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**HILTON KUALA LUMPUR,
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Pre - Conference Workshop
13th Aug 2025

Main Conference
14th - 16th Aug 2025

Venue
Hilton Kuala Lumpur, Malaysia



Oral Presentation

Note: All information in abstracts is the sole responsibility of the author(s)

Oral Presentation: CHS01

Topic: Arthroplasty

Femoral Stem Design Influences Early Periprosthetic Fracture Risk Following Total Hip Arthroplasty

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Background

Periprosthetic femur fracture (PFF) is a serious complication after total hip arthroplasty (THA), with risk influenced by patient and implant factors. This study assessed whether a triple-taper, metaphyseal-filling femoral stem with collar design reduces early PFF risk compared to other cementless stems. Secondary aims included evaluating fracture risk by age, femoral bone quality, and stem collar position (proud vs. on-the-calcar).

Methods

This retrospective study included 774 patients who underwent primary cementless THA: triple-taper metaphyseal stems (n=311), single-wedge (n=294), double-wedge (n=116), and gradual taper/metadiaphyseal-filling (n=53). The triple-taper cohort was drawn from a multicenter clinical trial, while comparators were from a single *urban health system* (name underlined for anonymization). Patients were stratified by stem type, age, Dorr bone quality, and collar position. Primary outcome was 90-day PFF. Logistic regression identified PFF predictors.

Results

PFF occurred in 53 patients (6.8%), with 38 (4.9%) requiring reoperation. Patients with PFF were older (mean 70.5 vs. 65.1 years; $P = 0.001$) and predominantly female (73.6% vs. 56.0%; $P = 0.020$). Triple-taper metaphyseal stems had significantly lower PFF risk than other stem types (OR 0.20; 95% CI, 0.08–0.48; $P < 0.001$). PFF incidence was 1.9% for triple-taper stems vs. 7.8% (single-wedge; $P < 0.001$), 14.7% (double-wedge; $P < 0.001$), and 13.2% (gradual taper; $P < 0.001$). These differences held across age groups and Dorr A/B femora. Within the triple-taper group, a proud collar was associated with increased PFF risk (6.3% vs. 0.8%; $P = 0.020$).

Conclusions

Triple-taper metaphyseal stems significantly reduce early PFF risk, independent of patient age or bone quality. On-the-calcar collar positioning further minimizes fracture risk. Stem design and collar seating are important considerations in preventing early postoperative PFF following THA.

Oral Presentation: CHS02

Topic: Arthroplasty

Analysis of Failure Causes and Risk Prediction of Debridement, Antibiotics, and Implant Retention (DAIR) for Acute Periprosthetic Joint Infection

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Background

Debridement, antibiotics, and implant retention (DAIR) is the preferred treatment for acute periprosthetic joint infection (PJI), yet its failure rate remains high, and the influencing factors are not fully elucidated. This study aimed to investigate the causes of DAIR failure in acute PJI and construct a risk prediction model based on clinical characteristics, inflammatory markers, and microbiological data.

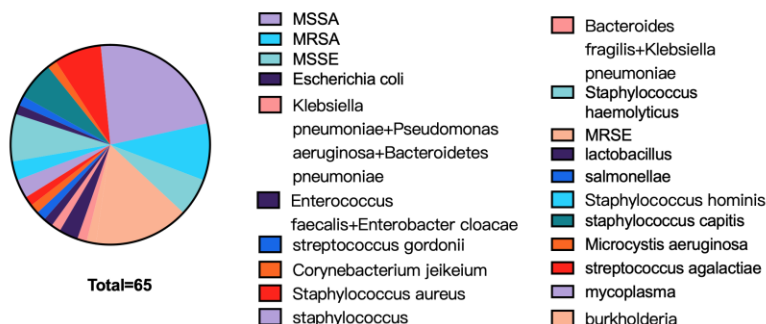
Methods

A retrospective analysis was conducted on 90 patients with acute PJI treated at our medical center between January 2008 and April 2024. All patients underwent standard DAIR treatment and were categorized into success ($n = 77$) and failure ($n = 13$) groups based on outcomes. Demographic data, infection characteristics, laboratory markers, microbiological results, and surgical details were collected. Univariate and multivariate logistic regression analyses were performed to identify independent risk factors, and a nomogram prediction model was developed.

Results

The overall success rate of DAIR was 85.6% (77/90). In the success group, microbial identification was achieved in 65 cases, while all patients in the failure group had confirmed microbiological results. (Figure 1).

Success



Failure

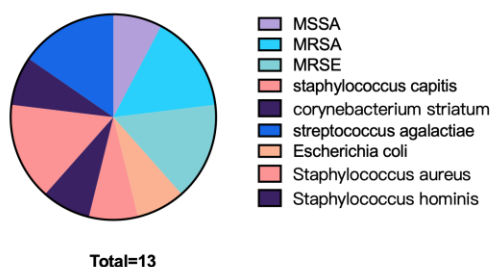


Figure 1. Microbiological identification results of the success and failure groups.

The failure group exhibited significantly higher rates of knee joint infection (84.6% vs. 50.6%, $p=0.023$), acute hematogenous infection (61.5% vs. 20.8%, $p=0.005$), preoperative peripheral White Blood Cell (WBC) ($9.5 \times 10^9/L$ vs. $8.2 \times 10^9/L$, $p=0.043$), CRP (79.6 4 mg/L vs. 42.4 mg/L, $p<0.001$), ESR (80.6 mm/h vs. 60.5 mm/h, $p=0.002$), synovial fluid WBC ($35,300 \times 10^6/L$ vs. $21,843 \times 10^6/L$, $p=0.043$), and synovial fluid polymorphonuclear leukocytes (PMNs) (91.7% vs. 83.8%, $p<0.001$) compared to the success group. Multivariate logistic regression (Table 5) identified acute hematogenous infection (OR 11.704, 95% CI 1.957–119.357, $p=0.015$), preoperative CRP (OR 1.022, 95% CI 1.009–1.040, $p=0.003$), synovial fluid PMN% (OR 1.196, 95% CI 1.039–1.454, $p=0.039$), and resistant pathogens (OR 0.107, 95% CI 0.010–0.665, $p=0.032$) as independent risk factors for DAIR failure.

Table 1 The multivariate regression analysis of the success and failure groups.

Variable	β	SE	z	OR (95%CI)	P value
Type					
Tsukayama 2	0.0			reference	
Tsukayama 3	2.5	1.0	2.4	11.7 (2.0,119.4)	0.015
CRP	0.0	0.0	2.9	1.0 (1.0,1.0)	0.003
Synovial PMN	0.2	0.1	2.1	1.2 (1.0,1.5)	0.039
Antimicrobial resistance					
Resistant	0.0			reference	
Sensitive	-2.2	1.0	-2.1	0.1 (0.0,0.7)	0.032

(Abbreviations: PMN: polymorphonuclear leukocytes)

The nomogram (**Figure 2**) model based on these factors demonstrated robust predictive performance.

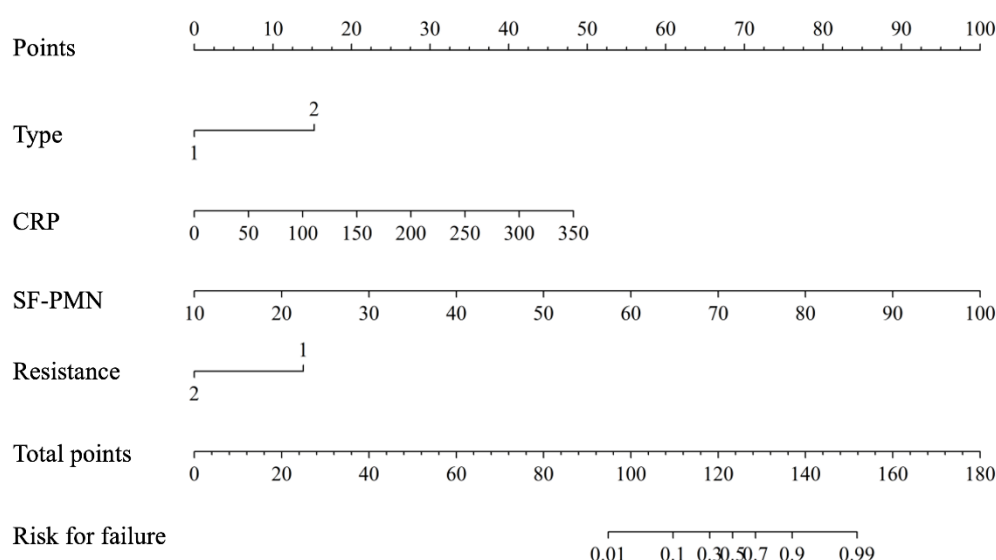


Figure 2. Nomogram for predicting the risk of treatment failure based on multivariate logistic regression analysis. For clinical application: (1) Locate the patient's clinical values (e.g., infection type, preoperative CRP) on the corresponding variable axes; (2) Project upward to determine the points for each parameter; (3) Sum all points to obtain the total score (range: 0-180); (4) Project downward from the total score to the "Risk of Treatment Failure" axis to determine the individualized probability of DAIR failure. (For infection type, '1' means 'Tsukayama 2' and '2' means 'Tsukayama 3'. For resistance, '1' means 'yes' and '2' means 'no'. SF-PMN: synovial fluid polymorphonuclear leukocytes)

Conclusions

DAIR failure is closely associated with hematogenous infection, the intensity of inflammatory response, and the presence of resistant pathogens. The proposed risk prediction model may aid clinical decision-making and optimize patient selection for DAIR.

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Oral Presentation: CHS03

Topic: Arthroplasty

Variations in Greater Trochanter Clear Space Makes Proximal Femoral Array Use Challenging

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Background

Total hip arthroplasty is a successful operation but instability is the equal most common reason for revision in the first 11 years.¹

Prosthetic Stability is determined by a combination of factors including component positioning, soft tissue factors and spino-pelvic biomechanics. There is extensive literature focusing on the positioning of the acetabular component² and more recently technological aids to help execute planned cup positioning. Stem positioning³ is however not well studied and its execution is poor⁴.

The enhanced workflow with the Stryker MAKO TM system allows the femoral broach and stem to be tracked allowing measurements of leg length, offset and stem version. This however requires the insertion of an 8mm screw into the Greater Trochanter for positioning of an array. There are concerns that there is not enough bony space available for insertion of the necessary screw to track the femoral component.

Methods

MAKO CT scans of 202 consecutive patients were reviewed. These were planned for both the Exeter stem (Fig.1) and an Accolade II stem (Fig. 2). The stems were set at 10 degrees anteversion with appropriate stem size and aiming to match the leg length and offset of the opposite side. The maximum distance from the edge of the stem to the perpendicular inner cortex of the greater trochanter was measured and recorded as the Greater Trochanter Clear Space (GTCS).

Results

There were 202 primary hip replacement plans recorded in 109 females and 93 males. The average age of the patients was 67. For Exeter stems the GTCS mean was 12mm (SD=2.92, Range 6 – 20mm) – this was typically low in the GT. For Accolade II stems the GTCS mean was 18mm (SD=3.07, Range 10 – 25mm) this was typically high in the GT. If we consider the 8mm screw requiring 4mm on either side of it only 6% of Exeter stems but 89% of Accolade II stems had the required 16mm of GTCS (Fig. 3).

Conclusion

While the MAKO Enhanced workflow is a useful aid to femoral component positioning, a large percentage of patients do not have enough Greater Trochanter Clear Space to use the proprietary system with the Exeter stem. Although we are aware of individual surgeons who have created their own solutions to this problem, a widely available solution would be of benefit.

Fig. 1 MAKO plan of Exeter stem showing site of typical maximal Greater Trochanter Clear Space



Fig. 2 MAKO plan of Accolade II stem (of same patient as Fig. 1 above) showing site of typical maximal Greater Trochanter Clear Space

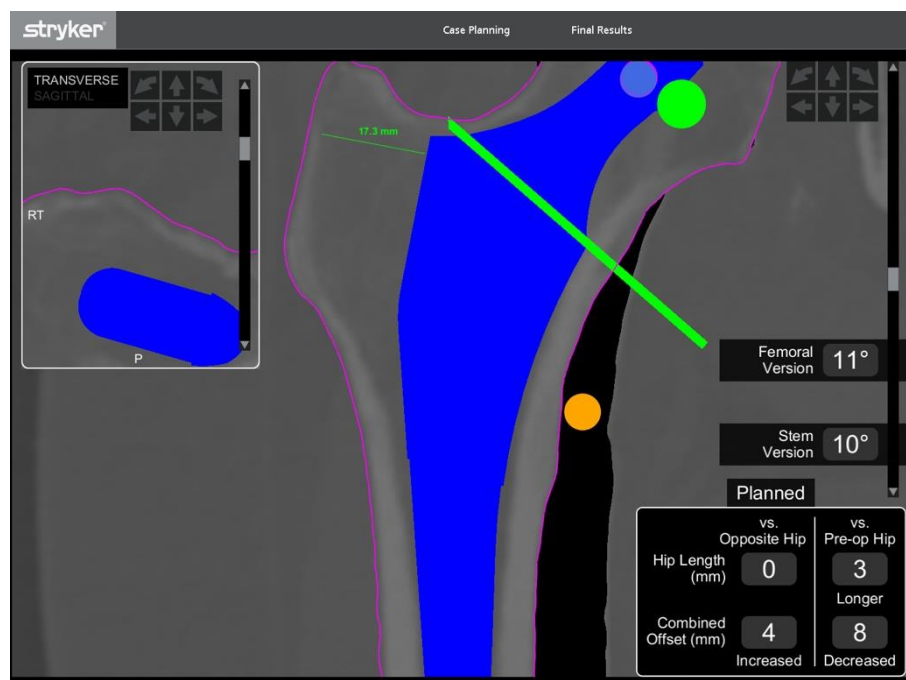
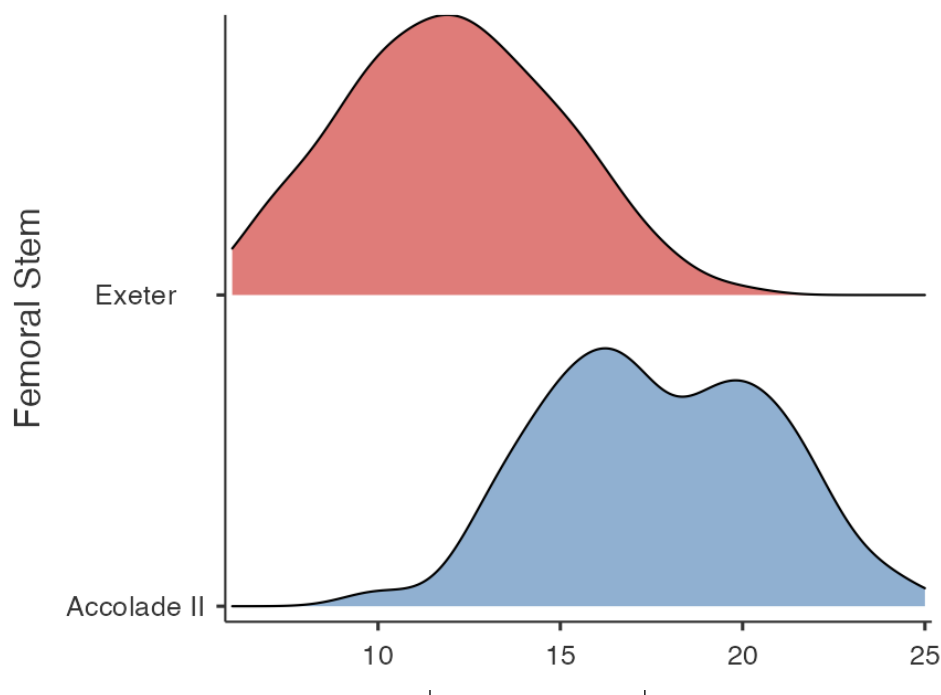


Fig.3, Density histogram displaying the Greater Trochanter Clear Space (in mm) for the Accolade II and Exeter stems.



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Oral Presentation: CHS04

Topic: Arthroplasty

Early Functional Outcomes After Fixed-Bearing Medial Unicompartmental Knee Arthroplasty in Patients with Patellofemoral Osteoarthritis: A Comparative Study

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Background

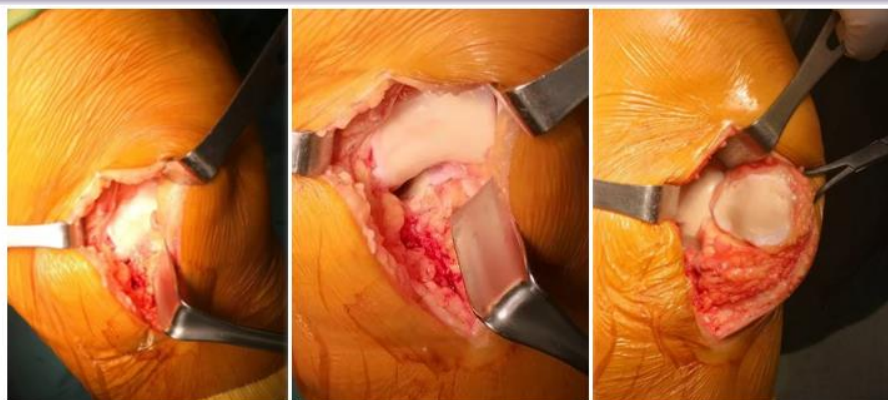
Over its 50-year history, medial unicompartmental knee arthroplasty (UKA) has been used to treat osteoarthritis (OA) of the knee. This procedure replaces only the medial compartment of the knee. The presence of patellofemoral joint osteoarthritis (PFOA) has been questioned as a contraindication due to limited results of fixed-bearing medial UKA in PFOA cases.¹⁻³ The objective of this study is to compare the functional outcomes after fixed-bearing medial UKA between patients with PFOA and those without.

Methods

This prospective cohort study included a total of 51 fixed-bearing medial UKAs (SIGMA®HP Partial Knee, DePuy Synthes, Warsaw, USA). Intra-operative assessments (Fig. 1) categorized patients into a PFOA group (The International Cartilage Repair Society, ICRS grades I-IV) and a non-PFOA group (ICRS grade 0). Clinical information was double blinded to the surgeon, and intra-operative information was blinded to the follow-up physician (Fig. 2). Functional outcomes were measured through both performance-based tests and Patient-reported outcome measures (PROMs). The performance-based tests included the five-times sit-to-stand test (5-STST), timed up-and-go test (TUG), and 3-minute walk test (3mWT). Patient-reported outcome measures included the Oxford Knee Score (OKS), Knee Society Score (KSS), the 12-item Short Form Health Survey (SF-12), and range of motion (ROM). Statistical analyses included independent t-tests and Chi-square tests for demographic data. Paired t-tests and generalized estimating equations (GEE) were used for all pre-operative and post-operative outcome comparisons, with a significance threshold set at p-value < .05.



(a)



(b)

Fig. 1. Intra-operative patellofemoral joint; (a) Non-patellofemoral osteoarthritis (Non-PFOA) with normal cartilage at trochlear and both patellar facet (ICRS grade 0). (b) patellofemoral osteoarthritis (PFOA) with cartilage injury grade IV according to ICRS (International Cartilage Repair Society).

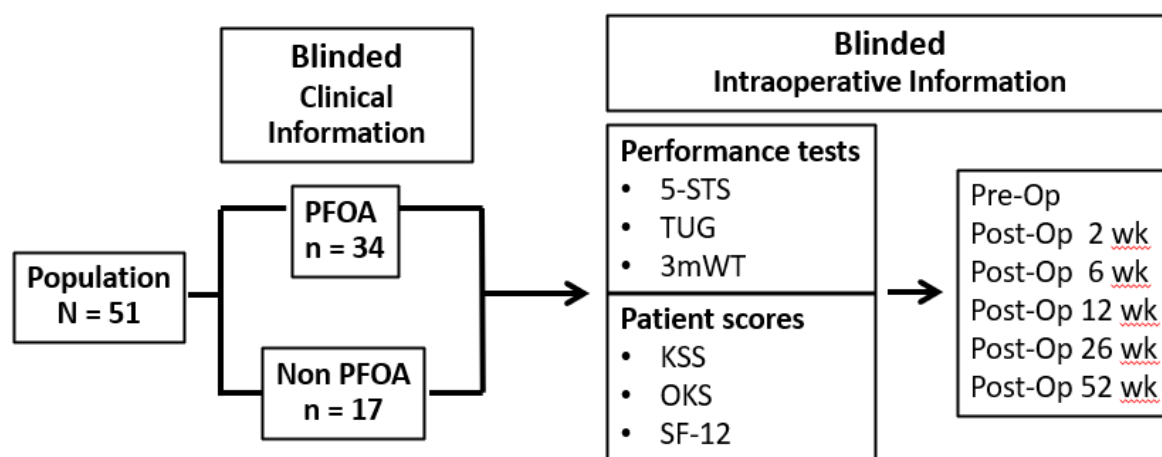


Fig. 2. Framework. 5-STs = Five-times sit to stand, TUG = Time-up and go test, 3mWT = 3 min walk test
KSS = Knee society score, OKS = Oxford knee score, SF-12 = Short form-12

Results

We recruited 51 patients (51 knees) for this study, divided into two groups based on intraoperative patellofemoral findings: 34 knees in the PFOA group and 17 in the non-PFOA group. Demographic data showed that the PFOA group had a significantly longer duration of pain onset compared to the non-PFOA group (2.75 ± 1.5 years vs. 2.03 ± 0.84 years, $p = 0.033$). No other parameters showed a statistically significant difference. At the 1-year postoperative follow-up, there were no significant differences in functional performance or patient-based clinical scores between PFOA and non-PFOA groups across measures, including 5-STs, TUG, 3mWT, KSS pain, KSS function, OKS, SF-12, and ROM. By 6 weeks, both groups showed significant improvement over preoperative scores in 5-STs, KSS pain, OKS, and SF-12. At 12 weeks, further improvements were seen in KSS function, ROM, TUG, and 3mWT for both groups compared to preoperative scores (Table 1).

Table 1 Results

	Non-PFOA (n = 17)	PFOA (n = 34)	p-value
Range of motion (degrees)			
Pre-operative	117.35 ± 11.87	118.29 ± 11.98	0.792
2 weeks	115.53 ± 11.8	113.59 ± 14.45	0.634
6 weeks	120.29 ± 8.56	120.76 ± 10.78	0.876
12 weeks	125.41 ± 6.15	125.18 ± 7.69	0.913
26 weeks	126.47 ± 6.06	125.12 ± 7.48	0.521
52 weeks	126.47 ± 6.06	125.41 ± 6.84	0.591
5-STS (sec)			
Pre-operative	22.67 ± 6.09	21.13 ± 5.49	0.366
2 weeks	27.21 ± 6.64	25.98 ± 7.1	0.554
6 weeks	20.96 ± 4.41	18.82 ± 4.79	0.129
12 weeks	16.12 ± 3.94	15.23 ± 4.3	0.473
26 weeks	15.34 ± 4.04	15.16 ± 4.2	0.885
52 weeks	14.43 ± 4.65	15.03 ± 3.99	0.633
TUG (sec)			
Pre-operative	15.66 ± 3.72	15.52 ± 5.16	0.918
2 weeks	24.2 ± 7.37	23.76 ± 12.07	0.873
6 weeks	16.33 ± 6.1	15.94 ± 7.78	0.857
12 weeks	12.43 ± 3.72	12.2 ± 3.91	0.842
26 weeks	12.62 ± 3.82	12.13 ± 3.64	0.659
52 weeks	12.54 ± 3.92	12.11 ± 3.36	0.700
3m-WT (meters)			
Pre-operative	93.21 ± 19.82	95.69 ± 20.02	0.677
2 weeks	67.05 ± 19.33	80.18 ± 30.04	0.066
6 weeks	101 ± 21.65	107.88 ± 28.08	0.380
12 weeks	126.71 ± 23.13	128.87 ± 35.04	0.819
26 weeks	127.41 ± 21.1	129.24 ± 31.6	0.831
52 weeks	127.88 ± 24.48	130.59 ± 28.73	0.741
	Non-PFOA (n = 17)	PFOA (n = 34)	p-value
KSS pain (max 50)			
Pre-operative	31.47 ± 12.34	28.38 ± 11.4	0.379
2 weeks	31.18 ± 10.54	31.76 ± 9.53	0.842
6 weeks	41.47 ± 7.66	40.44 ± 6.44	0.616
12 weeks	47.06 ± 4.7	44.71 ± 6.74	0.203
26 weeks	47.35 ± 4.37	45.29 ± 4.25	0.113
52 weeks	46.76 ± 5.57	45.15 ± 4.52	0.271

KSS function (max 100)			
Pre-operative	56.76 ± 13.8	54.26 ± 18.14	0.620
2 weeks	37.65 ± 8.5	39.56 ± 12.99	0.585
6 weeks	61.47 ± 11.83	62.21 ± 13.66	0.851
12 weeks	80.88 ± 13.02	80 ± 14.87	0.836
26 weeks	82.06 ± 11.87	80.59 ± 13.58	0.706
52 weeks	83.24 ± 9.83	80.74 ± 12.98	0.488
Oxford knee score (OKS)			
Pre-operative	28 ± 6.53	26.68 ± 5.94	0.472
2 weeks	26.65 ± 5.44	25.79 ± 6.15	0.630
6 weeks	32.82 ± 4.54	33.09 ± 5.93	0.872
12 weeks	38.24 ± 4.75	38.65 ± 6.66	0.821
26 weeks	38.41 ± 4.68	38.38 ± 6.62	0.987
52 weeks	38.47 ± 5.23	38.24 ± 6.42	0.896
SF-12			
Pre-operative	30.71 ± 3.8	31.74 ± 4.58	0.429
2 weeks	28.12 ± 2.85	29.24 ± 3.64	0.274
6 weeks	33.12 ± 2.83	34.44 ± 3.78	0.208
12 weeks	38.29 ± 3.72	38.79 ± 4.46	0.693
26 weeks	38.29 ± 3.85	38.79 ± 4	0.672
52 weeks	38.82 ± 4.07	39.06 ± 3.95	0.843

Value presented as mean ± SD. and Mean change ± SD. P-value corresponds to Paired t test and Generalized Estimating Equations (GEE).

Conclusions

Fixed-bearing medial UKA yields similar functional outcomes in patients with and without PFOA at 1-year postoperative follow-up. Both groups showed significant early improvements in functional performance and patient-reported outcomes, including 5-STS, KSS pain, OKS, and SF-12. These findings suggest that fixed-bearing medial UKA can be an effective treatment for patients with medial compartment osteoarthritis, regardless of the presence of PFOA. Further research with larger sample sizes and longer follow-up periods is needed to confirm the long-term effectiveness of this approach in patients with PFOA.

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Oral Presentation: CHS05

Topic: Arthroplasty

Minimal Clinically Important Difference of Patient-Reported Outcomes after Total Knee Arthroplasty Varies According to Pain Type: A Prospective Study Based on the PainDETECT Questionnaire

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Background

After total knee arthroplasty (TKA), some patients with knee osteoarthritis experience persistent pain and functional impairment. Pain type—neuropathic pain (NeP) versus nociceptive pain (NP)—may differentially affect postoperative recovery. The PainDETECT questionnaire, widely used in pain assessment, effectively distinguishes between NeP and NP. However, its impact on the minimal clinically important difference (MCID) of the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) scores remains unclear.

Methods

In this prospective cohort study, 625 patients with knee osteoarthritis were stratified based on PDQ scores. All patients were evaluated using the WOMAC index preoperatively and at 1 year postoperatively. MCIDs for the NeP and NP groups were determined using anchor-based and distribution-based methods. The change difference method defined the MCID as the difference in score changes between the minimal improvement group and the no-change group. Additionally, receiver operating characteristic (ROC) curve analysis was performed to calculate the MCID, and the percentage of patients achieving the MCID was compared between groups. Sample size and statistical power were analyzed with G*Power software.

Results

At 1-year follow-up, the mean improvements in WOMAC total scores were 33.4 ± 24.1 for the NeP group and 41.0 ± 23.3 for the NP group ($p < 0.001$). Based on the change difference method, the WOMAC total score MCIDs were 23.0 for the NeP group and 16.3 for the NP group. ROC-derived MCIDs for the WOMAC total score were 23.2 and 17.5, respectively. Furthermore, the MCID thresholds for the pain and function subscales were higher in the NeP group, which also demonstrated significantly lower MCID achievement rates compared to the NP group (both $p < 0.05$).

Conclusions

This study provides evidence-based MCID values for Chinese TKA patients according to pain type. The findings indicate that patients with NeP require higher MCID thresholds on WOMAC scores than those with NP, and the MCID achievement rate is lower in the NeP group.

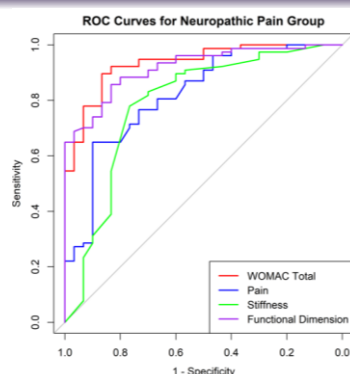


Fig.1

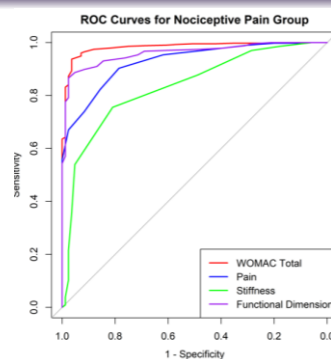


Fig.2

Fig. 1. Receiver Operating Characteristic (ROC) Curves for Neuropathic Pain Group

The ROC curves illustrate the diagnostic performance of four predictive variables in identifying neuropathic pain. The red curve represents the WOMAC Total score, the blue curve represents the Pain dimension, the green curve represents the Stiffness dimension, and the purple curve represents the Functional dimension. The area under the curve (AUC) indicates the model's diagnostic ability: an AUC of 0.5 suggests no discrimination, 0.7–0.8 is considered acceptable, 0.8–0.9 is considered excellent, and above 0.9 is outstanding.

Fig 2. Receiver Operating Characteristic (ROC) Curves for Nociceptive Pain Group

The color scheme follows the same pattern as in Figure 1. The AUC values provide insight into the model's predictive performance, with higher AUC values reflecting better discrimination.

Oral Presentation: FPOP1.01

Topic: Arthroplasty

A Comparative Study of Early Plantar Pressure After Total Hip Replacement via Direct Anterior Approach and Posterolateral Approach in Patients with Femoral Neck Fractures

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Background

Plantar Pressure is a key parameter for measuring gait and lower extremity function, and its distribution characteristics can reflect the weight-bearing distribution and joint stability of patients during walking. The early changes of plantar pressure are closely related to the postoperative rehabilitation process, joint stability and functional recovery.

Methods

Patients with femoral neck fractures who visited the Department of Joint and Sports Medicine at Yiyang Central Hospital from January to October 2024 and consented to undergo total hip arthroplasty were selected. A total of 63 patients were included. The surgical patients were randomly divided into two groups based on the inclusion and exclusion criteria: the direct anterior approach (DAA) group and the posterolateral approach (PLA) group. The study compared the data on step length, plantar pressure difference, and hip joint mobility in the early postoperative walking period between patients who underwent minimally invasive direct anterior approach hip arthroplasty and those who underwent traditional posterolateral approach hip arthroplasty.riefly describe the main methods or treatments applied.

Results

(1) As the postoperative time extended, both groups of patients showed gradual improvements in step length, plantar pressure difference, and hip joint mobility. One week after surgery, the DAA group had significantly better results in step length and plantar pressure difference compared to the PLA group ($P < 0.001$). The DAA group also had a better 2-minute walking test result compared to the PLA group ($P = 0.011$).

(2) One month after surgery, the DAA group had significantly better results in step length and plantar pressure difference compared to the PLA group ($P < 0.001$). The DAA group also had a significantly better 2-minute walking test result compared to the PLA group ($P = 0.013$).

(3) Three months after surgery, the DAA group had better results in step length and plantar pressure difference compared to the PLA group ($P < 0.001$). The DAA group had a significantly better 2-minute walking test result compared to the PLA group ($P < 0.001$).

Conclusions

The recovery of step length, plantar pressure, and hip joint mobility was inconsistent between the two groups of patients after surgery. Patients in the direct anterior approach group exhibited significantly better step length, plantar pressure difference, and hip joint mobility in the early postoperative period compared to those in the posterior approach group.

Table 1. Step Size Test Results (cm)

	Group	Sample size	Mean (standard deviation)	p
1 week after surgery	DAA	30	44.601 (3.379)	<.001
	PLA	33	41.230 (2.946)	
1 month after surgery	DAA	30	46.344 (3.325)	<.001
	PLA	33	43.237 (2.727)	
3 months after surgery	DAA	30	51.227 (3.450)	<.001
	PLA	33	45.862 (2.582)	

Table 2. Comparison of plantar pressure difference test results (%)

	Group	Sample size	Mean (standard deviation)	p
1 week after surgery	DAA	30	15.146 (1.607)	<.001
	PLA	33	20.996 (1.924)	
1 month after surgery	DAA	30	9.841 (1.706)	<.001
	PLA	33	15.906 (2.090)	
3 months after surgery	DAA	30	7.053 (1.370)	<.001
	PLA	33	9.765 (1.983)	

Table 3. Comparison of 2-minute walk test results (m)

	Groups	Sample size	Mean (standard deviation)	p
1 week after surgery	DAA	30	111.896 (7.082)	0.011
	PLA	33	107.362 (6.684)	
1 month after surgery	DAA	30	120.251 (5.183)	0.013
	PLA	33	116.154 (7.359)	
3 months after surgery	DAA	30	130.810 (3.789)	< 0.001
	PLA	33	121.167 (6.820)	

Oral Presentation: FPOP1.02

Topic: Arthroplasty

Comparison of the Application of Lateral Position DAA Approach and Posterolateral Approach in Hemiarthroplasty of Elderly Patients with Femoral Head Fracture

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Background

Femoral neck fractures are a major public health concern, particularly among the elderly population, due to the high morbidity, mortality, and socioeconomic burden associated with these injuries. With the rapid aging of the global population — especially in developed regions such as Beijing, where individuals aged 65 and above account for a significant proportion of residents—the incidence of osteoporotic hip fractures continues to rise. Hemiarthroplasty (HA) has become a widely accepted surgical treatment for displaced femoral neck fractures in elderly patients, offering pain relief, early mobilization, and restoration of function. The choice of surgical approach in HA remains a topic of debate. The Direct Anterior Approach (DAA) in the lateral position and the posterolateral approach (PLA) are two commonly used techniques, each with distinct advantages and limitations. This study aims to analyze and compare the clinical outcomes, complication rates, and functional recovery between the lateral DAA and PLA in elderly patients undergoing HA for femoral neck fractures.

Methods

80 elderly patients with femoral neck fracture in the department of orthopedics of our hospital from January 2019 to December 2021 were selected. All patients were treated with artificial femoral head replacement and were divided into group A (DAA group, 45 cases) and group B (Posterolateral group, 40 cases) according to different approaches. DAA approach was used in group A and posterolateral approach in group B. The operative indexes (operation time, intraoperative blood loss, drainage, hospital stay), pain degree (VAS score), hip joint function (Harris score), clinical efficacy and complications (poor incision healing, lower limb deep venous thrombosis and postoperative dislocation) were compared between the two groups.

Results

The drainage volume, intraoperative blood loss and hospital stay in group A were shorter than those in group B. The VAS score of group A was lower than that of group B at 1, 3 and 7 days after operation; the Harris score of group A was higher than that of group B at 1, 3 and 6 months after operation; the incidence of complications in group A was lower than that in group B, $p=0.34$.

Conclusions

The application effect of lateral position DAA approach in artificial femoral head replacement of elderly patients with femoral neck fracture is better than that of posterolateral approach in lateral recumbent position, which can reduce intraoperative bleeding, postoperative drainage and shorten hospital stay. DAA approach in lateral recumbent position can relieve postoperative pain and help hip joint function to recover as soon as possible.

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Oral Presentation: FPOP1.03

Topic: Trauma

Femoral Neck Fractures: Different Patients, Different Problems

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Background

This study analyzes in-hospital outcomes associated with total hip arthroplasty, hip hemiarthroplasty and internal fixation for treatment of femoral neck fractures in patients aged 45–64.

Methods

Records of patients between the ages of 45–64, from 2002 to 2025, sustaining femoral neck fractures and treated with internal fixation, hip hemiarthroplasty or total hip arthroplasty were obtained from the NIS. Examined variables were age, sex and CCI. Outcome measures included hospital length of stay (LOS), complications, and inpatient hospitalization charge.

Results

From 2002–2025, 2135 femoral neck fractures were available for analysis. THA use increased from 6.3% of operatively managed fractures in 2002 to 23.3% of operatively managed fractures in 2025 ($p < 0.0001$). Patients undergoing THA had higher hospital cost, higher in hospital complication rates and longer length of stay than patients undergoing internal fixation ($p < 0.0001$). The in-hospital mortality for patients undergoing a hip hemiarthroplasty was higher (1.3%) than either total hip arthroplasty (0.3%) or internal fixation (0.5%) ($P = 0.007$).

Conclusions

This study demonstrates that the use of total hip arthroplasty in treatment of femoral neck fractures in patients from the age of 45–64 increased 4.2-fold over the study period. This treatment is associated with increased hospital cost, length of stay and complications. Additionally, as age increased in our study population, there was a stepwise increase in the use of arthroplasty, and it appears that hemiarthroplasty is being used with a different patient population.

Oral Presentation: FPOP1.04

Topic: Trauma

Comparison of the Femoral Neck System Versus Inverted Cannulated Cancellous Screws for the Treatment of Femoral Neck Fractures in Young and Middle-Aged Patients: A Retrospective Study with a Minimum Follow-up of Two Years

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Background

The Femoral Neck System (FNS) is a novel internal fixation device designed to treat femoral neck fractures. This study compares its clinical outcomes with Inverted Cannulated Cancellous Screws (ICCS) in young and middle-aged patients and explores factors related to adverse outcomes in FNS-treated patients.

Methods

A total of 149 patients with femoral neck fractures were enrolled from June 2019 to December 2022. Of these, 71 were treated with FNS (31 males, 40 females, aged 24-60, average 52 years), and 78 with ICCS (36 males, 42 females, aged 20-60, average 52 years). Observational indicators included gender, age, injury mechanism, fracture type, surgery timing, intraoperative radiographic exams, operation duration, Garden index, cortical support, healing time, weight-bearing time, femoral neck shortening, and avascular necrosis. The FNS group was further divided based on femoral neck shortening. Univariate and multivariate logistic regression analyzed risk factors for femoral neck shortening in the FNS group.

Results

In examining variables such as the Garden index, cortical support, fracture healing time, follow-up duration, femoral head necrosis rate, and postoperative final Harris hip score, no statistically significant differences were observed between the two groups ($P > 0.05$). Nevertheless, the rate of femoral head necrosis was higher in the FNS group (39.40%) compared to the hollow screw group (28.2%). Statistically significant differences were found between the FNS and the ICCS groups in terms of intraoperative fluoroscopy counts, operation duration, complete weight-bearing time, and femoral neck shortening length ($P < 0.05$). Through single-factor and multivariate Logistic regression analyses, it was revealed that the existence of comminuted or defective fracture ends of the femoral neck and negative support after reduction were independent risk factors for postoperative femoral neck shortening in the FNS group ($P < 0.05$). Among patients with negative support, the shortening rate was as high as 83.33%.

Conclusions

FNS offers advantages over ICCS, including fewer intraoperative fluoroscopy images and shorter operation time, potentially enabling earlier weight-bearing. However, it does not show clear superiority in preventing femoral head necrosis and has a higher femoral shortening rate, especially in comminuted fractures or negative reduction. Further investigation is needed to assess its overall effectiveness.

Table 1: Comparative Analysis of Demographic Characteristics Between the Two Patient Groups

* 1: Low-energy injuries included slipping and falling

Variable	ICCS Group (n=78)	FNS Group (n=71)	Statistical value (Z/ χ^2)	P-value
Age	52(45.5, 55.25)	52(38, 57)	-0.097	0.923
Gender			0.093	0.76
male	36	31		
female	42	40		
Injured Side			1.676	0.195
Left	39	28		
Right	39	43		
Injury mechanism			0.025	0.874
Low-energy injuries* ¹	54	50		
High-energy injuries* ²	24	21		
Anatomical Classification			4.088	0.129
Basal	3	6		
Transcervical	55	55		
Subcapital	20	10		
Pauwels Type			0.589	0.745
I	10	9		
II	23	25		
III	45	37		
Garden Type			3.556	0.314
I	4	1		
II	16	24		
III	28	26		
IV	30	20		
Time to surgery [days]	3(2, 5)	3(2, 4)	-1.742	0.082

*2: High-energy injuries included traffic accident and falling from height

Table 2: Comparison of outcome indicators between the two groups

Outcome indicator	ICCS Group (n=78)	FNS Group (n=71)	Statistical value (Z/ χ^2)	P-value
Operation time [min]	80 (63.75,110)	64 (55,70)	-4.8	<0.001
Perspective number[times]	20(16,24)	14(12,16)	-7.314	<0.001
Garden alignment index angles(AP)			-0.606	0.544
I	25	12		
II	15	18		
III	38	41		
Reduction classification			-1.611	0.107
Anatomic reduction	38	41		

Positive buttress position reduction	25	12		
Negative buttress position reduction	15	18		
Complete weight-bearing time[weeks]	12.5(12, 14)	12(11, 14)	-2.336	0.05
Fracture healing[months]	3.4(3, 4)	3.3(3, 4)	-0.204	0.838
Follow-up time[months]	27.5(26, 30.5)	27(26, 30)	-0.968	0.333
Harris hip score	91(84.75, 94)	91(84, 94)	-0.248	0.804
Hip joint shortening [mm]	3(1, 5.8375)	5.2(3.46, 6.56)	-2.36	0.05
Femoral head necrosis(% , n)	28.2%(22/78)	39.4%(28/71)	2.103	0.147
Morcellation or defect rate(% , n)	76.92%(60/78)	73.24%(28/71)	0.270	0.603

Table 3. Univariate analysis of factors influencing femoral neck shortening (FNS Group)

Variables	Femoral neck shortening(n=36)	Without Femoral neck shortening (n=35)	P-value
Gender (male/female)	12/24	19/16	0.075
Age	55(47, 58)	48(34, 55)	P<0.05
Injury mechanism			0.482
Low-energy injuries	24	26	
High-energy injuries	12	9	
Injured Side			0.924
Left	22	21	
Right	14	14	
Garden Type			P<0.001
I、 II	4	21	
III、 IV	32	14	
Pauwels Type			P<0.001
I	0	9	
II、 III	36	26	
Anatomical Classification			0.524
Basal	3	3	
Transcervical	30	26	
Subcapital	3	6	
Time to surgery [days]	3(2, 5)	3(2, 4)	0.140
Operation time [min]	68.5±15.89	64.43±12.83	0.081
Perspective number[times]	15.17±3.11	13.94±2.41	0.069
Complete weight-bearing time[weeks]	13.06±1.71	12.4±1.72	0.113
Fracture healing[months]	3.5 (3,4)	3(3,3.5)	P<0.001
Follow-up time[months]	27(26,30)	27(25,30)	0.140
Morcellation or defect rate (% , n)	94.44% (34/36)	51.43% (18/35)	P<0.001
Garden alignment index angles(AP)			P<0.001
I	15	29	
II	14	6	
III	7	0	
Reduction classification			P<0.001
Anatomic reduction	9	3	
Positive buttress position reduction	15	3	
Negative buttress position reduction	12	29	

Oral Presentation: FPOP1.05

Topic: Joint Preservation

Imaging Parameters for Contralateral Hip Dysplasia in Asymptomatic Adults Over 60 Years Old with Femoral Neck Fractures

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Background

It is unclear whether a hip with a developmental dysplasia deformity can remain functional and free of osteoarthritis (OA) throughout life. This study aims to determine the percentage of Chinese older adults with healthy hip function who meet the diagnostic criteria for DDH and BDDH. Additionally, this study seeks to explore hip morphology in this population.

Methods

Data from 808 consecutive patients with recent unilateral femoral neck fractures, collected between January 2022 and October 2024, were retrospectively analyzed. A total of 493 patients were included in the analysis. For imaging evaluation, the following parameters of the fractured contralateral hip were measured: LCEA, Tönnis angle, Sharp's angle, femoral head eminence index (FHEI), and femoral head lateralization.

Results

In this study, 7.1% of individuals aged over 60 years with unilateral femoral neck fractures exhibited imaging results consistent with DDH, while 13.2% had results consistent with BDDH. Table 1 summarizes the imaging parameters and BMI of 493 patients. Patients with DDH and BDDH were at a higher risk of developing mild OA compared to healthy individuals. However, not all individuals with DDH or BDDH develop OA. Only the Tönnis angle was significantly associated with mild OA, indicating a 7.8% increase in OA risk for each 1° increase in the Tönnis angle. Significant differences were observed in the Tönnis angle, Sharp's angle, femoral head lateralization, and FHEI between the healthy group and both the DDH and BDDH groups.

Conclusions

The prevalence of DDH imaging abnormalities is notable among Chinese older adults with healthy hip function. Individuals with DDH and BDDH are more likely to exhibit mild OA symptoms, although not all develop OA. Using multiple imaging parameters in addition to LCEA facilitates characterizing hip morphology in asymptomatic individuals with DDH.

Table 1. Imaging measurements of all patients

Group	LCEA in °	Tönnis angle in °	Sharp' s angle in °	femoral head lateralization in mm	FHEI in %	Tönnis Grade1	BMI in kg/m ²
DDH (n=35)	17.3(15.3,18.4)	17.5±4.1	44.0±2.5	10.3±2.8	30±4	37.1(13)	22.9±3.9
BDDH (n=65)	22.6(21.3,23.6)	11.5±4.1	41.7±2.5	9.3±2.6	25±3	35.4(23)	23.7±3.8
Normal (n=373)	31.5(28.7,34.2)	5.0±3.9	38.2±2.9	7.8±2.7	17±4	16.9(63)	22.9±3.8
Overcoverag e (n=20)	43.0(41.9,44.1)	-4.4±4.5	34.8±2.9	5.0±2.8	7±3	10.0(2)	20.8±4.1
Whole Chort (n=493)	30.2(26.1,33.9)	6.1(2.9,10.0)	38.9±3.4	8.1±2.8	18(14,22)	20.5(101)	23.0±3.8

Continuous variable data presented as mean ±SD or median (Q1, Q3) Categorical variables data presented as % (n). LCEA = lateral center-edge angle; FHEI=femoral head extrusion index; DDH= Developmental dysplasia of the hip; BDDH= Borderline developmental dysplasia of the hip.

Oral Presentation: FPOP1.06

Topic: Arthroplasty

Preoperative Osteoporosis in Joint Arthroplasty Patients: A Call for Routine Screening and Management in China

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Background

Osteoporosis is a leading contributor to periprosthetic fractures and elevated rates of long-term revision in joint replacement patients. Despite the significant global burden of osteoporosis, there is a lack of systematic studies investigating its prevalence among individuals undergoing joint replacement surgery, particularly in China, where the number of osteoporosis cases is the highest worldwide. This study aimed to determine the prevalence of preoperative osteoporosis and the rate of osteoporosis treatment in patients undergoing joint replacement surgery.

Methods

We retrospectively analyzed patients aged 50 years or older who underwent total knee arthroplasty (TKA), unicompartmental knee arthroplasty (UKA), total hip arthroplasty (THA), or hemiarthroplasty (HA) at the Department of Orthopedics, Second Xiangya Hospital, Central South University, between 2021 and 2023. Data on preoperative osteoporosis and related clinical aspects were collected and analyzed.

Results

A total of 1,736 patients were included in the study, comprising 811 TKA, 169 UKA, 697 THA, and 86 HA cases. Among these, 1,122 patients (64.6%) underwent dual-energy X-ray absorptiometry (DXA) testing prior to surgery. The prevalence of osteoporosis was 60.6% in TKA patients, 52.7% in UKA patients, 62.5% in THA patients, and 100% in HA patients. Notably, 75% of patients with comorbid arrhythmia, heart failure, or valve disease had osteoporosis, compared to 60.7% in those without these conditions. The overall treatment rate for osteoporosis was 68.6%, with most patients opting for denosumab over teriparatide or other oral medications. In terms of age distribution, the majority of patients (41.0%) were between 60 and 69 years old, and 54.5% of this age group were diagnosed with osteoporosis.

Conclusions

Osteoporosis is highly prevalent among joint replacement patients, particularly in HA, TKA, and THA cases, highlighting the need for routine DXA screening and targeted management.

Tables as shown below

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Table 1. Baseline Characteristics and Bone Health Parameters of Patients Undergoing Joint Arthroplasty

	THA			HA			TKA			UKA		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
N	255	442	697	21	65	86	184	627	811	39	130	169
Age(yr.)	64.64 ± 8.69	65.28 ± 9.16	65.04 ± 8.99	77.86 ± 8.44	81.40 ± 7.75	80.53 ± 8.02	68.29 ± 7.54	67.85 ± 6.61	67.95 ± 6.83	63.00 ± 6.27	63.55 ± 7.00	63.43 ± 6.83
BMI(kg/m ²)	24.42 ± 4.28	23.90 ± 3.82	24.09 ± 4.00	22.39 ± 3.17	20.69 ± 3.14	21.06 ± 3.20	25.44 ± 3.79	25.49 ± 4.40	25.48 ± 4.26	24.83 ± 3.02	25.82 ± 3.33	25.60 ± 3.28
Smoking(%)	45(17.6%)	4 (0.9%)	49(7.0%)	1(4.8%)	0(0%)	1 (1.1%)	21(11.4%)	4 (0.6%)	25(3.1%)	2 (5.1%)	3 (2.3%)	5(3.0%)
Drinking(%)	44(17.3%)	5 (1.1%)	49(7.0%)	1(4.8%)	0(0%)	1 (1.1%)	17(9.2%)	7 (1.1%)	24(3.0%)	1 (2.6%)	6 (4.6%)	7 (4.1%)
T-Neck	-1.56 ± 1.67	-2.24 ± 1.23	-2.04 ± 1.40	-4.00 ± 0.73	-3.73 ± 0.89	-3.77 ± 0.86	-1.69 ± 1.32	-2.27 ± 1.19	-2.15 ± 1.24	-1.29 ± 1.24	-1.70 ± 0.93	-1.63 ± 0.99
T-Lumbar spine	-2.09 ± 1.33	-2.41 ± 1.20	-2.32 ± 1.25	-3.87 ± 0.95	-3.49 ± 1.06	-3.55 ± 1.04	-1.68 ± 1.57	-2.34 ± 1.23	-2.21 ± 1.33	-1.79 ± 1.12	-2.29 ± 1.09	-2.21 ± 1.11
DXA test %	48.63	66.74	60.25	28.57	49.23	44.19	59.24	70.81	68.2	48.72	71.54	66.27
Osteopenia %	30.6	26.8	27.9	0	0	0	39.4	27.5	29.7	57.9	43	45.5
OP %	57.3	64.7	62.5	100	100	100	43.1	65.3	60.6	26.3	48.4	52.7
Fracture	29(11.3%)	80(18.1%)	109 (15.6%)	21(100%)	65(100%)	86(100%)	3(1.6%)	12(1.9%)	15 (1.8%)	1(2.6%)	1(0.7%)	2(1.2%)
FRAX-MOF	10.21	9.91	10	17.49	16.63	16.74	7.93	8.68	8.51	7.73	7.97	7.93
FRAX-Hip	7.15	6.94	7	12.24	11.64	11.72	5.55	6.08	5.96	5.41	5.58	5.55
PTH	46.00 ± 26.51	50.10 ± 23.04	48.82 ± 24.20	55.02 ± 18.74	53.86 ± 33.92	54.08 ± 31.39	48.82 ± 20.08	55.69 ± 34.25	54.20 ± 31.82	45.47 ± 18.70	53.09 ± 29.23	51.48 ± 27.42
25VD	52.17 ± 21.72	44.71 ± 17.08	47.08 ± 18.96	38.71 ± 18.14	45.59 ± 23.48	44.36 ± 22.56	53.60 ± 20.80	45.07 ± 17.31	46.92 ± 18.44	54.78 ± 19.91	45.60 ± 17.23	47.43 ± 18.06
BGP	19.22 ± 15.97	22.36 ± 12.29	21.37 ± 13.61	22.29 ± 17.68	19.57 ± 15.48	20.08 ± 15.69	16.92 ± 7.76	21.99 ± 11.97	20.90 ± 11.38	16.83 ± 6.86	20.61 ± 12.23	19.86 ± 11.43

CTX	610.04 ± 278.63	726.00 ± 353.10	689.69 ± 335.46	522.15 ± 382.28	823.03 ± 517.83	774.24 ± 506.36	508.15 ± 235.99	699.28 ± 356.54	658.19 ± 343.17	443.75 ± 225.66	603.87 ± 393.68	571.85 ± 370.83
PINP	73.60 ± 48.52	70.59 ± 32.45	71.54 ± 38.21	56.26 ± 16.38	72.98 ± 40.00	70.59 ± 37.84	59.32 ± 30.86	67.82 ± 33.78	66.00 ± 33.32	48.08 ± 15.08	61.10 ± 32.18	58.52 ± 29.98
Ga2+	2.23 ± 0.13	2.26 ± 0.14	2.25 ± 0.14	2.17 ± 0.20	2.17 ± 0.13	2.17 ± 0.15	2.24 ± 0.11	2.27 ± 0.12	2.26 ± 0.11	2.25 ± 0.09	2.27 ± 0.12	2.26 ± 0.11

Table 2. Distribution of Bone Mineral Density, Fracture Incidence, and Surgical Types by Age and Gender

Age	50 - 59		60 - 69		70 - 79		80 - 89		≥ 90	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
BMI (kg/m ²)	23.85	24.65	24.72	25	24.44	24.83	24.75	24.1	23.16	17.48
T-Neck	-1.96	-2.02	-1.84	-2.36	-2.15	-2.54	-1.46	-2.87	-2.85	-3.49
T-Lumbar spine	-1.58	-1.67	-1.55	-2	-1.69	-2.63	-2.11	-3.29	-3.05	-3.88
Normal (%)	17.40	13.40	16.60	6.50	9.40	4.30	18.70	1.70	0.00	0.00
Osteopenia (%)	30.40	32.90	40.90	34.90	34.10	21.30	31.30	12.10	0	0
Osteoporosis (%)	52.20	53.70	42.50	58.60	56.50	74.40	50.00	86.20	100	100
Fracture (%)	4.30	7.90	15.70	8.60	14.10	17.00	18.80	48.3	100	100
THA (%)	61.27	59.45	43.89	27.14	43.07	34.46	28.12	26.44	75.0	20.00
HA (%)	0.70	0.39	0.45	0.61	8.03	4.66	21.88	40.23	25.0	80.00
TKA (%)	19.01	29.53	37.10	62.45	43.80	56.99	46.88	29.89	0.00	0.00
UKA (%)	19.01	10.63	18.55	9.80	5.11	3.89	3.12	29.89	0.00	0.00

Table 3. Prevalence of Comorbidities in Osteoporosis and Non-Osteoporosis Patients Undergoing Joint Arthroplasty

	Joint Arthroplasty			
	NON-OP	OP	Total	P value
Hypertension				
No	211	375	586	<0.05
Yes	225	311	536	<0.05
Diabetes				
No	342	587	929	<0.05
Yes	94	99	193	0.611
Arrhythmia/Heart Failure/Valve Disease				
No	428	662	1090	<0.05
Yes	8	24	32	<0.05
Post-total hysterectomy				
No	223	564	787	<0.05
Yes	35	42	77	0.259
Cerebrovascular disease				
No	398	638	1036	<0.05
Yes	38	48	86	0.127
Hepatic insufficiency				
No	430	675	1105	<0.05
Yes	6	11	17	0.086
Renal insufficiency				
No	428	675	1103	<0.05
Yes	8	11	19	0.33
Hyperthyroidism/hypothyroidism				
No	425	665	1090	<0.05
Yes	11	21	32	0.012

Oral Presentation: FPOP1.07

Topic: Arthroplasty

Efficacy of One-Stage Debridement and Total Hip Arthroplasty for Acute Staphylococcus Aureus-Induced Pyogenic Arthritis of the Adult Hip (II-III Stage)

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Background

Due to the risk of recurrent infection after one-stage debridement and total hip arthroplasty (THA), clinicians often treat acute stage II-III pyogenic hip arthritis caused by Staphylococcus aureus in adults using one-stage debridement followed by two-stage THA. However, this approach incurs higher treatment costs. To evaluate the efficacy of one-stage debridement and THA in managing acute stage II-III pyogenic hip arthritis caused by S. aureus in adults.

Methods

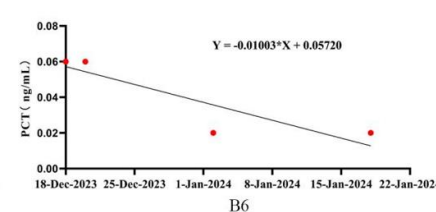
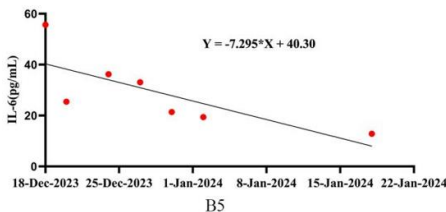
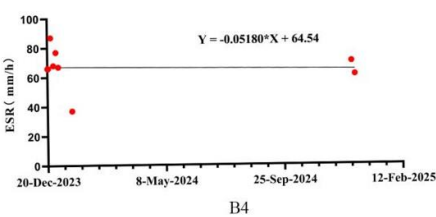
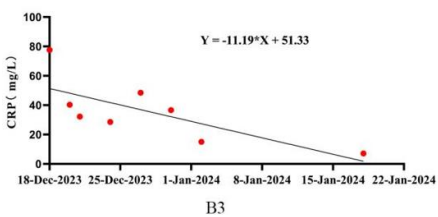
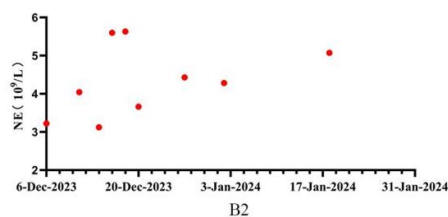
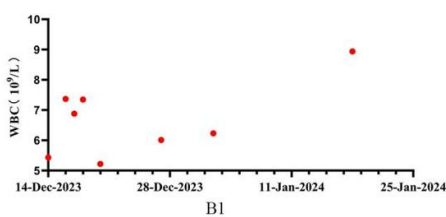
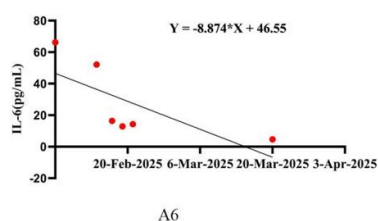
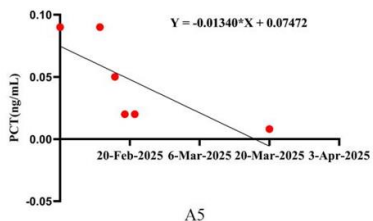
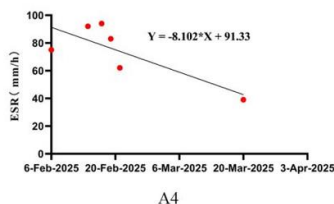
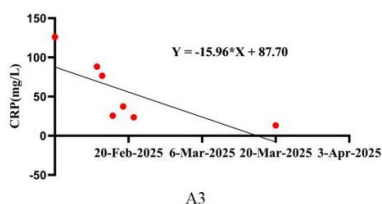
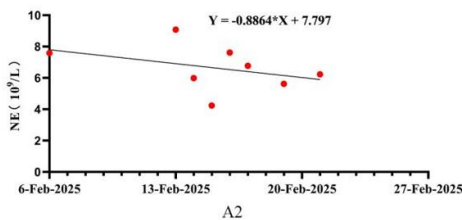
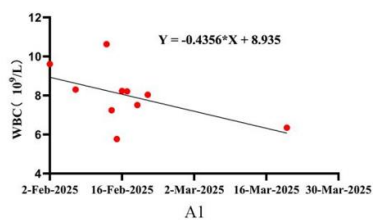
A retrospective analysis was conducted on three cases of pyogenic arthritis of the hip in adults treated by a designated surgical team at our institution between August 2022 and January 2025. The study evaluated: Postoperative serum inflammatory markers, including interleukin-6 (IL-6), erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), procalcitonin (PCT), white blood cell (WBC) count, and neutrophil count; The 3-month readmission rate; and Periprosthetic bone integrity assessed by hip radiographs during follow-up.

Results

Patients 1 and 3 demonstrated declining trends ($k < 0$) in serum IL-6, ESR, CRP, PCT, WBC count, and neutrophil count. Patient 2 maintained normal WBC and neutrophil levels throughout hospitalization, but exhibited elevated IL-6, ESR, CRP, and PCT levels upon admission that progressively declined postoperatively ($k < 0$, Figure 1). All patients achieved 0 readmission rates within 3 months postoperation. Postoperative radiographs (taken on day 1 and at 3-month follow-up) showed no periprosthetic fractures or sclerotic bone formation around the implants (Figure 2 and 3).

Conclusions

One-stage debridement and THA effectively controlled acute stage II-III S. aureus pyogenic hip arthritis in adults, with favorable periprosthetic bone stability. This study provides a theoretical basis for using one-stage debridement and THA in economically disadvantaged patients with acute S. aureus-induced pyogenic hip arthritis.



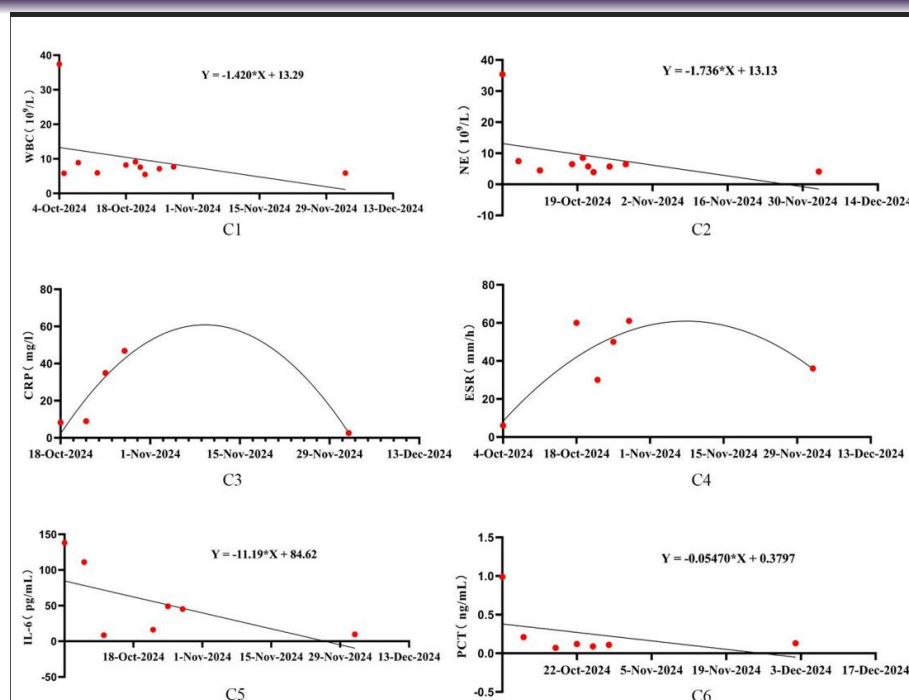


Figure 1: Serum leukocytes, neutrophils, C-reactive protein, erythrocyte level, interleukin-6, and procalcitonin in 3 patients with suppurative coxitis from admission to hospital until 3 months after surgery. patient 1 (A1~A6), patient 2 (B1~B6), and patient 3 (C1~C6).

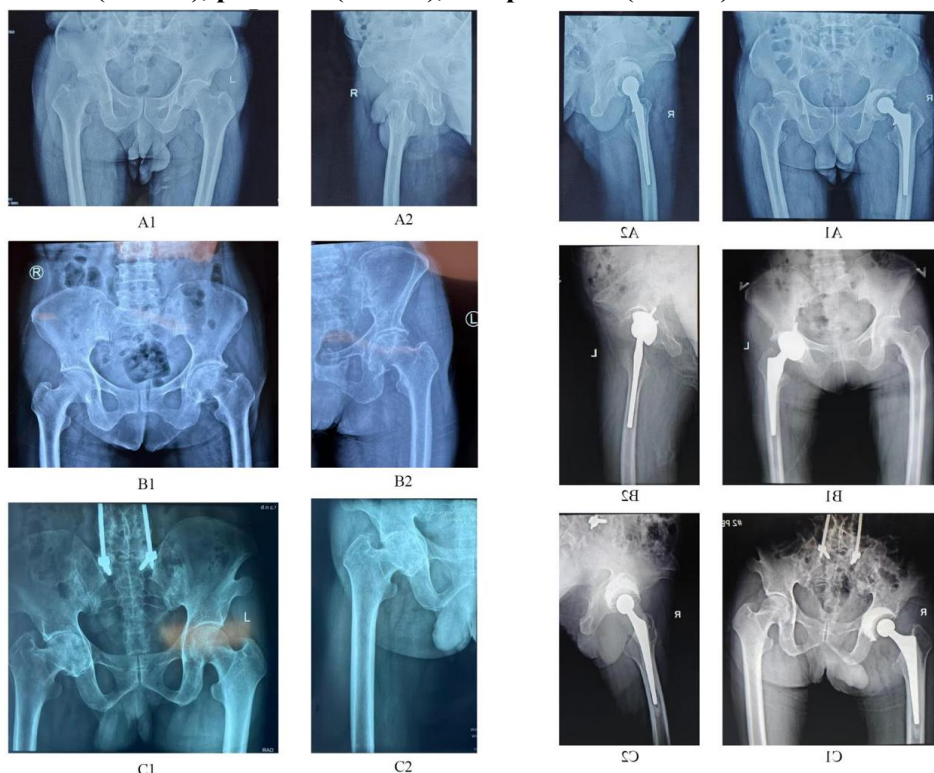


Figure 2

Figure 3

Figure 2 Preoperative X-rays of patients, patient 1 (A1~A2), patient 2 (B1~B2), and patient 3 (C1~C2).

Figure 3. Postoperative X-rays of patients, patient 1 (A1~A2), patient 2 (B1~B2), and patient 3 (C1~C2).

Oral Presentation: FPOP1.08

Topic: Arthroplasty

Application of Extended Trochanteric Osteotomy Combined with a Longer Biological Femoral Component in One Stage Total Hip Arthroplasty Revision for Periprosthetic Joint Infection: A Retrospective Study

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Background

This retrospective study aimed to investigate the efficacy of extended trochanteric osteotomy (ETO) combined with a longer biological femoral component in primary total hip arthroplasty (THA) revision for periprosthetic joint infection (PJI) and to analyze the influencing factors.

Methods

A total of 38 patients (mean age 56.2 years; 18 males, 20 females) who underwent ETO-assisted one-stage THA revision for PJI at two hospitals between January 2018 and January 2022 were analyzed. All patients were diagnosed based on the Musculoskeletal Infection Society criteria. Infection recurrence rate, femoral osteotomy healing, complications, and functional status (Harris Hip Score, HHS) were evaluated. T-tests were used for continuous variables, Chi-square tests for categorical variables, and logistic regression for risk factor analysis.

Results

All patients were followed up until January 2024, with a mean follow-up of 30.8 months (range, 24-48 months). Infection was controlled in 36 patients (94.74%), with recurrence in 2 (5.26%). The average osteotomy healing time was 15.2 ± 1.6 weeks. The mean HHS significantly improved from 35.63 ± 5.15 preoperatively to 79.52 ± 5.24 at the final follow-up ($P = 0.0017$). Complications occurred in 6 cases (15.79%), including 2 infection recurrences, 2 Postoperative periprosthetic fractures, and 2 cases of mild painless limp due to limb length discrepancy >2 cm.

Conclusions

ETO-assisted primary THA revision is an effective treatment for PJI, capable of effectively controlling infection and improving patients' functional status. However, there is still a risk of complications. Influencing factors for infection control rate included patient age, sex, primary disease, comorbidities, infection type, infection duration, and bacterial species (Table 1).

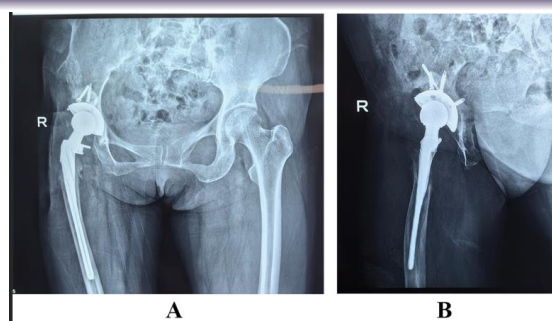


Figure 1

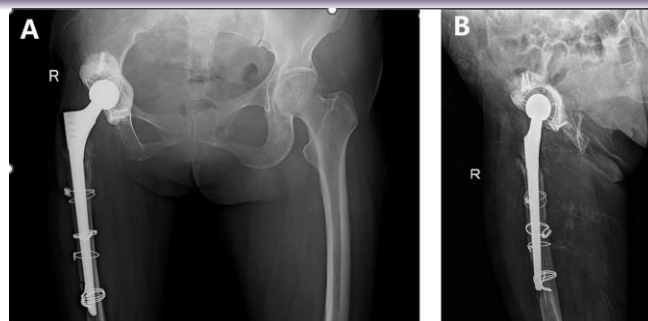


Figure 2

Figure 1. A: Anteroposterior X-ray showing stable femoral stem fixation after right total hip arthroplasty, with partial bone absorption around the acetabulum. **B:** Lateral X-ray showing partial absorption of bone around both the proximal femoral stem and the acetabulum in the right hip arthroplasty.

Figure 2. A: Anteroposterior X-ray: Due to excessive acetabular bone defects, the acetabulum is fixed using bone cement technique. **B:** Lateral X-ray: A long stemmed cemented stem is implanted on the femoral side, with a stress fracture in the distal part of the stem.

Table 1. Comparison of Univariate and Multivariate Analyses of Risk Factors for Infection Control Failure after One-Stage Revision for PJI

Risk Factor	Univariate Analysis OR (95% CI)	P-value	Multivariate Analysis OR (95% CI)	P-value
Age $\geq$ 65 years	4.20 (1.50–11.76)	0.006	3.21 (1.12–9.13)	0.031
Gender (Male vs Female)	3.00 (1.20–7.50)	0.020	2.78 (1.03–7.65)	0.043
Primary Disease (Rheumatoid vs Traumatic)	5.50 (1.70–17.80)	0.004	4.52 (1.38–14.76)	0.012
Infection Duration $\geq$ 1 year	3.50 (1.30–9.40)	0.013	2.87 (1.01–8.24)	0.048
Pathogen (Staphylococcus aureus vs Others)	3.80 (1.30–11.10)	0.015	3.14 (1.08–9.17)	0.035

Oral Presentation: FPOP1.09

Topic: Joint Preservation

Arthroscopic Dual Decompression for ONFH Collapse Prevention

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Background

The intramedullary core decompression treatment for non-traumatic femoral head necrosis (ONFH) prior to femoral head collapse has limited efficacy[1]. Lowering joint capsule pressure benefits femoral head blood circulation[2]. Arthroscopy enables concurrent femoral head and intraarticular decompression[3,4]. Arthroscopic femoral head core decompression is more precise, and the small joint capsule incision doesn't affect joint stability[5]. This study aims to explore the therapeutic effect of arthroscopic outside-in intraarticular decompression combined with through femoral neck intramedullary core decompression in treating femoral head necrosis.

Methods

A retrospective analysis was carried out on the clinical data of 81 patients (106 hips) with pre-collapse ONFH admitted from April 2019 to December 2022. Fifty patients (61 hips) received small-diameter multi-channel core decompression alone (group B). Thirty-one patients (45 hips) were treated with intra-articular decompression (debridement of the hip joint and incision of the hip capsule) and small-diameter multi-channel core decompression through femoral neck under outside-in hip arthroscopy guidance (group A)(Fig.1). The surgical duration; intraoperative bleeding; intra-articular pressure (IAP) before and after surgery; length of hospital stay; hospitalisation expenses; visual analogue scale score (VAS) before, 1 week, 4 weeks, 3 months and 12 months after surgery; and Harris score of the hip joint before, 3 months and 12 months after surgery were recorded and compared between group A and group B. X-ray examination was performed every month to observe the collapse of the femoral head within 24 months after surgery (Fig.2), which was compared using the Kaplan-Meier survival curve analysis..

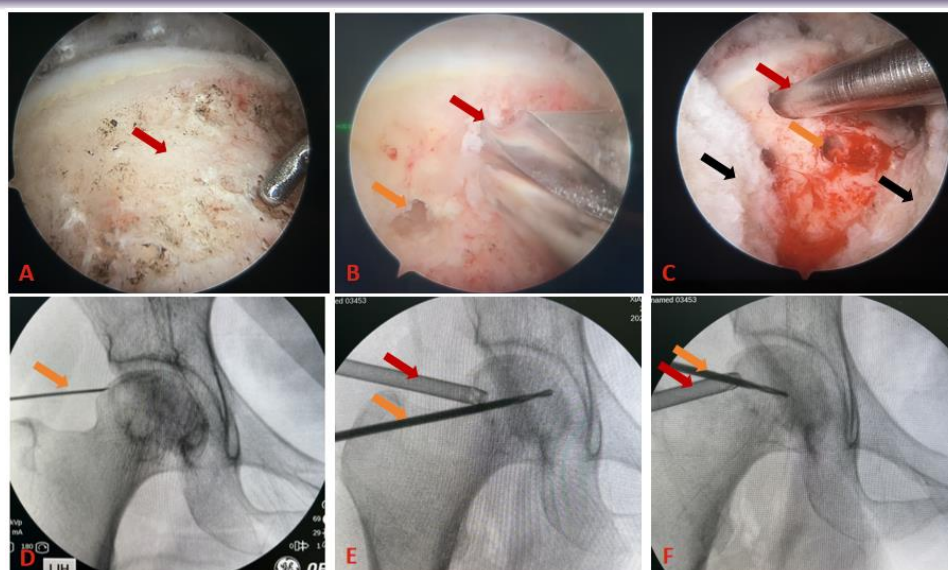


Fig. 1. Arthroscopic Dual Decompression. (A) Femoral neck exposed after capsule incised. The red arrow shows the exposed anterolateral femoral neck. (B) Core decompression through the femoral neck. The red arrow points to a 2.5-mm drill bit, and the yellow arrow marks the drilled hole. (C) The osteonecrotic lesion after drilling is curetted. The red arrow indicates the curette, the yellow arrow the drilled hole, and the brown arrow the longitudinally incised joint capsule. (D) For perspective positioning, the yellow arrow points to the puncture needle. (E) and (F) are fluoroscopic images of drill holes in different directions according to the preoperative lesion location. The red arrow denotes the arthroscope sleeve, and the yellow arrow the drill bit.

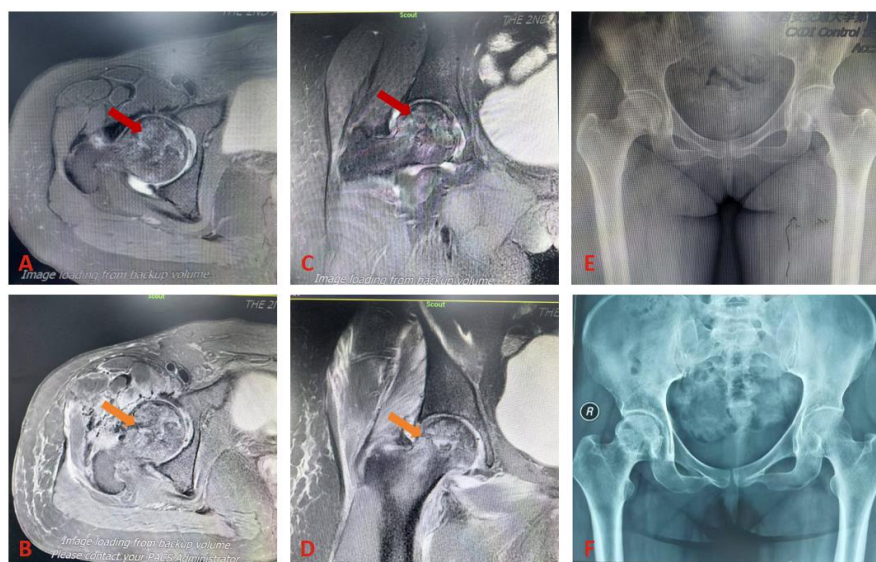


Fig. 2. Comparison of radiological imaging before and after the operation. (A) and (B). Axial hip MRI before and after the operation. The red arrow in A points to the necrotic area, and the yellow arrow in B points to the necrotic area and the tunnel for drilling decompression. (C) and (D) Coronal hip MRI before and after the operation. The red arrow in A points to the necrotic area, and the yellow arrow in B points to the necrotic area and the tunnel for drilling decompression. (E) Anteroposterior pelvic radiograph before the operation shows the manifestation of right femoral head necrosis without collapse. (F) Anteroposterior pelvic radiograph 24 months after the operation shows that the manifestation of right femoral head necrosis is aggravated, but there is still no collapse.

Results

When the two groups were compared, the surgical duration was longer and hospitalisation expenses were higher in group A than in group B ($P < 0.05$). However, the VAS score and the Harris score of the hip joint after surgery improved significantly compared with those before surgery ($P < 0.05$), which were more apparent in group A than in group B ($P < 0.05$)(Table1). X-ray examination revealed that 6 hips in group A and 21 in group B received femoral head collapse at the 2-year follow-up. The survival rate of the femoral head in group A was significantly higher than that in group B($P < 0.05$).

Table 1. Comparison of Harris scores before, 3 months and 12 months after surgery between the two groups

Time	Group A(n=45)	Group B (n=61)	<i>T</i>	<i>P</i>
Before surgery	61.4±10.7	59.4±8.9	1.0632	0.4281
3 Months after surgery	87.2±7.4	77.2±10.2	5.3271	0.0000
12 Months after surgery	82.9±6.6	75.9±5.3	3.2147	0.0011

Conclusions

Arthroscopic dual decompression (intraarticular decompression and core decompression) for treating early ONFH can more effectively alleviate joint pain, improve joint function and delay ONFH progression.

References

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Oral Presentation: FPOP1.10

Topic: Joint Preservation

Robot-Assisted Uniportal Endoscopic Core Decompression for the Osteonecrosis of Femoral Head: Clinical Application and Early Outcomes

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Background

Enhancing the accuracy of core decompression (CD) and ensuring complete lesion debridement are pivotal to optimizing hip preservation surgery outcomes in the osteonecrosis of the femoral head (ONFH). This study was designed to evaluate the clinical validity and early outcomes of robotic-assisted uniportal endoscopic core decompression (RUECD) for ONFH.

Methods

A prospective case-control study was conducted, enrolling 40 eligible ONFH patients undergoing joint-preserving surgery at the Department of Orthopedics, First Affiliated Hospital of Kunming Medical University. These patients were randomized into RUECD (n=20) and conventional core decompression (CD) (n=20) groups. Comparative parameters included: 1) perioperative metrics (operative time, blood loss, fluoroscopy frequency); 2) clinical outcomes (Harris Hip Score [HHS], International Hip Outcome Tool-33 [iHOT-33]) at 1, 3, 6, 12 and 24 months postoperatively; 3) radiographic parameters (necrotic lesion volume, ARCO classification, Tönnis grade) at 6, 12, and 24 months; and 4) femoral head survival rates (endpoints: subchondral collapse or conversion to THA).

Results

No significant intergroup differences were observed in operative time, intraoperative blood loss, HHS and iHOT-33 scores at 1 and 3 months, as well as ARCO and Tönnis progression between the two groups. However, the RUECD group demonstrated superior outcomes in:

- 1) Reduced fluoroscopy frequency (4.3 ± 0.9 vs 7.1 ± 1.1 exposures, $P < 0.001$)
- 2) Better HHS scores (80.3 ± 4.7 vs 76.5 ± 5.3 at 6 months, $P = 0.02$; 83.1 ± 4.7 vs 79.4 ± 5.1 at 12 months, $P = 0.025$; 84.6 ± 3.9 vs 79.6 ± 4.8 at 24 months, $P = 0.001$)
- 3) Higher iHOT-33 scores (59.4 ± 2.1 vs 57.0 ± 3.2 at 6 months, $P = 0.008$; 67.6 ± 3.6 vs 64.2 ± 3.9 at 12 months, $P = 0.007$; 73.8 ± 4.6 vs 69.0 ± 5.5 at 24 months, $P = 0.005$)
- 4) Greater necrosis ratio improvement at 24 months ($28.7 \pm 5.1\%$ vs $32.2 \pm 4.9\%$, $P = 0.031$)

While 24-month survival rates with collapse as endpoint showed significant differences (90% vs 65%, $P = 0.055$), RUECD demonstrated significantly higher survival of femoral head when considering THA conversion (100% vs 75%, $P = 0.018$).

Conclusions

Robotic-assisted uniportal endoscopic core decompression provides more precise necrotic tissue debridement compared to conventional CD, yielding superior early-term functional outcomes, improved lesion containment, and enhanced femoral head preservation rates for ONFH.

Keywords

Robotic-assisted technology; Endoscopic technology; Osteonecrosis of the femoral head; Core decompression

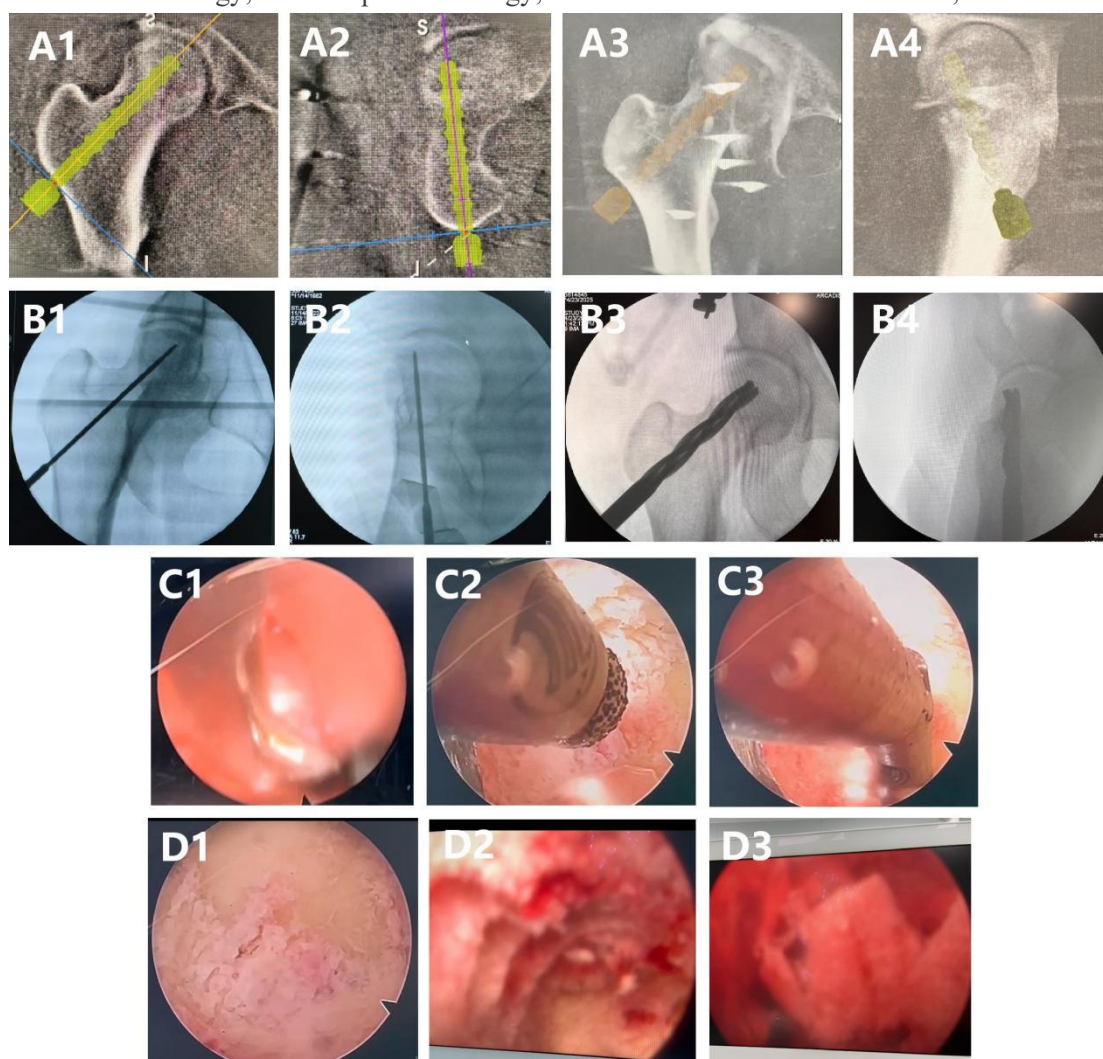


Figure 1 Robot-assisted Uniportal Endoscopic Core Decompression for the Osteonecrosis of Femoral Head. A: The placement planning path and simulation graph were designed on the TiRobot workstation to ensure passing through the core necrotic area; B: Core decompression based on the robot-assisted planning path; C: Complete debridement of necrotic tissues under endoscopy; D: Bone grafting under endoscopy after debridement until bleeding occurs.

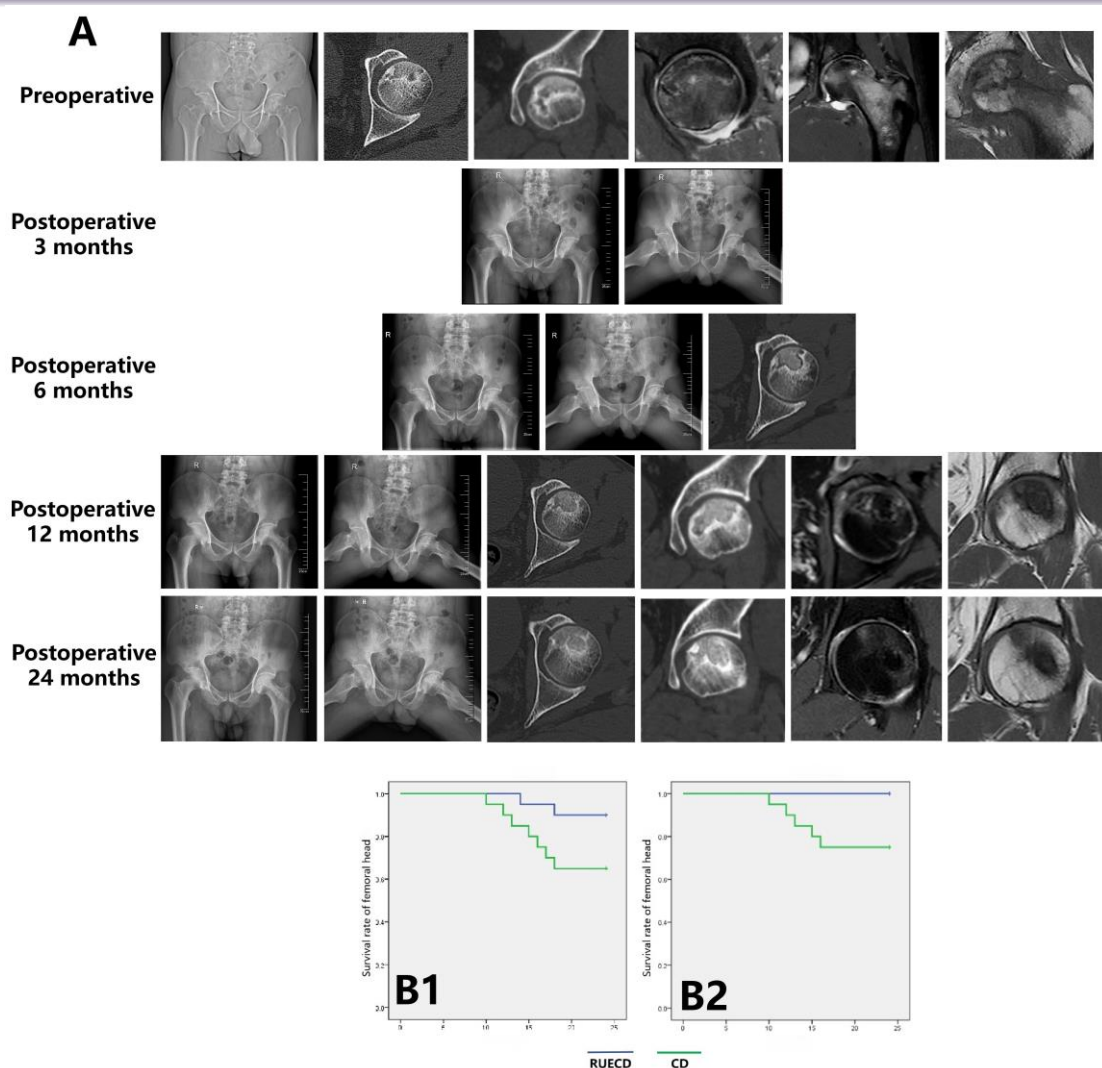


Figure 2 Early clinical outcomes. A: Follow up data of one case. B: Comparison of survival rates of femoral head between two groups: (1) The survival curve of the femoral head with the collapse of the femoral head as the endpoint time; (2) The survival curve of the femoral head with THA as the endpoint time.

Oral Presentation: FPOP2.01

Topic: Arthroplasty

How Frequently Do Five Alignment Methods for Total Knee Arthroplasty Cause Collateral Ligament Imbalance and Change Alignment from Natural in Asian Patients?

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Background

This study simulated and compared the outcomes of five alignment methods in TKA, including MA, adjusted mechanical alignment (aMA), anatomical alignment (AA), kinematic alignment (KA), and restricted kinematic alignment (rKA), in terms of undesirable collateral ligament balance and changes in alignment parameters.

Methods

Bone models were reconstructed from knee computed tomography scans of 144 Asian patients with osteoarthritis, and five alignment methods for TKA were simulated, with minimal bone resection based on the thickness of the femoral and tibial components. Comparisons were made of the proportions of simulations achieving balanced collateral ligaments at 0° extension and the proportions of instability between 0° extension and 90° flexion that remained uncorrected after ligament release. Changes in constitutional alignments, joint line orientations and coronal plane alignment of the knee (CPAK) classification were also assessed.

Results

The proportions of TKAs requiring more than 2 mm of ligament release to achieve balanced collateral ligaments at 0° extension were 65.97% for MA, 60.42% for aMA, 45.83% for AA, 33.33% for rKA and 0% for KA (Figure 1 A, B). The proportion of instability not corrected by ligament release between 0° extension and 90° flexion was 31.95% for MA, 21.53% for aMA, 61.81% for AA, 4.86% for rKA and 0% for KA, with no significant difference between rKA and KA (Figure 1 C, D). KA retained the natural alignment parameters, and rKA showed minimal changes in these alignment parameters, retaining approximately 85.42% of constitutional alignment, 82.64% of joint line orientation, and 68.06% of CPAK classification (Figure 2).

Conclusions

KA and rKA outperform MA, aMA and AA in achieving better collateral ligament balance and maintaining the patient's natural alignments and CPAK classifications. KA and rKA are recommended to restore the natural angle and level of the joint lines in Asian patients undergoing TKA, potentially reducing patient dissatisfaction caused by changes in knee stability and limb alignment.

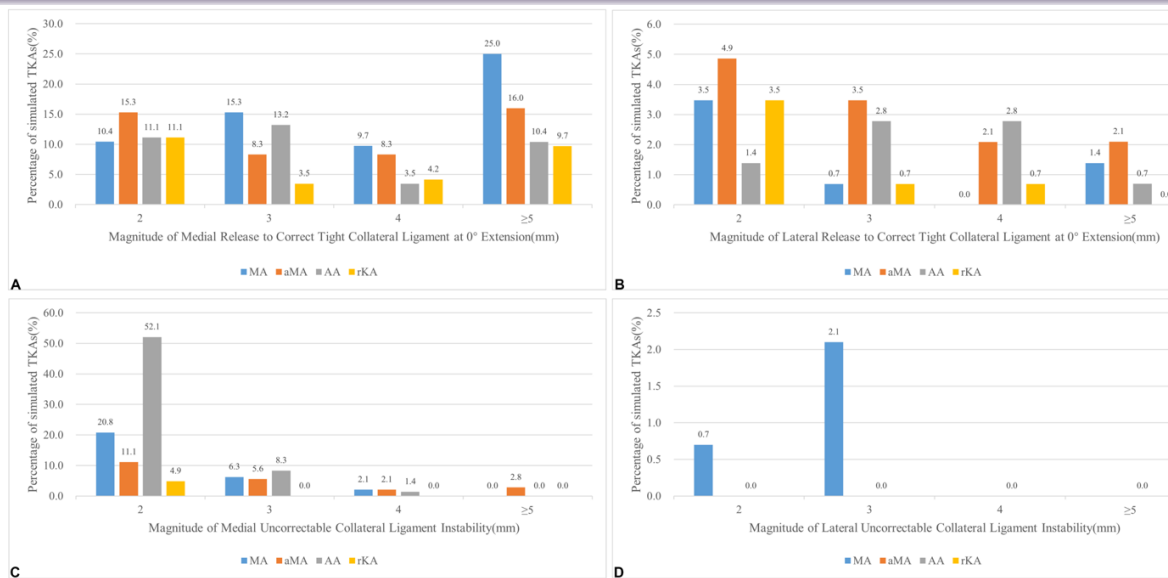


Fig. 1. Comparison of undesirable collateral ligament imbalances in different alignment strategies. The simulation of kinematic alignment did not show any undesirable collateral ligament imbalances; hence, it is not shown in the figure. A. Comparison of the requirement for 2mm or greater medial collateral release. B. Comparison of the requirement for 2mm or greater lateral collateral release. C. Comparison of instability of 2 mm or more in the medial compartment between 0° of extension and 90° of flexion that was uncorrectable by collateral ligament release. D. Comparison of instability of 2 mm or more in the lateral compartment between 0° of extension and 90° of flexion that was uncorrectable by collateral ligament release. MA= mechanical alignment, aMA= adjusted mechanical alignment, AA= anatomical alignment, rKA= restricted kinematic alignment.

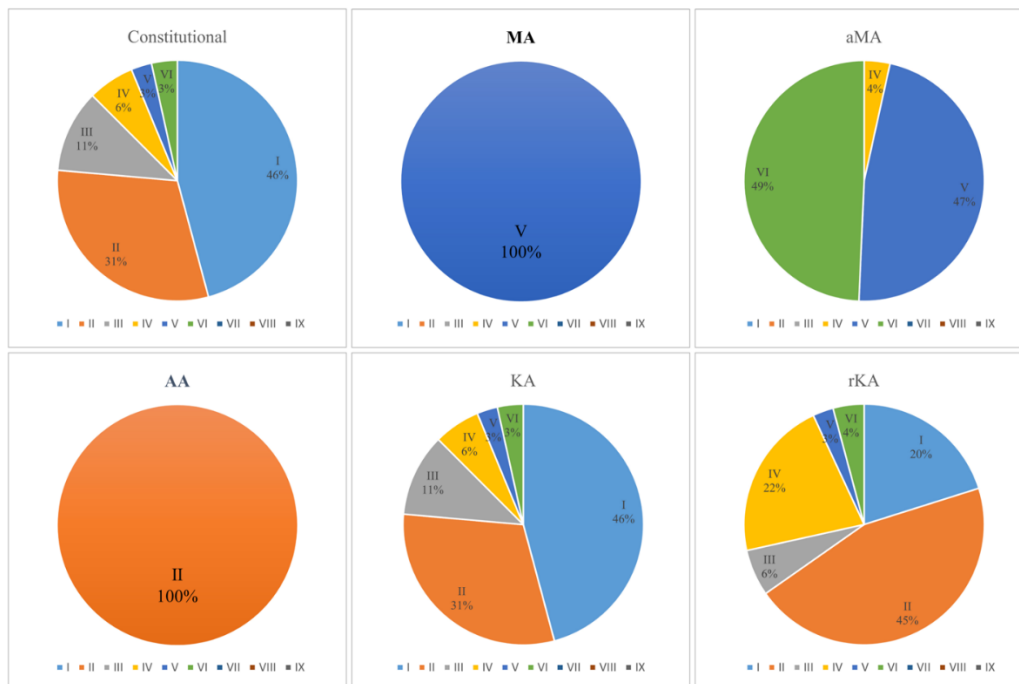


Fig. 2. The coronal plane alignment of the knee phenotypes after the simulation of five different alignment strategies in total knee arthroplasty.

Oral Presentation: FPOP2.02

Topic: Sports

Correlation Between Preoperative Gait Biomechanics and Multidimensional Clinical Scores in Patients Undergoing Total Knee Arthroplasty

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Background

Total knee arthroplasty (TKA) is an effective treatment for end-stage knee osteoarthritis[1] [2]. However, a significant proportion of patients remain dissatisfied with postoperative outcomes[3, 4]. Studies have demonstrated that knee kinematics are often impaired before TKA, and postoperative biomechanical characteristics do not fully return to normal[5, 6]. This suggests that preoperative gait kinematic parameters may play an important role in predicting postoperative functional recovery[7, 8]. Nevertheless, the precise relationship between six-degree-of-freedom knee kinematics and multidimensional clinical scores—such as SF-36, WOMAC, and KSS—remains unclear and warrants further investigation.

Methods

A total of 30 patients scheduled for TKA were enrolled. Preoperative knee kinematic data were collected, including six parameters: varus-valgus angle, internal-external rotation, mediolateral translation, flexion-extension angle, vertical translation, and anteroposterior translation. Clinical outcomes were evaluated using SF-36, WOMAC, and Knee Society Score (KSS). Pearson correlation analysis with two-tailed significance testing was performed to assess the strength of association between gait parameters and clinical scores.

Results

Significant correlations were found between specific gait parameters and clinical outcomes: internal-external rotation was negatively correlated with KSS functional score ($r = -0.379$, $p = 0.039$) and positively correlated with SF-36 physical functioning ($r = 0.508$, $p = 0.006$); mediolateral translation was positively correlated with WOMAC stiffness score ($r = 0.391$, $p = 0.033$); varus-valgus angle was negatively correlated with SF-36 mental health ($r = -0.553$, $p = 0.004$) and positively correlated with pain during level walking ($r = 0.383$, $p = 0.037$).

Discussion

The study reveals a dual and potentially contradictory role of internal-external knee rotation: it shows a positive association with physical functioning, but a negative correlation with functional activity performance. This may be explained by the fact that mild rotational motion could preserve joint flexibility, contributing to better endurance. In contrast, abnormal or excessive rotation—especially during critical phases of the gait cycle—may compromise neuromuscular control and reduce performance in daily activities.

The varus-valgus angle demonstrated significant correlations with both mental health and pain levels, suggesting that gait abnormalities are not purely mechanical issues but are also intimately connected to the patient's psychological well-being. These findings are consistent with previous literature linking biomechanical

instability to preoperative anxiety and depression, underscoring the importance of including gait assessment in comprehensive health evaluations.

The positive correlation between mediolateral translation and stiffness scores indicates that deficits in lateral stability may aggravate perceived joint stiffness. Such displacement abnormalities typically manifest as asymmetries or instabilities during the mid-stance phase of gait. This highlights a potential limitation of current clinical stiffness assessments, which often rely on static passive range of motion and may overlook dynamic control disturbances.

Conclusion

Preoperative six-degree-of-freedom gait kinematic parameters serve as valuable objective indicators of the comprehensive status of patients undergoing TKA. Their correlation with clinical scores provides a theoretical foundation for functional prognosis and supports the development of personalized rehabilitation strategies.

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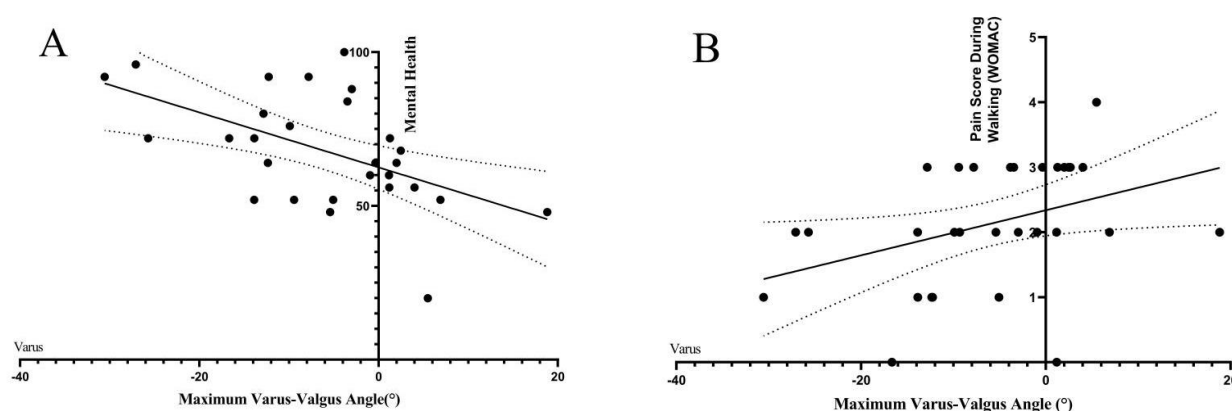


Figure 1.

A: Scatter plot showing the correlation between preoperative maximum varus-valgus angle and SF-36 (Mental Health) score.

B: Scatter plot showing the correlation between preoperative maximum varus-valgus angle and pain score

during level walking.

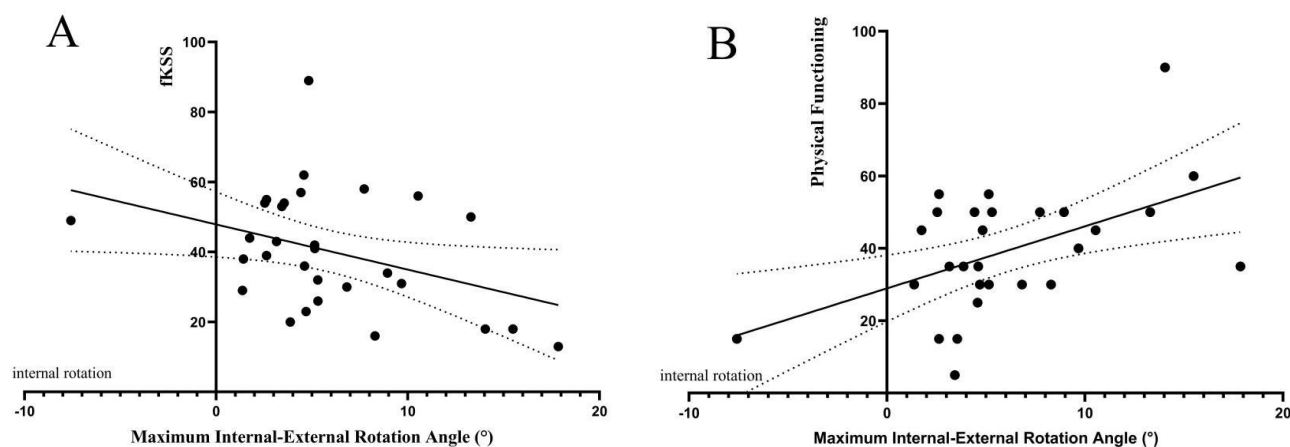


Figure 2.

A: Scatter plot showing the correlation between preoperative maximum internal-external rotation angle and fKSS score. fKSS: function Knee Society Score

B: Scatter plot showing the correlation between preoperative maximum internal-external rotation angle and SF-36 (Physical Functioning) score.

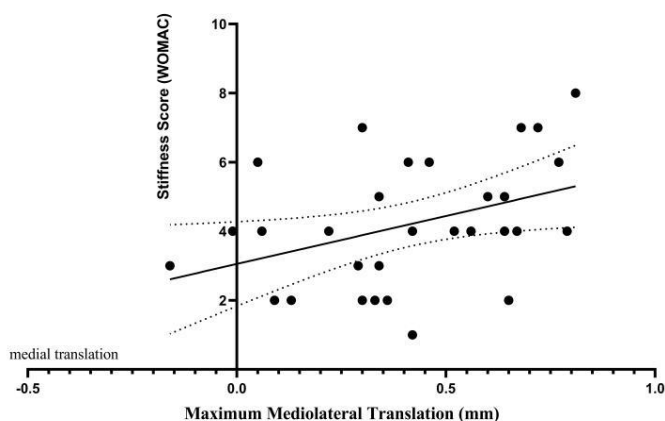


Figure 3. Scatter plot showing the correlation between preoperative maximum mediolateral translation and stiffness score.

Oral Presentation: FPOP2.03

Topic: Arthroplasty

Precision in Medial Pivot Total Knee Arthroplasty: A 10-Year Retrospective Study on Mechanical Axis Alignment and Functional Outcomes with CT-Guided Patient-Specific Instrumentation

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Background

Total Knee Arthroplasty (TKA) is the standard treatment for end-stage osteoarthritis, with optimal outcomes dependent on achieving precise mechanical alignment and proper implant positioning. Patient-specific instrumentation (PSI), facilitated by preoperative CT imaging, has emerged as a technique to enhance surgical precision [1]. However, the relationship between mechanical alignment and functional outcomes in TKA remains uncertain [2]. This study aimed to evaluate the effectiveness of medial pivot CT-guided PSI TKA in achieving mechanical axis alignment and its correlation with functional outcomes over a 10-year period.

Methods

This retrospective study analysed 389 primary medial pivot TKA procedures performed between January 2015 and December 2024 using CT-guided PSI (Figure 1). Functional outcomes were assessed using the Oxford Knee Score (OKS) and Lysholm Knee Score (LKS), both preoperatively and at three, six, and twelve months postoperatively. Mechanical alignment was evaluated through the Hip-Knee-Ankle (HKA) angle, measured preoperatively and postoperatively. Descriptive statistics and paired t-tests were employed to analyse pre- and post-operative data, with a significance level set at $p < 0.05$.

Results

Total of 389 patients were included, 62.7% were female. The mean age of the cohort was 69.6 years, with a mean BMI of 31.4 kg/m². PSI significantly improved mechanical alignment in most patients, with the mean HKA increasing from 172.2° preoperatively to 179.5° postoperatively. Functional outcomes also improved, with the mean OKS increasing from 18.5 preoperatively to 38.6 postoperatively, and the mean LKS improving from 52.4 to 85.5. However, patients classified as outliers, with severe preoperative deformities, demonstrated no significant improvement in mechanical alignment, though they still showed substantial functional recovery (Table 1).

Conclusions

CT-guided PSI significantly improves mechanical alignment and functional outcomes in medial pivot TKA, particularly for patients with mild to moderate deformities. The weak correlation between alignment and functional recovery suggests that other factors, such as soft tissue balance, rehabilitation and prosthesis play a crucial role in postoperative outcomes. Further research with larger cohorts and longer follow-up is needed to explore PSI's full potential, particularly in patients with severe preoperative deformities.

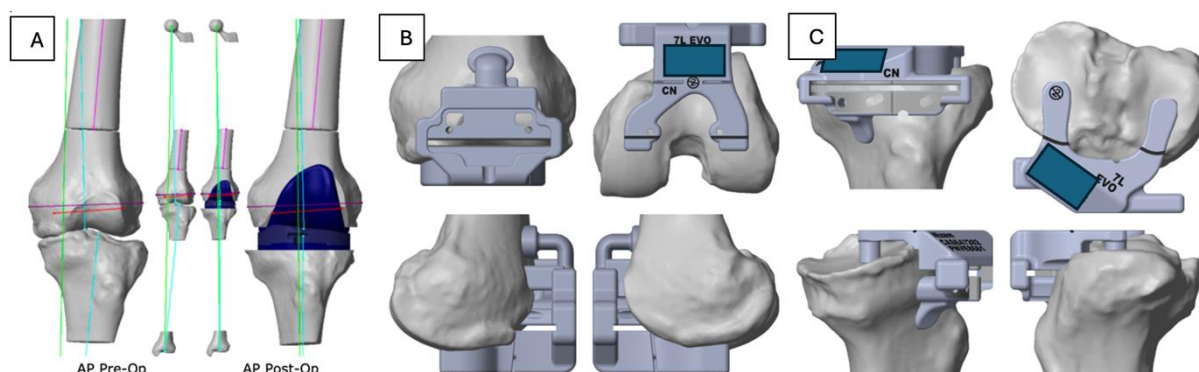


Fig. 1. Preoperative planning using Prophecy Evolution Protocol. (A) Pre and postoperative HKA. (B) Femoral guide placement. (C) Tibial guide placement.

Table 1: Paired t-test Results for OKS, LKS, and HKA Pre- and Post-Operative Comparisons

Outcome	Non-Outliers (n=367)	Outliers (n=22)
OKS	t = -88.57, p < 0.0001	t = -25.68, p < 0.0001
LKS	t = -62.74, p < 0.0001	t = -18.84, p < 0.0001
HKA	t = -54.79, p < 0.0001	t = -1.27, p = 0.215

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Oral Presentation: FPOP2.04

Topic: Arthroplasty

Total Knee Arthroplasty Alters Lower Limb Biomechanics: The Role of Lateral Distal Tibial Angle in Postoperative Outcomes

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Background

This study investigates the impact of coronal plane alignment changes after total knee arthroplasty (TKA) on lower limb biomechanics, focusing on the role of the lateral distal tibial angle (LDTA) in postoperative outcomes.

Methods

We retrospectively analyzed 242 patients (318 knees) who underwent primary TKA from January 2016 to December 2018. Preoperative and postoperative coronal alignment parameters, including hip-knee-ankle angle (HKA), lateral distal femoral angle (LDFA), medial proximal tibial angle (MPTA), LDTA, as well as hip and ankle parameters, were measured using full-length weight-bearing radiographs. Clinical outcomes were assessed via the Visual Analog Scale (VAS) for pain, the Oxford Knee Score (OKS) for function, and the 12-item Short Form Health Survey (SF-12) for quality of life. Correlations between alignment changes and postoperative outcomes were analyzed, with subgroup comparisons based on LDTA ranges.

Results

Postoperative knee alignment changes significantly influenced hip and ankle biomechanics. While TKA improved knee alignment, associated changes in hip adduction and ankle positioning were observed (Table 1). The LDTA, which remained anatomically stable, correlated with ankle alignment and postoperative pain (Fig1 and 2). Patients with lower LDTA values reported higher pain and reduced function, whereas those within or above the physiological range had better recovery. Greater alterations in hip and ankle parameters were linked to increased pain and impairment, indicating that knee alignment adjustments affect proximal and distal joint mechanics.

Conclusions

Evaluating full lower limb alignment in TKA planning is essential. LDTA plays a crucial role in recovery, with deviations contributing to pain and functional limitations. Preoperative LDTA assessment may help identify patients at risk for suboptimal outcomes, guiding surgical strategies. Future research should explore interventions to optimize lower limb biomechanics post-TKA.

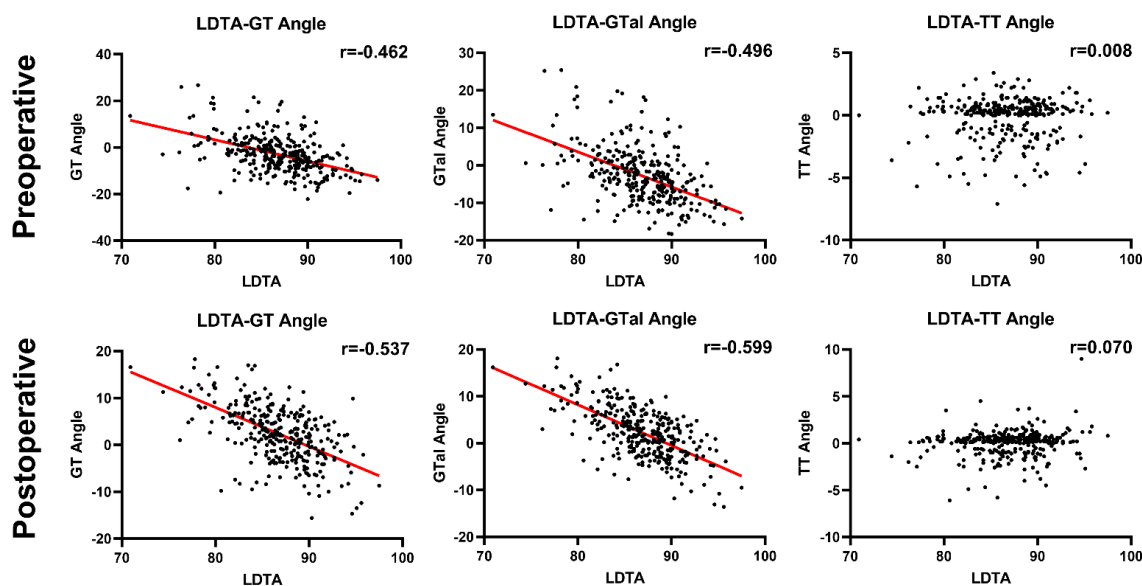


Fig. 1. Correlation Between LDТА and Ankle Alignment Parameters.

(LDТА, Lateral Distal Tibial Angle; TT angle, Talus Tibialis Angle; GT angle, Ground Tibialis Angle; GTAl angle, Ground Talus Angle.)

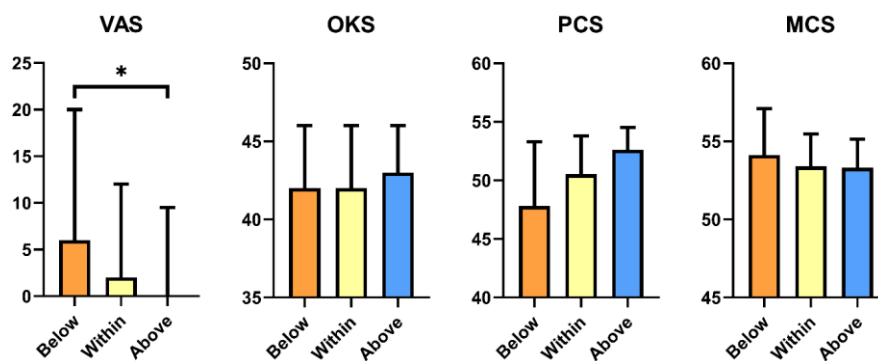


Fig. 2. Comparison of Clinical Outcomes Across Different LDТА Groups. (Below: <86°, Within: 86-92°, Above: >92°); *P<0.05.

Table 1. Correlation Analysis of Coronal Plane Knee Joint Parameters with Hip and Ankle Joint Parameters

Knee Joint Parameters	Hip and Ankle Joint Parameters	r	P Value
HKA	IFD	0.27	<0.001
	FAA	-0.513	<0.001
	TT Angle	-0.046	0.409
	GT Angle	-0.504	<0.001
	GTal Angle	-0.528	<0.001
JLCA	IFD	0.189	0.001
	FAA	-0.397	<0.001
	TT Angle	-0.029	0.601
	GT Angle	-0.418	<0.001
	GTal Angle	-0.447	<0.001
LDFA	IFD	0.117	<0.037
	FAA	-0.209	<0.001
	TT Angle	-0.083	0.138
	GT Angle	-0.314	<0.001
	GTal Angle	-0.299	<0.001
MPTA	IFD	-0.174	0.002
	FAA	0.328	<0.001
	TT Angle	-0.006	0.916
	GT Angle	0.199	<0.001
	GTal Angle	0.217	<0.001

HKA, Hip-knee-ankle angle; JLCA, Joint Line Convergence Angle; LDFA, Lateral Distal Femoral Angle; MPTA, Medial Proximal Tibial Angle; IFD, Ischiofemoral Distance; FAA, Femoral Adduction Angle; LDFA, Lateral Distal Tibial Angle; TT angle, Talus Tibialis Angle; GT angle, Ground Tibialis Angle; GTal angle, Ground Talus Angle.

Oral Presentation: FPOP2.05

Topic: Arthroplasty

Can Non-Operated Leg Length Predict the Recovery Outcomes After Total Knee Arthroplasty?

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Background

Prior research has highlighted the significance of the non-operated leg in predicting functional outcomes following total knee arthroplasty (TKA) [1-7]. While it is established that limb lengthening occurs in the operated leg during TKA procedures, the impact on the non-operated leg remains unclear. Specifically, the question of whether the non-operated leg undergoes lengthening and the implications of this phenomenon on the likelihood of requiring a second-stage surgery are yet to be addressed. Understanding the potential lengthening effects on the non-operated leg is essential for optimizing surgical outcomes and informing decision-making regarding subsequent interventions. This retrospective study aims to analyze the limb length of the non-operated leg and its impact on recovery outcomes, as well as the likelihood of requiring a second-stage surgery following total knee arthroplasty.

Methods

Patients who underwent total knee arthroplasty as the first stage between June 2020 and December 2021 were recruited. Patients demographic (age, gender and BMI) was collected. Whole-body radiographs were taken before and six months after the surgery. Measurements of femur, tibia, anatomical and functional length were conducted. The differences between the operated and non-operated legs were calculated. The Knee Society Knee Score (KSKS) and Knee Society Functional Assessment (KSFA) were assessed at 1 year and 3 years post-surgery. Patients who proceeded to the second stage were also documented. The Wilcoxon Signed-Rank Test was utilized to compare the length of the operated and non-operated legs, as well as the preoperative and postoperative length. Spearman's rank-order correlation was first employed to examine the relationship between limb length parameters and recovery outcomes and then variables with less than or equal to 0.15 p-value were included in multivariable linear regression analysis.

Results

A total of 40 patients (34 female and 6 male) were included in the study. Significant differences were observed in the lengths of the femur, tibia, functional length, and anatomical length between the operated and non-operated legs both before and after surgery (all $p > 0.05$) (Table 1). All parameters were longer on the non-operated sides pre- and post-operatively, except for the functional length post-operatively. The tibia and anatomical length showed significant decreases, while the functional length significantly increased after surgery (all $p > 0.05$) (Table 2). A smaller difference in femur length between the operated and non-operated legs preoperatively ($t = -2.694$, $p = 0.011$), being female ($t = 3.398$, $p = 0.002$), and younger age ($t = -2.291$, $p = 0.029$) were

associated with a better KSFA score at 3 years post-surgery ($F(9,30) = 3.67$, $p = 0.003$, $R^2 = 0.524$) (Table 3). No significant multivariable regression model was found for KSFA at 1 and 3 years, and KSFA at 1 year after surgery, leading to the initiation of the second stage of surgery.

Conclusions

Notably, differences in femur length between the operated and non-operated legs prior to surgery, in conjunction with age and gender, were predictive of functional outcomes three years post-surgery. This suggests that clinicians should take into account femur length discrepancies when predicting post-surgical outcomes.

Table 1. Leg Length Measurements of Patients

Length (mm)	Preoperative			Post-operative		
	Operated side	Non-Operated side	Differences*	Operated side	Non-Operated side	Differences*
Femur	375.7±18	377.5±17.2	-1.8±4.9	374±18.6	375.7±21.8	-1.6±15.7
Tibia	315.5±14.5	318.7±15.9	-3.3±4.8	310.5±14.8	326.9±60.1	-16.4±56.7
Functional	688.8±32.8	694.9±33.4	-6.1±7.3	698.2±31.6	686.2±66.6	12.1±60
Anatomical	691.1±31	696.2±31.9	-5.1±6.1	684.5±32	702.6±66	-18.1±57.9

*Differences = Operated leg - non-operated leg

Table 2. Differences of Leg Length Measurements of Patients

Length (mm)	Differences between operated side and non-operated side		Differences between preoperative and post-operative	
	At preoperative	At post-operative	At operated side	At non-operated side
Femur	0.024*	0.004*	0.061	0.486
Tibia	<0.001*	<0.001*	<0.001*	0.36
Functional	<0.001*	0.036*	<0.001*	0.844
Anatomical	<0.001*	<0.001*	<0.001*	0.392

*Denotes statistical significance $p < 0.05$

Table 3. Multivariable linear regression analysis of KSFA at 3 years after surgery

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	-105.913	71.232		-1.487	0.147	-251.388	39.562
Pre Functional length of Oper	0.105	0.618	0.188	0.17	0.867	-1.158	1.367
Pre Anatomical length of Oper	1.108	0.826	1.878	1.342	0.19	-0.578	2.794
Pre Femur length of NonO	-1.412	0.897	-1.329	-1.574	0.126	-3.243	0.42

Pre Tibia length of NonO	-0.355	0.785	-0.309	-0.452	0.654	-1.958	1.248
Pre Functional length of NonO	0.013	0.548	0.024	0.024	0.981	-1.107	1.133
Pre Difference in Femur length between Oper and NonO	-1.804	0.67	-0.48	-2.694	0.011*	-3.172	-0.436
Sex	24.12	7.098	0.477	3.398	0.002*	9.624	38.615
Age	-1.005	0.439	-0.317	-2.291	0.029*	-1.901	-0.109
Pre KSFA	0.02	0.243	0.013	0.083	0.934	-0.476	0.516

Pre= preoperative, Oper= operated leg, NonO= non-operated leg, KSFA= Knee Society Functional Assessment

*Denotes statistical significance $p < 0.05$

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Oral Presentation: FPOP2.06

Topic: Arthroplasty

Comparing Bicompartamental Knee Arthroplasty and Bicuruciate Retaining Total Knee Arthroplasty with Midterm Clinical Outcomes

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Background

To compare the clinical outcomes of bicompartamental knee arthroplasty (BKA) combined with patellofemoral arthroplasty and medial unicompartmental knee arthroplasty with bicruciate-retaining total knee arthroplasty (BCR-TKA) at a mean postoperative period of five years.

Methods

This study included patients who underwent either primary BKA combined with PFA and medial UKA (Fig.1) or primary BCR-TKA (Fig.2). BKA procedures were performed between July 2015 and April 2017, while BKA or BCR-TKA procedures were conducted from April 2017 to October 2020. A retrospective comparative study was conducted, including 16 knees in the BKA group and 39 knees in the BCR-TKA group. The inclusion criteria for BKA were unicompartmental disease (medial) associated with patellofemoral osteoarthritis presenting with evident clinical symptoms, no symptoms or signs in the lateral compartment, and intact and functional ACL and PCL. The inclusion criteria for BCR-TKA were intact and functional ACL and PCL, Kellgren-Lawrence classification Grade 3 or 4, degeneration affecting all three compartments, and patients indicated for BKA who wished to have varus deformity corrected. Retention of both cruciate ligaments in both BKA and BCR-TKA was confirmed by MRI and visualized intraoperatively. The exclusion criteria for both groups were rheumatoid arthritis, previous surgery, flexion contracture >15°, and valgus deformity. Demographic data and clinical outcomes, such as the 2011 Knee Society Score (2011 KSS), Forgotten Joint Score-12 (FJS-12), and knee range of motion (knee ROM), were collected and compared between the two groups.

Results

The mean follow-up period was six years for the BKA group and five years for the BCR-TKA group. No significant differences were observed between the two groups in terms of age, BMI, or follow-up period. Preoperative evaluations, including the 2011 KSS (except for patient expectations) and knee ROM, showed no significant differences between the groups. At the final follow-up, no statistically significant differences were observed in the 2011 KSS or FJS-12. However, knee ROM was significantly greater in the BKA group ($141.9^\circ \pm 6.0^\circ$ vs. $130.0^\circ \pm 10.7^\circ$ for BCR-TKA, $p < 0.05$). No revisions were required in the BKA group, while one knee (2.6%) in the BCR-TKA group underwent revision surgery due to persistent pain.

Conclusions

BKA demonstrated comparable patient-reported outcome measures to BCR-TKA and provided significantly greater knee ROM. BKA may be a viable treatment option for knees with degeneration and symptoms limited to the medial compartment and the patellofemoral joint.

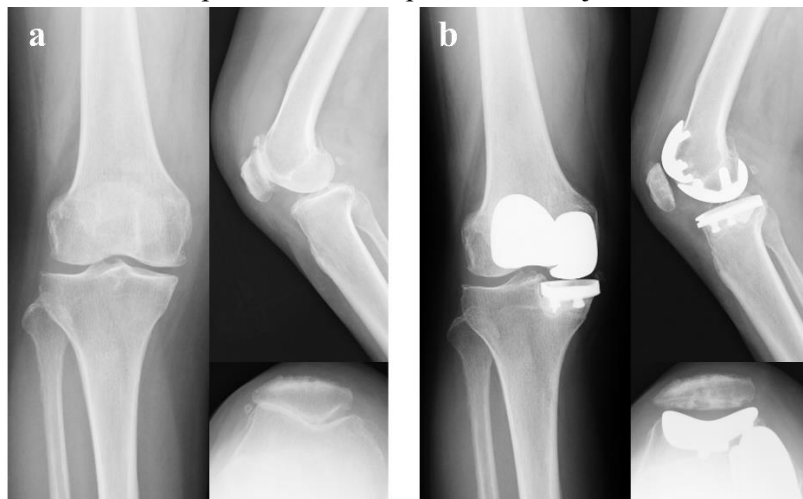


Fig. 1. Preoperative (a) and postoperative (b) radiographs of a bicompartmental knee arthroplasty (BKA).

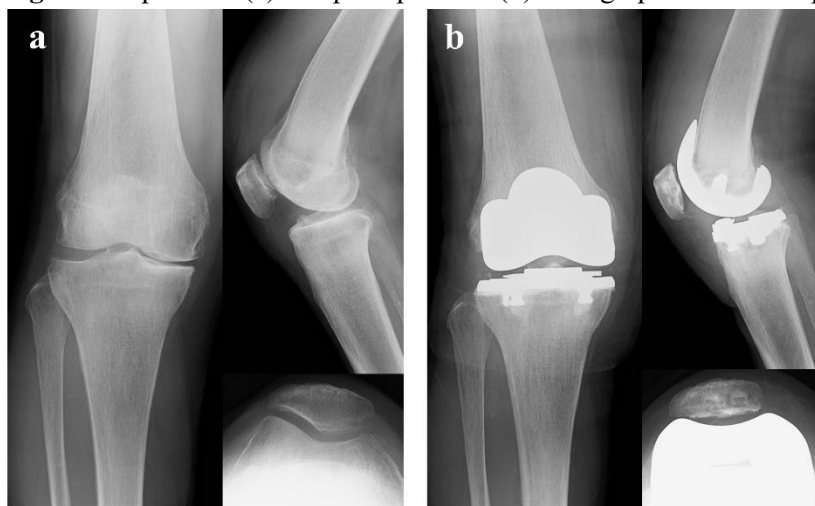


Fig. 2. Preoperative (a) and postoperative (b) radiographs of a bicruciate retaining total knee arthroplasty (BCR-TKA).

Oral Presentation: FPOP2.07

Topic: Arthroplasty

Efficacy of Adding Dexmedetomidine for IPACK Block in Out-Patient TKA: A Randomized Controlled Trial

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Objectives

To observe the clinical effect of IPACK block with the addition of dexmedetomidine in outpatient total knee arthroplasty.

Methods

The present study included a total of 80 patients who underwent outpatient unilateral total knee arthroplasty in our hospital from September 2024 to March 2025. They were randomly divided into two groups: conventional IPACK group and dexmedetomidine group, with 40 cases in each group. All patients were placed in the supine position 15 minutes before general anesthesia induction. Ultrasound-guided adductor duct block was routinely performed, and 25ml of 0.25% ropivacaine was injected into the adductor canal. The affected limb was then suspended and the superior popliteal fossa approach was taken for ultrasound-guided IPACK block. The conventional group was given only 0.25% ropivacaine for a total of 12ml; The group with the addition of dexmedetomidine was given 0.5 µg/Kg dexmedetomidine + 0.25% ropivacaine for a total of 12 ml. Intraoperative maintenance of general anesthesia continued. At 6, 12 and 24 hours after surgery, VAS scores in resting state, exercise state, usage of analgesic medication, number of wake-ups due to pain at night, and adverse reactions were observed.

Results

At 12 h and 24 h after surgery, the VAS scores of the patients in the dexmedetomidine group at rest and during exercise were significantly lower than those in the conventional IPACK group. There was a statistically significant difference ($P=0.042$ and $P<0.01$); there was no statistically significant difference between the two groups in the use of analgesic drugs ($P=0.762$), the number of night wake-ups due to pain in the dexmedetomidine group was significantly lower than that in the conventional IPACK group ($P=0.007$), and there was no significant difference in adverse reactions between the two groups ($P=0.712$).

Conclusions

The addition of dexmedetomidine for IPACK combined with adductor canal block can effectively reduce the pain score after total knee arthroplasty, reduce the number of wake-ups at night, alleviate the pain after total knee arthroplasty, and benefit the development of outpatient total knee arthroplasty.

Keywords

Dexmedetomidine; IPACK; day surgery; Total knee replacement; pain

Oral Presentation: FPOP3.01

Topic: Sports

Effect of Trochlear Morphology Over Clinical Outcomes After Medial Patellofemoral Ligament Reconstruction in Patients with Recurrent Patellar Dislocation

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Background

Medial patellofemoral ligament reconstruction (MPFLR) is the most common procedure for recurrent lateral patellar dislocation (RLPD). While low-grade trochlear dysplasia (TD) can be managed conservatively, trochleoplasty is recommended for high-grade TD as ignoring high-grade may result in sub-optimal clinical outcomes. However, the literature remains divided over clear indications and benefits of trochleoplasty while morbidity of trochleoplasty cannot be ignored. Therefore, our study assessed the clinical outcome of patients with all types of TD who underwent MPFLR without any trochleoplasty.

Methods

The study included 58 patients who underwent MPFLR. Trochlear dysplasia was classified into low- and high-grade as follows; Dejour Type A as low-grade, while B, C, and D as high-grade. Pre- and post-operative clinical outcomes were assessed using Patient reported outcome measures (PROMs) such as Kujala, Lysholm, and International Knee Documentation Committee (IKDC) scores, with a minimum follow-up of two years. PROMs were also compared with the patient acceptable symptom state (PASS) to assess whether all patients improved above the PASS cutoff or not.

Results

The mean age ($\pm$ SD) at the time of surgery was 26.76 ($\pm$ 10.73) months, and 67.2 % of patients were female. At the mean final follow-up of 77 months, all PROMs significantly improved in all patients; Kujala, from 62.36 to 90.95; Lysholm, from 62.84 to 91.4; and IKDC, from 57.83 to 87.78 ($p < 0.001$). Considering age and gender, young patients and male gender had higher post-operative scores. The low-grade TD group had higher pre- and post-operative clinical scores than high-grade TD ($p < 0.05$). Except for the Kujala score in TD type C and D, all three scores in all other patients surpassed cutoff PASS score. There was no difference in clinical outcome of patients with or without patella alta. There were no recurrences of patella dislocation in any of the patients.

Conclusions

Although isolated MPFL reconstruction is an effective procedure in patients with RLDP with any grade of TD to prevent recurrence, the Kujala scores are inferior in severe grades of TD and fail to surpass PASS cutoff.

Oral Presentation: FPOP3.02

Topic: Arthroplasty

Biomechanical and Finite-Element Analysis of Cement-Screw Technique for Tibial Bone Defect in Total Knee Arthroplasty

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Background

The cement-screw technique stands out as an effective method for addressing tibial bone defects in total knee arthroplasty (TKA). However, the absence of consensus regarding the optimal angle for screw implantation poses a challenge. This study aims to investigate the most suitable screw implantation angle for repairing tibial bone defects in TKA, with a focus on biomechanical considerations.

Methods

The angle of screw implantation is categorized into four groups: 0°, 15°, 30°, and 45° relative to the tibial mechanical axis. Finite-element analysis (FEA) is employed to assess stress distribution and displacement in each group model. Static compression mechanical tests are conducted to evaluate the displacement generated by each group model. Additionally, high-cycle fatigue compression tests are performed to assess the displacement and structural stiffness of each group model.

Results

FEA results indicate that at a screw implantation angle of 15°, the maximum stress on the screw, cement in the defect, prosthesis, and cement under prosthesis is minimized, with the least displacement of the screw. Biomechanical test results demonstrate that a 15° screw implantation angle leads to minimum displacement and maximal structural stiffness in the model.

Conclusions

The screw implantation angle of 15° provides biomechanical advantage in the cement-screw technique context for TKA tibial bone defects.

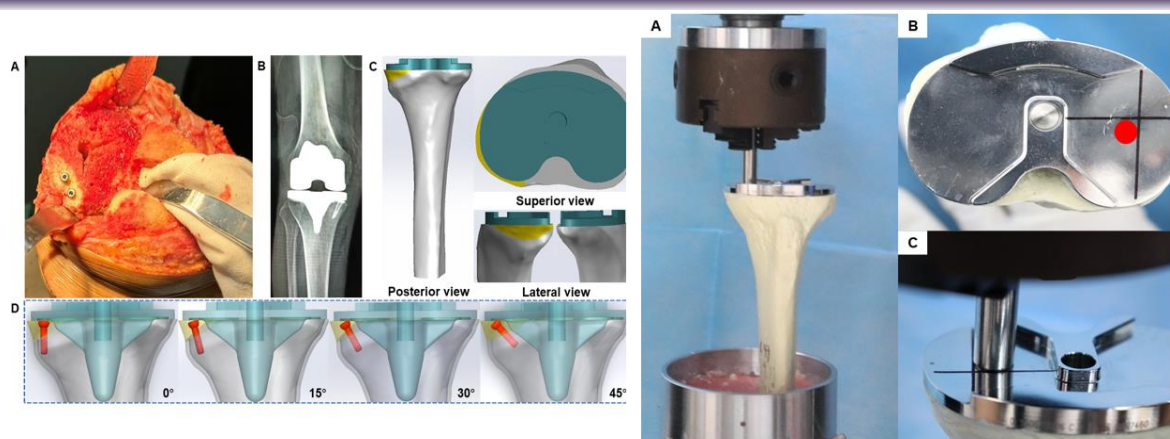


Figure 1: Clinical scenarios and FE models of cement-screw technique.

Figure 2: Schematic diagram of biomechanical tests.

Oral Presentation: FPOP3.03

Topic: Arthroplasty

Nanozyme-Engineered Polyethylene for Postponing Wear Particles Induced Osteolysis

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Background

Arthroplasty is a successful operation for treating end-staged joint disorder, while improving the longevity of prostheses remains a challenge. As the most common long-term failure cause of arthroplasty, the pathological mechanisms of aseptic loosening related to the wear debris-induced periprosthetic osteolysis (WPO) is still unclear. As the leading cause of long-term failure, the pathological mechanisms underlying aseptic loosening, particularly wear debris-induced periprosthetic osteolysis (WPO), remain unclear despite continuous advancements in mechanical improvements.

Nanozyme is a series of nanoparticles with sustained biological activity. To address WPO, we propose an innovative "proactive preventive" strategy by using nanozymes to modify ultra-high molecular weight polyethylene (UHMWPE). This approach aims to simultaneously reduce the generation of wear particles and minimize their immunostimulatory effects. The key innovation lies in the dual functionality of nanozyme-modified UHMWPE: it enhances wear resistance without compromising tribological properties, while also serving as a drug delivery system for localized anti-inflammatory agent release.

Methods

We synthesized a model system by incorporating ceria nanozymes into UHMWPE through a surface modification process. The material characterization was performed using XRD, FT-IR, and tensile testing to evaluate changes in crystallinity, chemical structure, and mechanical properties. To assess the anti-osteolysis effect of CZPE, we established a distal femoral implant model in ICR mice using a standardized surgical technique. Radiological evaluation via microCT and histopathological analysis were conducted at predetermined time points to monitor bone remodeling and osteolysis progression. To explore the underlying mechanisms, RNA-sequencing was employed to identify differentially expressed genes related to inflammation and bone metabolism. These findings were further validated using *in vivo* studies with our animal model. Finally, inhibition and overexpression of plasma cells were performed in the animal models.

Results

Our findings demonstrate that CZPE significantly reduces WPO. As illustrated in **Figure 1**, mechanical assessments reveal a statistically significant 32% reduction in wear particle production compared to unmodified ultra-high molecular weight polyethylene ($p < 0.05$). Furthermore, as shown in **Figures 2 and 3**, CZPE exhibits superior anti-osteolysis properties in vivo, with minimal trabecular bone loss and reduced inflammatory infiltrates compared to conventional PE. RNA sequencing analysis identifies macrophage-mediated inflammation and diminished intramedullary plasma cell infiltration as key contributors to the pathological process of WPO. Interestingly, treatment with bortezomib significantly enhances the therapeutic effect by inhibiting plasma cell activity. While supplementation with U266B1 cells was found to counteract these benefits, highlighting the contribution of humoral immune modulation in this context.

Conclusions

These results underscore the potential of CZPE as a promising material for prosthetic applications, offering enhanced durability through reduced wear particle production and improved management of inflammatory responses. Our study provides valuable insights into the development of advanced biomaterials for orthopedic implants, with implications for improving patient outcomes.

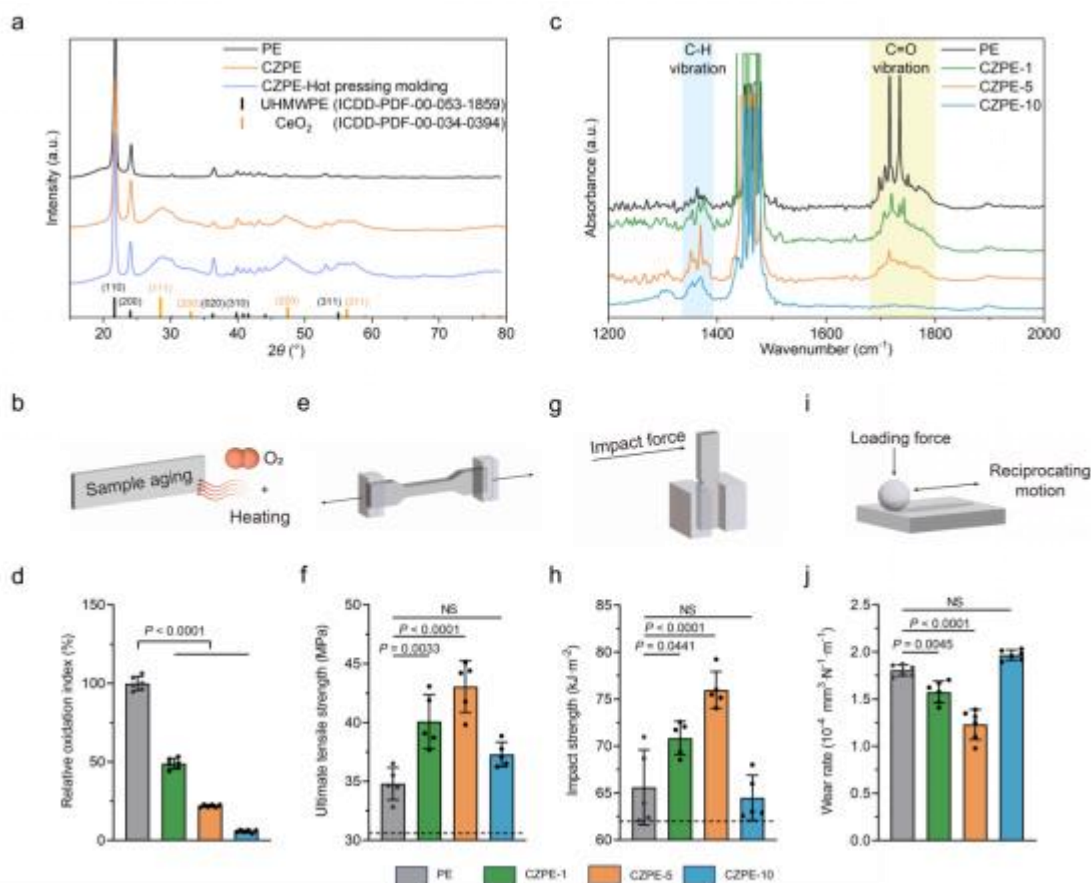


Fig. 1: Characterizations of CZPE bulk samples. **a**, XRD patterns of UHMWPE and CZPE before and after hot pressing. **b**, Scheme of oxidative aging treatment. **c**, FT-IR spectra of CZPE-1, CZPE-5, CZPE-10, and PE bulk samples after four months of aging treatment. **d**, Relative oxidation indices of CZPE-1, CZPE-5, CZPE-10, and PE bulk samples after four months of aging ($n = 6$). **e**, Scheme of tensile testing. **f**, Ultimate tensile strength of CZPE-1, CZPE-5, CZPE-10, and PE bulk samples ($n = 5$). Dotted line indicates the minimum value of clinically used UHMWPE²⁸. **g**, Scheme of notched Izod impact testing. **h**, Impact strengths of CZPE-1, CZPE-5, CZPE-10, and PE bulk samples ($n = 5$). Dotted line indicates the minimum value of clinically used

UHMWPE²⁸. **i**, Scheme of friction testing. **j**, Wear rates of CZPE-1, CZPE-5, CZPE-10, and PE bulk samples ($n = 6$). Data in **d**, **f**, **h**, and **j** are presented as mean $\pm$ standard deviation (s. d.). P values were analysed by one-way analysis of variance (ANOVA) with Tukey's multiple comparisons test. NS, not significant, $P \geq 0.05$.

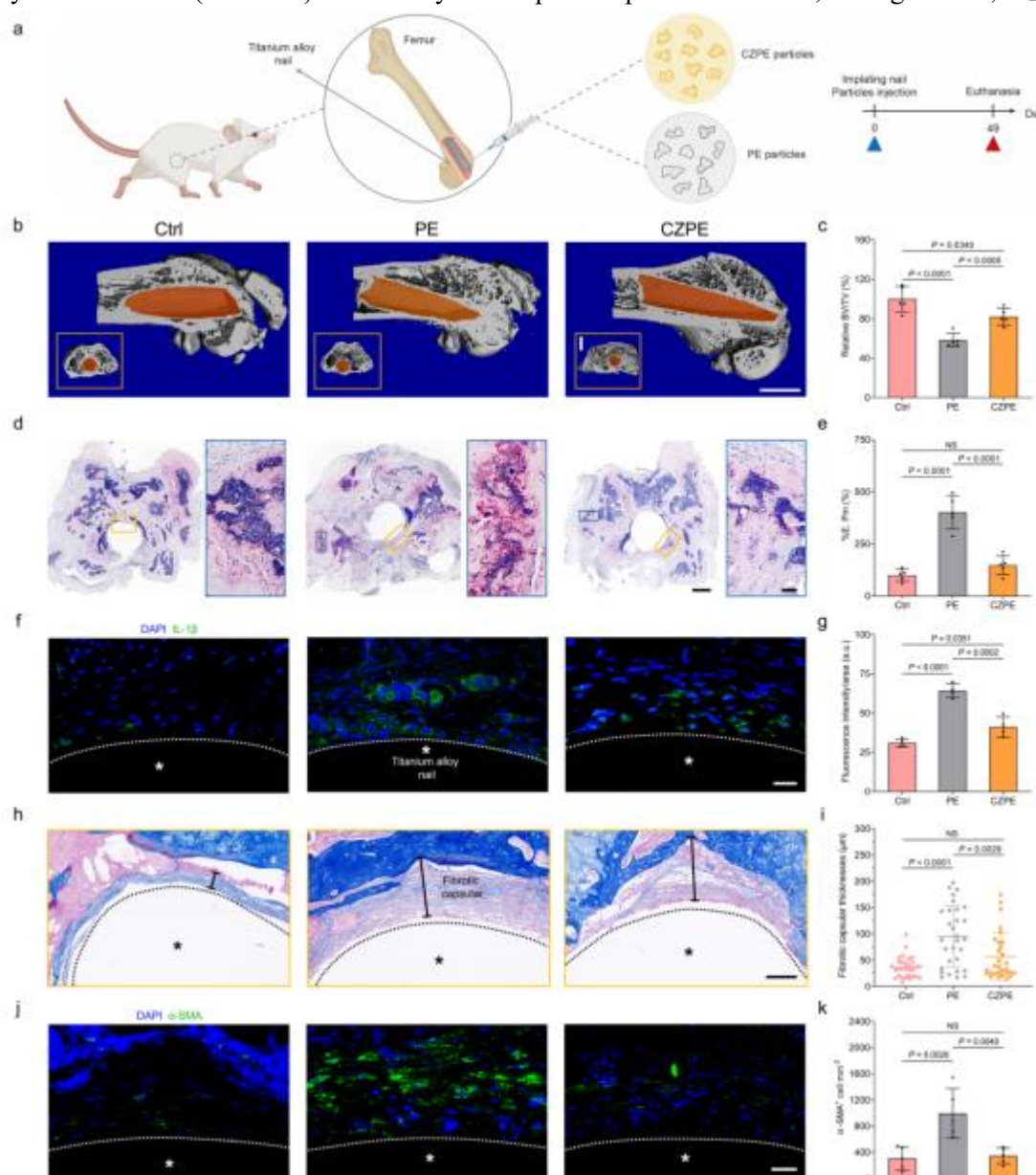


Figure 2: Reduced WPO-inducing potential of CZPE particles. **a**, Schematic illustration and timeline of the distal femoral implant model. **b**, Representative micro-CT images of the femoral transverse section at day 49 post-injection. Main images: femoral cross-section parallel to the direction of nail insertion. Insets: femoral cross-section perpendicular to the direction of nail insertion. Scale bar, 1 mm. **c**, Quantifications of relative BV/TV corresponding to data in **b** ($n = 5$). **d**, Representative histological images of TRAP-stained bone sections at day 49 post-surgery. Left: $3\times$ magnification, scale bar, 500 μm ; Right: $48\times$ magnification, scale bar, 50 μm . **e**, Quantifications of %Er. Pm corresponding to data in **d** ($n = 5$). **f**, Representative immunofluorescence staining of femoral sections from experimental mice at day 49 post-surgery. Green indicates IL-1 β ; blue indicates DAPI nuclear stain. Scale bar, 200 μm . **g**, Intensity quantification of IL-1 β immunofluorescence staining corresponding to data in **f** ($n = 4$). **h**, Representative histochemical images of femoral sections stained with Masson's trichrome for collagen at day 49 post-surgery, showcasing areas with the most severe foreign body

reactions across all groups. The areas of fibrotic capsules were marked with black line segments. Scale bar, 100 μ m. **i**, Fiber capsule thickness determined by measuring collagen thickness surrounding the titanium alloy nails using Masson's trichrome staining ($n = 5$). **j**, Representative immunofluorescence images for DAPI and α -SMA co-staining. Green indicates α -SMA; blue indicates DAPI nuclear stain. Scale bar, 20 μ m. **k**, The quantification of α -SMA⁺ cells per unit area. Data in **c**, **e**, **g**, **i**, and **k** are presented as mean $\pm$ s.d. P values for **c**, **e**, **g**, **i** and **k** were analyzed by one-way ANOVA with Tukey's multiple comparisons test. NS, not significant, $P \geq 0.05$. Asterisk denotes titanium alloy bone nail.

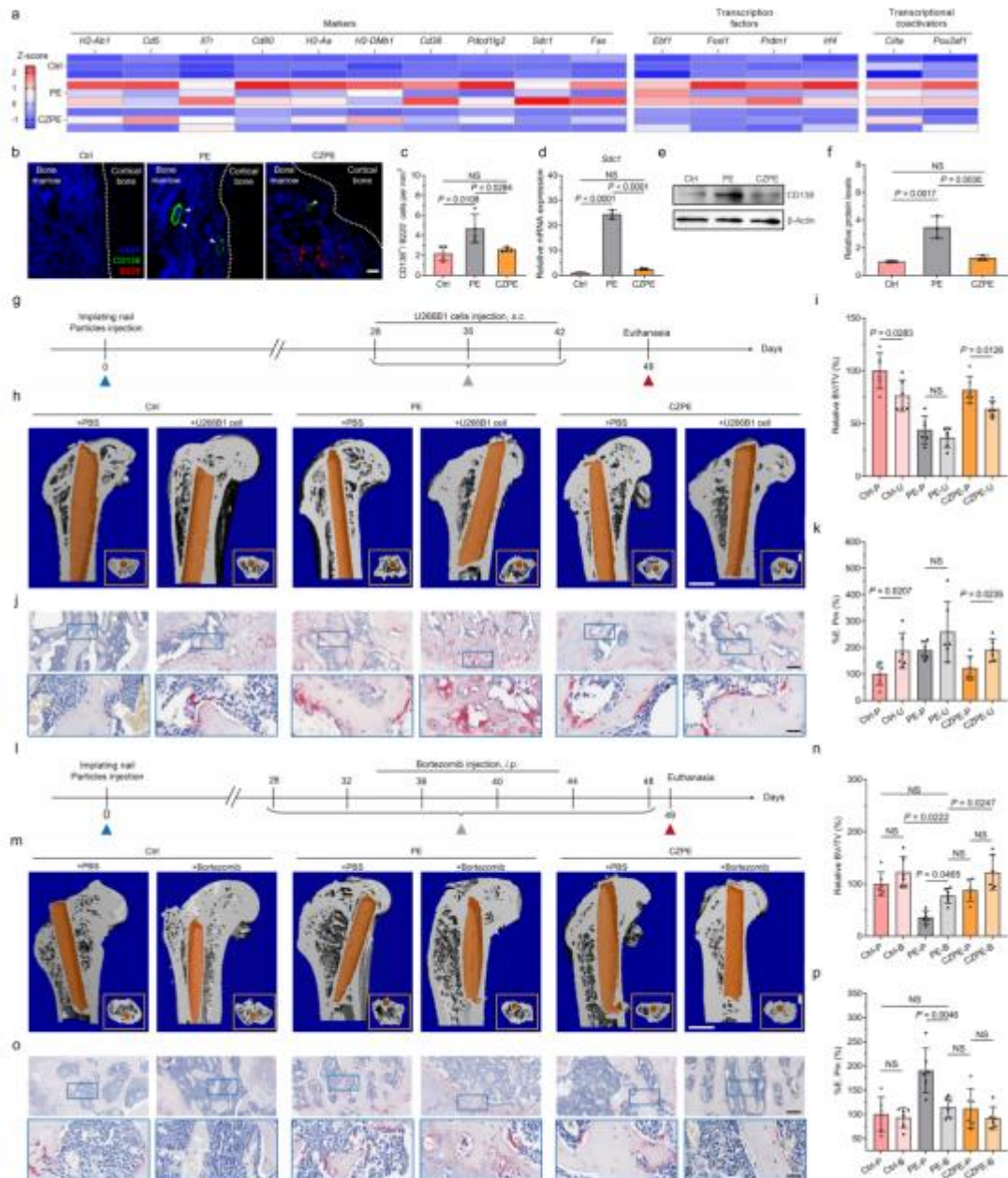


Figure 3: Preventive Effect of CZPE on WPO associated with plasma cell-mediated pathway. **a**, Heat map of differentially expressed mRNAs ($q < 0.05$, $|\log_2^{\text{foldchange}}| > 1$) encoding proteins associated with marker proteins, transcription factors and transcriptional coactivators involved in plasma cell development. **b**, Representative immunofluorescence staining of femoral sections at day 49 post-surgery. Green indicates CD138; red indicates B220; blue indicates DAPI nuclear stain. Scale bar, 30 μ m. **c**, Quantification of CD138⁺/B220⁻ cell density corresponding to data in **b**. **d**, Relative expression of *Sdc1* mRNA in femur tissue

samples. **e**, Western blot analysis of expression levels of CD138 in femur tissue samples. β -Actin was used as a loading control. **f**, Relative protein levels determined by density analysis in **e**. **g**, Schedule of the distal femoral implant models injected with U266B1 cells. **h**, Representative micro-CT images of the femoral transverse section from U266B1 cells injected mice. Main images: femoral cross-section parallel to the direction of nail insertion. Insets: femoral cross-section perpendicular to the direction of nail insertion. Scale bar, 1 mm. **i**, Quantifications of relative BV/TV corresponding to data in **e** ($n = 6$). **j**, Representative histological images of TRAP-stained bone sections from U266B1 cells injected mice. Top: 16 $\times$ magnification, scale bar, 100 μ m; Bottom: 64 $\times$ magnification, scale bar, 25 μ m. **k**, Quantifications of %Er. Pm corresponding to data in **j** ($n = 6$). **l**, Schedule for bortezomib administration in distal femoral implant models. **m**, Representative micro-CT images of the femoral transverse section from bortezomib-treated mice. Main images: femoral cross-section parallel to the direction of nail insertion. Insets: femoral cross-section perpendicular to the direction of nail insertion. Scale bar, 1 mm. **n**, Quantifications of relative BV/TV corresponding to data in **m** ($n = 6$). **o**, Representative histological images of TRAP-stained bone sections from bortezomib-treated mice. Top: 16 $\times$ magnification, scale bar, 100 μ m; Bottom: 64 $\times$ magnification, scale bar, 25 μ m. **p**, Quantifications of %Er. Pm corresponding to data in **l** ($n = 6$). In **i**, **k**, **n**, **p**, “P” stands for PBS, “B” for Bortezomib, and “U” for U266B1 cells. Data in **c**, **d**, **f**, **i**, **k**, **n**, **p** are presented as mean $\pm$ s.d. *P* values for **c**, **d**, and **f** were analyzed by one-way ANOVA with Tukey’s multiple comparisons test. *P* values for **i**, **k** were analyzed by an unpaired t-test. *P* values for **n**, **p** were analyzed by two-way ANOVA with Tukey’s multiple comparisons test. NS, not significant, $P \geq 0.05$.

Oral Presentation: FPOP3.04

Topic: Sports

Concurrent Arthroscopic Meniscus Centralization During Open-Wedge High Tibial Osteotomy Fails to Enhance Clinical Outcomes in Medial Meniscus Posterior Root Tear

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Background

To investigate whether concurrent arthroscopic meniscus centralization during open-wedge high tibial osteotomy (OWHTO) leads to superior clinical and radiologic outcomes compared with OWHTO alone in patients with medial meniscus posterior root tears (MMPRTs) [1-3].

Methods

A total of 82 patients diagnosed with MMPRTs who underwent OWHTO were prospectively enrolled and randomized into two groups: OWHTO alone (Group A, n = 44) or OWHTO combined with arthroscopic meniscus centralization (Group B, n = 38). Clinical outcomes, radiographic variables, and second-look arthroscopic findings were compared between the groups.

Results

At a mean follow-up of 32.9 months, no significant differences were found between the two groups in terms of final Lysholm ($P = 0.102$, Fig 1a) or Hospital for Special Surgery (HSS) scores ($P = 0.547$, Fig 1b). The increase in knee flexion (Δ flexion) was significantly greater in Group A than in Group B ($P = 0.036$, Fig 2a). However, Group B exhibited significantly higher postoperative knee flexion loss than Group A (36.8% vs 13.6%; $P < 0.001$, Fig 2b). This loss was more pronounced in Group B patients with preoperative flexion $>130^\circ$, with the incidence of 66.7%. Group B demonstrated significantly decreased MME at final follow-up compared to Group A (0.8 mm vs. 4.2 mm, $P < .001$, Fig 3) but no differences in other radiologic variables. Second-look arthroscopy revealed a significantly higher meniscal healing rate in Group B (28.9% vs. 13.6%, $P < .001$, Fig 3). Nevertheless, no significant differences in postoperative Lysholm or HSS scores were observed between healed and non-healed patients.

Conclusions

Although concurrent arthroscopic meniscus centralization during OWHTO improved meniscal healing and reduced MME, it paradoxically compromised terminal flexion kinematics in preoperative hyperflexion patients and failed to demonstrate clinical superiority over OWHTO alone. These findings highlight mechanical alignment correction as the primary determinant of functional improvement in MMPRT management, superseding the therapeutic priority of meniscal repositioning strategies.

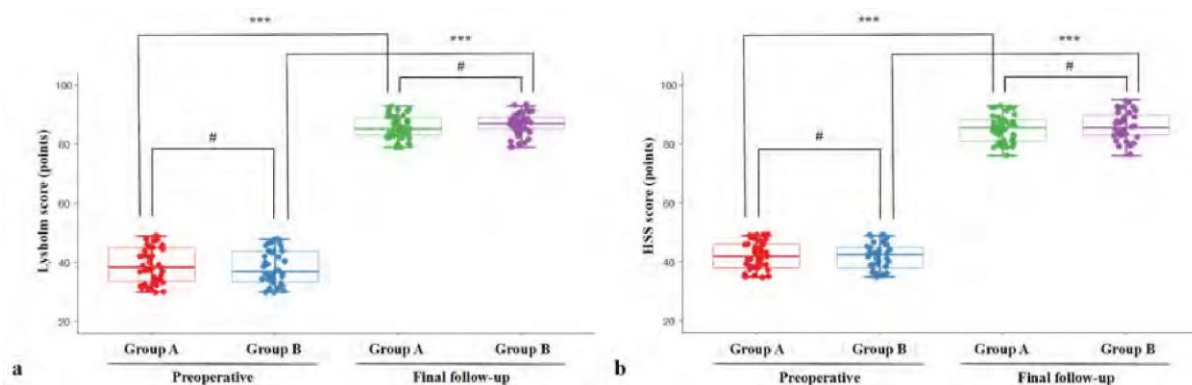


Fig 1. Lysholm scores (a) and Hospital for Special Surgery (HSS) scores (b) measured preoperatively and at the final follow-up in Group A and B. # $P > 0.05$; *** $P < .001$

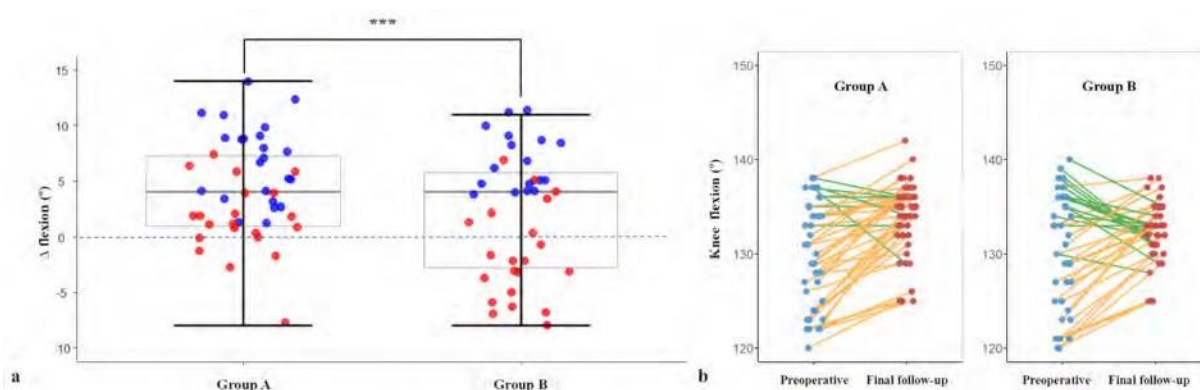


Fig 2. Comparative analysis of knee flexion changes (Δ flexion) between Group A and Group B. (a) Scatter box plot demonstrates significant intergroup differences in Δ flexion ($P = 0.036$). Red dots: preoperative flexion $>130^\circ$; blue dots: preoperative flexion $\leq 130^\circ$. (b) Paired trajectory plots visualize individual knee flexion changes. Green lines: postoperative flexion loss ($>0^\circ$); yellow lines: postoperative flexion improvement. Δ flexion was calculated as: (final follow-up flexion) - (preoperative flexion). * $P < 0.05$.

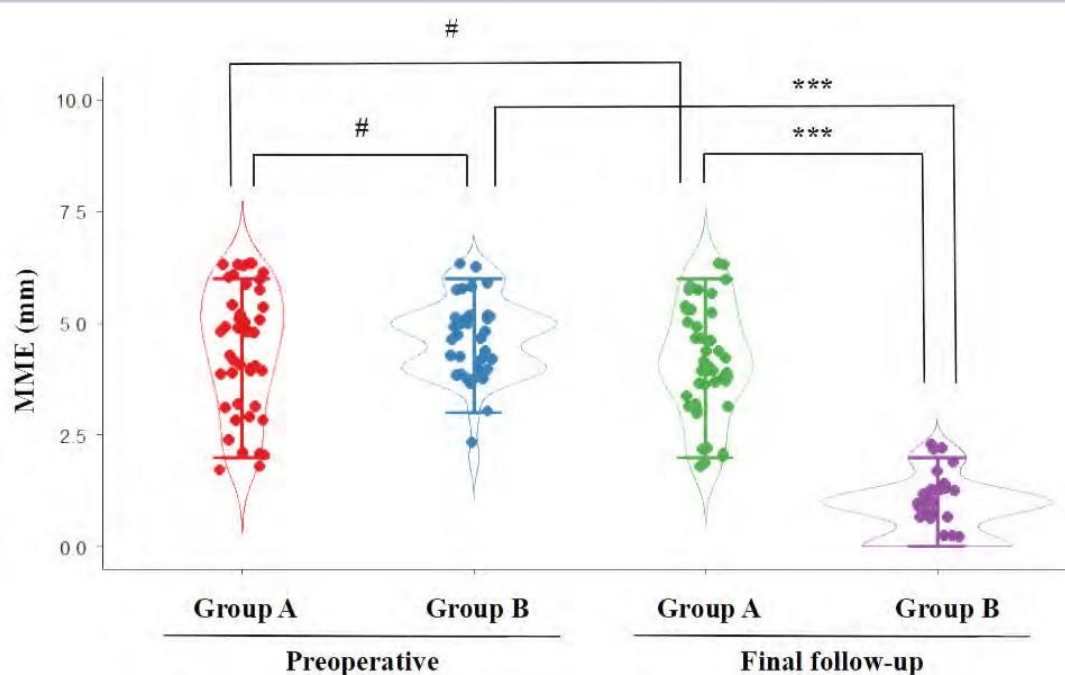


Fig 3. Violin plots showing medial meniscus extrusion measured preoperatively and at the final followup in Group A and B. # P > 0.05; *** P < .001

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Oral Presentation: FPOP3.05

Topic: Trauma

Bioactive Polydopamine/EGCG Cross-Linked PEEK Coatings Enhance Osteogenic Activity and Bone-Implant Integration

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Background

Current orthopedic implants often exhibit suboptimal surface properties that hinder cell adhesion, proliferation, and osteogenic differentiation, limiting their clinical efficacy [1,2]. To address this challenge, polyetheretherketone (PEEK) coatings modified with polydopamine (PDA) and epigallocatechin-3-gallate (EGCG) were developed [3,4]. These coatings aim to transform the inert surface of PEEK into a bioactive interface, enhancing hydrophilicity, protein adsorption, and osteogenic activity for improved bone-implant integration [5,6].

Methods

Four cross-linked PE coatings (P2E0.1–P2E2) were fabricated by varying EGCG concentrations (0.1–2 mg/mL) with fixed PDA (2 mg/mL) [7,8]. Material properties were analyzed via SEM, XPS, micro-BCA, water contact angle, and protein adsorption assays [9]. In vitro studies using primary osteoblasts evaluated cytocompatibility, adhesion (Calcein AM), proliferation (CKK-8), and osteogenic differentiation (ALP staining, RT-qPCR for ALP/BMP2/Runx2) [10]. For in vivo validation, P2E0.5-coated porous PEEK scaffolds were implanted into rabbit femoral condyles, and osteointegration was assessed after 1 month via micro-CT and histology (HE/Goldner staining) [11,12].

Results

The P2E0.5 coating significantly improved hydrophilicity (water contact angle: 54° vs. 79° for bare PEEK) [13], exhibited the highest phenolic hydroxyl density [14], and enhanced protein adsorption by 2.5-fold [21]. In vitro, P2E0.5 promoted osteoblast adhesion (1.8× proliferation at 5 days) [10] and upregulated osteogenic genes (ALP: 3.2×; BMP2: 2.7×; Runx2: 2.5×) [15]. In vivo, P2E0.5-coated scaffolds demonstrated 40% higher bone volume (BV/TV), 30% increased trabecular thickness, and dense bone formation within/around implants. (Fig. 1).

Conclusions

The PDA/EGCG cross-linked PEEK coating (P2E0.5) effectively transforms inert implant surfaces into bioactive interfaces, fostering cell adhesion, proliferation, and osteogenic differentiation. This strategy addresses limitations of conventional implant, offering a promising solution to enhance clinical outcomes through accelerated bone healing and implant stability [16].

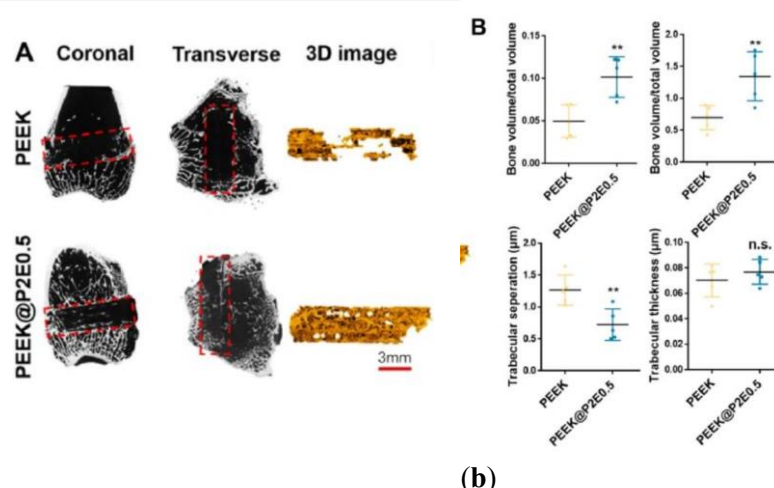


Fig. 1. Osteointegration of the cross-linked P2Eimplant, d PEEK from micro-CT. **(a)** Nascent bone tissue inside the cross-linked P2E0.5-coated PEEK scaffold viewed using micro-CT; **(b)** Quantified analysis of the bone microparameters of the nascent bone tissue inside the cross-linked P2E0.5-coated PEEK scaffold.

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Oral Presentation: FPOP3.06

Topic: Joint Preservation

HTO for Varus Knee Osteoarthritis: Equivalent Efficacy of Medial Meniscus Posterior Root Tear Repair and Non-repair

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Background

Medial meniscus posterior root tear (MMPHRT) in varus knee osteoarthritis (OA) may cause medial meniscus extrusion (MME) and accelerate cartilage degeneration. Whether MMPHRT repair is necessary during open-wedge high tibial osteotomy (OWHTO) remains controversial. This study compared clinical outcomes between OWHTO with MMPHRT repair and OWHTO alone.

Methods

Sixty patients with knee OA and medial meniscus tears who underwent OWHTO from 2019 to 2021 were retrospectively analyzed. Thirty-five patients received OWHTO combined with total-inside repair of MMPHRT using the Fast Fix suture system (HTOR group), and 25 underwent OWHTO alone (HTO group), with a mean follow-up of 2 years. Outcomes included meniscus healing status (complete healing, partial healing, non-healing) via second-look arthroscopy, International Cartilage Repair Society (ICRS) grades of the medial femoral condyle (MFC) and medial tibial plateau (MTP), MME severity on MRI, weight-bearing radiograph parameters (medial joint space width, joint line convergence angle [JLCA], posterior tibial slope [PTS], Kellgren-Lawrence [KL] grading, hip-knee-ankle angle [HKA], weight-bearing line [WBL] ratio), and clinical scores (Knee Society Score [KSS], Western Ontario and McMaster Universities Osteoarthritis Index [WOMAC]).

Results

The HTOR group showed significantly higher partial/complete healing rates of MMPHRT than the HTO group (77% vs. 44%, $P < 0.001$). No significant differences were observed between groups in ICRS grades of MFC and MTP before or after surgery (Table 2). Postoperative MME (4.2 ± 1.8 mm vs. 4.1 ± 2.0 mm, $*P > 0.05$), medial joint space width, JLCA, PTS, KL grading, and clinical scores (KSS, WOMAC) did not differ significantly between groups. (Table 2).

Conclusions

While MMPHRT repair during OWHTO improves tear healing rates, it does not significantly affect imaging parameters or clinical outcomes compared with non-repair. Current evidence does not support routine MMPHRT repair during OWHTO for varus knee OA.

Table 1. Comparison of ICRS Grading of Femoral Condyles and Tibial Plateau between the Two Groups before and after Arthroscopic Surgery

	HTOR (n=35)	HTO (n=25)	P
ICRS grading of the medial femoral condyle			
Before surgery (Grade0/1/2/3/4)	0/1/8/12/14	0/2/7/9/7	0.420
After surgery (Grade0/1/2/3/4)	0/6/9/11/9	0/4/6/9/6	0.477
ICRS grading of the tibial plateau			
Before surgery (Grade0/1/2/3/4)	0/0/4/9/12	0/1/11/12/14	0.426
After surgery (Grade0/1/2/3/4)	1/7/7/11/9	3/8/9/11/7	0.297

Table 2. Comparison of Imaging Results between the Two Groups before and after Surgery

	HTOR (n=35)	HTO (n=25)	P
Medial meniscus extrusion (mm)			
Before surgery	4.4±1.8	4.3±1.9	0.155
After surgery	4.2±1.8	4.1±2.0	0.979
Medial joint space (mm)			
Before surgery	3.5±1.0	3.6±1.3	0.129
After surgery	3.8±1.2	3.5±1.7	0.678
Joint line convergence angle (degrees)			
Before surgery	3.1±1.2	3.0±1.6	0.087
After surgery	2.5±1.1	2.3±1.4	0.376
Posterior tibial slope (degrees)			
Before surgery	8.9±1.3	8.6±1.9	0.467
After surgery	8.8±1.8	9.1±1.7	0.534
Weight-bearing line (WBL) ratio (%)			
Before surgery	21.2±9.9	22.2±12.8	0.876
After surgery	63.1±10.7	64.0±11.7	0.236
Hip-knee-ankle angle (degrees)			
Before surgery	Varus6.7±2.2	Varus6.8±2.6	0.841
After surgery	Valgus 1.7±1.2	Valgus 1.8±1.2	0.445
Kellgren-Lawrence (KL) grading			
Before surgery (1/2/3/4)	3/13/16/3	0/7/15/3	0.567
After surgery (1/2/3/4)	5/16/12/2	2/11/10/2	0.335
Weight-bearing line (WBL) ratio (%)			
Before surgery	21.2±9.9	22.2±12.8	0.876
After surgery	63.1±10.7	64.0±11.7	0.236
Hip-knee-ankle angle (degrees)			
Before surgery	Varus6.7±2.2	Varus6.8±2.6	0.841
After surgery	Valgus 1.7±1.2	Valgus 1.8±1.2	0.445
Kellgren-Lawrence (KL) grading			
Before surgery (1/2/3/4)	3/13/16/3	0/7/15/3	0.567
After surgery (1/2/3/4)	5/16/12/2	2/11/10/2	0.3349

Oral Presentation: FPOP3.07

Topic: Joint Preservation

Clinical Outcomes of Platelet-Rich Plasma at Varying Concentrations for Knee Osteoarthritis: A Prospective Study

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Background

To investigate the specific clinical efficacy of platelet-rich plasma (PRP) therapy at different concentrations in the treatment of knee osteoarthritis (KOA).

Methods

A total of 150 patients with knee osteoarthritis admitted to the Knee Conservation Department of Xi'an Honghui Hospital affiliated to Xi'an Jiaotong University from January 2024 to December 2024 were selected and randomly divided into five groups: control group (sodium hyaluronate therapy), observation group I (PRP therapy at a concentration of $900 \times 10^9/L$ - $1199 \times 10^9/L$), observation group II (PRP therapy at a concentration of $1200 \times 10^9/L$ - $1599 \times 10^9/L$), observation group III (PRP therapy at a concentration of $1500 \times 10^9/L$ - $1800 \times 10^9/L$), and observation group IV (PRP therapy at a concentration of $1801 \times 10^9/L$ - $2100 \times 10^9/L$). Analysis was conducted on the post-treatment adverse reaction rate, VAS score, and IKDC score.

Results

The IKDC scores were 67.03 ± 2.46 in observation group I, 70.54 ± 6.48 in observation group II, 74.01 ± 7.38 in observation group III, and 65.98 ± 10.29 in observation group IV after 3 months of treatment; the VAS scores were 4.33 ± 1.42 in observation group I, 3.52 ± 1.41 in observation group II, 2.22 ± 1.03 in observation group III, and 3.16 ± 1.11 in observation group IV, with significant differences between groups ($P < 0.05$).

Conclusions

In PRP therapy for knee osteoarthritis, if the concentration can be maintained between $1500 \times 10^9/L$ and $1800 \times 10^9/L$, more significant clinical efficacy can be achieved. If the concentration is too low or too high, patients' pain will increase and knee joint function will be limited. Therefore, the plasma concentration in PRP therapy should be well controlled. This therapy is both effective and safe.

Table 1. Comparison of IKDC scores of patients before and after treatment

Group/Rating	IKDC scores			
	Before treatment	3 months	6 months	9 months
Control group (n=30)	54.93±6.79	64.39±8.49	54.96±5.84	56.94±7.38
Observation Group I (n=30)	55.29±5.68	67.03±2.46	58.59±5.89	58.38±5.75
Observation Group II (n=30)	55.01±5.97	70.54±6.48	59.69±6.03	57.32±5.39
Observation Group III (n=30)	54.28±5.39	74.01±7.38	66.43±7.34	65.39±7.86
Observation Group IV (n=30)	55.01±6.03	65.98±10.29	58.37±6.39	59.30±6.49
t	0.306	4.583	4.448	4.392
P	>0.05	<0.05	<0.05	<0.05

Table 2. Comparison of VAS scores of patients before and after treatment

Group/Rating	VAS scores			
	Before treatment	3 months	6 months	9 months
Control group (n=30)	6.22±1.21	5.48±1.25	5.72±1.55	5.85±1.35
Observation Group I (n=30)	5.93±1.11	4.33±1.42	4.37±1.32	4.82±1.22
Observation Group II (n=30)	6.13±1.02	3.52±1.41	4.29±1.22	3.79±1.01
Observation Group III (n=30)	6.01±1.03	2.22±1.03	2.59±1.03	3.42±1.05
Observation Group IV (n=30)	5.98±1.31	3.16±1.11	3.34±1.23	3.88±1.21
t	0.023	4.592	4.203	4.024
P	>0.05	<0.05	<0.05	<0.05

Oral Presentation: FPOP3.08

Topic: Arthroplasty

Comparison of Pain and Functional Performance Between Crystalline Glucosamine Sulfate and Diacerein in Early Knee OA Patients

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Background

Among symptomatic slow-acting drugs for osteoarthritis (SYSADOA) used to treat early knee osteoarthritis (OA), oral patented crystalline glucosamine sulfate (pCGS) and diacerein have gained popularity for controlling symptoms and slowing progression of the disease. Although studies have shown that pCGS and diacerein improve clinical outcomes, no study has compared the results between these two agents. We compared pain and functional performance between pCGS and diacerein in patients with early knee osteoarthritis (OA).

Methods

We retrospectively reviewed 275 patients with Kellgren-Lawrence (KL) grades I and II knee OA, who were continuously treated with either 1,500-mg pCGS per day or 100-mg diacerein per day for 1 year. The visual analogue scale (VAS) was used to assess pain, and the 5-time sit-to-stand test (5xSST), the time up-and-go test (TUGT), and the 3-minute walk distance test (3MWD) were employed to evaluate functional performance outcomes at baseline, 12-week, 24-week, and 1-year follow-ups (FUs). Changes in all parameters were evaluated and compared between the two groups.

Results

At the final follow-up, 215 patients completed all evaluations, with an average age of 65 years, a BMI of 26.9 kg/m², and 75% being female. There were 129 patients receiving p-CGS and 86 receiving diacerein. The pCGS group showed significant improvements in VAS, 5xSST, and TUGT from the 12th week and significant improvement in 3MWD from the 24th week. In contrast, the diacerein group showed significant improvements in TUGT from the 12th week and significant improvements in VAS, 5xSST, and 3MWD from the 24th week. At 1-year FU, both groups had significantly improved VAS and all three functional performances without adverse events. However, there were no statistically significant differences in VAS, 5xSST, TUGT, and 3MWD between the two groups at baseline and all three follow-up time points.

Conclusion

In early knee OA patients, according to individual baseline evaluations, pCGS provided faster and significantly improved VAS and 5xSST, as well as similar improvements in TUGT from the 12th week, compared to diacerein; however, there were no differences between the two groups. From the 24th week to one year, both agents provided similarly significant improvements in pain and all functional performance tests.

Oral Presentation: FPOP3.09

Topic: Arthroplasty

Automated Morphological Classification and Measurement of the Distal Femur in the Chinese Population Based on Statistical Shape Modeling

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Background:

Designing prostheses that fit the anatomical characteristics of the Chinese population is crucial. However, no comprehensive classification system exists for normal distal femur morphology. Traditional manual measurement methods are labor-intensive, subjective, and lack reproducibility. Advances in computer-assisted technology now enable automated and precise measurement through machine learning approaches. This study aims to (1) establish a novel morphological classification of the normal distal femur in the Chinese population to guide prosthesis design, and (2) develop an automated measurement system for high-throughput, multi-parameter data acquisition with improved accuracy and efficiency.

Methods:

Morphological variations were analyzed using registration algorithms, statistical shape modeling (SSM), principal component analysis (PCA), and clustering techniques. A custom automated measurement system was developed via secondary development of the 3D Slicer platform, integrating hierarchical clustering and SSM. Accuracy was validated through comparison with manual measurements, and comprehensive morphometric analysis was conducted based on geometric transformations.

Results:

Four distal femur types were identified: Wide type, Shallow trochlear type, Deep trochlear type, and Narrow type. The automated measurement system achieved a point matching error of 1.03 mm, a dimensional measurement error of 0.37 mm, and an angular measurement error of 0.63°. Intraclass correlation coefficients (ICCs) for automated measurements were superior to those of manual methods. A total of 33 morphological parameters were automatically measured, with results consistent with qualitative analysis findings.

Conclusions:

A novel four-type classification of the normal distal femur in the Chinese population was established. This classification can guide prosthesis design, including the development of "wide" versions, and enhance computer-assisted preoperative planning. Additionally, a highly accurate automated measurement system based on 3D Slicer secondary development was successfully established and validated. This system enables high-throughput, multi-parameter quantitative analysis, providing a robust methodological basis for anatomical data collection to support prosthesis optimization.

Oral Presentation: FPOP3.10

Topic: Arthroplasty

The Efficacy of Low-Level Laser on Postoperative Pain and Range of Motion after Bilateral Total Knee Arthroplasty: Randomized Clinical Trial

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Background

Total knee arthroplasty (TKA) is a surgical procedure that can significantly improve the quality of life in patients with OA knee. Nevertheless, moderate to severe pain following TKA can affect physical rehabilitation and patient satisfaction^[1]. The medications can lead to side effects such as gastrointestinal ulcers, renal failure, or drug overdose, especially in the elderly^[2]. Low-level laser therapy (LLLT) is a non-invasive treatment that helps reduce pain and tissue swelling^[3]. Thus, in this study, we investigated the efficacy of low-level laser therapy (LLLT) on pain and range of motion after bilateral primary total knee arthroplasty (TKA).

Methods

The prospective randomized clinical trial, single-center, single-surgeon, was performed bilateral primary TKA via mid vastus approach with 2 groups of 16 patients. The LLLT (810 nm, 500 mW) group received LLLT postoperatively (fig. 1) and the control group received laser in turn-off mode for the same length of time as the LLLT group. The visual analog scale pain scoring and range of motion (ROM) were recorded preoperative and postoperative on day 2, day 3 and month 3. Furthermore, postoperative complications due to LLLT and opioid consumption on day 2 and 3 were also documented.

Results

The preoperative demographic data, visual analog scale pain scoring and range of motion were similar between groups. Compared with the control group, the LLLT group had significantly less pain on postoperative day 2, day 3 and month 3 (6.00 ± 1.46 vs 7.56 ± 1.55 , 4.88 ± 1.31 vs 6.31 ± 1.58 and 2.69 ± 1.35 vs 4.13 ± 1.50 , P value = 0.006, 0.009 and 0.008) and greater ROM on postoperative day 2 and day 3 (80.63 ± 20.16 vs 62.50 ± 21.76 and 94.69 ± 16.88 vs 73.75 ± 20.37 , P value = 0.021 and 0.004) however, did not differ on month 3 (112.19 ± 13.29 vs 101.56 ± 16.71 , P value = 0.056) (table 1). In addition, the amount of opioid consumption in the LLLT group was significantly lower than the control group (P value <0.001) and there were no complications due to LLLT.

Conclusions

According to this study, low level laser therapy is effective in reducing pain, improving range of motion, decreasing opioid consumption and there are no complications from LLLT in acute postoperative bilateral total knee arthroplasty.



Fig. 1. Applying laser on the knee

Table 1. Comparison of outcomes of postoperative VAS pain scoring and ROM

Variables	Laser	Control	P value
VAS pain			
48 hours	6.00±1.46	7.56±1.55	0.006*
72 hours	4.88±1.31	6.31±1.58	0.009*
3 months	2.69±1.35	4.13±1.50	0.008*
ROM			
48 hours	80.63±20.16	62.50±21.76	0.021*
72 hours	94.69±16.88	73.75±20.37	0.004*
3 months	112.19±13.29	101.56±16.71	0.056

References

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Oral Presentation: FPOP4.01

Topic: Arthroplasty

Correlation of Patient Native Anatomy and Postoperative Component Placement with Demographic Predictors of Hip Outcome Scores in Mako Robotic-Arm Assisted Total Hip Arthroplasty: A Prospective Analysis

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Background

Accurate replication of native femoral and acetabular anatomy in total hip arthroplasty (THA) is crucial for optimal implant positioning and postoperative function. The Mako robotic-arm assisted system offers enhanced precision in component placement. This prospective study investigates the correlation between patient native anatomy and postoperative femoral and acetabular positioning, and evaluates demographic predictors of hip outcome scores.

Methods

The study involved 171 patients (195 hips) undergoing primary THA performed by a single surgeon via the posterior approach using Mako robotic assistance. Preoperative native femoral version, acetabular anteversion, and inclination were compared with postoperative computed tomography (CT)-based component positioning. Scattergrams assessed the relationship between native acetabular anatomy and postoperative alignment, with adherence to Lewinnek and Dorr safe zones. Outcomes were measured using Harris Hip Score (HHS) and Hip Disability and Osteoarthritis Outcome Score (HOOS). Repeated measures ANOVA evaluated HHS and HOOS over time (preoperative, 3 months and 1 year). Analysis of covariance (ANCOVA) was identified demographic predictors of clinical outcomes, and pairwise comparisons were conducted to identify significant differences ($p < 0.05$).

Results

Mean patient age was 60.8 ± 12.5 years; 60.2% were female, 91.8% Chinese, and 45.1% overweight. Robotic-assisted THA demonstrated consistent acetabular placement accuracy: mean planned cup inclination was $43.6^\circ \pm 2.1^\circ$, with an achieved inclination of $42.1^\circ \pm 5.5^\circ$. Planned cup version averaged $19.5^\circ \pm 1.9^\circ$, closely matched by a postoperative version of $27.9^\circ \pm 6.8^\circ$. Femoral component positioning showed greater variability, with planned femoral version at $-1.8^\circ \pm 14.9^\circ$ and postoperative femoral version at $14.3^\circ \pm 10.4^\circ$. Planned stem version averaged $18.9^\circ \pm 9.9^\circ$, compared to $11.4^\circ \pm 9.0^\circ$ postoperatively.

CT-based assessment showed a mean acetabular inclination of $42.1^\circ \pm 5.5^\circ$, with 92.2% of cases within the Lewinnek safe zone (30° – 50°). Mean postoperative combined anteversion was $40.9^\circ \pm 13.4^\circ$, with Dorr safe zone adherence observed slightly above 50.0% of the cohort (25° – 45°) (Figure 1).

Repeated measures ANCOVA demonstrated significant improvements in both HHS and HOOS across all time points (preoperative, 3 months, and 1 year postoperative; $p < 0.001$), with post-hoc analyses indicating significant difference between each interval. ANCOVA identified age and sex as significant demographic

predictors of postoperative outcomes. Specifically, patients aged <55 had significantly higher HHS scores at 3 months compared to those aged >65 ($p=0.046$), and females had significantly higher HHS scores at 1 year compared to males ($p=0.016$) (Table 1 & 2).

Conclusions

Robotic-assisted THA achieved high accuracy in component placement and significant functional improvements, regardless of demographic factors. Minor deviations from traditional safe zones did not impact short-term recovery. Further follow-up is needed to determine the long-term effects on implant longevity and functional durability.

Figure 1. Scatterplot of postoperative stem and cup anteversion angles. The green shaded area represents the Dorr Safe Zone, corresponding to a combined anteversion between 25° and 45°.

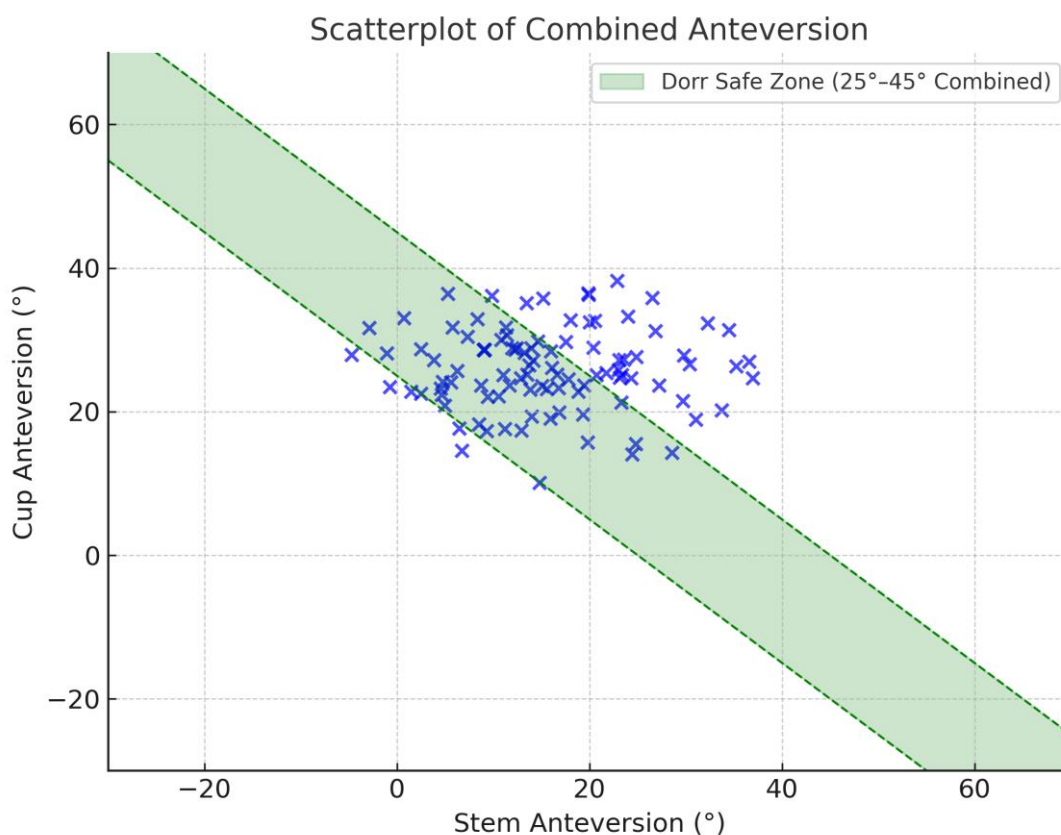


Table 1. Analysis of Covariance Showing Demographic Predictors of Clinical Outcome Measures at 3M versus Preoperative

Demography		HHS score		HOOS score	
		Estimated marginal mean difference (95% confidence interval)	Significance	Estimated marginal mean difference (95% confidence interval)	Significance
Age	<55	83.57 (80.32 – 86.82)	F(2,192) = 3.207 p=0.046	249.81 (191.43 – 308.18)	F(2,192) = 0.029 p=0.972
	55 – 65	81.45 (78.25 – 84.65)		275.93 (210.23 – 341.63)	
	>65	78.02 (74.67 – 81.37)		241.91 (184.164 – 299.66)	
Sex	Male	82.19 (79.25 – 85.13)	F(1,193) = 3.207 p=0.046	261.28 (209.06 – 313.50)	F(1,193) = 0.133 p=0.716
	Female	80.52 (78.16 – 82.89)		250.80 (205.24 – 296.35)	
Race	Malay	81.90 (72.23 – 91.57)	F(2,192) = 0.794 p=0.456	228.30 (46.80 – 409.79)	F(2,192) = 0.282 p=0.754
	Chinese	81.95 (79.91 – 83.98)		208.55 – 279.59)	
	Others	78.51 (71.81 – 84.22)		327.90 (214.66 – 441.13)	
BMI	Underweight	83.29 (78.59 – 87.98)	F(3,191) = 0.487 p=0.692	181.22 (99.15 – 263.29)	F(3,191) = 1.728 p=0.164
	Normal	79.78 (75.80 – 83.76)		218.19 (149.51 – 286.87)	
	Overweight	81.026 (77.99 – 84.06)		289.71 (228.02 – 351.41)	
	Obese	82.02 (78.152 – 85.90)		305.87 (234.34 – 377.40)	
Side of surgery	Right	81.91 (79.33 – 84.48)	F(1,193) = 2.854 p=0.095	258.74 (211.39 – 306.09)	F(2,192) = 0.024 p=0.878
	Left	80.84 (78.01 – 83.68)		253.92 (201.90 – 305.93)	

Table 2. Analysis of Covariance Showing Demographic Predictors of Clinical Outcome Measures at 1YR versus Preoperative

Demography		HHS score		HOOS score	
		Estimated marginal mean difference (95% confidence interval)	Significance	Estimated marginal mean difference (95% confidence interval)	Significance
Age	<55	86.61 (83.27 – 89.95)	F(2,192) = 2.962 P=0.087	138.62 (79.72 – 197.53)	F(2,192) = 1.049 P=0.248
	55 – 65	86.82 (83.54 – 90.10)		106.55 (40.254 – 172.85)	
	>65	83.86 (80.61 – 87.12)		78.61 (20.34 – 136.89)	
Sex	Male	86.89 (83.98 – 89.81)	F(1,193) = 7.628 P=0.016	101.29 (48.60 – 153.99)	F(1,193) = 2.552 P=0.115
	Female	84.97 (82.41 – 87.54)		121.33 (75.36 – 167.30)	
Race	Malay	86.09 (77.25 – 94.93)	F(2,192) = 1.141	110.59 (-72.56 – 293.74)	F(2,192) = 0.996 P=0.383

	Chinese	85.28 (83.19 – 87.37)	P=0.349	90.92 (55.08 – 126.76)	
	Others	88.51 (82.48 – 94.55)		204.60 (90.34 – 318.87)	
BMI	Underweight	88.53 (82.94 – 94.12)	F(3,191) = 1.423	51.82 (-30.998 – 134.64)	F(3,191) = 0.497
	Normal	81.16 (76.02 – 86.31)	P=0.281	80.79 (11.49 – 150.09)	P=0.685
	Overweight	86.60 (83.77 – 89.43)		124.15 (61.89 – 186.41)	
	Obese	86.25 (81.95 – 90.56)		161.67 (89.49 – 233.85)	
Side of surgery	Right	85.14 (82.75 – 87.53)	F(1,193) = 0.014 P=0.906	115.50 (67.73 – 163.28)	F(1,193) = 0.009 P=0.926

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Oral Presentation: FPOP4.02

Topic: Arthroplasty

How Much Benefit Can Robot-Assisted Total Hip Arthroplasty Provide for Patients with Severe Hip Dislocations?

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Background

Robotic-assisted total hip arthroplasty (RATHA) has rapidly developed and garnered considerable attention in recent years because of providing systematic preoperative planning and precise intraoperative navigation, thereby facilitating personalized and precise THA. However, there are limited reports on the use of RATHA in the treatment of severe hip dislocation. So, can robots offer a different experience for patients with severe hip dislocation compared to conventional THA? Here, we investigated the RATHA technology in anterior approach THA for severe hip dislocations and to evaluate its clinical safety and effectiveness.

Methods

Eighteen patients with severe hip dislocations (Crowe type III-IV), including 3 males and 15 females, with an average age of 47.2 ± 11.9 years (range: 23-72 years), were enrolled in our department from October 2022 to October 2023. Preoperatively, the MAKO robot was used to plan the acetabular position, prosthesis type and size, and implantation angle. The anterior approach was used to expose the hip in the supine position, with the acetabular cup prepared and installed under robotic arm assistance, while manual reaming and femoral prosthesis installation were performed. Data were collected on preoperative and postoperative (1 month, 3 months, and 1 year) Harris hip function scores, operative duration, leg length discrepancy, acetabular cup anteversion and abduction angles, preoperative and postoperative hematocrit and hemoglobin levels, and postoperative complications.

Results

The average operative duration was 162.5 ± 36.3 minutes. Hemoglobin levels decreased from 126.2 ± 12.9 g/L preoperatively to 109.0 ± 10.9 g/L postoperatively, and hematocrit decreased from $41.2 \pm 12.0\%$ preoperatively to $33.1 \pm 3.1\%$ postoperatively, with statistically significant differences ($P=0.009$). Leg length discrepancy was corrected from an average of 35.4 ± 20.4 mm preoperatively to 9.6 ± 6.2 mm postoperatively. Postoperative measurements showed an average acetabular cup anteversion angle of $19.6 \pm 4.1^\circ$, which was larger than the preoperative plan of $14.4 \pm 1.6^\circ$, and an average abduction angle of $40.3 \pm 5.1^\circ$, which was smaller than the preoperative plan of $43.8 \pm 2.6^\circ$, with statistically significant differences ($P=0.007$). The preoperative planning for femoral stem and acetabular cup sizes matched the intraoperative use with 100% consistency. Leg length discrepancy improved from 20.8 ± 15.1 mm preoperatively to 3.8 ± 4.7 mm postoperatively. The Harris hip function score increased from an average of 58.2 ± 10.8 preoperatively to 79.9 ± 15.9 at 3 months postoperatively and 89.5 ± 8.3 at 1 year postoperatively, indicating significant improvement in hip function. Two patients (11.1%) experienced proximal femoral fractures, and two patients (11.1%) had postoperative prosthesis dislocations.

After open reduction and fixation with braces, no recurrences occurred. No patients experienced complications such as wound infection or poor wound healing.

Conclusions

RATHA had demonstrated excellent advantages in the personalized selection of appropriate prosthesis types and sizes, and the prosthesis position and angle. The anterior approach facilitates adequate release of the proximal insertion of the tensor fascia lata, which is beneficial for correcting leg length discrepancy. Significant improvement in hip function can be achieved after 3 months postoperatively. However, the high risk of dislocation due to local structural deformity and muscle disuse atrophy remain issues that robots cannot overcome. More refined perioperative soft tissue management is required to reduce the risk of dislocation.

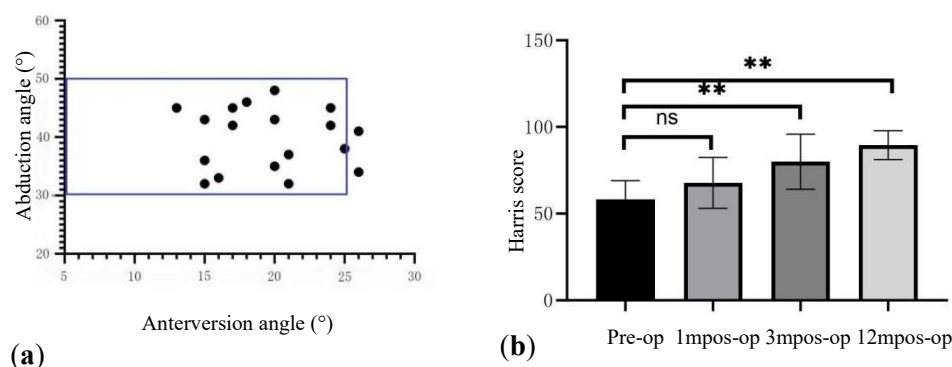


Fig. 1. This is a figure of acetabular cup angle and hip Harris score: **(a)** the acetabular cup angle includes abduction angle and anterversion angle, and the rectangular box is the Lewinck safe zone; **(b)** hip Harris scores are from pre-operation (pre-op), 1 month post operation (1m pos-op), 3 months post operation (3m pos-op), and 12 month post operation (12m pos-op), ns means none statistically significant difference, ** means statistically significant difference.

Table 1. Comparison of Various Indicators Before and After MAKO Robot-Assisted Total Hip Arthroplasty (THA)

Indicators	Pre-op	Pos-op	P/t
Hemoglobin (g/L)	126.2±12.9	109.0±10.9	<0.01/5.241
Hematocrit (%)	41.2±12.0	33.1±3.1	<0.01/2.791
Anterversion angle (°)	14.4±1.6	19.6±4.1	<0.01/4.940
Abduction angle (°)	43.8±2.6	40.3±5.1	0.014/2.591
Off-set (mm)	8.6±5.8	8.8±7.4	0.130/0.897
The limbs length discrepancy (mm)	35.4±20.4	9.6±6.2	<0.01/5.130

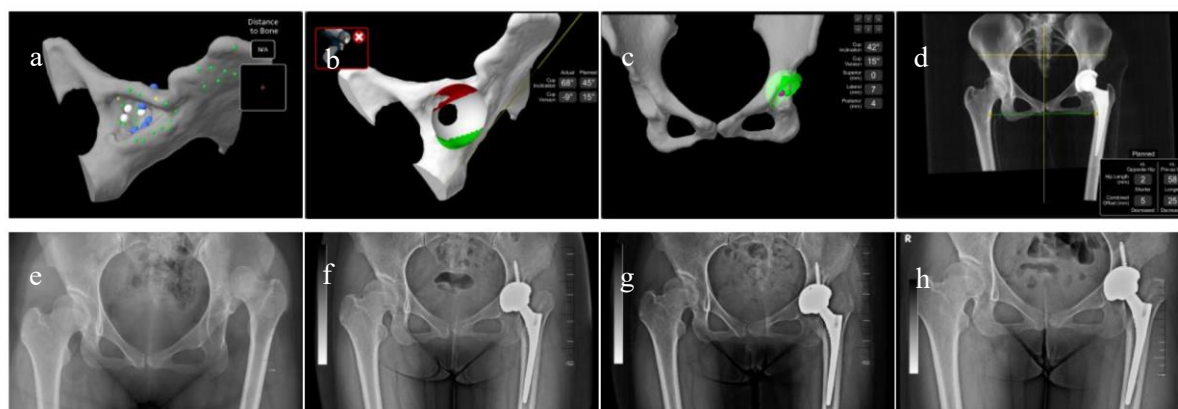


Figure 2. Typical Case 1: A 23-year-old female patient with congenital severe left hip dislocation (Crowe Type IV).

- a) Registration points planned intraoperatively using the robotic system;
- b) Robotic arm-assisted acetabular preparation with 45° abduction and 15° anteversion. The red area indicates bone grinding beyond the planned range, green indicates inadequate bone grinding, and gray indicates just right;
- c) Robotic simulation of cup installation at 42° abduction and 15° anteversion;
- d) Overall appearance after installation of the acetabular and femoral prosthesis, with leg length discrepancy corrected from 58mm preoperatively to 2mm postoperatively, and combined offset reduced from 25mm preoperatively to 5mm;
- e) Preoperative anteroposterior radiographs of both hips showing severe dislocation of the left hip and mild dysplasia of the right hip;
- f, g, h) Follow-up anteroposterior radiographs of both hips at 1 month, 3 months, and 1 year after left total hip arthroplasty, respectively, showing good prosthesis position.

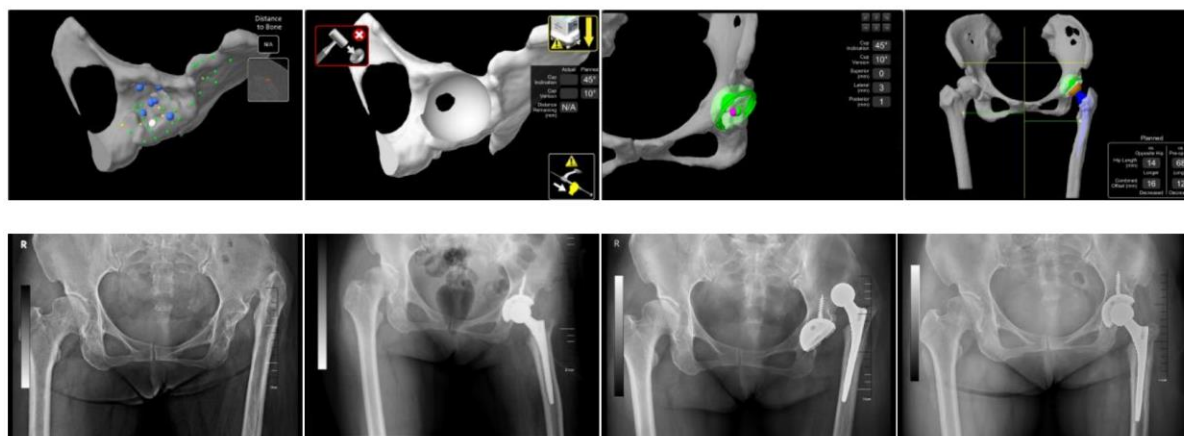


Figure 2. Typical Case 2: A 55-year-old female patient with severe right hip dislocation, proximal femoral deformity, and femoral head absence.

- a) Intraoperative registration of the acetabulum and pelvis for the right hip joint;
- b) Preparation of the acetabular bone bed completed with robotic arm assistance, at 45° abduction and 10° anteversion;
- c) Installation of the acetabular cup at 45° abduction and 10° anteversion;
- d) Appearance after robotic simulation of the femoral and acetabular prosthesis installation, with leg length discrepancy improved from 68mm preoperatively to 14mm postoperatively, and combined offset changed from 12mm to 16mm;

- e) anteroposterior radiographs of both hip joints showed severe dislocation of the left hip, proximal femoral deformity with osteoporosis, and acetabular dysplasia, while the right hip showed mild developmental abnormality;
- f) anteroposterior radiographs of both hip joints taken on the second postoperative day showed good prosthesis size and angle, with significant postoperative pelvic obliquity;
- g) A hint of joint dislocation occurred three months postoperatively, with a noticeable upward displacement of the femoral head;
- h) Follow-up anteroposterior radiographs of both hip joints taken one year postoperatively showed good prosthesis position and angle, with significant improvement in pelvic obliquity.

Oral Presentation: FPOP4.03

Topic: Arthroplasty

Comparison of Functional Implant Position and Clinical Outcome Between Robotic-Assisted THA vs Conventional THA

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Background

The optimal orientation of the acetabular component is a key factor in successful THA. Component malposition in THA has been associated with an increased risk of dislocation. [1,2] The use of robotic systems may improve the accuracy of component positioning. Therefore, the researchers aimed to compare the functional implant position and postoperative clinical outcomes between robotic-THA and conventional-THA

Methods

A retrospective review was conducted on data from 128 consecutive patients who underwent THA, including 65 robotic-THA using the MAKO Stryker® system and 63 conventional-THA. Both groups were used Accolade II cup and Trident II stem, performed by single surgeon using posterior approach between 2022-2024. Preoperative CT scans were obtained for both groups to plan component placement before surgery. We measured the cup inclination, cup anteversion, stem anteversion and combined anteversion from postoperative CT scan by two independent researchers with assessments based on the Lewinnek safe zone.[2] Operative time, blood loss, complication and the Forgotten Joint Score-12 (FJS-12) were collected and analyzed.

Results

Cup inclination showed a significantly better result in the robotic-THA ($p < 0.001$) (Fig. 1), But no significant difference in cup anteversion, stem anteversion and combined anteversion ($p = 0.41, 0.37, 0.72$) between both groups. Operative time was significantly longer in the robotic-THA group ($p < 0.001$) and postoperative blood loss was also significantly higher in the robotic-THA group ($p < 0.001$). No complications were found in either group. No significant difference in the FJS-12 ($p = 0.72$). (Table 1) There were no significant difference in age, gender, side and diagnosis between groups.

Conclusions

The results showed that robotic-THA was superior to the conventional-THA in the placement of cup inclination, which is an important parameter that plays a significant role in the long-term success of THA. However, robotic-THA had a longer operative time and higher postoperative blood loss.

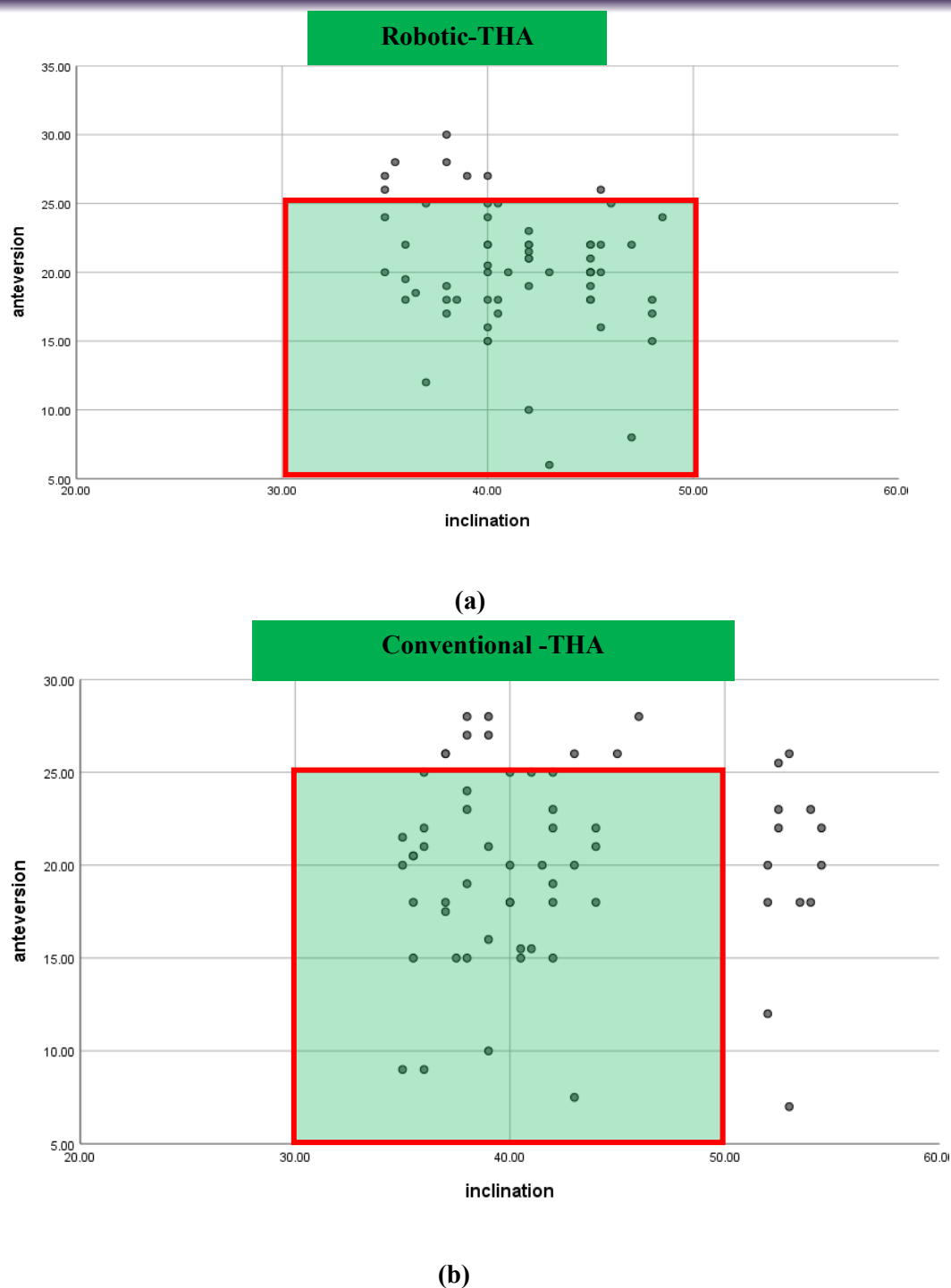


Fig. 1. Scatterplots of the postoperative cup position (a) Robotic-THA and (b) Conventional-THA in the safe zones of Lewinnek, showed significant outlier of inclination in conventional-THA group compared with robotic-THA

Table 1. Post-operative component position and outcome between the two groups.

Variable	Robotic THA	Conventional THA	p-value
Component position within Lewinnek's zone			
n (%)			
Cup Inclination	65(100)	50(79.4)	<0.001*
Cup Anteversion	57(87.7)	52(82.5)	0.41
Stem Anteversion	48(73.8)	42(66.7)	0.37
Combined Anteversion	62 (95.4)	59 (93.7)	0.72
Operative time (min)	96.9	71.9	<0.001*
Blood loss (ml)	294.6	230.1	<0.001*
FJS-12 score (mark)	75.7	75.9	0.72

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Oral Presentation: FPOP4.04

Topic: Arthroplasty

Postoperative CT Evaluation of Pelvic Reference Pins in Computer Assisted Total Hip Arthroplasty

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Background

Secure fixation of pelvic reference pins is crucial for accurate cup placement in computer-assisted total hip arthroplasty (THA) [1,2]. While pin site complications are rare in hip surgery compared to knee surgery, serious complications have been reported [3,4]. This study evaluated pin placement and associated complications using postoperative CT imaging in robotic-arm assisted and navigated THA.

Methods

We retrospectively analyzed 307 hips (269 patients) who underwent THA between April 2023 and April 2025. Of these, 265 hips (229 patients) underwent robotic-arm assisted THA (Mako), and 42 hips (40 patients) underwent CT-navigated THA. The cohort included 260 hips in females and 47 hips in males, with a mean age of 68.3 years (range: 16-91). Diagnoses included osteoarthritis (285 hips), osteonecrosis (11 hips), rheumatoid arthritis (1 hip), and ankylosing spondylitis (2 hips). Postoperative CT images were evaluated using Vincent software to assess pin trajectory, penetration of inner/outer tables, associated fractures, and hematomas (Fig 1a). The distance from ASIS to the most anterior pin and intraosseous pin length were measured on 3D bone models (Fig 1b). Mako procedures used three parallel pins with a guide, while navigation cases used two manually inserted pins.

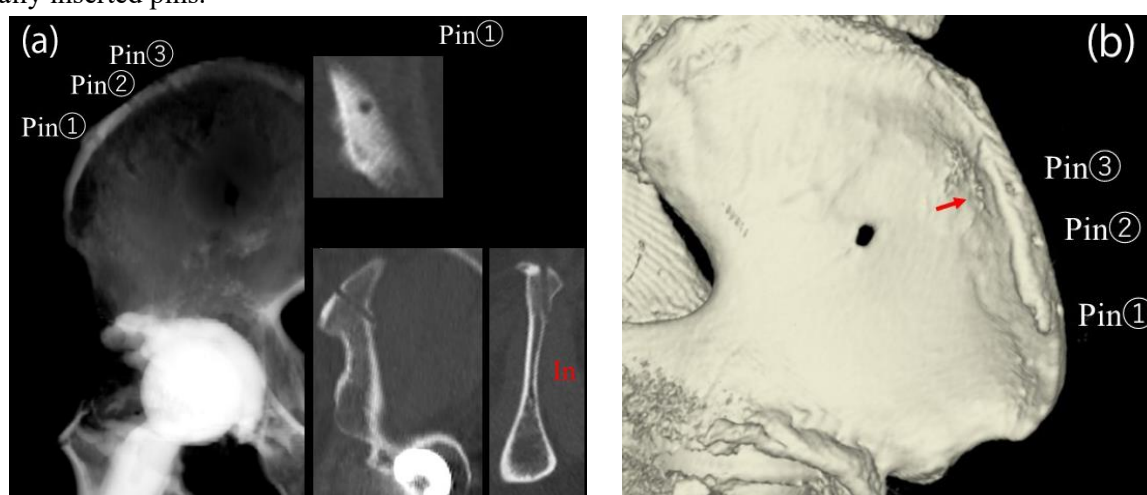


Fig. 1. Postoperative CT 3D viewer analysis: (a) A digital projection and MPR views of the ilium; (b) A 3D pelvic model

Results

Pin tips in the Mako group were located external to the pelvis in 33%, within the bone in 41%, and internal to the pelvis in 23%. For navigation cases, these percentages were 27%, 54%, and 19%, respectively. The mean distance from ASIS to Pin 1 was 35.0 mm for Mako and 34.1mm for navigation cases. Average intraosseous pin lengths for Mako were 37.2, 36.2, and 32.1 mm for Pins 1, 2, and 3, respectively, while navigation cases showed 36.1 and 35.2 mm for Pins 1 and 2. The percentage of pin tip position within the pelvis was significantly lower with Mako pin 3 than the others ($P < 0.05$, Chi square test) (Table 1). No pin-related complications such as fractures, hematomas, lateral femoral cutaneous nerve injuries, or infections were observed.

Table 1. The percentage of pin tip position at the external pelvic, within the pelvis, and the internal pelvis.

Pin tip position	Mako			CT-navigation	
	Pin①	Pin②	Pin③	Pin①	Pin②
External pelvis (%)	18	22	61	26	29
Within pelvis (%)	56	46	22	57	50
Internal pelvis (%)	27	29	14	17	21

Conclusions

Postoperative CT evaluation of 307 consecutive THAs revealed no pin-related complications. While navigation cases showed higher rates of pin tips within the pelvis compared to Mako cases, likely due to manual cross-pin insertion technique, neither approach resulted in clinical complications. Further optimization of pin diameter, length, and insertion angle may be warranted, particularly for robotic-assisted cases where pins are placed more proximally on the ilium.

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Oral Presentation: FPOP4.05

Topic: Arthroplasty

Total Hip Arthroplasty for Untreated Acetabular Fractures: A Case Series

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Background

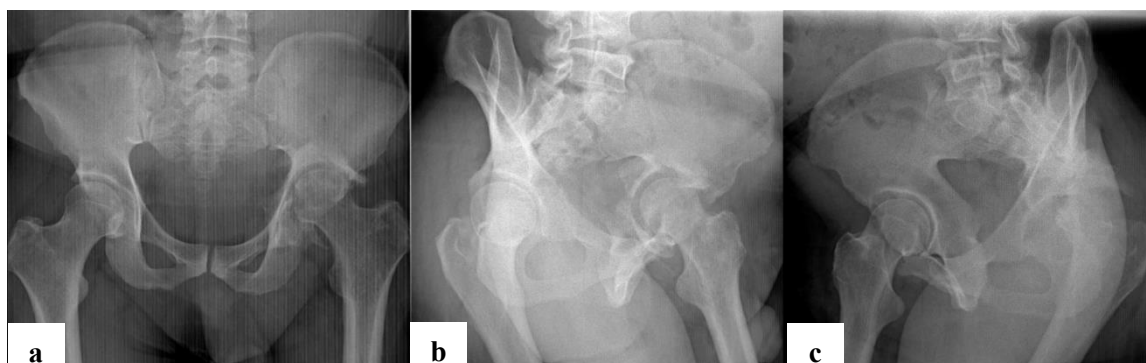
Acetabular fractures are uncommon traumatic injuries which can be sustained from high-energy motor vehicular crashes. Within the past two decades, its incidence has been decreasing in the United States but the opposite has been observed in Asia where motorcycle transportation is predominant [1].

When acute, acetabular fractures are managed with internal fixation. In developing countries, treatment is sometimes delayed due to socioeconomic factors and limited access to healthcare facilities. When an acetabular fracture is left untreated for more than three weeks, the hip becomes arthritic and the femoral head undergoes osteonecrosis [2]. Total hip arthroplasty is indicated to address these complications and allow the earliest return to function, preventing the sequelae of prolonged immobilization such as deep venous thrombosis, pressure sores, and pneumonia [3-5]. The Forgotten Joint Score (FJS) and the Harris Hip Score (HHS) can be used to document the improvement in function after surgery.

In a review of recent literature, only one study in Southeast Asia has documented its outcomes in managing untreated acetabular fractures with total hip arthroplasty. This was published in Indonesia where six cases were encountered within a span of three years [6]. No similar studies have been published in the Philippines.

Case Presentation

This study documented six cases of untreated acetabular fractures managed with total hip arthroplasty in Vicente Sotto Memorial Medical Center, Philippines in 2023. The cases included five males and one female ages 21-40 years old. All cases resulted from motorcycle crashes and most presented with untreated posterior wall fractures with posterosuperior, segmental, acetabular defects and chronic posterior hip dislocations (Figure 1). The chronicity of the fractures ranged from 31.1 weeks to 5.3 years.



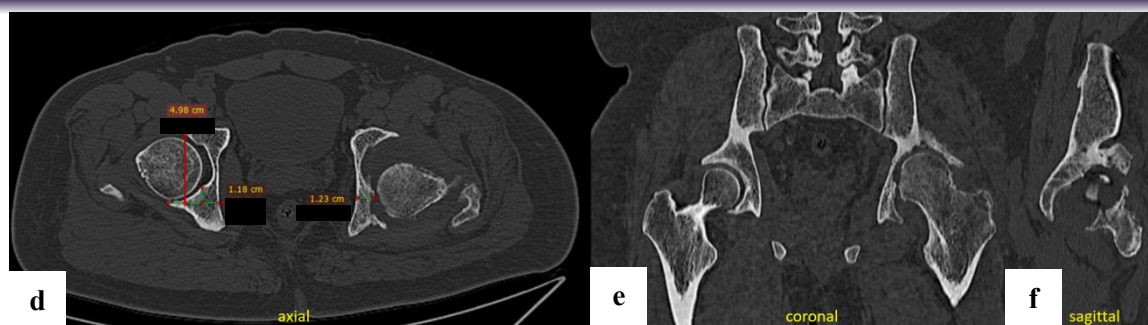


Figure 1. Pre-operative Diagnostic Imaging:

- (a) pelvis anteroposterior radiograph, (b) pelvis right obturator Judet radiograph,
(c) pelvis right iliac Judet radiograph, (d) axial cut of plain pelvis computed tomography scan,
(e) coronal cut of plain pelvis computed tomography scan,
(f) sagittal cut of plain right hip computed tomography scan

Results

An untreated acetabular fracture presents with reconstructive challenges: (a) contracted hip musculature, (b) a segmental acetabular defect, (c) a pseudoacetabulum, and (d) a proximally migrated hip center of rotation [2]. These predispose the hip to post-operative dislocation [3]. To prevent this, dual mobility cups were used and acetabular augments were added when needed (Table 1). Short stems were selected for the femur given the relatively young age of the patients.

Table 1. Implant Characteristics of the Cases

Case	Acetabular Augment	Acetabular Cup	Femoral Head	Femoral Stem
1	structural autologous bone graft, 54 x 10 mm metal augment	52 mm dual mobility	22 mm metal head	size 2 type 2A short stem
2	none	48 mm dual mobility	22 mm metal head	size 4 type 2A short stem
3	structural autologous bone graft	48 mm dual mobility	22 mm metal head	size 2 type 2A short stem
4	structural autologous bone graft	50 mm dual mobility	22 mm metal head	size 2 type 2A short stem
5	none	50 mm dual mobility	22 mm metal head	size 4 type 2A short stem
6	50 x 20 mm metal augment	48 mm dual mobility	22 mm metal head	size 6 type 2A short stem

In this study, the untreated acetabular fractures managed with total hip arthroplasty resulted in no infection, dislocation, or implant failure in the short-term post-operative period which ranged from two weeks to one year after surgery (Figure 2). Functional scores of the six cases improved after surgery by 12-48% in the FJS and by 24-51% in the HHS.

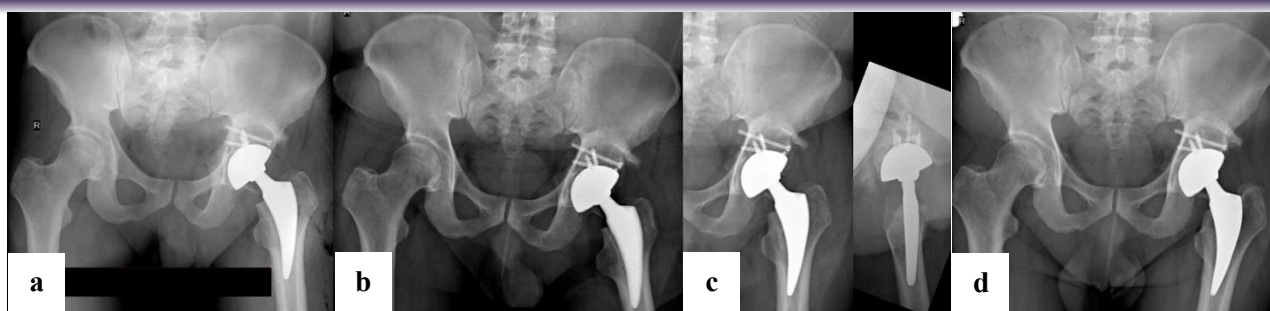


Figure 2. Post-operative radiographs: (a) immediate, (b) two weeks, (c) six weeks, (d) nine months

Conclusions

Untreated acetabular fractures are managed with total hip arthroplasty to address the accompanying post-traumatic arthritis and femoral head osteonecrosis. Segmental acetabular defects and chronic hip dislocations present in these cases can be managed with acetabular augments and dual mobility cups. When these injuries present in the young, femoral short stems can be used to preserve the femoral neck, maximize the proximal metaphyseal bone stock, and decrease calcar stress-shielding. This study can further be improved by recruiting more cases and continuing to monitor the mid-term and long-term outcomes.

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Oral Presentation: FPOP4.06

Topic: Arthroplasty

Defect-Specific Strategies for Femoral Reconstruction in Revision Total Hip Arthroplasty

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Background

Femoral bone defects in revision total hip arthroplasty (RTHA) compromise biomechanics and fixation longevity. A comprehensive understanding of femoral bone defects and the establishment of a systematic treatment strategy tailored to the specific type of defects is critical for improving patient functional outcomes and implant survivorship. In this study, we propose defect-specific revision strategies for distinct types of femoral bone defects, based on our institutional experience in a series of RTHA cases.

Methods

We retrospectively reviewed 47 patients (48 hips, mean age 59 years; range, 37 to 75 years) who were admitted to our institution from January 2018 to December 2023 and underwent RTHA. The Paprosky classification system was utilized to evaluate the severity of femoral bone defects in all enrolled patients. Preoperative and post-revision Harris scores, VAS scores, and post-revision complications were evaluated.

Results

Among all 48 cases, there are 17 cases with Type I defects, 11 Type II, 12 Type III, and 8 Type IV defects. In Type I cases, 9 received cemented stems, 4 proximally fixed cementless stems, and 4 distally fixed cementless stems. For Type II defects, 4 underwent cemented stems with impaction bone grafting (IBG) and titanium mesh for proximal femoral reconstruction, while 7 received cemented stems alone. Among Type III defects, 8 were managed with modular stems, and 4 underwent cemented stems in combination with IBG and titanium mesh. In Type IV defects, 5 cases utilized cemented stems with IBG and mesh, 2 received modular stems with IBG and mesh, and 1 was treated with modular stem alone. These patients all reported significant improvement in their mobilization, Harris and VAS scores post operation. No implant migration or change in center of rotation of the hip joint was observed in the last follow-up. At the latest follow-up, no patient had re-revision or operations related to the prosthesis.

Conclusions

Femoral reconstruction can be a complex and time-consuming process in RTHA, as no single technique universally addresses all scenarios. Successful outcomes require both a thorough understanding of the distinct characteristics of bone defect subtypes and mastery of diverse techniques to restore anatomy and biomechanical stability.

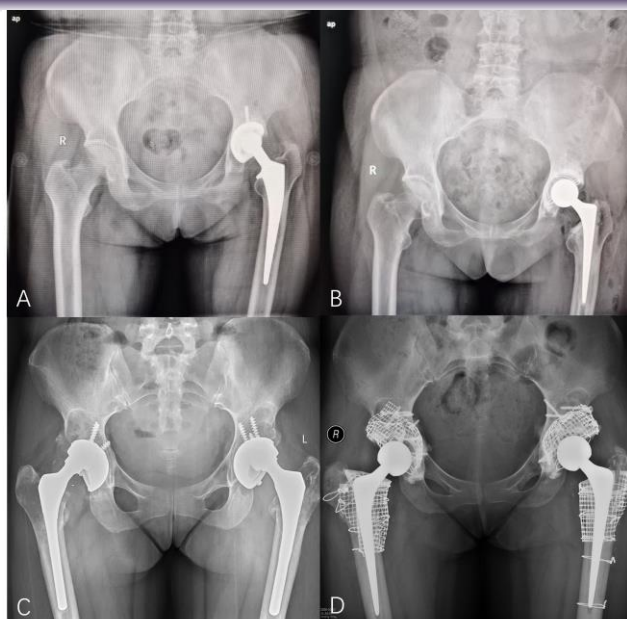


Fig. 1. (A), (B) Pre-op and Post-op X-ray of one case with Paprosky Type I defect; (C), (D) Pre-op and Post-op X-ray of one case with bilateral Paprosky Type II defect.

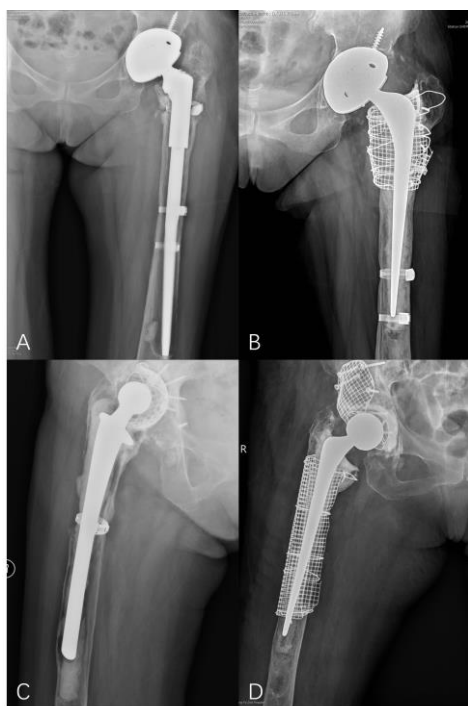


Fig. 2. (A), (B) Pre-op and Post-op X-ray of one case with Paprosky Type III defect; (C), (D) Pre-op and Post-op X-ray of one case with bilateral Paprosky Type IV defect.

Oral Presentation: FPOP4.07

Topic: Arthroplasty

Acetabular Revision Arthroplasty Based on 3-Dimensional Reconstruction Technology Using Jumbo Cups

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Background

This study aimed to evaluate acetabular cup coverage (CC) and changes in vertical/horizontal centers of rotation (V-COR, H-COR) following jumbo cup reconstruction in acetabular revision arthroplasty.

Methods

Between September 2017 and October 2022, 60 patients presenting with failed primary total hip arthroplasty were enrolled. 20 participants with Paprosky I defects, 20 with type II, and 20 with type III. A control cohort of healthy hips from 20 individuals was established for comparative analysis. Pelvic CT scans were acquired for three-dimensional reconstruction. Bone segmentation was performed using Mimics Research 21.0 (Materialise), with virtual jumbo cup placement simulated using computer-assisted planning software. Key parameters, including cup anteversion, inclination angle, CC, and V-COR/H-COR, were quantitatively assessed.

Results

Postoperative V-COR changes from preoperative values were significantly lower in the intervention group compared to controls (1.69 ± 0.83 mm vs. -2.13 ± 4.07 mm; $P < 0.001$), with a mean V-COR decrease of 2.13 mm postoperatively. H-COR changes from preoperative values also differed significantly between groups (-4.74 ± 1.05 mm vs. 0.84 ± 3.26 mm; $P < 0.001$), with a mean lateral shift of 0.84 mm in the intervention group. When comparing postoperative to contralateral V-COR, the intervention group exhibited a significant increase compared to controls (1.69 ± 0.87 mm vs. 6.07 ± 4.99 mm; $P < 0.001$), with a mean postoperative V-COR elevation of 6.07 mm. The V-COR increase in Paprosky III defects was significantly greater than in Paprosky I ($P < 0.001$) and Paprosky II defects ($P = 0.001$). Postoperative H-COR in the intervention group showed a mean medial shift of 3.35 mm relative to the contralateral hip ($P < 0.05$). CC following jumbo cup revision arthroplasty was 89.96%, 85.64%, and 80.35% for Paprosky I, II, and III defects, respectively. The bone defect maps of Paprosky type I, II, and III are shown in **Figure 1**, **Figure 2**, and **Figure 3**.

Conclusions

Although jumbo cup use in Paprosky I-III defects reduces initial CC, CC consistently exceeded 70%. However, it is associated with a substantially elevated V-COR relative to the contralateral hip, particularly in Paprosky III defects. These findings should prompt surgeons to consider adjunctive procedures to mitigate excessive V-COR elevation when employing jumbo cup techniques.

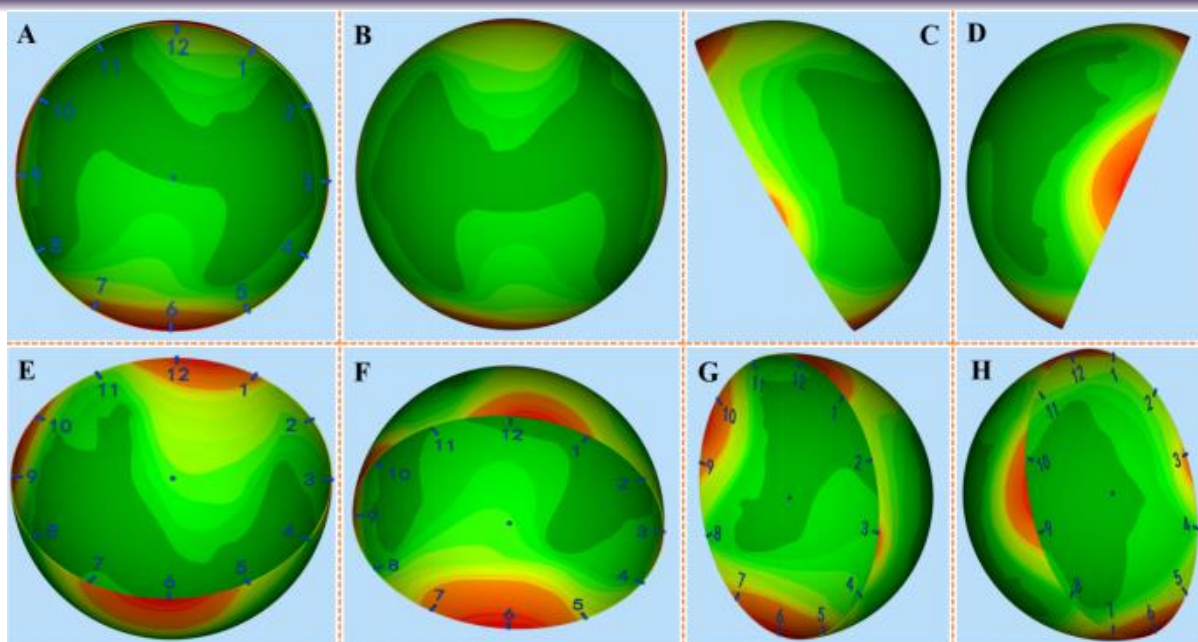


Fig. 1. Bone defect maps of Paprosky I. Green to red indicates that the uncovered frequency ranges from low to high.

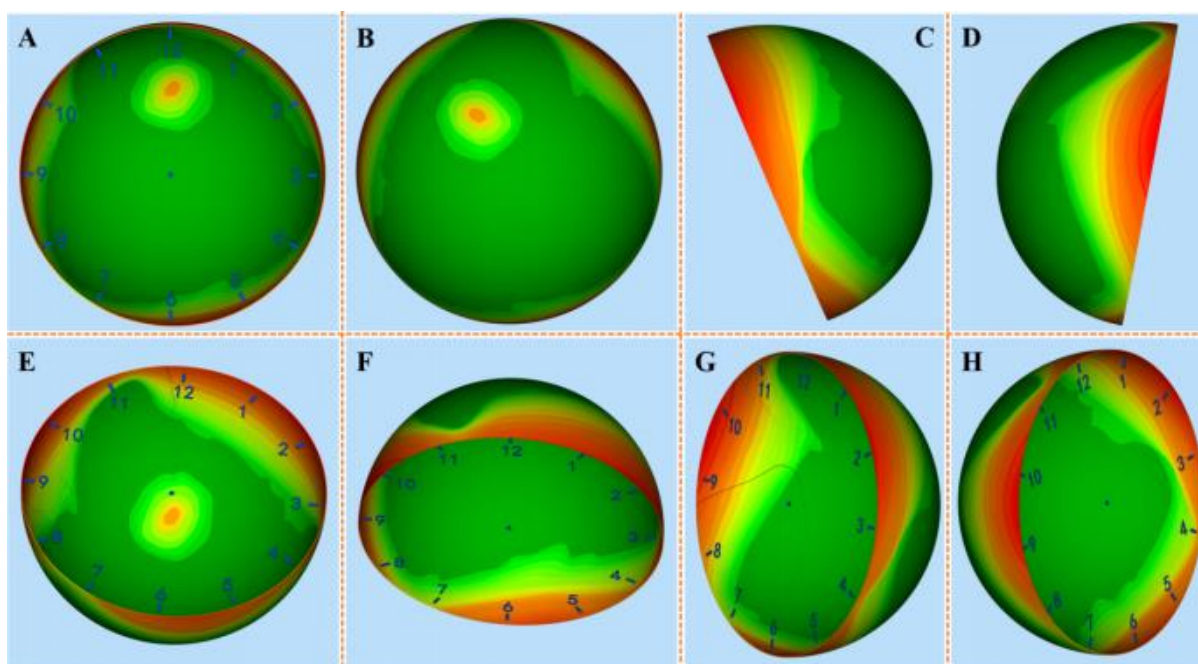


Fig. 2. Bone defect maps of Paprosky II. Green to red indicates that the uncovered frequency ranges from low to high.

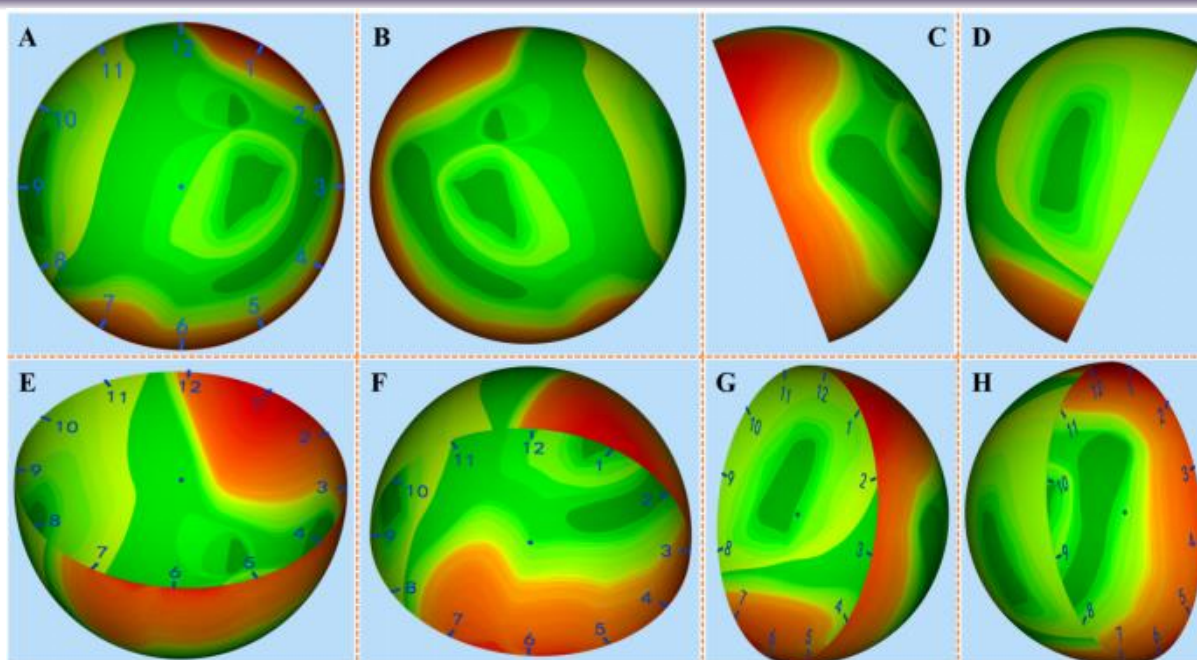


Fig. 3. Bone defect maps of Paprosky III. Green to red indicates that the uncovered frequency ranges from low to high.

Oral Presentation: FPOP4.08

Topic: Arthroplasty

The Customized 3D-Printed Tri-flange in Acetabular Revision

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Background

With the aging population and increasing prevalence of total hip arthroplasty (THA), revision surgeries for aseptic loosening, periprosthetic fractures, and implant-related complications have surged globally. Among these, acetabular bone defects—particularly severe Paprosky type III defects—pose significant challenges due to extensive bone loss and complex anatomical alterations. Traditional methods, such as structural bone grafting, metal augments & cages, or revision cups & “cup on cup”, all have limitations—including suboptimal implant fit, fail to achieve optimal stability and osseointegration, prolonged operative time, and high complication rates. 3D printing technology has emerged as a transformative solution, enabling patient-specific implants tailored to precise anatomical and biomechanical requirements.

Methods

We have designed and operated for 34 patients in last 8 years, by using preoperative CT and X-ray data to replicate patient-specific acetabular defects, work together with the engineers to design and adjust the parameters of the prosthesis, which usually takes days. ensuring meticulous reconstruction of the hip center and optimal load distribution. Their porous titanium alloy structure mimics trabecular bone, promoting osseointegration and reducing stress shielding.

Results

All patients are doing well and accountable, even for those cases with design flaws and the malplacement of the prosthesis.

Anatomical Precision: Custom implants achieve a "perfect fit" for irregular defects, restoring hip biomechanics and alignment. Studies report postoperative acetabular cup abduction angles within the Lewinnek safe zone (40°–49°) and anteversion angles (19°–26°), significantly reducing dislocation risks.

Reduced Operative Time and Morbidity: Preoperative simulations shorten surgery duration (average 151–223 minutes) and blood loss (600–1,500 mL).

Enhanced Osseointegration: Porous structures with pore sizes of 50–500 µm facilitate bone ingrowth, improving long-term stability.

Cost-Effectiveness: While initial manufacturing costs are higher but still a lot cheaper than cage + revision cup + augments, reduced hospital stays and fewer complications offset expenses in the long term.

Conclusions

3D-printed implants allow preoperative surgical simulation, enhancing precision and minimizing intraoperative risks. While challenges remain in material science and accessibility, ongoing advancements promise to solidify their role as a gold standard for complex hip revisions. Future research should prioritize long-term clinical trials and cost-benefit analyses to optimize their global implementation.



Fig. 1. This is the preoperative and postoperative comparison image. The left image shows loosening of the acetabulum and stem, and the bone defect on the acetabular side. Post-op image shows that the hip center and off-set are restored.

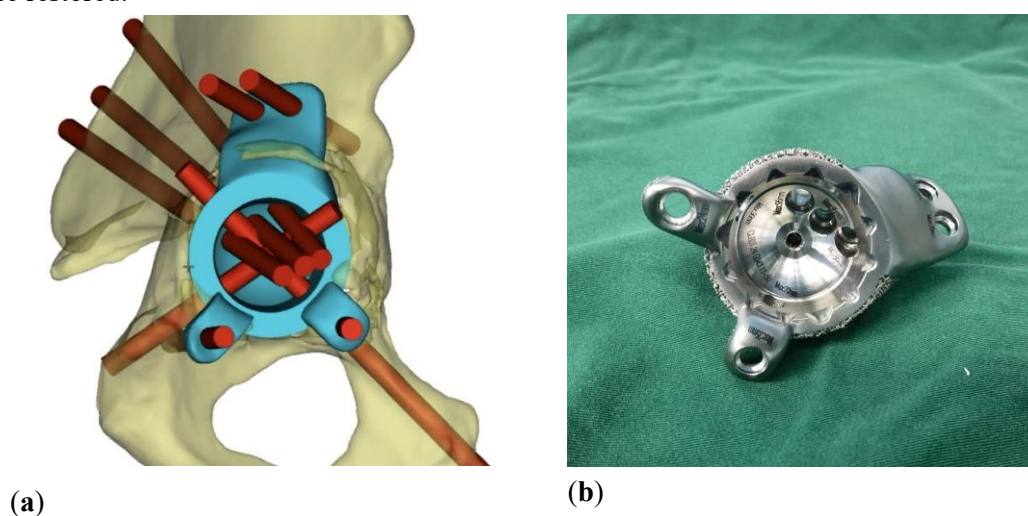


Fig. 2. This figure illustrates the process of 3D design(a) and the final product(b), which incorporates the augment structure for bone defect, the tri-flange design to prevent the prosthesis from collapsing into the pelvis, and all possible screw holes with markers of required screw type (the matching screws are also designed, because they have different screw rods and thread lengths), and all surfaces in contact with bone are 3D-printed to simulated trabecular bone structures.

Oral Presentation: FPOP4.09

Topic: Arthroplasty

Mid-term Outcome of Dual-Mobility Articulation in Revision Hip Arthroplasty of Porous Revision Acetabular Component

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Background

This retrospective study aims to inform of the outcome of cementing dual-mobility articulation in porous revision shell at mid-term follow up.

Methods

From a total of 102 revision hips between 2015 and 2021 in our revision database, we identified 47 cemented dual mobility articulations. Indications for revision total hip arthroplasty (rTHA) included aseptic failure of acetabular shell (n=34), infection (n=7) and dislocation (6). For this study we only included those patients who had cemented dual mobility articulation in a porous revision shell and a minimum of one year follow up.

Results

No complications were noted intra-operatively. There was no dislocation for any of the patient. There was also no radiological evidence of loosening at latest follow up. The mean OHS improved from 24 (SD 13) preoperatively to 42 (SD 15) postoperatively. There has been no revision performed at latest follow up and no peri-prosthetic joint infection.

Conclusions

No complications were noted intra-operatively. There was no dislocation for any of the patient. There was also no radiological evidence of loosening at latest follow up. The mean OHS improved from 24 (SD 13) preoperatively to 42 (SD 15) postoperatively. There has been no revision performed at latest follow up and no peri-prosthetic joint infection.

Oral Presentation: FPOP4.10

Topic: Arthroplasty

Application of Multi-point Fixation Technology and Theoretical System in Joint Revision Surgery: A New Approach for Severe Bone Defects

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Background

With the aging population and increasing incidence of joint diseases, the demand for joint revision surgeries is rising. Traditional techniques for managing severe bone defects in joint revision surgeries, such as structural bone grafting and acetabular reinforcement rings, have limitations in providing adequate initial stability and long-term fixation. The multi-point fixation technology and theoretical system, combined with computer-aided design and 3D printing, offer a promising solution by enabling personalized prosthesis design and enhanced stability.

Methods

A prospective study was conducted on patients with severe bone defects undergoing joint revision surgeries at the Honghui Hospital, Xi'an, China. The study included patients with acetabular bone defects classified as Paprosky III or IV, who were treated with multi-point fixation technology. Preoperative planning involved CT scans for detailed bone defect assessment, followed by personalized prosthesis design using computer-aided design (CAD) software. The prostheses were manufactured using 3D printing with porous tantalum metal, ensuring a high match with the patient's anatomy. The surgical procedure included precise implantation of the prosthesis according to the preoperative plan. Postoperative management involved pain control, infection prevention, and rehabilitation training. Clinical outcomes were assessed using the Harris Hip Score (HHS), visual analog scale (VAS) for pain, and European Quality of Life Five Dimensions Five Levels (EQ-5D-5L) index. Radiographic evaluations were performed to assess prosthesis positioning and bone integration.

Results

A total of 30 patients (35 hips) were included in the study, with an average age of 68 years (range: 55-78 years) and a mean follow-up of 24 months (range: 18-30 months). Preoperatively, the average HHS was 45.6 (range: 38-52), which improved to 89.2 (range: 83-95) postoperatively ($P < 0.001$). The average VAS score decreased from 7.8 (range: 6-9) preoperatively to 1.4 (range: 0-3) postoperatively ($P < 0.001$). The EQ-5D-5L index showed significant improvement in quality of life, with an average score increasing from 0.45 (range: 0.32-0.58) preoperatively to 0.82 (range: 0.75-0.88) postoperatively ($P < 0.001$). Radiographic analysis revealed no signs of prosthesis loosening or radiolucent lines, indicating successful bone integration. No postoperative infections, aseptic loosening, periprosthetic fractures, or dislocations were observed.

Conclusions

The application of multi-point fixation technology and theoretical system in joint revision surgery demonstrates significant improvements in clinical outcomes and patient quality of life. The personalized prosthesis design and enhanced stability provided by this technology offer a viable solution for managing severe bone defects in joint revision surgeries. Further long-term studies are warranted to confirm the durability and efficacy of this approach. This innovation has the potential to revolutionize the management of complex joint revision cases, providing better functional outcomes and reduced complications.

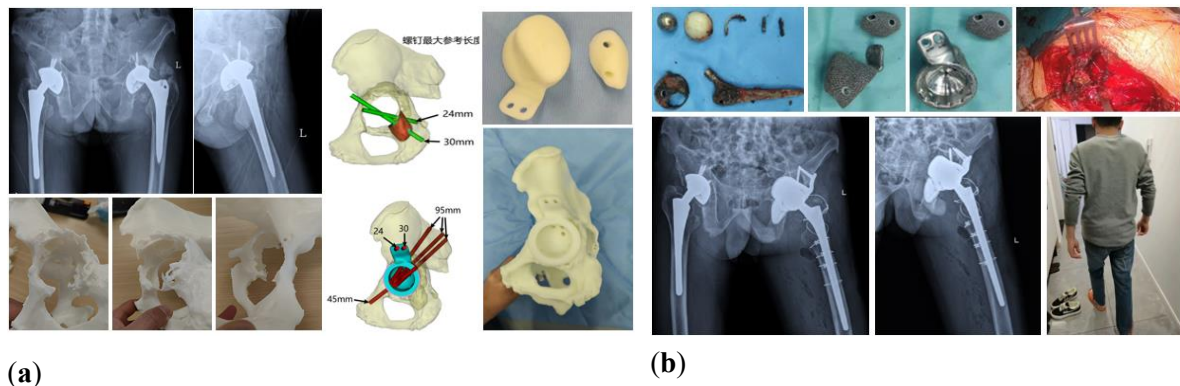


Fig. 1. A 75-year-old male patient with severe acetabular bone defect undergoing hip revision surgery. (a) Preoperative X-ray and 3D model showing severe acetabular bone defect. The personalized prosthesis design was based on the model. (b) Intraoperative findings revealed severe wear of the previous prosthesis and extensive bone defect. Postoperative radiograph at 1 year shows no signs of prosthesis loosening, with good range of motion and satisfactory clinical outcomes.

Oral Presentation: FPOP5.01

Topic: Arthroplasty

Early Clinical and Radiographic Outcome of Robot-Assisted Versus Conventional Total Knee Arthroplasty

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Background

Robot-assisted total knee arthroplasty (TKA) has been introduced to enhance precision in implant positioning and alignment [1]. However, its clinical benefits over conventional TKA remain debated [2]. This study compares early clinical and radiographic outcomes between robot-assisted and conventional TKA.

Methods

A randomized controlled trial was conducted involving 114 patients undergoing primary TKA, with 55 assigned to the conventional technique and 59 to the robot-assisted system (ROSA TKA). Clinical outcomes were assessed using the Knee Society Score (KSS) at 2 weeks, 6 weeks, 3 months, and 6 months postoperatively. Radiographic parameters were evaluated for alignment accuracy and implant positioning.

Results

There were no significant differences in baseline demographics and preoperative KSS. At 2 weeks, the ROSA group demonstrated significantly higher Objective Knee Scores compared to the control group, suggesting better early recovery. This advantage persisted at 6 weeks and 3 months, before converging at 6 months (Table 1).

Table 1 Objective Knee Scores between ROSA and conventional TKA

Timepoint	ROSA Group (Mean ± SD)	Control Group (Mean ± SD)	p- value
Pre-op	52.78 ± 5.2	53.12 ± 5.0	0.742
2 weeks	82.34 ± 3.8	70.12 ± 4.1	0.012
6 weeks	84.21 ± 3.5	73.45 ± 4.3	0.015
3 months	88.56 ± 3.2	85.12 ± 3.7	0.022
6 months	90.34 ± 3.0	89.89 ± 3.1	0.181

For Functional Activities Scores, both groups started with similar pre-op scores. However, at 2 weeks, the ROSA group showed significantly better recovery, particularly in basic mobility. Advanced activities improved more rapidly in the ROSA group at 3 months, but by 6 months, both groups had similar outcomes (Table 2).

Table 2 Functional Activities Scores between ROSA and conventional TKA

Time Point	ROSA TKA (Mean ± SD)	Conventional TKA (Mean ± SD)	p-value
Pre-op	32.45 ± 6.0	32.78 ± 5.9	0.678
2 weeks	50.23 ± 5.6	40.12 ± 6.1	0.009
6 weeks	58.76 ± 5.2	48.23 ± 5.8	0.027
3 months	68.34 ± 4.8	67.89 ± 5.0	0.048
6 months	75.12 ± 4.5	74.89 ± 4.7	0.103

Alignment and stability scores were similar across all patients and post-op follow ups, indicating comparable benefit in both groups.

Conclusions

This study highlights the benefits of robotic-assisted TKA in early postoperative recovery. These advantages were most evident at 2 weeks and 3 months but diminished by 6 months, where both groups achieved similar functional and satisfaction outcomes. ROSA TKA provides an advantage in early recovery. However, by 6 months, both robotic-assisted and conventional TKA show comparable outcomes in overall KSS.

Reference

1. Xu J et. al. Orthop Surg. 2022;14(9):1972-80.
2. Gunaratne R et. al. J Arthroplasty. 2017;32(12):3854-60.

Oral Presentation: FPOP5.02

Topic: Arthroplasty

Robotic-Assisted Functional Alignment with Adjusted Mechanical Alignment in Total Knee Arthroplasty: Shifts in CPAK Phenotypes and Clinical Implications

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Background

Total knee arthroplasty (TKA) remains the gold standard for end-stage knee osteoarthritis and complex deformities, where optimal alignment and soft-tissue balance are critical for long-term success. With the growing adoption of robotic-assisted surgery, functional alignment (FA) —prioritizing soft-tissue equilibrium—has gained traction. However, debates persist regarding unrestricted FA and the implementation/outcomes of restricted FA. This study investigates the influence of FA integrated with adjusted mechanical alignment (aMA) on postoperative CPAK classification changes and its clinical implications.

Methods

From May 2023 to October 2024, a prospective cohort of robotic-assisted TKA patients was retrospectively evaluated. FA+aMA ($\leq 3^\circ$ neutral alignment) was performed using a robotic system, with 101 well-balanced cases (medial/lateral and flexion/extension gap differences < 2 mm) included. All procedures utilized posterior cruciate-stabilizing implants. Pre- and postoperative full-leg radiographs were analyzed by three independent observers to measure: lateral distal femoral angle (LDFA), medial proximal tibial angle (MPTA), arithmetic hip-knee-ankle angle (aHKA = MPTA – LDFA), and joint line obliquity (JLO = MPTA + LDFA). CPAK classification was determined pre- and postoperatively, and comparative analysis was conducted^[1].

Results

Mean patient age was 70.4 years, with 17 males and 86 females. Mean follow-up was 6.5 months. Knee Society Score improved from 57.25 ± 2.20 preoperatively to 89.82 ± 3.1 at final follow-up ($P < 0.001$).

1. CPAK I (n=48, 48%): Pre- vs. postoperative: LDFA (88.60° vs. 91.30° , $P < 0.05$), MPTA (81.02° vs. 88.74° , $P < 0.05$), aHKA (-7.57° vs. -2.56° , $P < 0.05$), JLO (169.62° vs. 180.04° , $P < 0.05$). Preoperative varus alignment with distal joint line apex shifted postoperatively to residual mild varus and neutral joint line (CPAK IV).

2. CPAK II (n=19, 19%): LDFA (85.67° vs. 90.80° , $P < 0.05$), MPTA (85.56° vs. 89.44° , $P < 0.05$), aHKA (-0.11° vs. -1.36°), JLO (171.23° vs. 180.24° , $P < 0.05$). Preoperative neutral alignment with distal joint line apex transitioned postoperatively to neutral alignment and horizontal joint line (CPAK V).

3. CPAK III (n=22, 22%): LDFA (82.57° vs. 89.76° , $P < 0.05$), MPTA (88.16° vs. 89.73°), aHKA (5.60° vs. -0.029° , $P < 0.05$), JLO (170.73° vs. 179.50° , $P < 0.05$). For valgus-aligned patients, we advocate complete correction of residual valgus deformity to achieve neutral mechanical alignment. Preoperative valgus alignment with distal joint line apex achieved postoperatively near-neutral alignment and horizontal joint line (CPAK V).

4. CPAK IV (n=8, 8%): MPTA (86.35° vs. 89.21°, $P < 0.05$), aHKA (-7.64° vs. -1.75°, $P < 0.05$). Preoperative varus alignment with horizontal joint line shifted postoperatively to restored (residual mild) varus with horizontal joint line (CPAK V).
5. CPAK V (n=4, 4%): Postoperatively, CPAK V patients remained classified as type V.
6. Given the small cohort size, no other CPAK phenotypes were observed, aligning with reports in the literature (Fig 1).

Conclusions

Robotic-assisted FA+aMA facilitates balanced gap optimization in TKA. While preserving soft-tissue equilibrium, varus and valgus deformities were corrected to within 3° of neutral alignment, with joint line restoration shifting postoperative CPAK classification predominantly to types IV and V. This approach demonstrates reproducible alignment precision and functional improvement, supporting its role in personalized TKA planning.

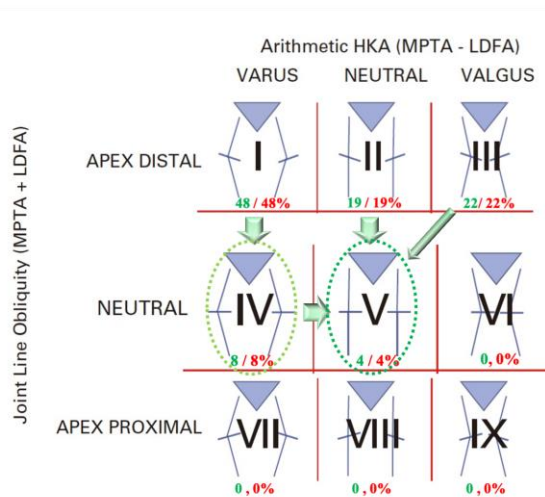


Fig. 1. Preoperative CPAK Phenotype Distribution and Postoperative Transition Patterns.

The chart illustrates the preoperative CPAK classification profile (Type I: 48%, Type II: 19%, Type III: 22%, Type IV: 8%, Type V: 4%; no other phenotypes observed). Postoperatively, Type I cases predominantly transitioned to Type IV, while Types II, III, and IV converged toward Type V. Native Type V phenotypes remained unchanged.

References

- [1] MacDessi SJ, Griffiths-Jones W, et al. Coronal Plane Alignment of the Knee (CPAK) classification. Bone Joint J. 2021;103-B(2):329-337.

Oral Presentation: FPOP5.03

Topic: Arthroplasty

Comparing Serum Systemic Inflammatory Biomarkers in Bone-Milling Robotic-Assisted Total Knee Arthroplasty Vs. Conventional Total Knee Arthroplasty: A Prospective Randomized Controlled Trial

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Background

The use of bone-milling in robotic-assisted total knee arthroplasty (RA-TKA) is regarded as a refined technique that enhances surgical precision while minimizing trauma to periarticular soft tissues. In contrast, conventional TKA relies on a saw blade, which is more likely to cause soft tissue injury. This prospective randomized controlled trial aimed to compare (1) serum systemic inflammatory biomarkers as the primary outcome, with secondary outcomes including (2) tourniquet time, (3) estimated blood loss, (4) radiographic alignment, and (5) clinical outcomes between bone-milling RA-TKA and conventional TKA.

Methods

A total of 60 patients were included: 30 patients underwent bone-milling robotic-assisted total knee arthroplasty, and 30 patients underwent conventional TKA; all procedures were performed by a single surgeon. Serum systemic inflammatory biomarkers, including interleukin-6, erythrocyte sedimentation rate, C-reactive protein, creatine kinase, and lactate dehydrogenase were measured preoperatively and postoperatively at 6 h, 1 d, 3 d, 2 weeks, and 6 weeks.

Results

Neither RA-TKA nor conventional TKA showed statistically significant differences in serum systemic inflammatory biomarker levels at any postoperative time point. Radiographic alignments were more accurate in the RA-TKA group. However, RA-TKA was associated with longer tourniquet times. The Knee Society Score and visual analogue scale scores showed no statistically significant intergroup differences.

Conclusion

Besides the more accurate radiographic alignment in the bone-milling RA-TKA compared to conventional TKA, there were no differences in soft tissue injury and short-term clinical outcomes.

Keywords: Robotic-assisted total knee arthroplasty; inflammation; tourniquet time; blood loss; radiographic alignment; bone-milling

Table I. Table showing serum systemic inflammatory biomarkers in conventional total knee arthroplasty and robotic-assisted total knee arthroplasty.

	Preoperative			6 hours			Day 1			Day 3			Week 2			Week 6		
	C-TKA	RA-TKA	p-value*	C-TKA	RA-TKA	p-value*	C-TKA	RA-TKA	p-value*	C-TKA	RA-TKA	p-value*	C-TKA	RA-TKA	p-value*	C-TKA	RA-TKA	p-value*
IL-6	2.76 (2.12)	2.38 (1.58)	0.437	15.34 (7.80)	14.58 (8.74)	0.727	29.65 (30.08)	42.19 (48.35)	0.232	16.69 (16.58)	15.71 (12.60)	0.801	6.55 (5.20)	5.39 (4.63)	0.379	4.54 (3.88)	4.21 (4.78)	0.773
ESR	27.2 (13.0)	29.7 (17.9)	0.545	20.6 (13.3)	22.1 (18.1)	0.710	20.9 (12.4)	22.1 (14.8)	0.714	35.0 (19.1)	36.7 (17.7)	0.734	41.8 (16.9)	44.9 (21.4)	0.548	35.7 (16.7)	37.5 (23.8)	0.750
CRP	1.78 (1.88)	1.32 (1.12)	0.248	2.95 (3.65)	1.56 (1.56)	0.059	16.95 (14.89)	16.81 (13.57)	0.747	35.73 (55.21)	29.08 (29.15)	0.566	13.39 (17.58)	7.53 (9.17)	0.122	3.06 (2.31)	2.66 (2.44)	0.523
CK	130.6 (89.7)	132.6 (104.0)	0.936	211.7 (91.2)	262.0 (134.2)	0.099	413.4 (225.9)	479.4 (268.6)	0.308	317.7 (207.2)	367.8 (264.7)	0.427	63.3 (30.2)	58.4 (36.7)	0.579	88.7 (54.1)	76.9 (43.4)	0.370
LDH	254.6 (115.6)	260.8 (144.6)	0.856	256.8 (75.1)	287.0 (138.2)	0.299	262.9 (71.8)	245.6 (58.3)	0.308	278.5 (72.5)	260.7 (73.4)	0.359	298.9 (113.0)	303.9 (91.9)	0.856	247.6 (69.1)	229.5 (46.7)	0.252

*Independence t-test. TKA, total knee arthroplasty; RA-TKA, robotic-assisted total knee arthroplasty; C-TKA, conventional total knee arthroplasty; IL-6, interleukin-6; ESR, erythrocyte sedimentation rate; CRP, C-reactive protein; CK, creatine kinase; LDH, lactic dehydrogenase.

Table II. Table showing intraoperative outcomes and postoperative radiographic parameters in RA-TKA and conventional TKA.

Characteristics *	RA-TKA (n=30)	Conventional TKA (n=30)	p-value
Postoperative Hct, % (SD)	36.6 (3.8)	36.9 (3.3)	0.729
Tourniquet time, mins (SD)	121.4 (15.3)	95.0 (13.3)	<0.001
Calculated EBL, ml (SD)	247.0 (239.2)	265.3 (207.5)	0.753
Postoperative clinical outcomes			
VAS score	1.3 (1.5)	1.6 (1.9)	0.508
Postoperative KSS score			
Knee score	51.3 (13.8)	46.1 (10.8)	0.114
Functional score	77.6 (9.8)	75.2 (13.8)	0.448
Patient satisfaction score	34.9 (5.3)	36.2 (5.0)	0.350
Patient expectation score	13.2 (2.6)	14.0 (2.2)	0.240

*independence t-test

Hct, hematocrit; EBL, estimated blood loss.

Table III. Table showing postoperative radiographic parameters between RA-TKA and conventional TKA.

Radiographic parameters *	RA-TKA (n=30)	Conventional TKA (n=30)	p-value
HNA, ° varus (SD)	0.3 (2.4)	2.8 (3.4)	0.002
LDFA, ° (SD)	91.0 (1.9)	92.4 (2.8)	0.030
MPTA, ° (SD)	90.8 (1.5)	89.9 (2.1)	0.047
TFA, ° (SD)	5.4 (2.0)	3.2 (2.8)	0.001
sFCA, ° (SD)	3.4 (1.9)	2.7 (2.1)	0.192
sTCA, ° (SD)	1.8 (1.4)	5.0 (2.6)	<0.001

*independence t-test

HKA, hip-knee-ankle angle; LDFA, lateral distal femoral angle; MPTA, medial proximal tibial angle; TFA, tibiofemoral angle; sFCA, sagittal femoral component angle; sTCA, sagittal tibial component angle.

Oral Presentation: FPOP5.04

Topic: Arthroplasty

Novel Technique of Kinematic Alignment Total Knee Arthroplasty Using VELYS™ Robotic-Assisted Solutions

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Background

Robotic-assisted total knee arthroplasty (TKA) offers precision and potential improvements in early functional recovery. While robotic assistance has clearly advanced alignment precision in TKA, particularly in mechanical alignment (MA) and functional alignment (FA) workflows, it is important to note that robotic kinematic alignment (robotic KA) remains uncommon and under-validated. We have developed a novel technique for performing KA robotic-assisted TKA using a VELYS™, an imageless, table-mounted robotic system and presents its early outcomes.

Methods

This is a retrospective, single-center study of 50 knees from 49 patients who underwent robotic-assisted kinematically aligned total knee arthroplasty (KA-TKA) between 30 January 2024 and 3 July 2024. The first 10 patients were excluded from this analysis as they were considered part of the learning curve for the surgeon adopting this novel technique. Demographic data such as age, gender, height, weight, and body mass index (BMI) were recorded and analyzed. Patients were assessed on postoperative day one (POD1) and at six months. Functional knee parameters, including range of motion (ROM), walking distance, and alignment, were recorded. Pain scores using the visual analogue scale (VAS) were assessed at rest and during movement. Patient-reported outcome measures (PROMs), including the Short-Form 36 (SF-36), Knee Society Knee Score (KSKS), Knee Society Function Score (KSFS), and Oxford Knee Score (OKS), were evaluated. The minimal clinically important difference (MCID) was used for PROMs, and the number of patients achieving MCID for each score was recorded.

Results

The mean age was 69.4 years (SD 7.1), with a predominance of female patients (n = 32, 64%). The cohort had a mean height of 158.5 cm (SD 8.6), mean weight of 68.4 kg (SD 13.9), and a mean BMI of 27.3 kg/m² (SD 4.6). Surgical laterality was relatively balanced, with 56% (n = 28) undergoing right-sided TKA. On POD1, early functional outcomes were assessed. The mean ROM was 70.4° (SD 20.2), with a mean extension of 4.2° (SD 4.1) and flexion of 74.6° (SD 18.7). The mean walking distance was 19.0 meters (SD 13.2). Pain scores measured using the VAS showed a mean of 1.14 (SD 1.60) at rest and 3.36 (SD 2.05) during movement. At six months postoperatively, a large proportion of patients achieved MCID. Specifically, 86% achieved MCID for the OKS, and 68% reached MCID for the KSKS, demonstrating restoration of knee-specific performance. Improvements extended to broader physical and mental health, with 62% and 36% achieving MCID in the SF-

36 Physical Component Summary (PCS) and Mental Component Summary (MCS), respectively. However, only 18% achieved MCID for the KSFS, a measure heavily weighted toward demanding activities such as stair climbing.

Conclusions

This preliminary report suggests that robotic KA-TKA yields promising results, particularly in the early postoperative period.

Oral Presentation: FPOP5.05

Topic: Arthroplasty

Comparison of Early Postoperative Outcomes Between VELYS and MAKO Robotic-Assisted Total Knee Arthroplasty

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Background

Robotic-assisted total knee arthroplasty (TKA) offers precision and potential improvements in early functional recovery. While robotic-assisted TKA has been widely studied, no research to date has specifically evaluated immediate postoperative outcomes, especially on postoperative day one. This study aims to compare early functional recovery between VELYS and MAKO robotic systems and to assess how changes in Coronal Plane Alignment of the Knee (CPAK) influence these early outcomes.

Methods

A total of 326 patients were included in this retrospective analysis from January 2024 to January 2025, with 177 undergoing VELYS and 149 undergoing MAKO robotic-assisted TKA. The cohort comprised 210 females and 116 males, with an almost equal distribution of surgical laterality (167 left, 159 right). The mean age was 69.1 years (SD 7.6), height 157.8 cm (SD 8.8), weight 68.1 kg (SD 14.8), and BMI 27.3 kg/m² (SD 5.0). Early postoperative outcomes assessed on day one included pain scores using the Visual Analogue Scale (VAS), range of motion (ROM), and walking distance.

Results

No significant differences were observed between the VELYS and MAKO groups for VAS during movement (VELYS 3.80 vs. MAKO 4.07) or ROM (VELYS 68.9° vs. MAKO 70.2°) on postoperative day one (Table 1). However, VELYS patients reported significantly lower VAS at rest (1.08 vs. 1.46) and achieved greater walking distances (20.6 m vs. 16.7 m) compared to MAKO patients.

Assessment	Robot	Frequency (n)	Mean	SD	P-value
VAS at rest	VELYS	177	1.08	1.49	0.030
	MAKO	149	1.46	1.63	
VAS during movement	VELYS	177	3.80	2.10	0.276
	MAKO	149	4.07	2.28	
Range of movement (°)	VELYS	177	68.89	22.50	0.591
	MAKO	149	70.17	20.06	
Walking distance (m)	VELYS	177	20.58	18.39	0.026
	MAKO	149	16.66	12.04	

For CPAK alignment analysis, only 221 patients were included due to the absence of long limb radiographs in the remaining cases. Changes in CPAK were not associated with significant differences in VAS at rest, VAS during movement, or walking distance (Table 2). However, patients with retained CPAK alignment demonstrated superior ROM (74.1° vs. 67.1°).

Assessment	CPAK Change	Frequency (n)	Mean	SD	P-value
VAS at rest	No	120	1.05	1.38	0.212
	Yes	101	1.30	1.55	
VAS during movement	No	120	3.80	2.03	0.561
	Yes	101	3.97	2.32	
Range of movement (°)	No	120	74.06	19.07	0.013
	Yes	101	67.13	21.89	
Walking distance (m)	No	120	21.81	19.87	0.079
	Yes	101	17.89	12.84	

Conclusions

VELYS and MAKO robotic-assisted TKA systems yield comparable early outcomes in pain during movement and ROM. VELYS may offer advantages in pain at rest and early ambulation. CPAK alignment retention appears to contribute to improved early postoperative ROM.

Oral Presentation: FPOP5.06

Topic: Arthroplasty

Comparison of Postoperative Knee Laxity and Clinical Outcomes Between Anatomically Aligned and Mechanically Aligned Robotic-Arm Assisted Total Knee Arthroplasty in Severe Osteoarthritis Patients

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Background

Mechanically aligned total knee arthroplasty (TKA) has been gold standard of total knee arthroplasty for decades. However, only a few people have neutral mechanical alignment of knee before TKA. Recently, with the assistance of robotic systems, anatomically aligned TKA has been gaining attention. However, to date, there are few studies evaluating the medio-lateral gap laxity based on different alignments and their clinical outcomes. Therefore, the purpose of this study was to compare knee laxity and clinical outcomes between anatomically aligned TKA and mechanically aligned TKA.

Methods

We retrospectively reviewed 157 patients who were diagnosed with severe osteoarthritis and underwent robotic-arm assisted TKA (MAKO®, Stryker, Michigan, USA) from October 2021 to May 2022. We excluded patients as following: eight patients due to insufficient data, seven patients with rheumatoid arthritis, and two patients with post-traumatic osteoarthritis. We finally included 140 patients into 4 groups according to the type of alignment aimed in operation; mechanical alignment (n=19), adjusted mechanical alignment (n=40), adjusted anatomical alignment (n=38), and anatomical alignment (n=43). We defined medial and lateral laxity using intraoperative gap measure under varus, valgus stress and no stress. Demographic, radiographic, clinical outcomes (pain numeric rating scale, Knee Society Scores, WOMAC, Forgotten Joint Score, Kujala score) and knee laxity were compared among the groups.

Results

There was no difference between groups in demographic, preoperative radiographic and preoperative clinical outcomes. In groups with adjusted anatomical alignment and anatomical alignment, extension lateral laxity was significantly larger than extension medial laxity. Mechanical alignment group showed extension lateral laxity in significantly smaller number of knees than other groups, when extension lateral laxity was categorized by 2mm. At three months after TKA, the Forgotten Joint Score was statistically significantly higher in the anatomically aligned TKA group. However, there were no statistical differences in other clinical scores at this time point. There were no statistical differences between any of the clinical scores at 1 year after TKA. However, no statistical correlation was found between the Forgotten Knee Joint Score at three months after TKA and the lateral laxity in extension and flexion.

Conclusions

With the application of robotic-arm assisted total knee arthroplasty, a medio-lateral gap analysis was able to be performed. Among the various alignment aimed at total knee arthroplasty, extension lateral laxity was larger than extension medial laxity in the groups with adjusted anatomical alignment and anatomical alignment. Additionally, at the three months after TKA, the Forgotten Joint Score was significantly higher in the anatomical aligned TKA group. Further studies involving a large number of participants and a longer follow-up period are needed.

Oral Presentation: FPOP5.07

Topic: Arthroplasty

Robotic-Assisted Total Knee Arthroplasty in the Presence of Extra-Articular Deformity – Reducing Complexity and Cost

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Background

Performing total knee arthroplasty (TKA) in the setting of significant extra-articular deformity remains a technically challenging endeavour, with distorted bony anatomy and pre-existing hardware often compromising optimal implant placement with conventional TKA techniques. The introduction of robotic systems for TKA has led to improvements in the accuracy and reproducibility of bone resection and component placement, allowing surgeons to overcome many of the limitations of conventional TKA techniques in this setting.

Methods

We reviewed a series of 12 robotic-assisted TKAs performed on patients with underlying tibial metaphyseal and diaphyseal deformities, distal femoral deformities, and retained implants. All patients underwent a single-stage primary TKA with the MAKO robotic system, with pre-operative planning based on a 3D CT model of the patients' knees. Patients were followed up for two years post-operatively with standard weight bearing radiographs of the knees, full length lower extremity radiographs, as well as functional scores. Cost-effectiveness analysis was performed for selected cases, evaluating the cost of a single-stage robotic assisted TKA against a two-stage conventional TKA.

Results

All 12 patients underwent a single-stage robotic-assisted TKA without need for revision at the time of latest follow up. Radiographically, an average mechanical axis correction of 8.7 degrees was achieved, and all patients were noted to have significant improvements in functional scores and quality of life measures at the two-year follow up mark. Significant cost savings were demonstrated for cases that utilised the MAKO robotic system to perform a single-stage TKA instead of a conventional two-stage procedure.

Conclusions

Our experience demonstrates the utility of robotic-assisted TKAs in achieving optimal and cost-effective surgical outcomes in the setting of complex extra-articular deformities, with the aid of enhanced pre-operative surgical planning and intra-operative surgical feedback and guidance through the MAKO robotic system.

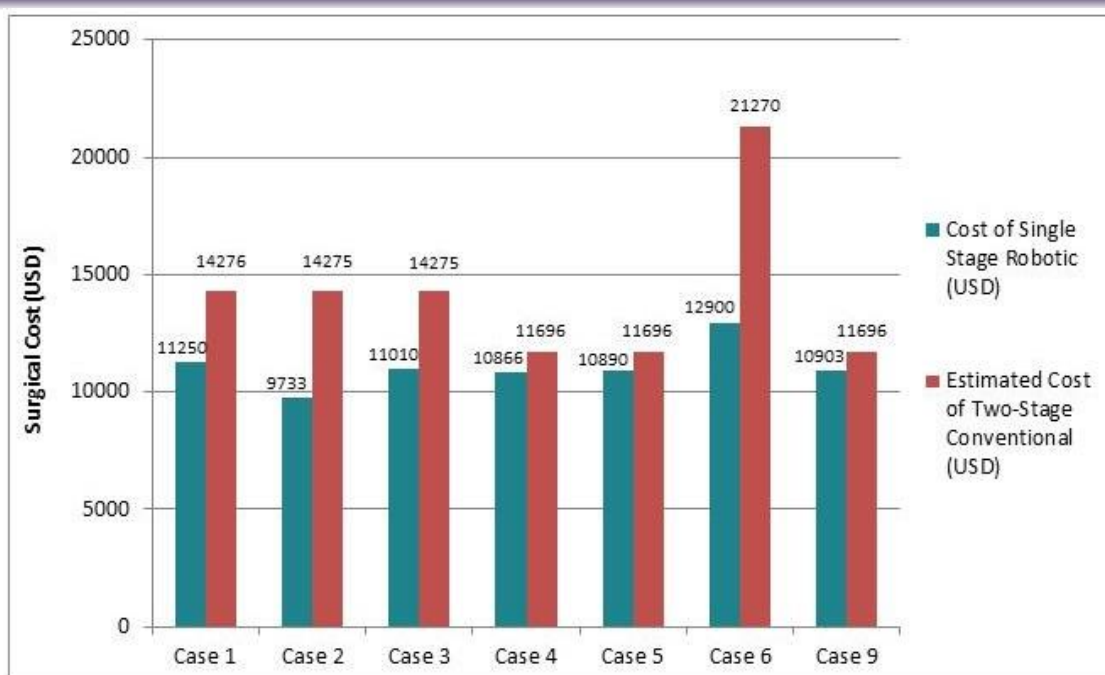


Fig. 1.

Illustrating the estimated cost savings in select cases with the use of robotic assistance to perform a single-stage procedure, compared to the estimated costs of a two-stage conventional procedure

Case Number	Nature of Extra-Articular Deformity	Description of Deformity	Pre-operative Range of Motion	Pre-operative Mechanical Axis	Post-operative Mechanical Axis
Category A: Retained Implant					
1	Retained Implant	Previous ORIF with LISS Plating of distal femur	0 – 90	Valgus 4.2	Varus 0.8
2	Retained Implant	Previous Intramedullary Nailing for femoral shaft fracture	16-110	Varus 6.0	Valgus 1.1
3	Retained Implant	Previous high tibial osteotomy (medial opening wedge) with retained implant	0-120	Valgus 3.5	Valgus 2.0
4	Retained Implant	Previous high tibial osteotomy (medial opening wedge) with retained implant	10-120	Varus 2.9	Varus 0.8
5	Retained Implant	Previous high tibial osteotomy (lateral closing wedge) with retained implant	10-120	Varus 13.1	Varus 2.5

Category B: Extra-Articular Femoral Deformity					
6	Femoral	Distal femur fracture with severe varus malunion deformity	10-92	Varus 25.3	Varus 7.5
Category C: Extra-Articular Tibial Deformity					
7	Tibial metaphyseal	Previous high tibial osteotomy (lateral closing wedge)	10 - 100	Varus 10	Valgus 1.7
8	Tibial metaphyseal	Schatzker V tibia plateau fracture	-5 – 102	Varus 12	Valgus 3.4
9	Tibial metaphyseal	Previous high tibial osteotomy (lateral closing wedge) with retained implants	5-100	Varus 3.2	Varus 1.1
10	Tibial diaphyseal	Previous tibia shaft fracture with shortening	5-105	Varus 10.7	Valgus 1.4
11	Tibial diaphyseal	Previous tibia shaft fracture	-5 - 102	Valgus 2.4	Valgus 3.5
12	Tibial diaphyseal	Tibia bowing with angular deformity of tibia diaphysis (etiology unknown)	0 - 95	Varus 5.1	Varus 0.5

Table 1. Details of the type of knee deformities encountered in each of the 12 cases in our series

Oral Presentation: FPOP5.08

Topic: Arthroplasty

Immersive Virtual Reality Simulation Training Enhances Technical Skill Acquisition and Procedural Accuracy in Cadaveric Total Knee Arthroplasty

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Background

Although immersive virtual reality (iVR) is used for training in various surgical procedures, its efficacy in complex multistep orthopaedic surgeries is less established [1]. iVR training allows surgical trainees to be able to better achieve skills in important steps in surgical procedures [2]. The aim of this study was to evaluate the effectiveness of iVR simulation training in comparison to the surgical technique guide and video for fixed-bearing total knee replacement (TKA).

Methods

Twenty-two orthopaedic surgery residents from a local university were randomized into two groups: one receiving surgical training for TKA using a surgical technique guide and instructional video (control group, CG), and the other using an iVR training module (VR group). Following the training, participants performed TKA on cadavers with standardized surgical instruments and implants. Subjective and objective data were collected before, during and after the procedure. Two blinded evaluators were tasked to obtain objective data during cadaver dissection.

Results

Residents from a single institution were randomized equally (n=11) in the VR and CG groups. VR group achieved significantly higher scores in instrument handling and flow of operation compared to CG group on the Objective Structured Assessment of Technical Skills (Table 1). VR group performed significantly better than CG group in procedure-based assessment (VR 4.3 vs CG 2.9, $p < 0.001$). VR group achieved significantly higher mean score for correct steps performed than CG group (VR 29.7 ± 2.9 , CR 25.8 ± 5.8 , $p = 0.05$). Although VR group completes the procedure faster (54.8 ± 14.8 min), this was not found to be statistically significant when compared to CG (55.4 ± 10.9 min, $p = 0.93$). The VR group would recommend this training method to other trainees and acknowledged that it significantly increased their confidence in performing TKA.

Conclusions

Although there was no significant difference in TKA completion times between VR and control groups, the VR group demonstrated superior performance in specific skill assessments and executed a higher number of TKA procedural steps correctly. Positive trainee feedback suggests iVR training is well-received and has potential for enhancing surgical education in orthopedics.

Table 1. Surgical performance of participants

	Control group (min)	Virtual Reality group (min)	p-value
Operative time	55.4 (10.9)	54.8 (14.8)	0.93
Procedure specific checklist			
Total score (max 35)	25.8 (5.8)	29.7 (2.9)	0.05
Global assessment categories			
Respect for tissue	3.1 (0.7)	3.6 (0.5)	0.10
Time and motion	2.7 (0.7)	3.1 (0.9)	0.31
Instrument handling	2.5(0.7)	3.3 (0.5)	0.01
Knowledge of instruments	2.7 (0.8)	3.0 (0.8)	0.49
Flow of operation	2.7 (0.5)	3.5 (0.8)	0.02
Use of assistants	2.8 (0.9)	3.3 (0.8)	0.24
Knowledge of specific procedure	2.9 (0.9)	3.4 (0.8)	0.10
Procedure-based assessment			
Global summary score	2.9 (0.8)	4.3 (0.6)	<0.01

References

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Oral Presentation: FPOP6.01

Topic: Arthroplasty

Risk Factors and Management Strategies for Tibial Plateau Fractures Following Unicompartmental Knee Arthroplasty: A Retrospective Cohort Study and Literature Review

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Background

To investigate the pathogenesis and clinical management of tibial plateau fractures (TPF) following unicompartmental knee arthroplasty (UKA) and provide evidence-based recommendations for optimizing perioperative care.

Methods

A retrospective analysis was conducted on 752 UKA cases (May 2018–October 2024), identifying 5 TPF cases (incidence: 0.66%). Interventions included: revision to total knee arthroplasty (TKA, n=1), proximal tibial screw fixation (n=1), and conservative management (n=3; 2 cases with 6-week restricted weight-bearing, 1 case diagnosed delayedly but radiologically healed at 3 months). A systematic literature review (PubMed/EMBASE, keywords: UKA, tibial fracture, complications) was performed for evidence synthesis.

Results

At a mean follow-up of 6 months (range: 3–12 months), all patients achieved knee flexion $\geq 120^\circ$ without pain recurrence, implant loosening, or fracture displacement. Literature analysis identified critical risk factors: Reduced bone density (T-score < -2.5 , OR=4.3). Prosthesis-tibial size mismatch (OR=3.8). Surgical technical factors (excessive keel preparation, stress concentration from fixation pin holes, posterior cortical breach). Intraoperative over-impaction (≥ 3 adjustments). Treatment selection depended on fracture displacement (> 5 mm favoring surgery), implant stability, and bone quality.

Conclusions

Although rare ($< 1\%$), post-UKA TPF may lead to catastrophic outcomes. Its occurrence correlates with bone quality, implant selection, and surgical precision. A stepwise treatment strategy based on AO/OTA classification is recommended: Type I (non-displaced): Conservative management. Type II (partial displacement): Screw/plate fixation, Type III (complete displacement with implant failure): Revision to TKA.

Oral Presentation: FPOP6.02

Topic: Arthroplasty

An Innovative Approach Using Intraoperative CT to Assess Accuracy in Patient-Specific Instrumentation Assisted TKA: Comparing Osteotomy Plane with Preoperative Planning

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Background

Patient-specific instrumentation (PSI) in total knee arthroplasty (TKA) holds promise for achieving accurate prosthesis alignment, but its precision remains controversial due to limitations in traditional evaluation methods. The key issue is whether PSI enables accurate execution of the planned resections. To date, no in vivo studies have directly validated PSI by comparing osteotomy planes. This prospective study aimed to address this issue by using intraoperative CT, to quantify angular discrepancies between the intraoperative osteotomy and the preoperative 3-D planning.

Methods

In this prospective study, intraoperative CT scan images of 52 knees were obtained during TKA procedure. 3-D models were created based on these intraoperative images and superimposed on the preoperative planning models. Angular discrepancies were quantified and the proportion of outliers of the femur and tibia in coronal, sagittal, axial planes, as well as united femorotibial angles (UFTA) were evaluated, in order to verify whether this PSI system can precisely replicate the preoperative planning.

Results

On the femoral side, the absolute value of the coronal angle discrepancy was $0.87 \pm 0.65^\circ$, with an outlier ratio of 1.96%, sagittal was $2.09 \pm 2.00^\circ$, 21.57%, and axial was $1.45 \pm 1.26^\circ$, 17.65%. For the tibial osteotomy, coronal was $1.38 \pm 0.93^\circ$, 4.08%, sagittal was $2.18 \pm 1.98^\circ$, 26.53%, and axial was $4.33 \pm 3.43^\circ$, 6.12%. The angle discrepancy in UFTA was $1.20 \pm 0.78^\circ$ in the coronal plane, $2.87 \pm 2.63^\circ$ in sagittal, outlier ratios were 2.08% and 37.5%.

Conclusions

This study was the first to investigate the angular discrepancies of TKA osteotomy planes using intraoperative CT. The results for PSI-assisted TKA, validated by this innovative method, showed excellent performance in the coronal plane, with minimal angular deviations and low outlier rates.

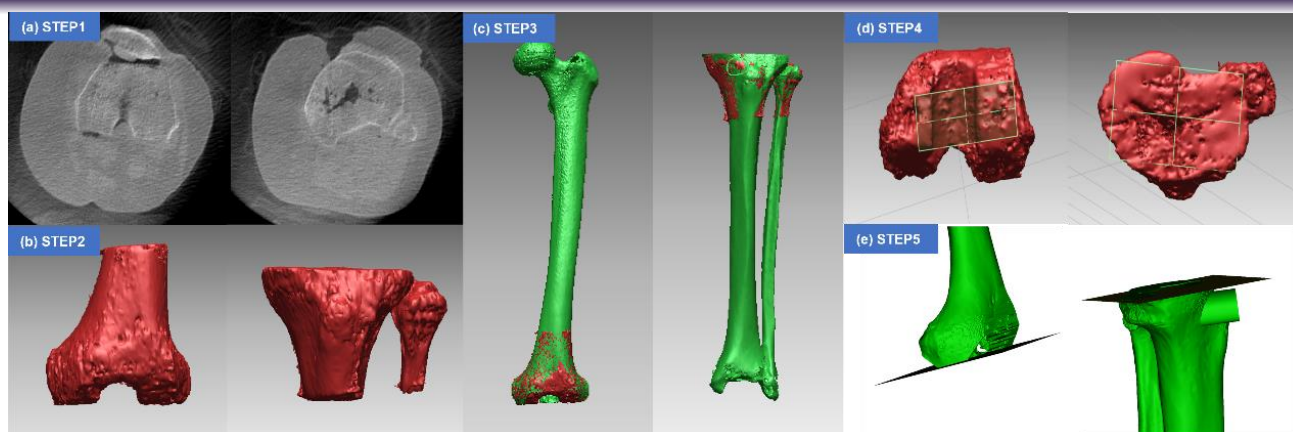


Fig. 1. A schematic diagram of the reconstruction, registration, and the osteotomy plane creation. (a) DICOM files. (b) Reconstruction. (c) Registration with pre-operation planning. (d) PSI osteotomy plane creation. (e) Pre-operation planning osteotomy plane creation. The red model depicted the femoral and tibial structures reconstructed from intraoperative CT scan images, whereas the green model illustrated the preoperative planning, representing the anticipated postoperative bone morphology.

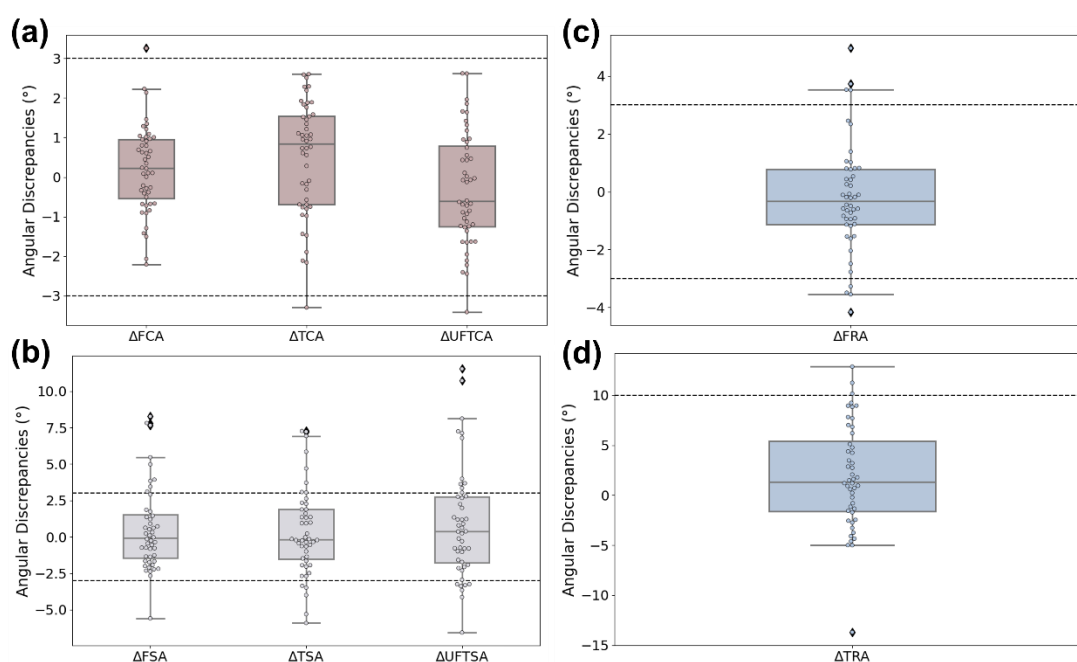


Fig. 2. Angular discrepancies between preoperative planning and intraoperative osteotomy. (a) Coronal plane. (b) Sagittal plane. (c) Femoral axial plane. (d) Tibial axial plane. The dashed line indicated the cut-off value for the outlier.

Table 1. Angle discrepancies between preoperative planning and intraoperative osteotomy

Side	Plane	Mean± SD (°) ^a	<1°, n (%)	1-2° n (%)	2-3°, n (%)	Outliers (>3°), n (%)
Femur	Coronal	0.87±0.65	34 (66.67)	12 (23.53)	4 (7.84)	1 (1.96)
	Sagittal	2.09±2.00	18 (35.29)	15 (29.41)	7 (13.73)	11 (21.57)
	Axial	1.45±1.26	26 (50.98)	11 (21.57)	5 (9.80)	9 (17.65)
Tibia	Coronal	1.38±0.93	21 (42.86)	18 (36.73)	8 (16.33)	2 (4.08)
	Sagittal	2.18±1.98	18 (36.73)	11 (22.45)	7 (14.29)	13 (26.53)
	Axial	4.33±3.43	7 (14.29)	9 (18.37)	6 (12.24)	3 (6.12) ^b
United femoral-tibial angle	Coronal	1.20±0.78	22 (45.83)	19 (39.58)	6 (12.50)	1 (2.08)
	Sagittal	2.87±2.63	13 (27.08)	9 (18.75)	8 (16.67)	18 (37.50)

^a The numbers in this column were recorded by absolute value. ^b The outliers for tibial rotation were defined as internal rotation exceeding 10°, while outliers in other planes were defined as exceeding 3°.

Oral Presentation: FPOP6.03

Topic: Joint Preservation

Clinical Efficacy of Patellofemoral Joint Replacement in Treating Isolated Patellofemoral Osteoarthritis

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Background

The prevalence of radiographic PFOA was 23.9% (20.5% men vs. 25.8% women). Prevalence of lateral radiographic OA was higher than medial radiographic OA at PF joint. As a method for treating patellofemoral osteoarthritis, the efficacy of patellofemoral joint replacement surgery has been reported inconsistently. This study explores the efficacy of patellofemoral joint replacement surgery in treating isolated patellofemoral osteoarthritis.

Methods

A retrospective analysis was conducted on 20 patients with isolated severe patellofemoral osteoarthritis who underwent patellofemoral joint replacement surgery and were followed up from March 2021 to April 2024. Among them, 6 were male and 14 were female; ages ranged from 48 to 71 years, with an average age of 54.7 ± 3.3 years. The surgeries were performed by the same physician using a patellofemoral prosthesis from the American company J&J. The efficacy was evaluated by comparing the Hospital for Special Surgery knee score (HSS) and visual analogue scale (VAS) scores before and after surgery, as well as postoperative excellent rates and patient satisfaction.

Results

20 patients were followed up for 6 to 24 months, with an average follow-up of 14.68 months. The preoperative HSS scores ranged from 42 to 65, with an average of (52.56 ± 4.51) ; postoperative scores were (71.04 ± 5.33) at 1 month, (87.136 ± 4.12) at 3 months, and (90.49 ± 5.23) at 12 months, showing significant improvement compared to preoperative scores ($P < 0.05$). The preoperative VAS scores ranged from 3 to 7, with an average of (4.93 ± 0.87) ; postoperative scores were (1.47 ± 0.69) at 1 month, (0.86 ± 0.57) at 3 months, and (0.36 ± 0.13) at 12 months, also showing significant reduction compared to preoperative scores ($P < 0.05$). Among the patients, 10 had excellent outcomes, 2 had good outcomes, resulting in a 100% excellent rate, with significant improvement compared to preoperative conditions. The subjective satisfaction rate among patients was 100%. No complications such as incision infection, patellar dislocation, or prosthesis loosening occurred during the follow-up period.

Conclusions

By adhering to strict surgical indications, patellofemoral joint replacement can effectively treat isolated patellofemoral osteoarthritis, significantly alleviating joint pain and improving joint function.

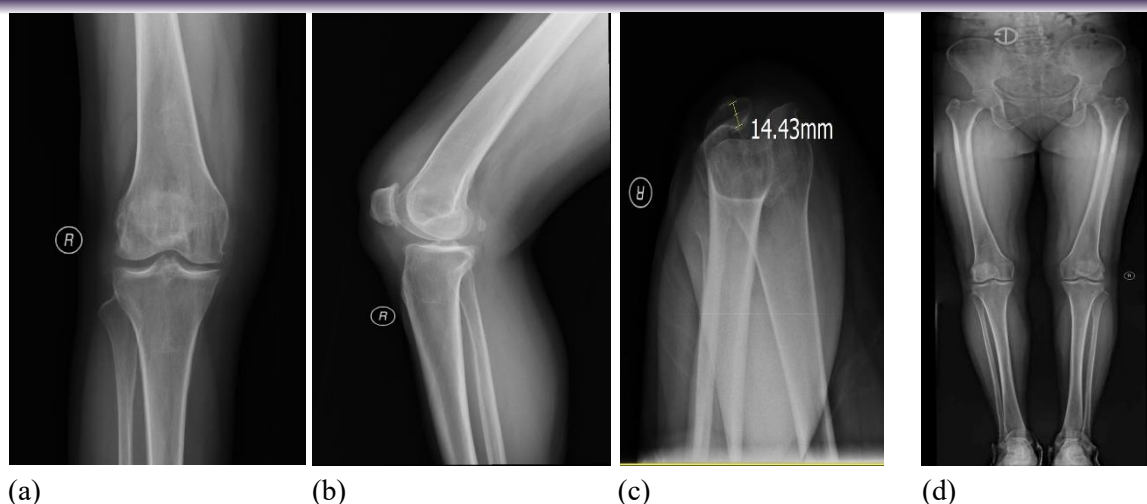


Fig.1 a: Anteroposterior plain film of the knee joint (weight-bearing position), b: Lateral plain film of the knee joint (weight-bearing position), c: Axial flat patellar film (weight-bearing position), d: total-length plain film of the lower extremity (weight-bearing position).

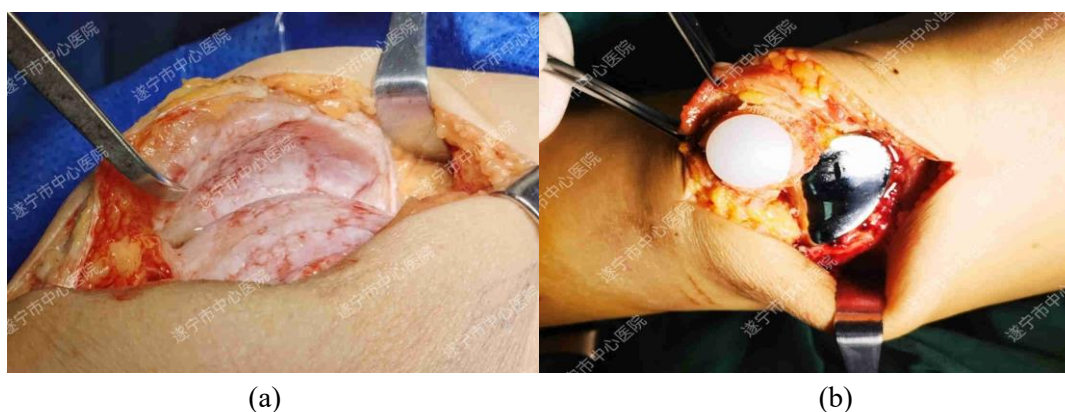


Fig. 2. a: Intraoperative severe osteoarthritis of the patellofemoral joint, b: The replacement of the hip joint has been completed.

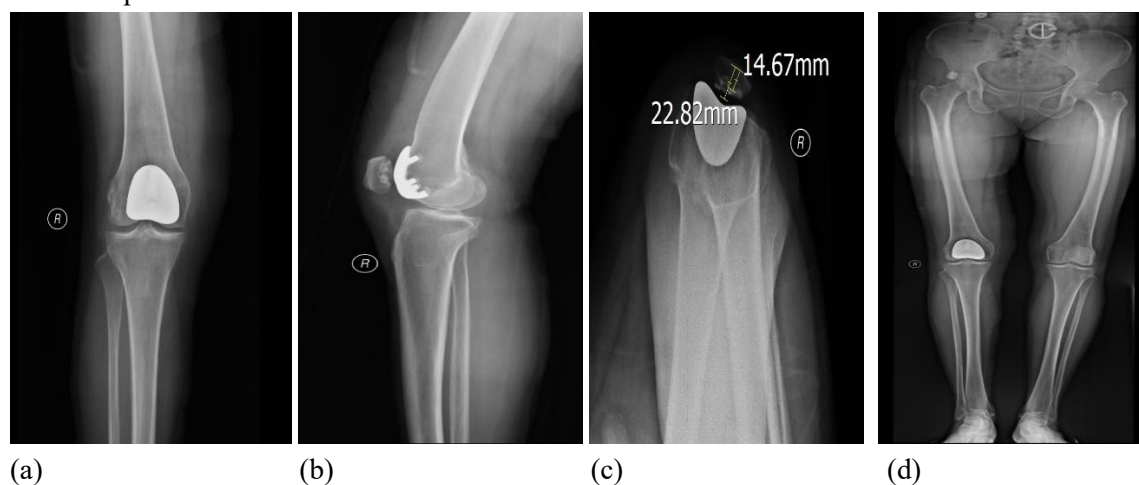


Fig. 3. a: Postoperative anteroposterior plain film of the knee joint (weight-bearing position), b: Postoperative lateral plain film of the knee joint (weight-bearing position), c: Postoperative axial flat patellar film (weight-bearing position), d: Postoperative total-length plain film of the lower extremity (weight-bearing position).

Oral Presentation: FPOP6.04

Topic: Joint Preservation

Correlation and Analysis of Knee Skin Temperature and Related Inflammatory Indicators After Unicompartmental Knee Arthroplasty

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Background

Unicompartmental knee arthroplasty (UKA) effectively alleviates pain and restores function in end-stage knee osteoarthritis. However, the relationship between postoperative knee skin temperature dynamics and systemic inflammatory responses remains poorly characterized. This study aimed to: (1) quantify changes in bilateral knee skin temperature differentials (ΔST) for 6 months post-UKA, and (2) analyze correlations between ΔST and serum inflammatory markers.

Methods

In this retrospective study, 100 patients undergoing primary UKA for medial compartment osteoarthritis were enrolled. Bilateral knee skin temperatures were measured via infrared thermography preoperatively and at 1, 3, 5 days, 1 month, 3 months, and 6 months postoperatively, with strict ambient temperature control ($20 \pm 1.0^\circ\text{C}$). Concurrently, serum C-reactive protein (CRP), white blood cell count (WBC), and erythrocyte sedimentation rate (ESR) were assessed. Functional outcomes were evaluated using the Hospital for Special Surgery (HSS) Knee Score.

Results

A total of 100 patients participated in the study. The skin temperature and differential temperature of both knees peak reached 3 days after UKA and gradually returned to normal in 6 months after UKA. Three days after UKA, the patient's CRP and WBC continued to rise to their peak, and ESR began to increase. However, on the fifth day, CRP and WBC levels began to decline, while ESR reached its peak one month after surgery. All indicators slowly decreased to normal.

Conclusions

It is the first to elucidate the dynamic changes in bilateral knee temperature up to six months following UKA. This study provides novel insights into the postoperative temperature changes following UKA, demonstrating that bilateral knee temperature differences normalize by six months and a normal surgical response.

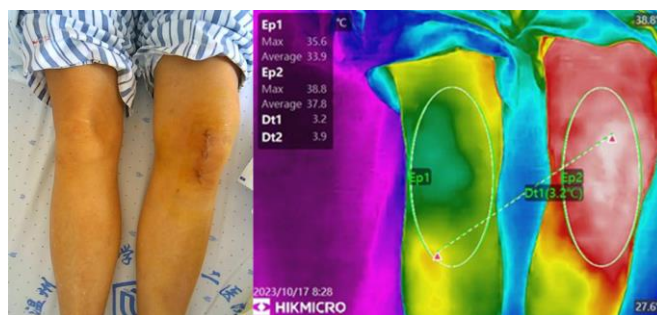


Fig. 1. Figure 1- This representative patient underwent UKA 1 week postoperatively. For the skin knee temperature measurements, patients were lying flat with both knees extended in a controlled environment of $20.0 \pm 1.0^\circ\text{C}$ and $50.0\% \pm 10.0\%$ humidity. Skin temperature was measured using an infrared thermometer and this patient showed a 3.2°C temperature difference between the operated and contralateral knees.

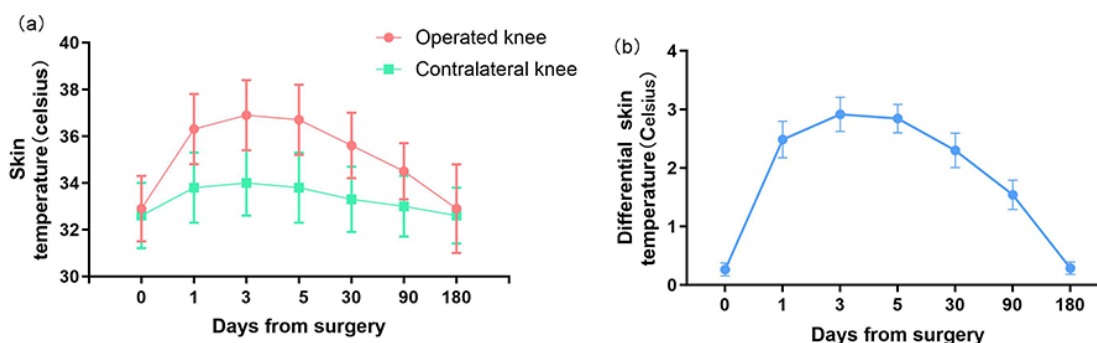


Figure 2 Skin temperature changes for the operated and contralateral knees (a) and the differential between the two knees (b) before and for 6 months following unicompartmental knee arthroplasty (n=100).

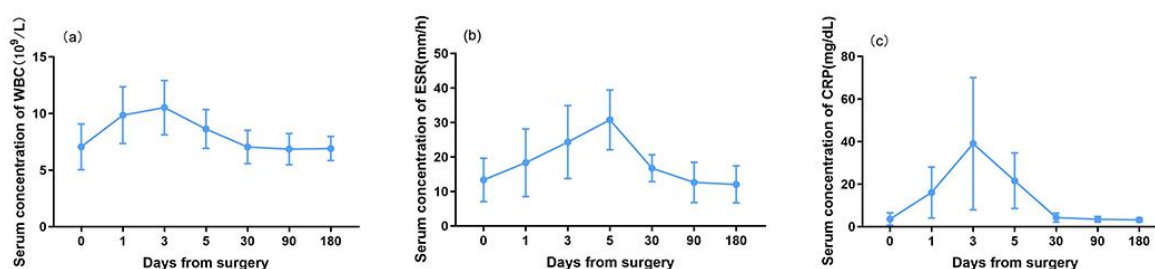


Figure 3- Serum indices taken preoperatively and for up to 6 months postoperatively following UKA (n=100): (a) WBC, white blood cells; (b) ESR, erythrocyte sedimentation rate; (c) CRP, C-reactive protein.

Oral Presentation: FPOP6.05

Topic: Arthroplasty

Validation of a Novel Genomic-Based Host Response Assay, Synvichor, for Discriminating Septic from Aseptic Joint Pain.

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Background:

Acute presentations of swollen and painful joints are common – their investigation and management associated with considerable healthcare cost and resource consumption. Differentiating septic arthritis from other aseptic diagnoses remains a challenging yet critical clinical determination. No current, universally accepted, gold standard test exists for this purpose. While microscopy and culture remain the historical standard, these are slow and inaccurate with poor clinical utility, often prompting non-specific empiric treatment pathways - the cost and morbidity of which cannot be overstated. Cutting-edge science has seen a transition away from non-specific serum markers and crude cell indices towards patient-centric diagnostic genomic assays. These validated and robust methods directly sample the physiologic host response to infection and can rapidly and accurately differentiate septic from aseptic aetiologies. This technology has tremendous potential utility in decreasing the time to diagnosis, while vastly improving diagnostic predictive value and test accuracy. This study aimed to explore the preliminary diagnostic application of the newly developed Synvichor™ assay in an Australian adult cohort.

The aim was to evaluate the real-world diagnostic performance of a novel molecular polymerase chain reaction host response assay (Synvichor™), designed to distinguish between infectious and non-infectious joint pain in both native and prosthetic joints.

Methods:

The study employed a retrospective, observational, non-interventional design, and recruited a heterogeneous cohort of adult patients from seven Australian hospital sites (n=315). The performance of Synvichor™ was compared to standard-of-care diagnostic methods and with prospectively collected clinician diagnoses. Patients were recruited from 7 hospitals across Queensland and South Australia with a combination of rural, regional, and metropolitan facilities. Current standard-of-practice testing approaches were utilised for routine clinical diagnostic pathways. Patients were retrospectively diagnosed using validated Retrospective Physician Diagnosis methods. Standard-of-care diagnostic outcomes were retrospectively assessed against the blinded results of the Synvichor™ assay. Assay performance was determined using receiver operator characteristics (ROC).

Results:

Synvichor™ demonstrated a ROC area under curve of 0.95 for discrimination between infectious and non-infectious joint pain compared to 0.15 for culture. The relative likelihood of joint infection versus sterile arthropathy was found to increase with increasing test score (range, 0–37+). Patient scores were split into four diagnostic bands. Bands (1) and (2) have corresponding negative predictive values (NPV) associated with aseptic inflammation, whilst bands (3) and (4) have corresponding positive predictive values (PPV) associated with septic inflammation. Overall performance resulted in maximum NPV and PPV of >95%. The results can be obtained within 4 hours compared to many days for culture.

Conclusions:

Synvichor™ is a powerful diagnostic tool which may aid clinicians in rapidly differentiating between septic and aseptic causes of joint pain. Associated improvements in diagnostic confidence and accuracy may translate to substantial healthcare savings through earlier definitive treatment instigation, avoidance of extended emergency department stays, and unnecessary hospital admissions.

Oral Presentation: FPOP6.06

Topic: Joint Preservation

Ground Kinematic Alignment in High Tibial Osteotomy Achieves Identical Clinical Outcomes to Classic Alignment for Constitutional Varus Knees: A Short-term Comparative Cohort Study

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Background

Constitutional varus, affecting 18%–34% of healthy adults, features compensatory medial tibial plateau parallelism during weight-bearing. While kinematic alignment (KA) principles have revolutionized arthroplasty for constitutional varus knees by prioritizing native joint line restoration over mechanical axis correction [1], their application in high tibial osteotomy (HTO) remains underexplored. Traditional Fujisawa-targeted HTO often requires excessive osteotomy gaps, to achieve 60-62.5% weight-bearing line (WBL) correction, elevating risks of delayed union and implant failure. However, HTO protocols remain contentious, particularly regarding optimal alignment targets [2, 3]. This study introduces ground kinematic alignment (GKA)-HTO, a novel protocol replicating contralateral knee joint line obliquity (KJLO), to address these biomechanical challenges. We hypothesize that GKA-HTO achieves equivalent clinical outcomes with reduced surgical morbidity compared to conventional alignment strategies.

Methods

This prospective comparative cohort study enrolled 88 patients (mean age 54.3±6.1 years) with unilateral medial compartment osteoarthritis and asymptomatic contralateral constitutional varus (HKA >3° varus). Patients underwent CT-based 3D planning and were randomized to Fujisawa-targeted HTO (Group F, n=47; target WBL 62.5% tibial plateau) or GKA-HTO (Group G, n=41; target contralateral KJLO). Both groups utilized 3D-printed patient-specific instrument (PSI) guides (Fig.1). Primary outcomes included osteotomy gap width, functional scores (Lysholm, HSS), radiographic parameters (HKA, WBL, medial proximal tibial angle [MPTA], posterior tibial slope [PTS], joint line convergence angle [JLCA]), medial meniscus extrusion (MME), and osteoarthritis progression (K-L grade, Outerbridge classification). The clinical and radiographic outcomes and second-look arthroscopic findings were statistically compared for comprehensive assessments.

Results

No statistical differences were found between the two groups concerning the demographic characteristics. After a mean follow-up of 37.1 months, Group G demonstrated significantly smaller osteotomy gaps (4.2±1.2 mm vs. 8.3±1.8 mm, p<0.001) when compared to Group F. No significant differences were observed between the Group F and G regarding the functional outcomes were comparable (Lysholm: 84.1±3.7 vs. 82.3±4.1, p=0.213; HSS: 84.2±3.3 vs. 86.5±4.9, p=0.407) (Fig.2). However, we only observed significant differences between the two groups in terms of the final hip-knee-ankle angle, weight-bearing line ratio, and medial proximal tibial angle (p<0.001, respectively). Radiographically, the mean KJLO of the contralateral limb was 0.7°±0.4° (ranged, -0.2° to 1.8°). Postoperatively, Group G achieved near-physiological joint line obliquity (KJLO discrepancy

$0.5^{\circ} \pm 0.1^{\circ}$, ranged 0 to 1.1°) when compared to Group F ($3.8^{\circ} \pm 1.5^{\circ}$, $p < 0.001$) (**Fig.2**). Second-look arthroscopy did not reveal a significant difference in meniscal healing rate between the two groups ($p = 0.786$).

Conclusions

As the first comparative study implementing KA principles in HTO, PSI-guided GKA-HTO reduces osteotomy gaps and preserves joint line orientation without compromising clinical outcomes at a short-term follow-up, offering a biomechanically superior alternative to Fujisawa-targeted HTO in constitutionally varus patients. Our study establishes a novel reference standard for constitutional varus correction. Study limitations include single-center design and midterm follow-up. Future multicenter trials should validate these findings across diverse populations and assess long-term osteoarthritis progression.



(a)



(b)



(c)

Fig. 1. Radiographic evaluation, surgical intervention in a 58-year-old male with right knee medial compartment osteoarthritis and constitutional varus alignment. (a) Preoperative full-length standing radiograph demonstrating physiological joint line orientation in the asymptomatic contralateral limb (HKA=3°). Note that joint line of knee was parallel to the ground. (b) Intraoperative application of patient-specific 3D-printed osteotomy guide fabricated through CT-based 3D preoperative planning, ensuring precise replication of contralateral KJLO parameters. (c) Postoperative full-length standing radiograph confirming successful ground kinematic alignment restoration (postoperative HKA = 2° varus; KJLO = 0.2°), maintaining native joint line parallelism.

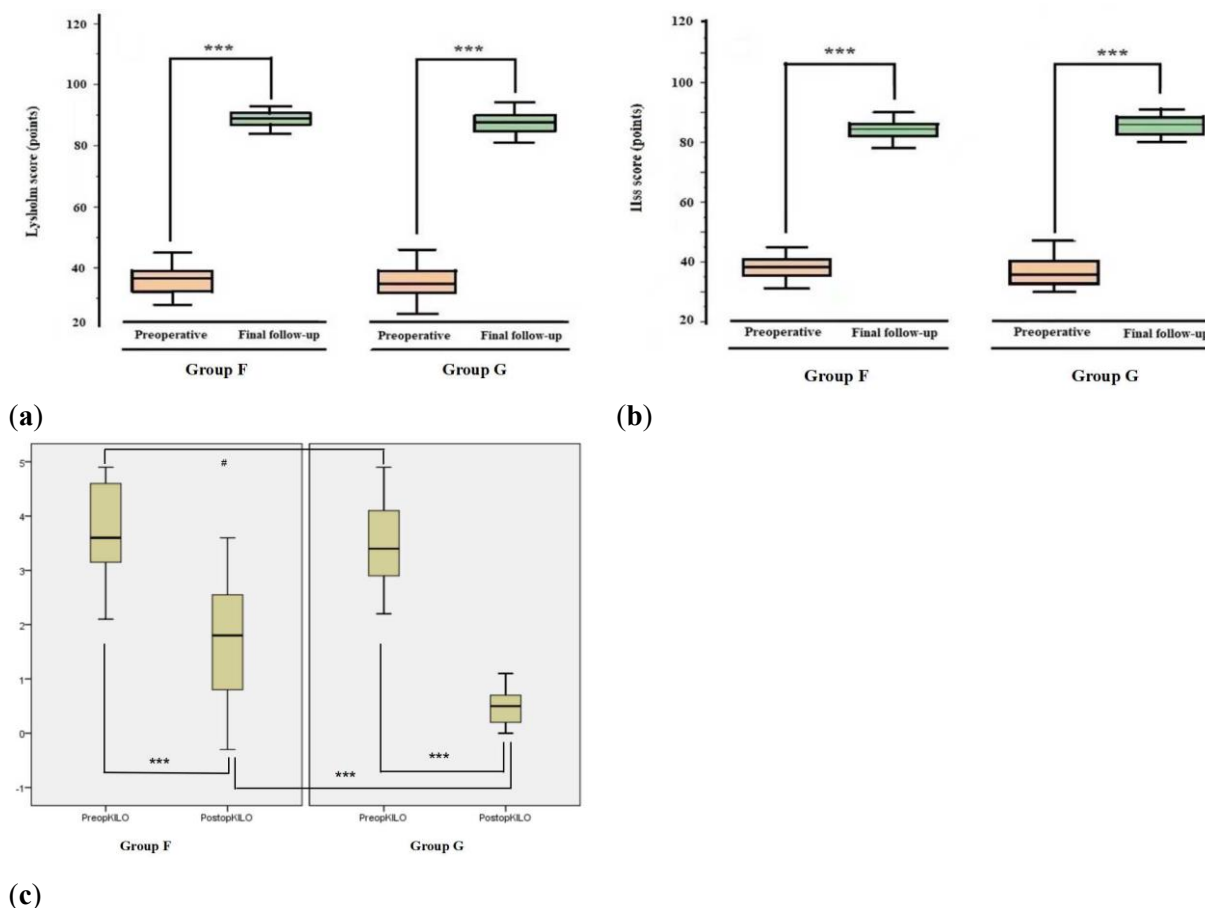


Fig. 2. Clinical and radiographic outcomes of patients in Group F and G. (a) Lysholm scores measured preoperatively and at the final follow-up in Group F and G. (b) Hospital for Special Surgery (HSS) measured preoperatively and at the final follow-up in Group F and G. (c) KJLO measured preoperatively and at the final follow-up in Group F and G. # $p > 0.05$; *** $p < 0.001$.

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Oral Presentation: FPOP6.07

Topic: Trauma

Optimal Decision of Achilles Tendon Rupture: A Systematic Review and Meta-Analysis of Randomized Controlled Trials Comparing Operative Versus Nonoperative Treatment

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Background

Achilles tendon rupture (ATR) is a common injury, with an incidence of 7–40 per 100,000. The choice between operative and nonoperative has long been a subject of debate in ATR treatment. This study aims to systematically review published randomized controlled trials (RCTs) comparing operative versus nonoperative management of ATR, evaluating outcomes including re-rupture rates, complications, and functional recovery, to provide evidence-based guidance for clinical decision-making.

Methods

We systematically searched PubMed/Medline, Cochrane Library, and Embase, with a cutoff date of March 1, 2025. This systematic review adhered to the PRISMA 2020 guidelines. Included studies met predefined eligibility criteria. Two independent reviewers extracted data on re-rupture rates, complications (including skin-related adverse events, deep vein thrombosis, deep infection, and sural nerve injury), and functional outcomes, while also assessing study eligibility and risk of bias. Statistical heterogeneity was evaluated using the I^2 statistic, with fixed-effects or random-effects models applied as appropriate. Subgroup analyses were performed based on follow-up duration.

Results

Our meta-analysis included 1,628 participants (1,327 male [80%]) from 14 RCTs. Of these, 903 underwent surgical repair (minimally invasive: 255; open: 648), while 725 received nonsurgical management. Re-rupture occurred in 2.7% (24/903) of operative cases versus 9.5% (69/725) in the nonoperative group. Pooled analysis demonstrated significantly lower re-rupture rates for both minimally invasive (RR: 0.28, 95% CI: 0.11–0.74) and open operative approaches (RR: 0.33, 95% CI: 0.20–0.54) compared to nonoperative management (**Figure 1**). No significant difference in overall complications was observed between minimally invasive surgery and nonoperative treatment (RR: 2.35, 95% CI: 0.52–10.63), whereas open operative showed higher complication rates (RR: 3.02, 95% CI: 1.74–5.23) (**Figure 2**). Subgroup analyses revealed comparable outcomes for minimally invasive versus nonoperative management in skin-related adverse events (RR: 0.80, 95% CI: 0.41–1.57), deep vein thrombosis (RR: 0.98, 95% CI: 0.20–4.80), and deep infection (RR: 7.24, 95% CI: 0.38–139.19), but increased risk of sural nerve injury (RR: 5.86, 95% CI: 1.57–23.93). Functional outcomes assessed by SMFA, ATRS, and Leppilahti scores showed no statistically significant differences between operative and nonoperative groups at long-term follow-up. Notably, patients undergoing minimally invasive surgery returned to work earlier than those managed conservatively (MD: -7.00, 95% CI: -13.10 to -0.90).

Conclusions

Meta-analysis findings demonstrated that open operative significantly reduced re-rupture rates compared with nonoperative management, albeit with higher complication risks. Minimally invasive techniques offered a balanced approach, maintaining the re-rupture prevention benefits while mitigating complication risks, and additionally facilitating earlier return to work. These advantages position minimally invasive surgery as a promising therapeutic strategy for ATR.

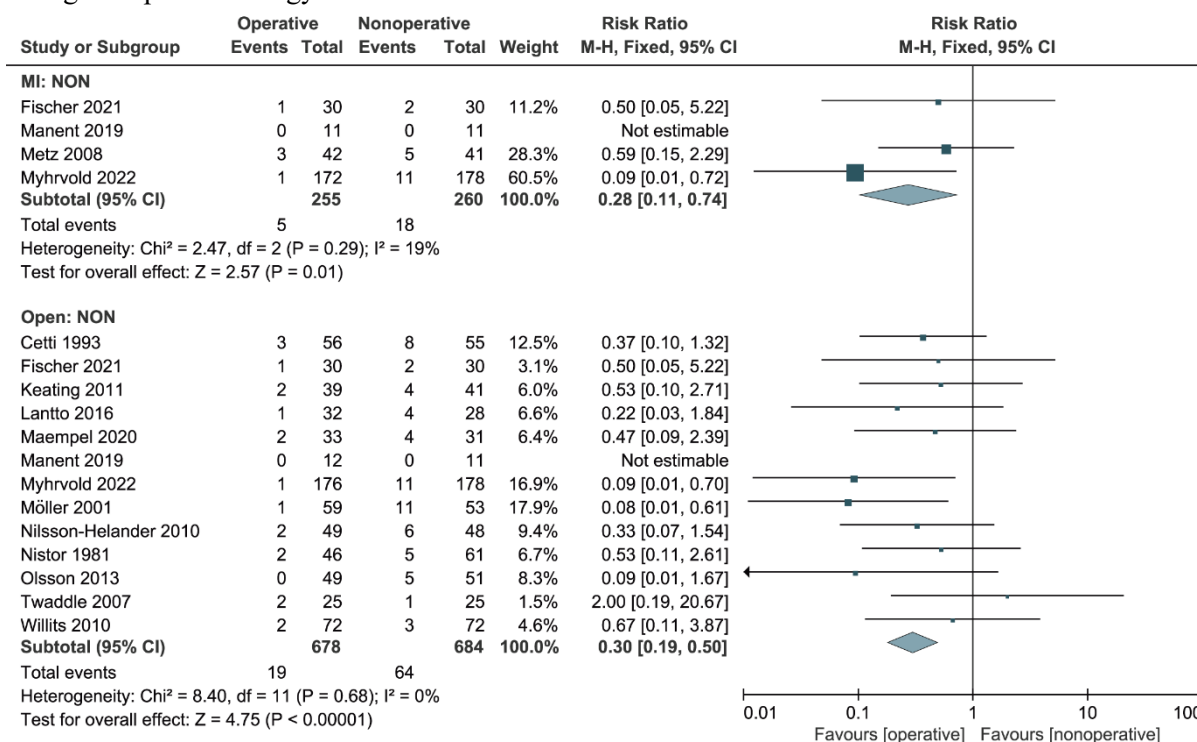


Fig. 1. Forest plot of re-rupture rate in a meta-analysis of Achilles tendon ruptures.

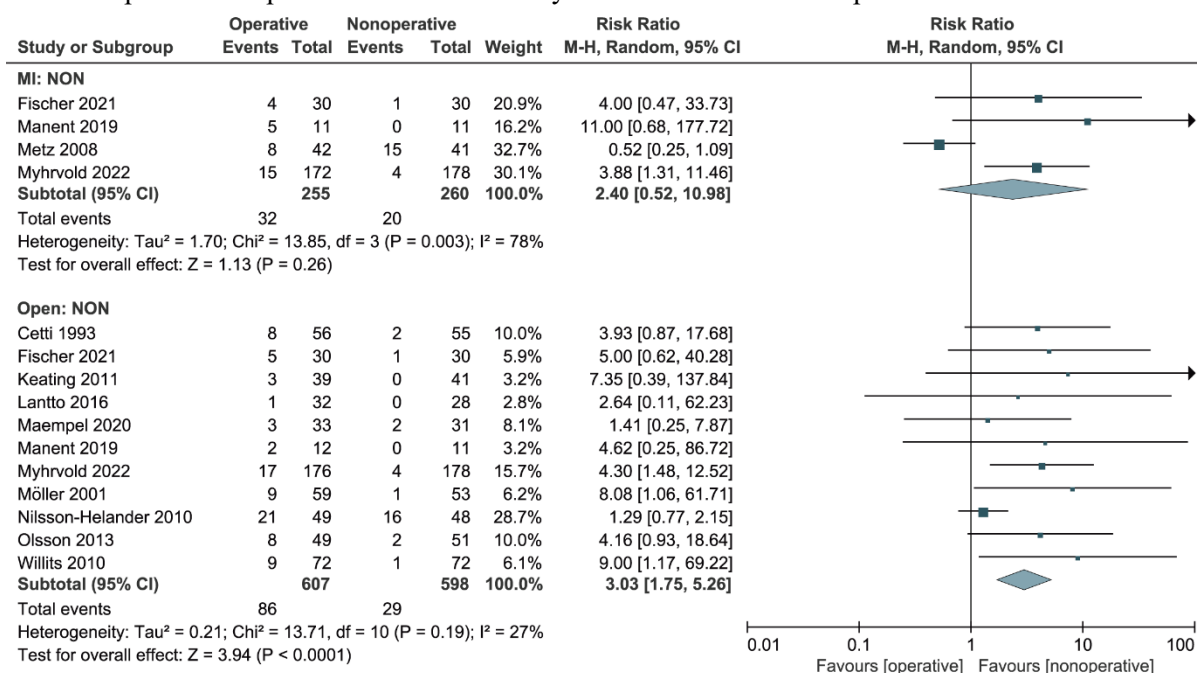


Fig. 2. Forest plot of complication rate in a meta-analysis of Achilles tendon ruptures.

Oral Presentation: FPOP6.08

Topic: Sports

Application of Arthroscopic Precision Nerve Release in Gluteal Deep Syndrome

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Background

To evaluate the efficacy of arthroscopic precision sciatic nerve release in the treatment of gluteal deep syndrome; and to explore the standardized diagnosis and treatment of gluteal deep syndrome under arthroscopy[1-3].

Methods

A retrospective analysis was conducted on 29 consecutive patients with gluteal deep syndrome who had ineffective conservative treatment from July 2021 to now. The gluteal deep space exploration and sciatic nerve release under arthroscopy were performed in the lateral decubitus position. In addition to the pelvic X-ray, lumbar intervertebral disc and hip joint MRI were performed before surgery, all patients underwent sciatic nerve color Doppler ultrasound examination. Strict conservative treatment was carried out; The sciatic nerve was precisely released under arthroscopy during the operation. The clinical efficacy was evaluated by visual analog scale pain score (VAS), modified Harris hip score (mHHS) and The Benson symptom-rating scale. The correlation between preoperative sciatic nerve color Doppler ultrasound and clinical efficacy was analyzed, and the standardized diagnosis and treatment process was explored.

Results

All 29 patients were followed up, and the follow-up time was 6-56 months (with an average of 47.2 months). Preoperative color Doppler ultrasound showed that 27 patients had definite morphological changes of the sciatic nerve. The VAS score decreased from 5.0 (4.0, 6.0) before surgery to 0.5 (0, 1.0) after surgery ($P < 0.001$), and the mHHS score increased from 64.0 (57.0, 67.0) before surgery to 95.0 (93.0, 97.0) after surgery ($P < 0.001$). According to the Benson symptom score: excellent in 16 cases, good in 11 cases, fair in 1 case, and poor in 1 case; The excellent and good rate was 93.1%. For those with abnormal sciatic nerve morphology shown by preoperative color Doppler ultrasound, the curative effect was excellent and good. Four patients had transient numbness on the posterior side of the thigh after surgery, and no other surgical complications occurred. The precise release during the operation was standardized, safe and effective.

Conclusions

Arthroscopic sciatic nerve release is a safe and effective treatment method for gluteal deep syndrome. The precise release during the operation is minimally invasive, safe and effective. Preoperative color Doppler ultrasound can assist in surgical decision-making and the positioning of intraoperative release.

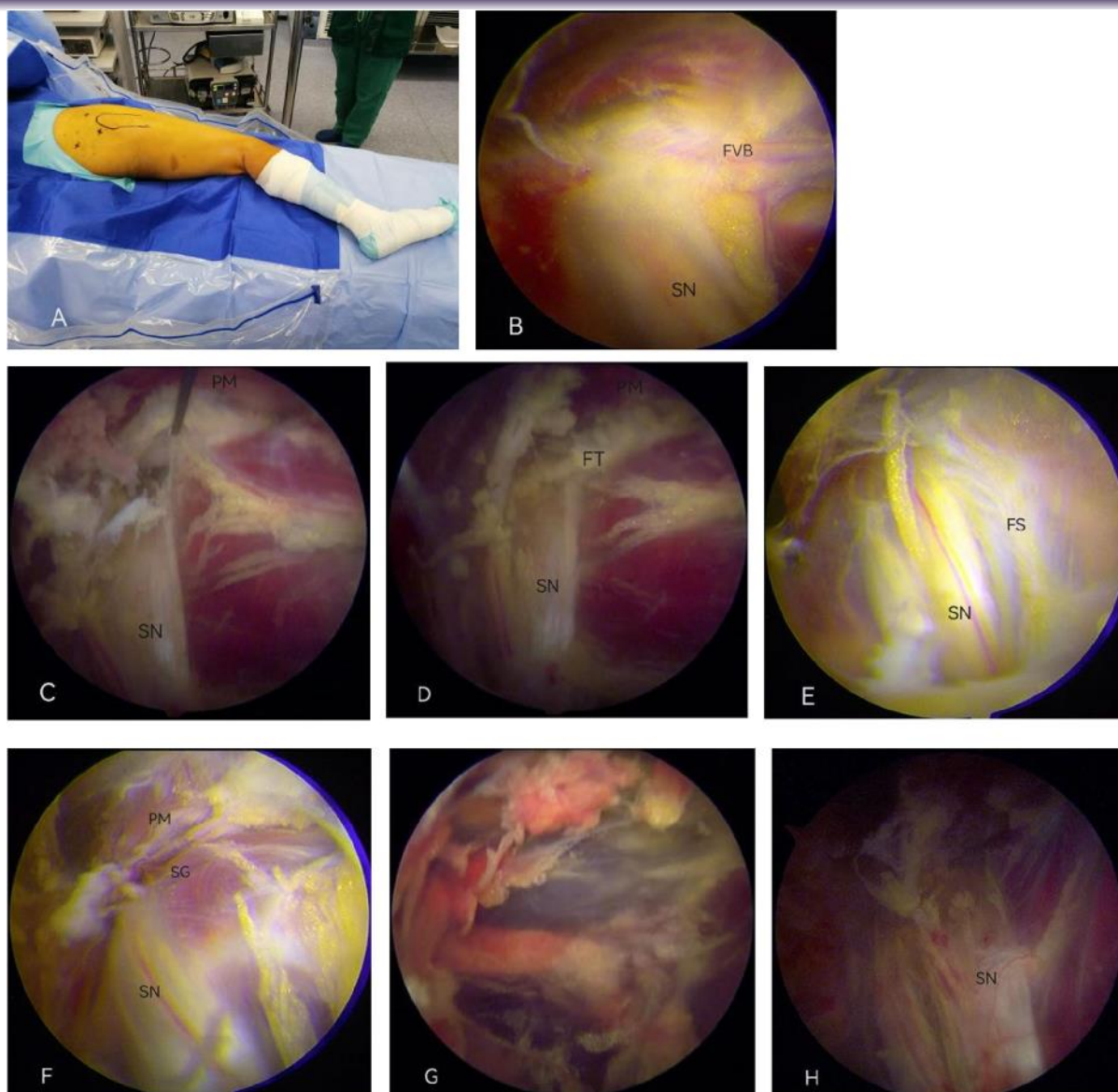


Fig. 1 Intraoperative pathological changes. **A** Surgical position. **B** Fibrovascular bundle (FVB). **C** Piriformis muscle (PM). **D** Fibrous tissue (FT). **E** Fibrous scar (FS). **F** Superior gemellus muscle (SG). **G** Extensive synovial hyperplasia. **H** After synovial tissue debridement.

Table 1. VAS and mHHS Score of pre- and post-operation

	VAS Score	mHHS Score
Pre-operation	5.0(4.0,6.0)	64.0(57.0,67.0)
Post-operation	0.5(0,1.0)	95.0(93.0,97.0)
Z	-4.826	-4.784
P	<0.001	<0.001

Table 2. Benson symptom-rating scale of pre- and post-operation

Outcome	Symptoms	Number (%)
Excellent	No pain with prolonged periods of sitting (30 min), strenuous activity, bending, twisting, stairs, rapid walking, jogging	15 (51.7%)
Good	No pain with short periods of sitting (30 min) or daily activities or mild pain with prolonged periods of sitting or strenuous activity	12 (41.4%)
Fair	Occasional mild pain with short periods of sitting or normal daily activities or moderate pain with prolonged sitting or strenuous activity	1 (3.4%)
Poor	Severe pain with short periods of sitting or normal daily activities, little change from preoperative level of pain associated with sciatic nerve	1 (3.4%)

References:

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Oral Presentation: FPOP7.01

Topic: Arthroplasty

Risk Analysis of Reoperation after Primary Total Hip Arthroplasty

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Background

Total hip arthroplasty (THA) is the preferred treatment for severe hip osteoarthritis, however some patients require reoperation after surgery, imposing substantial physical, psychology and economic burdens. Identifying risk factors for reoperation can help mitigate these outcomes. This study aims to analysis reoperation risk after primary THA.

Methods

This study is a retrospective study. Patients who underwent primary THA between 2000 and 2024 at a China hospital, Guangxi were selected randomly based on inclusion and exclusion criteria. This study utilized a probability sampling approach, incorporating a random number table to streamline the patient selection procedure. Bivariate analysis was used to explore the association between independent variables with reoperation (yes or no). Simple logistic regression and multiple logistic regression were used to find factors associated with higher probability of reoperation.

Results

There was total 852 patients included in study comprised 279 (32.75%) reoperation cases and 573 (67.25%) without reoperation cases. The median follow-up duration was 5.75 (6.47) years, from 0 to 25 years. In total, 112 independent variables were collected to find whether have relationship with reoperation or not. Final model demonstrated that nationality, education level, drinking history, surgery duration, preoperative albumin (ALB), postoperative erythrocyte sedimentation rate (ESR), postoperative calcium levels, clothing (activities daily living assessment preoperative), decorate (activities daily living assessment postoperative) and postoperative thrombosis risk scores associated with higher probability of reoperation.

Conclusions

This study identified critical risk factors associated with reoperation after primary THA. The findings provide valuable insights for healthcare providers to develop targeted interventions aimed at reducing reoperation rates, ultimately improving patient outcomes.

Oral Presentation: FPOP7.02

Topic: Arthroplasty

Incidence and Characteristics of Noise Generation in Total Hip Arthroplasty with Ceramic-On-Ceramic Bearings

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Background

Total hip arthroplasty (THA) with ceramic-on-ceramic (CoC) bearings is associated with noise generation, a complication affecting patient satisfaction. While CoC bearings offer superior wear resistance, noise prevalence ranges from 3% to 53% in long-term studies, attributed to factors like component malpositioning. Robotic-assisted surgery (RAS) enhances precision in implant placement, potentially reducing noise risk. This study compared noise incidence between RAS and conventional (CON) THA methods and evaluated predictors of noise.

Methods

A secondary analysis of a multicenter RCT (June 2021–July 2022) included 74 patients with CoC bearings (37 RAS, 37 CON). Noise incidence, characteristics, and duration were recorded at 14 days and 24 weeks postoperatively. Radiological assessments measured acetabular alignment, femoral component positioning, and leg length changes. Logistic regression identified predictors of noise. Statistical tests (chi-squared, paired t-test) compared outcomes, with significance at $P < 0.05$.

Results

Early noise incidence was significantly lower in RAS (5.4%) versus CON (32.4%) at 14 days ($P = 0.008$). At 24 weeks, noise rates were 5.4% (RAS) and 21.6% (CON) ($P = 0.089$). RAS demonstrated superior precision: COR deviation (RAS: 0.90 mm vs. CON: 11.51 mm, $P < 0.001$), femoral alignment (RAS: 1.74° vs. CON: 2.19° , $P = 0.009$), and leg length change (RAS: 2.80 mm vs. CON: 6.17 mm, $P = 0.001$, Fig 1, Table 1). Logistic regression identified CON surgery as a noise predictor (OR = 7.10, 95% CI 1.51–33.33; $P = 0.013$). Acetabular abduction angle differed between noise (38.53°) and non-noise (42.72°) groups ($P = 0.035$). Functional outcomes (HHS, OHS) did not differ between groups.

Conclusions

RAS significantly reduces early postoperative noise in CoC THA, likely due to enhanced component alignment. CON surgery, posterior approach, and smaller femoral head size were key noise predictors. Despite similar functional outcomes, RAS mitigates noise-related complications, emphasizing its role in optimizing THA precision.

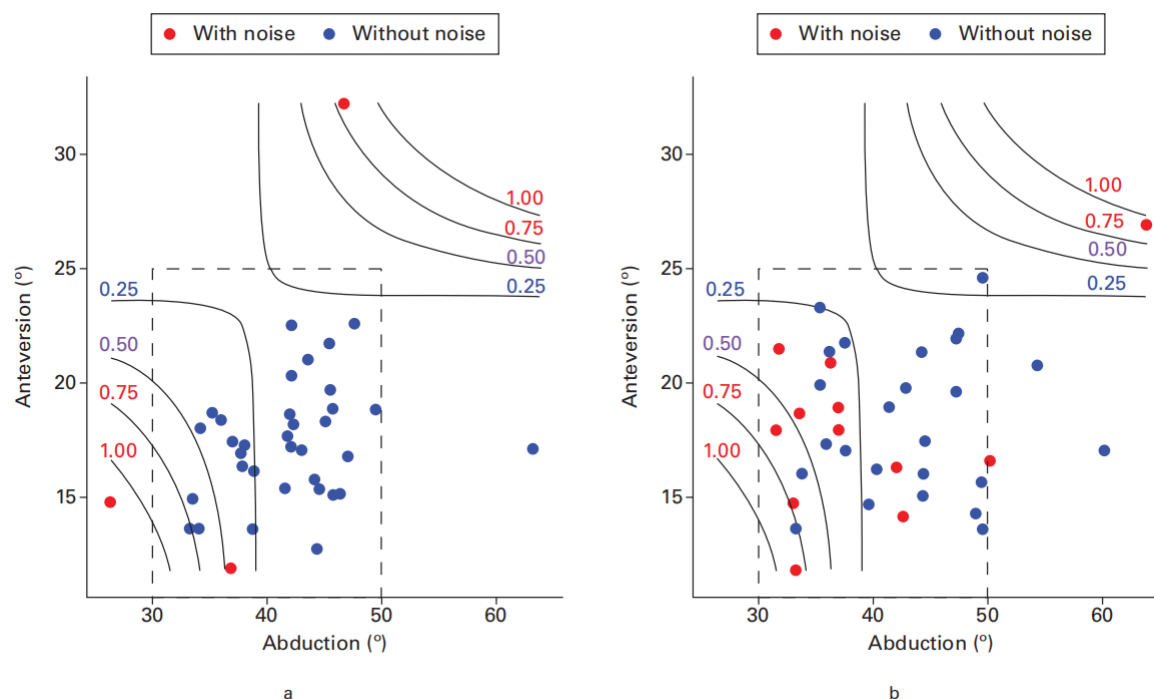


Fig. 1. a) Projection of the robotic-assisted surgery group data onto the noise probability map, showing the relationship between robotic surgery and noise incidence. b) Projection of the conventional group data on the same map, offering a comparative view of manual techniques. Both a) and b) include grey curves with numerical labels (0.25, 0.5, 0.75, and 1) representing noise thresholds and their associated probabilities.

Table 1. Radiographic assessments comparisons between patient with and without noise complaints.

	Without noise	With noise	p
Abduction (°, mean (SD))	42.72 (6.18)	38.53 (9.07)	0.035
Abduction deviation (°, mean (SD))	5.27 (4.16)	7.18 (5.44)	0.135
Anteversion (°, mean (SD))	17.84 (2.81)	18.17 (5.34)	0.744
Anteversion deviation (°, mean (SD))	3.21 (2.39)	4.19 (4.53)	0.245
COR distance from planned (mm, mean (SD))	5.84 (9.86)	7.52 (7.37)	0.53
Acetabular depth (mm, mean (SD))	16.30 (2.83)	16.99 (3.35)	0.408
Femoral component anteversion(°, mean (SD))	13.82 (3.67)	14.21 (3.47)	0.699
Stem alignment (°, mean (SD))	1.93 (0.65)	2.10 (1.07)	0.43
Change in leg length (mm, mean (SD))	4.08 (4.75)	5.95 (3.25)	0.145

Oral Presentation: FPOP7.03

Topic: Arthroplasty

Correlation of Pelvic Incidence and Acetabular Orientation Using 3D Computed Tomography Image Measurement

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Background

Acetabular orientation is defined by parameters such as version and inclination play a pivotal role in determining the stability and function of the hip joint. It may be influenced by pelvic incidence, a key morphologic parameter in spinal biomechanics that reflects the spatial relationship between the sacrum and the pelvis [1,2]. Given the interdependence between the spine, pelvis, and hip, understanding this relationship is essential for optimizing outcomes in both hip and spine surgeries [3]. This study aims to investigate the biomechanical association between pelvic incidence and acetabular orientation, thereby elucidating the interplay between pelvic morphology and hip joint alignment.

Methods

We analyzed 100 pelvic CT scans of skeletally normal adult patients. Pelvic incidence and acetabular orientation were measured using 3D images reconstructed from the CT scans. Radiographic definitions were utilized to quantify both parameters, and Pearson's correlation coefficient was employed to assess the relationship between acetabular orientation and pelvic incidence.

Results

The mean pelvic incidence among participants was $53.07^\circ \pm 9.39^\circ$. The mean acetabular orientation measurements were $17.77^\circ \pm 4.15^\circ$ for acetabular anteversion and $45.78^\circ \pm 4.87^\circ$ for acetabular inclination [Table 1]. Statistical analysis revealed no significant correlation between pelvic incidence and either parameter of acetabular orientation ($p > 0.05$) [Table 2]. However, statistically significant gender-based differences were identified in both pelvic incidence and acetabular orientation, suggesting a potential influence of sex-specific pelvic morphology. Pelvic Incidence and acetabular inclination showed weak positive correlation ($r = 0.19$) suggesting a minor tendency for increased pelvic incidence to be associated with greater acetabular inclination angles [Figure 1].

Conclusions

In this study of the normal Malaysian population, no linear correlation was found between pelvic incidence and acetabular orientation. Despite this, the presence of significant gender differences in pelvic parameters highlights the importance of accounting for anatomical variability in orthopedic assessment and surgical planning, particularly in hip and spine-related interventions. Future studies should aim to explore the dynamic interplay between pelvic incidence, pelvic tilt, and acetabular orientation during functional activities such as standing, sitting, and squatting, using weight-bearing 3D imaging modalities.

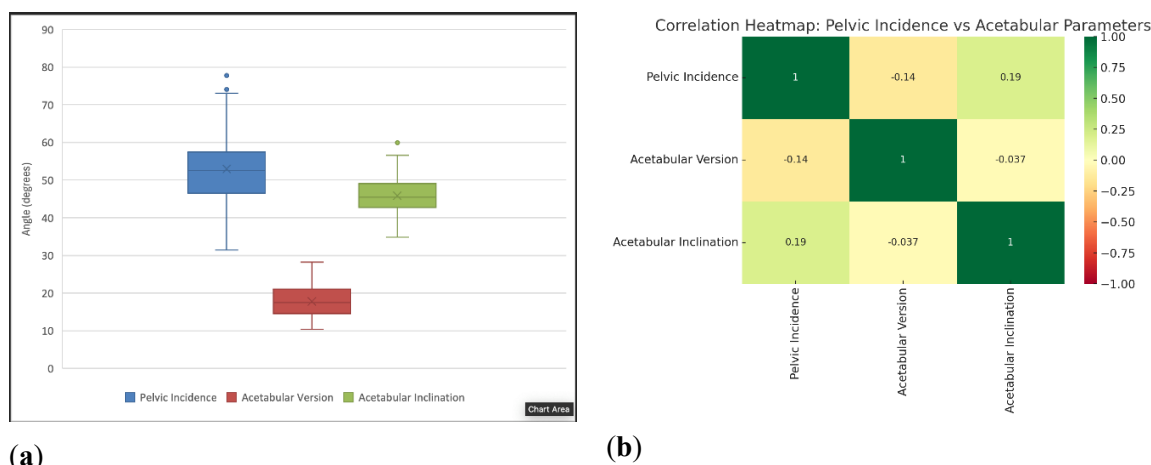


Fig. 1. (a) Boxplot showing distribution, variability, and outliers for three parameters (b) Correlation heatmap of pelvic incidence and acetabular orientation.

Table 1. Acetabular morphometric parameters in Gender

Variables, n =100	Gender	N	Mean (°)	Standard Deviation (°)
Pelvic Incidence	Male	67	51.55	7.51
	Female	33	56.16	11.91
Acetabular inclination	Male	67	46.56	5.11
	Female	33	44.45	4.07
Acetabular Version	Male	67	16.94	3.80
	Female	33	19.45	4.39

Table 2. Correlation of pelvic incidence and acetabular orientation

Variables, n =100	Pelvic Incidence	
	Pearson's correlation (r)	P-value
Acetabular inclination	0.060	0.555
Acetabular version	0.148	0.143

References

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Oral Presentation: FPOP7.04

Topic: Arthroplasty

Long-Term Outcomes of Cementless Total Hip Arthroplasty Using A 32 mm Femoral Head with CT-Based Navigation: A Comparative Study with Manual THA

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Background

This study aims to compare long-term clinical and radiographic outcomes between cementless THA performed with CT-based navigation and manual techniques, using a 32 mm femoral head.

Methods

A retrospective cohort study was conducted on 93 hips in 83 patients who underwent primary cementless THA with a 32 mm femoral head between April 2011 and September 2014. All patients had a minimum of 10 years of postoperative follow-up. The CT-based navigation group (CT-based group) comprised 48 hips, and the manual THA group (Manual group) comprised 53 hips. Postoperative radiographic inclination (RI) and radiographic anteversion (RA) were evaluated using three-dimensional analysis software based on CT scans obtained two weeks after surgery. The percentage of cups placed within the Lewinnek safe zone was calculated. In the CT-based group, absolute errors between intraoperative navigation-recorded cup angles and postoperative cup angles were calculated. Clinical evaluations included the Merle d'Aubigné and Postel score, Harris Hip Score (HHS), assessed preoperatively and at final follow-up. Postoperative complications and 10-year implant survival rates (revision THA as endpoint) were also evaluated. Statistical significance was set at $p < 0.05$.

Results

The mean postoperative RI and RA were $40.0^\circ \pm 3.4^\circ$ and $14.9^\circ \pm 3.4^\circ$ in the CT-based group, and $37.0^\circ \pm 9.4^\circ$ and $22.9^\circ \pm 9.1^\circ$ in the Manual group, respectively. The proportion of cups placed within the Lewinnek safe zone was significantly higher in the CT-based group (100%) compared to the Manual group (49%). In the CT-based group, the mean absolute errors in cup positioning were $1.5^\circ \pm 1.7^\circ$ for RI and $2.1^\circ \pm 1.8^\circ$ for RA. Both groups showed significant improvement in the Merle d'Aubigné and Postel score and HHS postoperatively. At final follow-up, the CT-based group had significantly higher the Merle d'Aubigné and Postel score and HHS than the Manual group (Figure 1, 2). No dislocations or cup loosening occurred in both groups. One case of infection occurred in the CT-based group, requiring revision THA. The 10-year implant survival rates were 98.2% in the CT-based group and 100% in the Manual group, with no significant difference (Figure 3).

Conclusions

CT-based navigated THA with a 32-mm femoral head achieves more accurate cup positioning and better long-term clinical outcomes than manual THA. Although the survival rates were comparable, cementless THA performed with CT-based navigation demonstrated advantages in clinical precision and effectiveness over a 10-year follow-up period.

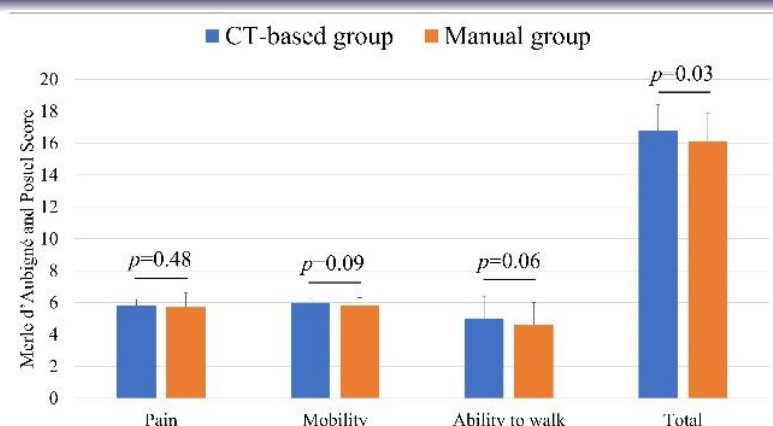


Figure. 1 Comparison of the Merle d'Aubigné and Postel Score (pain, mobility, ability to walk, and total) between the CT-based and Manual groups

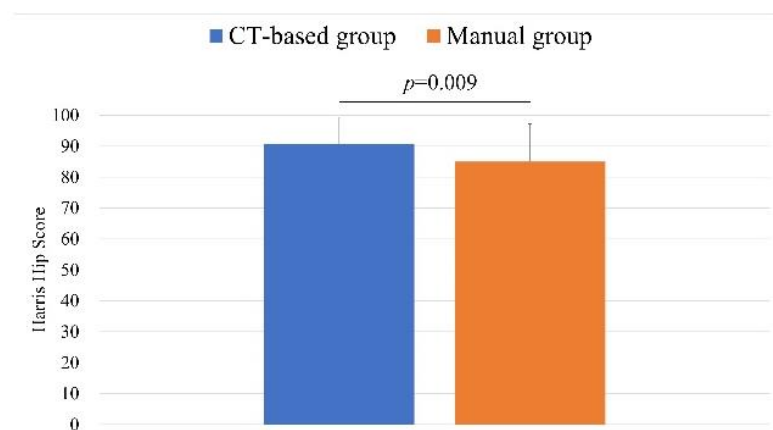


Figure. 2 Comparison of the Harris Hip Score between the CT-based and Manual groups

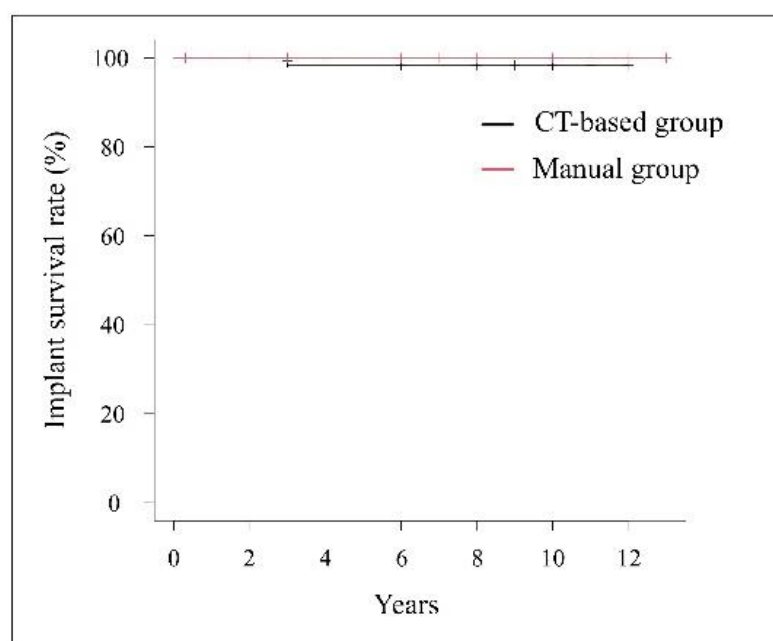


Figure. 3 10-year implant survival rates (revision THA as endpoint)

Oral Presentation: FPOP7.05

Topic: Arthroplasty

Single-Incision Combined Anterior and Posterior Approach for Total Hip Arthroplasty in Stiff and Ankylosed Hip - Outcomes Study and Surgical Technique

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Introduction:

Total hip arthroplasty (THA) in a stiff and ankylosed hip is challenging. The majority of the surgeries can be performed using isolated posterolateral or anterolateral approaches. However, there were specific scenarios requiring a more extensive approach. Conventionally, trochanteric osteotomy was performed to have thorough anterior and posterior access, which had its morbidities. By comparison, the single-incision combined anterior and posterior approach (SICAP), as we named it, was another less invasive extensile approach used for complex hip conditions that allows full exposure of the anterior and posterior hip joint.[1] This write-up aims to describe the surgical technique and report the outcomes of THA in a stiff and ankylosed hip using this extensile approach.

Methodology:

This is a retrospective analysis of patients' records from 2015 to 2024. Patients with a diagnosis of hip ankylosis with THA performed using the SICAP approach were included. The clinical outcome measures include blood loss, transfusion, hip pain, Harris Hip Score (HHS), and SF-12 performance score. The radiological outcome measures included the presence of heterotopic ossification and implant mal-positioning.

Results:

20 patients with THA performed with a combined approach were recruited, with a mean age of 46 years. The duration of the follow-up period was an average of 2 years. The average duration of surgery was 205 minutes. The mean HHS improved significantly from 34 to 80. All patients had fixed flexion contracture of a mean of 25 degrees and improved to within 5 degrees. Only 1 patient had heterotopic ossification post-surgery, and 1 had early dislocation, which resolved by conservative management.

Discussion:

THA in a stiff, ankylosed hip carries multiple challenges and requires an experienced surgical team. The challenges involved difficult surgical exposure, uncertainty in identifying a distorted anatomy, soft tissue contracture, additional adhesion scarring if there was any history of previous surgeries, mixed sclerotic and osteopenic bone quality, and inability to reduce the hip joint and restore limb length.

The traditional isolated approach does not provide adequate exposure in severe ankylosed hip, especially those with fixed adduction and rotational deformity. Inadequate removal of ankylosed bone circumferentially would prevent hip rotation and dislocation, and femoral broaching and result in impingement and soft tissue imbalance later.[2]

The combined approach with double window was made to facilitate neck osteotomy, removal of calcified capsule, large osteophytes or heterotopic ossified fragments which cause impingement, release of tight tethered muscles, and major reconstruction of large anterior acetabulum defect or proximal femoral defect. This approach preserves abductor muscles, allows distal extension, and avoids the morbidities related to the trochanteric osteotomy approach, which includes non-union, trochanter escape, bursitis, lateral hip pain, instability, and heterotopic ossifications.[3] One study reported trans-trochanteric approach has an 18 times higher risk of complications when compared to the posterolateral approach alone. [4]

Conclusion:

Single-incision combined anterior and posterior approach was a useful extensile approach in creating well-balanced, stable THA in complex ankylosed hip.



Figure 1: (left) white arrow: large bone fragment fused at the anterior acetabulum, white-coloured asterisk*: Anterolateral approach, window for removal of fused bone fragment, double level neck osteotomy; (right) black-coloured star symbol: posterolateral approach- main work window for femur broaching and acetabulum reaming

Table 1: Demographics and clinical outcomes of patients, statistical analysis by student t-test (two-sided)

Parameter	Outcome (SD)	p-value
Mean Age (in years)	46	
Gender		
Male	12	
Female	8	
Affected side		
Right	6	
Left	6	
BMI (kg/m2)	24.2	
Mean follow-up (in years)	8	
Mean duration of disease (in years)	18	
Mean duration of surgery (in minutes)	205	
Diagnosis		
Ankylosing Spondylitis	3	

<i>Rheumatoid arthritis</i>	2	
<i>Post-surgical fusion</i>	2	
<i>Post-traumatic arthritis</i>	5	
<i>Hip Dysplasia (Crowe IV)</i>	3	
<i>Tuberculosis</i>	1	
<i>Septic arthritis</i>	4	
Mean blood loss (ml)	333	
Number requires transfusion	5	
Harris Hip Score (pre-op)	34.0(9.9)	
Harris Hip Score (post-op)	74.0(12.4)	<0.001
SF-12 PCS (pre-op)	23.0(0.8)	
SF-12 PCS (post-op)	44.9(6.7)	<0.001
SF-12 MCS (pre-op)	38.0(3.5)	
SF-12 MCS (post-op)	49.6(9.4)	0.019
Mean pre-op hip flexion contracture (°)	25	
Mean post-op hip flexion contracture (°)	5	
Pre-op LLD (cm)	2.3(1.4)	
Post-op LLD (cm)	0.33(0.2)	0.014
Complications		
<i>Infection</i>	0	
<i>Dislocation</i>	1	
<i>Fracture</i>	0	
<i>Heterotopic ossification</i>	1	
<i>Stem or cup malposition</i>	0	
<i>Limping</i>	1	
<i>Sciatic nerve palsy/ Femoral nerve palsy</i>	0	

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Oral Presentation: FPOP7.06

Topic: Arthroplasty

Mid-Term Outcomes of "Shackle-Type Lower Limb Abduction Casting" (S-LAC) for Recurrent Dislocation After Hip Arthroplasty

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Background

Dislocation remains a common complication following hip arthroplasty, with recurrent instability posing significant challenges post-reduction. Traditional immobilization methods—including skin traction, T-shoe traction, and pelvic stabilizers with bilateral/unilateral limb fixators—often compromise patient mobility and wound care accessibility^[1]. We developed an innovative "Shackle-Type Lower Limb Abduction Casting" (S-LAC) technique, providing rigid immobilization while preserving bed mobility exercises and perineal hygiene. This study evaluates its mid-term efficacy in preventing redislocation and function recovery, a method unreported in existing literature.

Methods

We retrospectively analyzed 27 cases (from 3,360 hip arthroplasty patients between January 2013 and December 2022) who underwent closed/open reduction combined with S-LAC, excluding cases with component loosening/malposition. Initial procedures included: bipolar hemiarthroplasty (BHA, n=8), primary total hip arthroplasty (THA, n=9), and revision hip arthroplasty (RHA, n=10). The S-LAC technique immobilized both lower limbs in 15-20° abduction with appropriate internal/external rotation (based on dislocation mechanism) using below-knee casts connected by a crossbar, maintained for 6-8 weeks (Fig 1). For recurrent dislocations without component malposition, we adhere to the S-LAC protocol (reapplication 6-8 weeks). Demographics, surgical history, reduction approach (closed:20; open:7), and 2-year minimum follow-up data were analyzed.

Results

The cohort (mean age 75.2±11.15 years) comprised 17 primary dislocations (BHA:7, THA:5, RHA:5) and 10 recurrent dislocations (BHA:1, THA:4, RHA:5). Redislocation triggers included inadequate prior immobilization and neuropsychiatric noncompliance.

1. Primary dislocation group: 17 patients (closed reduction:12; open:5) achieved 100% stability at mean 6.4-year follow-up. Mean Harris Hip Score improved to 89.5.
2. Recurrent dislocation group: All 10 patients (closed:8; open:2) maintained stability post-S-LAC at mean 4.9-year follow-up. Mean Harris Hip Score improved to 89.3.
3. No cast-related complications (e.g., pressure ulcers, DVT) occurred.

Conclusions

The S-LAC technique demonstrates three key advantages: 1) Biomechanical efficacy: Abduction-rotation control prevents redislocation regardless of initial/recurrent status. 2) Enhanced practicality: Distal fixation preserves perineal access for wound care/skin integrity while enabling bedside sitting. 3) Safety profile: Zero cast-related complications versus traditional methods. These outcomes position S-LAC as a paradigm-shifting immobilization strategy warranting multicenter validation and biomechanical studies.



Fig1 (a) Anteroposterior view for S-LAC (b) Lateral view for S-LAC

Fig.1. Schematic illustrations of the "Shackle-Type Lower Limb Abduction Casting" (S-LAC). (a) Anteroposterior view (b) Lateral view

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Oral Presentation: FPOP7.07

Topic: Joint Preservation

Optimizing Patient Selection for Periacetabular Osteotomy in Borderline Hip Dysplasia: Beyond the Lateral Center-Edge Angle

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Background

Borderline developmental dysplasia of the hip (BDDH), defined by a lateral center-edge angle (LCEA) of 18° to 25°, presents significant challenges in determining optimal treatment strategies. While periacetabular osteotomy (PAO) and conservative treatment are both viable options, the radiographic parameters that should guide this decision remain unclear. We asked: (1) Which radiographic parameters best differentiate between BDDH patients requiring PAO versus those succeeding with conservative treatment? (2) What are the optimal radiographic thresholds for surgical decision-making? (3) How reliable are these measurements for clinical application?

Methods

We conducted a retrospective analysis of consecutive BDDH patients (LCEA 18°-25°) treated at our institution between 2018-2023. Two independent observers evaluated radiographic parameters including lateral center-edge angle (LCEA), anterior center-edge angle (ACEA), Tönnis angle, crossover sign (COS), posterior wall sign (PWS), ischial spine sign (ISS), femoral head coverage, femoro-epiphyseal acetabular roof (FEAR) index and Femoral torsion angle (FTA). Interobserver reliability was assessed using intraclass correlation coefficients (ICC). ROC analysis determined threshold values for surgical intervention. Radiographic parameters were compared between PAO and conservative treatment groups.

Results

The PAO group showed significantly greater dysplasia across multiple parameters other than LCEA. Key findings included lower ACEA ($21.0^\circ \pm 8.0^\circ$ vs $24.7^\circ \pm 6.2^\circ$, $p = 0.036$), higher Tönnis angle ($13.4^\circ \pm 5.3^\circ$ vs $8.5^\circ \pm 4.6^\circ$, $p < 0.001$), and greater FTA ($36.5^\circ \pm 10.9^\circ$ vs $30.1^\circ \pm 9.2^\circ$, $p = 0.013$). Crossover sign positivity (33.3% vs 6.9%, $p = 0.009$) and posterior wall sign positivity (72.2% vs 34.5%, $p = 0.007$) were more prevalent in the PAO group. Tönnis angle emerged as the sole independent predictor of PAO necessity (OR: 1.194, 95% CI: 1.038-1.373, $p = 0.013$), with an optimal threshold of 11.7° (sensitivity 66.7%, specificity 79.3%, AUC = 0.750). All measurements demonstrated excellent interobserver reliability (ICC > 0.81), with Tönnis angle showing highest reliability (ICC = 0.89, 95% CI 0.85-0.93).

Conclusions

Multiple radiographic parameters can reliably distinguish BDDH patients requiring PAO from those suitable for conservative management. A Tönnis angle threshold of 11.7°, combined with ACEA, FTA, crossover sign, and posterior wall sign provides comprehensive guidance for surgical decision-making. These findings offer quantitative criteria for treatment selection in BDDH patients.

Oral Presentation: FPOP7.08

Topic: Joint Preservation

Calibrated Fluoroscopy in Periacetabular Osteotomy: An Approach to Optimize Anterior Coverage Accuracy

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Background

Periacetabular osteotomy (PAO) is the gold-standard treatment for developmental dysplasia of the hip (DDH) in skeletally mature patients. However, achieving optimal acetabular correction remains challenging, particularly in assessing anterior coverage, as conventional uncalibrated fluoroscopy may not accurately represent the functional acetabular position due to variations in pelvic tilt between standing and operative positions.

Questions/Purposes

We asked: 1. What are the radiographic parameters (LCEA and ACEA) in PAO patients? 2. How does calibrated fluoroscopy compare to onventional techniques in achieving optimal correction? 3. What factors influence radiographic outcomes with calibrated fluoroscopy? 4. What is the interobserver reliability of this measurement technique?

Methods

We conducted a retrospective comparative study of 213 consecutive PAOs (212 patients) performed at our tertiary referral center between January 2018 and October 2020. After applying strict inclusion/exclusion criteria, we compared outcomes between two cohorts: a calibrated fluoroscopy group (121 hips) utilizing our novel technique of matching intraoperative imaging to preoperative standing radiographs, and a historical control group (92 hips) using conventional fluoroscopic guidance. Our calibrated fluoroscopy technique involved adjusting the C-arm position to match the obturator foramen appearance with preoperative standing radiographs, thereby accounting for individual pelvic tilt variations. Both groups had comparable demographic characteristics including age (median 29.0 vs 27.5 years), gender distribution (86.0% vs 79.3% female), and body mass index (22.1 ± 2.8 vs 22.1 ± 3.4 kg/m²). Radiographic parameters, specifically lateral center-edge angle (LCEA) and anterior center-edge angle (ACEA), were evaluated on standardized standing anteroposterior and false-profile radiographs obtained preoperatively and at minimum 6-month follow-up when patients had achieved unassisted ambulation.

Results

Among 213 consecutive PAOs, preoperative analysis revealed median LCEA of 6.3° in the calibrated group versus 3.3° in controls ($p=0.180$), with median ACEA of 10.2° versus 7.9° respectively ($p=0.572$). The calibrated fluoroscopy group demonstrated significantly improved anterior coverage outcomes, with 90.9% achieving normal anterior coverage compared to 75.0% in controls ($p=0.004$), and lower rates of excessive anterior correction (5.0% vs 18.5%). Both groups achieved comparable accuracy in lateral coverage correction (90.9% vs 90.2% within normal range, $p=0.921$). Analysis revealed a strong positive correlation between preoperative LCEA and ACEA measurements ($r=0.695$, $p<0.001$), while preoperative borderline dysplasia and

normal anterior coverage showed weak positive correlations with postoperative overcorrection in both parameters.

Conclusion

Calibrated fluoroscopy referencing preoperative standing radiographs significantly improves the accuracy of anterior coverage correction in PAO while maintaining reliable lateral correction. This practical technique accounts for individual variations in pelvic orientation during surgery and enhances radiographic outcomes.

Level of Evidence: Level III, Therapeutic study.

Oral Presentation: FPOP8.01

Topic: Arthroplasty

To Save or Sacrifice? MRI Assessment of Contralateral Cartilage in Periprosthetic Joint Infection After UKA

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Background

To investigate the value of metal artifact-reduced sequence MRI (MARS MRI) in determining the extent of infection in periprosthetic joint infections (PJI) after unicompartmental knee arthroplasty (UKA) and to assess its usefulness as a preoperative guide to preserving or not preserving the contralateral compartment intraoperatively.

Methods

Prospectively and consecutively enrolled 17 patients with PJI following UKA treated at our hospital between January 2016 and January 2025, all of whom underwent preoperative MARS MRI. Orthopedic surgeons and radiologists independently assessed bone marrow edema (high signal on fat-suppressed T2-weighted sequences) and cartilage barrier defects (cartilage discontinuity or T2 high signal). Using intraoperative exploration as the gold standard, the sensitivity and specificity of MARS MRI in diagnosing contralateral compartment infection were analyzed, and inter-observer agreement was evaluated using the κ test.

Results

The sensitivity of bone marrow edema in diagnosing contralateral compartment infection was 75% (95% CI: 30.0–95.4), with a specificity of 87.5% (95% CI: 64.0–96.5). Cartilage barrier defects demonstrated 100% sensitivity (95% CI: 51.0–100.0) and 93.8% specificity (95% CI: 71.7–98.9). Overall, MARS MRI achieved 100% sensitivity and 87.5% specificity in detecting contralateral compartment involvement. Inter-observer agreement was excellent ($\kappa=0.73$). Among patients who underwent contralateral compartment preservation ($n=16$), postoperative infection control outcomes were favorable.

Conclusions

In MARS MRI, bone marrow edema and cartilage barrier defects are key imaging features for determining PJI involvement of the contralateral compartment following UKA, with cartilage integrity demonstrating particularly high sensitivity in assessing the extent of infection. MARS MRI can effectively guide intraoperative decision-making regarding preservation of the contralateral compartment, helping to balance infection eradication and joint function preservation. This provides crucial imaging evidence for the precise management of UKA-associated PJI.

Oral Presentation: FPOP8.02

Topic: Arthroplasty

The Influence of Fluoroquinolones With or Without Rifampicin on the Efficacy of Primary and Secondary Revision of Staphylococcal PJI

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Background

Currently, many literatures have reported that after DAIR treatment for Staphylococcal prosthesis joint infection (PJI), the use of rifampicin combined with targeted antibiotics seems to achieve certain effects. However, there are relatively few reports on the use of rifampicin in the first and second phase renovations of staphylococcal PJI, and there is some controversy. The purpose of this study is to compare the efficacy effect of whether rifampicin is added to fluoroquinolones on the first and second revisions of staphylococcal PJI.

Methods

We retrospectively analyzed patients with staphylococcal PJI who received primary or secondary revision treatment in our hospital from January 2014 to July 2023. These patients were first treated with intravenous antibiotics after new prosthesis implantation, and then switched to oral fluoroquinolones for anti-infection treatment. Depending on whether rifampicin was used in combination for treatment, they were divided into the rifampicin combination treatment group and the non-rifampicin combination treatment group. Compare the differences in outcomes between these two groups. Successful PJI treatment is defined as no recurrence of infection, no new infection, and no need for long-term antibiotic control of infection during the 12-month follow-up period.

Results

We included 103 patients, with an average age of 64.38±10.47 years. Among them, 47 were male patients and 56 were female patients. The average follow-up time was 15.00(14.00, 17.00) months. There were 35 cases in the rifampicin group and 68 cases in the non-rifampicin group. The research results showed that there was no significant difference in the treatment success rate of PJI between the rifampicin treatment group and the non-rifampicin treatment group (85.71% vs 83.82%, P=0.802), and the binary logistic regression model determined that diabetes was an independent and significant risk factor for the failed outcome (odds ratio [OR], 3.61; 95% Confidence Interval [CI], 1.15-11.41; (P=0.028), while the use or non-use of rifampicin was not an independent risk factor affecting the outcome. Kaplan-Meier survival curve analysis showed that there was no significant difference in the time of failure outcome between the two groups of treatment (P= 0.818). Further sublayer analysis revealed that regardless of whether it was in the first-stage revision or the second-stage revision, or in

hip joint PJI or knee joint PJI, there was no significant difference in the treatment success rate of PJI when rifampicin was used without rifampicin treatment. In terms of drug-related complications, a total of 15 patients experienced drug-related adverse events. The incidence of drug-related adverse events in the rifampicin receiving group was significantly higher than that in the non-rifampicin receiving group (25.71%vs8.82%, $P = 0.021$).

Conclusions

This study has not yet demonstrated that fluoroquinolones combined with rifampicin have a significant impact on the efficacy of the first and second revisions of staphylococcal PJI. Instead, it increases drug-related adverse events.

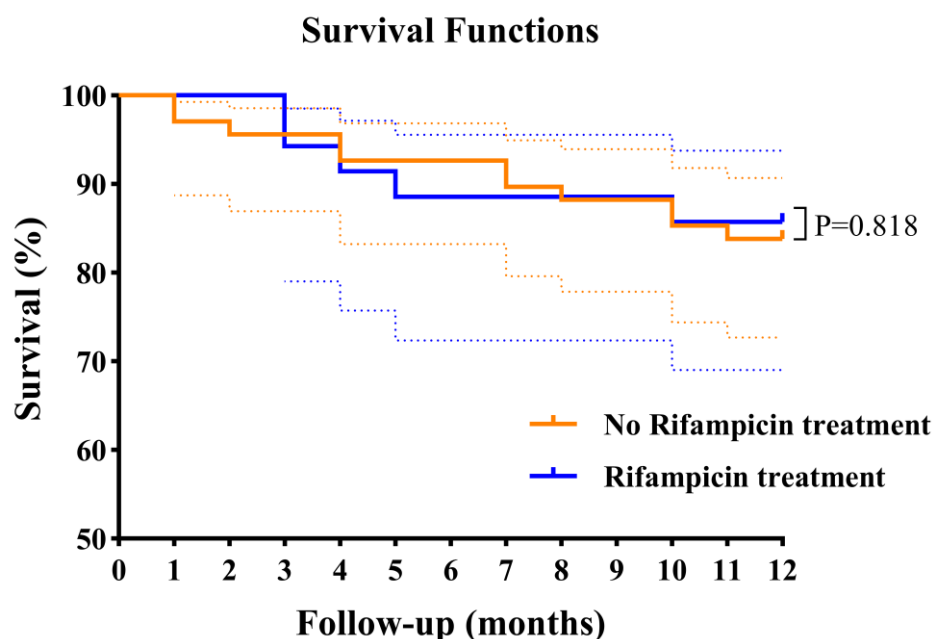


FIGURE 1. Survival rate of rifampicin treatment group and no rifampicin treatment group. This dotted line represents the 95% confidence interval.

Table 1: Comparison of Variables Between Rifampicin Treatment and No Rifampicin Treatment Groups

Variables	Rifampicin Treatment (<i>n</i> =35)	No Rifampicin Treatment(<i>n</i> = 68)	<i>P</i> value
Age (years)	64.89±8.91	64.12±11.24	0.726 ^a
Males/females	15/20	32/36	0.685 ^b
BMI (kg/m ²)	25.90(24.30, 27.20)	26.50(24.80, 27.20)	0.268 ^c
Comorbidities			
Diabetes mellitus (%)	7(20.00%)	18(26.47%)	0.468 ^b
Autoimmune disease(%)	2(5.71%)	1(1.47%)	0.266 ^d
Active cancer (%)	0(0.00%)	1(1.47%)	1.000 ^d
Active smoking(%)	2(5.71%)	8(11.76%)	0.528 ^c
CCI	4.14±0.73	3.96±0.94	0.269 ^a
ASA score	2.00(2.00, 2.00)	2.00(2.00, 2.00)	0.861 ^e
Site of infection			

Hip / Knee	18/17	38/30	0.667 ^b
Laboratory examination			
WBC (10 ⁹ /L)	7.17(5.36, 9.77)	6.66(4.92, 7.98)	0.149 ^e
CRP (mg/L)	25.33(11.40, 37.60)	23.66(10.65, 37.40)	0.775 ^e
ESR (mm/h)	52.00(44.00, 72.00)	51.00(41.00, 62.75)	0.757 ^e
D-dimer (mg/L)	2.87(1.83, 3.22)	2.37(1.67, 3.19)	0.473 ^e
IL-6 (pg/mL)	24.58(14.24, 35.58)	19.55(11.09, 35.41)	0.413 ^e
SF WBC (/mL)	8776.00 (4589.00, 16195.00)	8848.50 (5620.00, 14180.00)	0.933 ^e
SF PMN (%)	82.10(74.50, 91.80)	78.00(71.35, 89.83)	0.262 ^e
Microorganism			
<i>Staphylococcus aureus</i> (%)	14(40.00%)	24(35.29%)	0.639 ^b
MSSA(%)	12(34.29%)	20(29.41%)	0.613 ^b
MRSA(%)	2(5.71%)	4(5.88%)	1.000 ^d
<i>Staphylococcus epidermidis</i> (%)	8(22.86%)	12(17.65%)	0.527 ^b
Other CoNS(%)	13(37.14%)	32(47.06%)	0.337 ^b
MS-CoNS(%)	11(31.43%)	28(41.18%)	1.000 ^d
MR-CoNS(%)	2(5.71%)	4(5.88%)	
Type of operation			
One-stage/Two-stage revision	16/19	32/36	0.897 ^b
Drug-related adverse events(%)			
Drug-related adverse event	9(25.71%)	6(8.82%)	0.021 ^b
leading to rifampin(%)	5(14.29%)	0(0.00%)	0.004 ^d
Remission(%)	30(85.71%)	57(83.82%)	0.802 ^b
Mean follow-up time (months)	16.00(14.00, 19.00)	15.00(14.00, 17.00)	0.338 ^e

^aIndependent-samples t-test. Quantitative data are expressed as mean ± standard deviation.

^bChi-squared test.

^cContinuity correction Chi-square test.

^dFisher's exact test.

^eMann-Whitney U test

BMI:body mass index; CCI:Charlson comorbidity index; ASA: American Society of Anesthesiologists (a clinical scoring system widely used to assess pre-operative clinical status); WBC:white blood cell count; CRP:C-reactive protein; ESR:erythrocyte sedimentation rate; IL-6:interleukin-6; SF:synovial fluid; PMN:polymorphonuclear neutrophil; MSSA: methicillin-susceptible *Staphylococcus aureus*; MRSA: methicillin-resistant *Staphylococcus aureus*; CoNS:Coagulase negative staphylococci ; MS-CoNS: methicillin-susceptible coagulase negative staphylococci; MR-CoNS: methicillin-resistant coagulase negative staphylococci.

Table2: Risk Factors for Clinical Failure; Univariate and Multivariate Logistic Regression Analysis

Variable	Univariable Analyses		Multivariable Analyses	
	OR (95%CI)	P value	Adjusted OR (95%CI)	Adjusted P value
Age (years)	0.98(0.88-1.09)	0.684		
Males/females	1.23(0.42-3.58)	0.703		
BMI (kg/m ²)	0.83(0.62-1.13)	0.234		
Comorbidities				
Diabetes mellitus	4.12(1.35-12.55)	0.013	3.61(1.15-11.41)	0.028
Autoimmune disease	12.29(1.04-144.67)	0.046	8.26(0.62-109.47)	0.109
Active cancer	0.00	1.000		
Active smoking	0.58(0.07-4.90)	0.615		
CCI	1.67(0.94-2.99)	0.082		
ASA score	2.28(0.53-9.72)	0.266		
Site of infection				
Hip	1.49(0.50-4.45)	0.479		
Knee	0.67(0.23-2.02)	0.479		
Laboratory examination				
WBC (10 ⁹ /L)	1.01(0.94-1.09)	0.821		
CRP (mg/L)	1.00(0.98-1.02)	0.890		
ESR (mm/h)	1.00(0.97-1.03)	0.928		
D-dimer (mg/L)	1.12(0.87-1.56)	0.320		
IL-6 (pg/mL)	1.00(0.98-1.02)	0.990		
SF WBC (/mL)	1.00	0.491		
SF PMN (%)	0.99(0.94-1.04)	0.618		
Microorganism				
<i>Staphylococcus aureus</i>	1.41(0.48-4.14)	0.537		
MSSA	1.01(0.32-3.19)	0.986		
MRSA	2.96(0.50-17.74)	0.234		
<i>Staphylococcus epidermidis</i>	0.95(0.24-3.71)	0.941		
Other CoNS	0.74(0.25-2.21)	0.588		
MS-CoNS	0.50(0.15-1.66)	0.255		
MR-CoNS	2.96(0.50-17.74)	0.234		
Type of operation				
One-stage revision	1.18(0.40-3.42)	0.767		
Two-stage revision	0.85(0.29-2.47)	0.767		
Drug-related adverse event				
Drug-related adverse event leading to rifampin	1.44(0.36-5.82)	0.607		
Rifampin treatment	0.86(0.28-2.72)	0.802		
Mean follow-up time	1.03(0.84-1.25)	0.799		

BMI:body mass index; CCI:Charlson comorbidity index; ASA: American Society of Anesthesiologists (a clinical scoring system widely used to assess pre-operative clinical status); WBC:white blood cell count; CRP:C-reactive protein; ESR:erythrocyte sedimentation rate; IL-6:interleukin-6; SF:synovial fluid; PMN:polymorphonuclear neutrophil; MSSA: methicillin-susceptible *Staphylococcus aureus*; MRSA: methicillin-resistant *Staphylococcus aureus*; CoNS:Coagulase negative staphylococci ; MS-CoNS: methicillin-susceptible coagulase negative staphylococci; MR-CoNS: methicillin-resistant coagulase negative staphylococci

Oral Presentation: FPOP8.03

Topic: Arthroplasty

Multidisciplinary Team (MDT) Impact on Perioperative and Functional Outcomes in Neck of Femur Fractures

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Background

Neck of femur (NOF) fractures are associated with significant perioperative morbidity, mortality, and functional decline, particularly in geriatric populations. Integration of a multidisciplinary team (MDT) approach prior to surgical intervention has been proposed to mitigate these risks through comprehensive perioperative optimization. Our centre embarked on setting up a multidisciplinary team (MDT) to manage patients with neck of femur fracture prior to surgery. Hence this study is to compare between patients who had pre-operative MDT involvement and those who did not in terms of the surgical timing, perioperative outcomes, and functional recovery in neck of femur fracture patients.

Methods

A retrospective comparative cohort analysis was conducted on 54 patients admitted with NOF fractures between January 2023 and December 2024. This time frame was chosen as we had started MDT management from January 2024. Patients were stratified into MDT-managed (n=27) (January 2024 – December 2024) and non-MDT-managed (n=27) (January 2023 – December 2023) cohorts. MDT intervention included coordinated assessments by orthopaedic surgeons, geriatricians, anaesthetists, physiotherapists, and specialist nurses, focusing on preoperative medical stabilization and functional planning. Primary outcomes were time to surgery, length of hospital stay, Harris Hip Score, Forgotten Hip Joint Score, and incidence of inpatient complications. Statistical significance was determined using independent t-tests and chi-square tests, with p-values reported.

Results

Preoperative MDT involvement was associated with significantly expedited surgical intervention (mean 3.5 ± 1.0 days vs 11.5 ± 1.8 days; $p < 0.001$) and reduced hospital length of stay (7.5 ± 1.2 days vs 11.5 ± 1.5 days; $p < 0.001$). MDT patients demonstrated superior postoperative functional outcomes, reflected in higher mean Harris Hip Scores (80.5 ± 2.5 vs 71.0 ± 3.1 ; $p < 0.001$) and Forgotten Hip Joint Scores (93.6 ± 0.8 vs 91.3 ± 1.2 ; $p = 0.002$). Furthermore, the complication rate was significantly lower in the MDT cohort (3.7% vs 18.5%; $p = 0.045$) (Table 1).

Conclusions

Preoperative MDT engagement in NOF fracture management confers substantial benefits, including accelerated time to surgical fixation, shortened hospitalization, and enhanced postoperative functional recovery. These findings underscore the importance of adopting structured MDT pathways as a standard of care to optimize perioperative outcomes and functional independence in patients sustaining NOF fractures. We would recommend that all tertiary centres in Malaysia implement MDT management in patients with neck of femur fracture.

Table 1. Clinical Outcomes Comparing MDT and Non-MDT Cohorts

Outcome	MDT Group (n=27)	Non-MDT Group (n=27)	p-value
Time to Surgery (days)	3.5 ± 1.0	11.5 ± 1.8	<0.001
Length of Stay (days)	7.5 ± 1.2	11.5 ± 1.5	<0.001
Harris Hip Score	80.5 ± 2.5	71.0 ± 3.1	<0.001
Forgotten Hip Score	93.6 ± 0.8	91.3 ± 1.2	0.002
Complication Rate (%)	3.7%	18.5%	0.045

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Oral Presentation: FPOP8.04

Topic: Arthroplasty

Arthroplasty for Neck of Femur fractures in Dialysis Patients are Associated with Higher Complications

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Background

Dialysis patients undergoing hip arthroplasty for neck of femur fractures face heightened risks of early mortality and complications due to their underlying comorbidities¹. **This study assesses 30-day mortality and complication rates in dialysis patients compared to non-dialysis patients.**

Methods

A retrospective cohort of 150 patients (25 dialysis, 125 non-dialysis) treated at a national referral center (2020–2024) was analyzed. We excluded patients who underwent hemodialysis due to acute renal failure, patients with renal transplant and patients with known renal impairment but were not on dialysis after hip replacement surgery. Patients with the diagnosis of polytrauma, pathological fractures due to tumors and patients with previous hip fracture surgery were also excluded. Demographic data obtained were Age, Sex, Body Mass Index, Tobacco use, Diabetes Mellitus, and Hypertension. Complication assessed were 30-day mortality, surgical site infection, Prosthetic Joint Infection, Sepsis, Prosthesis Dislocation, Periprosthetic Fracture, Deep Vein Thrombosis, Myocardial infarction, Seizures, Delirium and Hospital Acquired Pneumonia. Descriptive statistics, Fisher's exact tests, and propensity score matching (PSM) were used to evaluate outcomes. Number needed to harm (NNH) was calculated to quantify risk.

Results

Dialysis patients had a 30-day mortality rate of 16% compared to 0.8% in non-dialysis patients ($p = 0.0028$, OR = 23.62, NNH = 7). Complications were significantly higher in dialysis patients, including myocardial infarction (20% vs. 0.8%, $p = 0.0005$, OR = 29.84, NNH = 5), hospital-acquired pneumonia (32% vs. 1.6%, $p < 0.0001$, OR = 27.79, NNH = 3), and seizures (16% vs. 0%, $p = 0.0006$, OR = Inf, NNH = 6). The composite outcome of “any complications” was 40% in dialysis vs. 10.4% in non-dialysis patients ($p = 0.018$, OR = 3.56, NNH = 3). PSM confirmed higher complication rates in dialysis patients (68% vs. 16%, $p = 0.00044$, OR = 10.52, NNH = 2).

Discussion

Dialysis patients are associated with higher co-morbidities and is a risk factor for perioperative complication and mortality. In our study we found that arthroplasty in dialysis patients have higher risks for 30-day mortality, myocardial infarction, hospital acquired pneumonia, seizures and others.

Conclusion

Dialysis patients face significantly higher risks of early mortality and complications following hip arthroplasty, necessitating targeted preoperative optimization with multidisciplinary approach and postoperative care.

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Oral Presentation: FPOP8.05

Topic: Arthroplasty

Dental Plaque Disclosing Gel: An Effective Detecting Agent for Guiding Debridement of Bacterial Biofilms in Periprosthetic Joint Infection

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Background

The presence and invisibility of biofilms are critical factors contributing to incomplete debridement in periprosthetic joint infection (PJI), often leading to infection relapse and failure of debridement, antibiotics, and implant retention (DAIR) procedures or subsequent revision surgeries. GC Tri Plaque ID Gel™ (GC gel), a three-tone disclosing gel, was widely used for dental plaque. Only a simple smear on the tooth surface was required to assess the presence of plaque, maturation and acidic potential by different colors. However, its utility in PJI remains unvalidated. This study aimed to assess GC gel's feasibility in visualizing implant surface biofilm and distinguishing its maturity, further evaluating its utility in guiding DAIR procedures.

Methods

Murine subcutaneous biofilm infection models were respectively established with fluorescence-labeled Methicillin-resistant Staphylococcus aureus (MRSA) and Escherichia coli (E. coli), simulating biofilm formation in vivo. Infected implants collected at different time points were observed under fluorescence microscopy, followed by GC gel staining. Staining accuracy was calculated by comparing fluorescence and stained images. Bacterial load and inflammatory responses were evaluated via bacterial counting and routine blood tests. A murine PJI model was used to assess the debridement effectiveness of GC gel-guided DAIR through microbiological, hematological, and histological analysis. Clinical PJI prostheses were stained to evaluate GC gel's clinical applicability.

Results

GC gel staining accuracy for biofilms reached over 80% for MRSA. Infected implants, particularly clinical PJI prostheses, showed distinct red, blue, and purple staining, which represented biofilms at different stages and maturity (Figure1, 2). With prolonged infection, bacterial load and systemic inflammatory response increased, with corresponding changes in staining area and intensity. In the PJI model, biofilm visualization-guided DAIR resulted in lower bacterial load and inflammation postoperatively. Staining profiles of clinically infected prostheses indicated biofilms aggregated on static region exposed in the joint cavity, with low density at articulating surface.

Conclusions

GC gel can effectively visualize biofilms and assess biofilm maturity, revealing biofilm distribution patterns on prosthetic surfaces. GC gel-guided DAIR exhibited superior debridement outcome in animal model, supporting its potential in further PJI treatment.

Case 1

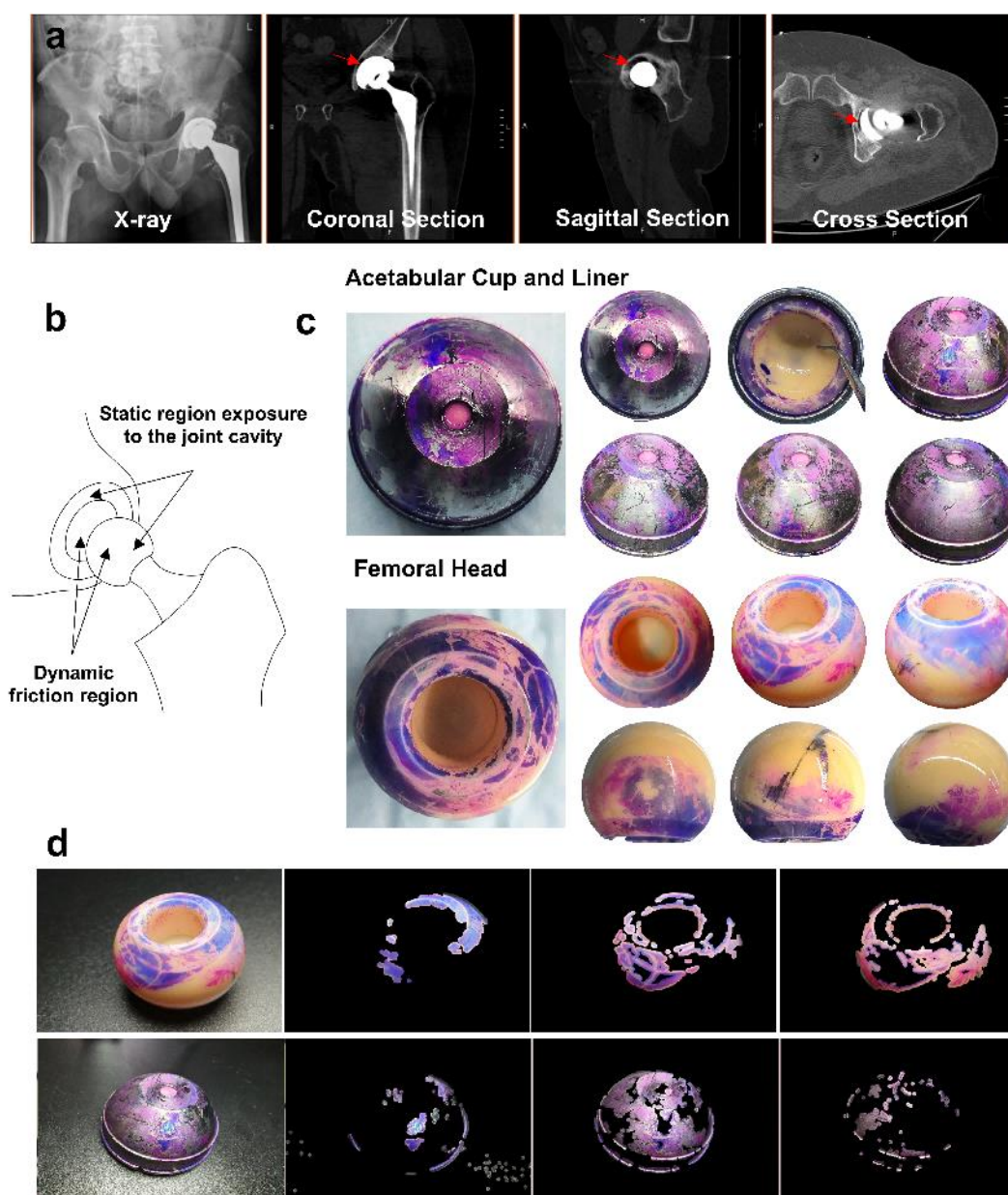


Figure 1. Case 1: Infected prosthesis staining after THA. a) X-ray and CT images. b) Schematic diagram of hip prosthesis. c) Representative stained images of multiple views of the acetabular cup and femoral head. d) Representative images after separation and 3D reconstruction of different colors after the staining of the acetabular cup and femoral head.

Case 2

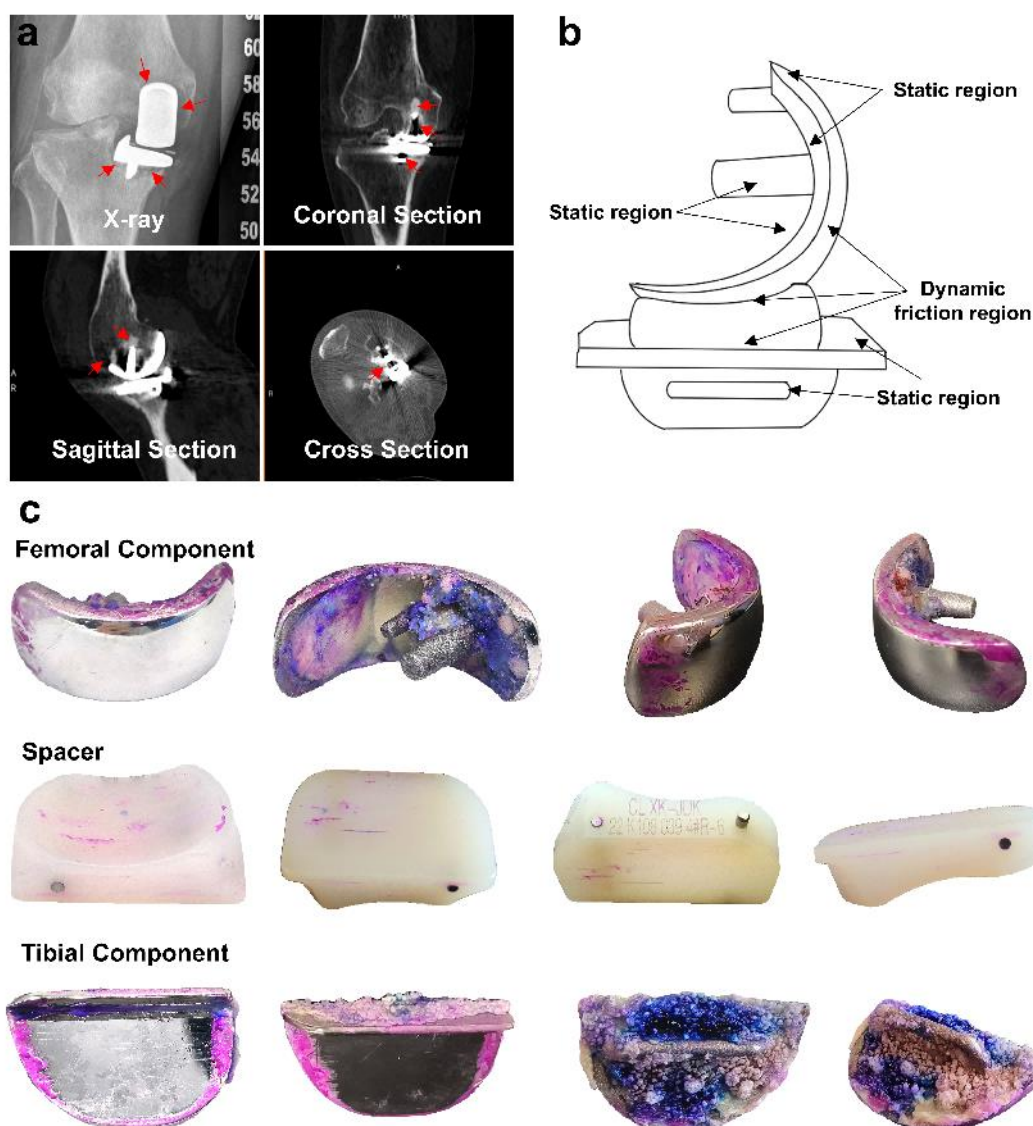


Figure 2. Case 2: Infected prosthesis staining after UKA. a) X-ray and CT images. b) Schematic diagram of knee prosthesis. c) Representative stained images of multiple views of the femoral component, liner and tibial component.

Oral Presentation: FPOP8.06

Topic: Arthroplasty

Arthrocentesis in Guiding Hip and Knee Arthroplasty Surgeons: Analysis of Data from a National Arthroplasty Referral Centre

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Background

Arthrocentesis is an aspiration of synovial fluid for diagnostic or therapeutic purposes. At University of Malaya Medical Centre (UMMC), our team routinely conducts arthrocentesis in the preoperative setting, particularly in patients presenting with knee effusion, atypical hip pain, or requiring revision arthroplasty. In this case series, we present 8-months review of arthrocentesis procedures performed at our centre and their impact on subsequent clinical decision-making and surgical management strategies.

Methods

Patients' data were collected from the operation theatre lists, clinic and ward registries for arthrocentesis procedures performed outside the OT setting, spanning the period from June 2024 to January 2025.

Results

The overall positive culture yield from arthrocentesis was 47%, with 71% of those originating from knee aspirations and 39% from hip aspirations. The most frequently isolated pathogen was MSSA, predominantly from knee aspirates. In contrast, hip aspirates yielded more antibiotic-resistant organisms at our center. Table 1 shows PJI has the highest number of positive preoperative and intraoperative culture findings. Table 2 illustrates CUMARS preferred for hip revision surgery while DAIR for knee revision surgeries

Table 1 Tabulation of data comparing preoperative arthrocentesis finding to intraoperative finding based on diagnosis

Site	Diagnosis	Preoperative Arthrocentesis Culture		Intraoperative Culture	
		Positive	Negative	Positive	Negative
Hip	12 Prosthetic Joint Infection (PJI)	4	3	1	3
	2 Avascular Necrosis (AVN)	0	2	0	2
	2 Aseptic Loosening	0	2	0	2
	1 Non- Union	0	1	0	1
	1 Exacerbation of Osteoarthritis	0	1	0	1
	2 Septic Arthritis	1	1	-	-
Knee	18 Prosthetic Joint Infection (PJI)	12	10	2	11

	Avascular Necrosis (AVN)	1	0	1	0	1
	Aseptic Loosening	1	0	1	1	0
	Non- Union	1	0	1	0	1
	Exacerbation of Osteoarthritis	3	0	3	0	3
	Septic Arthritis	0	0	0	0	0

Table 2 Tabulation of data for culture positive arthrocentesis based on the diagnosis, type of surgery, organism isolated and the antibiotic used in implant

Site	Diagnosis	Type of Surgery	Organism Isolated	Antibiotic in Implant
Hip	Prosthetic Joint Infection (PJI)	Custom Made Articulating Spacer (CUMARS)	<i>Corynebacterium striatum</i>	1 Nil
			<i>Staphylococcus epidermidis</i>	1 Nil
		2 stage revision	<i>Candida Glabrata</i> , <i>Enterococcus Faecalis</i> , <i>Staphylococcus Aureus</i>	1 Voriconazole, Amphotericin B, Gentamicin, Vancomycin
	Septic Arthritis	Joint Washout	Mycobacterium tuberculosis complex	1 Nil
Knee	Prosthetic Joint Infection (PJI)	Debridement, Antibiotics, and Implant Retention (DAIR)	Methicillin Sensitive <i>Staphylococcus Aureus</i> (MSSA)	5 Nil
			<i>Escherichia coli</i> (E. Coli)	1 Nil
		2 stage revision	MSSA	1 Ceftadizine, Vancomycin, Gentamycin
			E.Coli	1 Ceftadizine, Vancomycin, Gentamycin
			<i>Serratia Marcescen</i>	1 Meropenam, Vancomycin, Gentamycin
			Methicillin Resistant <i>Staphylococcus Aureus</i> (MRSA)	1 Vancomycin, Gentamicin

Conclusions

The findings of our case series underscore the importance of synovial fluid analysis in guiding surgical management decisions and tailoring antibiotic strategies, including intraoperative cement loading. A significant proportion of infections involved multidrug-resistant organisms, highlighting the need for continued vigilance and institution-specific antimicrobial stewardship.

Oral Presentation: FPOP8.07

Topic: Arthroplasty

Long-Term Outcome of Two-Stage Revision Surgery for Prosthetic Joint Infection in A Malaysian Tertiary Hospital

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Background

Prosthetic joint infection (PJI) is a severe complication following total joint arthroplasty. Two-stage revision remains the gold standard for managing chronic PJI, though reported eradication rates vary widely (54–100%). This study aimed to evaluate the long-term infection eradication rate after two-stage revision in a Malaysian tertiary hospital.

Methods

We retrospectively analyzed all two-stage revision procedures performed for chronic PJI from 2020 to 2025. Patient demographics, microbiological profiles, antibiotic regimens, and comorbidities were reviewed. The primary outcome was infection eradication, defined as absence of reinfection requiring further surgery or long-term suppressive antibiotics. Predictors of reinfection were assessed using Firth's logistic regression.

Results

A total of 26 patients underwent two-stage revision (mean age: 62.8 years; 54% female). Diabetes was the most common comorbidity (42.3%). Organisms isolated included *Staphylococcus epidermidis*, *E. coli* (ESBL), and *Pseudomonas aeruginosa*. IV vancomycin was the most frequently used antibiotic. Infection eradication was achieved in 24 of 26 patients (92.3%). Firth's logistic regression revealed no statistically significant associations between reinfection and age ($p = 0.81$), sex ($p = 0.65$), BMI ($p = 0.17$), diabetes ($p = 0.51$), smoking ($p = 0.83$), alcohol ($p = 0.75$), or cardiovascular disease ($p = 1.00$).

Conclusions

Two-stage revision surgery achieved a high infection eradication rate of 92.3% in our cohort. No significant predictors of reinfection were identified, supporting the robustness of this surgical strategy in managing chronic PJI.

Table 1: Descriptive analysis of patients in the study

Variable		Value
Age	Age Range (years)	33 – 86
	Mean Age (years)	62.8
	Median Age (years)	68.5
Sex	Female (%)	53.8% (14/26)
	Male (%)	46.2% (12/26)
BMI	Mean BMI	29.0
	Median BMI	28.6
	BMI Range	23 – 39
ASA Group	ASA 2 (%)	65.4% (17/26)
	ASA 3 (%)	26.9% (7/26)

Table 2: Association Between Risk Factors and Reinfection

Risk Factor	Total Patients With the risk factor	Reinfected	Total patients without risk factors	Reinfected
Diabetes	11	0	15	2
Cardiovascular	2	0	24	2
Smoking	4	0	22	2
Alcohol	3	0	23	2
Immunocompromised	0	0	21	2

Table 3: Firth's Logistic Regression Report

Predictor	Odds Ratio	p-value	95% Lower CI	95% Upper CI	Interpretation
Age	1.04	0.81	0.75	1.43	Not significant
Sex (Male)	7.41	0.65	0.0014	39592	Not significant
BMI	1.45	0.17	0.85	2.48	Not significant
Diabetes	~0.001	0.51	~0.000001	960000	Not significant
Smoking	~0.11	0.83	~0.00001	185000000	Not significant
Alcohol	~0.02	0.75	~0.00001	320000000	Not significant
Cardiovascular	~1.00	1.00	0.00	152	No effect seen

Table 4: Organism isolated

Organism	Count
Staphylococcus species	15
No growth	3
Escherichia coli	3
Pseudomonas aeruginosa	2
Streptococcus agalactiae	1
Enterococcus faecalis	1
Other	1

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Oral Presentation: FPOP8.08

Topic: Joint Preservation

Pilot Study If Septic Arthritis Irrigation Using Superoxidized Solution

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Background

Septic arthritis is a surgical emergency associated with high morbidity and mortality when not promptly treated. The α -toxin from common organisms swiftly destroys cartilage, necessitating immediate, effective irrigation. Irrigation optimization, including osmolarity may counteract toxin damage. This study examines Hydrocyn, a superoxidized solution, marking the first study to evaluate its application in septic arthritis irrigation where no prior evidence currently exists.

Methods

A prospective case series was conducted at Hospital Universiti Kebangsaan Malaysia involving ten adult patients (≥ 18 years) with a first episode of knee septic arthritis. Exclusion criteria were inflammatory arthritis, prosthetic joint infections, and immunosuppression (except diabetes). All patients underwent arthrotomy washout using of Hydrocyn delivered according to the Hydrocyn Protocol.

Results

Early surgical intervention with Hydrocyn irrigation led to a consistent decline in CRP and WCC levels. Most patients demonstrated progressive improvement in knee range of motion by six weeks. Outcomes were favorable across various pathogens and comorbidities. No significant differences were observed between organism groups, suggesting broad applicability. Over 6 weeks, patients showed significant CRP and WBC reduction with improvement in term of ROM and HSS score ($p < 0.001$)

Discussion

Hydrocyn showed promise as a safe and effective adjunct, enhancing infection control and facilitating early functional recovery. Its broad-spectrum antimicrobial properties and non-cytotoxic nature make it suitable even in complex clinical scenarios, including cases with resistant organisms and metabolic comorbidities. The consistent improvement in inflammatory markers and mobility suggests that Hydrocyn may enhance the efficacy of standard surgical debridement.

Conclusions

Hydrocyn appears to be a safe and potentially effective adjunct to standard irrigation in the surgical management of septic arthritis. These preliminary results support further research into its clinical benefits and its potential role in improving joint outcomes.

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E-Poster Presentation

Note: All information in abstracts is the sole responsibility of the author(s)

E-Poster: LBP01

Topic: Joint Preservation

Early Experience with Patient-Specific Instrumentation for Opening-Wedge High Tibial Osteotomy

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Background

Patient-specific instrumentation (PSI) has been introduced in high tibial osteotomy to enhance surgical accuracy and optimize clinical outcomes in the management of medial compartment knee osteoarthritis. However, the radiological and clinical outcomes associated with its use have yet to be established in our clinical setting. This study aims to evaluate the radiological and clinical outcomes of PSI-assisted opening-wedge high tibial osteotomy (OWHTO).

Methods

This retrospective case series evaluates the impact of PSI in OWHTO, focusing on surgical accuracy and functional outcomes. Patients with medial compartment knee osteoarthritis who underwent OWHTO using PSI were included. Postoperative alignment correction was assessed from radiographic measurements. Clinical outcomes were evaluated in patients who completed a minimum of 24 months of follow-up, using patient-reported outcome measures (PROMs). Data were analyzed using two-tailed paired t-tests.

Results

At a mean follow-up of 52 (± 16.6) months, clinical outcomes assessed using patient-reported outcome measures (PROMs) were available for five patients, as summarized in Table 1. A statistically significant improvement was observed in the WOMAC score ($p = 0.011$). However, no significant differences were noted in the KOOS ($p = 0.050$) and OKS ($p = 0.055$) scores. Radiographic analysis of 12 knees demonstrated significant improvements in mechanical axis deviation, hip-knee-ankle angle, and medial proximal tibial angle (all $p < 0.001$), as shown in Table 2. There was no significant difference in the posterior medial tibial slope compared to preoperative measurements ($p = 0.462$). Complications included one case of lateral tibial plateau fracture requiring conversion to total knee arthroplasty and one case of prominent implant requiring removal.

Conclusions

In this case series, the use of PSI in high tibial osteotomy enhanced surgical precision, resulting in improved alignment accuracy and satisfactory clinical outcomes. Although further studies with larger cohorts and longer follow-up periods are warranted, our findings suggest a positive trend toward improved activities of daily living and return to work following PSI-guided OWHTO, with minimal risk of major complications.

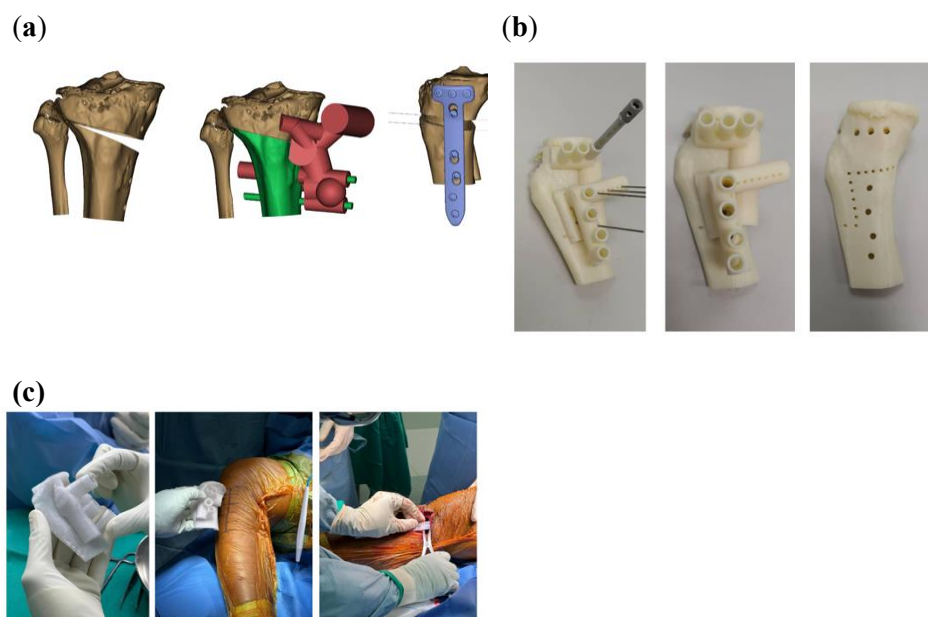


Fig. 1. (a) Preoperative 3D imaging of OWHTO using PSI; (b) Trial of PSI on bone model; (c) Intraoperative use of PSI in patients undergoing OWHTO.

Table 1 Patient-reported outcome measures (mean $\pm$ standard deviation)

PROM	Preoperative	Postoperative	<i>p</i> value
KOOS	89.2 $\pm$ 42.1	28.6 $\pm$ 35.2	0.05
WOMAC	28.6 $\pm$ 13.2	5.2 $\pm$ 9.1	0.011
OXS	49.8 $\pm$ 42.9	7.2 $\pm$ 15	0.055

Table 2: Radiographic alignment measures (mean $\pm$ standard deviation)

	Preoperative	Postoperative	<i>p</i> value
Mechanical axis deviation (mm)	41.28 $\pm$ 14.96	-0.97 $\pm$ 14.98	<0.001
Hip-knee-ankle angle (°)	12.75 $\pm$ 4.20	-1.30 $\pm$ 4.98	<0.001
Medial proximal tibial angle (°)	6.23 $\pm$ 1.96	-1.29 $\pm$ 3.68	<0.001
Posterior medial tibial slope (°)	10.7 $\pm$ 3.2	11.7 $\pm$ 4.07	0.462

E-Poster: LBP02

Topic: Arthroplasty

Comparing Multiple Screw Fixation and Bipolar Hemiarthroplasty for Displaced Femoral Neck Fracture: A Retrospective Analysis of Twenty Years of Data from a Tertiary Referral Hospital

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Background

The adverse results of elevated mortality rates and the implication of high economic costs have contributed to the intense discourse surrounding hip fracture surgery. It is pivotal to identify the treatment that yields favorable outcomes for displaced femoral neck fracture (FNF). Our study aimed to evaluate and compare (1) surgery-associated parameters and (2) mortality rates following multiple screw fixation (MSF) or bipolar hemiarthroplasty (BHA) in patients with displaced FNF using twenty years of data from a single tertiary referral center.

Methods

Between January 2000 and January 2018, we analyzed 1,153 cases of displaced FNFs treated at our institution with either internal fixation employing multiple screws (multiple screw fixation) or cementless bipolar hemiarthroplasty (BHA). We evaluated (1) surgery-associated parameters, (2) duration of hospitalization, and (3) postoperative complications and mortality rates at one year and at five years following the surgical procedure.

Results

Multiple screw fixation (MSF) showed a reduced waiting period preceding surgery, a shortened duration of the surgical procedure, but an extended period of hospitalization. There was an estimated increase of blood loss and postoperative transfusion with cementless BHA compared to that with MSF. Both the procedures did not differ in postoperative complications. The one-year- and five-year-mortality rates were also similar in both groups.

Conclusions

Since cementless BHA and MSF surgeries did not distinctly differ in mortality rates at one year and at five years, it is crucial that surgeons make personalized surgical decisions based on the individual characteristics of the patient. Surgeons should carefully weigh the advantages of MSF, which include shortened surgery time and low blood loss against the benefits (eg, reduced hospitalization period) of cementless BHA.

E-Poster: LBP03

Topic: Joint Preservation

Biologic Augmentation in Early Idiopathic Osteonecrosis of the Femoral Head: Long-Term Outcomes of Core Decompression with Bone Marrow Aspirate Concentrate and Teriparatide

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Background

Idiopathic osteonecrosis of the femoral head (ONFH) affects young adults and, if untreated, can progress to femoral head collapse and early arthroplasty. Joint-preserving techniques such as core decompression combined with biologic augmentation like bone marrow aspirate concentrate (BMAC) and anabolic agents such as teriparatide, offer promising alternatives in early-stage disease.

Methods

Two female patients with ARCO Stage I–II ONFH underwent core decompression and injection of 10cc of BMAC derived from the iliac crest. Patient A had isolated left hip involvement (ARCO Stage II) confirmed by CT while patient B presented with bilateral ONFH: right hip (ARCO Stage II) and left hip (Stage I–II) confirmed via MRI. Each hip was treated surgically in a staged manner and supplemented with adjunctive teriparatide therapy (in patient B). Long-term follow-up assessments included clinical examination and serial radiographs at 8- and 11-years post-op respectively.

Results

Both patients demonstrated complete resolution of pain, with full return to function within 6 months of the procedure. Radiographic follow-up showed no evidence of femoral head collapse, joint space narrowing, or degenerative changes. No further surgical interventions were required after initial surgery (Figs. 1 and 2).

Conclusions

Core decompression augmented with BMAC with or without adjunctive teriparatide may offer durable joint preservation in early idiopathic ONFH. These two long-term cases demonstrate the potential of regenerative and anabolic strategies to halt disease progression and preserve native hip function in ARCO Stage I–II patients.

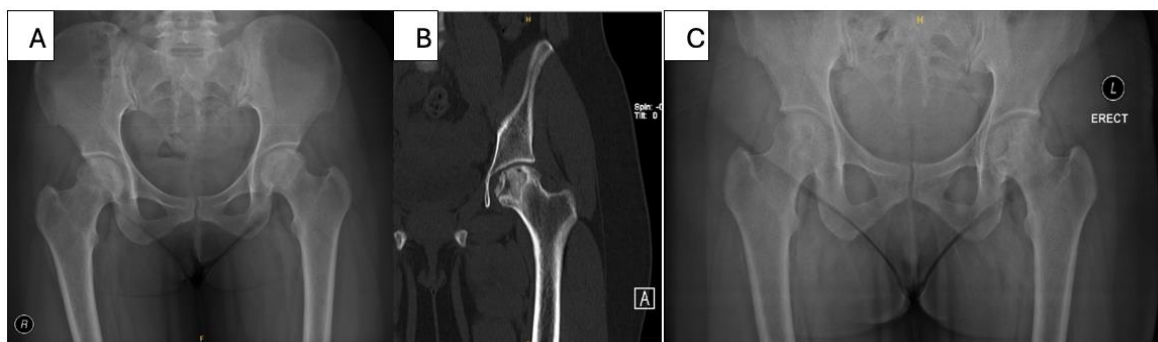


Figure 1 (A) and (B) Preoperative plain radiograph and CT scan illustrating osteonecrosis of bilateral femoral head (C) Radiograph at most recent follow up, 8 years post procedure (Patient A)

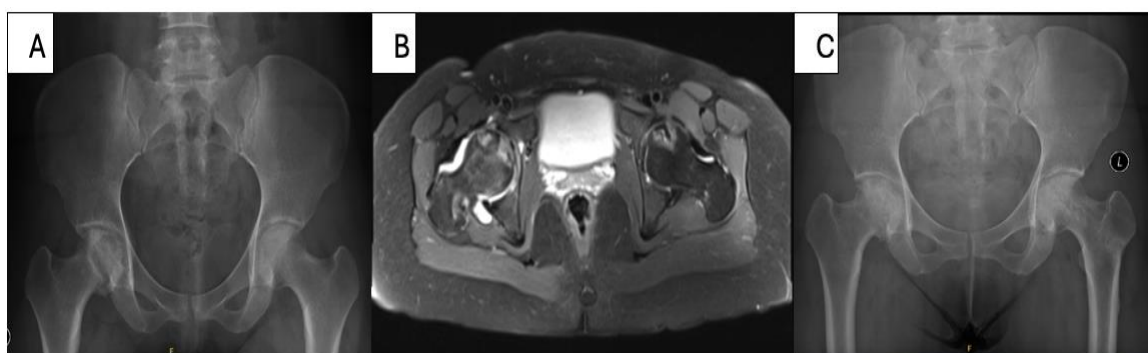


Figure 2 (A) and (B) Preoperative radiograph and MRI illustrating osteonecrosis of bilateral femoral head (C) Radiograph at most recent follow up, 11 years post procedure (Patient B)

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E-Poster: LBP04

Topic: Joint Preservation

Patient-Specific Versus Oxford Microplasty Instrumentation in Unicompartmental Knee Arthroplasty

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Background

The purpose of the study was to compare patient-specific instrumentation (PSI) with Oxford microplasty instrumentation (MPI) in unicompartmental knee arthroplasty (UKA) for patients with anteromedial knee osteoarthritis.

Methods

We performed a prospective study at a single high-volume orthopaedic hospital. All patients were randomly assigned to undergo either PSI-assisted UKA performed by inexperienced surgeons (PSI group) (Fig. 1) or MPI-assisted UKA performed by experienced surgeons (MPI group) at a 1:1 ratio. Radiological measurements included the femoral component varus and valgus angle, flexion and extension angle, tibial component varus and valgus angle, tibial posterior slope angle, and hip-knee-ankle angle (HKAA). The Knee Society Score (KSS) and Hospital for Special Surgery (HSS) score were assessed at one, three, six, and 12 months. Mixed-effects modelling was used to analyze repeated measurements.

Results

A total of 73 participants (37 in the PSI group and 36 in the PM group) were enrolled from June 2021 to July 2023. No patients were lost to follow-up. No significant differences between groups were found in the femoral component varus and valgus angle, flexion and extension angle, tibial component varus and valgus angle, tibial posterior slope angle, or hip-knee-ankle angle (all $P > 0.05$) (Table 1). At the 12-month follow-up, the PSI group and MPI group achieved mean KSSs of 93.4 points (95% CI, 88.6-97.8) and 93.6 points (95% CI, 89.1-98.4), respectively (Fig. 2). There were no significant between-group differences in the KSS and HSS score improvements from baseline to each follow-up point.

Conclusions

PSI-assisted UKA performed by inexperienced surgeons can yield radiological and functional outcomes comparable to those of MPI-assisted UKA performed by experienced surgeons in the treatment of knee osteoarthritis. PSI is emerging as a promising alternative for practitioners inexperienced at UKA on a learning curve.

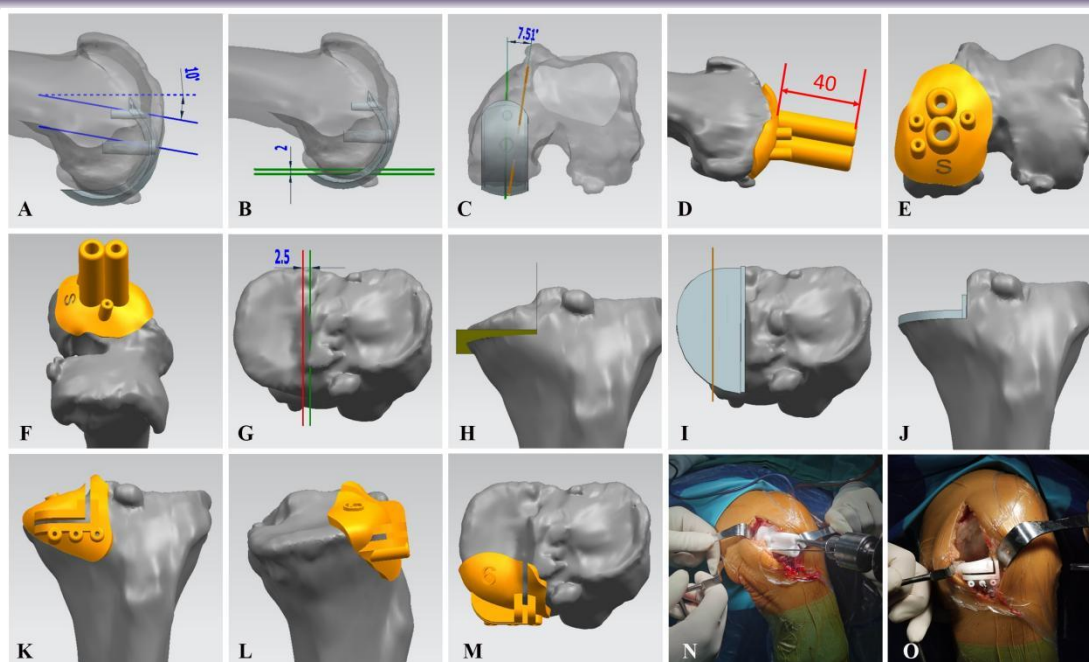


Fig. 1. Preoperative planning and definitive cutting block of the femoral PSI. A, B, C Femoral component designs for sizing, alignment, and implant positioning that matches the femoral anatomy. D, E, F Femoral PSI 3D images of the definitive position superimposed on the preoperative plan. G, H, I, J Tibial component designs for sizing, alignment, and implant positioning that matches the tibial anatomy. K, L, M Tibial PSI 3D images of the definitive position superimposed on the preoperative plan. N, O The definitive cutting block of the femoral and tibial PSI. PSI, patient-specific instrumentation.

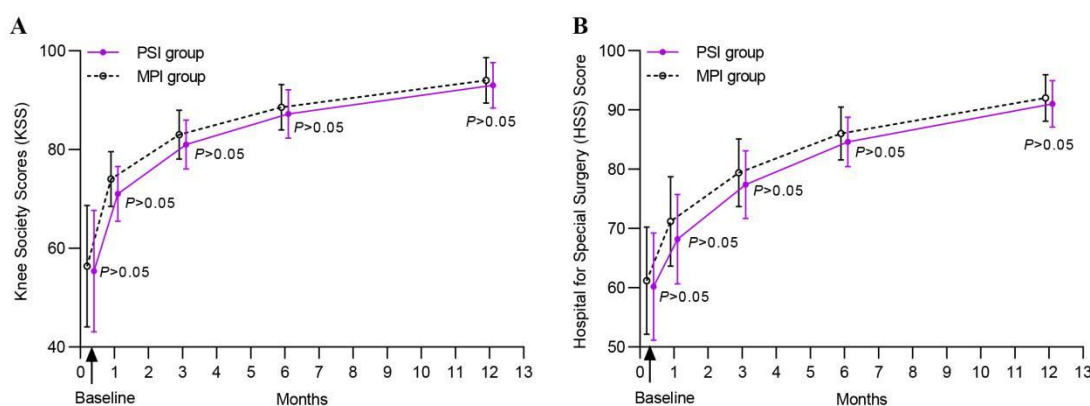


Fig. 2. Postoperative measurements of the Knee Society Score (KSS) and Hospital for Special Surgery (HSS) score at baseline and one, three, six and 12 months post-operatively. The KSS and HSS score range from 0 to 100, with higher scores indicating better functioning. PSI, patient-specific instrumentation. MPI, Oxford microplasty instrumentation.

Table 1. Radiological measurements at post-operative one day

	PSI group (n=37)	MPI group (n=36)	Mean difference
Femoral component			
Varus/valgus angle	0.88 (-0.41 to 2.16)	2.47 (1.10 to 3.84)	-1.59 (-3.38 to 0.19)
Flexion/extension angle	8.38 (7.76 to 9.01)	9.04 (8.31 to 9.77)	-0.66 (-1.56 to 0.25)
Tibial component			
Varus/valgus angle	3.16 (2.57 to 3.76)	4.26 (2.99 to 5.52)	-1.10 (-2.41 to 0.22)
Posteroinferior tilt	3.91 (2.26 to 4.57)	4.18 (3.28 to 5.08)	-0.27 (-1.33 to 0.78)
Hip-knee-ankle angle	176.25 (175.61 to 176.89)	175.80 (174.91 to 176.70)	0.45 (-0.59 to 1.49)

E-Poster: LBP05

Topic: Joint Preservation

Development of Rehabilitation Norms for Total Knee Arthroplasty Patients: Linking Hospitals and Communities Through Exercise Function Evaluation

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Background

Exercise rehabilitation immediately after total knee arthroplasty (TKA) is essential to prevent postoperative physical function decline and promote recovery. Despite the benefits of TKA, recovery outcomes vary significantly among patients. This study aimed to establish standardized evaluation norms for linking hospital-based rehabilitation with community care.

Methods

This study included 824 patients (164 men and 660 women; age: 72 ± 6.4 years) with a history of TKA. Participants were categorized based on the postoperative period (immediately after discharge to over 49 months). Physical function indicators such as muscular strength, endurance, flexibility, cardiorespiratory endurance, balance, and gait were measured. Quality of life was assessed using WOMAC and SF-36 questionnaires. Data analysis was performed using SPSS software (version 21.0), employing descriptive statistics and one-way ANOVA to identify sex-based differences.

Results

There was no significant difference in the Visual Analogue Scale(VAS) according to sex; however, body composition (weight, skeletal muscle mass, body fat weight, and body fat percentage), showed significant differences between men and women. Additionally, knee flexion contracture range of motion (ROM), 6-minute walking, sit-and-reach flexibility, muscle strength (flexion and extension), and Timed Up and Go (TUG) test results (Tables 1-2) showed significant differences. Using the means and standard deviations of these indicators, Cajori 5-grade evaluation norms were established to provide standardized rehabilitation guidelines linking hospital-based care with community-based rehabilitation services. (Table 3)

Table 1. Differences in VAS and body composition according to sex.

	VAS	Weight (kg)	Skeletal muscle mass (kg)	Fat weight (kg)	%fat (%)	BMI kg•m ²
Sex						
Men	3.5±2.7	68.9±10.2	30.6±3.4	19.1±6.7	27.2±6.3	24.8±3.9
Women	3.8±2.4	60.9± 9.2	20.4±2.6	22.4±6.5	36.2±6.1	25.4±3.3
F value	1.410 _(1,404)	52.343 _(1,404) ***	27.101 _(1,400) ***	1 7.862 _(1,396) ***	154.778 _(1,400) ** *	1.749 _(1,406)
significance	0.236	0.001	0.001	0.001	0.000	0.187

Abbreviations: BMI, body mass index. ***: Significant difference (p<0.001).

Table 2. Differences in exercise rehabilitation-related variables according to sex.

Sex		Men	Women	Total	F value	p value
Variables						
ROM	Knee maximum flexion (°)	94.25±20.25	89.65±19.87	90.58±20.17	6.764	0.009**
	Knee flexion contracture (°)	1.01±2.84	0.45±2.02	0.56±2.22	8.625	0.003**
Muscle Strength	Knee flexion (kg)	14.76±5.20	10.74±3.95	11.55±4.52	117.297	0.000***
	Knee extension (kg)	19.11±7.83	13.40±5.00	14.54±6.11	131.518	0.000***
Muscular endurance	30 s stand up from a chair (frequency)	13.08±4.87	12.09±4.07	12.27±4.25	5.350	0.021*
Flexibility	Sit and reach (cm)	5.56±8.48	12.05±8.30	10.78±8.72	76.456	0.000***
Cardiopulmonary endurance	6min walking (s)	411.71±123.09	378.83±125.41	385.46±125.56	9.011	0.003**
Gait	Single support time (%)	36.17±5.79	37.18±4.29	36.97±4.65	5.841	0.016*
Balance	Single-leg stance test(sec)	12.06±13.79	15.82±21.54	15.05±20.25	4.438	0.035*
	TUG (s)	8.89±3.98	10.39±6.94	10.09±6.94	6.964	0.008**
Quality of life	SF36 V2	55.25±19.16	54.47±19.53	54.61±19.45	0.168	0.682
	WOMAC	28.15±18.93	28.96±18.91	28.81±18.90	0.232	0.630

*: Significant difference (p<0.05). **: Significant difference (p<0.01). ***: Significant difference (p<0.001).

Table 3. Norms of variables related to exercise rehabilitation function.

Variables			Excellent	Very Good	Good	Poor	Very Poor
ROM	Knee maximum flexion (°)	Men	122.3≤	101.2–122.2	79.7–101.1	58.5–79.6	58.4≥
		Women	120.4≤	98.7–120.3	76.9–98.6	55.2–76.8	55.1≥
	Knee flexion contracture (°)		1.2≥	1.3–1.7	1.8–2.5	2.6–2.9	3≤
Muscle Strength	Knee flexion (kg)	Men	21.2≤	16.0–21.1	10.5–15.9	5.4–10.4	5.3≥
		Women	15.1≤	11.3–15.0	7.4–11.2	3.6–7.3	3.5≥
	Knee extension (kg)	Men	36.4≤	28.2–36.3	19.8–28.1	11.6–19.7	11.5≥
		Women	24.9≤	19.1–24.8	13.3–19.0	7.5–13.2	7.4≥
Muscular Endurance	30s stand up from a chair (N)		19≤	15–18	10–14	5–9	4≥
Flexibility	Sit and reach (cm)	Men	17.0≤	8.4–16.9	0.2–8.3	-8.7–0.1	-8.8≥
		Women	24.4≤	15.6–24.3	6.7–15.5	-2.09–6.6	-2.10≥
Cardiopulmonary function	6min walking (m)	Men	581.9≤	460.8–581.8	339.5–460.7	218.4–339.4	218.3≥
		Women	551.2≤	424.1–551.1	296.8–424.0	169.6–296.7	169.5≥
Gait	Single support time (%)		45.0≤	39.1–44.9	33.0–39.0	27.0–32.9	26.9≥
Balance	Single-leg stance test (s)	Men	36.0≤	20.9–35.9	5.7–20.8	1.0–5.6	0.9≥
		Women	50.6≤	27.1–50.5	3.5–27.0	1.0–3.4	0.9≥
	TUG (s)	Men	4.8≥	4.9–6.7	6.8–11.3	11.4–15.8	15.9≤
		Women	4.7≥	4.8–6.4	6.5–15.6	15.7–24.6	24.7≤
Quality of life	SF36 (score)		89≤	69–88	48–68	27–47	26≥
	WOMAC(score)		0	1–15	16–38	39–59	60≤

Conclusions

The findings highlight the importance of early and tailored rehabilitation programs to address individualized physical fitness needs post-TKA. The Cajori 5-grade evaluation norms provide measurable standards for assessing recovery progress and optimizing rehabilitation strategies.

Keywords: exercise rehabilitation function, total knee arthroplasty, TUG

E-Poster: EP01

Topic: Arthroplasty

Hybrid Total Hip Arthroplasty In Acetabular Defect Paprosky IIB Using Combine Autologous Structural Bone Graft and Impaction of Bone Graft Technique

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Background

Acetabular defects are frequent encounter in total hip replacement, the goals of reconstruction are to reconstitute acetabular bone stock, ensure secure fixation of the acetabular component, restore hip centre, and restore leg length. Impaction bone grafting (IBG) is a reliable method to restore acetabular bone-stock deficiency and to form a durable scaffold for the acetabular implant, incorporate into the host bone, and undergo gradual remodeling. (1) Here we describe a case using combine autologous structural bone grafts and bone graft impaction technique for a hybrid total hip arthroplasty with acetabular defect Paprosky IIB secondary to tuberculosis arthritis.

Case report

This is a 38 years old gentlemen. No co-morbid. Presented with right hip pain for 2 years and worsening for 4 months. He was unable to ambulate due to pain. He underwent CT guided biopsy of right hip after MRI right hip, HPE result came out to be granulomatous inflammatory. HRCT thorax done and features are in favor of bilateral pulmonary tuberculosis changes. He was treated as pulmonary and extra-pulmonary tuberculosis and started anti-TB treated for 1 year. Prior to operation, CT pelvis done to evaluate acetabular bone loss. He underwent hybrid right total hip replacement after completion of anti-tuberculosis treatment. Intraoperative findings AVN head of right femur and there is cavitation over superolateral and superomedial of acetabulum, partially defect over superior rim. Chondral bone over femoral head removed, head and neck cut in to blocks and small pieces. The defects fill up with autologous structural bone graft and fixed with screws. Bone graft impaction done, cement and acetabular component inserted. Post operatively patient was told not to weight bearing for 6 weeks and started on anti-osteoporosis agent. Patient started to weight bearing 6 weeks post op and able to ambulate without aid at 3 months post op.

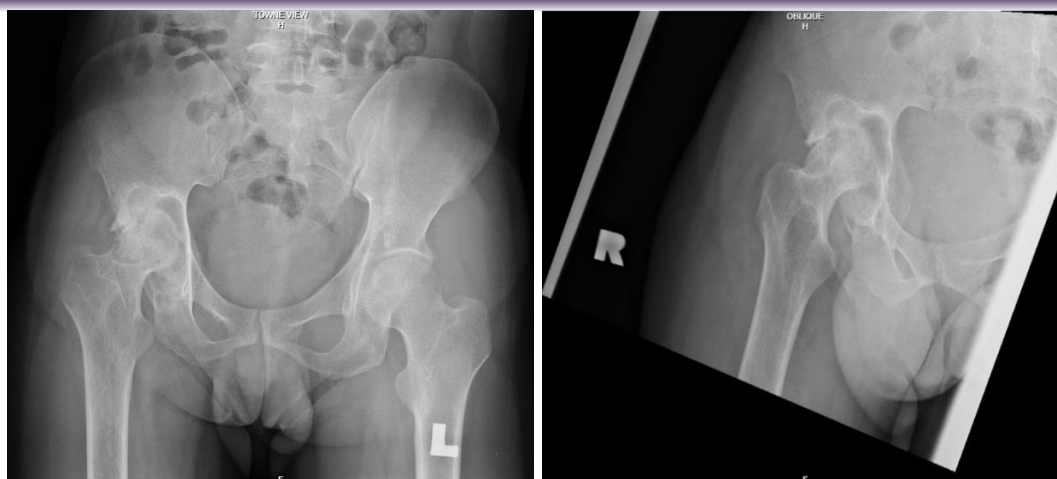


Fig. 1. Preoperative radiographs



Fig. 2. Postoperative radiographs

Discussion

Abu-Zeld et al reported 50 patients with IBG for contained acetabular defects in THA, more than 70% of patients achieved complete graft incorporation. (1) Kwong-ting et al reported 8 patient using structural bone graft fixed with two screws in acetabular reconstruction, the survival rate for the grafts was 100%, with either revision or loosening at the end point. (2) Structural bone graft has advantages including anatomical placement over acetabular defect, provision of support for acetabular components implantation, and reconstitution of bone stock that is beneficial for future revision surgery. Using impaction bone grafting technique with cement can improve the strength over the bone defect area, allowing stable placement of the acetabular component.

Conclusions

Our case proved that combine structure bone grafts fixed with screws followed by impaction bone graft and cementing, the acetabular component is stable, and bone grafts completely incorporated into body. Bone health is also an important factor to consider to prevent migration of the components.

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E-Poster: EP02

Topic: Arthroplasty

White Tongue, Failing Knee: Fungal PJI Unveiling Candida Tropicalis

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Background

Prosthetic joint infection (PJI) is a dreaded complication following total joint arthroplasty, including total knee replacement (TKR). Even a minimal microbial burden can precipitate infection due to the biofilm-forming potential of pathogens. While bacterial organisms are the predominant culprits, fungal PJIs are exceedingly rare and often devastating. Fungal infections are typically associated with multifactorial risk factors, including immunosuppression, prolonged antibiotic exposure, and underlying autoimmune conditions.

Report

An 81-year-old male, fully independent in activities of daily living, with a background of bronchial asthma, dyslipidemia, benign prosthetic hyperplasia, iron-deficiency anaemia, bilateral apical fibrosis with granuloma, and previous bilateral TKRs (left TKR in 2022; right TKR in 2023), was admitted under the geriatric unit for acute gouty arthritis and dehydration-related hypernatraemia and hypercalcemia.

During the admission, he complained of right knee pain and was referred to joint replacement unit for evaluation. On clinical examination, the right knee was warm with significant medial and lateral joint line tenderness. Passive motion was limited by pain, although distal perfusion and sensation remained intact. A working diagnosis of PJI was made. Notably, patient also had a whitish tongue bringing up the suspicion of fungal infection. Infectious disease team started him on oral nystatin for oral candidiasis treatment.

Synovial fluid aspiration of the right knee grew *Candida tropicalis*. The patient subsequently underwent a first stage revision with insertion of an articulating antibiotic cement spacer, (Amphotericin B 200mg per 40g of cement). Intraoperatively, a medial parapatellar approach was employed. Findings included loosening of the medial tibial component, sloughy and inflamed soft tissue, minimal pus, and biofilm formation on implant surfaces. A complete synovectomy was performed. Intraoperative tissues and synovial fluid cultures all grew *Candida tropicalis*. He was started on Fluconazole and planned to continue for at least 6months before second stage replantation. Second stage surgery will only be performed once the infection markers normalized and clinically free of infection.

Discussion

This case underscores a rare but serious fungal knee PJI caused by *Candida tropicalis*, in the setting of concomitant oral candidiasis. This highlights the importance of considering systemic fungal involvement in atypical PJIs and the role of multidisciplinary evaluation in uncovering potential occult comorbidities.

Conclusions

Aggressive surgical debridement, antifungal therapy and systemic assessments remain essential in managing fungal PJIs.

E-Poster: EP03
Topic: Arthroplasty

Anthropometry of the Proximal Tibia in Malaysian Females Undergoing Knee Arthroplasty: Implications for Tibial Component Sizing

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Background

Knee arthroplasty is a widely accepted intervention for end-stage osteoarthritis (OA), aiming to relieve pain and restore function with minimal complications [1]. The success of this procedure heavily relies on selecting implants that match the patient's anatomy, particularly the tibial component, which is more prone to postoperative issues than the femoral component [2]. Asian populations, especially females, typically have smaller skeletal structures than Western populations, yet most prosthetic designs are based on Western anthropometry. This mismatch can result in poor knee component fit, jeopardizing implant stability and long-term function. The issue is particularly critical in UKA, where smaller tibial components are linked with a greater risk of periprosthetic fractures [3]. Given the rising number of knee replacements among Malaysian females and the limited data on their tibial dimensions, this study aims to assess the proximal tibia dimensions in this group to support the development of better-fitting, gender-specific implants.

Methods

A retrospective study was conducted on 84 knees from 68 female patients who underwent knee arthroplasty between 2019 and 2021 at Universiti Malaya Medical Centre and Universiti Malaya Specialist Centre. Patient demographics and implant types were retrieved from case records. The tibial component dimensions—anteroposterior (AP) and mediolateral (ML)—were documented based on manufacturer sizing charts. The relatively small sample size was due to reduced elective surgeries during the COVID-19 pandemic.

Results

The mean age of patients was 67.6 years. Of the procedures, 51 were TKR and 17 were UKR [Table 1]. The average tibial component dimensions were 45.74 ± 2.90 mm (AP) and 63.47 ± 6.86 mm (ML) [Table 2].

Operated Side	Total Knee Replacement (TKR) (N=51)	Unicompartmental Knee Replacement (UKR) (N=17)
Right	26	7
Left	15	4
Bilateral	10	6

Table 1: Type of knee replacement done with their operated side

Tibial Component Dimension	
Parameter	Value (mean $\pm$ SD)
Average AP dimension (mm)	45.74 $\pm$ 2.90
Average MP dimension (mm)	63.47 $\pm$ 6.86

Table 2: Mean tibial component sizes used

Comparative analysis with international data revealed population-specific variation: Thai females had 46.36 mm (AP) and 72.52 mm (ML) [1]; Kenyan, 49.38 mm (AP) and 69.38 mm (ML) [4]; Japanese, 50.3 mm (AP) and 71.4 mm (ML) [5]; Indian, 43.4 mm (AP) and 65.4 mm (ML) [6]; and Caucasian, 45.2 mm (AP) and 70.2 mm (ML) [7]. Malaysian females showed consistently smaller ML dimensions, highlighting a potential risk of component overhang or poor coverage when using standard implants.

Conclusions

Malaysian females possess smaller proximal tibial dimensions compared to other populations. These anatomical differences underscore the need for population and gender-specific implant designs. Incorporating local anthropometric data into prosthesis design may improve implant fit, reduce complications, and enhance long-term outcomes in knee arthroplasty for Malaysian patients.

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E-Poster: EP04

Topic: Arthroplasty

Robotic-Assisted Total Knee Arthroplasty Reduces the Need for Constrained Implant in Patients with Severe Coronal Plane Deformity: A Case Series

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Background

Total knee arthroplasty (TKA) for patients with severe coronal plane deformity and bony defects is challenging and often necessitate the use of constrained implants. However, the advent of robotic assistance which provided higher precision in bone resections and better soft tissue balancing has made possible the use of primary implants in severe varus deformities. We submit two cases of knee osteoarthritis with severe varus deformity in which primary implants have been successfully used with robotic assistance, avoiding the need for constrained implants.

Report

Case A

A 68-year-old man presented with progressive left knee pain over 13 years. Examination elicited an antalgic gait with varus thrust, 25 degrees varus deformity and 20 degrees fixed flexion deformity. Knee range of movement (ROM) was 20 to 110 degrees with grade 3 laxity of lateral collateral ligament (LCL). Radiographs showed marked reduction in tibiofemoral joint space with erosion of medial tibial condyle and abundant osteophytes, HKA of 29 degrees, lateral distal femoral angle (LDFA) of 90 degrees and medial proximal tibial angle (MPTA) of 37 degrees. He underwent ROSA robotic-assisted TKA with standard medial parapatellar approach and recovered uneventfully. Post operative radiographs exhibited LDFA of 93 degrees and MPTA of 85 degrees.

Case B

A 62-year-old man presented with worsening left knee pain for 2 years. Examination revealed a varus thrust gait, 20 degrees varus deformity with ROM 0-100 degrees and grade 3 laxity of LCL and anterior cruciate ligament (ACL). Radiographs showed obliteration of medial joint space with erosion of medial tibial condyle and abundant osteophytes, HKA of 34 degrees, LDFA of 90 degrees and MPTA of 86 degrees. He underwent ROSA robotic-assisted TKA with standard medial parapatellar approach and recovered uneventfully. Post operative radiographs demonstrated LDFA of 97 degrees and MPTA of 82 degrees.



Case A

Case B

Discussion

Knees with severe varus deformity pose difficulties in achieving mechanical alignment, accurate bone cuts, balanced soft tissue tension and proper implant positioning. Conventional TKA with its aim to restore mechanical axis often requires extensive bone resections and soft tissue releases which may necessitate the use of constrained implant to attain stability. Instead, functional alignment achieved via robotic assistance allows precise, patient-specific implant positioning, minimizing soft tissue disruption and reducing the need for constrained implants.

Conclusion

Robotic-assisted TKA, through restoration of functional alignment, enables the use of primary implants even in cases with severe coronal plane deformity without resorting to constrained implants.

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E-Poster: EP05

Topic: Arthroplasty

Let's Get Moving Again: Primary Modified Quadriceps V-Y Turn Down During Total Knee Replacement

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Background

Local augmentation Quadriceps V-Y turndown technique was first described by Scuderi et al in 1958 often used as salvage for extensor mechanism rupture during TKR[1]. Primary quadriceps V-Y turndown is rarely used for atrophied extensors during TKR. We present such a case encountered at our center.

Methods

A 51-year-old patient with over 40 years of left knee stiffness in extension and significant quadriceps atrophy due to childhood trauma, presented to us with severe knee pain secondary to osteoarthritis. Adapted to ambulating with a stiff knee since childhood, he sought help to relieve his condition of worsening knee pain. Guided by clinical and radiologic imaging, he was advised for Total Knee Replacement (TKR). During the procedure, a modified quadriceps V-Y turndown as described by Insall in 1983 was done, to preserve the vital genicular vessel supply. During following months, patient was able to finally restore flexion of his knees, with adequate muscle gain, much to the joy of the patient.

Results

In patients with longstanding knee stiffness and quadriceps atrophy and weakness, restoration of motion is often not considered causing patients to endure lifelong knee pain. TKR augmented with primary quadriceps V-Y turndown offers to improve knee motion by partially restoring quadriceps function, which is critical for rehabilitation after TKR.

Conclusions

The quadriceps V-Y turndown during TKR offers a valuable solution for patients with chronic knee stiffness, flexion contractures, and quadriceps atrophy due to long-term osteoarthritis. By addressing both the deformity and muscle weakness, this technique improves knee function and accelerates postoperative recovery, enhancing the overall quality of life for patients with advanced osteoarthritis.



(a) Intra- operative post VY graft (Modified Insall technique) (b) Completion of graft turn-down procedure

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E-Poster: EP06

Topic: Arthroplasty

15 Years Later: A Case of Ceramic on Metal Total Hip Arthroplasty

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Background

Total hip arthroplasty (THA) is nowadays the gold standard treatment for patients with hip osteoarthritis whom non-operative managements have been exhausted. It should also be considered for elderly and active patients with neck of femur fractures. The survivorship of implants has dramatically improved over the years, thanks to the advancement of bearing surfaces and good surgical techniques. We would like to report a case of aseptic loosening with femoral stem fracture in uncemented ceramic on metal (CoM) THA.

Reports

A 65 years old gentleman presented to us with gradually worsening right hip pain which has finally confined him on wheelchair for ambulation. He had a history of right THA performed in 2010 following complications of right femoral neck fracture. Plain radiographs of pelvic and hip showed broken uncemented femoral stem with lucency around the femoral prosthesis (Fig.1a). Inflammatory markers taken were within the normal range. He was scheduled for revision of femoral stem and acetabular liner. Intra-operatively, there were presence of greyish sterile fluid collection with loose and broken femoral stem. To our surprise, the bearing surface used during first surgery was CoM with tightly fitted acetabular cup and metal liner. Decision was made to proceed only with cemented femoral stem using metal on metal (MoM) articulation. The broken tip of femoral stem was not extracted and pushed deeper into the femoral canal, distal to the cement plug (Fig.1b). At 5 months post-operatively, patient was able to weight bear without pain using walking stick. Plain radiographs showed well fitted femoral prosthesis with good cement mantle. The loose cerclage wire used to secure tip of greater trochanter was left in situ as patient did not complaint of any pain (Fig.1c).



Fig. 1a

Fig. 1c

Fig. 1: (a) Hip plain radiograph at presentation; (c) Pelvic AP plain radiograph at 5 months post revision.

Discussions

CoM was first introduced with the aim to reduce loss of metal debris, adhesive and corrosive wear from MoM as well as reducing risk of fracture and squeaking from CoC articulation. However, its use was rapidly declining due to the fear of ions toxicity and poor implant survivorship in addition to the limited data on long term outcome. Mehta et al. in 2021 reported reasonable functional outcome with CoM at 9 years follow up. Failure of CoM does happen in a similar way with MoM but at a slower rate¹. Saracco et al. in 2022 concluded that CoM bearing is safe and reliable at long term follow up when the implant is correctly positioned. He also suggested annual monitoring of Co and Cr ion levels with revision be considered should the value exceeded normal range².

Conclusions

Thorough pre-operative planning is important prior to any revision THA especially in the event where previous medical records and documentations are not available. In depth knowledge on bearing surfaces will help surgeon to produce the best long-term outcome possible for the patient.

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E-Poster: EP07

Topic: Arthroplasty

Aseptic Loosening with Proximal Femur Deformity Treated with Osteotomy and Diaphysel Engaging Stem with Concomitant Administration of Romosozumab: A Case Report

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Background

With an Index surgery 13 years ago, a 72 year old lady was referred to our center with progressively worsening right hip pain for 5 years, rendering her unable to weight bare for 4 months. Clinical examination revealed a shortened right lower limb of 7cm. Plain radiographs and Computer Tomography showed obvious peri-implant lucency over the bipolar stem with a fracture around the stem, and a deformed proximal femur.(Figure 1). Infective markers were not suggestive of infection and a hip aspiration showed no organisms. Bone Mineral Density T-score was -3.1 indicating osteoporosis and the patient was started on anabolic monthly injections prior to surgery.



Figure 1: Lucency around the prosthesis stem with subsidence and fracture around the stem.

Report

Options for treatment included a proximal femur endoprosthesis, however in our patient, a single stage revision total hip arthroplasty was done using a diaphyseal engaging stem using the posterior hip approach with multiple proximal femur osteotomy. The femoral canal was cleared of all bone cement. A comminuted fracture of the proximal femur occurred during the stem insertion which complicated the surgery, requiring a cable plate with cables and synthetic bone grafting over the osteotomy sites. (Figure 2) A drain was inserted and anchored, soft tissue layers closed with antimicrobial sutures and dressing done with a negative pressure device. Intra-operative cultures were negative for infection. Wound healing was without complications. Post operatively, patient was mobilized by toe touch weight bearing.



Figure 2: Immediate post operative image showing multiple fractures of the proximal femur secured with cable plating

Discussion

Early diagnosis and initiation of treatment for osteoporosis is essential in the management of periprosthetic fracture. An anabolic agent (Romosozumab) was administered for a duration of 6 months, 3 months before and after surgery. Subsequent osteoporosis treatment continued with an anti-resorptive agent. Significant callus formation was noted by 6 weeks for which she was allowed partial weight bearing and fracture union confirmed after 3 months. (Figure 3) By enhancing bone formation and inhibiting bone resorption, the use of Romosozumab facilitated the fracture healing process.



Figure 3 : Post operative 3 months demonstrating fracture union.

Conclusions

The use of Romosozumab in management of periprosthetic fracture with aseptic loosening treated with revision arthroplasty demonstrated successful fracture union, highlighting the role of anabolics periprosthetic fractures with underlying osteoporosis.

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E-Poster: EP08

Topic: Arthroplasty

Differences In Knee Function Between Patients Scheduled to Undergo Unilateral TKA and Bilateral TKA (1-Week Interval)

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Background

Among patients to have TKA, some have both knee severe arthritis and pain, while some have only one knee problem and a rather mild and painless contralateral knee. Patients with severe knee arthritis and pain are reluctant to walk and they have reduced daily activities. This leads to leg muscle weakness and decreased knee function. The purpose of this study was to compare the clinical and functional knee statuses of patients who were scheduled to undergo unilateral TKA and bilateral TKA (1-week interval). The hypothesis was that patients scheduled for only unilateral TKA would have better clinical and functional knee status than patients scheduled for bilateral TKA.

Methods

One hundred and fifty consecutive patients who underwent either unilateral or staged (1-week interval) bilateral TKAs between March 2021 and January 2023 were subjects of this study. Among patients who had unilateral TKA, 25 patients who had previously received contralateral TKA, or who also have severe (KL grade 4) arthritis and pain on the contralateral knee but were reluctant to receive bilateral TKA at 1-week interval were excluded. There were 62 patients who received unilateral TKA (Group U) and 63 patients who received bilateral TKAs (Group B). Preoperatively, demographic data and clinical scores (Lysholm, IKDC, Tegner, Korean knee score, WOMAC) were checked. Time up and go (TUG) test and 4-meter walking time test, which is considered to indicate sarcopenia status, were performed. Isokinetic knee muscle strength (60°/sec for both knee extension and flexion) and hip abductor strength tests were performed. Two thigh point circumferences were measured (5cm, 15cm from the upper pole of patella) to check circumference differences in both thighs.

Results

There were no differences in age and sex between the two groups. BMI was significantly lower in Group U compared to Group B ($p=0.021$). Lysholm score ($p=0.016$) and IKDC score ($p=0.046$) were significantly better in Group U, however, there were no differences in KKS, Tegner, and WOMAC scores. There also were no differences in the TUG and the 4-meter walking test. Meanwhile, knee extensor strength difference was significantly higher in Group U compared to Group B ($p=0.002$) with a significantly higher thigh circumference difference at 15cm from the upper pole of patella ($p=0.012$). The knee flexor and hip abductor strength differences and circumference differences of both thighs at 5cm from the upper pole of patella were similar in both groups.

Conclusions

Patients scheduled for only unilateral TKA had significantly lower BMI and better Lysholm and IKDC scores compared to patients scheduled for bilateral TKA. They also showed significantly more knee extensor strength and proximal thigh circumference imbalances. However, they did not show better sarcopenic status, and knee flexor and hip abductor strength imbalances were not significantly different compared to patients scheduled for bilateral TKA. Age and sex meant little.

E-Poster: EP09

Topic: Arthroplasty

Total Knee Arthroplasty in a Patient with Ochronosis: A Case Report

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Background: Ochronotic arthropathy is a rare manifestation of alkaptonuria, characterized by the accumulation of homogentisic acid in connective tissues, leading to progressive pigmentation and degeneration of cartilage.[1] The disease often results in early-onset osteoarthritis, particularly affecting large weight-bearing joints such as the knees and hips. Total knee replacement (TKR) has emerged as an effective intervention for end-stage ochronotic arthropathy of the knee, offering significant pain relief and functional improvement.[2] However, the pathological changes in connective tissue quality and pigmentation can pose unique intraoperative challenges. A better understanding of surgical outcomes in this subgroup is critical to guide clinical decision-making and optimize patient care.

Report: A 64-year-old man came with a history of bilateral knee pain, more severe on the left side than the right. The X-ray revealed severe degenerative changes in the left knee, including osteophytes and symmetrically reduced joint space, and dished-out proximal tibial articular surface. The patient underwent left total knee replacement. A standard midline incision was performed. On exposure, the quadriceps tendon, patellar tendon, femur, tibia, and patellar articular cartilage showed blackish discoloration. Tissue samples from bone and the synovium were sent, and intraoperative presumptive diagnosis of ochronosis was made. During eversion of the patella, as the tendon was friable due to abnormal pigment deposition, there was partial thickness patellar tendon rupture. The ruptured tendon was repaired. Following a biopsy report and a positive urine homogentisic acid test postoperatively, ochronotic arthritis was diagnosed.

Discussion: Total knee replacement in patients with ochronotic arthropathy has shown outcomes comparable to those observed in primary osteoarthritis. Intraoperative findings often include brittle, discolored cartilage and darkened synovium, requiring careful soft tissue handling to prevent complications. The altered tissue characteristics and potential for spinal involvement require thorough preoperative planning. Awareness of the systemic nature of alkaptonuria is also important for optimizing perioperative management. Long-term results suggest that prosthetic survival in ochronotic patients is favorable.

Conclusions: Our case study shows that individuals with ochronotic arthropathy have great results with total knee arthroplasty. Given the high incidence of TKRs in ochronotic arthropathy, there is a considerable risk of intraoperative complications due to tendon attenuation and degeneration. Preoperative diagnosis is therefore essential to treat the tendon more carefully during TKR.

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E-Poster: EP10

Topic: Arthroplasty

Risk Factors Associated with Very Early Functional Outcomes Following Robot-Assisted Total Knee Arthroplasty

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Background

Total knee arthroplasty (TKA) is the definitive treatment for end-stage knee osteoarthritis, but postoperative recovery often depends on multiple factors [1,2]. Clinically, some patients achieve significant functional improvement as early as two weeks postoperatively. However, the factors influencing very early (2-week) functional outcomes after TKA remain unclear. This study aims to comprehensively evaluate the impact of preoperative clinical indicators and surgical factors on very early functional outcomes in patients with knee osteoarthritis, using changes in the functional Knee Society Score (fKSS) at two weeks postoperatively to guide rehabilitation strategies for robot-assisted TKA (RA-TKA).

Methods

Clinical data were collected from 31 patients with end-stage knee osteoarthritis who underwent RA-TKA at the Department of Orthopaedics, General Hospital of the Chinese People's Liberation Army, between December 2024 and January 2025. All patients underwent RA-TKA performed by the same senior surgeon and received outpatient-guided rehabilitation exercises. Variables included demographic data, preoperative imaging, laboratory tests, surgical details, and preoperative and 2-week postoperative scale scores (Table 1). Univariate analysis of variance or Pearson correlation analysis was performed, and variables with $P < 0.05$ were included in a multivariate linear regression model.

Results

Correlation analysis revealed significant associations between postoperative fKSS changes and the following variables: Physical Functioning of SF-36 ($P = 0.0454$), Bodily Pain of SF-36 ($P = 0.0038$), Social Functioning of SF-36 ($P = 0.0337$) and serum uric acid ($P = 0.0448$). Other variables, such as Role-Physical, Role-Emotional, and WOMAC scores, also showed trends (Table 2). Multivariate linear regression identified Bodily Pain of SF-36 as the most significant predictor ($P = 0.037$) (Table 3), with a negative correlation estimate of -0.492 .

Discussion

Preoperative bodily pain was an independent risk factor for very early functional outcomes after TKA. Severe preoperative pain may hinder rapid functional recovery through outpatient-guided rehabilitation, possibly linked to psychological factors [3]. Other potential predictors, such as UA and Role-Emotional, align with prior studies on osteoarthritis progression and TKA outcomes [4,5]. Larger sample sizes may reveal additional factors.

Conclusions

This study comprehensively evaluated preoperative and surgical factors influencing very early functional recovery after RA-TKA. It highlighted the critical role of preoperative pain in early rehabilitation, providing insights to optimize rapid recovery and functional exercise within two weeks postoperatively. These findings support tailored strategies to enhance outcomes in patients undergoing RA-TKA.

Table 1. Patient Clinical Characteristics

Characteristic	All patients (31)
Gender	5 (16.13%) males; 26 (83.87%) females
Age (years)	66.26±4.97
BMI (kg/m ²)	26.35±3.12
Charlson comorbidity index	4.32±1.9
Pain Duration (years)	9.83±10.27
Postoperative Hospital Stay (days)	3.77±1.33
Total Hospital Stay (days)	9±2.98
Flexion (degrees)	117.58±17.79
Extension (degrees)	5.16±7.5
HKA (degrees)	7.97 ± 8.57
mMPTA (degrees)	84.42 ± 3.78
mLDFA (degrees)	90.22 ± 4.74
JLCA (degrees)	3.69 ± 2.07
Femoral AMA (degrees)	6.5 ± 1.77
K-L Grade	Grade 3: 12 (38.71%); Grade 4: 19 (61.29%)
Surgery Duration (minutes)	122.14 ± 24.76
Laterality	19 left (61.29%); 12 right (38.71%)
Femur Distal Medial Resection (mm)	7.65 ± 1.92
Femur Distal Lateral Resection (mm)	6.6 ± 2.31
Femur Posterior Medial Resection (mm)	8.13 ± 1.32
Femur Posterior Lateral Resection (mm)	5.82 ± 2.17
Tibia Medial Resection (mm)	4.66 ± 1.86
Tibia Lateral Resection (mm)	8.08 ± 2.16
Patellar Treatment	Retained: 24 (77.42%); Replaced: 7 (22.58%)
Femoral Prosthesis Size	4.71 ± 0.97
Tibial Prosthesis Size	3.81 ± 1.01
Liner Thickness (mm)	7.4 ± 2.16
Preoperative SF-36 PF	32.42 ± 18.97
Preoperative SF-36 RP	16.13 ± 33.26
Preoperative SF-36 BP	39.26 ± 17.26
Preoperative SF-36 GH	55.71 ± 18.42
Preoperative SF-36 VT	57.9 ± 21.09
Preoperative SF-36 SF	50.38 ± 20.94
Preoperative SF-36 RE	39.81 ± 43.4
Preoperative SF-36 MH	68.77 ± 17.45
Preoperative SF-36 HT	69.39 ± 22.1
Preoperative WOMAC	46.41 ± 14.92
Preoperative KSS Function	35.45 ± 14.77
Postoperative KSS Function	38.95 ± 19.89
WBC (10 ⁹ /L)	5.40 ± 1.11
Hemoglobin (g/L)	125.37 ± 18.32
NLR	1.38 ± 0.57

PLR	630.92 ± 207.65
Albumin (g/L)	41.62 ± 2.65
PT (s)	11.42 ± 0.98
APTT (s)	28.35 ± 3.03
Fibrinogen (g/L)	2.67 ± 0.55
ESR (mm/h)	8.42 ± 5.3
IL-6 (pg/mL)	4.23 ± 3.77
CRP (mg/dL)	0.12 ± 0.09
Uric Acid (μmol/L)	256.37 ± 63.54
RDW (%)	12.32 ± 0.63
INR	0.99 ± 0.07
Sodium (mmol/L)	141.54 ± 2.91

Table 2. Correlation Analysis of Factors Affecting 2-Week Postoperative Knee Function

Variable	r Value	P Value
Age	0.063	0.7368
BMI (kg/m ²)	-0.086	0.6447
Comorbidity Index	0.238	0.1978
Pain Duration (years)	-0.018	0.9249
Postoperative Hospital Stay (days)	-0.092	0.6236
Total Hospital Stay (days)	-0.005	0.9779
Flexion Angle (degrees)	0.184	0.323
Extension Angle (degrees)	0.081	0.6665
HKA Angle (degrees)	-0.222	0.2296
mMPTA (degrees)	0.032	0.864
mLDFA (degrees)	-0.183	0.3238
JLCA (degrees)	0.007	0.9718
Femoral AMA (degrees)	-0.294	0.1085
Surgery Duration (minutes)	0.11	0.5568
Femur Distal Medial Resection Depth (mm)	0.292	0.1115
Femur Distal Lateral Resection Depth (mm)	-0.179	0.3342
Tibia Medial Resection Depth (mm)	0.124	0.5057
Tibia Lateral Resection Depth (mm)	-0.044	0.8136
Femur Posterior Medial Resection Depth (mm)	-0.135	0.4704
Femur Posterior Lateral Resection Depth (mm)	0.204	0.2701
Liner Thickness	-0.068	0.7157
Tibial Prosthesis Size	0.073	0.6979
Femoral Prosthesis Size	-0.033	0.8597
Preoperative SF-36 PF	-0.362	0.0454
Preoperative SF-36 RP	-0.322	0.0773
Preoperative SF-36 BP	-0.505	0.0038
Preoperative SF-36 GH	-0.21	0.2579
Preoperative SF-36 VT	0.001	0.9963
Preoperative SF-36 SF	-0.383	0.0337
Preoperative SF-36 RE	-0.347	0.0557
Preoperative SF-36 MH	-0.045	0.8083
Preoperative SF-36 HT	-0.035	0.8537
Preoperative WOMAC	0.327	0.0722
WBC (10 ⁹ /L)	0.137	0.4632
Hemoglobin (g/L)	0.054	0.7728

NLR	0.161	0.386
PLR	0.181	0.3289
Albumin (g/L)	0.148	0.4276
PT (s)	0.299	0.1019
APTT (s)	0.273	0.1374
Fibrinogen (g/L)	0.22	0.2353
ESR (mm/h)	-0.129	0.4892
IL-6 (pg/mL)	0.199	0.2836
CRP (mg/dL)	0.079	0.6708
Uric Acid (μmol/L)	0.363	0.0448
RDW (%)	-0.113	0.5467
INR	0.23	0.2137
Sodium (mmol/L)	-0.162	0.3847

Table 3. Multivariate Linear Regression Analysis of Factors Affecting 2-Week Postoperative Knee Function

Variable	Estimate	Std. Error	Statistic	P Value	95% CI
(Intercept)	-1.352	18.239	-0.074	0.941	-38.842 to 36.138
Preoperative SF-36 PF	-0.013	0.187	-0.071	0.944	-0.398 to 0.371
Preoperative SF-36 BP	-0.492	0.224	-2.196	0.037	-0.953 to -0.031
Preoperative SF-36 SF	0.031	0.183	0.17	0.866	-0.345 to 0.407
Uric Acid (μmol/L)	0.09	0.052	1.741	0.093	-0.016 to 0.196

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E-Poster: EP11

Topic: Arthroplasty

Close to Home or Far Away: Impact of Geographical Distance on Recovery Post-Total Knee Arthroplasty

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Background

Patients who have undergone Total Knee Arthroplasty need to return to the hospital regularly for follow-up, physiotherapy, and occupational therapy. Many patients have reported experiencing significant pain, which has led to reluctance to move around and attend hospital follow-up appointments. This retrospective study aims to analyze the impact of geographical and social factors on the recovery outcomes of patients.

Methods

Patients who underwent unilateral total knee arthroplasty for the first time between June 2020 and December 2021, with a three-year follow-up, were included in the study. Data on age, sex, body mass index, number of individuals residing together, distance from home to the hospital, and whether patients needed to climb stairs to access their homes were gathered. The study also took into account the assumption that patients utilized the fastest public transportation available, and measurements were taken for the number of transitions from home to the hospital, time taken, and walking distance required. Knee Society Knee Score (KSFS) which evaluates patients at: pain, range of motion, stability, flexion contracture, extension lag and alignment and Knee Society Functional Assessment (KSFA) which evaluates the mobility during walking, stairs and the use of walking aids data were collected at preoperative, 1-month, 1-year, and 3-year postoperative intervals. Spearman's rank-order correlation was first applied and variables with less than 0.15 p-value were included in multivariable linear regression to examine the relationship between the parameters and the outcomes of recovery.

Results

Out of a total of 130 patients screened, 41 (35 Female and 6 male) were included in the study. At 1-month post-surgery, the pain index from KSFS showed a weak positive correlation with the need to climb stairs ($r=0.329$, $p=0.046$). Age ($t=-2.42$, $p=0.021$) and the need to climb stairs ($t=2.35$, $p=0.024$) significantly predicted KSFA at 1-month post-surgery ($F(3,37)=3.59$, $p=0.023$, $R^2=0.225$) (Table 1). A higher number of public transport transitions ($t=2.07$, $p=0.046$) and a better preoperative KSFA score ($t=2.41$, $p=0.022$) were significant predictors of KSFA at 1-year post-surgery ($F(5,33)=3.54$, $p=0.011$, $R^2=0.349$) (Table 2). A higher number of public transport transitions ($t=2.07$, $p=0.047$) and being female ($t=3.19$, $p=0.003$) significantly predicted higher KSFA scores at 3-year post-surgery ($F(6,32)=3.90$, $p=0.005$, $R^2=0.422$) (Table 3). Lastly, no variables were found to be statistically significant predictors of pain index at 1 year and 3 years post-surgery, as well as KSFS scores at 1 month, 1 year, and 3 years post-surgery.

Conclusions

The results suggest that in the long term, a larger number of transitions from home to the hospital and being female are associated with better functional recovery. No factors were found to be associated with pain at 1 and 3 years after surgery. Therefore, it is unlikely that regular follow-up will result in poor recovery.

Table 1. Multivariable linear regression analysis of KSFA at 1 month after surgery

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	85.046	24.051		3.536	0.001	36.315	133.778
Age	-0.697	0.288	-0.361	-2.42	0.021*	-1.281	-0.114
Stairs	9.566	4.066	0.344	2.352	0.024*	1.327	17.805
Preoperative KSFA	0.018	0.14	0.019	0.129	0.898	-0.265	0.301

KSFA = Knee Society Knee Assessment

*Denotes statistical significance $p < 0.05$

Table 2. Multivariable linear regression analysis of KSFA at 1 year after surgery

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	22.477	56.581		0.397	0.694	-92.638	137.592
Age	-0.7	0.529	-0.206	-1.323	0.195	-1.776	0.376
Number Of Transition	8.343	4.03	0.3	2.07	0.046*	0.144	16.543
BMI	0.524	0.697	0.115	0.752	0.457	-0.894	1.942
Live Alone	16.672	9.151	0.269	1.822	0.078	-1.945	35.289
Preoperative KSFA	0.578	0.24	0.367	2.405	0.022*	0.089	1.067

BMI = body mass index, KSFA = Knee Society Knee Assessment

*Denotes statistical significance $p < 0.05$

Table 3. Multivariable linear regression analysis of KSFA at 3 years after surgery

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	40.393	46.459		0.869	0.391	-54.24	135.027
Age	-0.823	0.464	-0.252	-1.774	0.086	-1.767	0.122
Number Of Transition	11.205	5.419	0.421	2.068	0.047*	0.166	22.243
Travel Time	-0.07	0.146	-0.097	-0.478	0.636	-0.367	0.228
Sex	23.598	7.395	0.438	3.191	0.003*	8.536	38.66
Live Alone	7.99	8.372	0.134	0.954	0.347	-9.064	25.043
Preop KSFA	0.258	0.219	0.171	1.178	0.248	-0.188	0.704

KSFA = Knee Society Knee Assessment

*Denotes statistical significance $p < 0.05$

E-Poster: EP12

Topic: Arthroplasty

Disengagement of Tibial Insert Locking Pin in Total Knee Arthroplasty Rare, but Happens

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Background

Total knee arthroplasty (TKA) has seen numerous advancements over decades. Different polyethylene locking mechanisms were designed to minimize micromotion and wear issues. These include central, peripheral, both central and peripheral as well as locking pin mechanism. Locking pin mechanism for polyethylene insert was designed to reduce interface micromotion and backside wear in modular implants. However, unexpected dislodgement of the tibial insert locking pin may compromise stability of the knee, giving traumatic experience to the patient and surgeon.

Report

A 56 year old gentleman with medical history of diabetes mellitus, hypertension and dyslipidaemia presented to us with grade 4 left knee osteoarthritis. He underwent a left TKA using a design with locking pin mechanism in tibial polyethylene insert. Four months post operatively patient was in pain with a limp. He denied history of trauma or fever. There was a palpable sharp medial knee swelling with restricted range of motion. Plain radiographs of the knee revealed a dislodged locking pin from the tibial component. He has to undergo surgery in the form of removal of dislodged pin and old polyethylene insert, reinsertion of a new polyethylene insert which was secured with a new locking pin. Intraoperatively, it was noted that the hook-end of the pin was bent downwards and was caught in the medial subcutaneous tissue. Cultures from the joint fluid and tissue samples were negative for infection.

Discussion

Disengagement of locking pin may lead to dislocation of insert and subsequently dislocation of the knee. It is uncertain what is the causative factor for such complication. Possible incomplete locking effort or improper locking fit at the index surgery may be the root cause, or patient himself did not disclose a history of trauma.

Conclusions

Although disengagement of locking pin is not common, it should be suspected if a patient presents with acute medial knee swelling and pain post TKA.

E-Poster: EP13

Topic: Arthroplasty

Learning Curve of THA Using Anterior Minimally Invasive Surgery (AMIS) Approach and Evaluation of Outcomes with Bikini Incision

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Background

Anterior minimally invasive surgical (AMIS) approach was designed to minimize the extension of the surgical exposure for THA performance through DAA. AMIS for THA has gained popularity among hip surgeons in recent years; however, surgeons still fear the learning curve, which was estimated to be between 50 and 100 surgeries. Moreover, bikini incision may improve postoperative scar cosmesis and patient satisfaction while reducing wound complications, but the surgical field is poorly developed. In this study, we compared the outcomes of early introduction, late introduction, and bikini incision groups in THA using AMIS approach.

Methods

Patients who underwent surgery for AMIS-THA in our hospital were included in the study. After receiving training, bikini incision was introduced from the 95th case, and was limited to female patients only and to cases with non-severe deformities. We divided patients into three groups (Group NE: normal incision, early introduction, Group NL: normal incision, late introduction, Group B: bikini incision). Demographic and clinical parameters were retrospectively collected: age, BMI, disease, time of surgery, intraoperative blood loss, incision length, cup alignment (inclination, anteversion), stem alignment (varus, anterior tilt), perioperative fractures and compared in each groups.

Results

In this study, a total of 141 patients (group NE: 2 male and 48 female, group NL: 17 male and 46 female, group B: 28 female) were included. No significant differences were found among each groups in age, BMI, disease. The time of surgery was significantly shorter in the NL and B groups than in the NE group, with the B group being the shortest significantly (NE: 108 minutes, NL: 99 minutes, B: 85 minutes: $p < 0.05$). Incision length was significantly longer in the NE group (NE: 8.5 cm, NL: 8.0 cm, B: 8.0 cm: $p < 0.05$).

There were no significant differences in cup alignment, stem alignment among each groups. 92.0% of the NE group, 92.1% of the NL group, and 92.9% of the B group were within Lewinnek safe zone, and no significant differences were observed. Perioperative fractures occurred in 2 patients in the NE group, 1 patient in the NL group, and 1 patient in the B group.

Conclusions

In this study, the later AMIS introduction group showed significantly shorter incision length and shorter operation time, suggesting the existence of a significant learning curve. The bikini incision group was introduced after the surgeons had fully mastered AMIS, which allowed for further shortening of surgery time and successful implant placement. However, perioperative fractures were observed in each group, indicating that careful operation is necessary regardless of skill level. In conclusion, AMIS-THA has a learning curve, but once the surgeon has sufficient skill, the bikini incision can be performed safely, and the outcomes have been good.

E-Poster: EP14

Topic: Arthroplasty

1.5-Stage Knee Revision For PJI: Lessons from Five Cases and the Road to Refinement

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Background

Periprosthetic joint infection (PJI) is a challenging complication following knee arthroplasty. Traditional two-stage revision remains the gold standard with high success rates albeit with significant patient morbidity, functional decline and multiple surgeries.

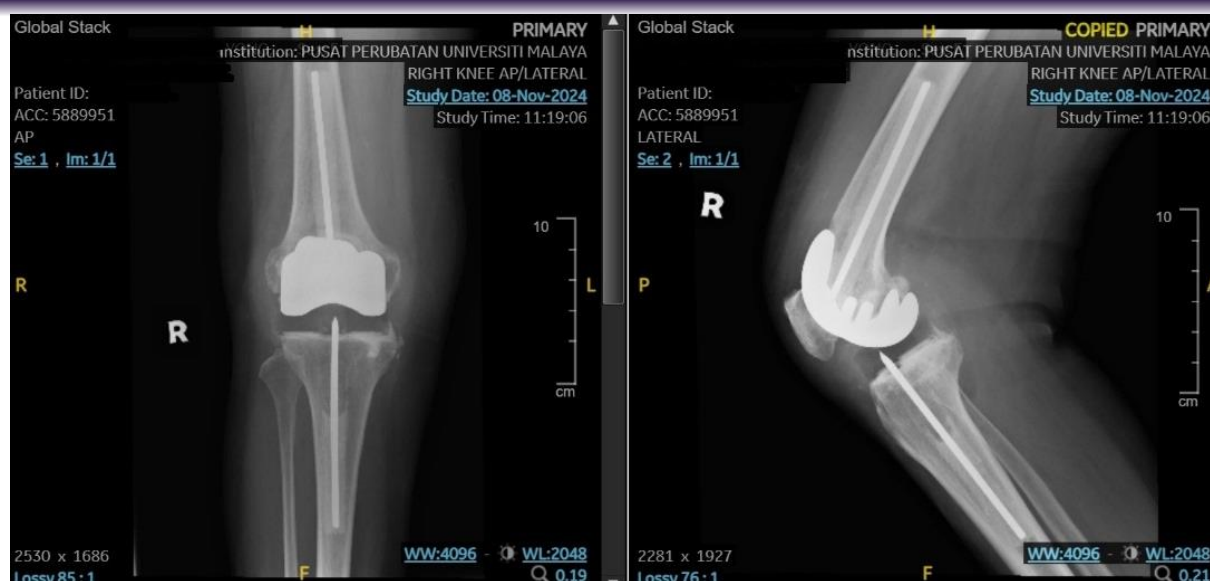
A hybrid strategy—known as the 1.5-stage revision, a novel approach, uses a robust, antibiotic-loaded articulating spacer meant for prolonged service with the possibility for conversion to a second-stage revision in cases of reinfection or failure. This case series evaluates the outcomes of five patients treated with 1.5-stage revision technique for persistent PJI at our centre.

Methods

Between 2021 and 2024, five patients with confirmed knee PJI underwent 1.5-stage revision procedure at our centre. Preoperative evaluation encompasses comprehensive surgical history including prior implant selection, perioperative complications, medical comorbidities, radiographic analysis, physical examination and diagnostic evaluation. All of the patients develop symptoms more than 3 months after index procedure. Knee aspirations were performed to get samples and no antibiotics were started before revision surgeries. Preoperative radiographic evaluation involves weight-bearing anteroposterior, lateral and sunrise radiographs to look at radiolucencies, bone loss, constraint levels and appropriate implant selection. CT scans were not employed routinely. Physical examination encompasses an inspection of skin integrity, sinus tracts, scars, erythema, swelling, gait analysis, passive and active range of motion, flexion contracture, flexion-extension instability and varus-valgus laxity or deformity.

Intraoperative protocol:

- **Surgical Debridement:** Removal of old scar, infected synovium, devitalised tissue, old cement and implants followed by canal preparation.
- **Spacer Construction:** Handcrafted spacers fashioned from primary femoral components, all-poly tibial components or inserts with cemented dowels created by hand-coating Steinmann pins with antibiotic-laden bone cement. Stems were moulded using a syringe, placed surround the stem and allowed to harden on backtable.
- **Cement Implantation:** Cementing metaphyseal defects, providing rotational stability and facilitating future surgeries if necessary.
- **Postoperative Management:** Broad-spectrum antibiotics, transitioned to culture-specific regimens, serial radiographs and inflammatory markers. Functional outcomes were assessed using KOOS.



Postoperative radiographs of a patient post explantation and placement of an articulating spacer for PJI

Results

Of the five patients treated with 1.5-stage revision, four patients achieved infection-free outcomes and retained their spacers with satisfactory functional recovery with KOOS scores ranging 75-94. One patient developed reinfection, requiring conversion to a first-stage revision, underscoring the importance of careful patient selection.

Overall, this technique has shown excellent short-term outcomes and promising midterm results in our centre.

Conclusion

The 1.5-stage revision method offers several advantages namely fewer surgeries, reduced morbidity, earlier mobility, potential cost savings by avoiding a second major surgery. Reinfection remains a concern, especially in high-risk patients. Careful patient selection, meticulous surgical technique and long-term follow-up are needed to refine patient selection criteria and for improving the efficacy of this emerging technique.

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E-Poster: EP15

Topic: Arthroplasty

2 Strut Allograft Is Better Than 1 In Periprosthetic Total Hip Replacement Fracture?

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Background

Periprosthetic hip fracture is a potentially devastating complication following total hip arthroplasty (THA), with high first-year mortality (15–20%).¹ Vancouver B1 generally require open reduction internal fixation with implant with or without strut graft. We report a case of dual strut allograft stabilized with cable ties reconstruction in a chronic kidney disease patient with osteoporosis.

Report

A 74-year-old lady known case of chronic renal failure with history of right long stem total hip replacement 20 years ago presented with right thigh pain after a fall. Radiograph noted Vancouver Type B1 periprosthetic fracture of right femur (Figure 1). Allograft strut graft with cable ties were done and postoperative radiographs are as Figure 2 (a,b).



Figure 1 – Pre-operative radiograph noted femoral fracture at stem level with osteoporosis.



Figure 2(a) – Immediate post-operative dual plane strut allograft fixation.



Figure 2(b) – 9 months post-operative noted union with well-fixed implant.

Discussion

Incidence of periprosthetic femur fracture has been reported to range from 0.1% to 6% of all total hip arthroplasties (THA), with higher rates for uncemented and revision THA.² Periprosthetic femur fracture treatment needs to be individualized taking into account patient comorbidities, implant stability, patient function

levels, availability of relevant resources and expertise.³ The need to establish specific clinical pathways for fragility fractures, similar to those for other common fracture types, has recently become apparent. Customized treatment, which considers the stability of the femoral stem and the configuration of the fracture, showed favorable overall results, despite differing substantially from the Vancouver classification system.⁴

The difference in fracture patterns between cemented and uncemented stems has recently been described. A simple 'sickle-like' oblique fracture pattern was more commonly seen in uncemented stems while cemented tapered stems resulted in a comminuted 'axe splitting' pattern.⁵

As in this patient due to the osteoporotic bone, revision arthroplasty can become complicated and stabilization with bone allograft without anatomical reduction would be a treatment of choice. Bridging locking plates are usually recommended incorporating screws with cables through the plate but was not technically feasible or recommended in this patient. Some studies define the criteria to indicate fixation in cemented stem to be of well cementation, polished prosthesis with fully intact cement-bone interface and no signs of loosening or 'floating stem'.⁶

While revision arthroplasty (RA) is likely to remain the mainstay of treatment in periprosthetic total hip replacement, fixation should be considered in patients where RA is not ideal. Furthermore, the results of fixation and outcomes are likely less disastrous and may offer a benefit over RA, although further research will help identify patients who may benefit from fixation over RA.

However, it is important to check the stability of fixation of the prosthesis intraoperatively as 20% of fractures which were initially classified as Type B1 on preoperative radiographs were found to have an unstable stem intraoperatively.

Conclusions

Cable plate with single cortical strut allografts had been proven effective treatment method, dual strut allograft dual plane cable tie fixation will require further studies/ series to evaluate effectiveness and functional outcome. Therefore, cortical struts essentially represent or be able to act as biologic bone plates that provide mechanical stability, enhance fracture healing and can potentially increase bone stock.

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E-Poster: EP16

Topic: Arthroplasty

Hip Pain 10 years after Total Hip Replacement

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Background

Femoral stem fracture following total hip arthroplasty (THA) is an infrequent but devastating complication with incidence of 0.1 to 3.4%.¹ Loss of proximal support with a well-fixed distal stem causes cantilever bending that later promote localized corrosion, fretting and fatigue crack initiation leading to stem failure.

Report

80-year-old man history of bilateral THR in 2014 presented with insidious right hip pain for one month. There was no history of trauma and was able to ambulate with walking frame. Radiographs showed right femoral stem fracture Figure 1(a). Removal of broken stem was done using Burr at lateral femoral cortex at tip of stem and pushed proximally disengaging from cement grout. V40 femoral stem size 30 length 95mm was inserted with 28mm femoral head. Post-operative radiograph is shown in Figure 1(b).

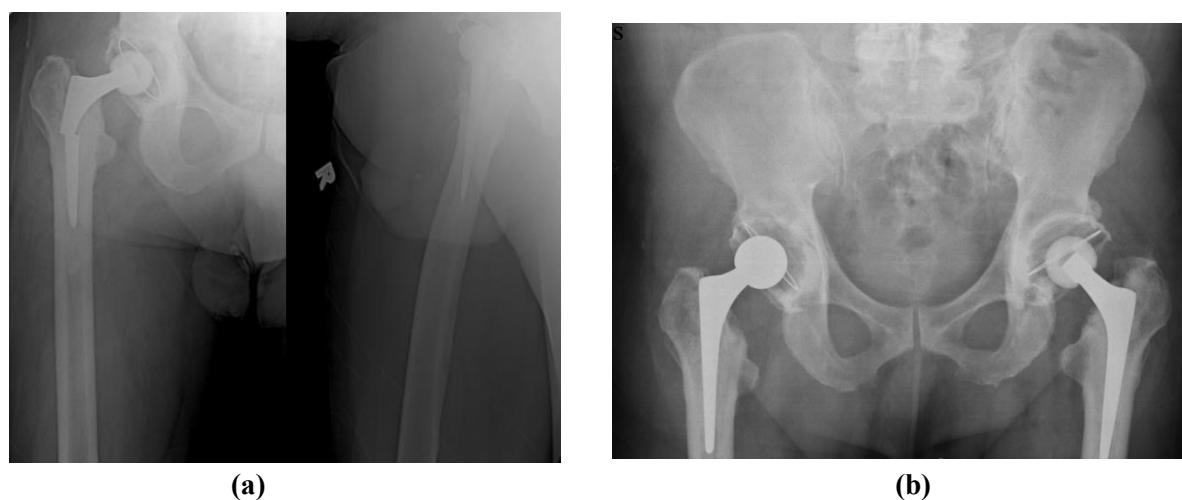


Fig. 1

- (a) Right hip radiograph showed femoral stem fracture resulting in varus angulation of proximal stem.
(b) Post-operative revision of right proximal femoral stem.

Discussion

Risk factors for stem fracture can be divided into patient (BMI, activities, bone stock), implant (design, material, modularity, cemented/cementless) and surgical (varus malposition, sizing, cementing technique) factors.²

Meta-analysis of 49723 THAs noted median time frame of 68 months post-op, 61.8 years in age, predominantly male gender and above 80kg. It was noted that age below 63 years, varus stem alignment, modular implants and revision arthroplasty contributed to statistically significant risk of stem fracture with risk window of 15 years.³ Osteoarthritis, rheumatoid avascular necrosis were main indication of surgery. Even with comparable male to female ratio, 77% of stem fracture occur in male.

In terms of weight, overweight patients had increased risk was observed since Charnley era especially above 88kg and average difference of 23kg between fractured/ non-fractured groups. The risk is linear and significant between weight and time to fracture.

In managing revision THA or osteoporosis, the increased strain due to bone loss, loosening or trochanteric osteotomies will require larger diameter implant and proximal bone support to avoid stem fracture.⁴ However, this can be technically challenging or not feasible due to the narrow proximal femur of our Asian population. 83% of stem fractures were seen to occur before 10 years as in this patient and rarely beyond 15 years is consistent with 11-year “at risk” noted by Wroblewski et al.⁵

Patients’ activity level, stem sizing and cement mantle are more complex measurements in assessing risk of stem fracture and warrant more future studies.

Conclusions

Despite manufacturer reported a very low (0.0006%) stem fracture rate, identifying risk factors for stem fracture and modifying them where possible forms part of a wider strategy to help reduce risk of subsequent revision surgery in patients which will increase cost as well as resulting in poorer outcomes when compared to primary THA.

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E-Poster: EP17

Topic: Arthroplasty

Simple, Convenient and Economical Method to Treat Femoral Medullary Shaft Infection in Prosthetic Joint Infection Using Calcium Sulfate Beads (STIMULAN Rapid Cure) with Available Instruments in a Healthcare Setup

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Background

Calcium sulfate beads (STIMULAN® Rapid Cure; Biocomposites, UK) are widely used in the management of prosthetic joint infections and osteomyelitis[1-3]. Commercially available instruments, such as the Stimulan bullet mat and the introducer, can facilitate the molding and insertion of the calcium sulfate into the femoral canal. Nevertheless, these tools increase the overall treatment cost. In this report, we describe a simple, convenient, and economical technique to mold calcium sulfate into a long tubular form using standard syringes, allowing easy insertion and reliable antibiotic delivery without the need for specialized equipment.

Methods

We demonstrate a technique for shaping calcium sulfate into elongated cylindrical forms using 5 cc syringes. This alternative approach produces longer molds compared to the commercially available molds, which typically generate small pellets (3–6 mm in size). A mixture of 3 g of vancomycin and 240 mg of gentamicin (in 6 mL solution) was incorporated into 20 cc of calcium sulfate. The mixture was packed into the syringes to form cylindrical rods. Intraoperative images document the procedure. Two surgical drains were placed outside the capsule and above the fascia for third-space management, and the wound closure was augmented with vacuum-assisted closure therapy.

Results

The patient recovered well with successful infection clearance and complete wound healing. At one-year follow-up, the patient was able to bear weight on the affected limb.

Conclusions

This syringe-based technique for molding calcium sulfate is a cost-saving and practical alternative to the commercially available introducer system. It provides a viable and practical solution for effective antibiotic delivery in femoral canal infections, particularly in resource-limited healthcare settings.

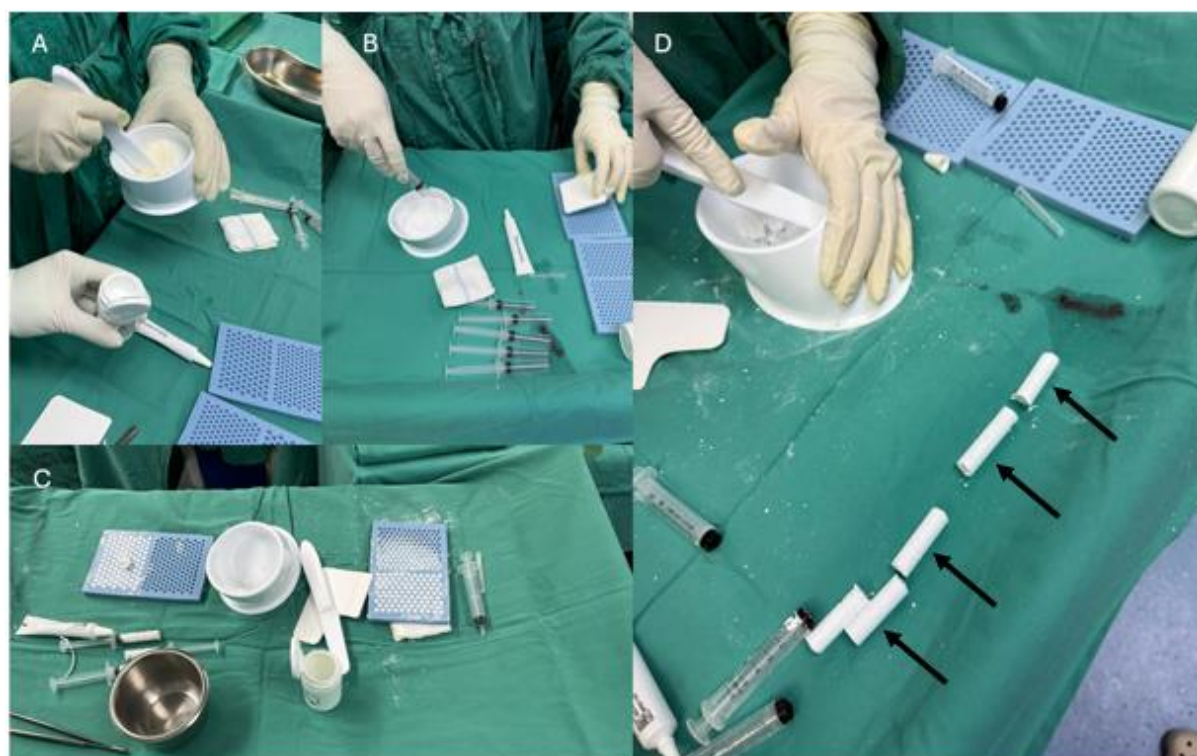


Fig. 1. The figure above shows the Step-by-step process for creating calcium sulfate antibiotic-loaded rods: (A) A paste is prepared by mixing 3 g of vancomycin powder and 240 mg of gentamicin in 6 mL of solution, followed by the addition of 20 cc of calcium sulfate powder; (B) The solvent (sterile water) is then slowly added in small amounts and thoroughly mixed to form a uniform paste; (C) The paste is then molded into cylindrical rods using 5cc syringes; (D) The final product consists of short rods of antibiotic-loaded calcium sulfate, ready for implantation (marked by black arrow).

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E-Poster: EP18

Topic: Arthroplasty

Effects of Closed Kinetic Chain Exercise on Muscle Strength, Balance, Range of Motion, and Gait in Older Patients After Total Knee Arthroplasty

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Background

Rehabilitation following total knee arthroplasty (TKA) is essential for optimizing functional outcomes. This study evaluated the effects of a 12-week closed kinetic chain exercise program compared to a combined kinetic chain exercise program on muscle strength, balance, range of motion (ROM), gait, knee function, and pain in older female patients after TKA.

Methods

Thirty-four patients who underwent TKA were allocated to three groups: closed kinetic chain exercise group (CKCG, n=12), comparison group (COMG, n=11), and control group (CG, n=11). Knee extensor and flexor strength were measured using a portable muscle strength meter. Static balance was assessed using the single-leg standing test, and dynamic balance was measured using the Timed Up and Go test. Gait performance was evaluated with the 6-minute Walk Test. Knee function was assessed using the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), and pain was measured using the Visual Analog Scale (VAS). All measurements were taken before and after the 12-week intervention period.

Results

Significant increases in knee extensor strength were observed over time in both exercise groups. However, no statistically significant differences were found between groups. Knee flexor strength did not show significant changes. Static balance abilities showed no significant differences between groups or over time. Dynamic balance improved significantly over time but did not differ between groups. ROM and gait performance improved significantly over time without significant between-group differences. WOMAC scores and VAS pain scores did not show statistically significant differences between groups or over time.

Conclusions

Closed kinetic chain and comparison exercise programs both improved knee extensor strength, dynamic balance, ROM, and gait in older women after TKA. However, due to the absence of significant between-group differences in several outcomes, future studies should aim to control for baseline group heterogeneity and consider refining exercise protocols.

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E-Poster: EP19

Topic: Arthroplasty

Development of Rehabilitation Norms for Total Knee Arthroplasty Patients: Linking Hospitals and Communities Through Exercise Function Evaluation

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Background

Exercise rehabilitation immediately after total knee arthroplasty (TKA) is essential to prevent postoperative physical function decline and promote recovery. Despite the benefits of TKA, recovery outcomes vary significantly among patients. This study aimed to establish standardized evaluation norms for linking hospital-based rehabilitation with community care.

Methods

This study included 824 patients (164 men and 660 women; age: 72 ± 6.4 years) with a history of TKA. Participants were categorized based on the postoperative period (immediately after discharge to over 49 months). Physical function indicators such as muscular strength, endurance, flexibility, cardiorespiratory endurance, balance, and gait were measured. Quality of life was assessed using WOMAC and SF-36 questionnaires. Data analysis was performed using SPSS software (version 21.0), employing descriptive statistics and one-way ANOVA to identify sex-based differences.

Results

There was no significant difference in the Visual Analogue Scale (VAS) according to sex; however, body composition (weight, skeletal muscle mass, body fat weight, and body fat percentage), showed significant differences between men and women. Additionally, knee flexion contracture range of motion (ROM), 6-minute walking, sit-and-reach flexibility, muscle strength (flexion and extension), and Timed Up and Go (TUG) test results (Tables 1-2) showed significant differences. Using the means and standard deviations of these indicators, Cajori 5-grade evaluation norms were established to provide standardized rehabilitation guidelines linking hospital-based care with community-based rehabilitation services. (Table 3)

Table 1. Differences in VAS and body composition according to sex.

	VAS	Weight (kg)	Skeletal muscle mass (kg)	Fat weight (kg)	%fat (%)	BMI kg•m ²
Sex						
Men	3.5±2.7	68.9±10.2	30.6±3.4	19.1±6.7	27.2±6.3	24.8±3.9
Women	3.8±2.4	60.9± 9.2	20.4±2.6	22.4±6.5	36.2±6.1	25.4±3.3
F value	1.410 _(1,404)	52.343 _(1,404) ***	27.101 _(1,400) ***	17.862 _(1,396) ***	154.778 _(1,400) ***	1.749 _(1,406)
significance	0.236	0.001	0.001	0.001	0.000	0.187

Abbreviations: BMI, body mass index. ***: Significant difference (p<0.001).

Table 2. Differences in exercise rehabilitation-related variables according to sex.

	Sex Variables	Men	Women	Total	F value	p value
ROM	Knee maximum flexion (°)	94.25±20.25	89.65±19.87	90.58±20.17	6.764	0.009**
	Knee flexion contracture (°)	1.01±2.84	0.45±2.02	0.56±2.22	8.625	0.003**
Muscle Strength	Knee flexion (kg)	14.76±5.20	10.74±3.95	11.55±4.52	117.297	0.000***
	Knee extension (kg)	19.11±7.83	13.40±5.00	14.54±6.11	131.518	0.000***
Muscular endurance	30 s stand up from a chair (frequency)	13.08±4.87	12.09±4.07	12.27±4.25	5.350	0.021*
Flexibility	Sit and reach (cm)	5.56±8.48	12.05±8.30	10.78±8.72	76.456	0.000***
Cardiopulmonary endurance	6min walking (s)	411.71±123.09	378.83±125.41	385.46±125.56	9.011	0.003**
Gait	Single support time (%)	36.17±5.79	37.18±4.29	36.97±4.65	5.841	0.016*
Balance	Single-leg stance test(sec)	12.06±13.79	15.82±21.54	15.05±20.25	4.438	0.035*
	TUG (s)	8.89±3.98	10.39±6.94	10.09±6.94	6.964	0.008**
Quality of life	SF36 V2	55.25±19.16	54.47±19.53	54.61±19.45	0.168	0.682
	WOMAC	28.15±18.93	28.96±18.91	28.81±18.90	0.232	0.630

*: Significant difference (p<0.05). **: Significant difference (p<0.01). ***:Significant difference (p<0.001).

Table 3. Norms of variables related to exercise rehabilitation function.

Variables		Excellent	Very Good	Good	Poor	Very Poor
ROM	Knee maximum flexion (°)	Men 122.3≤	101.2–122.2	79.7–101.1	58.5–79.6	58.4≥
		Women 120.4≤	98.7–120.3	76.9–98.6	55.2–76.8	55.1≥
	Knee flexion contracture (°)	1.2≥	1.3–1.7	1.8–2.5	2.6–2.9	3≤
Muscle Strength	Knee flexion (kg)	Men 21.2≤	16.0–21.1	10.5–15.9	5.4–10.4	5.3≥
		Women 15.1≤	11.3–15.0	7.4–11.2	3.6– 7.3	3.5≥
	Knee extension (kg)	Men 36.4≤	28.2–36.3	19.8–28.1	11.6–19.7	11.5≥
		Women 24.9≤	19.1–24.8	13.3–19.0	7.5–13.2	7.4≥
Muscular Endurance	30s stand up from a chair(N)	19≤	15–18	10–14	5–9	4≥

Flexibility	Sit and reach (cm)	Men	17.0≤	8.4–16.9	0.2–8.3	-8.7–0.1	-8.8≥
		Women	24.4≤	15.6–24.3	6.7–15.5	-2.09–6.6	-2.10≥
Cardiopulmonary function	6min walking (m)	Men	581.9≤	460.8–581.8	339.5–460.7	218.4–339.4	218.3≥
		Women	551.2≤	424.1–551.1	296.8–424.0	169.6–296.7	169.5≥
Gait	Single support time (%)		45.0≤	39.1–44.9	33.0–39.0	27.0–32.9	26.9≥
Balance	Single-leg stance test (s)	Men	36.0≤	20.9–35.9	5.7–20.8	1.0–5.6	0.9≥
		Women	50.6≤	27.1–50.5	3.5–27.0	1.0–3.4	0.9≥
	TUG (s)	Men	4.8≥	4.9–6.7	6.8–11.3	11.4–15.8	15.9≤
		Women	4.7≥	4.8–6.4	6.5–15.6	15.7–24.6	24.7≤
Quality of life	SF36 (score)		89≤	69–88	48–68	27–47	26≥
	WOMAC(score)		0	1–15	16–38	39–59	60≤

Conclusions

The findings highlight the importance of early and tailored rehabilitation programs to address individualized physical fitness needs post-TKA. The Cajori 5-grade evaluation norms provide measurable standards for assessing recovery progress and optimizing rehabilitation strategies.

Keywords: exercise rehabilitation function, total knee arthroplasty, TUG

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E-Poster: EP20

Topic: Arthroplasty

Impaction Bone Graft (IBG) Tibia for Right Knee Post-Traumatic Osteoarthritis with Large Medial Defect (AORI Type 3)

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Background

Bone defects in knee arthroplasty should be addressed meticulously to prevent the risk of early loosening and failure. There are two ways, namely biological and non-biological methods, in tackling bone defects. The current trend has shifted towards the use of metal substitutes, including augment, cone, sleeve or 3D-printed customised implant. Here, we describe a case of IBG, the biological way to reconstruct bone defect.

Case Report

A 45-year-old female with the chief complaint of right knee pain for more than 6 years. She had a history of an open right knee fracture 6 years ago and underwent multiple surgery debridement, external fixator, followed by flap repair surgery. She sustained an open distal femur fracture and comminuted right medial tibia plateau fracture. Clinically, her right knee is stiff with limited ROM 30-45 degree. There are multiple scars with large skin flap on the anteromedial aspect right knee.

CT scan shows AORI Type F2A, T3A defect with 3cm bone loss in the medial tibia plateau and Hoffa fracture right medial femoral condyle with defect of 1cm. In MRI, MCL was avulsed at the medial tibia.

Incision was made following the most lateral margin of the previous skin flap and undermined to follow the extensile medial parapatellar approach. Quadricepsplasty was performed and scar tissue was removed from the anterior femur. The bone-cut graft was used to reconstruct the postero-medial femoral condyle. Tibia trial implant with long stem, one size bigger in diameter was kept in place. The metal mesh was shaped to reconstruct the proximal-medial cortical rim. Morselized bone grafts were impacted to reconstruct the metaphysis and epiphysis region, converting this into a contained defect. Finer grafts(<5mm) were packed first, followed by the bigger grafts(5-7mm) proximally. Cement was pressurized, and a hinge knee implant was inserted. [1]

Discussion

There were four main challenges in this case. First, the large and uncontained medial tibia defect without a cortical rim. Second, exposure in the stiff and limited motion knee. Third, skin incision in a case with multiple scars and the presence of skin flap. And lastly, the loss of MCL. There are few options in managing AORI type 3 defect, which are either metal cone or metaphyseal sleeve, structural allograft, or a customized megaprosthesis. Considering the young age, IBG method was selected to reconstruct the proximal-medial defect. Preserving the bone stock is important in the anticipation of future revision.

IBG is time-consuming and technically demanding. Multiple studies have shown its durability in restoring bone stock, with no mechanical failure.[2, 3] A long stem with adequate rim support restored by IBG is associated with adequate stability and long-term survival. [4] Formation of neocortex is expected in previously defective areas filled by grafts. Histological analysis had shown active new osteoid formation in allograft areas with vascular stroma seen in between bone fragments. [5]

Conclusion

Impaction Bone Graft Tibia technique is technically demanding but safe and important in preserving bone stock, especially in younger patients.



Fig. 1. (a) Top Left Three: Stiff knee, ROM 20-45°, Multiple scars with skin flap;(b) CT scan: Distal and posteromedial bone loss medial femoral condyle, Proximal medial tibia bone loss (AORI F2A, T3A) ;(c) Intra-op IBG tibia with mesh, bone block with screws at medial femoral condyle



Fig. 2. Postop radiograph after IBG mesh at medial tibia

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E-Poster: EP21

Topic: Arthroplasty

Tibial Tracker Pin Wounds Heal Safely in Robot Assisted Total Knee Replacement

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Background

Robot-assisted total knee replacement surgery utilises femoral and tibial pin trackers for navigation. While femoral tracker pins may be placed within the original incision, many surgeons relegate tibial pins distally outside the main incision to allow room for tibial component intramedullary preparation. These additional wounds are potential sources of wound-related complications.

Methods

We studied the incidence of tibia pin-related bleeding, wound oozing and infection in our series of 146 patients with robot-assisted primary total knee replacements -- Ages spanned 54 to 83. Four patients had sequential bilateral knee surgeries. Tibial pin calibre measured 3.2mm (ROSATM Zimmer, Warsaw, Indiana) in 111 knees while 35 had 4mm pins (VELYSTM, DePuy Synthes, Warsaw, Indiana). All tibia pin stab incisions (<7mm) were outside of the main incision wound using a size-10 surgical scalpel blade. Drilling did not ensnare skin edges and soft tissue. Wound closure utilised interrupted external non-absorbable 000 sutures.



Fig 1 : External sutures



Fig 2: Femoral and tibial pin placements

Results

Table: Outcomes of our distal pin wounds

	3.2mm	4.0mm
Heals within 2 weeks	98	34
Stained dressings	10	1
Oozed out, requiring change of dressings	2	-
Delayed tibia pin wound healing more than 2 weeks	1	-
Tibial Pin Infections (within 90 days)	-	-

There were no infections encountered at the end of 90 days.

Observed Safety Rate: $143/146 = 97.9\%$

Exact one-sided binomial test

- Null hypothesis(H_0): True Safety Rate $\leq 95\%$
- Alternative hypothesis (H_1): True Safety Rate $> 95\%$
- P value 0.063

95% Confidence Interval (Wilson Method) for $143/146 = 93.6\%$ to 99.4%

While the observed safety rate of 97.9% is high, its p-value of 0.063 does not achieve statistical significance. However, the confidence interval exceeds 95% .

Discussion

Tracker pin complications may include infection, muscle injury, nerve injury and iatrogenic bone fractures. Pin placement^{1, 2, 3} and pin calibre⁴ have been the subject of recent studies. Several points are pertinent: (1) Incorporating both femoral and tibial pins would have resulted in a long incision wound, increasing morbidity and degrading cosmesis. (2) Bone marrow leak in the thin tibia subcutaneous tissue may be troublesome in younger patients where fatty replacement has not been extensive. (3) Skin fragility is higher over the anteromedial shin especially in thin patients (4) Basic tenets of proper wound closure must be practised. Staples have been discouraged due to higher infection rate and painful removal^{5, 6, 7} while we have no experience with adhesive strips.

Conclusions

No significant wound morbidity was seen in placing tibial tracking pins outside the main incision wound during robot-assisted total knee replacements. It is important that proper wound closure is done.

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E-Poster: EP22

Topic: Joint Preservation

Temporary Relief, Permanent Pain? - Evaluating Transcutaneous Pulsed Radiofrequency in End-Stage Knee Osteoarthritis: A Case Series

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Background

Knee osteoarthritis (OA) is a leading cause of chronic musculoskeletal pain and impaired quality of life, particularly among the elderly. Management strategies range from pharmacologic interventions and physiotherapy to total knee replacement (TKR). However, many patients are either unfit for surgery or decline it due to personal preferences or comorbidities.

Pulsed radiofrequency (PRF) has gained attention as a novel pain modulation technique. Unlike conventional radiofrequency ablation, PRF delivers intermittent electrical pulses, avoiding significant tissue heating and preserving nerve integrity. The transcutaneous application of PRF (TCPRF) offers a needle-free, outpatient-friendly alternative.

Taverner et al. demonstrated significant short-term pain relief in patients awaiting TKR following TCPRF treatment. Sluijter et al. proposed the RedoxPRF hypothesis, which suggests PRF exerts its effects at the cellular level by modulating oxidative stress and interrupting inflammatory pathways—offering a theoretical rationale for its use in OA-related pain.

Methods

A retrospective case series was conducted in our orthopaedic outpatient clinic at HSAAS, UPM. Six patients (4 female, 2 male; aged 69–84 years) with Kellgren–Lawrence grade 3–4 knee OA were included. All had declined surgical intervention and consented to undergo TCPRF.

Each patient received a single session of TCPRF using bipolar self-adhesive electrodes placed over standard anatomical landmarks. Parameters included 15 minutes of stimulation at 80V, pulse width 20ms, and frequency of 2 Hz, delivered via the Neurotherm NT 1000 generator.

Pain intensity was assessed using the Visual Analog Scale (VAS) at baseline, 1 week, and 4 weeks post-treatment. Subjective reports of functional improvement were also extracted from clinical notes.

Results

Baseline VAS scores ranged from 6 to 9. At 1 week post-treatment, 3 patients (50%) experienced a 1–2 point reduction in VAS, while the remainder showed no significant change. By week 4, all patients reported return of pain to baseline levels. No adverse events or complications were observed. Those who experienced short-term relief noted temporary improvements in daily activities such as walking, though these effects were not sustained.

Conclusions

TCPRF is a safe, non-invasive modality that may offer short-term pain relief in patients with advanced knee OA. However, its therapeutic benefit appears limited in end-stage disease, where structural degeneration predominates. Future studies should assess its potential in earlier OA stages and explore whether repeated or adjunctive therapies can improve and sustain outcomes.

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E-Poster: EP23

Topic: Joint Preservation

Three-dimensional Acetabular Containment Surgery Improves Femoral Head Morphology and Clinical Outcomes in Older Children with Legg-Calvé-Perthes Perthes Disease

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Background

Legg-Calvé-Perthes disease (LCPD) in older children (≥ 6 years) presents unique therapeutic challenges due to limited remodeling potential and high risk of permanent deformity. While various surgical interventions exist, the optimal treatment strategy for patients with substantial femoral head subluxation remains controversial. Traditional containment procedures often fail to provide adequate three-dimensional coverage when femoral epiphyseal extrusion index exceeds 20%.

Questions

We asked: (1) Can triple pelvic osteotomy and periacetabular osteotomy provide three-dimensional improvement in acetabular coverage for older LCPD patients with high femoral epiphyseal extrusion index? (2) How does the morphology of the acetabulum and femoral head evolve postoperatively? (3) What are the clinical and functional outcomes following these procedures?

Methods

We retrospectively reviewed 10 patients (10 hips; mean age, 9.12 years; range, 6-13 years) who underwent either triple pelvic osteotomy ($n=7$) or periacetabular osteotomy ($n=3$) between 2015 and 2023. All patients had femoral epiphyseal extrusion index $>20\%$ and minimum follow-up of 12 months (mean, 60.1 months; range, 15.6-105.8 months). We assessed three-dimensional coverage using lateral center-edge angle (LCEA), anterior center-edge angle (ACEA), Tönnis angle, and femoral epiphyseal extrusion index. Femoral head morphology was evaluated using modified sphericity deviation score and Stulberg classification. Clinical outcomes were measured using modified Harris Hip Score and McKay classification.

Results

Both procedures significantly improved three-dimensional coverage: LCEA increased from $10.8^\circ \pm 1.8^\circ$ to $36.1^\circ \pm 3.2^\circ$ ($p<0.001$), ACEA from $25.7^\circ \pm 2.8^\circ$ to $39.9^\circ \pm 3.8^\circ$ ($p=0.008$), and femoral epiphyseal extrusion index decreased from $29.9\% \pm 3.0\%$ to $5.3\% \pm 3.3\%$ ($p=0.001$). The mean postoperative modified sphericity deviation score was 8.5% (range, 0-30.5%). At final follow-up, 9 hips (90%) achieved Stulberg I/II classification. The modified Harris Hip Score improved from 79.0 ± 2.4 to 95.1 ± 1.2 ($p<0.001$), with 80% of patients achieving excellent McKay functional outcomes. Multivariate analysis revealed significant correlations between postoperative sphericity and preoperative Herring classification ($p=0.035$), postoperative LCEA ($p=0.05$), ACEA ($p=0.003$), and BMI ($p=0.042$).

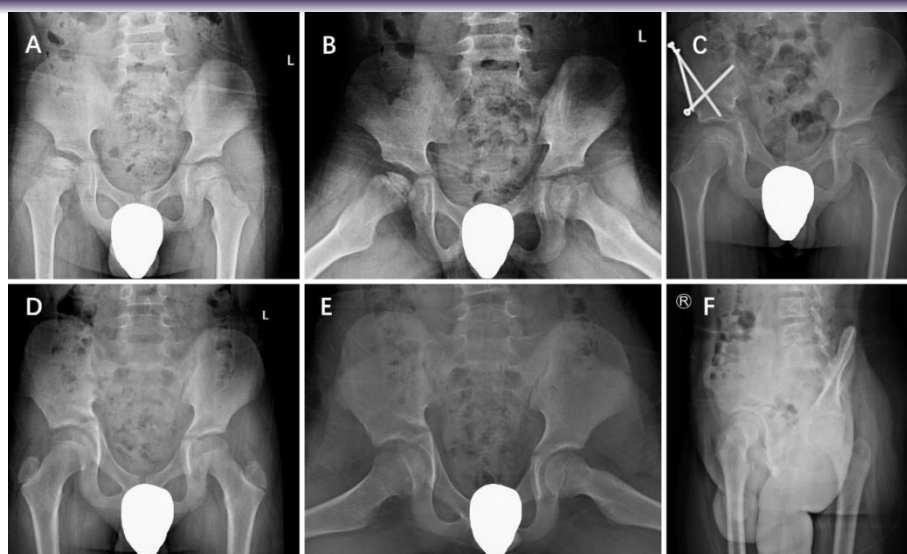


Fig. 1. A 7.6-year-old boy with Perthes disease treated with triple pelvic osteotomy. Preoperative femoral epiphyseal extrusion index was 37.4%. Preoperative (A, B), 12-month postoperative (C), and 73.2-month final follow-up (D-F) radiographs showing anteroposterior, frog-leg lateral, and false-profile views.

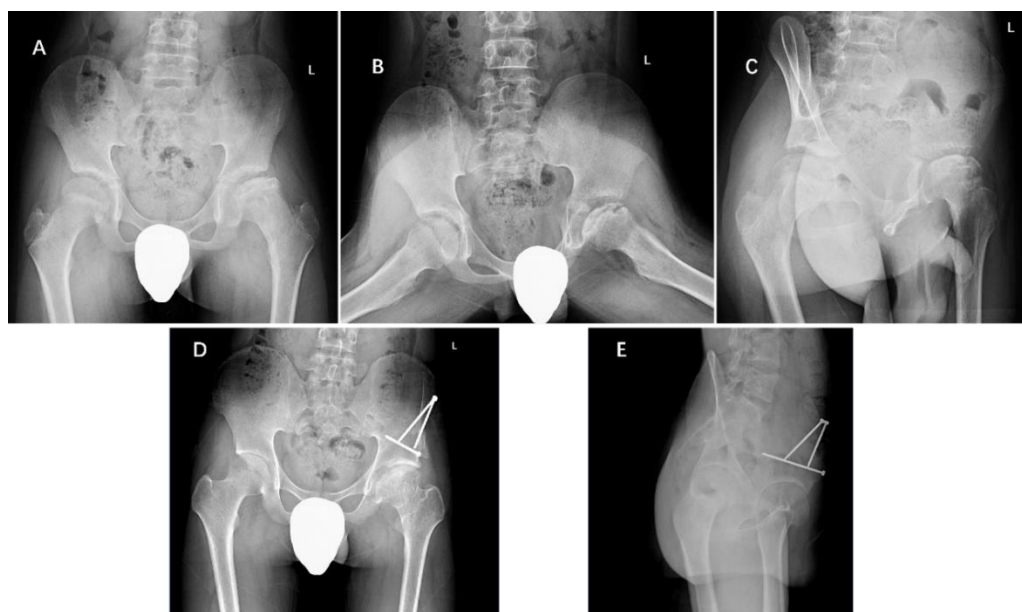


Fig. 2. A 13-year-old male with Perthes disease treated with periacetabular osteotomy. Preoperative femoral epiphyseal extrusion index was 31.2%. Radiographs showing anteroposterior, frog-leg lateral, and false-profile views preoperatively (A-C) and at 102.7-month follow-up (D-E).

E-Poster: EP24

Topic: Sports

Knee Muscle Strength Recovery After Anterior Cruciate Ligament Reconstruction

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Background

Muscle strength recovery is a key factor in rehabilitation following anterior cruciate ligament reconstruction (ACLR). Returning to sports typically depends on regaining knee strength, yet time since surgery remains the most commonly used criterion in decision-making. However, studies show conflicting results on how muscle strength recovers over time after ACLR. How do knee extensor and flexor strength change post-surgery? How do the operated and non-operated knees compare? This study aims to assess changes in knee muscle strength over time after ACLR.

Methods

This study included 40 patients who underwent ACLR with autologous hamstring tendon, with or without tibialis anterior allograft, and were followed for one year postoperatively. Quadriceps-strengthening exercises began as early as possible after surgery. A six-week period of progressive weight-bearing and motion-controlled bracing (gradual increase in knee range of motion) was recommended. Patient-reported outcome measures (PROMs), including the modified Lysholm knee score, IKDC score, and Tegner activity score, were collected preoperatively, at 3, 6, and 12 months postoperatively. Isokinetic knee muscle strength was assessed at the same intervals using a Biodex System IV dynamometer, testing both knees at 60°/sec and 180°/sec for extension and flexion. Muscle strength deficits (operated vs. non-operated knee) and absolute strength values were calculated at each time point. Data across time points were compared using the Friedman test, with pairwise comparisons performed via the Wilcoxon signed-rank test.

Results

All PROMs showed significant improvement after 6 months postoperatively. Further significant improvements were observed between the 6-month and 1-year postoperative time points. The deficits in knee extensor and flexor strength (at 60°/sec) increased following surgery, peaking at 3 months postoperatively, and gradually improved to levels significantly lower than preoperative conditions at 6 months postoperatively (Extensor; Pre: 30.97±20.76%, Post 3mo: 36.15±18.79%, Post 6mo: 19.96±12.17%, Post 1yr: 16.57±17.04%, Flexor; Pre: 17.50±19.12%, Post 3mo: 23.61±16.34%, Post 6mo: 9.73±13.28%, Post 1yr: 6.54±16.36%). When tested with the 180°/sec protocol, the trend was similar, but deficits returned to preoperative levels at 6 months postoperatively, with only the extensor deficit improving significantly compared to the preoperative level at 12 months postoperatively. These changes in deficit were mainly due to changes in the strength of the operated knee. Operated knee muscle strength decreased significantly at 3 months postoperatively compared to the preoperative condition but improved to significantly better levels at 6 months postoperatively compared to the preoperative condition.

Conclusions

Patients typically report improved clinical and functional status by 6 months after ACLR. Muscle strength in the operated knee declines significantly during the first 3 months but gradually recovers afterward. On average, it takes about 6 months for the operated knee to surpass its preoperative strength level.

E-Poster: EP25

Topic: Sports

From Clicks to Clarity: Mechanistics Insights into Bilateral Snapping Knee

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Background

A snapping knee is defined as the sound or feeling of popping of the knee during a specific motion. Aetiologies include discoid meniscus, meniscal tear & loose bodies. We present a rare case of bilateral snapping knee and its diagnostic challenges.

Report

A 12-year-old boy with underlying G6PD deficiency presented with clicking sound affecting both knees. He had a sports injury 6-months prior, sustaining pain and swelling of both knee joints after being tackled by an opponent and landing on his knees. He subsequently developed instability, which became more pronounced with running. A click is audible bilaterally as he brings his knee into full extension. There were no tenderness nor limitations of motion of either knee upon examination. He had a grade 2 laxity on anterior drawer test & positive pivot shift test for both knees. Radiographs were normal. MRI scan of bilateral knee joints confirmed bilateral lateral meniscus discoid menisci with horizontal tears. A dedicated sports surgery team was consulted and he has been planned for saucerisation of both lateral discoid menisci.

Discussion

Discoid meniscus is a congenital anomaly which has morphologic abnormalities and lateral meniscus instability. Unstable discoid menisci may develop snapping knees however in most of the cases they remain asymptomatic. Observation alone is recommended for asymptomatic cases, however, saucerization and lateral meniscus repair may be opted for if patients develop symptoms. Studies have shown that surgical repair provides good short-term outcomes. However, degenerative changes may develop later.[1-2]

Conclusions

Stable discoid menisci often remain asymptomatic, however they are susceptible to tearing with an insidious onset of pain and snapping. Careful examination and appropriate investigations with a high index of suspicion for bilateral DLM tears are necessary especially when bilateral snapping symptoms present following trauma.



(a) MRI image of right knee



(b) MRI image of left knee

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E-Poster: EP26

Topic: Trauma

Revision of Femoral Stem with Cold Welding Kuntscher Nail and Plate Augmentation in A Vancouver Type 3C Periprosthetic Fracture

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Introduction:

Periprosthetic fracture composed of around 20% of revision total hip arthroplasty with revision of the femoral component alone are the most common type of revision procedure. Femoral reconstruction in revision total hip arthroplasty using long stem is common and widely accepted worldwide. However, it's challenging to insert and might compromised the bone stock. (1) To achieved adequate strength and stability of fracture fixation, the implant needed to bypasses the femoral defect by 2 cortical diameters. Here we described a case of revision of femoral stem with cold welding k-nail and plate augmentation in a Vancouver type 3C periprosthetic fracture.

Case report:

88 years old lady with underlying hypertension and dyslipidaemia. She had left cemented total hip arthroplasty done in 2017. Patient was discharged well. She alleged fall on 16 Oct 2024, sustained left periprosthetic fracture Vancouver type 3C. She underwent surgery on 5 Nov 2024. Patient was put on lateral position, using lateral approach to explore left hip. Intraoperatively, fracture extending to midshaft of femur, abundant of fibrous tissue over left hip and callus over fracture site. After removal of old femoral stem and cement, fracture site was reduced and cerclage wire done, follow by bridging plate and cable wire system over proximal and distal femur. However, we noticed the femoral long stem unable to bypass the fracture site to obtained adequate length at distal femoral fragment. We decided to extend the stem length with k-nail using cold welding technique. Femoral stem was jammed into medullary of k-nail at least 2cm follow by cementation and insertion. Stability checked, wound washed and closure done.



Fig. 1. Preoperative radiographs



Fig. 2. Postoperative radiographs

Discussion:

Cold welding femoral stem with k-nail can be used with encounter intraoperation difficult femoral stem insertion, inadequate femoral stem size, narrow intramedullary diameters or deformed femur etc. K-nail came with variation of size, thus can fit into various size of medullary canal. Richards et al reported using cement loaded K-nail with a femoral stem implanted at the proximal of the nail in revision arthroplasty in prosthetic joint infection cases. Wroblewski et al described using conventional Charnley stem slotted down on a K-nail after a subprosthetic femoral shaft fracture. They achieved successful results after long-term follow up except one case complicated with infection and massive bone loss. (2)

Conclusions

Complications that occurs in revision total hip arthroplasty using long femoral stem including femoral perforations, femoral fractures, aseptic loosening etc. Our technique could be consider if encounter intra-operative difficult stem insertion and can be life-saving straw method. It had been proved that this method with successful outcome.

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E-Poster: EP27

Topic: Trauma

Femoroacetabular Impingement Caused by A Large Non-united Acetabular Rim Fracture: An Arthroscopic Solution

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Background

A non-united acetabular rim fracture is a rare cause of pincer-type femoroacetabular impingement (FAI). There are limited case reports discussing whether to excise or fix the fragment [1].

Report

A 40-year-old man presented with chronic right hip pain following a motor vehicle accident five years ago. He had undergone several open surgeries, but the acetabular rim fracture remained unaddressed. He experienced sitting intolerance and was unable to squat or prostrate during prayers. On examination, he had an antalgic gait, limited internal rotation of the hip, and a positive impingement sign. Imaging revealed mixed pincer and cam-type deformities with a large, non-united acetabular rim fragment (Figure 1a, b).

He underwent arthroscopic resection of the intracapsular rim fragment and femoral osteoplasty. He was positioned on a traction table under general anaesthesia. A mid-trochanteric portal and a mid-anterior portal were created under fluoroscopic guidance, avoiding the rim fragment. An interportal capsulotomy was performed. A 5.5 mm burr was used to resect the rim fragment (Figure 1c), followed by femoral osteoplasty and capsular closure.

At six months postoperatively, the patient was walking normally and able to squat and prostrate without pain.

Discussion

Pincer-type FAI may result from acetabular overcoverage, os acetabuli, or, more rarely, chronic rim fractures. A common dilemma is whether to excise the fragment or to perform fixation. Excision may relieve impingement and improve hip mechanics, provided joint stability is preserved [2]. In our case, hip arthroscopy allowed safe resection of the fragment while also addressing the cam deformity [3].

Conclusions

A large, non-united acetabular rim fragment can be safely resected arthroscopically without compromising joint stability. This minimally invasive approach also enables treatment of concurrent cam deformities, resulting in good functional recovery.

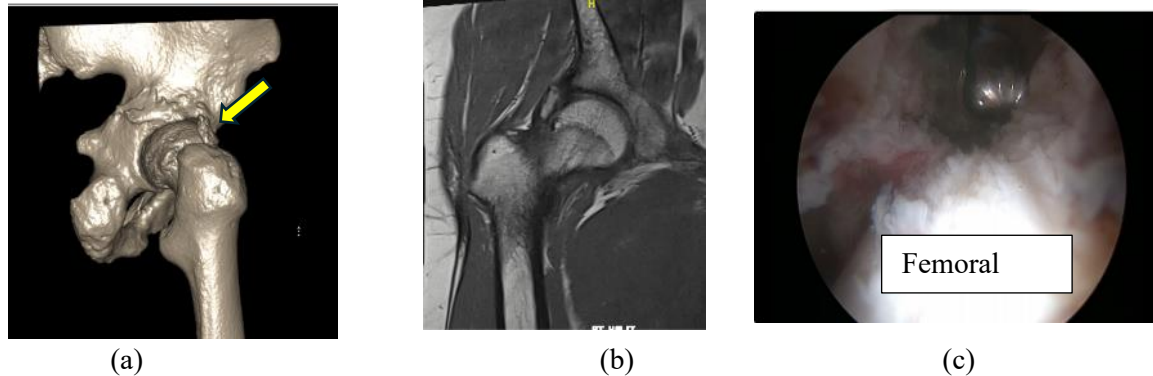


Fig. 1. (a) 3D computed tomography of the right hip confirming a non-united acetabular rim fracture (yellow arrow). (b) T1-weighted MRI of the right hip demonstrating the intracapsular location of the rim fragment. (c) Intraoperative arthroscopic view: a 5.5 mm burr was used to resect the rim fragment (red arrow) while preserving the hip capsule.

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E-Poster: EP28

Topic: Trauma

Post-Traumatic Pseudoaneurysm of Profunda Femoris Artery Is A Rare Complication of A Pertrochanteric Fracture – A Case Report

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Background: Post-traumatic pseudoaneurysm of the profunda femoris artery (PFA) is a rare but potentially life-threatening complication following pertrochanteric femoral fractures.[1] Due to its deep anatomical location and nonspecific clinical presentation, diagnosis is often delayed, leading to significant morbidity. Awareness of this rare entity is essential for timely diagnosis and intervention.[2] Neglected cases provide several challenges to the orthopaedician, such as proximal migration of the femur, muscle atrophy, and venous stasis. This case report describes a 77-year-old male with a 2-month-old neglected intertrochanteric fracture, which was further complicated by a pseudoaneurysm of the profunda femoris artery.

Case Report: A 77-year-old male presented to the outpatient department with complaints of left hip pain and inability to walk for 2 months, following a fall from bed. The left lower limb appeared shortened, externally rotated, with the thigh appearing tense and swollen. Upon examination, distal pulses on the left side were present but were feeble. X-ray revealed a pertrochanteric fracture with proximal migration of the greater trochanter and visibly calcified vessels. Arterial Doppler and CT angiography both showed a large saccular outpouching showing turbulent flow, confirming a pseudoaneurysm arising from the left profunda femoris artery. Following consultation with the departments of vascular surgery and interventional radiology, percutaneous glue embolization under balloon protection of the pseudoaneurysm was done. The patient underwent total hip arthroplasty the following day. The post-operative period was uneventful. 48 hours after surgery, repeat Doppler was done, and embolization of the pseudoaneurysm was found to be intact with normal flow in surrounding vessels. The patient was mobilized with walker support with no further complications.

Discussion: Pseudoaneurysms of the PFA following pertrochanteric fractures are rare. They can result from direct vascular injury by fracture fragments, surgical manipulation, or implant positioning. Clinical suspicion should arise in patients with unexplained anemia, thigh swelling, or hemodynamic instability after proximal femur fractures. Imaging modalities such as duplex ultrasound and CT angiography are critical for diagnosis. Endovascular treatment with coil embolization offers a minimally invasive, effective therapeutic option with low complication rates.

Conclusions: Post-traumatic pseudoaneurysm of the profunda femoris artery is a rare but serious complication of pertrochanteric fractures. Early recognition and prompt endovascular management are key to preventing significant morbidity. Surgeons should maintain a high index of suspicion during the preoperative, intraoperative, and postoperative periods when managing pertrochanteric fractures.

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