee arthroplasty

Authors: Meftah M.[1], [Co-author Family Name Initials][1]

Affiliations: [1] NYU Langone Health, Division of Adult Reconstructive Surgery, Department of Orthopaedic Surgery, New York, NY, USA

Presenter: Meftah M.

Introduction
Accurate preoperative planning is critical for optimizing component positioning in robotic-assisted total knee arthroplasty (TKA). Conventional CT-based planning is time-intensive and subject to inter-observer variability. We developed and validated a two-layer deep learning model to automate component sizing and alignment target prediction on the MAKO robotic platform.

Materials and methods
A two-layer deep learning neural network was trained and validated on 900 consecutive robotic-assisted TKAs (Stryker MAKO) at a single academic institution. Layer 1 automated CT-based bone segmentation and morphological feature extraction. Layer 2 generated component size predictions and multi-planar alignment targets. Accuracy was defined as bone cut prediction within ±1mm of intraoperative execution and component sizing within ±1 implant size. AI planning time was compared to conventional manual workflows.

Results
The AI model achieved 88% bone-cut accuracy within ±1 mm across tibial and femoral planes and 91% component-sizing accuracy within ±1 implant size. AI-assisted planning reduced workflow time by 74% compared with conventional manual methods. Performance remained consistent across deformity severity (HKA 168°–186°) and BMI subgroups. Inter-rater reliability between AI and experienced surgeon planning was excellent (ICC >0.85).

Conclusion
A validated two-layer AI model, called Adaptive Planning, demonstrates high accuracy in automated preoperative planning for robotic TKA, comparable to an experienced surgeon. These results support AI-assisted planning as a clinical decision-support tool to improve efficiency and standardize high-quality robotic TKA preparation.

Topic: Alignment/Anatomy

Title: Robotic assisted bilateral simultaneous total knee replacement using adjusted mechanical and kinematic alignment in contralateral knees gives comparable outcomes at 36 months

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Presenter: Rajgopal A.

Introduction:
Despite total knee arthroplasty (TKA) being an established procedure there appears to be no consensus on the ideal alignment choice. This study evaluated clinical outcomes, patient-reported outcome measures (PROMs), and recovery patterns in a patient cohort undergoing single-stage simultaneous bilateral robotic-assisted TKA, utilizing adjusted mechanical alignment (aMA) in one knee and kinematic alignment (KA) in the contralateral knee.

Material and Methods:
A study cohort of 50 patients with degenerative arthritis who underwent single-stage simultaneous bilateral robotic-assisted TKA between 2021 and 2023 was evaluated. All patients were assessed preoperatively and at regular intervals for Oxford Knee Score (OKS), Knee Society Score (KSS), Range Of Motion (ROM), stair climbing ability and gait patterns by an independent observer. The mean follow-up was 36 months.

Results:
Both the KA and aMA techniques achieved comparable clinical endpoints. The KSS improved from a preoperative of 21.9 ± 4.4 in the KA group to 89.9 ± 1.7 at 36 months postoperatively and from a preoperative of 22.0 ± 4.0 to 91.9 ± 1.7 at 36 months follow up (p= 0.830) in the aMA cohort. The ROM improved from a pre op of 98.3 ± 8.8° in the KA group to 108.1 ± 16.2° at 36 months post op, and from 98.4 ± 8.9° in the aMA group to 111.1 ± 6.9° at 36 months (p=0.052). Plantar pressure analysis recorded at 36 months postoperatively to assess foot loading patterns during walking demonstrated no significant difference in pressure distribution between the two cohorts. The visual analogue scale for pain too demonstrated no difference in stair climbing abilities.

Conclusion:
Robotic-assisted bilateral simultaneous TKA using aMA in one knee and KA in the contralateral knee yields comparable early recovery markers and mid-term functional outcomes at 36 months, suggesting both alignment options are viable intraoperative strategies for degenerative arthritis.

Topics: Alignment/Anatomy

Title**: Intentional asymmetric balancing in robotic-assisted valgus TKA: early outcomes and intraoperative laxity changes**

Author/Presenter: Stefano Petrillo

Affiliation: Prosthetic Surgery Centre, IRCCS Galeazzi Sant'Ambrogio Hospital, Milan, Italy

Introduction: To evaluate early patient- reported outcome measures (PROMs), radiographic alignment changes, intraoperative laxity changes and complications in a retrospective series of constitutional valgus knees treated with robotic- assisted total knee arthroplasty (TKA) using a semi-personalized (SP) alignment technique.
Methods: This retrospective single- centre cohort included patients with end- stage osteoarthritis (OA) and constitutional valgus morphotypes (coronal plane alignment of the knee III/VI) treated with imageless robotic-assisted TKA and a minimum follow-up of 12 months. Medial and lateral compartment laxity (mm) were quantified intraoperatively at 0° and 90°. PROMs (Knee Society Score [KSS] and Forgotten Joint Score [FJS]), range of motion (ROM) and hip– knee– ankle angle (HKA) were assessed preoperatively and at the latest follow- up.
Results: Fifty- eight patients were included at a mean follow- up of 26.5 ± 15.0 months. KSS Knee improved from 58.3 ± 9.4 to 87.9 ± 11.0 (mean change +29.6 points, 95% confidence interval [CI] = 26.0– 33.2; p = 0.00002) and KSS Function from 58.8 ± 15.0 to 82.4 ± 15.7 (mean change +23.6 points, 95% CI = 18.8– 28.4; p = 0.00004). Flexion contracture improved from 3.9 ± 4.0° to 0.6 ± 1.2° (mean change − 3.3°, 95% CI = − 4.3 to − 2.3; p = 0.00010), while flexion increased from 101.4 ± 6.0° to 126.8 ± 8.6° (mean change +25.4°, 95% CI = 23.2– 27.6; p = 0.00001). HKA improved from 6.2 ± 4.5° valgus to 2.1 ± 1.8° valgus (mean change − 4.1°, 95% CI = − 5.2 to − 3.0; p = 0.00030). Lateral laxity decreased in extension from 4.5 ± 1.7 to 2.5 ± 1.3mm (mean change − 2.0 mm, 95% CI = − 2.7 to − 1.3; p = 0.001) and at 90° from 5.3 ± 2.0 to 1.9 ± 1.2mm (mean change − 3.4 mm, 95% CI = − 4.3 to − 2.5; p = 0.0008), with smaller medial reductions.
Conclusion: In this retrospective single- surgeon series of constitutional valgus knees treated with robotic-assisted TKA, intentional asymmetric balancing was associated with good early clinical outcomes, correction towards less valgus alignment, and a reproducible reduction in lateral laxity, with a low complication rate.

Topic: ***TKA, PROM's / outcome measures Robotic or other technology***

Title: Trochlear Reconstruction Patterns Across the Flexion Arc determine the risk of persistent Anterior Knee Pain After Robotic TKA

Authors C. Roten, C-J. Bekaert, A. Dereu, T. Luyckx

Affiliation: [1] Department of Orthopaedic Surgery, AZ Delta Hospital, Belgium

Presenter: Luyckx T

Abstract:

Background: Persistent anterior knee pain (AKP) remains a leading cause of dissatisfaction after technically successful total knee arthroplasty (TKA), even with robotic functional alignment. Anterior compartment reconstruction ("stuffing") has gained attention, but current evidence links it to general function or range of motion rather than to AKP and mostly relies on static measurements at a single flexion angle. We aimed to determine whether AKP knees show a distinct pattern of trochlear reconstruction across the flexion arc.

Methods: In a retrospective matched case-control study of CT-based, robot-assisted, functionally aligned primary TKAs, forty patients with clinically confirmed AKP and a corresponding patellar hotspot on postoperative SPECT-CT were matched 1:1 with excellent-outcome controls (FJS-12 >76; n = 80). Patient-specific digital twins were generated from preoperative CT, and the prosthesis was virtually implanted from the robotic execution logs using a 4D simulation platform. Native and reconstructed trochlear morphology were compared over 0°–120° flexion in 15° increments. Radial offset (ΔRO, native vs. reconstructed) was measured at the medial flange, sulcus and lateral flange, with mediolateral trochlear shift. Linear mixed-effects models evaluated group-by-flexion interactions.

Results: The AKP group showed lower patellar resurfacing rates, greater native valgus, a larger anterior trochlear angle and thicker distal medial resection. Central and medial stuffing did not differ. A significant group-by-flexion interaction remained at the lateral trochlea (p=0.035): AKP knees kept more overstuffing of the lateral compartment toward deep flexion, whereas lateral stuffing decreased in controls. The reconstructed groove stayed more medial in AKP knees in deep flexion (3.7 mm, p=0.016).

Conclusions: AKP after TKA may be driven not by the amount of anterior reconstruction but by its spatial distribution across the flexion arc — persistent lateral overstuffing and a medialized groove in deep flexion — arguing for dynamic, flexion-dependent rather than static assessment.

Topic: Robotic or other technology

Robotic-assisted total knee arthroplasty reduces the need for constrained implants even in severe frontal plane deformity (HKA > 15°)

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Affiliations: [1] Hospices Civils de Lyon, Hôpital Lyon Sud, Service de Chirurgie Orthopédique et Traumatologique, Lyon, France; [2] Université de Lyon, Université Claude Bernard Lyon 1, Université Lyon 2, Université Gustave Eiffel, LBMC UMR_T9406, Lyon, France
Presenter: Neri T.

Introduction

Robotic planning, navigation, and more accurate execution have changed TKA indications, historically driven toward constrained implants when conventional cuts failed to balance severe deformities. We hypothesized that robotic assistance is associated with less use of PS, CCK, and hinge implants, in favor of CR, even in severe frontal deformity (HKA > 15°). We report implant constraint distribution in a cohort of severe-deformity robotic primary TKAs and associated factors.

Materials and methods

Retrospective single-center cohort of 50 primary TKAs for severe knee osteoarthritis with a preoperative HKA > 15° (varus or valgus) on long-leg radiographs. Exclusion criteria followed the classical indications for a hinged implant: collateral ligament insufficiency, extensor mechanism deficiency, major bone loss, neuromuscular instability, Charcot arthropathy, oncologic reconstruction, and prior infection/revision. Intraoperative constraint was recorded: Mako CR, PS, or TS (larger-cam insert between PS and CCK), or conventional CCK/hinge (United U2). Age, BMI, deformity reducibility (Ranawat grade), combined sagittal deformity (flexion contracture), and extra-articular deformity were analyzed as associated factors.

Results

Implant distribution (n=50, mean HKA [XX]°) was: CR 53%, PS 39%, TS 3%, CCK 3%, hinge 2% — CCK/hinge combined in only 5% of cases. Higher constraint (PS/TS/CCK/hinge vs CR) was significantly associated with older age, non-reducible/fixed deformity (Ranawat grade III), combined severe sagittal and frontal deformity, higher BMI, and an extra-articular deformity component (femoral or tibial diaphyseal/metaphyseal deformity distinct from pure intra-articular deformity) (all $p<0.01$).

Conclusion

This distribution contrasts with historical conventional series, where severe frontal deformity was more often managed with CCK because imprecise cuts left residual flexion-extension laxity. In severe frontal deformities (HKA > 15°), robotic-assisted TKA allows CR or PS implants in the large majority of cases, reserving CCK and hinge for genuinely complex presentations — fixed deformity, combined sagittal-frontal deformity, higher BMI, extra-articular involvement — rather than deformity magnitude alone.

Topic: Robotics and other Technologies

Title:

Implementation of Image-Based Robotic Technology as Standard Procedure in a Specialized Arthroplasty Unit Reduces Revision Rates for Partial and Total Knee Arthroplasty: Mid-Term Follow-Up of 7 Years from the Swiss National Joint Registry SIRIS

Authors

Calliess T.[1,4], Thürig G.[1], Brand C.[2,3], Christen B.[1,2], Theus-Steinmann C.[1]

Affiliations

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[4] *Orthopädische Klinik der Medizinischen Hochschule Hannover im DIAKOVERE Annastift, Hannover, Germany*

Presenter: Calliess T.

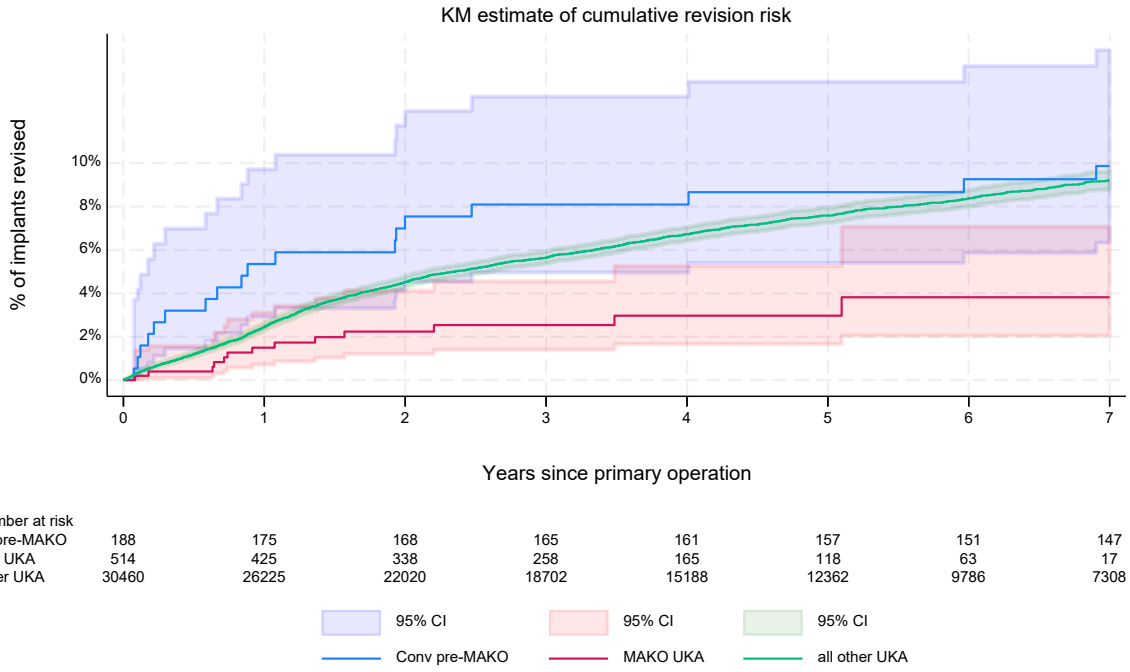
Introduction: Robotic-assisted knee arthroplasty has consistently been shown to improve implant positioning accuracy and facilitate patient-specific alignment strategies while reducing alignment outliers. However, evidence that these technical advantages translate into lower revision rates remains limited. Analyses from national registries often combine different robotic platforms, surgical philosophies, and healthcare settings, potentially obscuring technology-specific effects. This study evaluated the impact of implementing an image-based robotic-assisted (IB-RA) system on mid-term revision rates in a high-volume specialist knee arthroplasty center.

Methods: Data from the Swiss Implant Registry (SIRIS) were used to identify all primary unicompartmental knee arthroplasties (UKA) and posterior-stabilized total knee arthroplasties (TKA) performed between 2015 and 2025. Revision rates before and after implementation of an IB-RA workflow were compared, with conventional UKA and computer-navigated TKA serving as the pre-implementation cohorts. Implant survival was assessed using Kaplan–Meier analysis and multivariable Cox regression adjusted for age, sex, body mass index, ASA class, and Charnley category.

Results: A total of 773 UKAs (188 conventional, 585 IB-RA) and 911 TKAs (184 conventional, 727 IB-RA) were included. At 7 years, cumulative revision rates were significantly lower for IB-RA UKA than for conventional UKA (3.8% vs. 9.9%) (Figure 1), corresponding to a 64% reduction in adjusted revision risk (HR 0.36, 95% CI 0.17–0.75; p=0.007). IB-RA TKA also demonstrated lower 7-year cumulative revision rates than conventional TKA (4.3% vs. 6.7%) (Figure 2) and a 39% lower adjusted revision risk (HR 0.61, 95% CI 0.29–1.29), although this difference did not reach statistical significance.

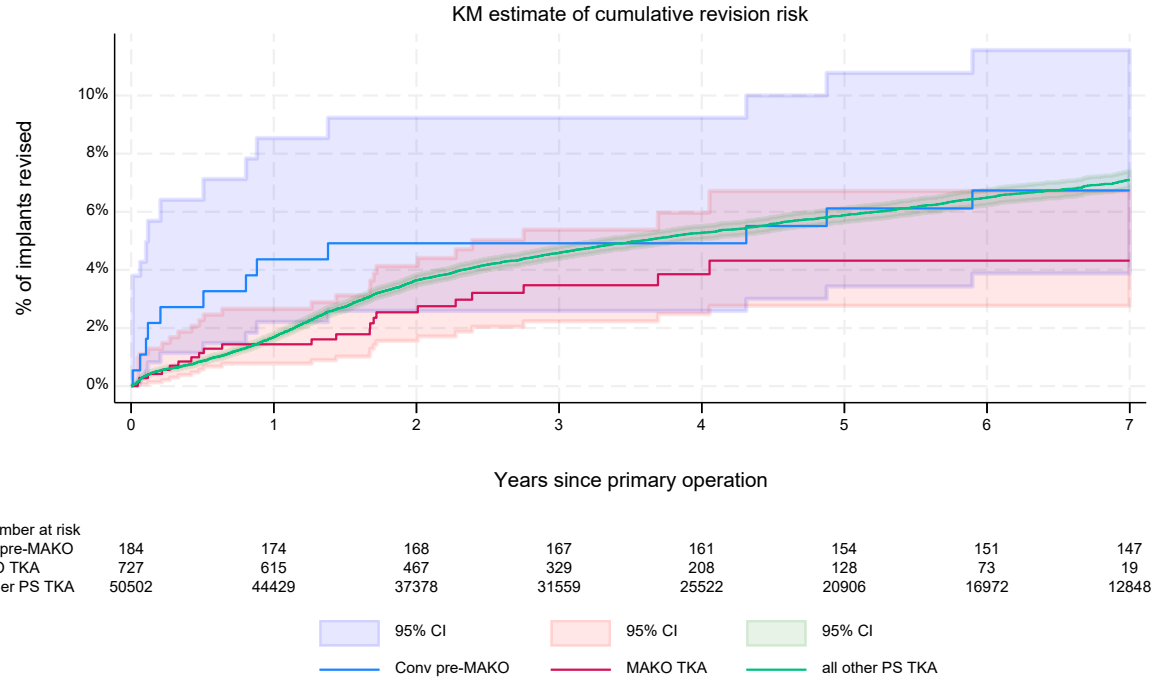
Conclusions: Implementation of an image-based robotic system in a specialist arthroplasty unit was associated with reduced mid-term revision rates for both UKA and TKA, with a significant benefit for UKA. These findings suggest that consistent use of a single image-based robotic platform in an experienced high-volume center may improve implant survivorship beyond the gains reported in heterogeneous registry analyses.

Figure 1: Kaplan Meyer estimate of cumulative revision risk of Conventional PKA, IB-RA PKA and all other PKA from the SIRIS registry 2015-2025.



Estimated cumulative revision rates	1-year	2-year	3-year	4-year	5-year	6-year	7-year
Conventional PKA	5.35 (2.92-9.72)	7.54 (4.54-12.41)	8.09 (4.96-13.07)	8.09 (4.96-13.07)	8.66 (5.40-13.76)	9.26 (5.86-14.48)	9.87 (6.33-15.22)
IB-RA PKA	1.49 (0.71-3.11)	2.23 (1.21-4.12)	2.54 (1.41-4.55)	2.97 (1.66-5.26)	2.97 (1.66-5.26)	3.82 (2.05-7.07)	3.82 (2.05-7.07)
all other PKA (SIRIS)	2.45 (2.28-2.63)	4.51 (4.27-4.77)	5.64 (5.36-5.93)	6.72 (6.41-7.05)	7.58 (7.24-7.94)	8.39 (8.01-8.77)	9.21 (8.80-9.63)

Figure 2: Kaplan Meyer estimate of cumulative revision risk of Conventional TKA, IB-RA TKA and all other PS TKA from the SIRIS registry 2015-2025.



Estimated cumulative revision rates	1-year	2-year	3-year	4-year	5-year	6-year	7-year
Conventional TKA	4.36 (2.21-8.53)	4.92 (2.59-9.23)	4.92 (2.59-9.23)	4.92 (2.59-9.23)	6.12 (3.43-10.78)	6.73 (3.88-11.56)	6.73 (3.88-11.56)
IB-RA TKA	1.44 (0.78-2.66)	2.54 (1.56-4.13)	3.47 (2.23-5.38)	3.85 (2.48-5.97)	4.32 (2.76-6.71)	4.32 (2.76-6.71)	4.32 (2.76-6.71)
all other PS TKA (SIRIS)	1.69 (1.58-1.81)	3.64 (3.48-3.82)	4.58 (4.39-4.79)	5.28 (5.06-5.50)	5.88 (5.65-6.12)	6.49 (6.24-6.75)	7.10 (6.82-7.39)

Topic**:** Robotic

Title**: Within-Patient Comparison of Robotic-Assisted Personalized Alignment Versus Conventional Mechanical Alignment in Total Knee Arthroplasty: A Multicenter Prospective Study**

Authors : Jacquet C[1], Boiteux G[1], Liguori T[1], Berton C[2], Lutz C[3], Fabre-Aubrespy M[1], Argenson JN[1]

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Presenter: Jean-Noel Argenson

Introduction: Robotic assistance and personalized alignment strategies in total knee arthroplasty (TKA) aim to improve functional recovery and patient satisfaction compared to conventional mechanically aligned techniques. Evidence from within-patient comparative studies remains scarce. The purpose of this multicenter prospective study was to compare clinical, radiological, and patient-reported outcomes between conventional mechanical alignment TKA and robotic-assisted personalized alignment TKA performed in the same patient.

Materials and methods: Patients undergoing bilateral staged primary TKA within a maximum interval of two years were prospectively included. Each patient received one knee implanted using a conventional technique with mechanical alignment and standard instrumentation, and the contralateral knee implanted using personalized alignment assisted by the ROSA® robotic system. Cemented posterior-stabilized Persona® implants were used in both groups. A total of 113 patients were included. The assessed perioperative outcomes included operative time, intraoperative blood loss, length of hospital stay, and complications. Functional outcomes were evaluated preoperatively and postoperatively at 6 weeks, 3 months, 6 months, and 1 year using KOOS and Knee Society Score (KSS). Radiographic assessment included HKA angle, JLO angle, and CPAK classification. Patient perception was collected using structured five-level response questions regarding ease of rehabilitation during different postoperative periods, current knee preference, and preferred surgical technique;

Results: Robotic-assisted personalized alignment TKA demonstrated a slightly longer operative time but comparable blood loss, hospital stay, and complication rates compared to conventional TKA. Functional scores (KOOS and KSS) were higher in the robotic group at early follow-up, with statistically significant differences observed at 6 weeks and 3 months, while scores converged at 1 year. Radiographic outcomes showed improved restoration of individual alignment targets and joint line parameters in the robotic group. Patient-reported outcomes favored the ROSA knee, with a majority reporting easier rehabilitation during the first 3 months and a preference for the robotic knee at final follow-up.

Conclusion: In a within-patient design, robotic-assisted personalized alignment TKA provided modest early functional and subjective advantages over conventional mechanically aligned TKA, with similar safety profiles.

Topic: TKA

Title: A Process Mining Analysis of Diagnostic Trajectories in Patients with an Unhappy Knee Arthroplasty

Authors: De Windt, T.S.[1], Dechesne, F.C.V. [1,2], Olde Heuvel, J.[1], Mikhal, J.[2], Wagenaar, F.B.M.[2]
Affiliations:

1. OCON Centre for Orthopaedic Surgery and Sports Medicine, The Netherlands
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Presenter: De Windt, T.S.

Introduction
Up to 20% of patients experience persistent complaints after knee arthroplasty, often requiring extensive diagnostic work-up. Although standardized work-ups are available, diagnostic pathways largely remain heterogeneous. Process mining analyzes and visualizes these pathways from routinely collected healthcare data. This study aimed to characterize the diagnostic trajectories after knee arthroplasty using process mining.

Materials and methods
A retrospective cohort study included patients with persistent complaints following total knee arthroplasty (TKA), unicompartmental knee arthroplasty (UKA), or revision TKA between 2013 and 2024. Patients were classified as having either a mechanical diagnosis (surgically treatable causes such as loosening, instability, or malalignment) or a non-mechanical diagnosis.
Trajectories represented all events from the first presentation until surgical treatment or the last recorded event, including consultations, laboratory investigations, imaging, and diagnostic surgical procedures. Process mining quantified event frequencies and identified common pathway patterns.

Results
A total of 832 patients were included: 461 (55.4%) with mechanical diagnoses, 316 (38.0%) with non-mechanical diagnoses, and 55 (6.6%) without a recorded diagnosis. Most patients had undergone TKA (80%), followed by revision TKA (9.9%), and UKA (8.8%). Diagnostic trajectories contained a mean of 6.8 events per patient (SD 6.1), with individual trajectories ranging up to 50 events. In total, 585 unique diagnostic trajectories were identified among 832 patients. The most frequently observed diagnostic pathway consisted of a single consultation, covering only 9.2% of patients. Conversely, 32.1% of patients underwent more than seven diagnostic events. Figure 1 shows the 20 most frequent diagnostic trajectories among TKA patients. Mechanical and non-mechanical groups showed similar numbers of diagnostic events across prosthesis types.

Conclusion
The cohort demonstrated heterogeneous diagnostic trajectories with substantial variation in the number and sequence of events. Process mining provides a novel method to visualize these pathways and may help identify opportunities to standardize diagnostic strategies and reduce unnecessary investigations.

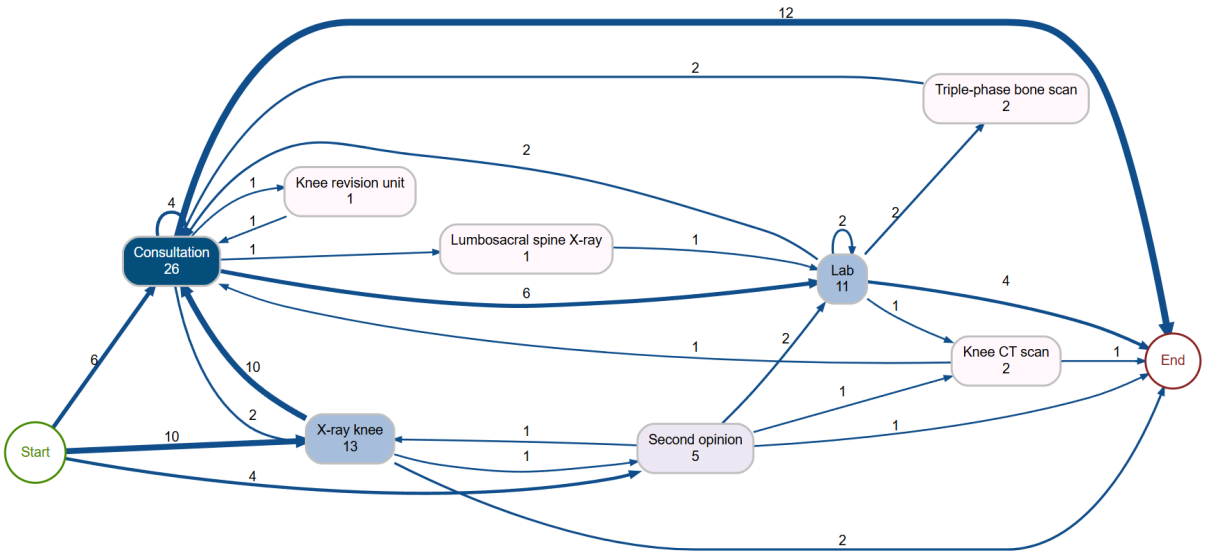


Figure 1. Process mining visualization of the top 20 most frequent diagnostic trajectories among TKA patients, covering 29% (193 out of 665 patients) of this subgroup. The diagram visualizes the sequence of events within these trajectories, with numbers representing the frequency of occurrence among the 20 most frequent trajectories.

Topic: Revision - aseptic

Turning Back the Clock: AI Reconstruction of the Native Femur in Revision Knee Arthroplasty

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Presenter: Gareth G Jones

Introduction:

Revision total knee arthroplasty (TKA) demands accurate reconstruction of the native joint line and femoral alignment to restore knee biomechanics. Key bony landmarks are frequently absent due to original bone cuts and subsequent bone loss, complicating surgical planning. This study evaluated a deep learning–based approach to reconstruct a patient's original three-dimensional (3D) femoral anatomy from limited CT data, as typically encountered during revision TKA planning.

Materials and Methods:

A femoral shape reconstruction model was trained on 377 full-leg CT scans from healthy individuals and validated on an independent dataset of 15 cadaveric femora with knee osteoarthritis. Two clinically relevant revision scenarios were simulated: (1) progressive distal bone loss, removing 1–10% of femoral length, and (2) implant-related bone defects mimicking post-implant removal. Reconstruction accuracy was assessed against manual ground-truth models using Dice similarity coefficient (DSC), root-mean-square Euclidean distance (RMSE), and clinically relevant femoral alignment and morphology measurements. Statistical significance was determined using the Wilcoxon signed-rank test ($p < 0.05$).

Results:

Reconstructed femoral models demonstrated high anatomical accuracy. Baseline DSC across the 15 cadaveric femora averaged 97.5%, remaining at 93.8% following simulated removal of 10% of distal femoral length. Condylar region RMSE remained within 2 mm in 11/15 cases up to 7% cropping. Under simulated implant-removal conditions, reconstructed models achieved an acceptable DSC of 95.4%, with no statistically significant differences across any other metric compared to ground-truth models.

Conclusion:

This automated deep learning tool accurately recreates intact 3D femoral models and key angular and distance measurements from incomplete CT imaging typical of revision TKA scenarios. This technology has the potential to meaningfully improve patient outcomes by enabling surgeons to develop precise preoperative 3D surgical plans, targeting restoration of the original joint line and limb alignment.

Topic: Revision – aseptic

Joint line restoration in revision total knee arthroplasty using the computationally reconstructed native proximal tibia

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Presenter: van Laarhoven S.N.

Introduction
Restoration of the native joint line (JL) in revision total knee arthroplasty (rTKA) is critical for knee stability, patellar height, quadriceps function and knee kinematics. It becomes challenging when anatomical landmarks are compromised. The aim of this study was to develop and validate a novel automated method to estimate the native JL from CT scans in rTKA.

Materials and methods
The approach combines automatic segmentation of CT scans of patients with a knee arthroplasty and a 3D statistical shape model (SSM) to reconstruct the native anatomy. This process was validated by comparing the average height of 3 points (medial and lateral) on the predicted proximal tibial shape with the corresponding points on the native tibia of the same patient (preoperative ipsilateral or contralateral). To evaluate the influence of defect size, the defect heights were calculated separately as the vertical distance from the JL to the segmented bony tibia. The clinical acceptability threshold was set to 4 mm.

Results
For validation 42 paired CT scans were included. The scans of 2 patients were excluded because of deformed tibial morphology. The medial and lateral JL was reconstructed with a median absolute error of 1.43 mm (IQ 0.63-2.59) and 1.10 mm (0.72-2.74) [Fig. 1}. All lateral predictions and 95% of medial predictions remained within the 4 mm threshold. Reduced prediction accuracy was observed in cases with bony wear of the native tibia by osteoarthritis leading to an overestimation. No significant differences were found between medial and lateral predictions. Mean medial defect heights were 11.22 ± 2.46 mm, and 10.81 ± 2.33 mm on the lateral side with no significant association between defect size and absolute prediction error.

Conclusion
The proposed SSM-based workflow enables accurate JL prediction in rTKA, independent of defect size or compartment (medial or lateral) and within clinically acceptable limits.

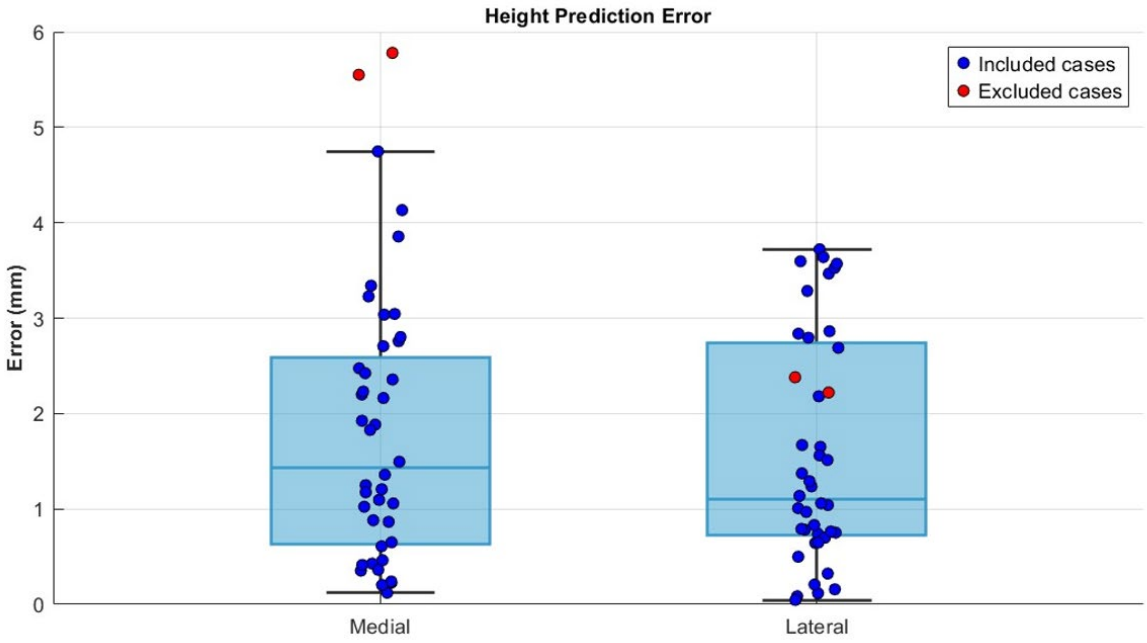


Figure 1. Absolute prediction errors for the medial an lateral side. Blue dots indicate data point (N=40) included in the final analysis. Excluded (failed) validation cases are represented by red dots.

A retrospective comparative study on the effect of tourniquet use in revision total knee arthroplasty in 278 patients.

Ismayl G, Jamjoom A, Asaju A, Hamsho W, Pandit H, Palan J

Affiliations: Leeds Teaching Hospitals NHS Trust

Presenter: Mr Jeya Palan

Abstract

Introduction:

Despite extensive research on the effects of tourniquet use in primary total knee arthroplasty (TKA), limited evidence is available on its role in revision TKA. This study aims to assess the effects of tourniquet use in revision TKA.

Materials and Methods:

This was a retrospective comparative study on all patients undergoing revision TKA with removal / exchange of one or both components from 2018 to 2024 at Leeds Teaching Hospitals. Primary outcomes measured were perioperative blood loss (haemoglobin Hb drop) and blood transfusion rates. Secondary outcomes included operative time, length of hospital stay, 30-day re-admission, 1-year re-operation, wound issues, venous thromboembolism, and mortality rates.

Results:

Total of 278 patients were included, 218 (78.4%) in the tourniquet group and 60 (21.6%) in the no-tourniquet group. No significant differences were observed in the median Hb drop and blood transfusion rates between the tourniquet (19 +/- 9.2 gm/dl and 8.7%) and no-tourniquet (22 +/- 11.4 gm/dl and 15.0%) groups (p 0.057 and 0.13, respectively). The no-tourniquet group had a shorter length of hospital stay (3 days versus 5 days, p=0.005). No significant differences were noted in operative time (p 0.57), the re-admission rates (p 0.44), re-operation rates (p 0.77), wound issues (p 0.42), venous thromboembolism (p 0.24), and mortality rates (p=0.82). Additionally, no significant differences were noted on subgroup analysis for American Society of Anaesthesiologists (ASA) classification, Charlson comorbidity index score, anticoagulation history, revision complexity and revision indication.

Conclusion:

Tourniquet use in revision TKA did not significantly reduce blood loss or transfusion requirements. It was found to increase the length of hospital stay. No differences were found in postoperative complication rates. Further studies on this topic are recommended.

Table 1: Comparison for baseline characteristics between tourniquet and no tourniquet group.

Variables	**All patients**	**Tourniquet**	**No Tourniquet**	**p value**
Number of cases, n (%)	278 (100.0)	218 (78.4)	60 (21.6)	
Age (years), mean +/- SD (range)	70 +/- 9.2 (34 - 93)	70 +/- 9.4 (34 - 93)	70 +/- 8.7 (53 - 89)	0.69
Gender, n (%)				0.88
Male	132 (47.5)	103 (47.2)	29 (48.3)	
Female	146 (52.5)	115 (52.8)	31 (51.7)	
BMI (Body Mass Index), Median +/- SD (range)	31 +/- 6.1 (17 - 49)	31 +/- 6.1 (17 - 49)	31 +/- 6.0 (23 - 45)	0.75
ASA classification, n (%)				0.12
Low risk (ASA 1 & 2)	170 (62.2)	140 (65.1)	31 (51.7)	
High risk (ASA 3 & 4)	104 (37.8)	75 (34.9)	29 (48.3)	
[Missing]	[4]			
Charlson Comorbidity Index, n (%)				0.98
Mild	82 (29.8)	64 (29.8)	18 (30.0)	
Moderate	117 (42.5)	92 (42.8)	25 (41.7)	
Severe	76 (27.6)	59 (27.4)	17 (28.3)	
[Missing]	[3]			
Anti-coagulation medication history, n (%)	32 (11.5)	24 (11)	8 (13.3)	0.71

Revision Side, n (%)				0.78
Right	167 (60.1)	130 (59.6)	37 (61.7)	
Left	111 (39.9)	88 (40.4)	23 (38.3)	
Index/Previous Procedure, n (%)				**0.0001**
Primary TKA	185 (66.8)	150 (68.8)	35 (59.3)	
Primary UKA	57 (20.6)	35 (16.1)	22 (37.3)	
Revision TKA	35 (12.6)	33 (15.1)	2 (3.4)	
Revision Complexity, n (%)				**0.016**
R1	56 (20.1)	36 (16.5)	20 (33.3)	
R2	162 (58.3)	133 (61.0)	29 (48.3)	
R3	60 (21.6)	49 (22.5)	11 (18.3)	
Revision Indication, n (%)				0.12
Periprosthetic fracture	22 (7.9)	15 (6.9)	7 (11.7)	
Infection	72 (25.9)	62 (28.4)	10 (16.7)	
Aseptic Atraumatic indications*	184 (66.2)	141 (64.7)	43 (71.7)	
Aseptic loosening	68	56	12	
Progressive arthritis remaining knee	32	17	15	
Instability	32	26	6	
Stiffness	24	22	2	
Malalignment	20	18	2	

Wear of polyethylene component	10	6	4	
Other	18	14	4	
Wound dressing, n (%)				0.61
Standard	200 (82.6)	155 (83.3)	45 (80.4)	
Negative pressure dressing (PICO/VAC etc)	42 (17.4)	31 (16.7)	11 (19.6)	
[Missing]	[46]			

Topic: Revision – septic

Title: Coronal alignment in revision total knee arthroplasty: cemented versus press-fit stems

Authors:

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Presenter: Zanna L.

Introduction

Optimal coronal alignment remains a cornerstone of implant survivorship in revision total knee arthroplasty (rTKA), yet whether stem length and fixation strategy truly dictate the final mechanical axis is still contested. Leveraging one of the largest multicentric cohorts comparing stem strategies to date, we investigated whether short-cemented stems can match the alignment reliability of longer cemented or press-fit designs, challenging their long-standing reputation as a less robust option.

Materials and methods

In this retrospective multicenter study, 124 rTKAs performed between 2019 and 2022 with a single semiconstrained implant were reviewed; 81 met strict inclusion criteria requiring stemmed revision of both femoral and tibial components. Patients were stratified by stem type: long-cemented (>75 mm), short-cemented (<75 mm), and hybrid press-fit. Postoperative weight-bearing radiographs were analyzed by two blinded raters for hip-knee-ankle (HKA) angle, mechanical lateral distal femoral angle (mLDFA), mechanical medial proximal tibial angle (mMPTA), and, in the press-fit group, canal fill ratio (CFR).

Results

Final coronal alignment was strikingly consistent across groups: mean HKA was 178.9°, 178.7°, and 178.7° for long-cemented, short-cemented, and press-fit stems, respectively (P=.985), with no differences in mLDFA or mMPTA (Table 1). Femoral alignment was significantly less predictable than tibial alignment, with three times more outliers (20% vs 7%, P=.021). Notably, no offset adapters were needed in the short-cemented group, whereas tibial offsets were used in up to 56.7% of press-fit and 50% of long-cemented stems (femoral offsets <17% in

both), without affecting final alignment (P>.05). Press-fit CFR averaged 77.3%, below thresholds linked to optimal fixation.

Conclusion

Stem length and fixation type do not compromise coronal alignment in rTKA. Short-cemented stems deliver alignment on par with longer constructs while preserving intraoperative versatility, positioning them as a compelling first-line strategy, especially when combined with metaphyseal cones.

Table 1. Postoperative radiographic alignment by stem type (mean ± SD)

Parameter	Long-cemented	Short-cemented	Press-fit	P value
HKA (°)	178.9 ± 2.9	178.7 ± 2.5	178.7 ± 3.4	.985
mLDFA (°)	90.9 ± 2.2	90.5 ± 1.8	90.5 ± 2.9	.573
mMPTA (°)	89.1 ± 1.1	89.5 ± 2.0	89.3 ± 1.7	.704

Topic: *Revision – aseptic*

Title: Are cones and sleeves routinely required in first-time aseptic revision surgery?

Authors: Tyas B; Deehan D: Hewitt C; Morgan-Jones R; Baker P
Affiliations: University Hospitals Tees, Middlesbrough UK; University of York, UK
Presenter: Baker P

Introduction

Routine use of cones/sleeves at a first-time revision risks unnecessary removal of bone, over fixation and making subsequent revisions more challenging. We aimed to characterise the incidence and patterns of bone loss at first-time aseptic revision and determine whether metaphyseal fixation devices (MFDs) are associated with improved implant survival in this setting.

Methods

Multi-centre prospective evaluation in patients undergoing first-time aseptic revision. Anticipated and encountered bone loss were recorded, using the AORI classification. Logistic regression identified factors associated with intraoperative AORI≥2B bone loss.

Retrospective cohort study used data from the National Joint Registry of patients undergoing first-time aseptic revision. Cumulative incidence of re-revision was estimated for the presence/type of MFDs and intramedullary stem use/design using competing risk models. Primary outcome was cumulative incidence of re-revision at 10 years.

Results

Most cases reported AORI≤2A bone loss (tibia=73.2%; femur=72.0%). Surgeons reported more bone loss than anticipated in 23.5% cases, less frequently when a pre-operative CT scan was performed. Tibial AORI≥2B bone loss was associated with an indication of loosening/lysis while femoral AORI≥2B was associated with increased time from primary to revision. The NJR analysis included 12,950 case (median follow-up 7.4 years (95% CI 7.3–7.5). There was no association between the use of MFDs and re-revision risk (sHR 0.97, p=0.713). There was no difference in re-revision risk by MFD type (metaphyseal cones: sHR 1.05, p=0.851). Absence of intramedullary stem fixation was associated with a higher hazard of re-revision (sHR 1.66, p<0.001).

Conclusions

Major bone loss at elective aseptic revision of a primary total knee replacement is uncommon. The use of MFDs was not associated with improved implant survival. More research is needed to define the thresholds for utilising these devices and to identify which patient subgroups are most likely to benefit from additional metaphyseal fixation in this setting.

Topic: Alignment/Anatomy

Title: Robotic assisted bilateral simultaneous total knee replacement using adjusted mechanical and kinematic alignment in contralateral knees gives comparable outcomes at 36 months

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Presenter: Rajgopal A.

Introduction:
Despite total knee arthroplasty (TKA) being an established procedure there appears to be no consensus on the ideal alignment choice. This study evaluated clinical outcomes, patient-reported outcome measures (PROMs), and recovery patterns in a patient cohort undergoing single-stage simultaneous bilateral robotic-assisted TKA, utilizing adjusted mechanical alignment (aMA) in one knee and kinematic alignment (KA) in the contralateral knee.

Material and Methods:
A study cohort of 50 patients with degenerative arthritis who underwent single-stage simultaneous bilateral robotic-assisted TKA between 2021 and 2023 was evaluated. All patients were assessed preoperatively and at regular intervals for Oxford Knee Score (OKS), Knee Society Score (KSS), Range Of Motion (ROM), stair climbing ability and gait patterns by an independent observer. The mean follow-up was 36 months.

Results:
Both the KA and aMA techniques achieved comparable clinical endpoints. The KSS improved from a preoperative of 21.9 ± 4.4 in the KA group to 89.9 ± 1.7 at 36 months postoperatively and from a preoperative of 22.0 ± 4.0 to 91.9 ± 1.7 at 36 months follow up (p= 0.830) in the aMA cohort. The ROM improved from a pre op of 98.3 ± 8.8° in the KA group to 108.1 ± 16.2° at 36 months post op, and from 98.4 ± 8.9° in the aMA group to 111.1 ± 6.9° at 36 months (p=0.052). Plantar pressure analysis recorded at 36 months postoperatively to assess foot loading patterns during walking demonstrated no significant difference in pressure distribution between the two cohorts. The visual analogue scale for pain too demonstrated no difference in stair climbing abilities.

Conclusion:
Robotic-assisted bilateral simultaneous TKA using aMA in one knee and KA in the contralateral knee yields comparable early recovery markers and mid-term functional outcomes at 36 months, suggesting both alignment options are viable intraoperative strategies for degenerative arthritis.

Utilization of constraint in manual, accelerometer-based computer navigated, and robotic total knee arthroplasty for varus osteoarthritis

Friedrich Boettner, Celia Aboaf, Ari Goldin.

Introduction: Varus knee deformity occurs in approximately 58% of knees with osteoarthritis. Total knee replacement (TKA) on severe varus deformity can be challenging because to achieve a neutral-aligned TKA in patients with varus deformity, increased soft tissue release and more complex bone resection may be required. When soft tissue balancing cannot be achieved, constrained inserts are utilized. This study investigates whether there are differences in the utilization of constrained inserts in manual, computer navigated, and robotic TKA.

Materials and Methods:

Retrospective cohort study was conducted on patients who underwent primary TKA between September 2022 and December 2023 for varus osteoarthritis. Patients with >2 deg of varus were included. The cohort included 1407 patients (manual: 411 patients; computer navigated: 565 patients, and robotic: 431 patients). The average age was 67.9 and 52.9% were women. Robotic systems studied include ROSA, CORI, MAKO, and Velys. Computer navigation systems were accelerometer based navigation (ABN) systems such as Intellijoint and OrthAlign.

Results:

The percent utilization of constrained inserts in the manual, computer navigated, and robotic TKA groups was 7.3%, 26.3%, and 7.2%, respectively. The computer navigated group had a significantly increased utilization of constrained inserts compared to the manual ($p<0.0001$) and

robotic ($p<0.0001$) groups. There were significant differences in the utilization of posterior stabilized (manual, 68.8%; computer navigated, 48.3%; robotic, 20.9%) and cruciate retaining (manual, 13.3%; computer navigated, 22.2%; robotic, 61.7%) inserts across all groups ($p<0.0001$).

Conclusion:

Experienced robotic and manual surgeons at a specialty hospital seem to utilize constrained inserts and similarly low rates, but cases that use accelerometer based computer navigation (OrthoAlign and Intellijoint) have significantly increased rates of conversion to a constrained inserts. The limitations of accelerometer-based navigation include lack of intraoperative feedback to bone cuts and soft tissue balance, which may explain the increased reliance on constrained inserts.

Not all previous surgeries are the same: Procedure-specific infection risk in total knee arthroplasty patients with a history of previous knee surgery

Authors

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Presenter

Christen B.

Abstract

Introduction

While patient-level factors for prosthetic joint infections (PJI) following total knee arthroplasty (TKA) are well-established, prior ipsilateral knee procedures are typically treated as a uniform risk factor despite likely variation in risk profile across procedure types. This study aimed to evaluate the procedure-specific risk of revision for PJI in patients undergoing primary TKA with a history of one or more prior ipsilateral knee surgeries.

Material and Methods

A retrospective nationwide cohort study using data from the Swiss Implant Registry analyzed all primary TKAs performed between 2015 and December 2022. The primary outcome was revision for infection, whereas secondary outcomes included all-cause revision and all-cause mortality at two years. Multivariable logistic regression adjusted for age, sex, BMI, and American Society of Anesthesiologists (ASA) classification, with individual prior procedures entered in a second block. Cumulative surgical burden was analyzed as an ordinal variable.

Results

Among 121,692 TKAs, 40,535 (33.3%) had a history of at least one ipsilateral knee intervention. All-cause revision occurred in 4,232 patients (3.5%), and revision for PJI in 803 (0.7%). Any prior surgery was independently associated with higher rates of all-cause revision (OR 1.33, 95% CI 1.25–1.41; p<0.001) and revision for PJI (OR 1.22, 95% CI 1.06–1.41; p=0.005). On procedure-specific analysis, prior surgery for knee infection conferred the highest risk of PJI revision (OR 3.30, 95% CI 1.56–6.96; p=0.002), followed by tibial osteotomy (OR 2.12, 95% CI 1.60–2.82), synovectomy (OR 2.18, 95% CI 1.27–3.73), tibial osteosynthesis (OR 1.71, 95% CI 1.10–2.68), and ACL reconstruction (OR 1.44, 95% CI 1.10–1.90; all p<0.05). Infection risk was significantly elevated only in patients with more than two prior procedures (OR 2.01, 95% CI 1.51–2.68, p<0.001).

Conclusion

Prior ipsilateral knee surgery is associated with procedure-specific and cumulative risk of PJI revision after TKA, supporting the integration of prior surgical history into preoperative risk stratification protocols.

A retrospective study on the use of a custom made articulating spacer (CUMARS) for prosthetic knee joint infection.

Ismayl G, Sanalla A, Ammori M, Cooke R, Pandit H, Palan J

Affiliation: Leeds Teaching Hospitals NHS Trust

Presenter: Mr Jeya Palan

Introduction:

The treatment for chronic knee prosthetic joint infection has been in the form of two-stage revision arthroplasty. However, patients may elect to retain a well-functioning first-stage knee spacer. This study evaluated the performance of metal-on-all polyethylene tibia articulating spacers in planned two-stage revision knee arthroplasty. It further compared the functional outcomes between those with a retained spacer and those with complete two-stage.

Methods:

Retrospective review on patients who underwent metal-on-all polyethylene tibia articulating spacer for the treatment of prosthetic joint infection at tertiary revision centre, from 2018 to 2025. Outcomes measured were postoperative complications, re-operation, recurrent infection, mortality rates and survivorship following the first-stage knee spacer. Oxford Knee Scores (OKS) and EQ-5D-3L were obtained to assess the functional outcome.

Results:

33 patients were included, 19 (57.6%) retained their knee spacer, and 14 (42.4%) proceeded to second-stage revision surgery. The retained knee spacer group were of older age (p 0.01) with higher Charlson Comorbidity Index (p 0.015) and Charnley modified scores (p 0.009). There were five cases (15.2%) of postoperative complications following the first-stage knee spacer. Recurrent infection was present in one case (3.0%) and re-operation in two (6.1%) cases, as described. The mortality rate was four (12.1%) at 1 year. The survivorship for retained knee spacers was 65.0% at median survival time of 22 months. The median OKS was 33 and EQ-5D-3L 0.780 in the retained knee spacer cohort, in comparison to 38 and 0.840, respectively in the second-stage cohort (p=0.64 and p=0.78, respectively).

Conclusions:

Patients undergoing metal-on-all polyethylene tibia articulating spacer had low postoperative complications, infection recurrence, re-operation and mortality rates. Functional outcomes were similar between those retaining the knee spacer and those proceeding to second-stage surgery. Retaining the knee spacer may be an alternative to two-stage revision in selected cases.

Table 1: Comparison for baseline characteristics between retained knee spacer and second stage groups.

Variables	**All patients**	**Retained spacer**	**2nd Stage**	**p value**
Number of cases, n (%)	33 (100)	19 (57.6)	14 (42.4)	
Age (years), mean +/- SD (range)	72 +/- 8.5 (52 - 87)	76 +/- 6.7 (62 – 87)	68 +/- 8.7 (52 – 80)	**0.01**
Gender, n (%)				0.57
Male	17 (51.5)	9	8	
Female	16 (48.5)	10	6	
BMI (Body Mass Index), Median +/- SD	34 +/- 6.7	32 +/- 6.6	35 +/- 6.3	0.09
Anaesthesia, n (%)				**0.02**
General	17 (51.5)	14	3	
Spinal	13 (39.4)	5	8	
[Missing]	[3]	[3]	[3]	
ASA, n (%)				0.08
1	1 (3.0)	1	0	
2	12 (36.4)	4	8	
3	16 (48.5)	10	6	
4	4 (12.1)	4	0	
Charlson Comorbidity Index (CCI), n (%)				**0.015**
Mild (CCI = 1, 2)	4 (12.1)	1	3	

Moderate (CCI = 3, 4)	10 (30.3)	3	7	
Severe (CCI ≥ 5)	19 (57.6)	15	4	
Clinical Frailty Score (CFS), n (%)				0.33
Fit (CFS = 1, 2)	3 (9.1)	1	2	
Vulnerable (CFS = 3, 4)	16 (48.5)	8	8	
Frail (CFS ≥ 5)	14 (42.4)	10	4	
Charnley modified score, n (%)				**0.009**
A	10 (30.3)	3	7	
B	11 (33.3)	5	6	
C	12 (36.4)	11	1	
Revision Side, n (%)				0.58
Right	17 (51.5)	9	8	
Left	16 (48.5)	10	6	
Index Procedure, n (%)				0.29
Primary TKA	27 (81.8)	15	12	
Primary UKA	1 (3.0)	0	1	
Revision TKA	5 (15.2)	4	1	
Micro-organism positive, n (%)	24 (72.7)	14	10	0.89
Micro-organism, n (%)				0.07
Streptococcus species	11 (33.3)	8	3	
Coagulase-negative Staphylococcus	5 (15.2)	0	5	

Staphylococcus Aureus	2 (6.1)	1	1	
Any other gram-positive bacteria	3 (9.1)	2	1	
Gram-negative bacteria	3 (9.1)	3	0	
No micro-organism identified	9 (27.3)	5	4	
All poly tibia with femoral component,				0.23
PFC	26 (78.8)	13	13	
Columbus	6 (18.2)	5	1	
Depuy PS	1 (3.0)	1	0	
Follow up, median	29 months	32	29	0.72
Death, n (%)	8 (24.2)	6	2	0.25

Topic: Revision – septic

Modular intramedullary knee arthrodesis for chronic periprosthetic joint infection: patient-reported satisfaction and functional outcomes

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Presenter: Zanna L.

Introduction

Chronic periprosthetic joint infection (PJI) after total knee arthroplasty (TKA) remains one of the most devastating complications in reconstructive surgery, often exhausting further revision options due to bone loss, extensor mechanism failure, or persistent infection. In this scenario, floating knee arthrodesis (KA) with a cemented modular intramedullary nail (IMN) offers a compelling limb-salvage alternative to above-knee amputation. This study assessed infection control, functional outcomes, and patient-reported satisfaction after floating KA for chronic PJI, hypothesizing that patients would consistently favor limb preservation over amputation.

Materials and methods

In this retrospective cohort study, patients undergoing floating KA with a cemented modular IMN as the second stage of a two-stage protocol for chronic PJI between 2016 and 2023 were reviewed. Demographic data, ambulatory status, use of walking aids, and residential independence were recorded. Health-related quality of life was assessed with the SF-12 physical (PCS) and mental (MCS) component scores, and correlation analyses explored factors associated with satisfaction.

Results

Fifteen patients (mean age 74.4 ± 9.5 years) were followed for a mean of 36 months. No septic recurrence or mechanical failure occurred, and no reoperation related to the arthrodesis construct was required (Table 1). Eleven patients (73.3%) reported satisfaction, and notably all patients, without exception, would have chosen KA over amputation. Most remained ambulatory with aids and continued living independently. Younger age was associated with better physical scores ($p=0.02$), a higher number of prior surgeries predicted worse mental health scores ($p=0.046$), and taller patients reported significantly lower satisfaction ($p=0.005$).

Conclusion

Floating KA with a cemented modular IMN is a durable, infection-free limb-salvage solution for chronic PJI after failed TKA, delivering mechanical stability and acceptable quality of life. Psychological well-being, more than physical recovery, emerged as the strongest driver of satisfaction, underscoring the value of structured psychological counseling before surgery.

Table 1. Key infection control, satisfaction, and correlation outcomes

Outcome	**Result**	**P value**
Septic recurrence / mechanical failure	0 / 15	-
Overall satisfaction	11/15 (73.3%)	-
Preferred KA over amputation	15/15 (100%)	-
Younger Age vs SF-12 PCS	r = -0.60	.02
Prior surgeries vs SF-12 MCS	rho = -0.52	.046
Height vs satisfaction	1.74 m vs 1.59 m	.005