1

Anterior Acromial Coverage is a Prognostic Factor for Arthroscopic Repair of Anteroposterior Massive Rotator Cuff Tears

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Introduction / Objective: To identify the association between the anteroposterior acromial coverage and the functional and radiological outcomes after arthroscopic repair of anteroposterior massive rotator cuff tears (AP-MRCTs).

Materials & Methods: A total of 98 patients who underwent arthroscopic repair of AP-MRCTs were included in the study and classified by whether the anterior acromial coverage (AAC) was anterior (positive AAC group) or posterior (negative AAC group) to the scapular line on true lateral shoulder radiographs. Demographic characteristics, surgical details, and functional outcomes were prospectively collected. The acromial morphological features, global tear extension (GTE), global fatty infiltration index (GFII), tendon integrity after repair, proximal humeral migration (PHM), and glenohumeral abduction (GHA) were measured and calculated on radiographs or magnetic resonance imaging preoperatively and at 2 years postoperatively. Multivariate logistic regression was performed to identify the independent risk factors of rotator cuff retear.

Results / Discussion: Postoperatively, the American Shoulder and Elbow Surgeons score (82.5 ± 8.3 vs 77.2 ± 11.5; *P* = .013), active abduction (157.8° ± 27.1° vs 142.7° ± 39.6°; *P* = .048), and GHA (45.6° ± 10.4° vs 39.7° ± 14.9°; *P* = .041) in the positive AAC group were significantly higher than those in the negative AAC group, while the retear rate (23.9% vs 44.2%; *P* = .035) and PHM (1.7 ± 1.0 mm vs 2.3 ± 1.2 mm; *P* = .006) were significantly lower in the positive AAC group. Smaller AAC (odds ratio [OR], 0.93; 95% CI, 0.87-1.00; *P* = .040), larger GTE (OR, 1.03; 95% CI, 1.01-1.06; *P* = .017), and higher GFII (OR, 3.49; 95% CI, 1.09-11.19; *P* = .036) were associated with increased risks of rotator cuff retear.

Conclusion: Increased AAC was associated with a lower retear rate and better functional outcomes after arthroscopic repair of AP-MRCTs. Preliminary risk evaluation integrating the GTE, GFII, and AAC is recommended to consider the necessity of additional procedures for arthroscopic rotator cuff repair.

2

Intra-articular Platelet-rich Plasma Injection after Anterior Cruciate Ligament Reconstruction: A Randomized Clinical Trial

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Introduction / Objective: To compare the subjective outcomes and graft maturity in patients undergoing anterior cruciate ligament reconstruction (ACLR) with and without postoperative intra-articular platelet-rich plasma (PRP) injection.

Materials & Methods: This surgeon- and investigator-masked randomized clinical trial included patients treated at a national medical center in China who were aged 16 to 45 years and scheduled to undergo ACLR. Participants were enrolled between March 2021 and August 2022, and the last participant completed a 12-month follow-up in August 2023. Participants were 1:1 randomized to the PRP group (n=60, receiving 3 doses of postoperative intra-articular PRP injection at monthly intervals) and control group (n=60, without postoperative injection) with the same follow-up schedule. The primary outcome was the average score for 4 subscales of the Knee Injury and Osteoarthritis Outcome Score ($KOOS_4$; range, 0–100, with 100 indicating best knee function and no symptoms) at 12 months postoperatively. Secondary outcomes were patient-reported outcomes, graft maturity, and physical examinations at 3, 6, and 12 months.

Results / Discussion: Among the 120 randomized participants (mean age, 29.0 years; 36 [30%] women), 114 (95%) were available for the primary outcome. The mean $KOOS_4$ scores at 12 months were 78.3 in the PRP group and 76.8 in the control group (adjusted mean between-group difference, 2.0; 95% CI, –2.3 to 6.3; *P* = .36). Secondary outcomes were not statistically significantly different between the 2 groups except for sports level and graft maturity at 6 months (more favorable in the PRP group than those in the control group; statistical but not clinical significance). Intervention-related adverse events included pain at injection site and knee swelling after injection.

Conclusion: Among patients undergoing ACLR, the addition of postoperative intra-articular PRP injection did not result in superior knee symptoms and function at 12 months compared to those without postoperative injection. Further studies are required to determine appropriate indications for PRP in musculoskeletal disorders.

3

Trans-clavicular Screw Fixation for Coracoid Base Fractures: A Novel Surgical Technique

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Introduction / Objective: Several fixation techniques have been described in the current literature for coracoid fractures. These include the use of screws, tubular plates, and reconstruction plates. The methods described in the literature are sufficient for fixation of some, or even most coracoid base fractures. However, there exists a subset of these fractures where current methods are inadequate in achieving optimal screw trajectory due to the mechanical barrier presented by the clavicle. We describe a novel trans-clavicular fixation technique in three patients (two Ogawa type 1 and one Ideberg type III fractures), whereby the ideal screw trajectory is blocked by the clavicle.

Materials & Methods: Preoperative 3-D reconstruction images were used to simulate and plan for screw trajectory, showing that the preferred screw trajectory violated the clavicle. The surgical technique used in these patients is described, which in brief involves:

- Surgical dissection involving a saber cut incision extended into a mini deltopectoral approach
- Reduction with bone holding clamps
- Temporary fixation with K wires through the clavicle
- Drilling of a clavicular portal
- Measurement of screw length via "two-wire" technique
- Delivery and insertion of screw through the clavicular portal
- Prophylactic clavicle plating

Results / Discussion: 1: A 34 year old man sustained a right scapula fracture and distal clavicle fracture. At three months postop, the fracture had healed, and he was able to achieve a good shoulder range of motion. **2**: A 28 year old man sustained a right Ogawa type 1

coracoid fracture and associated acromion fracture. At six months postop, the patient had made a good functional recovery, and was back to work. 3: A periprosthetic coracoid base fracture in a 35 year old man with a previous Ideberg 3 fracture treated with plate and screw fixation is treated with our technique. He makes an uneventful recovery.
Conclusion: This technique could potentially be a safe and effective alternative for coracoid fracture fixation.

5

Traumatic Spinal Cord Injury in Singapore: A Multicentre Study

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Introduction / Objective: While the incidence of Traumatic spinal cord injury (TSCI) may appear low, it is a condition with life changing consequences. In Singapore, the last known studies were from almost 30 years ago. The primary aim of this study was to provide an updated understanding of the epidemiology of TSCI in Singapore.
Materials & Methods: All patients who underwent surgical management for acute TSCI between January 2020 to December 2021 were included. Demographics, injury details, peri-operative condition, hospital length of stay (LOS) and discharge disposition were evaluated. The overall characteristics of TSCI were summarised using descriptive statistics. The difference between discharge destinations was compared using chi-square test or t-test. Variables with p-values < 0.3 were selected for multivariable analysis.
Results / Discussion: Forty-five patients were included. Median age was 65 (IQR 57, 72). The most common MOI was fall from standing height or less (53.3%). Accidents involving personal mobility devices, bicycles and motor vehicles made up the next largest group (20%). Forty cases (88.9%) involved the cervical region. There were two cases of inpatient mortality. Twenty-two patients (51.2%) were discharged home, 21 (48.8%) were discharged to a community hospital (CH) or nursing home (NH). The median LOS in an acute hospital was 41 days (IQR 25, 64). Multivariable logistic regression analysis revealed that greater age (OR 1.09 95% CI 1.02-1.19, p = 0.018), lack of improvement in ASIA score upon discharge (OR 8.95 95% CI 1.37-58.25, p = 0.022), and length of acute hospital stay (OR 1.06 95% CI 1.01-1.10, p = 0.016) were factors predicting discharge to CH/NH.
Conclusion: In conclusion, our study contributes an updated understanding of TSCI epidemiology in Singapore. A public health focus on falls prevention, the development of geriatric spinal rehabilitation programs, and the consideration of a national registry are recommended for the comprehensive management of TSCI in Singapore.

6

Morphometric Analysis of the Calcaneum in a South-East Asian Population

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Introduction / Objective: The calcaneum is the most commonly fractured tarsal bone. Sequelae of mismanaged fractures, or use of incorrectly sized implants can cause complications which are detrimental to the patient. A thorough understanding of calcaneal morphology is vital to ensure optimal conservative and surgical management of calcaneal pathology. This study aims to evaluate calcaneal morphology in the South-East Asian population using CT imaging, and to determine if morphological differences exist between male and female patients.
Materials & Methods: Calcaneum measurements were taken from CT scans of 100 patients with intact calcanei, consisting of 34 female and 66 male patients. Patients who have had fractures or previous calcaneum surgery were excluded. SPSS software was used to calculate Mean values and perform T-tests. Results were deemed to have a significant difference if the p-value was less than 0.05.
Results / Discussion: Males had larger calcanei measurements than females in all parameters included. Calcaneal length in females measured on CT axial views were 66.2mm, compared to 75.2mm in males ($p < 0.001$). Calcaneal height, measured at the medial wall, was 28.2mm in females and 33.9mm in males ($p < 0.001$). Calcaneal height measured at the lateral wall was 33.3mm and 38.1 mm in females and males respectively ($p > 0.001$). Calcaneal width was 33.0mm in females and 36.9mm in males ($p < 0.001$). Mean dimensions measured in the total sample gave an axial length of 72.1mm, medial wall height of 32.0mm, lateral wall height of 36.4mm, and width of 35.6mm. There was no significance difference in the degree of lateral to medial tilt from the calcaneocuboid joint between females and males, with measurements of 32.1° and 33.4° respectively ($p > 0.05$).
Conclusion: There is a significant difference in calcaneal dimensions between female and male patients in the South-East Asian population. This is important to aid in surgical planning and, in particular, selection of appropriately sized implants.

7

Novel Algorithm for Gap Balancing and Bone Cuts in Robotic Total Knee Replacements Significantly Improves Accuracy and Surgical Duration

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Introduction / Objective: Robotic Total Knee Replacements (rTKR) have become increasingly popular. However, intra-operative manual planning of the positions of the femur and tibia implants in all possible degrees of freedom to achieve the surgeon's ideal targets and limits of bone cuts, gaps and alignment is challenging. The final manually defined solution may not be optimal, and surgical duration becomes extended significantly. We aim to demonstrate the clinical effectiveness of utilising our novel algorithm.
Materials & Methods: We have developed a novel computational algorithm to achieve optimal positioning of rTKR implants. The initial set of parameters determining the 3D positioning of the implants and the surgeon-defined target gaps and bone cuts are first defined. The algorithm then determines various permutations that give the ideal 3D positioning of the implants, to fulfil the targets with an accuracy of ±0.5mm, while also ranking them by surgeon-preference and evidence-based criteria. We compared the accuracy and duration in achieving surgeon-defined target gaps between both groups. Power analysis based on a pilot study showed 44 patients were required.
Results / Discussion: A prospective study of 67 consecutive rTKR patients at a tertiary institution from November 2021 to December 2023 was performed. 25 utilised the algorithm intra-operatively while 42 did not. 92% of rTKRs that used our algorithm achieved surgeon-defined

target gaps ±1.5mm, compared to 52% of rTKRs that were done manually (P=0.003). With algorithm use, average difference between surgeon-defined target gaps and final achieved gaps was significantly lower (1.08±0.51mm vs 1.81±1.04mm, P=0.003), gap-balancing duration was significantly shorter (1.16min±0.11 vs 14.49min±8.31, P<0.0001), and total surgical duration was significantly lower (38.4min±14.94 vs 73.66min±19.61, P=0.0002).

Conclusion: Our novel algorithm significantly improves both accuracy of achieving the surgeon's target extension and flexion gaps, along with gap-balancing and overall surgical duration. This is highly promising for achieving both reproducibility and efficiency in rTKRs.

8

Pseudoseptic Arthritis of the Shoulder Following Pneumococcal Polysaccharide Vaccine Injection to the Deltoid: A Rare Complication

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Introduction / Objective: Pseudoseptic arthritis of the shoulder presents a diagnostic challenge for physicians, as its clinical presentation resembles that of septic arthritis**.**

Materials & Methods: We demonstrate a case of a 70-year-old male presenting with pain and swelling in his right shoulder following a pneumococcal polysaccharide vaccine (PPV) injection to the deltoid. Despite elevated white blood cell count and inflammatory markers, he remained afebrile. A magnetic resonance imaging of the shoulder showed no abscess apart from a high-grade bursal-sided tear of the supraspinatus footprint and deltoid myositis. Due to clinical worsening with rising inflammatory markers, he underwent an arthrotomy and washout of his shoulder joint. No pus was observed apart from friable soft tissue mass in the subdeltoid region and glenohumeral joint, which came back negative for infection. The patient remained asymptomatic and afebrile on follow-up but required subsequent rotator cuff repair due to the development of a complete tear of the subscapularis tendon and a full-thickness tear of the supraspinatus footprint.

Results / Discussion: This case highlights a rare complication of an inadvertent intra-articular PPV injection in a patient with an underlying rotator cuff tear.

Conclusion: Physicians administering vaccines intramuscularly should be aware of patients at risk of rotator cuff tears and consider alternative injection sites.

9

How Important is the Role of Mentors in Teaching Surgical Techniques for Intramedullary Nailing of Intertrochanteric Fractures with the Advent of Virtual Reality as a Tool? A Randomised Controlled Trial

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Introduction / Objective: Virtual reality (VR) simulation has emerged as an avenue for surgical training to supplement the limitations of conventional training methods. With emerging literature demonstrating its importance in orthopaedic surgical training, we seek to determine if the role of mentors is still relevant in this age of technological advancement.

Materials & Methods: Thirty first-year medical students without prior exposure to intramedullary femoral nailing were randomised equally into three groups to receive training by either a mentor alone, VR simulation alone, or a combination of both. In the mentor group, an Orthopaedic consultant demonstrated the insertion of a short intramedullary femoral nail on a sawbone model. The VR simulation was based on the exact procedure and steps taught by the mentor, using a commercial program. The participants then performed the procedure on a sawbone model and were evaluated using a 5-point global assessment and rating scale, and a procedure-specific checklist.

Results / Discussion: Participants in the combined mentor and VR simulation group significantly performed better regarding the aggregate global assessment score than the mentor and VR simulation group (13.2 vs. 9.7 vs. 5.4, p<0.05). The percentage of steps completed correctly was also significantly higher in the combined group compared to the mentor and VR simulation group (42.5% vs. 2% vs. 0.2%, p<0.05). Participants in the mentor group performed better for surgical steps that were more complex, although this was not significantly different compared to other training methodologies.

Conclusion: A combination of mentor and VR simulation training proved most effective in teaching inexperienced medical students how to insert an intramedullary femoral nail. VR simulation serves as an adjunct for learners to demonstrate proficiency in performing a surgical procedure but is not effective as a standalone training tool. Mentors are still relevant in imparting surgical procedural knowledge but should supplement their training with VR programs to enhance the learner's procedural competency.

11

Local Infiltration Analgesia in Total Knee Athroplasty: Addition of a Non-Steroidal Anti-Inflammatory Drug (NSAID) Increases the Risk of Acute Kidney Injury in Renally Impaired Patients. A Propensity-Matched Retrospective Cohort Study

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Introduction / Objective: Local infiltration analgesia (LIA) is a crucial component of pain management during total knee arthroplasty (TKA). Various formulations of the LIA drug cocktail have been described, with non-steroidal anti-inflammatory drugs (NSAIDs) commonly included. Although NSAIDs are highly effective in improving postoperative pain, they are associated with adverse renal, gastrointestinal and cardiovascular effects. This study aims to investigate whether the addition of an NSAID in LIA affects the incidence of acute kidney injury (AKI) in TKA patients, especially those who have pre-existing renal impairment. The secondary aim was to determine overall AKI incidence.

Materials & Methods: A retrospective cohort study was conducted on elective, primary TKA patients in a single tertiary institution between January 2020 and April 2024. Data was obtained from a prospectively collected institutional knee arthroplasty registry. Patients were administered LIA intraoperatively, with or without an NSAID (30 mg of ketorolac). The study population was divided into two subpopulations, patients with or without chronic kidney disease (CKD) and analyzed separately. Propensity matching was performed on the CKD group,

correcting for age, gender, BMI, ASA score, and presence of diabetes mellitus/hypertension. The outcome of interest was the incidence of AKI.

Results / Discussion: In patients with CKD (n=114), presence of ketorolac in LIA was associated with a higher AKI incidence (12.7% vs 2.0%, *P*-value=0.041). In patients without CKD (n=870), presence of ketorolac in LIA was not associated with a higher AKI incidence (2.0% vs 1.9%, P-value=1.00). Overall AKI incidence was 2.6%.

Conclusion: In patients with CKD, orthopaedic surgeons should be highly cautious of using NSAIDs in LIA during TKA as it is associated with a higher risk of AKI. Patients with a normal renal function can be given NSAIDs in LIA without an elevated risk of AKI.

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Outcomes After Acute Kidney Injury in Total Knee Arthroplasty: An Observational and Comparative Study

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Introduction / Objective: Acute kidney injury (AKI) is a relatively common medical complication after total knee arthroplasty. However, there is limited evidence regarding the outcomes of TKA patients who develop AKI. This study aims to examine the sequelae of AKI in TKA patients, and investigate the effect of AKI on patient outcomes.

Materials & Methods: A retrospective cohort study was conducted in a single tertiary institution, involving all patients who underwent an elective, unilateral TKA between January 2020 and April 2024. Twenty-seven patients with AKI were identified, and 3:1 propensity score matching was performed based on age, gender, BMI and ASA score. Baseline characteristics and outcomes including length of stay, discharge destination, Oxford Knee Score (OKS), Knee Society Score Function (KSSF) and Knee Society Knee Score (KSKS) were collected. The patients with AKI were examined individually for time to recovery, estimated glomerular filtration rate (eGFR) at 3 months and presence of secondary complications.

Results / Discussion: Twenty-six out of 27 patients recovered from their AKI, with a mean time to recovery of 3.8 days (range 1-20). After three months, there was a mean decrease of 11.9% in eGFR from baseline. No patients required renal replacement therapy, and no deaths, major cardiovascular or gastrointestinal complications were recorded. AKI was not associated with a longer length of stay (median 3 vs 3 days, p=0.882), or difference in discharge destination. There was no significant difference in change in OKS, KSSF or KSKS scores at 3 months.

Conclusion: Most AKIs after TKA are mild in severity. All patients, except one, recovered from their AKI with a mean time to recovery of 3.8 days. There was a mean decrease of 11.9% in eGFR from baseline after 3 months. There was no association of AKI with increased length of stay, worse functional outcome measures or discharge destination. Close monitoring of renal function is recommended.

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Role of Wound Alpha Defensin as a Marker for Early Diagnosis of Open Long Bone Fracture Related Infection

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Introduction / Objective: Diagnosing fracture related infection (FRI) requires either purulent discharge from wound or positive culture reports. Cultures are time-intensive and may be falsely negative. This necessitates the need for accurate and rapid biomarker-based diagnosis. Taking forward a pilot study looking at multiple biomarkers for the diagnosis of FRI, this study was conducted to determine the accuracy of Alpha Defensin(AD) for the diagnosis of FRI in open long bone fractures

Materials & Methods: This was a prospective cohort study on adult patients with long bone open fractures. Wound fluid levels of AD were evaluated on post-operative day 2 via sandwich ELISA, and patients were followed up for three weeks. Patients were categorized as cases (FRI) or controls (no FRI), on the basis of the consensus definition of FRI. Univariate and multivariable logistic regression analysis, along with receiver operating characteristic (ROC) analysis were performed.

Results / Discussion: 153 patients with average age of 36.3 (SD ± 14.6) years were included. AD levels showed a significant (P=0.001), 2.1-fold elevation in cases (n = 63, Mean = 28.8 µg/ml) as compared to controls (n = 83, mean = 13.5 µg/ml). The area under the curve for this estimate was 0.71. As per Youden's index, an AD value cut-off value of a value of 7.85 µg/ml had a sensitivity of 71.4% and specificity of 68.7%.

Conclusion: Wound AD levels are significantly elevated in patients with open fractures who develop FRI. This can be used as a tool for early diagnosis of FRI, at a time when frank pus/ wound dehiscence hasn't developed. This can be done via development of ELISA based rapid diagnostic kits based on our results. Further studies can look at the role of wound AD levels for guiding conversion osteosynthesis in open fractures.

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The Emergence of Otter Attacks in Singapore: A Case Series and Strategies for Management

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Introduction / Objective: The rising incidence of otter-human attacks in Singapore has revealed a lack of literature documenting local cases and management strategies. As with other animal bites, otter bites can lead to lasting complications if not treated properly. Our findings serve to assist primary and tertiary physicians in making better informed decisions when faced with future cases of otter attacks.

Materials & Methods: 3 recent cases of otter attacks presented to TTSH were analysed for this work. Biodata, type and location of injuries suffered, subsequent investigations, medical and surgical treatment as well as outcomes were extracted from our records and analysed. We also interrogated reputable sources including PubMed and sought advice from infectious disease specialists.

Results / Discussion: The proposed history taking, physical examination and investigations carries a focus on ruling out complications like sepsis, fractures and retained foreign bodies, which guides subsequent medical and surgical management. Key indications are highlighted to determine the choice and duration of antibiotics administered, when tetanus or rabies prophylaxis is required, and considerations for surgical wound irrigation and debridements. Parallels are also drawn against cat and dog attacks to compare key differences in their respective management.

Conclusion: Our work highlights the severity of otter attacks which can lead to extensive soft tissue injuries and infections if not treated properly. With limited case studies available and lack of an established local guideline, this work aims to provide key management pearls to achieve the best outcomes while minimising significant complications when faced with human-otter attacks in our local context.

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Morphometric Measurement of the Talus in a South-East Asian Population

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Introduction / Objective: The talus, as the structure bearing the entire compressive load between the leg and the foot, serves an extremely important biomechanical function. This study aims to evaluate talar morphology in the South-East Asian population based on CT imaging, to determine if morphological differences exist between male and female patients.

Materials & Methods: CT measurements of tali from 122 patients were taken, consisting of 41 female and 81 male patients. Talus length was measured at the midline on the sagittal cut. Talar height was measured at 3 points – at the head and neck parallel to the talonavicular joint, and at the maximum height of the dome to the sinus tarsi. Talar width was measured at 4 points – at the width of the dome, and widths of the head, neck, and body taken parallel to the talonavicular joint. Mean values were calculated for each measurement.

Results / Discussion: Males had larger talar dimensions that females in all parameters measured. Talus length measured 44.72mm in females, compared to 50.72mm in males ($p < 0.001$). Talus height in females was found to be 20.88mm, 17.14mm, and 18.35mm at the head, neck and maximum dome height respectively. In comparison, these measurements in male patients were 24.31mm, 19.80mm, and 21.49mm respectively ($p < 0.001$ in all measurements). The width of the talar dome was 27.95mm in females, but 31.93mm in males ($p < 0.001$). Talar widths in females were also significantly smaller ($p < 0.001$) in females compared to males at the talar head, neck, and body, with respective measurements in females of 23.74mm, 21.34mm, and 30.48mm, compared to measurements of 27.93mm, 24.81mm, and 35.07mm in male patients.

Conclusion: Male patients have significantly larger talar dimensions than female patients in the South-East Asian population. This highlights an importance consideration in the sizing and design of implants and prostheses for use in the 2 patient groups.

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A Rare Case of Florid Recurrent Synovial Chondromatosis in the Knee

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Introduction / Objective: Synovial chondromatosis is a rare and benign condition where the synovium undergoes metaplasia. This results in cartilaginous nodules that break free, mineralise and eventually ossify. The aetiology is controversial but has been hypothesised to have been due to metaplasia of the synovial membrane with the lack of atypia and invasion2, involving the knee joint most commonly. Presenting complaints for this condition include reduced range of motion of the affected knee4 and pain.

Materials & Methods: We performed a prospective analysis of our patient over a 1-year period from pre-operative to 6 months postoperatively. We collected basic demographics, radiological and intra-operative images, performed histological analysis, and compiled IKDC scores at regular intervals from pre-operative and at every post-operative follow-up visit. Prior to the write-up of this case study, we had obtained the patient's written consent for the publishing of his medical information whilst preserving his anonymity at all times.

Results / Discussion: Recurrent synovial chondromatosis presents as a rare occurrence in the literature characterised by the persistence of osteochondromas within the affected joint despite prior surgical intervention. While this condition can manifest in any joint, it predominantly affects the knee. Management typically involves the removal of loose bodies coupled with a subtotal or total synovectomy of the knee joint. To the authors' knowledge, our study is the first to detail functional scores from pre-operatively to early post-operatively in our patient with recurrent-synovial-chondromatosis.

Conclusion: Recurrence of synovial chondromatosis must be considered in any patient with a history of previous synovial chondromatosis. There is a role in performing a synovectomy in the index operation to reduce rates of recurrence. The decision to do an open compared to an arthroscopic approach may depend on the size of the synovial chondromatosis. We have shown objective significant improvement in early post-operative IKDC knee scores following an open approach and performing a subtotal-synovectomy.

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Pre-Emptive Analgesia for Pain Management in Total Knee Arthroplasty: An Asian Perspective

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Introduction / Objective: Knee osteoarthritis (KOA) affects up to 20% of Singapore's population.Total knee arthroplasty (TKA) is an effective treatment for KOA, but it is often associated with significant postoperative pain. To address this issue, pre-emptive analgesia (PA) has emerged as a proactive pain management strategy.

Materials & Methods: In a recent study, we aimed to evaluate the short-term outcomes of pre-emptive analgesia in TKA patients. The study involved a retrospective review of TKA cases performed by a single senior orthopaedic surgeon from January to December 2022. The patients were divided into two groups: the PA group (n=53) and the non-PA group (n=51). The PA group received a pre-surgery analgesic cocktail consisting of 50 mg tramadol, 200 mg celecoxib, 1000 mg paracetamol, and 300 mg gabapentin, while the non-PA group did not receive preoperative analgesia.

The outcomes measured included visual analog scale (VAS) scores at 6 and 24 hours post-surgery, knee range of motion (ROM), ability to perform a straight leg raise (SLR) and hospital length of stay (LOS).

Results / Discussion: Among the 104 patients, the study found that the PA group had lower VAS scores at 6 hours (1.94 vs. 2.24) but higher scores at 24 hours (3.75 vs. 3.43), with the differences not being statistically significant ($P = 0.404$ and 0.440). ROM and SLR ability

were similar between the two groups (83.4° vs. 81.3°, P = 0.44 and 77.4% vs. 68.6%, P = 0.25). Additionally, the LOS was comparable (4.00 vs. 2.67 days, P = 0.53).
Conclusion: In conclusion, the study found that pre-emptive analgesia with tramadol, celecoxib, paracetamol, and gabapentin did not significantly reduce postoperative pain after TKA.

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Ambulatory Catheter-based Interscalene Block for Proximal Humerus Fracture Rehabilitation: Safety, Efficacy and Lessons from a Pilot Study

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Introduction / Objective: Proximal humerus fractures (PHFs) are associated with morbidity/functional impairment. Rehabilitation adherence is crucial to regain independent function yet is often hindered by pain. This pilot study aims to analyse the safety and efficacy of ambulatory catheter-based interscalene blocks (CISBs) as analgesia in post-surgical PHF patients, and summarise learning points to guide further implementation/study of ambulatory CISB.
Materials & Methods: This pilot study selected PHF patients who were >18yo, surgically treated and received ambulatory CISB (CISB ≥72 hours). Data was derived from clinical documentation (anesthetist/surgeon/therapist reviews). Clinical outcomes (e.g. range of motion, Quick Disability of Arm/Shoulder/Hand (qDASH) scores), dynamic/resting pain scores and incidence of CISB-related complications were collected**.**
Results / Discussion: 12 patients were selected with mean ambulatory CISB duration of 9.5 days. All patients improved clinically, with means improvements of +64.6o and +61.9o for passive flexion and abduction, and reduction of 29.8 in qDASH after 3 months. 2 patients experienced neurological complications (phrenic nerve palsy; medial forearm numbness) while 6 patients experienced catheter-based complications (dislodgment, erythema). All complications were self-limiting, resolving with removal of catheter**.**
Conclusion: Ambulatory CISB can minimise pain and facilitate rehabilitation for PHF patients. Learning points include 1) complications are predictable and incidence/physiological impact on patients can be minimised via appropriate patient selection, 2) standardised protocols (e.g. tunnelling of catheters) help maximise utility of ambulatory CISB while minimising complications, 3) regular monitoring/anticipation of complications facilitate early detection and prompt management. These learning points, combined with existing literature, can be adapted to future applications of ambulatory CISB to better study its safety and efficacy**.**

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The Effective Analysis of Percutaneous Endoscopic Fenestration Discectomy in the Treatment of L4/5 Intervertebral Disc Herniation

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Introduction / Objective: To analyze the safety and effectiveness of percutaneous endoscopic fenestration discectomy (PEFD) in the treatment of L4/5 intervertebral disc herniation
Materials & Methods: A prospective study was conducted by collecting 56 patients (36 males and 20 females) who were diagnosed with L4/5 intervertebral disc herniation between December 2018 and July 2020 and scheduled to undergo minimally invasive surgery. Group A underwent percutaneous endoscopic transforaminal discectomy (PETD), and group B underwent percutaneous endoscopic fenestration discectomy (PEFD), after which the researchers analyzed the effectiveness of PEFD in the L4/5 segment.
Results / Discussion: The results showed that a total of 56 patients were enrolled, with an average age of 40.88±9.16 years (16 to 65 years), and an average course of disease of 22.5±4.42 months (6 to 60 months). There was no significant difference in operation time between group A and group B ($P>0.05$). However, the average fluoroscopy time of group B was shorter compared to group A ($P<0.05$). The Visual Analogue Scale (VAS) scores of patients with low back pain and lower limb pain did not significantly differ between the two groups preoperatively, and 24 hours, 72 hours, 3 months, and 1 year after the operation ($P>0.05$) whereas they all significantly improved ($P<0.05$). Also, there was no significant difference in Oswestry disability index (ODI) scores between the two groups ($P>0.05$) preoperatively, and 3 months and 1 year after the operation; however, they all significantly improved ($P<0.05$).
Conclusion: The conclusion is that PEFD is a safe and effective treatment method for L4/5 intervertebral disc herniation.

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Robotic-Assisted Compared to Conventional Total Hip Arthroplasty for Primary Hip Osteoarthritis: A Systematic Review and Meta-Analysis

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Introduction / Objective: Total Hip Arthroplasty (THA) remains the gold standard for treating end-stage hip osteoarthritis. Recent advancements aimed at enhancing reproducibility and safety have resulted in introduction of robotic-assisted systems, with the MAKO system the most extensively adopted. However, meta-analyses comparing MAKO-assisted THAs to conventional methods is lacking. Furthermore, previous reviews aggregated various indications for THA, including osteoarthritis, dysplastic hip, avascular necrosis, rheumatoid arthritis, and ankylosing spondylitis, introducing heterogeneity in pooled outcomes.
Materials & Methods: A random-effects meta-analysis was conducted on comparative studies between MAKO-robotic-arm-assisted and conventional THAs in patients undergoing THA for primary hip osteoarthritis. We searched MEDLINE, Embase, Cochrane Library, and SCOPUS from inception to 25 May 2024. We evaluated clinical outcomes – Harris Hip Scores (HHS), Forgotten Joint Scores (FJS) and Oxford Hip Scores (OHS) – radiographic parameters (proportion of implants located within the Lewinnek-and-Callanan Safe Zones), leg-length-discrepancy, surgical duration and associated complications.
Results / Discussion: 20 comparative studies were included in the meta-analysis.

MAKO-assisted THAs resulted in higher postoperative HHS (MAKO-THA Mean:89.1, 95%CI:86.4–91.7; C-THA Mean:87.0, 95%CI:83.8–90.1), FJS (MAKO-THA Mean:84.7, 95%CI:79.9–89.6; C-THA Mean:74.9, 95%CI:64.0–95.7) and OHS (MAKO-THA Mean:89.1, 95%CI:86.4–91.7; C-THA Mean:87.0, 95%CI:83.8–90.1). FJS and OHS was significantly greater compared to conventional THA (HHS Weighted Mean Difference (WMD):2.2 [95%CI:-0.3–4.7, p=0.09]; FJS WMD: 8.7 [95%CI:2.7–14.8, p=0.005]; OHS WMD:1.5 [95%CI:0.1–2.8, p=0.03]). Implant positioning accuracy was significantly greater (p<0.001) in MAKO-THA compared to conventional, with means of 94.7% (95%CI:89.1–97.5) and 90.3% (95%CI:84.3–94.2) of implants positioned within the Lewinnek-and-Callanan zones respectively. This is contrasted to 65.8% (95%CI:57.2–73.4) and 57.1% (95%CI:50.9–64.2) respectively for conventional THA. MAKO-THA group had longer mean surgical duration and lower postoperative leg-length-discrepancy, but not to significant degrees (Surgical-Duration WMD:3.5 [95%CI:-2.5-9.5, p=0.3]; Leg-Length-Discrepancy (WMD:-0.2 [95%CI:-0.7–0.4, p=0.6]).

Conclusion: MAKO robotic-arm-assisted THA significantly improves clinical outcomes and reproducibility in implant positioning without compromising surgical duration and complication rates.

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Machine Learning in Predicting Pre-operative ACL Graft Size

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Introduction / Objective: Accurate preoperative estimation of anterior cruciate ligament (ACL) graft size is pivotal for successful reconstruction, given the increasing incidence of ACL injuries. This study employs advanced machine learning algorithms to establish a predictive model for identifying the semitendinosus and gracilis tendons from knee MRIs.

Materials & Methods: Utilizing a subset of Knee MRI data from fastMRI, forty knee MRIs formed the basis for developing a machine learning model to identify the tendons. Data deidentification was ensured by converting them to the ISMRMD format and using the RSNA clinical trial processor. Processing employed both SwinUnetR and SegResNet, optimized for 3D multi-modal MRI images with four channels, generating a final segmentation output comprising two tendon channels. We leveraged two state-of-the-art approaches in 3D MRI segmentation, implementing a convolutional neural network (CNN)-based SegResNet model and a Swin UNETR model enhanced with a self-attention mechanism. The multi-label segmentation dataset was created using the open-source 3D Slicer software, designed for image visualization and analysis. A set of 10 MRIs were used for validation of the model.

Results / Discussion: Training utilized our proposed encoder-decoder architectures for 3D medical image segmentation based on the adopted MONAI preprocessing pipeline. Evaluation relied on the Dice coefficient, measuring spatial overlap between predicted and ground truth segmentations of the validation set. After 300 epochs, the model achieved a mean Dice coefficient of 0.8232, with fine-tuning involving a Region of Interest size of 144x144x64 and 32 initial filters.

Conclusion: This study offers a promising solution for the challenges associated with ACL graft size estimation through advanced image segmentation machine learning techniques. Its findings could enhance preoperative planning in ACL reconstruction surgeries, potentially improving patient outcomes. Further validation on diverse datasets and clinical settings is essential to assess the model's generalizability. Exploring additional metrics and refining the model architecture could offer avenues for continued improvement and optimization.

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All-Intra-Incisional Pins in Robotic Total Knee Arthroplasty as a New Standard of Care – A Practical Technique Guide

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Introduction / Objective: Major robotic systems for total knee replacements necessitate the use of array pins in the tibia and femur. These extra-incisional pins may lead to soft tissue injuries and peri-prosthetic fractures. There is currently no standardized, reproducible method for reliably placing pins in the femur and tibia metaphyses. We have developed an all-intra-incisional pin method with a low complication rate. This paper aims to describe our technique and analyse the proximity of the pins to the implants.

Materials & Methods: A total of 102 robotic-assisted total knee arthroplasties were performed using the ROSA, MAKO and CORI systems. Patient charts were reviewed for their age, gender, body-mass-index, and ethnicity. The patient's post-operative-day zero radiographs of the operated knee were used for measurements in anteroposterior and lateral views, with Xray magnifications taken into consideration.

Results / Discussion: Our study demonstrates that intra-incisional pins can be placed 6.52 times closer to the tibial implant compared to extra-incisional pins on the anteroposterior Xray view radiographs, with no observed significant difference between the complication rates. In anteroposterior view, it allows placement of tibia pins within 8.99 ± 1.21mm (95% CI: 7.78, 10.2) of the tibial implant, within 5.93 ± 1.29mm (95% CI: 4.64, 7.22) of the tibia-reamed-surface, and placement of the femoral pins within 6.01± 1.37mm (95% CI: 4.64, 7.37) of the femoral implant. In lateral Xray view, it enables the placement of tibial pins within 9.40 ± 1.43mm (95% CI: 7.97, 10.8) of the implant. Univariate analysis reveals that our technique and pin-distance from the implants are not influenced by patient demographics.

Conclusion: Our study has demonstrated that our technique is precise, not affected by patients' demographics, and without the need to reposition pins, which may result in a reduced incidence of pin-site complications.

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Survivorship in Robotic Total Knee Arthroplasty compared with Conventional Total Knee Arthroplasty: A Systematic Review and Meta Analysis

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Introduction / Objective: Total knee arthroplasty (TKA) is the gold standard surgical management for end stage knee osteoarthritis. Recently, due to enhanced accuracy and reproducibility without the need for soft tissue releases, aligning with the popularisation of functional alignment philosophy, robotic-assisted TKA (rTKA) has become very prevalent. Although its clinical outcomes have been shown to be favourable compared to the conventional TKA (cTKA), due to the recency of its popularisation, there has been insufficient literature on rTKA's effect on long term survival outcomes compared to cTKA.

Materials & Methods: A random-effects meta-analysis was conducted on comparative studies between robotic-assisted TKAs and conventional TKAs in patients undergoing TKA for primary knee osteoarthritis. We searched MEDLINE, Embase, Cochrane Library, and SCOPUS from inception to 30 July 2024. Random-effects modelling was used to obtain pooled proportions, Clopper-Pearson method used to calculate 95% confidence intervals, and Dersimonian-and-Laird estimator for between-study variance. We evaluated primary outcomes of short term and long term survivorship, and secondary outcomes of complications post-op.
Results / Discussion: 14 comparative studies were included in the meta-analysis. A total of 2641 knees underwent cTKA while 2314 underwent rTKA. Demographics were pooled for age, bmi and surgery duration. Studies were subdivided into short term (≤5 years) and long term (≥10 years) follow up. Regarding our primary outcome, difference in short term survivorship rates between cTKA (96.49% [95% CI: 94.45 - 97.80]) and rTKA (98.08% [95% CI: 95.63 - 99.17]) was insignificant (p=0.21). Difference in long term survivorship rates for cTKA (95.98% [95% CI: 92.94 - 97.75]) and rTKA (97.33% [95% CI: 95.91 - 98.26]) was also insignificant (p=0.27). Regarding our secondary outcome, the difference between total complication rates for cTKA (4.97% [95% CI: 2.74-8.83]) and rTKA (3.89% [95% CI: 2.15-6.96]) was also insignificant (p=0.57).
Conclusion: cTKA is non-inferior to rTKA at short term and long term follow-up with regards to implant survival, revision and complications.

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Enhanced Recovery after Surgery for Spine Surgery - Early Experience of an Asian Hospital

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Introduction / Objective: Enhanced recovery after surgery (ERAS) aims to utilise a multidisciplinary approach to perioperative care of a patient to reduce complications, length of stay and costs. Our institution piloted an ERAS program for selected spine surgery beginning in May 2020. We aim to review our tertiary institution's experience in implementing an ERAS programme for spine surgery.
Materials & Methods: The inclusion criteria for our ERAS program was 1) Age <70; 2) American Society of Anaesthesiologist Class I or II; 3) Type of operation – Single level lumbar fusions, vertebroplasty, one or two level anterior cervical discectomy and fusion (ACDF), single level lumbar decompression laminectomy and or discectomy. Patients were excluded if they had prior spine surgery or ASIA Impairment Scale A-C. Eligible patients were identified pre-operatively and counselled by a team of nurses, physiotherapists, anaesthesiologists and surgeons. The operations were performed by fellowship trained spine surgeons at our institution. Post-operatively, they were discharged once their pain was adequately controlled and were able to ambulate safely.
Results / Discussion: We had 50 patients undergo the ERAS program successfully. There were 13 patients who underwent ACDF, 11 patients who underwent lumbar fusion, 22 patients who underwent lumbar decompression laminectomy and or microdiscectomy and 4 patients who underwent vertebroplasty. The mean length of stay in this group of patients was 1.1 days, and there were no patients who were re-admitted within 30 days of the operation.
Conclusion: An ERAS spine program is safe and can be broadly adopted by more surgeons. It requires careful patient selection and a committed multidisciplinary team to optimize patients peri-operatively. Together with advances in minimally invasive techniques, patients can look forward to faster recovery.

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Biomechanical Evaluation of Bidirectional Self-Locking Fusion Apparatus in Vitro

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Introduction / Objective: To evaluate in vitro the biomechanics of a new bidirectional self-locking fusion apparatus developed by ourselves
Materials & Methods: 12 fresh domestic pig spine L3/4 segment specimens were randomly divided into 3 groups for modeling: normal group (intact state), traditional fusion device unilateral fixation group (traditional fusion device and unilateral screw fixation) and new fusion device group (bidirectional self-locking fusion device implanted).On the basis of MTS multi-freedom (spinal motion) simulation test system and 500N preload, 8Nm load was applied to experimental specimens in each direction successively, and the stability test was carried out according to the order of forward bending, backward extension, left bending, right bending and torsion.The axial fatigue compression test was carried out with TT-JQ-01-106 fatigue testing machine.
Results / Discussion: Compared with the normal group, the ROM in the new fusion group was decreased under the forward bending, right bending and right rotation conditions, the difference was statistically significant (P<0.05), while the ROM was decreased under the backward extension, left bending and right rotation conditions, the difference was not statistically significant (P> 0.05).Compared with the unilateral internal fixation group, the ROM values in all directions were slightly higher in the new fusion device group except the right flexion, and the difference was not statistically significant (P>0.05).The ROM values in the normal group were higher than those in the other three groups under the conditions of forward bending, right bending and right rotation, and the difference was statistically significant (P<0.05).After a certain number of fatigue tests, no deformation or cracks were found in the interbody fusion apparatus by visual inspection, and the analysis results showed that the axial compression fatigue test of the new fusion apparatus passed.
Conclusion: The bidirectional self-locking fusion device can obviously improve the stability of the fusion segment, and its stability effect is equivalent to that of using the rear single-sided nail rod system.In the axial compression fatigue test of the new fusion device, after 5 million load-displacement cycle tests, the fusion device still shows good performance, which proves that the fusion device has good fatigue resistance.The mechanical properties of the new fusion device can meet the needs of clinical applications.

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3D Printed Scaffold as Structural Support for Masquelet Technique in Open Tibial Fracture with Extensive Bone Loss - A Case Report

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Introduction / Objective: We describe how we used a combination of Ilizarov circular frame for tibial lengthening, masquelet techniques with a 3D printed scaffold as well as tibiotalocalcaneal arthrodesis for limb salvage surgery in a Gustillo 3b open pilon fracture with 11cm

tibial defect. This effectively enabled the patient to be off his circular frame at four and a half months and fully weight bearing at 7 months post injury, with no limb length discrepancy.

Materials & Methods: Our case is a 61 year old Male who jumped from the 5thstorey of a building on 16/11/23. He presented with a Gustillo Anderson classification 3b open right pilon intra-articular fracture. In total, there was 11cm of tibial shortening, which was filled with vancomycin impregnated palacos LV+G cement as a spacer. Reconstructive surgical team harvested a latissimus dorsi free flap and anastomosed it to the anterior tibial artery and drains were inserted before closure in layers. Patient underwent definitive circular frame on the 26th day for bone transport with corticotomy. Bone transport was started 10 days post corticotomy and over four and a half months the tibia was lengthened by 53mm. He was brought back for removal of circular frame and temporary TENS nail insertion into the regenerate segment to give him a frame free 2-week interval before definitive hindfoot nail fusion (Ankle Hindfoot Nail, Orthofix, Bussolengo VR, Italy)with second stage masquelet, cement spacer removal, implantation of 3D printed custom cage filled with autologous bone graft and 3.0mg of bone morphogenic protein (NovosisrhBMP-2, South Korea). TENS nail was removed and converted to minimally invasive titanium tibial Less Invasive Stabilization System (LISS) plate (Synthes, DePuy).

Results / Discussion: Masquelet's technique of inducing a membrane over a cement spacer and subsequent filling of defect with cancellous autograft has been reported to result in a high union rate for segmental tibial bone loss. To date, no one has described Masquelet's technique in combination with 3D printing as a scaffold filler.

Conclusion: For severe bone loss with extensive shortening, a 3D printed scaffold inserted into the pseudosynovial membrane formed by Masquelet technique provides a good structural support.

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Combined Therapy of Autologous Protein Solution and Hyaluronic Acid for Knee Osteoarthritis: 1-year Results

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Introduction / Objective: Autologous peripheral blood-derived orthobiologics like platelet-rich plasma (PRP) have been gaining in popularity in symptomatic relief of knee osteoarthritis (OA). Autologous protein solution (APS) that is derived from PRP offers higher levels of growth factors and anti-inflammatory cytokines, reducing inflammation and improve cartilage quality. Additionally, hyaluronic acid (HA) has shown efficacy in relieving OA symptoms. This study aims to assess the clinical outcomes of combined APS and HA therapy.

Materials & Methods: Patients with early-stage OA received APS and HA injections. Patients were evaluated pre-injection and at 1-year follow-up. Patient-reported outcomes were assessed with WOMAC, KOOS, VAS pain score, and SF-36 survey. The OMERACT–OARSI criteria determined treatment effects. Satisfaction and expectation fulfillment were also recorded.

Results / Discussion: 32 patients were included in the final analysis. Statistically significant improvements were observed in all outcome scores at 1 year. The responder rate per OMERACT-OARSI criteria was 65.6%, with 96.9% of patients reporting satisfaction and expectation fulfillment. When comparing responder-rates and improvement in patient-reported outcome measures with other studies, combined therapy does not appear to confer additional therapeutic benefit over APS monotherapy at the 1-year mark. No severe adverse events related to the injections were reported. Interestingly, all patients who had experienced immediate severe pain during the injection were responders at the 1-year mark.

Conclusion: At 1-year post-injection, the APS and HA combination significantly improved WOMAC, KOOS, SF-36 PCS, and VAS scores, with a high rate of patient satisfaction. Future high-powered comparative research should confirm these findings and compare its efficacy to APS or HA monotherapy.

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Effect of Proprioceptive Neuromuscular Facilitation on Efficacy and Pain Relief for Symptomatic Shoulder Conditions: A Systematic Review and Meta-analysis

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Introduction / Objective: Proprioceptive Neuromuscular Facilitation (PNF) is a rehabilitative technique widely used to enhance motor function and coordination in patients with neurological and orthopaedic conditions. This meta-analysis aims to review the existing literature to evaluate the effectiveness of PNF in managing symptomatic shoulder conditions.

Materials & Methods: A systematic search of the literature was performed in April 2024. Articles involving the use of PNF in the treatment of PT were included. Comparative meta-analysis was performed on articles reporting visual analogue scale (VAS) scores, range of motion (ROM), and Shoulder Pain and Disability Index (SPADI).

Results / Discussion: Nine studies consisting of 158 patients were identified. Mean follow-duration was 3.25 ± 1.20 weeks. VAS score improvement was -3.26 (CI: -4.33 to -2.20; *P* <0.01). SPADI scores improved by -20.57 (CI: -47.92 to 6.78; <0.01). Abduction, external rotation, internal rotation and flexion all had significant improvement.

Conclusion: PNF appears to be an effective intervention for improving pain and functional mobility in patients with various shoulder conditions. However, the clinical heterogeneity and variable methodology across studies highlight the need for standardized protocols and long-term effectiveness studies. Further research is required to refine PNF applications and evaluate its potential in post-operative rehabilitation.

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Effect of Neuromuscular Electrical Stimulation in Postoperative Shoulder Rehabilitation: A Systematic Review and Meta-analysis

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Introduction / Objective: Neuromuscular electrical stimulation (NMES) has been posited to augment rehabilitation after shoulder surgery. NMES is able to facilitate muscle contraction and alleviate pain. This systematic review and meta-analysis evaluate the effectiveness of NMES in improving postoperative outcomes for patients undergoing shoulder surgery.

Materials & Methods: A systematic search was conducted on Medline and Embase databases, adhering to PRISMA guidelines. Articles involving the use of NMES after shoulder surgery were included. Comparative meta-analysis was performed on articles reporting shoulder range of motion (ROM) and visual analogue scale (VAS) scores for NMES.

Results / Discussion: Three studies consisting of 120 participants were included in the analysis. NMES patients experienced significantly greater pain reduction (MD = -0.60, 95% CI: -1.17 to -0.04, *P* = 0.04). However, improvements in shoulder flexion (MD = 5.15 degrees (95% CI: -2.88 to 13.17 degrees, *P* = 0.21)), abduction (MD = 3.91 degrees (95% CI: -5.98 to 12.21 degrees, *P* = 0.44)), and external rotation (MD = 5.78 degrees (95% CI: 0.10 to 11.46, *P* = 0.05)) were not statistically significant**.**

Conclusion: NMES can be a valuable tool in multimodal rehabilitation for postoperative shoulder surgery patients, particularly for pain management. However, its implementation should be considered within the broader context of the patient's overall rehabilitation plan. Further research is needed to standardize NMES protocols and explore its effects on diverse postoperative outcomes.

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A Comparative Analysis of ChatGPT-3.5 and ChatGPT-4omni in Addressing Common Patients' Questions Regarding Pelvic Fractures

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Introduction / Objective: The use of Chat Generative Pretrained Transformer (ChatGPT) as a tool to address patients' queries on common orthopaedic conditions has garnered increasing interest. However, medical professionals are concerned about potential dissemination of inaccurate information through this platform. This study aims to evaluate the accuracy and readability of ChatGPT in responding to patients' frequently asked questions (FAQs) about pelvic fractures, a potentially devastating injury where misinformation can cause significant anxiety and psychological distress. The secondary aim is comparing responses provided by two free versions of ChatGPT, ChatGPT-3.5 and ChatGPT 4omni(o).

Materials & Methods: Ten FAQs about pelvic fractures were submitted to ChatGPT-3.5 and ChatGPT-4o. Ten fellowship-trained orthopaedic surgeons evaluated the responses, grading them based on the response accuracy score (excellent response requiring no clarification, satisfactory requiring minimal/moderate clarification, unsatisfactory requiring substantial clarification). The readability of the answers was assessed using the Flesch-Kincaid Grade level.

Results / Discussion: ChatGPT-3.5 responses had 25/100(25%) excellent responses overall compared to ChatGPT-4o's 71/10(71%). The overall total agreement for ChatGPT-3.5's responses demonstrated a moderate level of inter-rater agreement (Fleiss' Kappa:0.47, 95% CI [1.75,1.98], p=0.025), with a mean response accuracy score of 1.87. The overall total agreement for ChatGPT-4o's responses demonstrated a moderate level of inter-rater agreement (Fleiss' Kappa:0.58, 95% CI [1.20,1.38], p<0.05), with a mean response accuracy score of 1.29, demonstrating that responses from both versions of ChatGPT required minimal clarification. There was no statistically significant difference in response accuracy scores between both systems. The average Flesch-Kincaid was 11.1 for ChatGPT-3.5 and 11.21 for ChatGPT-4o, indicating an average reading level that is suitable for most patient education materials.

Conclusion: Both ChatGPT-3.5 and 4o provided reliable responses to common patients' FAQs regarding pelvic fractures, presenting information in a manner easily understood by most readers. As ChatGPT continues expanding its generative learning capabilities, it can potentially be an effective patient education tool.

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Developing A Patient Specific 3D-Printed Cutting and Reorientation Jig for Bernese Periacetabular Osteotomy

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Introduction / Objective: Periacetabular Osteotomy (PAO) is a well-established joint preserving surgery to correct acetabular coverage in hip dysplasia. However, it is technically demanding with a steep learning curve. 3D-printing has been beneficial in creating patient-specific models for surgical planning and guides. We aim to design a 3D Printed patient specific cutting and reorientation jig that will improve the safety and precision of correction in PAOs, and describe the surgical technique of performing PAOs with these jigs.

Materials & Methods: Five PAOs were performed across 3 female patients aged 36 to 44 for hip dysplasia. CT Pelvis was converted into virtual 3D models. Virtual surgical planning (VSP) of the osteotomy cutting planes, positioning of the K-wires and screws, and reorientation of the acetabular fragment to obtain desired coverage was performed. Results of the VSP were used to manufacture a customised pelvic model and the corresponding cutting and reorientation jigs. A trial PAO was performed on the pelvic model before each PAO to fine-tune the jigs.

Results / Discussion: PAOs were performed via a Smith Peterson and ilioinguinal approach. The ischial osteotomy was performed under image-intensifier guidance and the pubic osteotomy under direct vision. Supraacetabular and retroacetabular osteotomies were performed using the 3D-printed cutting jig which were fixed with K-wires. The cutting jig combined the retroacetabular and final osteotomy to complete the ischial cut, hence allowing the PAOs to be performed with 4 osteotomies rather than the traditional 5. The acetabular fragment was rotated according to the reorientation jig to achieve the pre-calculated correction of the acetabular coverage and fixed with screws. The 5 patients obtained an improved lateral center edge angle of between 27.2–32.3°. Limited literature has been published on 3D-printed patient-specific guides for PAO.

Conclusion: Using patient-specific jigs for PAO decreases the learning curve and improves osteotomy precision and accuracy in the correction of the acetabular coverage.

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A Novel Approach to Acromio-Clavicular Joint Reconstruction: A Case Series

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Introduction / Objective: Acromioclavicular joint (ACJ) injuries are common in the young who have direct trauma to the shoulder. For Rockwood types IV, V and VI, options include acromioclavicular fixation, coracoclavicular fixation and ACJ reconstruction.
Materials & Methods: In this case series, we describe a novel technique of ACJ reconstruction using arthroscopically drilled bone tunnels and dog bone fibre tape sutures passed in a figure of 8 pattern. A 48-year-old gentleman presented with Rockwood type V ACJ dislocation. 2.5mm tunnels were drilled into the acromion and distal clavicle, with 2 fibre tapes passed through the clavicle. Ethibond sutures were then passed through the acromial end. Coracoid base was exposed and then a tunnel drilled 3cm from the tip of the clavicle. 4 strand dog bone fibre tape sutures were passed and the ACJ reduced and tied down. Fibre tapes were then passed through the fascia and distal clavicle and passed through the acromion with a figure of 8 construct. Tapes were then tied over the fascia.
Results / Discussion: Adequate reduction and good fixation of the ACJ was attained with this novel technique. The patient achieved full shoulder abduction and flexion 3 months post operation. External rotation of 80° was attained. Radiographically, the ACJ remained reduced.
Conclusion: This novel method of ACJ reconstruction is reproducible and familiar, allowing a strong fixation and reconstruction of the ACJ.

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Comparing Early Functional Outcomes between the Midvastus and Medial Parapatellar approach for Total Knee Arthroplasty: A Prospective Cohort Study in an Asian Population

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Introduction / Objective: The medial parapatellar (MPP) approach is the most commonly used approach for total knee arthroplasty (TKA). Recent studies have suggested that the midvastus (MV) approach may confer benefits of reduced pain and better functional outcomes in the early post-operative period. This study aims to explore the differences between the two approaches.
Materials & Methods: This is a prospective cohort study of 72 TKA patients (36 MV, 36 MPP) in a single tertiary institution. Baseline demographics and functional status were collected. The primary outcome was functional outcomes - including range of motion, ambulatory distance, use of mobility aids, ability to straight leg raise (SLR), quadriceps strength - at post operative day (POD) 0, POD1, POD2, day of discharge and first follow up (4-6 weeks). Secondary outcomes included pain, operative time, length of stay, presence of any complications within 6 weeks and discharge destination**.**
Results / Discussion: Patients in the MV group achieved a greater ambulatory distance on POD1 (median 30 versus 18 meters, $p<0.001$) and shorter time to SLR (median duration 0 days vs 1 day, $p=0.016$) compared to those in the MPP group. There were no significant differences seen in ambulation distance at other collected time points. There was no significant difference in use of mobility aids, pain, quadriceps power, operative time, length of stay or discharge destination.
Conclusion: The midvastus approach showed functional benefits in the early post-operative period of shorter time to straight leg raise and longer ambulatory distance at POD1 when compared to the MPP approach. The initial perioperative advantage could enhance current Enhanced Recovery After Surgery (ERAS)-type protocols, aiming to optimize TKA procedures for potential outpatient or day surgery settings in the future. Clinicians need to balance the purported benefits of the MV approach with the intraoperative technicalities, before deciding if it is suitable to be a standard approach to the knee in TKAs.

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A Comparative Propensity Score Matched Study on Total Knee Replacement (TKR) Outcomes in Octogenarians in a Mixed Asian Population

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Introduction / Objective: The number of TKRs being performed on octogenarians are increasing due to an aging population in many developed countries. This is especially so in Asian populations wherein the disease burden of knee osteoarthritis is significant. Our study aims to compare demographic, intra-operative, mortality, morbidity and patient reported outcomes between octogenarians and younger patients.
Materials & Methods: 1856 patients from 1st January 2017 to 1st June 2022 were included in our study with a 2 year follow up. All patients who underwent primary TKR in our institution were included, with no exclusion criteria. Unpaired tests were conducted on unmatched and matched cohorts. Mixed Effects Linear Regression analysis with time as an independent variable was then conducted.
Results / Discussion: On matched analysis, significantly lower Oxford Knee Scores(OKS) were noted amongst octogenarians preoperatively and at the 3 month follow up. Lower Knee Society Scores(KSS) were noted amongst octogenarians at the 3 month mark. Overall OKS and KSS scores were improved amongst octogenarians after TKR and there were no differences between octogenarian and non-octogenarians at 12 month and 2 year follow up. No increased morbidity, mortality, readmissions and length of stay was noted amongst octogenarians. No differences in linear regression analysis over time was noted as well.
Conclusion: TKR is a safe and beneficial surgical option to consider in the octogenarian population, albeit there may be a slower recovery noted amongst their cohort.

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Comparative Analysis of Cemented and Cementless Total Knee Arthroplasty Implants in Robotically assisted Procedures

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Introduction / Objective: Total knee arthroplasty (TKA) is a widely performed surgical procedure for patients with severe knee arthritis. Recent advancements in technology have introduced robot-assisted techniques, offering potential benefits in terms of surgical outcomes. There has also been a revived interest in cementless fixation as a result of improvements in implant design and manufacturing technology. This study aimed to compare the surgical time and postoperative haemoglobin levels between cemented and cementless TKA implants in robotically assisted procedures**.**

Materials & Methods: A retrospective analysis was conducted on patients who underwent cemented or cementless robot-assisted (ROSA ® Knee System) TKA between January 2022 and November 2023 performed by three different surgeons using Persona® implants from Zimmer Biomet. Data on surgical time and postoperative haemoglobin levels were collected and analysed using R Statistical Software.
Results / Discussion: A total of 30 patients who underwent cemented and 26 who underwent cementless robotic TKA procedures were included in the analysis. The cementless group exhibited a statistically significant ($p = 0.011$) decrease in postoperative haemoglobin levels (Hb change = 2.15 ±1.00), indicating greater blood loss compared to the cemented group (Hb change = 1.47 ±0.98). Clinical blood loss was insignificant as none of the patient required transfusion. Conversely, the cementless group demonstrated statistically significant ($p = 0.0056$) shorter operative times of 1 hour and 44 minutes (± 24 minutes and 40 seconds) compared to the cemented group of 2 hours and 1 minute (± 19 minutes and 25 seconds).
Conclusion: This study provides valuable insights into the intraoperative and perioperative outcomes of cemented and cementless robot-assisted TKA procedures. Surgeons should consider these factors when selecting the most appropriate technique for TKA, considering patient-specific characteristics and surgical goals.

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Understanding the Use of a Hinged External Fixation in the Treatment of Various Knee Conditions. A Case Series.

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Introduction / Objective: A hinged external fixation is used on the knee to allow early rehabilitation in patients who sustain significant injury or trauma. We present 4 cases where the hinged knee external fixation was applied for varying indications and show how it can improve the functional outcomes patients.
Materials & Methods: 19-year-old with a complex left tibial plateau and femoral shaft fracture. She developed arthrofibrosis of the knee 3 months after primary fixation with a limited range of 5-45° and was placed on a knee-spanning hexapod external fixation. This was changed to a hinge external fixator to progressively improve her ROM. She was able to achieve 5-100° 8 months post-injury and ambulate well without aids. 64-year-old with a left knee fracture dislocation. He had an anterior column tibial plateau fracture with associated injuries to the PCL and LCL. His fracture was fixed primarily and was placed on a hinged external fixation for stability and allowed early ROM. He achieved good ROM of 5-130° by 9 months**.**
Results / Discussion: 39-year-old with a below knee amputation from arterial thrombosis of her lower limbs. This was complicated by a fixed flexion deformity and was unable to be fitted with a prothesis. She was placed on a hinged external fixator for 2 months which improved her ROM to be fitted with a prosthesis and achieved ambulation thereafter. 48-year-old with an open right knee fracture dislocation with multi-ligamentous knee injury, for which he underwent joint bridging external fixation and subsequently definitive fixation. His knee-spanning external fixator was changed to a hinged ring fixator three weeks after index surgery. This allowed for knee stability to be maintained while gradually increasing knee ROM. He achieved good ROM of 5-100° 3 months after surgery.
Conclusion: The cases highlight the various indications for which we can use a hinged external fixation to improve functional outcomes for patients.

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General Prediction Theory for Anterior Cruciate Ligament Graft Sizing

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Introduction / Objective: Predicting hamstring graft size before anterior cruciate ligament (ACL) reconstruction is crucial to avoid intraoperative graft failure. Our study aims to (1) develop a generalised algorithm to predict final ACL graft diameter for single and double tendon hamstring grafts consisting any number of folds, (2) evaluate our algorithm with a regression model adjusting for patient and surgical factors, and (3) assess algorithm's specificity, sensitivity, and discriminative ability, defining adequate graft size as ≥9mm.
Materials & Methods: We conducted a retrospective review of 105 patients who underwent primary ACL reconstruction with hamstring semitendinosus-gracilis grafts from January 2023 to June 2024 at a tertiary institution. MRI scans were independently measured by two junior members. Average of the measurements taken. Predicted graft diameter is $\sqrt{[A*B*X + C*D*Y]}$ - where A and B are the semitendinosus cross-sectional length and breadth, C and D are the gracilis cross-sectional length and breadth, and X and Y are the number of semitendinosus and gracilis folds, respectively**.**
Results / Discussion: Pearson correlation shows strong correlation between predicted and actual graft diameters ($R=0.568, P<0.01$). Univariate and multivariate linear regression, adjusted for age, gender, BMI, and graft type, indicate that males, overweight individuals, and those with single tendon grafts are more likely to have larger actual graft diameters($P<0.05$). Our algorithm has a sensitivity of 95.8%, specificity of 60.6%, with excellent discriminative ability (AUC=0.857). A high 78.1% agreement rate was achieved, with Cohen's kappa=0.468($P<0.05$).
Conclusion: We present a practical method to predict single and double tendon ACL grafts with any number of folds using pre-operative MRI measurements, achieving high sensitivity.

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Do Monocortical Distal Locking Screws Impair Mechanical Properties in Opening Wedge High Tibial Osteotomy with Bone Graft? – A Biomechanical Study

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Introduction / Objective: Medial opening wedge high tibial osteotomy (MOWHTO) has gained popularity for treating patients with medial knee osteoarthritis. Bicortical screw fixation is conventionally preferred, but its mechanical advantage over monocortical fixation remains elusive clinically. Furthermore, bicortical fixation can have higher cost and incidence of symptomatic hardware which monocortical fixation

may reduce. Our study aimed to quantify differences in compressive load bearing and fatigue strength between monocortical and bicortical distal screws construct in MOWHTO

Materials & Methods: 20 artificial composite tibiae were used, with 10 specimens per arm. The first arm underwent MOWHTO with bicortical screw fixation throughout; the second arm incorporated two monocortical distal locking screws. Mechanical properties of specimens were evaluated with static compression and cyclic fatigue strength testing

Results / Discussion: For quasi-static compression testing, monocortical specimens had a median ultimate load of 2.5978kN (n = 5, interquartile range = 0.1166kN), comparable to the bicortical group (n = 5, median = 2.6384kN, interquartile range = 0.464kN). Cyclic fatigue strength testing also demonstrated comparable median maximal loads tolerated by both monocortical (median = 1.28kN, interquartile range = 0.08kN) and bicortical (median = 1.28kN, interquartile range = 0kN) specimens, as well as median number of cycles attained before failure. Mann-Whitney-U tests showed no statistically significant difference for all measured outcomes between monocortical and bicortical groups (p-value > 0.05).

Conclusion: Our study found monocortical fixation of the two distal-most screws in MOWHTO non-inferior to bicortical fixation, in terms of compressive load-bearing till failure and fatigue strength. This should be considered a cost-effective alternative in MOWHTO without compromising surgical outcomes. Our study found monocortical fixation of the two distal-most screws in MOWHTO non-inferior to bicortical fixation, in terms of compressive load-bearing till failure and fatigue strength. This should be considered a cost-effective alternative in MOWHTO without compromising surgical outcomes.

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The Effect of Deltoid Arc and Thickness on the Clinical Outcomes of Reverse Shoulder Arthroplasty

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Introduction / Objective: Reverse shoulder arthroplasty (RSA) converts the elevation of deltoid contraction into a rotational force, allowing the deltoid to replace the function of the deficient rotator cuff. While RSA is classically contraindicated in patients with deltoid deficiency, there is no consensus in the literature as to the importance of the deltoid muscle in predicting clinical outcomes. Therefore, the deltoid wrap arc and the deltoid thickness are investigated as possible predictors of post-RSA outcomes in this study.

Materials & Methods: A retrospective review of prospectively collected data was performed in a tertiary institution in Singapore. Patients who had undergone a reverse shoulder arthroplasty from 2011 to 2021 were included. Pre- and post-operative radiographic measurements of deltoid wrap arc anteriorly and posteriorly, as well as thickness at 45-degree intervals were taken. These were correlated with forward flexion and abduction range of motion (ROM) and clinical scores pre-operatively and at 3, 6 months, and 1 year post-operatively. A statistical significance of $p<0.05$ was taken**.**

Results / Discussion: Forty-five cases from forty-one patients were included. Taking reference from the glenoid edge, the deltoid arc ranges at an average of 21.5˚ anteriorly to 142˚ posteriorly. The thickness of the deltoid at 45˚ was correlated with greater flexion and abduction ROM at the 6-month mark (p=0.037 and p=0.014 respectively). Greater deltoid thickness at 45o was also correlated with better early functional outcomes (Constant, University of California-Los Angeles and Oxford scores) at 6-months (p=0.007, p=0.004 and p=0.031 respectively). No correlation was found with late functional outcomes at 2-years.

Conclusion: Patients who undergo RSA with a greater pre-operative deltoid thickness, especially at 45˚ from the anterior, are associated with better forward flexion and abduction ROM, as well as improved functional outcomes 6 months post-operatively. There may be value in prehabilitation to improve early post-operation outcomes.

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A 15-year Case Series Analysis of the Accuracy of 4,814 Pedicle Screws Inserted using Intraoperative Navigation

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Introduction / Objective: A retrospective study was conducted to provide updated insights on the routine use of three-dimensional (3D) intraoperative imaging and navigation for accurate thoracolumbar pedicle screw insertion in an Asian population. 3D intraoperative imaging and navigation continues to be used as an adjunct in spinal instrumentation, aiming to enhance the accuracy of pedicle screw insertion. 4,814 thoracolumbar pedicle screws that were routinely inserted using intraoperative navigation were examined in this study. As an extension of a previously published retrospective study, this paper serves to expand the current dataset to provide more robust and comprehensive findings**.**

Materials & Methods: A retrospective analysis was conducted on patients who underwent thoracolumbar pedicle screw insertion using intraoperative imaging and navigation between 2009 and 2023. After the pedicle screws were inserted, computed tomography (CT) images were obtained and examined for signs of pedicle wall breaching. The Gertzbein classification was used to grade the pedicle screw breaches. The revision rate and breach rate were computed thereafter.

Results / Discussion: Analysis of 4,814 thoracolumbar pedicle screws implanted with intraoperative navigation guidance revealed a 98.36% insertion accuracy. The rate of major breaches was 0.19%, the rate of intraoperative screw revision was 0.44%, and the overall breach rate was 1.64%. There was no incidence of returns to the operating theatre for the revision of screws**.**

Conclusion: This paper provides continued support of regular use of intraoperative CT imaging and 3D navigation for consistently precise pedicle screw placement**.**

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Adipose-Derived Mesenchymal Stem Cells (AD-MSC) Combined with Core Decompression in the Treatment of Avascular Necrosis of the Femoral Head : A Case Report of Long Follow Up

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Introduction / Objective: Core decompression is a well-known modality for the treatment of early stages of avascular necrosis of the femoral head (AVN), however, several methods have been suggested to augment this procedure and improve the outcomes. After the

COVID pandemic the incidence of AVN of femoral head increased to a great extent specially in younger age group where THR is too early resort to apply considering the cost effectiveness as well as couping up with limitation of lifestyle after the procedure. Here comes the justification of preserving the femoral head by core decompression with augmentation with various options like Bone marrow aspirates, Mesenchymal stem cells and so on.

Materials & Methods: Here i showed a more that two years follow up of a case report of a 37 year young pediatrician who was diagnosed with a stage II AVN of the femoral head and treated with core decompression (CD) and injection of adipose-derived mesenchymal stem cells (AD-MSCs). Though The MRI showed mild signs of healing of the lesion after 6 months with significant clinical and functional improvement. The average pre-operative visual analogue scale (VAS) of pain was 7.8. Post operatively, the average VAS score decreased to 2.5

Results / Discussion: AD-MSCs could have the same capabilities as bone marrow-derived stem cells with many advantages, implantation of AD-MSCs in orthopedics and as an augmentation of core decompression has been tried before, but no clear guidelines nor methods of application are well established in the literature.

Conclusion: 1. Implantation of AD-MSCs with Core decompression could be an effective modality to treat avascular necrosis of the femoral head in pre-collapse stages, however, large scale clinical studies are required to determine the actual effectiveness of this method.

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Comparison between Calcaneal Lengthening Osteotomy and Calcaneo-Stop Procedure in the Surgical Treatment of Idiopathic Flatfoot in Children: Retrospective Cohort Study

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Introduction / Objective: Given the current lack of studies comparing surgical outcomes in children with flatfoot, we retrospectively compared calcaneal lengthening osteotomy and calcaneo-stop procedures. This retrospective cohort study aimed to compare the radiographic and clinical outcomes after calcaneal lengthening (CL) osteotomy and calcaneo-stop (C-stop) procedures in children with flatfoot deformity.

Materials & Methods: We enrolled 127 children (223 feet) who underwent CL osteotomy (165 feet) or C-stop procedures (58 feet) for flatfoot deformity between May 2003 and December 2022. The Oxford ankle-foot questionnaire (OAFQ) was administered preoperatively and postoperatively. Radiographic assessments, including the AP talus-first metatarsal angle, AP talus-second metatarsal angle, talonavicular coverage angle, lateral talus-first metatarsal angle, naviculocuboid overlap, calcaneal pitch angle, and calcaneocuboid joint subluxation, were conducted on preoperative, postoperative, and final foot-ankle standing radiographs. Radiological and clinical outcomes were compared between the two groups.

Results / Discussion: All radiographic parameters improved significantly after surgery in both groups. However, between the postoperative period and the final follow-up, AP talus-second metatarsal angle and naviculocuboid overlap significantly increased in both groups, and talonavicular coverage angle significantly increased in the CL group. Additionally, calcaneocuboid subluxation developed after surgery in the CL group but significantly improved at the final follow-up ($p<0.001$). There was no significant difference in complication rates between the two groups ($p=0.521$). Major complications, including nonunion of the osteotomy site, overcorrection of deformity, infection, and Achilles tendon rupture, occurred in six feet (3.6%) in the CL group and one foot (1.7%) in the C-stop group. All domains and total scores on the OAFQ significantly improved after surgery in both groups.

Conclusion: Both CL osteotomy and the C-stop procedure showed satisfactory radiological and clinical outcomes for correcting pediatric flatfoot deformities. However, clinicians should consider that the C-stop procedure is less invasive, has fewer major complications, and permits earlier weight-bearing compared to calcaneal lengthening osteotomy.

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Kinesiophobia is associated with Poorer Quality of Life and Physical Activity in Older Adults with Knee Osteoarthritis

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Introduction / Objective: Increasing evidence show that variations in psychosocial factors influences outcomes in Knee Osteoarthritis (KOA). Nonetheless, the available literature studying the relationship between kinesiophobia and patient reported outcome measures (PROMs) in KOA remains limited. The aim of this study was to examine: (1) the association between kinesiophobia and PROMs including quality of life (QOL), functional outcomes and physical activity in patients with KOA and (2) the patient disease and psychosocial demographics factors associated with kinesiophobia.

Materials & Methods: This was a multi-centre cross sectional study of 406 patients who received non-operative treatment for knee osteoarthritis. Kinesiophobia was measured using the Brief Fear of Movement (BFOM) scale, a validated 6-item questionnaire to measure kinesiophobia in OA. In terms of PROMs, the QOL/functional level of patients were measured using the widely validated KOOS-12 while the UCLA activity scale was used to measure patient physical activity. The key potential confounders between kinesiophobia and outcomes were identified and conceptualized on a directed acyclic graph (DAG).

Results / Discussion: Greater kinesiophobia (Higher BFOM) was observed to be significantly associated with lower QOL (KOOS-QOL) (Adj.IQR-OR:0.68;95%CI:0.52,0.88;p=0.004) and physical activity (UCLA) (Adj.IQR-OR:0.69;95%CI:0.53,0.91;p=0.009).

Higher levels of anxiety (PHQ2-Anxiety) (OR:2.41;95%CI:1.31,4.44;p=0.005) and depression (PHQ2-Depression) (OR:3.25;95%CI:1.67,6.42;p=0.006) were associated with greater kinesiophobia. The level of education, disease severity of knee OA, side of arthritis, history of previous injury/surgery were all not significantly associated with kinesiophobia (p>0.05).

Conclusion: This was the first large-scale study showing that kinesiophobia is associated with poorer quality of life and physical activity in knee OA patients, independent of pain level and disease severity. Furthermore, kinesiophobia was associated with psychological comorbidities, but independent of disease factors (severity, history of knee injury/surgeries) or one's sociocultural background. Our findings emphasizes the important association and utility in recognizing kinesiophobia and other psychological measures (depression, anxiety) in the development of knee OA screening and management strategies for early intervention.

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A Stratified Rehabilitation Protocol for Non-Operatively Treated Proximal Humerus Fractures Based on Fracture Stability is Safe and Effective

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Introduction / Objective: There remains little evidence on rehabilitation protocols for proximal humerus fractures (PHFs), although early mobilization has been associated with positive clinical outcomes. The study aim was to evaluate the safety and effectiveness of a stratified rehabilitation protocol based on fracture stability adopted by our institution for non-operatively treated PHFs.

Materials & Methods: Patients in our institution with non-operatively treated PHFs underwent a stratified rehabilitation protocol that classified patients into Accelerated versus Standard protocol - with more stable fractures undergoing an accelerated rehabilitation programme. The Oxford Shoulder Score (OSS), Quick Disabilities of the Arm, Shoulder and Hand Score (QuickDASH), EuroQol-5-Dimensions (EQ5D) questionnaires, shoulder range of motion (ROM) and grip strength were prospectively used to assess functional outcomes of patients at 6-months and 1-year post-injury. The frequency of adverse events that resulted in the need for surgical intervention was noted.

Results / Discussion: We included 164 patients and 43% (71/164) went through the accelerated protocol. Overall, patients had favourable OSS (median[range] 47[44-48]), EQ5D (median[range] 1.0[0.82-1.00]) and QuickDASH scores (median[range] 2.3[0- 10.7]). Shoulder ROM and grip strength above the requirement for functional activities of daily living (ADL) were reported at 1 year. There were no adverse events were reported 1-year post-injury.

Conclusion: Favourable outcomes with improvement in functional outcome scores (OSS/EQ5D/QuickDASH/ROM/grip strength) and the absence of adverse effects were observed among patients. The stratified rehabilitation protocol is a safe and effective option in non-operatively treated PHFs, achieving greater healthcare personalization with faster recovery for patients with more stable PHFs through earlier mobilization.

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Transverse Tibia Transport for the Treatment of Diabetic Forefoot Gangrene: First Iinternational Case Report.

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Introduction / Objective: Managing deep and recalcitrant diabetic foot ulcers is challenging due to delayed healing, infection, and exposure of deep structures. Failures are often due to macrovascular and microvascular disease. Angioplasty may improve macrovascular perfusion, but microvascular issues can prevent healing, leading to amputations. Transverse tibia transport (TTT) induces neovascularization and enhances vascular perfusion, widely used in China but unreported outside.

We present Singapore's first case of TTT on a patient facing below-knee amputation after conventional treatments failed. This may also be the first report of TTT use outside China. We aim to provide an unbiased analysis of its indications, outcomes, and risks.

Materials & Methods: Our first author trained in TTT under Prof Hua Qikai in December 2023. Our patient, a 78-year-old man with renal failure, diabetes, and vascular disease, had gangrene in the left forefoot. Despite ray amputation and angioplasty, his wound worsened. Patient declined below-knee amputation and TTT was performed in May 2024 at Ng Teng Fong General Hospital. Post-operatively, we followed the 2020 CAOS guidelines: 3 days latency, 6 days distraction (1 mm/day), and 6 days reversal. We shortened the transport duration and removed one holding suture near the distal guide pin to minimize skin tension.

Results / Discussion: Tibial pin sites were monitored daily, with dressings changed thrice weekly under the orthopaedic wound nurse's supervision. Foot wound care included regular debridement, local antibiotic PMMA bead application, and vacuum suction dressings to prevent cross-contamination. Two weeks post-op, the patient's ulcer showed healthy granulation, and inflammatory markers normalized. He did not require further surgeries, amputation, or skin coverage. No complications like skin necrosis, pin site infections, or fractures occurred. Further updates on his progress will be provided at presentation.

Conclusion: Our first international case report on TTT shows promising early results. Considering its safety and simplicity, TTT could be significant in managing complicated diabetic foot ulcers.

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Outcomes of Adhesive Capsulitis with Hydrodilatation in Diabetic Patients

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Introduction / Objective: Adhesive capsulitis (AC) is a common self-limiting debilitating condition. Diabetic patients have a higher prevalence of AC and tend to present with more severe symptoms than non-diabetics. Hydrodilatation is a relatively new treatment modality used to manage AC refractory to conservative management. The primary aim of this retrospective study is to evaluate the short and medium-term efficacy of shoulder hydrodilatation for treatment of shoulder AC in diabetic and non-diabetic patients**.**

Materials & Methods: Patients with clinical or radiological diagnosis of AC and who underwent ultrasound guided shoulder hydrodilatation in our local institution from January 2021 to June 2022 were included in this study. Clinical outcomes were measured with visual analog scale (VAS) for pain and passive range of motion consisting of forward flexion (FF) and external rotation (ER) at pre-hydrodilatation, 1-month and 6-months post hydrodilatation.

Results / Discussion: A total of 163 shoulders were included, corresponding to 156 patients consisting of 47 diabetics, 109 non-diabetics and 7 bilateral shoulders (3 diabetics and 4 non-diabetics). At the time of presentation, there was no significant difference in VAS, FF or ER between diabetics and non-diabetics. From pre-hydrodilatation to 1-month post-hydrodilatation and 1-month to **6-months post-**hydrodilatation, there was significant improvement in VAS, FF and ER for both groups. Comparing diabetics vs non-diabetics, non-diabetic

group had significantly better FF ($p<0.01$) at 1 month post hydrodilatation. At 6 months post-hydrodilatation, non-diabetic group also had significantly better outcomes including VAS score ($p=0.02$), FF ($p<0.01$) and ER ($p=0.02$).

Conclusion: Hydrodilatation provides good outcome in pain relief and improvement in range of motion in both diabetic and non-diabetics in the short to medium term. However, non diabetics showed superior outcomes at 6 months post-hydrodilatation when compared diabetics. Thus, clinicians may consider extended follow-up or lower threshold for further management for diabetic patients with AC.

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The BMD of the Pedicle Screw Preset Trajectory can Well Predict the Postoperative Pull-out Strength: A Cadaveric Biomechanical Study

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Introduction / Objective: This study aimed to predict the pull-out strength of robot-assisted pedicle screws using the three-dimensional bone mineral density (BMD) of the preset trajectory, providing data for planning the screw trajectory with optimal strength in robot-assisted procedures.

Materials & Methods: Before and after robot-assisted pedicle screw insertion in cadaveric lumbar spine specimens, scans were conducted using the same clinical quantitative computed tomography (QCT) parameters. Actual bone parameters along the preset trajectory were obtained by merging the two scan results. BMD calculations for the cylindrical 3D screw channel (3DSC) and its surrounding cylindrical 3D peripheral channel (3DPC) were performed using Python. The 3DPC thickness was gradient-divided by the QCT resolution. The 3D channel was segmented into pedicle and vertebral body parts for further correlation analysis. Pull-out strength from biomechanical experiments was correlated with different 3D channel parts to construct prediction models**.**

Results / Discussion: A total of 81 pedicle screws were inserted into human lumbar cadavers with robot assistance, comprising 47 screws sized 5.0mm*40mm and 34 screws sized 6.0mm*40mm. The pull-out strength of the 6.0mm screws was higher than that of the 5.0mm screws. For both screw types, the correlation between pull-out strength and 3DPC bone parameters was stronger compared to 3DSC bone parameters, and the correlation with pedicle part bone parameters was stronger than that of vertebral body part parameters. The best prediction model for the pull-out strength of 5.0mm*40mm screws was 1.95 * 0.3mm 3DPCp_BMD - 51.81 (R^2=0.7414), and for 6.0mm*40mm screws, the prediction model was 3.98 * 0.3mm 3DPC_BMD - 124.92 (R^2=0.7502).

Conclusion: The pull-out strength has the strongest correlation with the bone parameters of 0.3mm 3DPC, which is stronger than that of 3DSC.

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Diagnostic Efficacy of Tract-Specific Diffusion Tensor Imaging in Cervical Spondylotic Myelopathy with Electrophysiological Examination Validation

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Introduction / Objective: This study aimed to investigate the effectiveness of tract-specific diffusion tensor imaging (DTI) metrics in identifying the responsible segments for neurological dysfunction in cervical spondylotic myelopathy (CSM).

Materials & Methods: The study included nineteen participants diagnosed with CSM, with a group of ten healthy caregivers serving as controls. All participants underwent thorough physical examinations, magnetic resonance imaging (MRI) assessments, and DTI examinations overseen by a senior physician. Objective spinal cord function measures were obtained through intraoperative electrophysiological testing during patient surgeries. MRI parameters such as aspect ratio, transverse ratio, and T2 hyperintensities of the spinal cord were collected. Quantitative DTI metrics, including axial diffusivity (AD), mean diffusivity (MD), radial diffusivity (RD), and fractional anisotropy (FA), were analyzed for both the entire spinal cord and the dorsal column. Receiver operating characteristic curves evaluated the diagnostic accuracy of these parameters, calculating AUC, sensitivity, and specificity.

Results / Discussion: Neurological dysfunction due to cervical spine compression was identified in the study: 2 patients at C3/4, 10 at C4/5, 6 at C5/6, and 1 at C6/7 based on electrophysiological examination. The mJOA averaged 12.71 ± 1.55 for CSM patients. AD, MD, and RD were significantly higher, while FA was lower in affected segments compared to unaffected ones ($P<0.05$). DTI parameters specific to the dorsal column showed higher AUC values compared to those for the whole spinal cord. Among these, AD of DTI-Dorsal Column demonstrated the greatest efficacy (AUC=0.823) in identifying the responsible segment, surpassing AD of DTI-Whole spinal cord, aspect ratio, and transverse ratio. Subgroup analysis highlighted that the diagnostic efficacy of DTI and MRI parameters varied across different cervical spine segments**.**

Conclusion: AD from the DTI-Dorsal Column exhibited the most significant potential in identifying responsible segments. The diagnostic effectiveness of both DTI and MRI parameters was notably influenced by the specific cervical spine segment.

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A Review of Geriatric Open Ankle Fractures at a Single Institution

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Introduction / Objective: There has been an increasing incidence of geriatric open ankle fractures with aging world populations, with epidemiological trends mirroring that of geriatric hip fractures. There remains a paucity of data on the outcomes and best management of geriatic open ankle fractures. We thus aim to report the management and outcome of our patients in a single institution. Our secondary outcome is to report the overall institution length of stay following geriatric open ankle fractures.

Materials & Methods: Retrospective review of medical records of all patients above 60 years of age who had surgery for open ankle or distal tibia and fibula fractures between years 2017-2021 in a single institution was performed. Demographic data, ambulatory outcome, comorbidities, surgical management, length of stay, complications and radiographic data were recorded. A descriptive analysis of their management and outcome was performed

Results / Discussion: 12 of 99 patients above the age of 60 years had open ankle / distal tibia and fibula fractures. Mean age of was 69.5 years (61-85 years) and 7 were female patients (58%). 67% (n=8) of patients had low energy falls. The average follow up was 8.6 months (2 weeks-32 months). 42% were Gustilo-Anderson grade 1, 33% Grade 2, 8% Grade 3A and 17% Grade 3B injuries. The mean length of stay of patients with open fractures was 13.5 days as compared to 10.8 days for closed fractures. Patients spent a mean 52.6 days (28-77 days) at the step down facility. The 1 year mortality rate was 8%.50% of patients returned to previous ambulatory status. The rate of malunion and post traumatic arthritis was 11% each. There were no cases of deep surgical site infection or amputation.
Conclusion: Patients with open geriatric ankle fractures required long length of stay at institution and only 50% returned to previous ambulatory status.

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Removal of a Bent Intramedullary Nail of the Femur: A Case Report and Literature Review
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Introduction / Objective: Extraction of a bent intramedullary nail is not common and can be challenging for the trauma surgeon. Various techniques suggested in literature have been discussed here.
Materials & Methods: We present a case of 21 year old male who was treated for bilateral femoral fractures with intramedullary nailing. His post-operative recovery was complicated by hypertrophic delayed union of the right femur. He sustained another injury to his right femur, resulting in a re-fracture to his right femoral shaft, with the forces resulting in bending of his in-situ intramedullary nail
Results / Discussion: We identified 34 case reports in the literature reporting techniques for removing bent intramedullary nails of the femur. Reported techniques included removal without any reduction (2), closed reduction prior to removal of intramedullary nail (2), and partially burring of nail prior to manual reduction (15). A commonly reported technique is full sectioning of the nail either by high speed burr or jumbo pin cutters prior to removing the nail through fracture site (10). Some have even described creation of longitudinal bone window to expose the nail totally prior to removal followed up fixation with plates and/or cables. Two case reports described using a plate and bone clamps as reduction tools prior to removal of intramedullary nail.
Conclusion: Majority of surgeons preferred either sectioning of the nail and removing it in two separate pieces or partially sectioning the nail followed by manual reduction and removal. Pre-operative planning and knowledge of available resources (eg carbide drill bits, reduction tools, high speed stainless steel burrs) are crucial in the removal of bent intramedullary nail. We recommend that at least half the cross sectional diameter of the nail should be burred to sufficiently weaken the nail for successful straightening and removal. We caution against breaking the nail as this would complicate removal requiring retrieval through the fracture site**.**

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Risk Factors for Unsatisfactory Robot-Assisted Spinal Pedicle Screw Placement
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Introduction / Objective: To identify potential risk factors of unsatisfactory screw position during robot-assisted spinal pedicle screw fixation.
Materials & Methods: A retrospective analysis of robot-assisted spinal pedicle screw fixation performed in Beijing Jishuitan Hospital from March 2018 to March 2019 was conducted. Research data was collected from the medical record and imaging systems. Univariate tests were performed on the potential risk factors (patient's characteristics and surgical factors) of unsatisfactory screw position during robot-assisted pedicle screw fixation. For statistically significant variables in univariate tests, a logistic regression test was used to identify independent risk factors for unsatisfactory screw position.
Results / Discussion: A total of 780 pedicle screws placed in 163 robot-assisted surgeries were analyzed. The rate of perfect screw positions was 93.08%, and the unsatisfactory rate was 6.92%. In patients with severe obesity (body mass index ≥ 30kg/m2) (odds ratio [OR], 2.459; 95% confidence interval [CI], 1.199–5.044; p = 0.014), osteoporosis (T ≤ -2.5) (OR, 1.857; 95% CI, 1.046–3.295; p = 0.034), and the segments 3 levels away from the tracker (OR, 2.216; 95% CI, 1.119–4.387; p = 0.022), robot-assisted pedicle screw placement has a higher risk of screw malposition.
Conclusion: During robot-assisted pedicle screw placement for patients with severe obesity, osteoporosis, and segments 3 levels away from the tracker, vigilance should be maintained during surgery to avoid postoperative complications due to unsatisfactory screw position.

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Exploring Elderly Patients' Experiences and Concerns about Early Mobilization Implemented in Postoperative Care following Lumbar Spinal Surgery: A Qualitative Study
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Introduction / Objective: Given its apparent benefits, early mobilization is becoming increasingly important in spinal surgery. However, the time point at which patients first get out of bed for mobilization after spinal surgery varies widely. Beginning in January 2022, we conducted a study of early mobilization (mobilization within 4 hours postoperatively) following multi-segment lumbardecompression and fusion surgery in elderly patients. The study goal was to better understand elderly patients' perceptions of early mobilization and ultimately contribute to the improvement of elderly patients' perioperative experiences and quality of life.
Materials & Methods: We employed a qualitative descriptive study design involving face-to-face semi-structured interviews. Forty-five consecutive patients were invited, among whom 24 were enrolled and completed the qualitative investigation from February to June 2022. Of these 24 patients, 10 underwent early mobilization (mobilization within 4 hours postoperatively) and 14 underwent mobilization at ≥24 hours postoperatively. Three researchers conducted a 15-question interview the day before each patient's discharge. The interviews were audio-recorded, and content analysis was used to assess the data.
Results / Discussion: Six themes regarding the patients' experiences and concerns about early mobilization were identified: worries, benefits, daily routines, pain, education, and support. The study results revealed the obstacles in early mobilization practice and highlighted the importance of perioperative education on early mobilization.

Conclusion: Clear and explicit guidance on early mobilization and a multidisciplinary mobilization protocol that incorporates a comprehensive pain management plan are essential for effective patient education. These measures may have positive effects on reducing patients' stress and anxiety regarding postoperative early mobilization.

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A New Technique for Arthroscopic Double-row Rotator Cuff Repair with Acellular Dermal Matrix Augmentation

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Introduction / Objective: The management of large or massive rotator cuff tears poses significant challenges, with high re-tear rates commonly reported. Recent advancements have sparked growing interest in the biologic augmentation of rotator cuff repair (RCR) due to its potential to enhance tendon integrity and promote healing at the tendon-bone interface. Among the various types of patch repair augmentation available, acellular dermal matrix (ADM) allografts remains the safest and most extensively studied option. Despite the positive outcomes associated with arthroscopic rotator cuff repair with patch augmentation, the procedure remains technically demanding with a steep learning curve for arthroscopic shoulder surgeons

Materials & Methods: We present a novel technique for arthroscopic double-row RCR incorporating acellular dermal matrix augmentation, designed to streamline the double row cuff repair with the augmentation procedure and improve reproducibility. This technique involves utilizing all four existing suture anchors from the primary double-row rotator cuff repair for patch augmentation. In addition, this technique utilizes the same four portals required for a standard cuff repair. By leveraging standard, readily available instruments and implants, this method eliminates the need for additional anchor insertion, simplifying the procedure.

Results / Discussion

Conclusion: The described technique for RCR with ADM patch augmentation offers a more efficient approach by reducing the number of procedural steps and enhancing cost-effectiveness using existing suture anchors. Early clinical outcomes have been promising, indicating potential for improved patient outcomes and a reduction in re-tear rates. Medium to long-term follow-up studies are planned to provide further information on the clinical outcomes of this novel technique.

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Comparison of High Tibial Osteotomy and Unicompartmental Knee Arthroplasty Outcomes in Asian and Western Populations: A Meta-Analysis of Revision to Total Knee Arthroplasty

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Introduction / Objective: High Tibial Osteotomy (HTO) and Unicompartmental Knee Arthroplasty (UKA) are both viable surgical options for young patients with osteoarthritis (OA). The decision between these procedures can be influenced by factors such as age, activity level, and anatomical considerations. Notably, varus alignment is more prevalent in Asian populations, potentially affecting the choice and outcomes of these procedures. This meta-analysis aims to compare the outcomes of HTO and UKA in Asian and Western populations, with a specific focus on the rate of revision to Total Knee Arthroplasty (TKA).

Materials & Methods: A comprehensive literature search was conducted across PubMed, Scopus, and Embase using search terms related to HTO and UKA. From 148 identified studies, 5 were included in the analysis, an additional 4 studies were from existing reviews and 1 local study were included. comprising 1 prospective study and 9 retrospective studies. The studies were evenly split between Asian and Western populations, all comparing Medial Opening Wedge High Tibial Osteotomies (MOWHTO) and UKA. Data on the rate of revision to TKA were extracted and analysed.

Results / Discussion: In the Asian subgroup, HTO demonstrated a lower, though not statistically significant, odds of revision to TKA compared to UKA (OR: 0.36, 95% CI: 0.12-1.07, p=0.07). In contrast, in the Western subgroup, HTO was associated with a significantly higher risk of revision to TKA compared to UKA (OR: 4.70, 95% CI: 1.43-15.45, p=0.01). The heterogeneity was minimal in both subgroups ($I^2 = 0\%$).

Conclusion: The results suggest significant differences in outcomes between Asian and Western populations undergoing HTO and UKA. The higher prevalence of varus alignment in Asian knees may favor HTO, while UKA may be more suitable for Western patients with different alignment profiles. The choice of procedure should consider these anatomical and biomechanical differences to optimize patient outcomes.

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Retrospective Comparative Study between Conservative Management and Surgical Fixation of Pelvic Insufficiency Fractures

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Introduction / Objective: Pelvic insufficiency fractures (PIFs) are commonly underdiagnosed and delays in treatment can lead to complications including impaired mobility. There is currently limited evidence on different treatment outcomes. This study compared outcomes of conservative treatment and surgical fixation in patients with PIFs.

Materials & Methods: A retrospective study of 19 patients with pelvic fractures between July 2023 and February 2024 was performed. Patients with isolated sacral and pelvic insufficiency fractures with no concomitant fracture that requires rehabilitation were included. XR and MR images, and patient demographic data was collected. Primary study endpoints included the relative change in patient ambulation status from pre-injury to discharge. Patients were followed up outpatient 6 weeks and 3 months after discharge.

Results / Discussion: Surgical fixation was performed in 7 patients at an average of 10.1 days after injury (range: 4 -18 days). Mean duration of diagnosis was 2.74 days. Mean duration of diagnosis among patients requiring an MRI was 4.75 days. Length of inpatient stay in the non-operative and operative groups were 32.1 and 39.8 days respectively. Patients from the non-operative group ambulated 3.5 days after admission with minimal pain. In the operative group, patients underwent a trial of conservative therapy for an average of 9 days (range:

4 -16 days) before surgical fixation. Patients were ambulatory 1 day post fixation on average. There was no significant difference in ambulatory status between both groups at discharge.

Conclusion: Awareness of the sequelae of PIFs is required amongst clinicians and patients. Surgical intervention is a potentially effective treatment option for patients with unstable PIF and severe pain, as it can provide more rapid relief of symptoms and faster recovery. More robust protocols should be developed for the treatment of PIFs to improve patient outcomes. More studies are required to determine the best framework in the management of PIFs to guide optimal care and outcomes.

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Meniscus Injury Requiring Surgery During ACL Reconstruction has Worse Pre- and Post-pperative Outcomes

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Introduction / Objective: Anterior cruciate ligament (ACL) injuries are common in contact sports. These injuries often present with one or more menisci tears, which may affect pre- and post-operative patient outcomes.

Materials & Methods: This retrospective study included 415 consecutive patients who underwent ACLR at a tertiary referral hospital between January 2000 and December 2022. PROMs, including Knee Injury and Osteoarthritis Outcomes Score (KOOS) and Lysholm score, were assessed preoperatively and at 2-year follow-up between and within groups.

Results / Discussion: Of the 205 ACLR only cases and 210 ACLR with meniscus surgery cases analysed, both groups had similar baseline characteristics for age, gender and BMI ($p>0.05$). However, preoperative functional scores were significantly worse in the latter group for both Lysholm (74.9 vs 71.1) ($p=0.017$) and all domains of the KOOS score including KOOS symptoms (77.3 vs 72.4) ($p=0.011$), KOOS ADL (85.6 vs 81.4) ($p=0.006$), KOOS Pain (81.0 vs 76.3) ($p=0.006$) and KOOS QoL (43.9 vs 39.4) ($p=0.028$) except KOOS Sport and Recreation Function (39.9 vs 35.6) ($p=0.061$) which had a lower mean but was statistically insignificant. Both groups showed significant improvement post-operatively across all PROMs ($p < 0.001$), with comparable extents of improvement at 2 years. However, there was statistically worse scores in the ACLR with meniscus surgery group at post-op 2 years for the Lysholm score (95.3 vs 93.8) ($p=0.030$) and two domains of the KOOS score, KOOS pain (89.6 vs 87.5) ($p=0.025$) and KOOS QoL (85.0 vs 81.9) ($p=0.096$). The other domains of the KOOS score were not statistically significant ($p > 0.05$).

Conclusion: Patients undergoing ACLR with a concurrent meniscal surgery initially show poorer functional scores compared to those with undergo isolated ACLR. Both groups show significant postoperative improvement. However, patients requiring surgical intervention for concurrent meniscal injuries can expect poorer functional outcomes than an isolated ACLR even after two years.

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Concomitant Meniscus Repair with ACL Reconstruction Does not Affect Short Term Post Operative Outcomes Clinically

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Introduction / Objective: Anterior cruciate ligament injuries commonly present with concomitant menisci tears potentially requiring a meniscus repair.

Materials & Methods: The study included 205 cases of isolated ACL reconstruction (i-ACLR) and 85 cases of ACLR with concomitant meniscal repair (ACLR+MR). Patient-reported outcome measures (PROMs) were assessed pre-operatively and at 2 years using the Lysholm and Knee Injury and Osteoarthritis Outcomes score (KOOS). Minimally clinical important difference (MCID) was used as a measure of clinical significance by comparing the percentage of patients from ACLR+MR and i-ACLR populations who achieve MCID.

Results / Discussion: Baseline characteristics for age, gender and BMI ($p>0.05$) was similar in both groups. Pre-operatively, both groups had comparable PROMs ($p>0.05$). Post-operatively, both groups showed significant improvement ($p<0.001$) but the patients in the ACLR+MR group demonstrated inferior outcomes in the Lysholm score (74.9 vs 72.5,$p<0.01$) and all domains of the KOOS score: Symptoms (94.3 vs 91.5,$p=0.007$), ADL (98.2 vs 97.4,$p=0.001$), Pain (97.0 vs 96.3,$p=0.038$), Sport and Recreation function (89.6 vs 85.2, $p=0.001$) except the KOOS QoL (85.0 vs 81.9,$p=0.055$) at the two-year mark. The MCID values derived for Lysholm score (8.6 & 9.73) and KOOS score : Symptoms (9.44 & 10.9), Pain (8.58 & 9.98), ADL (7.62 & 9.21), KOOS Sports (15.0 & 17.5) and QoL (14.3 & 15.6) for ACLR & ACLR+MR respectively. However, clinically, both groups had similar percentage of the population passing MCID for the Lysholm score (90% vs 87.1%,$p=0.424$) and all domains of the KOOS score: Symptoms (79.0% vs 71.8%,$p=0.182$), Pain (80.5% vs 82.4%,$p=0.712$), ADL (86.3% vs 83.5%,$p=0.536$), Sports (95.1% vs 89.4%, $p=0.074$) and QoL (91.2% vs 89.4%, $p=0.630$) suggesting similar outcomes clinically**.**

Conclusion: Patients undergoing ACLR+MR had comparable pre-operative outcomes to the i-ACLR group. At 2 years, despite significant post-operative improvement, patients undergoing MR had poorer PROMs. However, these differences did not meet MCID thresholds suggesting similar clinical outcomes for both groups.

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Surgical Options for Synovial Chondromatosis of the Knee – A Systematic Review

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Introduction / Objective: Synovial chondromatosis is a rare, benign condition characterized by the formation of cartilaginous nodules within the synovium of joints, bursae, or tendon sheaths. The knee is one of the most commonly affected sites, leading to pain, swelling, and mechanical symptoms that can significantly impair function. While non-surgical management exists, surgical intervention is often necessary to alleviate symptoms and prevent recurrence. This systematic review aims to evaluate the surgical options for managing synovial chondromatosis of the knee and compare the recurrence rates following each procedure.

Materials & Methods: Adhering to the Cochrane Handbook for Systematic Reviews of Interventions and PRISMA guidelines, a comprehensive literature search was conducted using PubMed, SCOPUS, and Embase, covering studies published up to April 2024. Studies included case reports, case series, retrospective studies, and prospective studies detailing surgical interventions for synovial chondromatosis of the knee.

Results / Discussion: 30 studies met the inclusion criteria, comprising 24 case reports, 4 retrospective studies, and 2 case series, involving 110 patients (65 males, 44 females, and 1 unspecified). Surgical techniques were categorized into open, arthroscopic, and combined approaches. Open approaches included arthrotomies without synovectomy, partial and total synovectomies, and total knee arthroplasty. Arthroscopic approaches involved washouts and synovectomies (partial and total). Combined approaches included staged surgeries with both open and arthroscopic techniques. Average follow up duration across the studies was 3.73 years. Recurrence rates varied: open arthrotomy (0%), open synovectomy (18.1%), total knee arthroplasty (20.8%), arthroscopic washout (31.4%), and arthroscopic synovectomy (6.06%). Combined approaches reported no recurrences.

Conclusion: This systematic review highlights the variability in recurrence rates among different surgical techniques for synovial chondromatosis of the knee. Arthroscopic synovectomy and combined approaches demonstrated the lowest recurrence, suggesting it may be the most effective surgical option. However, the choice of surgical method should be tailored to the individual patient's condition and the surgeon's expertise.

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Return to Sports and Physical Activity Levels in Singaporean Patients Following Total Knee Arthroplasty: An Observational Study

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Introduction / Objective: Total knee arthroplasty (TKA) is a widely performed procedure that alleviates pain and significantly enhances the quality of life for patients with severe knee arthritis. However, the impact of TKA on patients' ability to return to sports (RTS) remains unclear. This study aims to evaluate the physical activity profiles and RTS rates of Singaporean patients post-TKA.

Materials & Methods: An observational study surveyed patients who underwent TKA between 2021 and 2022 by a single surgeon. Inclusion criteria included a diagnosis of osteoarthritis and total knee arthroplasty with follow-up care. The survey was conducted after an average follow-up period of 2 years (range 1.5-2.5 years). Patients' biodemographic data, preoperative and postoperative sports participation, time to RTS, and physical activity levels using the UCLA activity score were studied.

Results / Discussion: Our analysis included 78 patients, of whom 34 participated in sports before TKA, and only 20 (58.8%) continued postoperatively. The most common sports post-TKA were walking (11 patients, RTS 5.6 weeks), swimming (6 patients, RTS 6.5 weeks), and running (4 patients, RTS 26 weeks). The mean UCLA activity score significantly decreased from 4.65 ± 1.63 preoperatively to 4.05 ± 1.22 postoperatively ($p < 0.01$). The proportion of patients with moderate activity levels (UCLA score 4–6) increased postoperatively, while those with low (UCLA score ≤ 3) and high activity levels (UCLA score ≥ 7) decreased. Gender, race, and age were not significant predictors of postoperative sports participation. The primary predictor for RTS was preoperative sports participation ($p<0.01$). Common reasons for not resuming sports included problems in the operated knee (7 patients) and non-operated knee (6 patients).

Conclusion: While TKA patients exhibit a moderate level of physical activity postoperatively, a significant reduction in RTS rates was observed. Preoperative sports participation is a crucial predictor of postoperative RTS. Addressing knee-related issues post-TKA could potentially improve RTS rates and overall physical activity levels.

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A Multidisciplinary Approach to Reduce Length of Stay (LOS) in Older Adults with Hip Fracture: An Evidence Based Implementation

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Introduction / Objective: Hip fracture incidence in Singapore of persons aged 50 years and above will increase 3.5 times between 2018 and 2050. Moreover, mortality in older patients with hip fractures is often linked to their complex comorbidities rather than the fracture itself. The mean length of stay (LOS) for such patients in Singapore ranges from 10 to 19 days. Mean LOS within the National University Hospital, Singapore in 2022 was 10.3 days. This evidence-based quality improvement (EBQI) project aimed to reduce the length of stay (LOS) in hip fracture aged ³ 65 admitted under orthopedic surgery.

Materials & Methods: The EBQI project was implemented from July to Dec 2023 using the Plan-Do-Study-Act method. The multidisciplinary approach implemented comprised multiple interventions and a fast-track workflow to a dedicated rehabilitation facility for suitable patients on top of the usual care delivered by the Orthogeriatric team. The "fast-track" pathway allowed for patients to be discharged from NUH to St Luke's Hospital for rehabilitation services and smoothened this transition. In SLH, patients were offered day rehab for community integration, and to continue functional improvements.

Results / Discussion: The mean LOS decreased by 3.62 days from 13.5 to 9.88 after the new integration of multidisciplinary approach and the fast-track pathway to rehabilitation facility compared to the usual care delivered by Orthogeriatric team. Furthermore, although the mean readmission rate increased after the implementation of the scheme, from 3.47% to 6.4%, this difference was not statistically significant. Conversely, the mean complication rate decreased, from 14.93% to 6.4% after the implementation of the scheme and this difference was statistically significant.

Conclusion: The Orthogeriatric care model enhanced with the integration of coordinated multidisciplinary interventions and fast-track pathway has resulted in shorter length of stay in an acute hospital, reduction in cost of hospital stay and a decrease in mean complication rate.

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Comparing the Outcomes between Conventional Osteotomy and with the Adjunct use of 3-dimensional Printing in Paediatric Deformity Osteotomy Correction: A Systematic Review and Meta-analysis

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Introduction / Objective: Pediatric orthopedic deformities present challenges that necessitate precise surgical interventions to restore normal skeletal alignment and function. Conventional osteotomy techniques have long served as a cornerstone in the treatment arsenal but it is not without challenges. Recent advancements in medical technology have introduced 3D printed patient-specific cutting jigs as a promising adjunct to conventional osteotomy. This review aims to evaluate the clinical, radiological outcomes and complications of patients who underwent 3D printed patient-specific cutting jigs and conventional osteotomy in paediatric deformity correction.

Materials & Methods: The review was conducted in accordance with PRISMA guidelines. The current study searched from inception to April 2023. All studies that compared outcomes between conventional osteotomy and with the use of 3D printing as an adjunct in paediatric deformity correction in both upper and lower limbs were included.

Results / Discussion: A total of 13 publications with 482 patients included in this review. In term of intraoperative parameters, the 3D group had a shorter operative time by 21.3 min (95% CI 15.92,26.85), less radiation exposure of -3.42 times (95% CI -4.57,-2.28) and possibly less blood loss of 60.44ml (95% CI -13.94,134.82). For radiological outcomes, 3D group had a smaller mean osteotomy error of -2.03 degrees (95% CI -3.84,-0.22) and 1.94 times higher odds (95% CI 1.08,3.48) of having better radiological outcomes. The conventional osteotomy group has possibly a 1.4 times risk (95% CI 0.32,1.59) of growth plate, articular or risk of avascular necrosis compared to 3D templated group, though no reaching statistical significance. There was no significant difference in clinical outcome score, patient satisfaction, osteotomy site complication and nerve injury.

Conclusion: The findings of this meta-analysis support the use of 3D templated osteotomy is a useful adjunct in paediatric deformity correction for better intraoperative outcomes, reduce radiation exposure and better radiological accuracy in any deformity correction of the upper or lower limbs.

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A Comparative Study between Two Commonly used Robotic Systems on the Accuracy of the Intraoperative Cuts in Total Knee Arthroplasty

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Introduction / Objective: While there are many studies describing the accuracy of each robotic Total Knee Arthroplasty (TKA) system, there is a paucity of literature directly comparing the accuracy of each technology. We aimed to compare the accuracy of robotic TKA intraoperative cuts between Computed Tomography (CT) image-based MAKO and imageless ROSA.

Materials & Methods: This was a retrospective analysis of registry data for patients who underwent CT imaged-based MAKO (1 August 2022 to 31 December 2022) and imageless ROSA robotic TKA (1 August 2022 to 31 March 2024). Two reviewers independently radiographically measured the coronal alignment of the implants in relation to the mechanical axis at 3 months post-operation. These were compared to the planned intraoperative cuts dialed into the robotic planning.

Results / Discussion: 161 patients underwent MAKO TKA and 110 ROSA TKA. Intraclass correlation for radiographic readings was 0.88 to 0.96. When comparing the variability between intraoperative planned coronal alignment and 3 months postoperative, MAKO femur showed no statistically significant difference (-0.1° ± 0.8° vs. -0.1° ± 1.4°, p=0.62) but MAKO tibia showed significant difference (-1.1° ± 1.1° vs. -0.6° ± 1.5°, p<0.01). ROSA femur was also statistically significantly different (-1.2° ± 1.0° vs. -0.7° ± 1.3°, p<0.01) likewise for tibia (-0.4° ± 0.9° vs. -0.3° ± 1.5°, p=0.02). The variability from intraoperation to 3 months postoperative was significantly different between MAKO and ROSA for femur (0.0° ± 1.5° vs. 0.5° ± 1.6° respectively, p<0.01), and for tibia (0.5° ± 1.7° and 0.0° ± 1.2° respectively, p=0.02). To significantly detect 1° difference (80% power and alpha value 0.05), 35 subjects would be required in each group.

Conclusion: There was statistically significant variability in coronal alignment between intraoperative plan and postoperative 3 months in MAKO tibia, ROSA femur and tibia. The extent of variability between MAKO and ROSA for femur and tibia were also statistically significant. However, these variabilities were <0.5° which may not be clinically significant.

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Hyperextension Tibial Plateau Fractures – A Systematic Review on the Associated Injuries, Fixation Strategies and Outcomes

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Introduction / Objective: Hyperextension Tibial Plateau Fractures (HTPF) is a subset of tibial plateau fractures, due to compression failure of the anterior cortex with tension failure of the posterior cortex and loss of posterior slope of the tibial plateau. This systematic review was aimed to identify incidence of HTPF injuries, surgical fixation strategies, outcomes and complications.

Materials & Methods: A review of PubMed and Cochrane libraries was performed according to PRISMA guidelines from 1985 to 2023. All articles involving tibial plateau fractures with anterior, or hyperextension injuries were screened. Full text was subsequently assessed for criteria eligibility for original papers reporting surgical fixation strategies, soft tissue injuries, clinical outcomes or complications of HTPF were included.

Results / Discussion: A total of 12 studies were included, comprising of 212 patients with mean age of 48.1 years. The mechanism of injury consists of road traffic accident (58.7%), fall from height (23.7%) and crush injury (6.4%), of these 4.6% were open fractures. Associated ligamentous or meniscal injuries was reported in half of the patients with posterior cruciate ligament injury reported in 17.0% of patients. Peroneal nerve and popliteal artery injuries was reported in 10.8% and 13.7% of patients respectively. For choice of approach, dual surgical incision was the preferred approach in 55.3% of cases. Buttress construct was largely used for anterior tibial plateau fixation (95.7%) while bone graft was utilized in 72.3% of cases to address anterior bone void. In terms of functional outcomes, HTPF showed slightly poorer functional outcomes compared to bicondylar tibial plateau fracture in 2 studies.

Conclusion: HTPF is a unique injury with a variable wide spectrum of associated soft tissue injuries. Clinicians should be wary of increased risk of peroneal and popliteal artery injuries. Lastly, intra-operative assessment of the soft tissue injury post fixation is recommended to assess knee stability.

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Real-World Persistence with Antiresorptive Drugs – A Systematic Review of 3,009,027 patients

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Introduction / Objective: To examine real-world persistence with antiresorptive drugs for treatment of osteoporosis in the recent 10 years.

Materials & Methods: A systematic review on studies describing adherence and persistence with antiresorptive drugs was conducted with accordance with PRISMA guidelines. PubMed, EMBASE, and Cochrane databases were searched for English-language studies between May 2014 to May 2024. Outcomes of interest included studies which looked at the duration of which patients received therapy with antiresorptive drugs after initiating treatment (persistence).

Results / Discussion: A total of 30 primary references comprising 3,009,027 patients from 18 countries were included. Mean age of patients from included studies ranged from 66.2 to 82 years old, with follow up periods ranging from 6 months to 11 years. Mean persistence for oral bisphosphonates were 43.4% at 1 year, 37.6% at 2 years, 38.6% at 3 years, and 27.9% at 5 years; for IV bisphosphonates were 61.6% at 1 year, 41% at 2 years, 6.4% at 3 years, and 2.7% at 5 years; for denosumab were 69.5% at 1 year, 56.4% at 2 years, 40.2% at 3 years, 47.5 % at 4 years, and 16 % at 5 years; for teriparatide were 46.1% at 1 year, and 37.9% at 2 years. Factors which affected non-persistence included dosing frequency, type of medication administration route, missed appointments, patient concerns of side effects, and presence of other diseases**.**

Conclusion: Denosumab was found to have superior persistence compared to other antiresorptive drugs. However, rates of non-persistence have seen an alarming increase over longer periods of follow-up – regardless of the class of antiresorptive medications. Early identification of at-risk osteoporotic individuals for non-persistence, coupled with optimization of ease of drug administration and follow up, reducing polypharmacy, providing appropriate education, and addressing patient-related concerns (i.e. cost, side effects) are critical in ensuring adequate persistence in taking antiresorptive medications to tackle complications of osteoporosis

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The Power of Incorporating Situational Awareness into Critical Care Pathways: Results from a Hip Fracture Quality Improvement Initiative in a Major Acute Hospital

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Introduction / Objective: Hip fractures operated within 48 hours from admission have been shown to have improved outcomes. The lack of situational awareness as a group cognitive factor is an often missed and correctable cause of delay to timely surgery. We implemented an initiative to address this issue to improve the time to surgery and shorten the length of stay (LOS). The aim of this study is to analyse the impact of the incorporation of situation awareness in the timely management of hip fractures in a major hospital setting.

Materials & Methods: In March 2023, a near real-time dashboard documenting all hip fracture admissions was implemented. Visual cues and game theory components were included with indications to each patient's status regarding the 48-hour benchmark. Causal analysis was performed for cases that breached the benchmark with full transparency. Information was broadcasted daily to Orthopaedic Surgeons, Geriatricians and relevant stakeholders to create situational awareness. This study compares the 48-hour compliance rate and LOS results between pre-intervention and post-intervention patients across a 2-year time span.

Results / Discussion: A total of 647 hip fracture patients over a 2-year period were analysed. 2 groups were compared, pre-intervention(n=312) vs post-intervention(n=335). Mean age was 78.8 years. 68.2%(n=441) of patients were female. Mean time to surgery decreased significantly from 87.8 to 51 hours**(p=0.000)**. Mean 48-hour compliance rate improved significantly from 35.3% to 72.8% post-intervention**(p=0.000)**. Mean LOS decreased significantly from 14.4 to 10.7 days**(p=0.000)**. LOS≤10 days rate improved significantly from 44.6% to 57.8% post-intervention**(p=0.000)**.

Conclusion: The lack of situational awareness should not be discounted as a potential cause for operational insufficiencies at a systems level, especially in time-sensitive management. This can be mitigated by regular updates in a formatted manner for immediate group recognition and thus cognitively tuning the management group as a whole to a specific focal Schelling point.

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Does Robotic Surgical Assistant (ROSA) Functionally-Aligned TKA Lead to Higher Satisfaction than Conventional Mechanically-aligned TKA: A Propensity-matched Pair Analysis

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Introduction / Objective: Total knee arthroplasty (TKA) is the established treatment for severe knee osteoarthritis, with robotic-assisted TKA (rTKA) proposed to enhance surgical precision and potentially improve outcomes. This study investigates whether functionally-aligned rTKA using the ROSA Knee System results in superior functional outcomes and patient satisfaction compared to conventional mechanically aligned TKA (mTKA).

Materials & Methods: We conducted a retrospective, propensity-score matched cohort study including 154 patients (46 rTKA, 108 mTKA) who underwent primary TKA by a single surgeon from October 2020 to October 2023. Functionally-aligned (FA) rTKA was performed using the ROSA Knee System. Patients were assessed using the Short-Form 36 (SF36), Knee Society Knee Score (KSKS), Knee Society Function Score (KSFS), and Oxford Knee Score (OKS) preoperatively and at 6 months postoperatively. Immediate postoperative outcomes such as pain at rest and movement, ambulation distance, and range of motion were measured. Statistical analysis evaluated results at a 95% confidence interval, with significance at $P < 0.05$.

Results / Discussion: No significant differences were observed in immediate postoperative pain at rest ($P = 0.988$), pain during movement ($P = 0.634$), ambulation distance ($P = 0.243$), and range of motion ($P = 0.752$) between the groups. At 6 months, there were no significant differences between rTKA and mTKA in achieving the minimal clinically important difference for SF36 ($P = 0.996$), KSKS ($P = 0.150$), KSFS

(P = 0.091), and OKS (P = 0.949). No significant differences were noted for satisfaction levels (P = 0.315) and fulfilled expectations (P = 0.557) between both groups.

Conclusion: At 6 months postoperatively, FA rTKA demonstrated equivalent outcomes and satisfaction levels compared to mTKA. Future research should focus on examining longer-term follow-up outcomes, quantifying gap balance in MA mTKA to allow direct comparison with rTKA and studying alternative personalised alignment rTKA strategies to enhance patient outcomes.

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Advanced Epic Personalisation Course Significantly Improves Physician Efficiency in Utilisation of Electronic Medical Records

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Introduction / Objective: Since Singapore's first migration to Epic in February 2022, we have conducted a twice-a-year advanced Epic personalisation course for healthcare professionals, aimed at improving physician efficiency through customisation and personalisation of Epic interfaces based on their own unique workflow patterns. EMR education is an under-recognised pillar in reducing Health Information Technology (HIT)-related stress and burnout, being pivotal in reducing medical errors and enhancing work-life balance. Hence, our study aimed to investigate the quantitative amount of improvement in efficiency after attending our course.

Materials & Methods: We performed a prospective analysis from July 2022 to January 2024 of all 17 physician participants out of a total of 77 participants who attended our biannual course. The course was lead by advanced trainers and the course director was an Orthopaedic surgeon. The three months pre-and-post course Epic usage statistics of participants were analysed.

Results / Discussion: Documentation length decreased by 45.8% and progress note length decreased by 46.9% among participants versus increases in both among controls. Participants also had a 1.8 fold increased usage in Orders from Preference List or Order Set. The number of SmartPhrases created by participants was 5.64 times more than controls in addition to a 5.57 fold more utilisation of Quick Filters than controls. Moreover, the time in Chart Review per day decreased by 29.3% among participants versus an increase of 14.6% among controls. Compared to controls, participants spent 47.0% less time in the Epic system per day, 53.4% less time on Clinical Review per day, 56.6% less time on Notes per day, and 57.5% less time on Orders per day.

Conclusion: Overall, course participants became more efficient in their use of Epic and our results demonstrated broad improvements across multiple physician efficiency metrics. This may contribute to improving mental health for healthcare professionals and enhanced productivity within the local healthcare system.

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Pes Anserine Bursitis in Patients Referred for Symptomatic Knee Osteoarthritis and Its Implications for Australian Commission on Safety and Quality in Health Care Osteoarthritis of the Knee Clinical Care Standard

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Introduction / Objective: The Australian Commission on Safety and Quality In Health Care (ACSQH) Osteoarthritis of the Knee Clinical Care Standard 2017 (OKCCS) guides clinicians and health services managers in the care of patients with knee osteoarthritis (KOA). Pes Anserinus Tendinitis/ Bursitis (PATB) is an under diagnosed condition with symptoms similar to KAO. Thus PATB is a confounder when attributing knee pain to KOA. Treatment of PATB is mainly non-operative with steroid injection (SI), symptomatic PATB often persist after total knee replacement (TKR). We seek to establish the prevalence of PATB in patients with symptomatic KOA, its relationship with patient demographics and clinical characteristics, initial experience with steroid treatment and potential implications in management of patients referred for knee pain.

Materials & Methods: A retrospective audit of 100 consecutive adults (>16 years) referred for knee pain (attributed to KOA) to a lower limb clinic at Logan Hospital, a 500 bed Queensland Health regional hospital in the South Brisbane Metropolitan area. Patient demographics, physical characteristics including height, weight, knee alignment are identified. We collated clinical findings of knee joint line and PATB tenderness, and corroborated these with anatomical alignment and KOA severity fromweight-bearing knee radiographs (using Kellgren and Lawrence system,1957), We reviewed the clinical response of SI in a sample of patents who elected to have SI for PATB.

Results / Discussion: Available separately (exceeds word limit)

Conclusion: A high proportion of adults with knee pain attributed to symptomatic KOA have more pain being generated by PATB. This is associated with-increased BMI. Many responded to SI treatment, such that they did not need TKR. This has significant implications regardingmanagement of adults complaining of painful KAO, whereby treatment of concurrent PATB help to reduce TKR rates by some 30% (for high grade KAO). These results may form the evidence base leading to a rethink of recommendations by ACSQH OKCCS currently under review.

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Short-term Outcomes of Meniscus Repair are not Clinically Worse than Arthroscopic Partial Meniscectomy: A Retrospective Cohort Study of 219 Patients

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Introduction / Objective: To evaluate the short-term outcomes of meniscus repairs (MR) and arthroscopic partial meniscectomies (APM) concurrent with anterior cruciate ligament reconstruction (ACLR).

Materials & Methods: A retrospective study was conducted involving 219 patients who underwent ACLR between 2009 and 2022, with 92 concurrent APMs and 145 MRs. Patients were graded preoperatively and postoperatively using the Lysholm and Knee Injury and Osteoarthritis Outcome Score (KOOS) subscale scores. Minimally clinical important difference (MCID) is a measure of clinical significance and was measured by the percentage of individual patients who passed the threshold value attained from a **previous study with similar**

population demographics. The percentage of patients who passed MCID will be compared between both populations to assess whether there is a significant difference in patients who have clinically significant outcomes.

Results / Discussion: Baseline characteristics such as age, gender and BMI were similar in both groups (p>0.05). Both APM and MR groups had significantly better outcomes 2 years postoperatively. APMs had significantly better absolute PROMs for Lysholm/KOOS Symptoms/Pain/ADL/Sports/QoL of 95.2/94.7/97.5/98.3/90.8/85.5 at 2 years compared to MRs with 92.8/91.0/95.9/97.2/84.2/79.8. However, the absolute differences between 2-year and preoperative scores for APM and MR groups were not significantly different, except for KOOS QoL (46.8 vs 39.6, p=0.022). The percentage of patients who achieved MCID for APM and MR groups were 65.2-83.7% and 55.2-83.4% respectively, but there was no significant difference between individual scores except for KOOS Symptoms (69.6% vs 55.2%, p=0.027).

Conclusion: APM and MR concurrent with ACLRs have significant improvements at 2 years. Despite APM patients experiencing statistically significantly better PROMs 2 years postoperatively, when accounting for the improvement of outcome measures over 2 years and the clinical significance of results, where the differences between APM and MR are insignificant, we have determined that MR is not clinically worse than APM in the short term.

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Concomitant Meniscus Injury has Higher Likelihood of Achieving Minimally Clinically Important Difference after Anterior Cruciate Ligament Reconstruction Compared to Isolated ACL Injury

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Introduction / Objective: To identify minimally clinically important difference (MCID) values at 1-year and 2-year postoperatively in patients undergoing anterior cruciate ligament reconstruction (ACLR), and the effect of different preoperative factors in predicting MCID achievement.

Materials & Methods: This study involved 474 patients who underwent ACLR between 2000 and 2022 and were followed up at 1-year and 2-year timepoints. Patients were graded preoperatively and at 1-year and 2-year follow-up using Lysholm, Knee Injury and Osteoarthritis Outcome Score (KOOS) subscale, and Short-Form 36 Physical and Mental component Summary (SF-36 PCS and MCS) scores. MCID was calculated by a distribution method using half the value of the standard deviation of the difference between postoperative and preoperative outcome scores. Univariate and multivariate logistic regression analyses were performed to investigate factors associated with achieving MCID.

Results / Discussion: Baseline characteristics such as age, gender and BMI were similar in both groups (p>0.05). Characteristics such as lower body mass index, lower preoperative scores and concomitant meniscal injury were associated with a higher chance of achieving MCID. For the Lysholm score, 1-year and 2-year MCID values as well as the percentage of patients who achieved MCID were 9.13 (87.6%) and 9.07 (88.4%) respectively. For KOOS Symptoms: 9.99 (77.8%) and 10.7 (76.8%), KOOS Pain: 9.10 (81.4%) and 9.60 (81.0%), KOOS ADL: 8.44 (86.1%) and 8.70 (81.9%), KOOS Sport: 16.1 (90.9%) and 18.8 (84.0%), KOOS QoL: 14.9 (86.1%) and 16.1 (85.0%). For SF-36 PCS: 4.72 (69.4%) and 4.81 (70.4%) and, SF-36 MCS: 5.90 (89.0%) and 6.02 (89.2%).

Conclusion: This study attained 1-year and 2-year MCID values for ACLR patients in the context of limited local MCID literature, and showed that a majority of patients achieve MCID at 1-year (69.4-90.9%) and 2-year (70.4-89.2%) follow-up postoperatively, confirming the significant clinical benefits of ACLR. Furthermore, factors such as BMI, preoperative score, and meniscal involvement can predict the achievement of MCID.

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Evaluating the Clinical Benefits of Partial Lateral Patellar Facetectomy for Patellofemoral Osteoarthritis: A Systematic Review and Meta-Analysis

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Introduction / Objective: Surgical treatment for patellofemoral osteoarthritis (PFOA) consists of soft tissue, bony, and arthroplasty interventions. Partial lateral facetectomy (PLF) is a bone-reducing procedure, commonly done in conjunction with soft tissue and realignment procedures, that has grown in popularity after failure of conservative treatment due to its efficacy and minimally invasive nature. This systematic review and meta-analysis thus seeks to evaluate the efficacy of PLF in the absence of reviews on this topic.

Materials & Methods: A systematic review of three databases (PubMed, EMBASE, Scopus) was conducted, identifying studies that evaluated postoperative outcomes of PLF on patients who had osteoarthritis with patellofemoral compartment involvement. Pairwise meta-analysis was conducted between preoperative and postoperative, and proportional meta-analysis between postoperative values of subjective and radiographic outcome measures of Knee Society Score (KSS) and Congruence Angle (CA) respectively.

Results / Discussion: Ten studies were included in the meta-analysis, with 463 patients and 495 knees and a pooled mean follow-up of 68.1 months and pooled age of 56.0 years old. 6 studies evaluated PLF with lateral release, 2 studies evaluated PLF with realignment procedures, 1 study evaluated PLF with lateral lengthening, and 1 study evaluated PLF with both lateral release and realignment. Postoperatively, all studies showed a significant improvement in KSS of 34.45 (95%CI: 26.41 to 42.49), and CA of -10.31 (95%CI:-13.80 to -6.81).

Conclusion: This study provides valuable insight into PLF as a surgical treatment option for PFOA, as it has shown to be an effective procedure using subjective and radiographic outcome measures. Current cohort studies have shown significant improvement in PFOA treatment, even in the context of long-term outcomes and severe PFOA, and thus should be highly considered as a minimally invasive first-line surgery to treat PFOA, and study recommends randomised controlled trials to be conducted in future studies to more critically assess PLF's efficacy in comparison to more invasive procedures.

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The Therapeutic Efficacy of Mesenchymal Stromal Cell Exosomes for Intervertebral Disc Regeneration in a Rat Model

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Introduction / Objective: Current treatments of intervertebral disc degeneration (IVDD) remain stagnant with symptomatic relief through physiotherapy, analgesia and/or surgery. There is a search for effective disease-modifying therapies to combat IVDD, where intervention at an early stage of the disease can potentially avoid the need for surgical procedures. Given that inflammation is a major player mediating IVDD changes, MSC exosomes provide the potential solution by exerting an immune-based mechanism to suppress pain and inflammation, reduce tissue degeneration, and facilitate overall IVD regeneration. We aim to investigate if human MSC exosomes can repair the IVD in a rat IVD puncture model.

Materials & Methods: Eight 12-week-old rats underwent needle puncture using image intensifier (II) guidance at the L4/5 IVD to induce IVDD over 2 weeks. They were randomised to 2 groups – 5 µg exosome (study) or 5 µml of phosphate-buffered saline (PBS)(control). Single injection of these agents were administered to the L4/5 IVD at two-weekly intervals (2/4/6 weeks post-needle puncture). At each interval, the following were performed: 1) von Frey test, 2) magnetic resonance imaging (MRI) to evaluate disc hydration. At 8 weeks post-needle puncture, rats were sacrificed to harvest the IVDs for histological analyses**.**

Results / Discussion: Rats in both PBS and MSC exosome groups demonstrated persistently low Von Frey test scores throughout the study with no interval improvement to suggest alleviation of physical pain. On MRI, there was improvement in L4/5 IVD hydration in the MSC exosome group compared to the PBS control group at 4/6/8 weeks post-puncture. Histologically, using the IVDD scoring system by Tam et al. [1], the MSC exosome group had lower scores than PBS group signifying less degeneration (4.6 vs 7.6).

Conclusion: The MRI and histological results suggest that human MSC exosomes have regeneration potential in our rat IVDD model. Our findings contribute to the development of a “first-in-class” exosome-based therapy easily administered to patients.

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Enhancing Education in Lateral Lumbar Interbody Fusion Through the Use of an Exoscope

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Introduction / Objective: Lateral lumbar interbody fusion (LLIF) has emerged as a highly effective minimally invasive surgical option for patients afflicted with degenerative lumbar conditions. However, junior surgical doctors (JSDs) and scrub nurses (ScNs) can find it challenging to understand this approach due to difficulties in visualizing the procedure from the surgeon’s perspective. This study explores the educational benefits for JSDs and ScNs when an exoscope is used during LLIF procedures.

Materials & Methods: This study was conducted in a tertiary academic hospital in Singapore. All JSDs and ScNs working in the Department of Orthopaedic Surgery at our institution between January 2024 to July 2024 were invited for the survey. All participants included in this study had to have assisted in LLIF cases with and without the usage of an exoscope. Eligible participants completed a standardised survey, with responses rated on a scale from one to five (1: Strongly disagree, 2: Disagree, 3: Neither agree nor disagree, 4: Agree, 5: Strongly Agree).

Results / Discussion: A total of 12 JSDs/ScNs responded to the survey. They reported enhanced visualisation of anatomy during both superficial dissection (median score = 4.5) and deep dissection (median score = 5). Similar ratings were given for understanding disc space anatomy (median score = 5) and overall appreciation of the surgery (median score = 5). Participants found the exoscope to be more ergonomic for visualizing the surgery (median score = 5) and noted significant knowledge improvement in LLIF procedures (median score = 5). They expressed a strong preference for its use in future LLIF cases (median score = 5).

Conclusion: The study demonstrated that incorporating an exoscope significantly enhances JSDs' and ScN’s ability to appreciate the complexities of lateral access spine surgery. This can also result in improved workflow. Surgeons can consider integrating this technology into their practices to capitalize on its promising educational benefits.

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The Use of Bone Graft Substitutes in the Management of Non-Union and Critical Bone Defects

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Introduction / Objective: The management of non-union and critical bone defects remains a challenge for orthopaedic surgeons. With the heterogeneity of patients and fracture types, there remains a lack of consensus with regards to the definition of and optimal surgical techniques for the management of such injuries. Additionally, with the innovation of novel bone graft substitutes, the search for the ideal adjunctive agent to supplement fracture healing continues. This is a presentation of three consecutive cases in our unit that required surgical intervention for non-union or critical bone defects and were managed using various surgical techniques and newer bone graft substitutes**.**

Materials & Methods: The first patient had an open distal humerus fracture with extensive medial column bone loss, and was treated with a 2-stage Masquelet procedure. Our second and third patients presented with closed and open tibia shaft fractures respectively. Both underwent intramedullary nailing but were complicated by non-union. They underwent revision fixation with exchange of the intramedullary nail and supplementation with plates for added stability. In the third case, the fibula was also shortened to accommodate compression of the tibia fracture site. The Masquelet and revision surgeries were performed by the same orthopaedic trauma consultant. In all three cases, cortical bone fibres were used in addition to iliac crest bone autograft. All patients were followed up post-operatively.

Results / Discussion: On follow-up at 4 months, all patients reported resolution of pain, the fracture site was non-tender, and X-rays had demonstrated good fracture union.

Conclusion: This case series demonstrates the success of the use of newer bone graft substitutes in conjunction with appropriately applied surgical techniques in the management of both non-union and critical bone defects.

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Novel Repair Technique for Radial Oblique Meniscal Tears – A Technical Note

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Introduction / Objective: Meniscal tears are common injuries of the knee. Longitudinal and horizontal tears of the meniscus can be repaired with reliable and good outcomes. However, radial tears are challenging to treat due to a disruption of the native biomechanics of the meniscus. This is because of the loss of hoop stress, decreased tibio-femoral contact and unfavourable dynamic contact pressures (Milliron et al, 2021). With an increasing shift toward preservation of the meniscus, our authors would like to propose a novel technique for repair of radial tears of the meniscus. We present a technical paper detailing our use of a rip stop figure of 8 alongside a four-strand repair.

Materials & Methods: We present a case series of 5 patients that have been treated with the above technique in our tertiary centre. The patients have been followed up for varying durations with the longest being 12 months. Verbal pain scores and functional scores were assessed during routine clinic follow up.

Results / Discussion: This novel technique to provide good symptom resolution at the 12-month mark. Pain scores have reduced and functional scores are also comparable to other treatment options.

Conclusion: Radial tears are difficult to treat. Where partial meniscectomies used to be the preferred treatment, this paper aims to offer an alternative reliable repair option.

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Non-hip Non-vertebral Lower Limb Fragility Fractures - 1-Year Outcomes of Orthogeriatric Intervention

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Introduction / Objective: There is increasing recognition of fragility fractures of lower limb, but the effects of orthogeriatric care have yet to be well elucidated. The study aims to assess the impact of orthogeriatric co-management on outcomes of non-hip non-vertebral (NHNV) lower limb fragility fractures in elderly patients**.**

Materials & Methods: This is a 1-year prospective case-control study of NHNV lower limb fragility fractures from 2021-2022 in a single institution. Inclusion criteria were (1) minimum age of 60 years; and (2) low energy trauma. Control patients were taken from a 3-month pilot study prior to orthogeriatric intervention. Baseline demographics, management modality and preoperative Clinical Frailty Score (CFS) were collected. Outcomes studied included 1-year mortality, length of stay, and rates of acute inpatient medical complications.

Results / Discussion: 252 patients with NHNV fractures received orthogeriatric care, while 29 patients received usual care. The intervention cohort had a higher proportion of females (81.0% versus 68.6%), with a higher mean age of 77.7 years (versus 71.7 years), with 78,2% having a Clinical Frailty Score suggesting frailty (versus 55.2% with a non-frail score, $p<0.05$ for all comparisons). Surgical intervention was predominant, and a lower proportion of patients were allowed to weight bear as tolerated after treatment. Orthogeriatric intervention was associated with a decrease in the mean length of stay for operated patients, from 12.1 to 10.9 days; improvements in time to surgery (mean 4.1 days versus 2.5 days); and incidence of inpatient medical complications (27.6% to 17.9%; $p>0.05$ for aforementioned comparisons), for which only the incidence of pneumonia experienced statistically significant improvements (13.8% to 2.4% with intervention, $p=0.004$). There was no difference in 1-year mortality (11.1% vs 10.3%, $p=0.91$).

Conclusion: Despite a frailer and older intervention cohort, the intervention cohort experienced similar mortality rates while seeing improvements in key medical complications and lengths of stay. Orthogeriatric care is beneficial in these patients.

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Analysis of Fibula-Sided Complications Using the Fibulock Nail

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Introduction / Objective: Ankle fractures are a common orthopaedic injury, with approximately a quarter of cases classified as unstable, necessitating surgical intervention. Traditionally, plate-and-screw construct has been employed for fixing fibula fractures. An alternative of using intramedullary nails is gaining traction, supported by literature citing minimally invasiveness and reduced need for hardware removal. We report our learning experience and analysis of fibula-sided complications in the first 26 cases of the Fibulock nail at our institution.

Materials & Methods: 26 consecutive fibula nails were retrospectively reviewed. Data on demographics, fracture classification and radiographic outcome were recorded. Fibula sided complications were determined as fixation failure, malpositioning of transyndesmotic fixation and fibula shortening >2 mm. Two senior foot and ankle surgeons analysed the cases to evaluate fibula sided complications. 26 consecutive fibula nails were retrospectively reviewed. Data on demographics, fracture classification and radiographic outcome were recorded. Fibula sided complications were determined as fixation failure, malpositioning of transyndesmotic fixation and fibula shortening >2 mm. Two senior foot and ankle surgeons analysed the cases to determine the cause for fibula sided complications.

Results / Discussion: 70% were female. 42% were above age of 60. 50% are AO B2/3, 19% C1, 38% C2 and 4% 4F2. Quality of reduction was good to excellent (80%), fair (10%) and poor (10%). Fibula-sided complications (19%) included tightrope malposition (n=1), fixation failure (n=2) and fibula shortening >2mm (n=2). Deep infection was 6%. Overall early revision rate was 23%. After the first 19 cases, there were no-fibula sided complications or deep infection**.**

Conclusion: Understanding the nail design and its limitation is key to success. Fibula-sided complications occurred due to technical factors such as tightrope malpositioning and failure to prevent fracture shortening from the use of tightrope and poor interference fit of the proximal nail talons. Our learning curve showed that after the first 19 cases, there were no fibula sided complications.

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Factors Influencing Outcomes of Hip Arthroscopy for Femoroacetabular Impingement

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Introduction / Objective: Femoroacetabular Impingement (FAI) causes hip pain in young, active adults due to repetitive dynamic conflict between the acetabular and proximal femoral, leading to chondrolabral damage and early hip osteoarthritis. It presents as pincer, cam, or mixed morphologies. Hip arthroscopy corrects these abnormalities. Our study compares how various hip arthroscopic procedures for FAI affect Patient Reported Outcome Measures (PROMs) and analyzes the influence of patient demographics on PROMs.
Materials & Methods: 54 patients who underwent hip arthroscopy for FAI in a single institution between 2021 to 2024 were included in this cohort study. Patient demographics, type of FAI, surgical intervention performed, and PROMs - namely the Harrison Hip Score (HHS), modified Harrison Hip Score (mHHS), International Hip Outcome Tool (iHOT), Hip Outcome Score - Activities of Daily Living Scale (HOSADL) and Hip Outcome Score - Sports Specific Subscale (HOSSSS) were collected preoperatively, 6 months and 12 months postoperatively. The Wilcoxon test was used to assess post-surgical improvements, while the Mann-Whitney and Kruskal-Wallis tests identified demographic risk factors for poorer outcomes.
Results / Discussion: Out of the initial 54 patients included in this study, follow up data was obtained in 28 patients. 6 months postoperatively, patients who underwent femoroplasty showed significant improvements in HHS, mHHS and iHOT scores ($p < 0.05$), while patients who underwent femoroacetabuloplasty had better HHS and mHHS scores ($p < 0.05$). 12 months postoperatively, continued improvements in the HHS, mHHS, iHOT, HOSADL and HOSSSS scores were seen in the femoroacetabuloplasty group ($p < 0.05$). Males, Chinese ethnicity and lower ASA status were predictors for better PROMs. Obesity was not a risk factor for poor outcomes
Conclusion: Hip arthroscopy for FAI results in improved functional outcomes at both 6 months and 1 year. Male gender, Chinese ethnicity and lower ASA status are predictors for better outcomes.

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The Granhed Technique using a Standard C-arm for Distal Femur Screws of the Cephalomedullary Nail is Simple and Effective
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Introduction / Objective: Placement of distal femur locking screws can be challenging and various devices and techniques have been described. The freehand technique using the 'perfect circle' is the gold standard technique. However, this requires repositioning of the C arm to be perpendicular to the limb. A significant number of fluoroscopic shots need to be made to obtain the perfect circle and the surgeon's hand may be in the line of the receiver of the image intensifier.
Granhed described the technique of using of a biplane C-arm without the need for obtaining perfect circles for placing distal femur locking screws. As the biplane C-arm is not readily available in most units, we adopted this technique using the standard uniplane C-arm.
Materials & Methods: The Granhed technique was utilised by a senior trauma surgeon for placement of distal femur interlocking screws in long cephalomedullary nails in a series of patients in our institution. Appropriate placement of the screws were checked using orthogonal views at the end of the surgical case.
Results / Discussion: There was high reliability of successful distal femur interlocking screw placement with this method, with significant reduction in the intra-operative image intensifier time and number of shots required for screw insertion. Only 1 (3%) screw was malpositioned on intra-operative check imaging, which required resiting. There was also a relative ease of replication of this technique, with successful insertion of distal interlocking screws by other trauma colleagues who have started utilising this technique.
Conclusion: Our experience with the Granhed technique using the uniplane C arm has been reliable. This technique results in reduction in adjustments required of the C-arm to obtain the perfect circle. The learning curve is also minimal. When adopting this technique, a true lateral view of the nail is important at the end of the procedure to ensure no malpositioning of the screw.

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Dual Plate for Olecranon Fracture – A Systematic Review
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Introduction / Objective: Olecranon fractures can significantly impair function if not properly treated. Dual plate fixation has been proposed to provide enhanced stability and improved outcomes compared to traditional single plate fixation. This systematic review aims to consolidate current data on the efficacy and safety of dual plate fixation for olecranon fractures.
Materials & Methods: Adhering to PRISMA guidelines, we conducted a comprehensive search of PubMed, Embase, and the Cochrane Library up to July 2024. Keywords and MeSH terms included "dual plate," "double plate," and "olecranon fracture." Human studies in English were selected based on predefined inclusion criteria. Data extraction followed the Cochrane Handbook for Systematic Reviews of Interventions.
Results / Discussion: Out of 129 identified studies, 12 were eligible for full-text review, and 8 met the inclusion criteria. Analysis of 148 cases was conducted on patients with an average age of 48.1 years and an average follow-up duration of 23 months. Main outcomes included post-operative range of motion with mean elbow range of motion being 120.2 degrees and mean forearm range of motion being 165.6 degrees. Functional scores of the Mayo Elbow Performance Score and Disabilities of the Arm, Shoulder and Hand questionnaire revealed good postoperative patient outcomes. Secondary outcomes highlighted low incidences of hardware-related complications and reoperation rates.
Conclusion: Dual plate fixation for olecranon fractures offers significant advantages in terms of postoperative range of motion and patient outcomes. Further high-quality randomized controlled trials are necessary to confirm these findings and guide clinical practice in the mangement of olecranon fractures.

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Bifocal Humerus Fracture Treated with Dual Philos Plating: A Case Report
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Introduction / Objective: Multiply fractured patients pose a challenge to surgeons. Of which, multifocal humerus fractures have an incidence of between 4.8 - 7.6%. Currently, the best approach for these multifocal humerus fractures is unknown and not described in literature. A balance has to be made between damage control orthopaedics (DCO) vs early total care (ETC). We aim to highlight the management of a unique polytrauma case in our institution with multiple upper limb fractures, to provide a guide for orthopaedic trauma surgeons in tackling similar cases.
Materials & Methods: We present a case report for a gentleman who came in with polytrauma to our institution.
Results / Discussion: A 44 year old man presented following a road traffic accident. He had a concussion, Thoracic 12 fracture, right galeazzi fracture, right distal phalanx thumb fracture, left proximal humerus extra-articular fracture and left distal humerus extra-articular closed fractures. Given the bilateral upper limb injuries, all the displaced upper limb fractures except the thumb fracture required fixation. We describe our approach to this interesting fracture pattern using a philos plate at either end of the humerus. The bifocal humerus fracture was approached in supine position using a minimally invasive technique. This allowed the contralateral forearm fracture to be operated on concurrently. Our technique not only saved operating time but eliminated the need for patient repositioning. The clinical and radiological outcomes were favourable with fracture union in 14 weeks with good range of motion by 6 months. The implants were removed at 10-months due to patient's preference.
Conclusion: Bifocal humerus fractures can be managed by our described method. In the setting of multiple injuries, ETC has to be considered in tandem with the patient's other comorbidities and thorough surgical planning is required to minimise operative time and second hit phenomenon from occurring**.**

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Propensity-score Matched Analysis to Evaluate the Safety and Utility of Intraoperative Cell-Salvaged Autologous Blood Transfusion in Metastatic Spine Tumour Surgery

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Introduction / Objective: Blood loss is an important consideration in metastatic spine tumour surgery (MSTS). Allogeneic blood transfusion (ABT) is the current standard of blood replenishment for MSTS despite known complications. Salvaged blood transfusion (SBT) through intraoperative cell salvage addresses majority of complications related to ABT. However, use of SBT in MSTS still remains controversial. We aim to conduct a prospective propensity-score (PS) matched analysis to evaluate the long-term clinical outcomes of IOCS in MSTS**.**
Materials & Methods: Our study included 98 patients who underwent MSTS from 2014-2017. A PS matched cohort was created using the relevant and available predictors of treatment assignment and outcomes of interest. Clinical outcomes consisting of overall survival (OS), as well tumour progression (TP) that was evaluated using RECIST (v1.1) were compared in the matched cohort.
Results / Discussion: Our study had a total of 98 patients with a mean age of 60 years old. A total of 33 patients received SBT. Overall median blood loss was 600 mL [IQR 300-1000 mL] and overall median BT was 620 mL (IQR: 110 – 1600 mL). Group PS matching included 30 patients who received ABT and 28 patients who received SBT. There was also no significant difference between the OS of patients who underwent ABT or SBT (p=0.197). SBT did not show any significant increase in 4-year tumour progression [PS matched HR 3.659; 95% CI 0.346-38.7; p=0.281].
Conclusion: SBT has shown to have similar clinical outcomes to that of ABT in patients undergoing MSTS, with potential benefits of avoiding complications and costs of ABT. This will be the first long term PS matched analysis to report on the clinical outcomes of SBT and affirms the clinical role of SBT in MSTS today.

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An Aanalysis of Osteochondral Lesions in the Ankle Joint in Patients Treated for Lateral Ankle Instability – One in Five Have It!

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Introduction / Objective: Lateral ankle sprains are common and are more complicated than they were assumed to be because of its substantial morbidities and association with cartilage lesions such as chondral or osteochondral lesions (OCL). We aim to review the prevalence and characteristics of cartilage lesions in patients treated for lateral ankle instability.
Materials & Methods: A retrospective review of 240 patients who were treated surgically for lateral ankle instability from 2017 to 2022 was performed. Patient demographics, cartilage lesion characteristics including location, chondral or osteochondral in nature and associated injuries were analysed**.**
Results / Discussion: There were 60 (25%) patients with cartilage lesions in the ankle joint of which all were osteochondral in nature. 83.3% of these OCLs were located at the talar dome while only 4 (6.7%) were located at the tibial plafond. Six (10%) patients had OCLs in both the talar dome and tibial plafond. These patients were predominantly males (45; 75%) with an average age of 34 years (S.D.=11.2) and average body mass index (BMI) of 26.8 (s.d.=4.4). 71.7% of them had recurrent ankle sprains and all of them had associated injuries such as deltoid ligament injuries (41.7%), peroneal tendon injuries (23.3%) and syndesmosis injuries (15%). On the talus (n=56), 62.5% of these OCL were located at the medial talar dome and 28.6% were on the lateral talar dome. Location of these OCLs was not significantly different in terms of age, gender, BMI, those with recurrent sprains and associated injuries.
Conclusion: Up to 25% of patients with lateral ankle instability had an osteochondral lesion where the commonest location was in the talus predominantly found at the medial talar dome. Physicians should be cognizant of associated cartilage lesions in the ankle when treating patients with lateral ankle instability.

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A Safe, Novel and Ingenious Method for Autogenous Bone Graft Storage in Spine Surgery with Constrained Resources – Operative Site as the Bone Bank

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Introduction / Objective: Our study aims to establish whether the bone graft harvested and stored in the surgical wound by our technique is safe, reproducible and preserves the viability of the graft. In doing so, it promises successful bony fusion in staged spine and orthopaedic surgeries.

Materials & Methods: A prospective clinical case series was conducted substantiating an ingenious method for autogenous bone graft storage in staged complex spine surgeries, in situations with constrained resources

Results / Discussion: We prospectively recruited 16 complex spinal deformity patients who underwent surgery in a resource constrained hospital over a period of 5 years. Duration between both stages was within 2 weeks. All patients showed successful fusion, with mean follow-up of 2.6 years. There were no cases of deep or systemic infection in our series. The surgeons found harvesting, storing and retrieval of graft to be straightforward. The main outcome measures during the first surgical procedure were the ease and success of bone storage in the surgical wound. During the second procedure, the surgeons reported ease of graft retrieval and handling the harvested graft.

Conclusion: The operative site provides an ideal, safe and reproducible location for bone graft storage for staged surgeries conducted in resource constrained situations. Osteogenic potential of the autogenous bone graft is retained. This can be extrapolated to other orthopaedic surgeries conducted under resource limited environments like in surgical camps or combat medical facilities

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Novel Filament-Free 3D Printable PEEK-HA-Mg_2SiO_4 Composite Material for Spine Implants

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Introduction / Objective: Current 'gold standard' (Titanium) for spine implants have high young's modulus which causes stress shielding and generates imaging artifacts. We aim to develop a novel filament-free 3D printable polyether ether ketone (PEEK)-hydroxyapatite (HA)-magnesium orthosilicate (Mg2SiO4) composite material with enhanced properties for use in tumour, osteoporosis and other spinal conditions. Our study evaluates the biocompatibility, imaging compatibility and printability of the material.

Materials & Methods: Materials were prepared in three compositions, A: 75% PEEK, 20% HA, 5% Mg2SiO4; B: 70% PEEK, 25% HA, 5% Mg2SiO4; C: 100 % PEEK. Biomechanical properties were analyzed per ASTM standards and biocompatibility of the novel material was evaluated using indirect and direct cell cytotoxicity tests. Cell viability of the novel material was compared to PEEK and PEEK-HA materials. CT & MR imaging compatibility of the novel material cage were evaluated using a phantom setup.

Results / Discussion: Composite A resulted in cages and screws of optimal printability. Biocomposites exhibited linear elastic characteristic under bending load. Composite A enhanced cell viability up to around 30% compared to PEEK and PEEK-HA materials. Our material induces bioactivity thus avoiding the risk of delamination. Composite A cage and screws also generated minimal/no artefacts on CT & MR imaging, comparable to PEEK and PEEK-HA materials.

Conclusion: Composite A demonstrated superior bioactivity and comparable imaging compatibility vs PEEK and PEEK-HA materials. Our biocomposite has Young's modulus comparable to that of cortical bone, facilitating reduction in stress shielding. Filament-free printing also showed reduction in man-hours and costs savings during printing. Our material displays an excellent printability for manufacturing into spine implants with enhanced mechanical and bioactive property. This novel composite is predicted to improve osseointegration and reduce the chances of construct loosening/implant failure in MSTS and osteoporotic fixations.

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The Impact of Lateralization and Distalisation Shoulder Angles – A Systematic Review of Range of Motion and Clinical Outcomes Following Reverse Shoulder Arthroplasty

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Introduction / Objective: Reverse shoulder arthroplasty (RSA) is an important surgical option for traumatic and degenerative shoulder conditions. The lateralization and distalisation shoulder angle (LSA, DSA) are important and reproducible radiographic parameters that describe of the center of rotation (COR) of the RSA prosthesis. However, there has been a lack of consensus on the effect of these estimates. This study aims to evaluate if there is a significant association between LSA and DSA and the post-RSA range of motion (ROM) and clinical outcomes.

Materials & Methods: The study was performed according to PRISMA guidelines and registered with PROSPERO. Three databases (PubMed, Embase and Scopus) were searched from date of inception to 29 April 2024. Human studies which reported coefficients describing the relationship between LSA and/or DSA, and post-RSA ROM and/or clinical outcomes were included. Risk of bias was assessed based on quality Quality In Prognosis Studies tool and quality of evidence was judged based on Grading of Recommendations Assessment, Development and Evaluation (GRADE) framework.

Results / Discussion: 14 studies comprising 3,085 subjects (mean age 72.2 years, female proportion 62.9%) were included. 11 studies were assessed to have low risk of bias, while three studies were assessed to have moderate risk of bias. Based on the GRADE framework, higher LSA and lower DSA were significantly associated with increased acromial and scapular spine stress fracture incidence, while lower LSA and higher DSA were significantly associated with increased post-operative deltoid stiffness. There was no significant association between either radiographic parameter with any ROM measure (forward flexion, internal rotation, abduction, external rotation) or clinical outcome score (CMS, ADLEIR, ASES, VAS, SANE, SST, SSV). The quality of evidence ranged from 'Low' to 'Very Low'.

Conclusion: Despite the theoretical implications of a lateralized and distalised COR, there is no consistent association between LSA and DSA and post-RSA range of motion and clinical outcomes.

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Does Concomitant Thyroid Disorder Lead to Worst Outcomes in Frozen Shoulder? – A Systematic Review

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Introduction / Objective: Frozen shoulder is a common pathology characterized by significant shoulder pain, range of motion limitation and physical disability. There exists a clear association between frozen shoulder and thyroid disease prevalence. However, the effects of concomitant thyroid disease on clinical outcomes of frozen shoulder are less well established. This study aims to evaluate if the presence of thyroid disease predisposes to poorer clinical outcomes in patients with frozen shoulder.

Materials & Methods: The study was performed according to PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines and registered with PROSPERO. Two databases (PubMed and Embase) were searched from date of inception to 9 January 2024. Human studies reporting outcomes of patients with concomitant thyroid disorder and frozen shoulder reported were included. Risk of bias was assessed based on quality Quality In Prognosis Studies (QUIPS) tool and quality of evidence was judged based on Grading of Recommendations Assessment, Development and Evaluation (GRADE) framework in the domains of range of motion, responsiveness to treatment or timeliness of recovery, and multidimensional scoring systems.

Results / Discussion: Seven studies comprising 167,397 subjects (mean age 52.7 to 58 years, female proportion 67.1%), including 49,314 patients with concomitant thyroid disorder and frozen shoulder were included. Based on the QUIPS tool, three studies were assessed to have low risk of bias, while four studies were assessed to have moderate risk of bias. Based on the GRADE framework, there was no consistent prognostic association between thyroid disorder and frozen shoulder in the domains of range of motion, responsiveness to treatment or timeliness of recovery, and multidimensional scoring systems. The quality of evidence ranged from 'Very Low' to 'Low'.

Conclusion: Despite the association between frozen shoulder and thyroid disorder prevalence, there is no consistent evidence in available literature to suggest that concomitant thyroid disorder predisposes to worst clinical outcomes.

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Scaphoid Fractures - Bridging the (Bone) Void with Conservative Management

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Introduction / Objective: Diagnosis, investigation and management of scaphoid fractures remain a topic of debate despite decades of progress. Radiological risk factors for non-union and avascular necrosis include displaced fractures, humpback deformity, proximal location of fractures and significant bone loss. Early surgery is recommended to reduce risks of these complications. This study describes two cases of scaphoid fracture with bone loss, treated conservatively. Both subsequently achieved complete and successful fracture union.

Materials & Methods: This is a case report that describes 2 patients, who presented with scaphoid fractures at an average of 2 months post-injury. Scaphoid view x-rays were done during their first visits. Both patients had scaphoid waist fractures with significant bone loss. Both patients declined surgery and were treated with cast management. Both cases showed radiological and clinical union after cast treatment. Both patients were asymptomatic and returned to their baseline activities.

Results / Discussion: In cases of scaphoid fractures with bone loss, surgical fixation or bone grafting is typically recommended to mitigate the risks of non-union, avascular necrosis, and subsequent secondary arthritis. This case series demonstrates that, in instances of delayed presentation of scaphoid fractures with significant bone loss, immobilization alone may facilitate fracture healing. Additionally, the authors suggest that the radiographic evidence of bone resorption observed on plain X-rays may significantly lag behind the actual clinical union of the fracture.

Conclusion: This case report seeks to contribute to the limited existing literature on the non-surgical management of displaced scaphoid fractures with bone loss. These cases demonstrate that fracture union can still be achieved through conservative management alone.

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Clinical Application of 5G-based Telerobot-assisted Internal Fixation for Thoracolumbar Fractures

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Introduction / Objective: To investigate the clinical outcome of telerobot-assisted internal fixation in the treatment of thoracolumbar fractures. To Provide evidence for the clinical application of 5G-based telerobot-assisted spine surgery.

Materials & Methods: This study retrospectively analyzed 48 patients accepted internal fixation surgery by experts from Beijing Jishuitan Hospital remotely manipulating orthopedic robot of other hospitals from April 2021 to December 2021. Outcome of fixation, complications and success rate of communication were collected to evaluate the clinical outcome of telerobot-assisted surgery.

Results / Discussion: A total of 48 telerobot-assisted internal fixation surgeries were successfully completed, with an average operation time of 93.23 ± 33.3 min. A total of 288 pedicle screws were placed, 254 (88.19%) were grade A, 26 (9.03%) were grade B, and 8 (2.78%) were grade C. The clinically acceptable rate of screw placement (Grade A + Grade B) was 97.22%. The postoperative height of the fractured vertebral body was greater than that preoperatively (63.15±13.69% vs. 86.93±8.41%, $P < 0.001$). There were no communication failures, robot failures, and no perioperative complications.

Conclusion: Telerobot-assisted internal fixation surgery for thoracolumbar fractures could achieve good fracture fixation. Telerobot-assisted thoracolumbar internal fixation surgery based on 5G network is safe and effective.

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Surgical Intervention within 48-hours of Admission for Elderly Hip Fractures Reduces Post-operative Complications but does not Clinically affect 1-year Mortality or Functional Outcomes: A Matched Cohort Study of 1776 Fractures

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Introduction / Objective: Elderly patients with hip fractures can benefit from surgery, though optimal time to surgery is controversial. Some studies report reduced mortality from early surgery (<48 hours). The aim of this study was to determine if delay to surgery of more than 48 hours was associated with poorer functional outcomes and increased 1-year mortality rates for elderly hip fractures.

Materials & Methods: A retrospective review of elderly hip fracture patients in a single institution was conducted. Patients were divided into 2 groups depending on hours from admission to surgery: Group 1(<48 hours) and Group 2(>48 hours); these groups were 1:1 matched for the initial Modified Barthel's Index (MBI) and Charlson Comorbidity Index (CCI). Functional outcomes were reviewed. Similar matching and analysis was conducted between Group 3(<96 hours) and 4(>96 hours).

Results / Discussion: 2562 patients were eligible for the study. The point of inflection for ROC analysis regarding MBI was 60 hours, but its Area Under Curve (AUC) was 0.54. Group 1(n=888) had significantly better MBI scores at 6-months(mean 78.7(SD 19.9) vs. mean 75.5(SD 20.6)) and 1-year(mean 80.4(SD 20.1) vs. mean 76.9(SD 22.3))(p<0.001). although It did not meet the MCID MBI of 10. There was no significant difference in 1-year mortality (3.7% vs 4.4%). Delayed surgery past 48 hours significantly increased the risk of urinary tract infections, acute retention of urine, pneumonia and preoperative delirium. Similarly, there was no significant difference of mortality and functional outcomes between Group 3(n=302) and 4(n=302**).**

Conclusion: Delayed surgery for elderly hip fractures after 48 hours increases the risk of acute post-operative complications. There is no increase in 1-year mortality and no clinically important deterioration of MBI if operated on after 48 hours. Our study demonstrates reassuring results even if surgery may be delayed past 96 hours.

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Impact of Chronic Kidney Disease in Patients with Intertrochanteric Hip Fractures – How Do They Fare?

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Introduction / Objective: Intertrochanteric (IT) hip fractures pose a significant burden on individual's heath and healthcare systems. This study aims to compare postoperative outcomes, complications and mortality after IT hip fracture surgery for patients with and without chronic kidney disease (CKD).

Materials & Methods: A retrospective study of 559 patients who were surgically treated for an IT hip fracture between 2017 to 2022 was performed. Patient demographics, fracture characteristics and outcome measures such as the Parker Mobility Score (PMS), length of stay (LOS), mechanical complications and mortality rate were analyzed. These patients were divided to those with CKD (KDIGO Stages 3 to 5) and those without.

Results / Discussion: There were 68 (12.2%) patients with IT fractures that had CKD. 13 (19.1%) of these CKD patients required renal replacement therapy (dialysis). Patients with CKD had significantly lower PMS preoperatively compared to those without CKD although the PMS was not significantly different at 6 months and 1 year postoperatively. Additionally, patients with CKD had a significantly longer LOS than those without CKD (21.4 days vs 12.8 days; p=0.000) although there were no significant differences in mechanical complications and revision surgery between the two groups. CKD patients had significantly higher inpatient (8,8% vs 1.4%; p=0.002), 30-day (5.9% vs 1.2%; p=0.024), 1 year (25% vs 7.7%; p=0.000) and overall mortality rates (58.8% vs 32%; p=0.000) compared to those without CKD. Multivariate analysis identified CKD as an independent predictor of mortality in patients with surgically treated IT fractures.

Conclusion: CKD in patients with surgically treated IT fractures leads to significantly higher morbidities and mortality rates. Despite that, the PMS were not significantly different at 6 months and 1 year after surgery indicating that surgical intervention benefits those with and without CKD. These findings support the need to develop a patient-centric care strategy to reduce the rates of morbidities and mortality in patients with CKD.

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Implementing ERAS for Orthopedic Patients in Six-Parts Manner Based on Timeline

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Introduction / Objective: The Enhanced Recovery After Surgery (ERAS) is a concept of postoperative early recovery with reducing surgical stress and optimizing physiologic function by effective pain control, sufficient nutritional support, maintaining adequate skin cleanliness, and promoting early mobilization. In order to reduce postoperative complications, shorten length of stay, improve patient satisfaction and promote clinical outcome, we developed ERAS protocol for orthopedic patients in Taoyuan General Hospital, Taiwan. We compared the difference and improvement in Length of Stay (LOS), Case Mixed Index (CMI) and ratio of Diagnosis Related Groups (DRG) actual payment over cost.

Materials & Methods: The protocol is divided into six parts based on timeline including out-patient period, the day before surgery, preoperative period, intraoperative period, immediate postoperative period and the next day after surgery. Different measures were conducted since 2018, running as clinical pathway SOP's, with no extra paperwork, form filling or case manager intervention required. The data was collected and analyzed.

Results / Discussion: We compared the data before and after applying ERAS protocol in 2016 and 2023, the LOS decreased from 4.0 to 3.8 days which is lower than the average LOS of Taiwan National Health Insurance data of 4.0 days. The ratio of DRG actual payment over cost increased from 1.18 to 1.21, while CMI slightly increased from 1.19 to 1.20.

Conclusion: Clinical application of ERAS protocol for orthopedic patient in TYGH not only enhanced patient recovery with a shortened LOS, higher ratio of DRG payment and similar CMI by reducing postoperative complications, but also improved patient outcomes and satisfaction.

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Outcomes of Minimally Invasive Surgery Osteotomy Correction for Severe Hallux Valgus: A Systematic Review and Meta-analysis

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Introduction / Objective: The use of minimally invasive techniques in hallux valgus correction has been established in mild to moderate hallux valgus, however there has been no clear consensus on the outcomes of MIS techniques severe hallux valgus. This paper presents

a systematic review and meta-analysis to determine the clinical and radiological outcomes of patients with severe hallux valgus and underwent MIS corrective osteotomy.

Materials & Methods: The systematic review was conducted using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. All studies that presentation patients with severe hallux valgus (Mean preoperative HVA ≥ 40 ° and/or IMA ≥ 16 °) with clinical and/or radiological outcomes after minimally invasive osteotomy were included. The systematic review was conducted using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines**.**

Results / Discussion: 16 studies were included with 1170 feet. The average preoperative HVA was 36.0° and IMA was 16.9°. Post-operatively, AOFAS score significantly improve in all studies with a mean difference of 41.18 (95% CI 32.63, 49.74). All studies reported improvement in radiological parameters: mean improvement of hallux abductus angle of 24.1° (95% CI 28.39, 19.76), mean improvement in intermetatarsal angle of 9.0° (95% CI 10.5, 7.55) and mean improvement in the distal metatarsal articular angle of 8.0° (95% CI 12.15, 3.78). Patient satisfaction has average of 91.9% over 415 patients, 2.7% over 792 patients for postoperative infections, 4.4% over 284 patients with neurovascular injury and average of 2.9% over 981 patients for malunion, delayed union or non-union with a pooled average of 2.9%. Loss of correction, hallux varus and revision surgery have average of 8.0% over 564 and 3.1% over 465 patients and 6.7% over 659 patients respectively.

Conclusion: In the treatment of severe hallux valgus, the use of minimally invasive surgical techniques provide significant improvement in clinical and radiological parameters with low rates of complications.

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The Seamless Ward Initiative to Fast Track Discharges: the SWIFT Protocol Experience

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Introduction / Objective: The purpose of the study is to evaluate the implementation of an early discharge initiative for paediatric patients after emergency upper limb trauma surgery**.**

Materials & Methods: We piloted the Seamless Ward Initiative to Fast Track (SWIFT) protocol at an Asian tertiary paediatric hospital from September 2022 to December 2023. The protocol hinges on engagement and education of multidisciplinary teams throughout the perioperative period. Eligible patients who underwent emergency upper limb trauma surgery were transferred from the operation theatre recovery to the ward where they were reviewed promptly by nurses and the on-call Orthopaedic team to ensure stable vitals and no postoperative complications. Patients who met the discharge criteria were then discharged with caregiver education on home monitoring instructions and precautions. We reviewed the duration of ward stay post-surgery, duration of bed vacancy following patient discharge, daily ward charges in Singapore Dollars (SGD), presence of reattendances and complications from early discharge.

Results / Discussion: 69 patients underwent surgery for upper limb fractures, with 37 patients enrolled for SWIFT discharge and 32 discharged as per standard protocol. We found a 43% (234 minutes) and 74% (659 minutes) reduction in the post-operative ward stay duration for morning and evening cases respectively. Median bed vacancies were 366 minutes and 252 minutes for morning and evening surgeries respectively. Cost savings varied from SGD$80.35 up to SGD$940.55 a day depending on admission class and resident status. There were no readmissions or complications.

Conclusion: While the bulk of ERAS research centres around elective surgeries, our early discharge initiative focuses on emergency trauma surgeries in the paediatric population. The protocol significantly reduced post-operative stay without any increase in complications or readmissions. This would translate into increased cost-savings and better resource allocation in line with value-driven healthcare delivery.

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Factors Influencing Patient Satisfaction and Expectation after Hip Fracture Surgery.

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Introduction / Objective: Factors impacting patient satisfaction and expectations after osteoporotic hip fracture surgeries are not well defined. This study aims to identify factors which influence overall satisfaction and patient expectation after hip fracture surgery.

Materials & Methods: Retrospective analysis was conducted on a surgically treated prospective cohort of hip fracture patients (n=175) from 1st of January to 31st of December 2023. Significance of demographics, co-morbidities, pre and post-morbid patient reported outcome measures (PROM) scores for EQ5D, NPRS, HHS and SF36 were correlated against 6 months overall satisfaction (6-point Likert scale) and expectation (7-point Likert scale). Chi-square analysis and multinomial logistic regression was performed using SPSS (v29.0.2.0) with 0.05 significance level. Pearson's correlation was subsequently performed on significant factors.

Results / Discussion: The study population comprised 57 males and 118 females (Median age =78.8 years) of which 97 (57.4%) sustained neck of femur (NOF) fractures and 72 (42.6%) sustained inter-trochanteric (IT) fractures. Overall satisfaction was 94.3% (95.8% Intra-NOF group, 91.6% Intra-IT group) that was significantly impacted by 6 months physical functioning (PF) (M= 32.35, p=0.023, r= 0.304). This underscores the importance of early rehabilitation to optimize functional competencies recovery after surgery. Fracture type (p=0.021, r= 0.214) and 6 months role functioning (RF) (M= 27.81, p=0.05, r= 0.381) significantly impacted meeting patient expectation. Overall expectation met was 88.6% (91.75% Intra-NOF group and 83.3% Intra-IT group) with higher rates reported by NOF patients, due likely to hemiarthroplasty conferring immediate stability for NOF fractures with more predictable functional recovery. Positive correlation of 6 months RF with expectation met would align with post-operative resumption of activities specific to pre-fall social responsibilities**.**

Conclusion: Improved PF led to better satisfaction, while fracture type and RF were correlated with meeting patient expectation after hip fracture surgery. Understanding their impact will facilitate delivery of more holistic care to optimise patient reported outcomes.

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Selection of Antifungals in Bone Cements for the Treatment of Fungal Prosthetic Joint Infections: A Systematic Review

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Introduction / Objective: Although antibiotic-impregnated bone cement is widely used for treating bacteria prosthetic joint infections, the optimal type, dose and combination of antifungal-impregnated bone cement (AF-BC) for fungal PJIs (F-PJIs) remains unclear. This systematic review aimed to summarise the current literature on AF-BC use in F-PJI treatment.

Materials & Methods: A literature search was performed using Ovid Medline, Embase, CINHAL and Cochrane via the Ovid platform up to August 2023. Inclusion criteria included study involving F-PJIs with patients undergoing surgical revision using AF-BCs regardless of pathogen type or surgical treatment strategy. Exclusion criteria were studies that did not adequately report AF-BC outcomes in F-PJIs and studies falling into categories such as reviews, animal studies, in-vitro studies or mechanical studies.

Results / Discussion: Among the 25 studies included, 20 were case reports, four were retrospective studies and one was a prospective study encompassing a total of 102 cases. The mean age was 71.9 years (SD 9.7, range 34-89). Knees were the most commonly affected (78%), followed by the hip (20%), with the elbow and shoulder each involved in one case. Candida species were responsible for 95% of F-PJIs. Amphotericin-B was the preferred antifungal in 86% of cases with a mean dose of 0.37±0.25g per 40g of cement but ranged from 0.1-1.2g. Of the 81 cases that achieved infection-free survival, the mean AF-BC use duration was 25 weeks (range 3-60).

Conclusion: Our systematic review showed that a two-stage reimplantation using AF-BCs and systemic antifungal therapy was successful in treating majority of F-PJIs. Although specific recommendations cannot be made due to the small sample size, current consensus suggests voriconazole and liposomal amphotericin-B as preferred choices. Amphotericin-B (0.37±0.25g, range 0.1-1.2g per 40g of bone cement) and vancomycin was the most common AF-BC regime. Voriconazole (0.48±0.3g, range 0.2-0.6g per 40g of bone cement) was the next most common choice.

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Prosthetic Floating Knee - Concomitant Femur and Tibia Periprosthetic Fractures in a Patient with Previous Total Knee Arthroplasty: Surgical Planning and Outcome

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Introduction / Objective: While floating knee, a term used to describe concomitant ipsilateral femoral and tibial fractures, is uncommon, it is a rare occurrence with a total knee arthroplasty and poses challenges in management. We report a case of a floating knee with previous total knee arthroplasty and its management.

Materials & Methods: A 66-year-old male was involved in a road traffic accident and sustained a left distal femur and proximal tibia closed periprosthetic fracture as well as abrasions to both upper and lower limbs. There was no neurovascular compromise of the left lower limb. The fractures were reduced in the Emergency Department and a backslab was applied. The patient had undergone total knee arthroplasty of the left knee 2 months prior. He was planned for surgical fixation of his fractures. His surgery began with fixation of the femur with dual plate construct with bone grafting used to fill an area of metaphyseal bone void. Towards the end of the femoral fixation, the patient turned unstable with tachycardia, hypotension and desaturation and hence the decision to stage the tibial fixation as a second procedure was made. Haemorrhagic shock and obstructive shock from pulmonary embolism or fat embolism were the main concerns regarding his deterioration. After haemodynamic stabilization over the next few days, fixation of the tibia was performed with a plate and screw construct.

Results / Discussion: At 2 months follow up, the fracture was healing well, and the patient was ambulating with a walking frame. At 8 months follow up, the fracture had healed, and the patient was ambulating with a walking stick.

Conclusion: Fractures with prosthetic floating knee are unique and require surgical management tailored based on the individual fracture characteristics. Soft tissue envelope, bone stock and surgical planning around the implant are the main surgical considerations.

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Surgical Timing for Charcot Foot Reconstruction: Pattern of Paradigm Shift from A Systematic Review of Recent Literature

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Introduction / Objective: The optimal timing to surgically intervene in Charcot foot arthropathy remains controversial. Classical teaching avoids intervention in the active stage of Charcot foot, because of soft tissue and bony complications. However, several authors have advocated the paradigm shift to intervene early in active Charcot foot, to allow deformity correction and stabilization before further deformity develops. This article aims to investigate the current pattern of paradigm shift and the outcomes after intervention in the active and inactive stages of Charcot foot.

Materials & Methods: This study was done following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-analysis). A literature search was done on Pubmed, Embase, Cochrane Library, and Clinicaltrials.gov. We searched all relevant articles in unpublished sources such as conferences as well as the reference list of included studies. All relevant articles published in the last 5 years were included, excluding case reports.

Results / Discussion: 269 articles were screened, and 17 studies were included. There were 11 studies with surgery in the inactive stage of Charcot foot, 6 studies with surgery in both the active and inactive stages of Charcot foot and no studies in the active stage alone. The amputation rate for surgery in the inactive stage was 10.5% whilst active and inactive stages was 12.3%. The re-operation rate for surgery in the inactive stage was 31.2% whilst active and inactive stages was 50.0%. The non-union rate after surgery in the inactive stage was 13.0% whilst active and inactive stages was 32.5%.

Conclusion: Most surgeons still prefer to intervene surgically in the inactive stage of Charcot foot. Amputation rate, re-operation rate, and non-union rates were higher in studies that included surgery in both active and inactive stages of Charcot foot. Therefore, surgeons should be cautious in deciding optimal surgical timing for Charcot foot reconstruction and avoid the active stage of the disease if possible.

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A Case of Bisphosphonate Related Atypical Ulnar Fracture: Potential Challenges in Diagnosis and Management

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Introduction / Objective: Complications of prolonged bisphosphonates use are well studied, including the risk of atypical femoral fractures. Occurrences of atypical fractures in other sites are less observed. We report a case of atypical left ulnar fracture in a patient receiving risedronate therapy for 6 years**.**

Materials & Methods: We present the case of a 76-year-old Female with an atypical fracture of the ulna shaft upon lifting a 1 kg load. She had prodromal pain over her left forearm over past 3 months. There was no history of trauma. Radiographs taken reveal a transverse fracture of the ulna shaft, with cortical thickening over the fracture site and minimal comminution. Risedronate was held off since. She was initially managed with cast immobilization. However, radiographs taken at 1 month reveals minimal union and fracture displacement. Surgical fixation with plate and screws was performed. This was complicated by non-union post-op and she eventually required revision fixation with bone graft augmentation.

Results / Discussion: Compared to atypical femoral fractures, atypical ulnar fractures relating to bisphosphonate use is much less described. It was observed atypical ulnar and femur fractures shared many common characteristics. These include: 5 Major features- Minimal trauma, Transverse oriented fracture, Presence of anterior spike, Minimal comminution and Periosteal/endosteal thickening at fracture site. 5 Minor features- Diffuse cortical thickening at fracture site, Prodromal symptoms, Bilateral ulnar fractures, Delayed fracture healing, Previous atypical femoral fractures. Atypical ulnar fractures have a high rate of non-union with conservative management, and surgical fixation was commonly required.

Conclusion: Atypical fractures can occur in sites other than the femur. Prodromal pain in patients on bisphosphonates should prompt clinician to investigate carefully. Conservative management is associated with high rates of non-union. Meticulous debridement of the fracture site to remove diseased sclerotic bone should be performed during surgery, with a low threshold of using bone graft supplementation for best outcomes.

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Experience using CFR-PEEK Implants in Metastatic Spine Tumour Surgery; A Single Centre Experience

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Introduction / Objective: Titanium has been the conventional implant material of choice for fixation in both primary and metastatic spine tumour surgeries (MSTS). However, these implants result in artefact generation during post-operative Computed Tomography (CT) or Magnetic Resonance Imaging (MRI), resulting in poor planning of radiotherapy (RT) and suboptimal tumour surveillance. Carbon fibre-reinforced polyetheretherketone (CFR-PEEK) implants have gained momentum for instrumentation in MSTS due to their radiolucent properties. This in turn does not sacrifice the biomechanical strength of the implants. In this study, we compared the peri-operative outcomes, post operative imaging artefacts and dosimetric data of CFR-PEEK implants to titanium implants to asses for potential benefits in post-operative RT planning in patients who underwent MSTS.

Materials & Methods: This is a retrospective study involving 42 patients who underwent MSTS. Patient-related data including demographics, tumour pathology, intra-operative data, functional outcome, and RT-related data were collected and analysed for both groups. All patients were followed-up post-operatively for a minimum of 2 years or until demise, whichever was earlier.

Results / Discussion: In our study, 20 (47.6%) patients had CFR-PEEK implants, while 22 (52.4%) of patients had titanium implants used for MSTS. Both groups of patients had similar clinical outcomes for pain and overall survival predictability pre-operatively ($p>0.05$). Mean number of levels instrumented by titanium screws were 6.8 +/- 2.93, while for the CFR-PEEK screws were 4.07 +/- 1.05. Mean volume of artefact generated during post operative CT was 75.1 +/- 43.4 mm^3 in titanium group and 13.3 ± 14.2 mm^3 in CFR-PEEK group ($p=0.005$). The mean time taken to contour the artefacts was 17.3 ± 5.84 minutes in the titanium group, while the CFR-PEEK group took 9.60 ± 7.17 minutes ($p=0.049$).

Conclusion: Our study suggests that CFR-PEEK screws significantly reduce artefact generation and the time taken to contour them during post-operative RT planning, while delivering equivalent clinical and functional outcomes as compared to standard titanium implants.

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Comparison of Stand-Alone Anchored Cage vs. Plate and Cage System in Three-level Anterior Cervical Discectomy and Fusion for Degenerative Cervical Myelopathy

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Introduction / Objective: Degenerative cervical myelopathy (DCM) stands as the predominant cause of spinal cord dysfunction in adults globally. Compression of the cervical spinal cord due to degeneration results in symptoms of neck pain, fine motor impairment, and gait dysfunction. When conservative treatments fail, surgical intervention becomes necessary. Anterior cervical discectomy and fusion (ACDF) is a common approach for managing DCM. This procedure can utilize either standalone anchored cage (SAAC) or conventional plate and cage (PC) systems for multilevel decompression and stabilization.

Materials & Methods: Our study retrospectively reviews 51 patients who underwent three-level ACDF between January 2012 and December 2022 at the National University Hospital, Singapore. 25 patients received SAAC (SAAC group), and 26 patients received cage and anterior plate (PC group). Clinical and radiological outcomes were assessed and compared at the following timestamps: pre-op, immediate post-op and follow-ups at 6, 12, and 24 months. Statistical analyses were performed using SPSS version 19.0.

Results / Discussion: While both groups exhibited significant neurological and functional improvements post-operatively, differences emerged in surgical parameters and complications. Operative time and blood loss were significantly lower in the SAAC group compared to

the PC group, indicating potential advantages in surgical efficiency and reduced intraoperative morbidity with SAAC. However, there was a single incidence of subsidence noted in the SAAC group, suggesting a possible trade-off between intraoperative morbidity and long-term implant performance. Fusion rates at 24 months were similar between the groups, highlighting comparable efficacy in achieving spinal fusion.

Conclusion

Our study highlights the need for further research to clarify the optimal choice between SAAC and PC systems for multilevel ACDF. While SAAC may offer advantages in operative efficiency, possible higher subsidence rates warrant careful consideration. Comprehensive comparative studies with larger cohorts are essential to establish definitive guidelines that balance clinical outcomes, radiological outcomes, complications, and long-term viability in the surgical management of DCM.

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Role of PAX-7 as a Tissue Marker in Mangled Extremity: A Pilot Study

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Introduction / Objective: Mangled extremity is defined as a severe injury to a limb that often leaves its viability in doubt. It has also been defined as involvement of at least 3 out of 4 systems, i.e. bone, blood vessels, nerves and soft tissue. In the twenty-first century, the incidence of mangled extremity has risen in proportion to the increased number of motor vehicles on roads

Materials & Methods: A pilot study was prospectively conducted on 30 patients that presented with a mangled extremity to a level I trauma centre of North India from 1 January 2016 till 31 December 2016. All patients of age ≥18 years who sustained an injury of either upper or lower or both extremities, with either isolated injury or polytrauma and without medical comorbidities, were included in this study

Results / Discussion: Increasing trend towards positive expression PAX-7

Conclusion: It was concluded that the expression of PAX-7 is defnitely increased in the muscle tissue near the zone of injury in an attempt to accelerate the repair and regeneration of tissue. It further strengthens our hypothesis that the PAX-7 has a defnite role to play in predicting the regeneration ability and potential of traumatised muscle fbres and thereby may predict for better surgical outcome. Therefore, we strongly believe that, if explored meticulously in future, PAX-7 may have a predictive role, in association with various other blood or tissue markers, in deciding for limb salvage versus amputation or in predicting chances of postoperative complications like infection, delayed amputation, revision surgery, etc. However, many more studies may need to be conducted in near future with larger study cohorts and better resources in order to substantiate the exact role of PAX-7 markers in patients with mangled extremity.

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Outcomes of Isolated Endoscopic Repair of Gluteus Medius between 2 Different Repair Techniques (Side to Side versus Suture Bridge) with a Minimum of 2 Year Follow Up

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Introduction / Objective: To determine and report the early clinical outcomes of isolated endoscopically repaired gluteus medius using 2 different techniques (side to side versus suture bridge) in partial and full thickness tears.

Materials & Methods: 61 consecutive patients between 2013-2022 with gluteus medius tears (grade 2-4) identified on magnetic resonance imaging (MRI) underwent endoscopic gluteus medius repair with a minimum of 2 year follow up. All patients were evaluated with patient reported outcomes measures (PROM) scores pre and post operatively. The scores were the Modified Harris Hip (mHHS), Victorian Institute of Sport Assessment Gluteal (VISA-G) and the visual analogue scores (VAS). Statistical comparison between the pre and post-operative values were performed with a paired t test.

Results / Discussion: The average age of this patient cohort was 65 (range: 40-84) years old. 48 (78%) of these patients were female. There were 30 (49%) grade 2, 25(40%) grade 3 and 6 (11%) grade 4 tears. Follow-up was obtained on all the patients at an average of 70.7 months postoperatively (range: 24-142). 31 patients underwent a side to side repair whereas 30 underwent a suture bridge technique. Overall, there were improvements in all 3 scores for all the patients (mHHS, VISA-G, VAS). The mean mHHS improved from 32±19 (8-89) to 71±18 (24-91) postoperatively (p<.0001). The mean VISA-G improved from 34±19 (5-81) to 74±21 (29-100) postoperatively (p<.0001). Lastly the VAS improved from 7±2(1-10) to 3±2(1-8) postoperatively (p<.0001). The improvement in mHHS, VISA-G between both techniques were comparable with an average improvement of more than 30 in both scores. There were no complications in this cohort of patients

Conclusion: This study demonstrates that isolated endoscopic gluteus medius repairs can be an effective and safe option to treat gluteus medius tears with good satisfactory results at a minimum of 2 year follow up.

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Metal Augmented Glenoid Baseplates in Reverse Shoulder Arthroplasty: Minimum 5 Years' Follow-Up Outcomes

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Introduction / Objective: To report the radiographic results of porous metal-augmented baseplate and clinical assessment with minimum 5 years' follow-up.

Materials & Methods: Retrospective assessment of metal augmented baseplate with minimum 5 years' follow-up. AP views were used to assess initial (0 to 6 weeks) and final bone-implant contact, lucent lines, loosening or shift in position. Outcome measures were collected preoperatively and at final follow-up

Results / Discussion: 21 patients were identified. 3 patients were lost to follow-up, leaving 18 patients with complete clinical and radiographic assessment at mean 78,4 months (63-86) follow-up.

Active elevation improved from 95°±34°(10-140) preop to 140°±20°(90°-160°) postoperatively (p<0.005), external rotation improved from 10°±22° (-20° to 60°) to 48°±19°(10°-90°) postoperatively (p=<0.005) and internal rotation from sacrum to L3 vertebrae level (p=0.035). At follow-up, mean ASES score was 89 points (65-100), Constant score 73.5 points (60-87), SSV 87% (50-100).

Early postoperative radiographic assessment demonstrated incomplete bone-implant contact in 10/18 (55%) with visualization of a lucent line (partial, ≤50% of bone-implant interface in 9) and complete in 1. Eight of the partial contact cases became complete at final assessment. Overall, complete bone-implant contact was observed in 89% at follow-up. In one case (initial no bone-implant contact), lucent lines were present at follow-up around the inferior and central screw, at the back side of the metal augment with medial subsidence (loosening). No clinical consequence was observed (SSV 90%, Constant and ASES scores of 72 and 88 points, respectively)
Notching grade 1 was observed in 5 cases (28%). No revision surgery was recorded
Conclusion: Porous metal augmented glenoid baseplates provide stable initial fixation which is maintained at 5 years' follow-up. Initial partial (≤50%) bone-implant contact does not appear to be detrimental and bone integration is obtained in most cases. Conversely, complete lack of initial contact should be avoided to prevent loosening.

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Short Term Clinical and 3-dimensional(3D) CT Radiological Outcomes of Biconvex Posterior Augmented Glenoid(PAG) Implants in Anatomic Total Shoulder Arthroplasty (aTSA)

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Introduction / Objective: To determine (1) if biconvex PAGs combined with patient specific instrumentation (PSI) can correct glenoid version and humeral head subluxation and (2) present its short-term 3D CT radiological and clinical outcomes**.**

Materials & Methods: 10 consecutive shoulder (9 patients) with Walch B2 osteoarthritis of the shoulder and underwent aTSA with a keeled augmented biconvex PAG(15°, 25° or 35°) with a minimum of 2 years follow up. All patients underwent a complete clinical and radiographic evaluation at 2 years with range of motion (ROM), strength, ASES, Constant-Murley shoulder outcome and Subjective Shoulder Value(SSV) score recorded. Glenoid version, inclination and humeral head subluxation were calculated using a software based off 3D CT scans with manual segmentation. Statistical comparisons were performed with a paired t test.

Results / Discussion: There were improvements in glenoid version and humeral head subluxation in all shoulders on 3D CT scans. Mean glenoid version improved from -13.6°±4.2°(-6° to -19°) to -2.9°±3.2°(1 to -8) postoperatively (p=0.00002) and humeral head subluxation was 76.2±5.7% (66-88%) to 70.7±8.9% (57-82%) postoperatively (p=0.1622). The difference in planned and postoperative version was -0.9°±2.8. All range of motion improved and was statistically significant at follow up. VAS decreased from 5.2±2.4(1-9) to 0.4±0.9 (0-3) (p=0.0001). ASES score improved from 39.3±20.9 (5-77) to 95.9±8.4 (73-100) (p=0.0002). Constant score improved from 42.4±16.7 (17-70) to 79.6±4.1(74-86) (p=0.0009). SSV improved from 41±15 (20-60) to 93±9 (70-100) postoperatively (p=0.0004). All shoulders had a Lazarus score of 0 (no radiolucency seen about the keel) at 2 years follow up.

Conclusion: Biconvex half-wedge PAG implants combined with PSI can be a good option to treat shoulders with Walch B2 OA. They can correct glenoid version and humeral head posterior subluxation effectively with good short term clinical and radiological outcomes.

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High Return to Prior Level in Professional Sports Athletes after Knee Dislocation (KD III to V) with a Single Stage Reconstruction: A Retrospective Case Series

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Introduction / Objective: The purpose was to (1) assess the return to play, timing, and return to prior level rates and (2) to analyze the reoperations rate in a group of professional athletes treated for knee dislocations with a single stage repair/reconstruction. The hypothesis was that when managed with a standardized surgical approach and postoperative protocol, this specific group of patients will be able to go back to their prior professional sporting levels

Materials & Methods: Consecutive professional athletes who underwent surgery after sustaining knee dislocations (KDIII to V) between 2007 and 2022, with a minimum 2-year follow-up period were included. Patient information included demographic and injury details, surgical procedures, and postoperative outcomes. Primary outcomes were assessed for return to play (RTP), time to RTP, and return to prior level (RPL), with reoperation rates and complications as secondary outcomes**.**

Results / Discussion: A total of 9 professional elite athletes were included suffering from MLKI's, 50% KDIII M (5), 20% KD III L (2), 10% KD IV (1) and 20% KD V (2). 8 patients were operated with the first 3 weeks. 88.8% of patients (n = 8/9) returned to their previous sport within an average of 12 months (8-22) all of whom resumed activities at pre-injury levels with excellent post-operative outcomes, IKDC 89.9 (71.3-97.7) and Lysholm 91.1 (80-98). Two patients (22%) experienced common peroneal nerve palsy preoperatively and 3 patients (33.3%) underwent secondary surgeries, including planned arthroscopic arthrolysis for stiffness, with one screw removal.

Conclusion: Early single-stage surgery in professional sports athletes with MLKIs after knee dislocation can lead to high rate of return to sport and return to prior levels, with a low rate of reoperations.

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Finger-pointing to the Wrong Conclusion? Pilot Study into the Validity of Common Method of Assessing for Integrity of Flexor Digitorum Superficialis by Blocking Flexor Digitorum Profundus Function

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Introduction / Objective: A commonly taught method of assessing integrity of FDS function involves blocking corresponding FDP function through quadrigia effect by keeping the other 3 fingers in extension hence immobilizing FDP to these fingers. It is thought that any active flexion of the PIPJ of the tested finger must be due solely to FDS function. This conclusion is likely erroneous as the innervation of FDP to index (I) and middle finger (II) is attributed to the median nerve, whilst ring (III) and little (IV) fingers is the ulnar nerve. The muscle belly of FDP to the index finger is usually independent ie Flexor Indicis Profundus (FIP). The FDP III and IV tendons usually originate from the same muscle belly but may fuse at the midpalmar level in some individuals. Muscular slips may connect FDS to the corresponding FDP. Up to 20% don't have FDS IV. Hence 'fixing' FDP function to test FDS is likely invalid for index and little fingers.

Materials & Methods: 100 hands without prior injury (50 randomly selected adult volunteers) were examined using the standard superficialis test (STT) for FDS function. Whilst placing fingers in the same position for STT, the DIPJ flexion excursion and **strength is determined. If** normal/near normal active DIPJ flexion and FDP strength, this means the fixing of FDP function by quadrigia effect is insufficient. Hand dominance, and usual occupation were recorded and compared.
Results / Discussion: 98% has intact FDP function to index finger where testing for FDS integrity using STT. Testing little finger found 72% FDP integrity. This is not affected by hand dominance, although FDP strength is, as expected.
Conclusion: Performing STT using the theoretical quadrigia effect can lead to misleading conclusions particularly when assessing FDS integrity of index and little finger. It is time to consider promotion of other testing methods, for example Doğan et al, 2000.

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Traumatic Abdominal Wall Hernia in Context of Pelvic Fracture - A Case Report

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Introduction / Objective: Traumatic abdominal wall hernias (TAWH) are rare but clinically significant injuries following traumatic injuries. TAWH arises as a result in shear forces to the abdominal wall and a sudden increase in intra-abdominal pressure following direct trauma. Its association with pelvic fractures is further more uncommon and infrequently described in literature. TAWHs may not present with obvious clinical signs and 20% of TAWHs are missed on initial diagnosis**.**
Materials & Methods: We present the case of a 31-year-old male motorcyclist involved in a collision with a motor car, sustaining a pelvic fracture and left femur shaft fracture. This patient was noted to have a traumatic abdominal wall injury with a large fascial defect only during definitive fixation of his pelvic fracture. He required subsequent surgical repair of the defect at a separate operative setting.
Results / Discussion: TAWH is a rare type of injury following a high or low velocity trauma to the abdomen. A sudden application of a force to the abdomen results in a rise in intra-abdominal wall pressure leading to the disruption of the abdominal fascia and muscle wall layers. The most common clinical signs of TAWHs include a clearly palpable hernia (31%), or otherwise abdominal skin ecchymoses (49%). However, in other cases of TAWHs, there can be a paucity of obvious clinical signs during presentation. The diagnostic modality of choice for TAWHs is CT scan imaging.
Conclusion: It is important for clinicians to be aware of TAWHs and their association with abdominal/pelvic injuries. CT scan is the diagnostic modality of choice. Timely diagnosis allows for better planning and coordination of care across relevant surgical subspecialties, minimizes the number of operations the patient has to go through and avoids delayed complications**.**

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Is there a Need for Exploration in Pulseless Supracondylar Fractures of the Humerus: A Systematic Review and Individual Patient Data Meta-analysis

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Introduction / Objective: Different approaches have been proposed to treat patients with pulseless supracondylar humeral fractures (SHF), one of the most common elbow fractures. Thus, we aim to analyse the current practices and outcomes of patients who have undergone different treatment options for pulseless SHF to determine the need for surgical exploration.
Materials & Methods: Electronic databases including PubMed, Embase, and The Cochrane Library were explored. We included case reports, case studies and cohort studies. We analysed pulseless SHF patients from all age groups and an individual patient data meta-analysis was done to evaluate key outcomes of surgical exploration vs no surgical exploration in pulseless SHF patients.
Results / Discussion: Overall, the data for 1070 individual patients from a total of 48 studies were included. Pulseless SHF patients with open fractures ($p<0.001$), pucker sign ($p=0.003$) and ecchymosis ($p=0.002$) were more likely to undergo surgical exploration. However, the neurological status in pulseless SHF patients had no relation to rates of surgical exploration ($p=0.382$) and also does not affect complication outcomes ($p=0.326$) nor the need for vascular intervention ($p=1.00$). However, patients with pale pulseless SHFs were more likely to undergo surgical exploration ($p<0.001$), were more likely to have disrupted arteries ($p<0.001$), more likely to require vascular intervention ($p<0.001$), and have a higher likelihood of complications ($p<0.001$). Notably, there is no significant difference in overall complications between those who underwent exploration of arteries and those who did not among pink pulseless SHF patients ($p=0.230$).
Conclusion: For pink pulseless patients, our recommendation would be to monitor closely as long as the hand is pink, warm and well perfused as we found no difference in outcomes compared to patients who underwent exploration. However, for pale pulseless SHF patients, we recommend expedient and timely surgical exploration and vascular intervention as they are associated with higher rates of arterial disruptions so as to prevent long-term complications.

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Iliolumbar Vein Injuries In OLIF 25

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Introduction / Objective: Ante-psoas, or the oblique lateral lumbar interbody fusion (OLIF) techniques are widely employed for its benefits of indirect decompression, restoration of lordosis and foraminal height, and good mechanical stability for fusion. However, there are potential dangers with such techniques, such as approach-related complications.
Materials & Methods: We describe a case of an iliolumbar vein injury during an OLIF and aim to provide a review of the relevant anatomy of the oblique corridor as well as the iliolumbar vein. Additionally, we aim to highlight key surgical pearls for the prevention of such complications and provide management strategies.
Results / Discussion: A 61-year-old lady with asthma and liver cirrhosis presented with lower back pain and neurogenic claudication of 1 year duration. Radiographs and MRI lumbosacral spine revealed L4/5 spondylolisthesis with severe spinal stenosis. She was diagnosed to have L4/5 spinal stenosis with dynamic instability and underwent conservative treatment for 3 months. As her symptoms did not improve

with non-surgical measures, L4/5 OLIF with percutaneous L4/5 pedicle screw fixation was planned. An oblique skin incision was made 4 cm anterior to the anterior border of the L4/5 disc space. After cutting down **to the retroperitoneal space, the retroperitoneal fat was** pulled anteriorly, with the finger aimed posteriorly to prevent a peritoneal breach. The anterior border of the psoas was visualised and retroperitoneal fat was generously dissected cranially and caudally. However during posterior psoas retraction, sudden excessive bleeding occurred. The cause of the bleeding was discovered to be an iliolumbar vein injury at L5. After successful repair, the planned OLIF was converted to an open L4/5 transforaminal lumbar interbody fusion (TLIF) which proceeded uneventfully.

Conclusion: We believe that the OLIF technique is a powerful tool in the spine surgeon's armamentarium and a sound understanding of the anatomy and knowledge in preventing potential surgical complications is key to success in the OLIF.

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Accuracy of Postero-Superior Iliac Spine Reference Array Placement in Robot-Navigated Spine Surgery.

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Introduction / Objective: Computer-navigated spinal instrumentation requires placement of a dynamic reference base (DRB), typically intraosseously in the ilium via a percutaneous stab incision on the posterior superior iliac spine (PSIS) entry point. Data describing the accuracy and complications of DRB placement is limited in literature. The aim of this study is to measure the accuracy of DRB placement in the PSIS, determine its exact placement trajectory and determine the prevalence of related complications

Materials & Methods: Single-centre, institutional board approved, multi-surgeon retrospective analysis of 69 included DRB placements from 51 robot-assisted lumbar posterior instrumentation procedures. Pin entry point and trajectory were mapped out the intra-operative O-arm computed tomography scans, and skin-to-PSIS depth was also measured. Patient demographics (age, gender, BMI), surgical outcomes and post-operative complications are also recorded.

Results / Discussion: Of the 69 PSIS pin placement, 47 (68.1%) had the correct entry point on the PSIS, and 35 (50.7%) of them were placed correctly within the ilium without breaching a second cortex. Skin-to-PSIS depth was significantly higher in patients with misplaced DRB placement, while age, gender and BMI were similar. Of those with misplaced DRB (n= 34), 1 had delayed pin site wound healing.

Conclusion: Percutaneous PSIS DRB placement has poor accuracy, with skin-to-PSIS depth being a significant factor ($p = 0.005$). To avoid complications from misplaced DRB placement, the authors recommend the use DRB placement on the iliac wing or on the PSIS following the trajectory used in pelvis posterior column fracture fixation, using fluoroscopy intra-operatively to ensure the DRB pin position.

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Use of Antibiotic Impregnated Calcium Sulphate Beads in Musculoskeletal Infections and Trauma: A Single-Center Experience

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Introduction / Objective: Biocomposite products have gained increased traction in the management of musculoskeletal infections. Stimulan is a absorbable calcium sulfate antibiotic carrier which may be applied directly onto the target soft tissue or bone, and provides flexibility of antibiotic choice. This study aims to review the clinical experience and effectiveness of Stimulan in the surgical management of patients with a variety of musculoskeletal infections and trauma-related complications.

Materials & Methods: A retrospective review was performed for cases utilizing Stimulan antibiotic beads over a one-year period from May 2023 to May 2024 at Khoo Teck Puat Hospital, Singapore. A total of 20 patients underwent 23 surgeries with Stimulan application. Antibiotic choice was tailored based on culture and sensitivity results, between Vancomycin and Gentamicin. Patient outcome was reviewed at the time of the latest follow up, including re-infection rate and evidence of bone union/fracture healing**.**

Results / Discussion: A total of 23 surgeries with Stimulan application were performed over a 12 month period. Mean follow up was 7 months (range 1 to 12 months) from date of surgery. 11 cases (47.8%) were performed in the setting of fracture-related infection (FRI), 6 cases (26%) for prosthetic joint infections (PJI), and 4 cases (17.4%) for non-septic fracture non-union. 2 cases (8.7%) were performed in the setting of trauma, comprising of one periprosthetic fracture fixation, and one open tibial plateau fracture wound debridement. 20 of 23 patients (87%) were noted to have no clinical evidence of infection or non-union at time of latest follow up. A total of 3 patients presented with infection requiring further surgical management, with one each from the FRI and PJI groups, and one from the non-union group of patients.

Conclusion: The use of absorbable antibiotic-impregnated biocomposites appears to be an effective adjunct in the surgical management of musculoskeletal infections and trauma and warrants further follow up studies.

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The Keel Plays a Role in Periprosthetic Fractures of the Tibial Component in Cementless Unicompartmental Knee Replacement (UKR)

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Introduction / Objective: In cementless UKR, interference fit of the tibial component may reduce the structural integrity of the proximal tibia, increasing the risk of peri-prosthetic fractures. The risk of such fractures is 7 times greater in very small tibias. The mechanical processes underlying such fractures are not understood. This study explores the effect of keel-related features in fracture risk of these very small tibias.

Materials & Methods: This study compares the effect of keel and slot depth (standard vs 33% smaller vs no keel/slot) and loading position (anterior/posterior gait range limits) on fracture load and path. 3D-printed titanium tibial components were implanted in bone-analogue foam machined to a CT-reconstructed small tibia which experienced a peri-prosthetic fracture. Implantation was performed using surgical instrumentation and technique. Implants were loaded to failure. Load-to-fracture and fracture paths were assessed.

Results / Discussion: Introducing a standard slot reduces load-to-fracture by 50% (1421N vs 710N, $p<0.0001$). Press-fitting a standard keel into this slot further reduces load-to-fracture by 40% (710N vs 423N, $p=0.0001$). A small keel increases load-to-fracture by 60% (683N

vs 423N p=0.0004). Standard-sized keel resulted in significantly more vertical fractures (standard 8.2° vs shallow 15.5° vs no keel 21°, p<0.0001), consistent with fracture patterns seen clinically. There was a difference in load-to-fracture between loading positions with no keel (p=0.0038), but this was absent in standard (p=0.330) and shallow (p=0.635) keels.

Conclusion: Introduction of slot, and insertion of keel, both independently increase the risk of a peri-prosthetic fracture in very small tibias. Fracture lines follow the path of the keel and mask loading position effects, suggesting that these fractures are driven by the keel. A smaller keel significantly reduces the risk of peri-prosthetic fracture, but further assessment is needed to determine viability to fixation. Surgeons implanting cementless UKR tibias should avoid oversizing tibial components and slots.

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Interference and Keel Design Significantly Influence Sagittal Micromotion in Cementless Unicompartmental Knee Replacement (UKR)

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Introduction / Objective: In cementless UKR, early post-operative tibial fractures are 7x more common in very small tibias. This fracture risk is reduced when a smaller keel is used. However, a smaller keel may impair primary fixation. This may be compensated by reducing damage to the bone lining the slot during the press-fitting process. A new small, smooth-bottomed keel was designed to explore this. This study assesses the effect of different keel design elements (*standard*, *no-interference*, *no-keel*, *small-smooth-bottomed*) on sagittal micromotion of the standard tibial component.

Materials & Methods: A high-resolution uniplanar Digital Image Correlation setup was developed, and validated to be accurate to 50 micrometres. 3D-printed titanium tibial components were implanted into bone-analogue foam which was machined to a CT-reconstructed small tibia, using surgical instrumentation and technique. Tibias were loaded to 200N axially in physiological loading positions: 8mm posterior to midpoint representing a step-up, and 15mm posterior to midpoint representing a lunge, and corresponding micromotion was calculated.

Results / Discussion: In all tests, anterior lift-off was consistently the largest micromotion observed. In 'step-up' loading, a *standard* keel moved more than the *no-interference* and *no-keel* variants (340µm-vs-63µm-vs-30µm, p=0.002). However, compared to *standard* keel, *no-interference* and *no-keel* micromotion dramatically increased in 'lunge' loading (521µm-vs-826µm-vs-1003µm, p=0.039). The new *small-smooth-bottomed* keel performed similar or better than the *standard* in both tests (step-up 125µm-vs-340µm p=0.03, lunge 273µm-vs-521µm p=0.116). Values above are for largest micromotion; if overall micromotion was considered, all differences stated above were significant (largest p=0.006).

Conclusion: Counter-intuitively, interference increases micromotion in a step-up motion, likely due to implant pivoting around the fixed bone-keel interface. However, the keel is protective during the deeper lunge motion, though there was still substantial implant micromotion. To avoid excess implant micromotion prior to remodelling, patients should be advised against deep knee flexion early post-operatively. A new keel design may mitigate this issue.

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Changes in Bone Density below the Cementless Unicompartmental Knee Replacement Tibial Component are not related to Patient-reported Outcomes

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Introduction / Objective: After remodelling, loss of bone density beside the keel of cementless UKR tibial components has been observed as a potential cause of concern. How this affects patient-reported outcomes, and therefore its clinical implications, are unclear. This study aimed to assess the effect of cementless UKR implantation on tibial bone density, and to explore its relationship to patient demographics and outcomes.

Materials & Methods: This prospective study assesses 115 anterior-posterior radiographs from cementless UKR postoperatively and five years after surgery. Gray values from nine equally-sized regions around the tibial component keel were collected, and normalised to average bone gray value to enable inter-radiograph comparison. Change between the post-operative and 5-year radiographs (indicating bone density) was calculated and effect on 5-year patient demographics and pain and functional outcomes was assessed. Intermittent and Constant OsteoArthritis Pain (ICOAP), Oxford Knee Score (OKS), and Tegner Activity Score (TAS) were assessed in all patients. Repeat measurements were performed by two operators to assess reliability.

Results / Discussion: There was excellent inter-operator correlation (bias mean -0.54%, standard deviation 1.38%). Across patients, there was increased relative radio-opacity directly below the keel (9.1% vs 3.3%: p<0.0001), and reduced density beside the keel (-5.9% vs -1.0%, p<0.0001); comparisons to adjacent regions. A composite 'overall remodelling' score was generated, which averaged the changes directly below and beside the keel. Overall remodelling was significantly greater in smaller tibias (p=0.006), and females (p=0.01). Remodelling was unrelated to age, BMI, and Patient-Reported Outcomes (OKS, ICOAP, TAS p>0.05).

Conclusion: Remodelling patterns suggest increased loading below and decreased loading adjacent to the tibial keel. Remodelling is greater in smaller tibias and females. Remodelling is not related to any patient-reported pain or function five years after surgery, suggesting that remodelling is successful in removing any mechanical source of bone pain. Therefore, clinicians viewing such remodelling can ignore them as they are of no consequence.

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A Systematic Review and Meta-Analysis of Hybrid vs Cemented Stems – Which Method is More Optimal for Revision Total Knee Arthroplasty?

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Introduction / Objective: The number of primary and revision Total Knee Arthroplasty (TKA) cases are expected to increase in future. There are various advantages and disadvantage to employing either of the two main types of stem fixation methods – cemented or hybrid

technique. This review aimed to study the most optimal fixation method for revision TKAs by comparing radiological outcomes and re-revision rates.

Materials & Methods: A systematic review and meta-analysis was performed using PubMed and Cochrane Library from 2010 to identify studies explicitly comparing outcomes between cemented against hybrid fixation revision TKA techniques, with a minimum follow up of at least 24 months. A total of 8 studies was included in this review. Egger's test and visual inspection of the funnel plot did not reveal publication bias.

Results / Discussion: There was no statistically significant difference in radiological failure and loosening (OR 0.79, CI 0.37 – 1.66, I^2 = 29%, p = 0.22), all causes of re-revision (OR 1.03, CI 0.73 – 1.44, I^2 = 0%, p = 0.56) and aseptic revision (OR 0.74, CI 0.27 – 2.02, I^2 = 0%, p = 0.41) between cemented and hybrid techniques. Functional and pain outcomes compared between the two fixation techniques were largely similar across the studies included in this meta-analysis.

Conclusion: Despite a trend favouring hybrid stems in revision TKA, current evidence revealed that radiological outcomes and re-revision rates are largely similar between cemented and hybrid fixation techniques.

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Comparison of Early-stage Knee Osteoarthritis Induced by Medial Meniscus Tear vs Tibial Osteotomy in the Rat Model

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Introduction / Objective: Medial meniscus tear (MMT) is a common method to induce osteoarthritis in rats, but mimics secondary osteoarthritis. A novel method of carrying out a medial wedge closing tibial osteotomy (TO) has been recently developed to induce primary osteoarthritis. Our study aims to validate it, compared to MMT.

Materials & Methods: Twenty rats were divided equally into 2 groups. Outcome measures such as histology graded according to Osteoarthritis Research Society International (OARSI) guidelines and computed tomography (CT) scans were analyzed at 6 weeks post-operatively. Observational gait analysis and serum biomarkers such as C-terminal cross-linked telopeptides of type II collagen (CTX-II) and *interleukin*-1 beta (IL-1β) were collected at 2 weekly intervals up to 6 weeks post-operatively.

Results / Discussion: Serum CTX-II and IL-1β levels did not reveal a statistically significant difference across all time points between the 2 groups. CT grading was significantly more severe (2.80 ± 1.10 vs 1.40 ± 0.548, p = 0.0389) in the MMT group compared to the TO group. In addition, histological gradings such as calcified cartilage score (2.10 ± 1.91 vs 0.00 ± 0.00, p < 0.01) and cartilage degeneration score (4.80 ± 5.18 vs 0.00 ± 0.00, p < 0.01) revealed significantly more severe osteoarthritis in the MMT compared to TO group. Synovial membrane score did not reveal a statistically significant difference (1.10 ± 0.994 vs 1.00 ± 0.00, p = 1.00).

Conclusion: With the TO rat model, we can study earlier stages of primary osteoarthritis compared to MMT which commonly causes accelerated pathology in secondary osteoarthritis.

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Early Results of Navigation versus Robotic Assisted Lumbar Fusion - A Cohort Matched Analysis

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Introduction / Objective: This study aims to compare robotic-assisted and navigation-based spine surgery in single- and double-level interbody fusion cases with respect to operative duration, intraoperative blood loss, and length of hospital stay.

Materials & Methods: A retrospective cohort study was conducted at Tan Tock Seng Hospital, Singapore, on patients who underwent single- and double-level transforaminal and oblique lateral lumbar interbody fusion (TLIF and OLIF) surgeries by a single surgeon with the use of robotic-assisted spine surgery between October 2022 and May 2024, and patients who underwent navigation-based spine surgery prior to the introduction of robotic system in the institution between January 2018 and December 2020. The first 20 cases that underwent robotic surgery were excluded to account for its learning curve. Patient groups were matched for analysis based on the number of levels of fusion and surgical approach (TLIF or OLIF). Data on demographics, comorbidities, diagnoses, operative duration, intraoperative blood loss, and length of hospital stay were collected and analyzed**.**

Results / Discussion: There were 36 robotic cases and 45 navigation cases in our matched analysis. The mean operative duration for single and double level OLIF cases were significantly shorter in robotic surgery compared to use of the navigation system (p < 0.05). The blood loss was lower with robotic surgery in double-level TLIF and single- and double-level OLIF cases with robotic surgery, although not reaching statistical significance. The length of stay was also shorter in single-level TLIF and double-level OLIF cases, but not reaching statistical significance.

Conclusion: The findings of this study suggest that robotic-assisted spine surgery could offer advantages over navigation-based techniques in terms of reducing operative duration, minimizing intraoperative blood loss, and shortening the length of hospital stay. These benefits may contribute to improved patient outcomes, reduced perioperative complications and decreased healthcare costs.

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Management of Comminuted Extra-articular Proximal Radius Fracture (2R1A3) in a Resource Poor Setting: A Case Report

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Introduction / Objective: There has been little debate over the treatment of fractures of the forearm among orthopaedic surgeons. Surgical management most often refers to open reduction and plating or intramedullary nailing.

Materials & Methods: The authors presented a case of 67 year old male with a comminuted proximal radius which is not suitable for fixation with a 3.5 mm plate due to the proximity of the fracture. The next option would be a long T-plate but there was no plate size long enough to span the fracture. The surgeons decided to use Kirschner wires as makeshift nails. The wires were removed at 3 weeks follow-up.

Results / Discussion: Subsequent radiographs showed maintained reduction and with good callous formation. The patient had excellent functional outcome and no limitation of range of motion until 1 year follow up.
Conclusion: The case presented a novel technique to address the limitations of the author's setting. Although there are still risks and disadvantages of this technique, it may help surgeons in similar settings.

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Pseudotumour and Osteolysis after Ceramic-on-Ceramic Total Hip Arthroplasty

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Introduction / Objective: Pseudotumour and osteolysis formation are more frequently described complications after total hip arthroplasty (THA) with metal-on-metal (MoM) bearings.
Materials & Methods: In this case report, we present a unique case of pseudotumour and osteolysis formation with ceramic-on-ceramic (CoC) bearing THA which has been less commonly described in the existing literature. This happened to a 54 year–old patient that had a primary THA done 17 years prior to re-presenting to our institution.
Results / Discussion: As part of the workup for our patient to find out the underlying cause of his complications, we have carried out extensive investigations which have not been previously reported before, such as serum aluminium, titanium, cobalt and chromium levels. Histology and microscopy was done in addition to Inductively coupled plasma mass spectrometry (ICP-MS) and optical emission spectrometer (OES).
Conclusion: We conclude that ceramic bearings in THA may not be entirely inert and may cause complications such as osteolysis and pseudotumour formation.

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Robotic-Assisted Trans-Superior Articular Process Endoscopic Decompression: A Technical Overview and Case Demonstration

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Introduction / Objective: Endoscopic spine surgery has been gaining popularity given its minimally-invasive nature, potentially faster recovery time due to minimal tissue damage and superior visualisation. The use of robotics in spine surgery offers increased surgical precision through trajectory planning, accurate pedicle screw placement and interbody cage position. We explore the integration of these 2 technologies through the technical overview of a robotic-assisted trans-superior articular process(SAP) endoscopic decompression.
Materials & Methods: The case subject involves a 42 year old lady with a previous left L4/5 microdiscectomy 6 months prior. She currently presents with recurrence of left lower limb radicular pain, left L5 numbness and great toe weakness. Magnetic resonance imaging(MRI) revealed a paracentral disc with left lateral recess stenosis at L4/5. Trajectory planning was aided by the Mazor robotic guidance system for a robotic-assisted left L4/5 lateral recess decompression via a trans-SAP approach.
Results / Discussion: The patient's symptoms showed significant improvement, including the restoration of great toe strength and resolution of pain and numbness. No intra-operative or perioperative complication was encountered, and no need for re-operation arose.
Conclusion: The integration of robotic and spine surgery offers increased precision, minimal soft tissue damage and reduced operative time. However, one must also consider the significant learning curve and associated costs with such a procedure.

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Advancement in Halo Gravity Traction Devices for Peri-operative Optimization of Complex Scoliosis Surgery

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Introduction / Objective: Complex rigid, severe scoliosis treated via surgery is challenging, with an increased risk of neurological injury and implant failure. Halo gravity traction (HGT) offers a solution by gradually stretching soft tissues and neural elements within the spinal canal, reducing deformities, and preventing neurological complications. In bed traction will lead to 4-6 weeks of immobilization, risking deep vein thrombosis, lung infections, and psychological stress. Our team developed a device with HGT traction allowing patient to mobilise with sustained traction.
Materials & Methods: Patients with rigid spinal deformities (idiopathic scoliosis > 80 degrees, congenital, syndromic, and neuromuscular scoliosis were included based on sagittal cobb angle and spinal rigidity as assessed radiologically. Decision for HGT was based on curve magnitude and rigidity. A multidisciplinary quality improvement team developed innovative HGT mobility solutions. A first-generation HGT walker and wheelchair were bulky and had poor manoeuvrability. A $50,000 MSKACP innovation grant enabled the development of a lighter, user-friendly second-generation HGT walker and wheelchair. These devices were piloted in patient.
Results / Discussion: Since 2018, 10 patients have used the new HGT devices, starting with 5 kg of traction weight, gradually increasing to 40-50% of their body weight. Positive outcomes including Improved mobility and independence; Enhanced participation in physiotherapy and Reduced complications from prolonged immobilization**.** The second-generation HGT devices represent a significant advancement in caring for complex scoliosis patients requiring traction. Continued feedback and iterations aim for widespread implementation and further patient quality of life improvements. Rigid scoliosis remains challenging due to neurological complication risks. HGT has progressively reduced scoliotic angle severity to prevent neurological complications from acute surgical correction. There was a 40-75% improvement in Cobb's angle and a 4-13 cm height increase after correction of scoliosis surgery.
Conclusion: This innovation in care highlights the importance of collaboration in ensuring patient safety, optimizing and improvement in treatment outcomes.

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Carbon-fiber Reinforced Polyetheretherketone (CFR-PEEK) Instrumentation in Metastatic Spine Tumour Surgery: Technical Pearls and Potential Pitfalls to Avoid

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Introduction / Objective: Carbon-fiber reinforced Polyetheretherketone (CFR-PEEK) instrumentation has been described in recent years for use in MSTS. Benefits of CFR-PEEK include reduction of imaging artifacts, allowing for more efficient follow-up and adjuvant therapy planning as compared to traditional titanium implants. Despite the increase in CFR-PEEK usage in literature, there is currently no technical guide or considerations in terms of usage of CFR-PEEK in MSTS. Hence, we aim to highlight various important technical considerations and potential pitfalls for surgeons when utilising CFR-PEEK instrumentation in MSTS.

Materials & Methods: This narrative review was conducted using PubMed, Medical Literature Analysis and Retrieval System Online (MEDLINE), The Cochrane Library and Scopus databases through 30 June 2024. All studies that were related to CFR-PEEK instrumentation in MSTS were included. The vast personal experiences of the senior authors with CFR-PEEK instrumentation also circumstantiated the concepts highlighted in this paper.

Results / Discussion: A total of 36 studies were included in this review. We discussed various considerations when planning for CFR-PEEK instrumentation in MSTS patients. These factors include pre-operative construct planning, intra-operative handling of the CFR-PEEK system, as well as post-operative considerations such as requirement for radiotherapy (RT) planning**.**

Conclusion: In our manuscript, we are the first to highlight various considerations for MSTS surgeons to take into account when utilising CFR-PEEK instrumentation. This serves as an important guide for surgeons treating MSTS, with the continuous evolvement of our treatment capacity in MSD.

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Patient and Hospitalisation Predictors of Discharge Destination for Femoral Neck Fractures in Singapore

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Introduction / Objective: Early planning of discharge destination following hip fracture, Discharge Directly Home (DDH) vs Discharge to Community Hospital (DCH), is a priority for both patients and clinicians alike. However, majority choose to DCH, and DDH remains challenging. The aim of this study is to identify predictors of DDH for patients admitted from their own home with a femoral neck fracture in Singapore.

Materials & Methods: Data was collected retrospectively of patients above 65-years, admitted from their own home, with femoral neck fractures from a low mechanism injury who underwent bipolar hemiarthroplasty or total hip arthroplasty and discharged home or to the community hospital from the Changi General Hospital Hip Fracture Registry from March 2018 to December 2020. Potential predictors for DDH were statistically analysed individually and significant variables underwent a multivariate regression analysis. The cut-off point for nominal predictors for DDH was calculated using a ROC analysis.

Results / Discussion: Across 453 patients, 19% were DDH and 81% were DCH. Patients aged less than 76 years with serum vitamin D levels of more than 21.6 ng/mL (AUC 0.712, sensitivity 75.3%, specificity 57.8%), class A ward status (OR 1.847 vs class B, OR 2.802 vs class C) with time to surgery less than 48 hours (OR 1.584) from admission were shown to be predictive of DDH. However, gender, race, presence of caregiver, dementia history, premorbid function, concomitant upper limb injury, serum albumin levels and ASA score were not predictive of DDH**.**

Conclusion: With Singapore's ageing population, there is increasing incidence of hip fractures which is one of the leading causes of hospitalization. Hip fracture patients incur three times the inpatient cost compared to age-matched non-hip fracture patients with post-operative rehabilitation incurring a substantial amount. Therefore, early identification of patients suitable for DDH would be financially beneficial for patients with shorter length of stays and reduced healthcare resource usage.

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The Wrist-free Cast Study - A Randomized Controlled Trial Comparing the Traditional Above Elbow Cast and One which Frees the Wrist for Stable Paediatric Humerus Supracondylar Fractures

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Introduction / Objective: The treatment of pediatric supracondylar humerus fractures (SCHFs) involves utilizing the intact posterior periosteal hinge to maintain fracture stability, which requires only the elbow to be immobilized in flexion. Given that, terminating the cast proximal to the wrist would theoretically be sufficient in treating the fracture, while also allowing the patient to have more freedom to move their wrist. Hence, this randomized controlled trial seeks to assess the clinical outcomes, patient satisfaction and comfort of using a cast that terminates proximal to the wrist in the treatment of pediatric SCHFs.

Materials & Methods: 78 patients (aged 1-17) with modified Gartland's Type I and Type IIa SCHF were recruited and randomized to be casted with either the traditional cast which immobilizes the wrist or the shorter cast terminating proximal to the wrist. At the follow-ups, loss of reduction was assessed, followed by a patient comfort and satisfaction questionnaire which the patients filled out.

Results / Discussion: Better patient satisfaction scores (4.71 ± 0.469 vs 4.14 ± 0.516, $P = 0.100$), comfort scores (5.80 ± 0.354 vs. 5.43 ± 0.365, $P = 0.143$), and Quality of Life scores (24.0 ± 1.67 vs. 26.0 ± 2.20, $P = 0.159$) were observed in the modified cast group. Better QuickDASH scores were also observed in the modified cast group (284.9 ± 52.1 vs. 301.2 ± 46.7, $P = 0.646$). In addition, lower application times (257.0 ± 28.7 seconds vs. 289.2 ± 28.6 seconds, $P = 0.112$) and removal times (109.5 ± 10.9 seconds vs. 127.8 ± 26.6 seconds, $P = 0.183$) were observed in the modified cast group. Radiological outcomes were not compromised in the modified cast group.

Conclusion: The wrist-free casts provide better comfort, satisfaction and quality of life than the traditional casts which immobilize the wrist, without compromising outcomes.

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Coronal Plane Alignment of the Knee (CPAK) Distribution in a Diverse Asian Population: Influence of Ethnicity, Sex, and Bilaterality

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Introduction / Objective: In total knee arthroplasty (TKAs), it remains unclear which patients benefit from correction vs restoration of native knee alignment. The Coronal Plane Alignment Knee (CPAK) classification system was introduced in 2021 to describe native knee alignment, to improve characterisation of the effect of different TKA alignment techniques. This study aims to describe CPAK in an ethnically diverse population, and characterise the relationship between CPAK and ethnicity, bilaterality of OA, and other patient factors.

Materials & Methods: 503 primary TKAs were performed in a large tertiary institution in Singapore from 2014-2021. Pre-operative anteroposterior knee radiographs were collected for 441 procedures - all had ethnicity, age, sex, and BMI data. The medial proximal tibial angle (MPTA) and lateral distal femoral angle (LDFA) were measured with excellent inter-observer correlation. Knees were then classified into 9 CPAK categories based on arithmetic hip-knee-ankle (aHKA) angle and joint-line obliquity (JLO).

Results / Discussion: 77% of cohort were apex-distal (CPAK-1, 2, 3) and 59% were varus (CPAK-1, 4, 7); 44% were CPAK-1 (varus + apex-distal). Distributions did not vary between sexes or across BMI (p=0.156, p=0.355). Chinese and Indian knees followed near identical patterns: CPAK-1 (46%) > CPAK-2 (20%) > CPAK-4 (15%). Malay knees had significantly fewer CPAK-1 (p=0.0183), with CPAK-1 (29%) ≈ CPAK-2 (29%) ≈ CPAK-4 (21%). 38 patients had bilateral TKA. Identical categories were recorded bilaterally in 45% for CPAK, 67% for JLO, and 70% for aHKA. Bilateral TKA were more likely when knees were in valgus alignment, than unilateral TKA (p=0.00457)

Conclusion: Ethnicity is a factor influencing CPAK, and Malay knees are less likely to be CPAK-1; this is a novel finding and may explain ethnic differences in TKA outcomes described in literature. Bilateral TKA was more likely to be performed in valgus knees, but only 45% had the same CPAK category bilaterally. The implications of this bilateral CPAK congruence is unclear and requires further study.

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Comparing All-Suture Repair Versus Tension Band Wiring Fixation in Patella Fractures

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Introduction / Objective: Implant-related issues necessitating removal are well reported in metallic tension band wiring (TBW) fixation of patellar fractures. Suture materials can minimize complications associated with TBW fixation but there is a relative paucity of literature on all-suture fixation outcomes. This study aims to report and compare outcomes between all-suture versus TBW fixation of patellar fractures.

Materials & Methods: This retrospective, single-centre study included 79 patients with patellar fractures that underwent fixation with either all-suture (n=49) or TBW (n=30) fixation from 2020-2023, regardless of demographic or fracture characteristics. Outcomes reported include intra-operative duration, length of stay, bony union rate and time, post-operative knee range of motion, complications, and re-operation rate.

Results / Discussion: Mean age in years was 63.5 ± 11.9 and 65.2 ± 12.9 in the all-suture and TBW fixation groups respectively. Bony union time was comparable between the all-suture group (4 ± 1.58 months) and TBW group (4.37 ± 1.81 months) (p=0.34). Bony union rate was comparable between the all-suture group (98%) and TBW group (100%). Complication rate was lower in the all-suture group (2/49, 4.1%) when compared to the TBW group (4/30, 13.3%) (p=0.19). 10% (n=3) of the TBW group underwent re-surgery due to implant-related complications (p=0.05). More patients in the TBW group (7/30, 23.3%) experienced flexion contracture as compared to the all-suture group (1/49, 2%) (p=0.004), and with a greater degree of contracture (2.1° ± 4.6) (p=0.002). No significant difference was seen in operative duration, length of stay and post-operative knee flexion between the 2 groups (p>0.05).

Conclusion: All-suture fixation of patellar fractures is a reliable surgical method with a high union rate, good union time and post-operative range of motion, while avoiding complications that arise from metallic TBW implants. It is a safe alternative surgical technique in fixation of patella fractures.

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Novel Surgical Technique Using Double-Row Suture Anchor Fixation for Inferior Patella Pole fracture

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Introduction / Objective: The inferior pole of a patella fracture is clinically difficult to fix because of the inherent weakness of the small comminuted distal fragments with bone stock. The traditional methods of surgical fixation of this fracture, including tension-band wiring and transosseous fixation with patellectomy, have many disadvantages. To overcome these disadvantages, we proposed a novel surgical method using the double-row suture-anchor technique to fix inferior pole patella fracture.

Materials & Methods: Double-row suture-anchor technique used to treat an inferior pole of the patella fracture. Two suture anchors loaded with fibertape are inserted obliquely on either side of the proximal fragments, and a trocar needle is used to pass all the sutures through the patella tendon at the edges of either side of the inferior fragment. The fracture is reduced, and sutures are then brought to the opposite side of the quadriceps tendon of the proximal fragment and inserted with a suture anchor at the 10 and 2 o'clock positions.

Results / Discussion: This method provides adequate fixation stability of the fracture without the risk of implant migration that requires a second surgery. The method is simple and reproducible, thus reducing surgery timing and intraoperative radiographic exposure.

Conclusion: In summary, we believe that this surgical technique is suitable for fixing the inferior pole of a patella fracture and is easily reproducible. Most importantly, all the cases in which the technique has been applied to date have had good clinical outcomes.

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Metatarsal Parabola Restoration Surgery using Free Fibula Osteocutaneous Flap and Transverse Tibia Transport

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Introduction / Objective: Loss of toes with metatarsal bone defects would impact foot function, stability, and overall gait. This is noted following multi-ray amputations of the foot for various reasons. Loss of multiple toes and metatarsal bone defects could lead to increased

load transfer to the remaining toes, leading to pressure ulcers and toe deformities. This issue could cause an inefficient gait potentially leading to altered walking patterns and biomechanical inefficiencies as a result of the uneven distribution of forces across the remaining toes and metatarsal structures.

Materials & Methods: The reconstructive procedure involved harvesting a vascularized free fibula osteocutaneous flap from the patient's contralateral leg. The fibula would then be transplanted to address the 2nd and 3rd metatarsal defects using microvascular anastomosis. Fixation was achieved with intramedullary beaming and dorsal plating, supplemented by an offloading circular frame. The primary objective of this approach was to restore the metatarsal parabola and enhance foot biomechanics.

Results / Discussion: Postoperative assessments demonstrated successful cutaneous healing of the fibula flap, with no recurrence of infection and no requirement for additional surgical interventions. At one-month post-surgery, though significant bony union at the graft sites was not appreciated, however there was successful cutaneous healing of the fibula flap, with no recurrence of infection and no requirement for additional surgical interventions.

Conclusion: This technique presents a promising method for the reconstruction of digital loss and complex metatarsal defects, effectively restoring the critical metatarsal parabola. This approach offers a viable solution for improving foot function and biomechanics in patients with multiple ray amputations with metatarsal defects.

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Comparative Analysis of Clinical and Radiological Outcomes in Patients Undergoing Transforaminal Lumbar Interbody Fusion using Recombinant Human BMP-2 (Infuse BMP) and Escherichia Coli-Derived rhBMP-2(Novosis BMP)

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Introduction / Objective: This study compares the clinical and radiological outcomes in patient undergoing TLIF surgery for lumbar spine degenerative disc disease. The aim is to determine whether E-coli derived BMP can offer clinical superior outcomes with less complication

Materials & Methods: Our retrospective study spanning from July 2014 to July 2023 with minimum follow up of 1 year revealed 32 patients who underwent 1 or 2 level TLIF with E-coli derived BMP-2. We were able to retrieve 64 patients who underwent similar procedure using mammalian derived rh-BMP-2 using propensity matching. Patient demographics, clinical, radiological outcomes and complications and cost data were collected for both groups. The primary outcome included fusion rates at 3, 6month and 1 year based on the modified Bridwell grading system with secondary outcomes being improvement of segmental lordosis, restoration of disc height were measured, and the incidence of complications such as radiculitis, infection, seroma formation and reoperation and overall cost effectiveness of each BMP type. Post-surgery clinical improvement based on visual analog score for back and leg pain, and Oswestry disability index were compared.

Results / Discussion: The fusion rates at 3, 6 month were 85% for E- coli BMP and 80% for infuse BMP($p<0.05$). At 1 year, the fusion rate were 95% for E-coli derived and 88% for rh BMP-2($p<0.05$%). E coli derived BMP had significantly lower complication rates- Radiculitis (2% vs 7%) infection (3%-8%), seroma formation (2% vs 10%) , and reoperation rate (2% to 10)compared to rh-BMP2. The cost of treatment with E -coli BMP is 30 percent lower.

Conclusion: E-coli derived BMP is a financially effective options for degenerative lumbar spine surgery, showing faster and similar fusion rate with fewer complication compared to infuse BMP. These findings suggests that E-coli derived BMP is a viable alternative to rhBMP-2 for improving clinical outcomes and reducing healthcare costs

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Surgical Options in the Treatment of Cervical Spinal Diseases - Anterior Cervical Discectomy and Fusion versus Cervical Artificial Disc Replacements

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Introduction / Objective: While anterior cervical discectomy and fusion (ACDF) remains the gold standard for treating most cases of cervical degenerative diseases, cervical artificial disc replacement (C-ADR) is increasingly recognised as a viable alternative. Beyond addressing neural compression symptoms, C-ADR preserves mobility and anatomical spinal mechanics, thereby safeguarding adjacent segments from accelerated wear. Although C-ADR is found to be comparable, if not superior to ACDF in indicated cases, its efficacy in expanded indications is still under scrutiny.

Materials & Methods: A comprehensive literature review was conducted, comparing the efficacy of ACDF and C-ADR in treating cervical degenerative diseases, focusing on both primary and expanded indications. The review examined clinical outcomes and the suitability of C-ADR in traditionally contraindicated cases such as cervical myelopathy, osteoporotic spines, cervical kyphosis, facet joint arthropathy, hypermobile spines and in revision of previous fusions. Expert suggestions were also incorporated to assess the potential of C-ADR in these expanded indications.

Results / Discussion: C-ADR shows efficacy in treating soft tissue and radicular symptoms, supported by long-term outcomes. Expanded indications are being explored beyond initial Food and Drug Administration Guidelines. Multilevel C-ADR has shown positive results in select cases with low secondary surgery rates. Osteoporotic spines may tolerate C-ADR given the lower load and bone density in the cervical spine. While facet joint arthropathy and hyper mobile spines present challenges, careful patient selection and a meticulous surgical technique can still achieve significant benefits without exacerbating the above conditions. C-ADR for revising failed ACDF remains controversial with limited data.

Conclusion: C-ADR offers a viable alternative to ACDF, particularly for patients seeking to preserve cervical spine mobility. Its applicability in previously challenging or contraindicated off-label expanded indications requires careful patient selection and surgical expertise as described. Ongoing research is essential to further validate the use of C-ADR in these expanded indications, ensuring optimal outcomes and reducing the risk of complications.

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Surgical Repair of Pars Interarticularis Fracture with Modified Buck's Screw Technique under O-Arm Surgical Navigation System: A Novel Surgical Technique

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Introduction / Objective: We hereby describe the use of a novel surgical technique to fix an L5 pars interarticularis fracture in a 15 year old teenage athlete, with 6 months' history of activity related lower back pain, whose case had been diagnosed with L5 spondylolysis based on clinical and radiological assessment.

Materials & Methods: Literature review has been done during the operation planning phase. A few of the most commonly used conventional surgical repair techniques include: a) Buck's screw technique where a screw is directly placed through the pars defect; b) Scott's repair technique with wiring between transverse and spinous process; c) Morscher's technique where a hook-screw system is used; d) Pedicle screw technique with U shaped rod. Amongst which Buck's screw technique and Pedicle screw technique were described by literature as having the highest fusion and lowest complication rates. We have devised modified Buck's screw technique with O-arm guidance to keep the approach minimal.

Results / Discussion: Our surgical approach is as following: Initial skin incision of approximately 2.5cm was made with localisation of image intensifier (II). Muscles were dissected to be able to apply the O-arm clamp. After exposing the left sided pars defect, guidewire was passed across the defect starting from the medial aspect of inferior facet to base of the superior facet using an O-arm guided wire driver. Position of wire was confirmed using II, pars defect was then exposed and repaired. Cancellous bone graft harvested from the iliac crest was applied and a cannulated screw was inserted. There were no intraoperative or postoperative complications observed in the patient. The patient reported favourable outcomes and reduction in pain score during post operative review.

Conclusion: The above mentioned novel surgical technique of modified Buck's screw technique under O-arm guidance is a feasible one in treating spondylolysis.

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Management of Distal Femur Fractures: From Fixation to Replacement, Can More Be Less?

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Introduction / Objective: Distal femur fractures have been increasing in recent years due to an aging population. Surgical management is recommended for most distal femur fractures to promote early mobilisation, weight-bearing and reduction of complications from prolonged immobility. Various surgical options have been described for these group of fractures, but there has been limited literature on the optimal treatment strategy for distal femur fractures based on their morphology. In this study, we aim to investigate and compare the various surgical modalities for distal femur fractures.

Materials & Methods: A single centre retrospective review was conducted including all patients who sustained distal femoral fractures. The various fixation methods included single plating, dual plating, retrograde nail, combination retrograde nail with locked plate fixation as well as distal femur replacement. Baseline demographics and fracture details were documented. Intra-operative details, as well as post-operative functional status, radiographic results and knee society scores were evaluated and compared up to two years follow-up.

Results / Discussion: 96 patients were included. 30 (31%) underwent single plating, 48 (40%) underwent dual plating, 17 (18%) underwent retrograde nail fixation, 10 (10%) underwent retrograde nail with plate fixation, and 1 (1%) underwent distal femur replacement. There were no significant differences between the demographics and baseline co-morbidities of the patients. Patients whom underwent dual plating had significantly greater blood loss compared to the other surgical methods ($P < 0.01$). Comparatively, retrograde nail fixation was associated with increased duration of intra-operative imaging intensifier time but decreased blood loss. Retrograde nail with plate fixation and dual plating and distal femur replacement were associated with better functional knee scores at 6 months follow-up, and significantly faster union time ($P <0.01$). There were no significant differences between hospital length of stay and surgical complications between the groups.

Conclusion: Denser fixation constructs in distal femur fractures are not without benefits and should be carefully considered for patients.

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A Prospective randomized Controlled Trial (RCT) Comparing a Cellular Matrix Combination of Platelet Rich Plasma with Hyaluronic Acid versus Hyaluronic Acid Alone in Osteoarthritis of the Knee

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Introduction: The aim of this study was to compare the outcomes of intra-articular platelet rich plasma combined with hyaluronic acid (PRP-HA) injections versus intra-articular hyaluronic acid (HA) injections alone in the treatment of knee osteoarthritis.

Materials and Methods: This is a prospective randomized controlled trial conducted on 153 patients suffering from knee osteoarthritis with a follow-up duration of 1 year. The control arm comprised 80 patients treated with a single HA injection (Synolis VA). The intervention arm comprised 73 patients who were treated with a single Cellular Matrix PRP-HA injection (CM-PRP-HA). Patients aged 30 years and above with radiographical diagnosis of knee osteoarthritis were included in the study. Patients with prior surgery to the affected knee or corticosteroid injection at treatment site within the past month were excluded. For all patients, the Kellgren- Lawrence grade, Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) scores and demographics were collected at baseline. Patients were followed up with their WOMAC scores at 1 month, 3 months, 6 months and 12 months post injection via telephone surveys or electronic forms. Clinical characteristics such as age, presence of knee effusion at initial injection and physical exercise were also correlated with WOMAC scores.

Results: Baseline characteristics including age, gender, ethnicity, marital status, level of education and smoking status were homogenous between both arms. PRP-HA was significantly more effective in decreasing WOMAC total scores compared to HA at 3 months (difference

in mean WOMAC reduction: -8.77 (95% CI:-15.30, -2.24)), 6 months (difference in mean WOMAC reduction: -11.26 (95% CI: -17.81, -4.71)), and 12 months (difference in mean WOMAC reduction: -8.37 (95% CI: -15.35, -1.40)), with insignificant differences observed at 1 month (difference in mean WOMAC reduction: -3.30 (95% CI -9.76, 3.16)). PRP-HA was superior in reducing WOMAC (pain) at 6 months (difference in mean WOMAC pain reduction: -1.70 (95% CI: -3.11, -0.29); WOMAC (function) at 3 months (difference in mean WOMAC function reduction: -6.93 (95% CI: -11.76, -2.10)), 6 months (difference in mean WOMAC function reduction: -8.58 (95% CI: -13.42, -3.74)), 12 months (difference in mean WOMAC function reduction: -6.94 (95% CI: -12.07, -1.80)); WOMAC (stiffness) at 6 months (difference in mean WOMAC stiffness reduction: -0.99 (95% CI: -1.70, -0.28)). Age is significantly associated with changes in WOMAC total scores (p=0.004), where an increase of 1 year in age was shown to increase WOMAC total scores by 0.35 (95% CI: 0.11, 0.60). The presence of effusion (p=0.48) and physical exercise (p=0.26) did not have significant influence over WOMAC scores.

Conclusion: Our findings support a significant improvement in WOMAC scores demonstrated by PRP-HA from 3 months onwards up to 1 year compared to HA injections alone. Further trials on the optimal dose and timing between PRP-HA injections are warranted to establish its clinical utility in knee OA treatment.

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From Clinical to Benchside: Probiotics Lactobacillus rhamnosus and Faecalibacterium prausnitzii treats sarcopenia in aged mice through regulation of mitochondria function

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Introduction: Sarcopenia is a prevalent muscle disorder and the gut-muscle axis has been proposed recently. In this study, we aim to 1) identify specific probiotics positively associated with muscle health in elderly, and 2) investigate effects of them on aged sarcopenic mice and identify the underlying mechanisms for clinical translation in the future.

Materials and Methods: Old people (≥ 60 years) were recruited. Muscle health assessments and stool sample collection for shotgun metabolomics were conducted. Two potential therapeutic probiotics from human sequencing results were singly or combinedly administrated to aged mice. Muscle weight, grip strength and tetanic force, myofiber cross-sectional area (CSA) analysis and fiber type were detected. Muscle mitochondria function, density, and structure were observed by assay kits and transmission electron microscopy. Expression of proteins related to mitochondria dynamics, metabolisms, and biogenesis were evaluated.

Results: 51 old participants were recruited. Correlation analysis showed Lactobacillus rhamnosus (LR) and Faecalibacterium prausnitzii (FP) positively related to muscle health. 3 treated mouse groups (LR, FP, combined) displayed increased muscle mass and function, myofiber CSA, and reduced type I muscle fiber ($p<0.05$). ATP content and NAD+/NADH were elevated in LR and FP groups. Mitochondria structure and density improved in all groups ($p<0.05$). Expression of mitochondrial fusion, fission and biogenesis proteins increased in all groups ($p<0.05$).

Discussion and Conclusion: LR and FP is positively related to muscle health in old people. Probiotic treatments improved muscle status in aged sarcopenic mice through regulation of mitochondria function. This serves as a platform for clinical translation.

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Evaluation of Preoperative Factors that Affect the Alpha Angle of Screw Insertion After the Open Latarjet Procedure

Background: The open Latarjet procedure yields excellent results as a treatment for anterior shoulder instability. The position of the bony fragment and the insertion angle of the screw (the alpha angle) are critical factors for a successful procedure. This study aimed to assess preoperative patient anatomic factors that affect the alpha angle in the Latarjet procedure for anterior shoulder instability.

Methods: In this retrospective study, we included 76 patients who underwent the Latarjet procedure from October 2009 to December 2023. Postoperative computed tomography (CT) scans were reviewed for the alpha angle and classified into two groups: group 1 (alpha angle ≥ 25°) and group 2 (alpha angle < 25°). Preoperative patient characteristics and radiological parameters obtained from preoperative CT scans were analyzed and compared between groups 1 and 2. We developed a novel method to measure the depth of the chest and the angle between the deltopectoral interval and the plane of screw insertion. We also measured the thickness of the pectoralis major and subscapularis muscles.

Results: Of the 76 patients in this study, 41 and 35 were included in groups 1 and 2, respectively. The mean alpha angle of each group was 36° and 12°, respectively, and the body mass index was significantly higher in Group 1 ($p < 0.001$). In addition, Group 1 had significantly longer distances from the anterior edge of the glenoid to the skin margin of the deltopectoral interval ($p < 0.001$). The angle between the deltopectoral interval and the plane of screw insertion (Traction angle) was significantly larger in group 1 ($p < 0.001$), and the pectoralis major and subscapularis muscles were thicker in group 1 ($p = 0.017$ and $p = 0.032$, respectively).

Conclusion: The alpha angle after the Latarjet procedure was strongly related to the abovementioned factors. To our knowledge, this is the first study in which the preoperative factors that facilitate proper screw fixation in the Latarjet procedure are reported.

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Analysis of Whole Limb Alignment in Pediatric flat foot

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Background: The hip-to-calcaneus axis, previously known as the ground mechanical axis (GA), ideally passes through the center of the knee joint in the native knee. Hindfoot valgus deformity is one of the characters in patients with pediatric flexible flat foot. The aim of this study was to investigate the difference in the GA and the hip-to-ankle angle among pediatric patients with flat foot.

Methods: We conducted a prospective study on 96 lower limbs from 48 patients (Group A) with flexible flat feet. To evaluate lower-limb alignment, full-length standing posteroanterior hip-to-calcaneus radiographs were utilized to measure the hip-knee-ankle (HKA) angle and

hip-knee-calcaneus (HKC) angle. These measurements were compared with those from 100 lower limbs of 50 healthy pediatric individuals (Group B).

Results: The mean age of patients was not different between the two groups (10.93 vs. 10.92, p=0.994). The HKA angle was 2.11 in group A and 2.38 in group B (p=0.634). The HKC angle was 2.56 in group A and 1.94 in group B (p=0.634). HKA and HKC were significantly different within each group (p=0.013 and p=0.028, respectively).

Conclusions: HKC is larger than HKA in our pediatric patients, which means there is a tendency to have valgus knee alignment. Considering that flat foot is a hind foot disease, special attention should be paid to hind foot alignment when treating pediatric patients with flatfoot.

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Arthroscopy-assisted Hip Surgery in Special Cases

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Introduction: Arthroscopy has revolutionized the field of orthopedic surgery by providing minimally invasive solutions to complex joint issues. In particular, hip arthroscopy has expanded beyond routine procedures, allowing for the effective treatment of rare and challenging conditions. my presentation delves into two such special cases: the arthroscopic treatment of a displaced nonunion of the anterior inferior iliac spine (AIIS) causing extra-articular impingement, and the arthroscopy-assisted excision of an osteoid osteoma in the femur neck. These cases highlight the versatility and precision of arthroscopy in managing intricate hip pathologies that would traditionally require open surgery.

Case 1: Arthroscopic Treatment of a Displaced Nonunion of the Anterior Inferior Iliac Spine Causing Extra-Articular Impingement. The anterior inferior iliac spine (AIIS) plays a crucial role in the biomechanics of the hip joint, serving as the attachment point for the rectus femoris muscle. Trauma or avulsion fractures involving the AIIS can lead to nonunion, where the fractured bone fragments fail to heal properly. In some instances, this can cause extra-articular impingement, a condition where the abnormal bone positioning interferes with normal hip movement, leading to pain and restricted range of motion. Arthroscopic sub-spine decompression has been performed as part of acetabular rim management.

Surgical Technique: A 15-year-old boy with a history of left groin pain and loss of range of movement of the hip for over 2 years following an avulsion fracture of the AIIS during a game of soccer. y. MRI just after injury showed a single bony fragment measuring 22 mm × 25 mm × 12 mm at the rectus femoris origin of the AIIS and it was retracted inferiorly 3 cm, anteriorly 1 cm and laterally 0.5 cm. Conservative treatment was advised by the Paediatric Orthopaedic Surgeon and he was referred to a physiotherapist for mobilisation and subsequently muscle strengthening. A supine arthroscopic setup is preferred, hip arthroscopy began in the peripheral compartment using anatomical landmarks using standard anterolateral and modified mid-anterior portals under image guidance. After diagnostic arthroscopy to assess intra-articular pathology, the camera is positioned to provide an anterior profile view of the acetabular rim and labrum. A hooked radiofrequency (RF) probe is used to progressively reflect the labrum from the bone, preserving the chondrolabral junction, and to detach the capsule from the rim up to the inferior edge of the AIIS. The subspine region is observed and classified, and the capsular tissue is preserved for later repair. A 5.5 mm burr re-contours the subspine region, and the extent of bone removal is confirmed with image guidance. Significant AIIS caudad extension is typically accessible for re-contouring. Bone removal is closely monitored with intraoperative X-rays, and optimal resection is assessed postoperatively.

Case 2: Arthroscopy-Assisted Excision of an Osteoid Osteoma of the Femur Neck. Osteoid osteoma typically affects the lower extremities of young men, with half of the cases involving the femur or tibia. The lesion consists of a small, rounded area of osteolysis, known as the nidus, surrounded by bony sclerosis. While initial treatment is nonoperative, using medications, most patients eventually require surgical intervention due to persistent pain. Traditional surgical methods, such as open or drilled resection, are often avoided for osteoid osteomas in the femoral neck due to the associated risks, particularly in young, active males. Arthroscopic excision has been successfully used, though accessing the inferior femoral neck is challenging. We present a case of arthroscopic excision of an osteoid osteoma located just above the lesser trochanter, complicated by periosteal reaction.

Surgical Technique: The patient was positioned supine on a fracture traction table with both lower extremities secured. Under C-arm guidance, traction was applied to achieve a slightly flexed position, while the contralateral hip was abducted for easy fluoroscopic assistance.

Hip arthroscopy began in the peripheral compartment using anatomical landmarks. A guidewire was inserted from the greater trochanter tip to the midcervical area under anteroposterior imaging. After confirming the guidewire's position, a proximal anterolateral portal was established. A 4.5-mm, 30° arthroscope was introduced through the portal, followed by the creation of a distal anterolateral portal. Initial visualization revealed hyperemic, edematous synovium filling the joint capsule. The synovium was removed, and the capsule was released using a coblation device, improving the surgical view. The lesion was located under an image intensifier, though overlying cortical bone obstructed direct visualization. Using a high-speed bone burr, the periosteal reaction area was gradually removed to expose the cortical bone and access the nidus. A 10 mm diameter and 8 mm depth margin was identified in the nidus. The burr approached and excised the nidus, along with the periosteal reaction around it, ensuring complete removal. Postoperative CT confirmed the lesion's disappearance. The surgical time was 90 minutes with no complications. Partial weight-bearing was permitted the following day, and full weight-bearing, including jogging, was allowed after two weeks.

Key Steps of Arthroscopic Excision of Osteoid Osteoma

1. Routine arthroscopic peripheral compartment inspection
2. Synovectomy and capsular release under the appropriate situation
3. Identify cortical thickening of the osteoid osteoma under an image intensifier
4. Remove periosteal thickening by sweeping the cutter from tumor margin to nidus and progressing centrally
5. Complete mass excision by burr-down technique and confirm via direct visualization

Conclusion: Arthroscopy-assisted hip surgery has proven to be a highly effective approach for managing complex and rare conditions like displaced nonunion of the anterior inferior iliac spine (AIIS) causing extra-articular impingement, and osteoid osteoma of the femur neck. These cases underscore the versatility and advantages of arthroscopy in addressing challenging hip pathologies, offering patients improved outcomes and faster rehabilitation.