

# RESEARCH PRESENTATIONS ABSTRACTS - Winter SCOT 2023



## THE SUPRASCAPULAR NERVE BLOCK (SSCNB) IS EASILY ADMINISTERED USING A LANDMARK BASED TECHNIQUE: A CADAVERIC STUDY TO ASSESS NERVE STAINING POST-INJECTION

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The suprascapular nerve is an ideal target for nerve blockade to alleviate shoulder pain given its widespread innervation to the shoulder girdle. Many techniques have been described. To widen the availability of this treatment we investigate whether an anatomical landmark technique can be easily learned by novice injectors to provide efficacious blockade.

Five injectors were recruited with varying experience; from the novice medical student to an orthopaedic consultant. Five torsos (10 shoulders) were used. A single page of written instruction and illustration of the Dangoisse landmark technique was provided prior to injection of a Thiel embalmed cadaver bilaterally. A pre-mixed injectate with blue dye was used. Cadavers were dissected and the presence or absence of dye staining reported by 3 observers and a consensus agreement reached.

Dissection demonstrated diffuse staining in the suprascapular fossa. 90% of shoulders were found to have adequate staining of the suprascapular nerve directly, or its distal branches, in a manner which would provide adequate anaesthesia. The inter-observer agreement was good ( $k = 0.73$ ) for staining at the suprascapular fossa and excellent ( $k=0.87$ ) for staining distally. The technique was easily performed by novice injectors with a 100% success rate.

We demonstrate that this technique is reproducible by a range of clinicians to effectively provide anaesthesia of the SSCN. The main risks are ineffective block (10% in this series) and of intravascular injection. Within a resource strained healthcare environment greater uptake of this technique is likely to be of benefit to a wider array of patients.

## EFFECT OF ORAL NUTRITIONAL SUPPLEMENTATION ON OUTCOMES IN OLDER ADULTS WITH HIP FRACTURES AND FACTORS INFLUENCING COMPLIANCE: A SYSTEMATIC REVIEW AND META-ANALYSIS OF RANDOMISED CONTROLLED TRIALS

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Hip fractures are a major cause of morbidity and mortality, and malnutrition is a critical determinant of these outcomes. This systematic review and meta-analysis aims to determine whether oral nutritional supplementation (ONS) improves postoperative outcomes in older patients with hip fracture. An electronic systematic literature search was conducted in August 2022 using four databases. Randomized trials documenting ONS in older patients with hip fracture (aged 50+) were included. Two reviewers evaluated study eligibility, data extraction and assessed study quality.

There were 812 studies identified of which 18 studies involving 1,512 patients met the inclusion criteria. The overall meta-analysis demonstrates that ONS was associated with a significant risk reduction in infective complications (odds ratio (OR) 0.54, 95%CI 0.38, 0.76), pressure ulcers (OR 0.54, 95%CI 0.33, 0.88), total complications rate (OR 0.57, 95%CI 0.42, 0.79). Length of hospital stay (LOS) was also significantly reduced (weighted mean difference (WMD) -2.01, 95%CI -3.52, -0.5), particularly in the rehabilitation LOS (WMD -4.17, 95%CI -7.08, -1.26). There was a tendency towards lower risk in mortality (OR 0.93, 95%CI 0.62, 1.4) and readmission (OR 0.52, 95%CI 0.16, 1.73), though statistical significance was not achieved. The overall compliance to ONS ranged from 64.1% to 100%, but no factors influencing compliance were identified.

This systematic review was the first to quantitatively demonstrate that ONS reduces half the risk of infective complications, pressure ulcers, total complication rate and reduces LOS. ONS should be a regular and integrated part of medical practice, especially given that the compliance to ONS is acceptable.

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## OUTCOMES AND COMPLICATIONS OF MIDFOOT ARTHRODESIS IN A COHORT OF 108 PATIENTS

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Midfoot arthrodesis is the conventional surgical intervention for midfoot arthritis. Arthrodesis aims to stabilise, realign and fuse the affected joints, providing patients with improved pain and function. Current research neglects the measurement of patient reported outcomes.

This study aimed to investigate objective, and patient reported outcomes of midfoot arthrodesis. The secondary aim was to identify variables predicting the development of non-union.

An automated search of online patient records identified 108 eligible patients (117 feet). The rates of union, re-operations, and complications were calculated using radiographs and medical records. Logistic regression was used to model variables influencing the odds of non-union. All living patients were posted a Manchester Oxford Foot Questionnaire (MOx-FQ), a patient reported outcome assessment. Pre-operative MOx-FQ results were available in a minority of cases. Students t-test was used to compare pre- and post-operative MOx-FQ scores.

The rate of union achieved was 74%. The rate of re-operations was 35%. The rate of complications was 14%. Bone grafts and staple fixation independently impacted the odds of non-union. Bone grafts decreased the odds of non-union, whilst staple fixation increased the odds. This finding agrees with the opinion of other researchers.

We recommend the use of bone grafts, and the avoidance of fixation with staples. Previous attempts have been made to assess patient outcomes. However, this study is the first to use the MOx-FQ, a validated questionnaire. Therefore, this study establishes a baseline for improvements in patient reported outcomes.

## PRE-EXISTING KNEE OSTEOARTHRITIS AND JOINT DEPRESSION ARE ASSOCIATED WITH TKA REQUIREMENT AFTER TIBIAL PLATEAU FRACTURE IN PATIENTS $\geq 60$ YEARS OF AGE

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We aimed to determine the rate of and risk factors for post-traumatic osteoarthritis (PTOA) and total knee arthroplasty (TKA) requirement after operative management of tibial plateau fractures (TPF) in older adults.

We conducted a retrospective cohort study of 182 operatively managed TPFs in 180 patients  $\geq 60$  years old over a 12-year period with minimum follow up 1 year. Data including patient demographics, clinical frailty scores, mechanism of injury, management, reoperation and mortality were recorded. Radiographs were reviewed for: Schatzker classification; pre-existing knee osteoarthritis (KOA); severe joint depression  $>15$ mm; and development of PTOA. Kaplan Meier survival analysis was performed. Regression analysis was used to identify risk factors for radiographic indication for TKA and actual TKA.

Forty-seven percent were Schatzker II fractures. Radiographic KOA was present at fracture in 32.6%. Fracture fixation was performed in 95.6% cases and acute TKA in 4.4%. Thirteen patients underwent late TKA (7.5%). At five-years, 11.8% (6.0-16.7 95% CI) had required TKA and 20.9% (14.4-27.4 95% CI) had a radiographic indication for TKA. Severe joint depression and pre-existing KOA were associated with worse survival for endpoints radiographic indication for TKA and actual TKA. Severe joint depression (HR 2.49(1.35-4.61 95% CI),  $p=0.004$ ), pre-existing KOA (HR 2.23(1.17-4.23),  $p=0.015$ ) and inflammatory arthropathy (HR 2.4(1.04-5.53),  $p=0.039$ ) were independently associated with radiographic indication for TKA.

In conclusion, severe joint depression and pre-existing arthritis are independent risk factors for both severe PTOA and TKA after TPFs in older adults. These features should be considered as an indication for primary management with acute TKA.

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## HIP FRACTURE PATIENTS WITH DELIRIUM HAVE A HIGHER MORTALITY RISK, LONGER LENGTH OF STAY, AND INCREASED CARE NEEDS ON DISCHARGE: THE IMPACT DELIRIUM STUDY

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Hip fracture patients are vulnerable to delirium. This study examined the associations between delirium and outcomes including mortality, length of stay, post-discharge care requirements, and readmission.

This cohort study collected validated healthcare data for all hip fracture patients aged  $\geq 50$  years that presented to a high-volume centre between March 2020-November 2021. Variables included: demographics, delirium status, COVID-19 status, treatment factors, and outcome measures. Wilcoxon rank sum or Chi-squared tests were used for baseline differences, Cox proportional hazard regression for mortality, logistic regression for post-discharge care requirements and readmission, and linear regression for length of stay. Analyses were adjusted for age, sex, deprivation, pre-fracture residence type and COVID-19.

There were 1822 patients (mean age 81 years; 72% female) of which 496/1822 (27.2%) had delirium (4AT score  $\geq 4$ ). Of 371/1822 (20.4%) patients that died within 180 days of admission, 177/371 (47.7%) had delirium during the acute stay. Delirium was associated with an increased 30- and 180-day mortality risk (adjusted HR 1.74 (95% CI 1.15-2.64;  $p=0.009$  and 1.74 (1.36-2.22;  $p<0.001$ ), respectively), ten day longer total inpatient stay [adj. B.coef 9.80 (standard error 2.26);  $p<0.001$ ] and three-fold greater odds of higher care requirements on discharge [Odds Ratio 3.07 (95% Confidence Interval 2.27-4.15;  $p<0.001$ )].

More than a quarter of patients had delirium during the hip fracture stay, and this was independently associated with increased mortality, longer length of stay, and higher post-discharge care requirements. These findings are relevant for prognostication and service planning, and emphasise the importance of effective delirium screening and evidence-based interventions in this vulnerable population.

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### **MEDIAL MALLEOLUS: OPERATIVE OR NON-OPERATIVE (MOON) - 'A PROSPECTIVE RANDOMISED CONTROLLED TRIAL OF OPERATIVE VERSUS NON-OPERATIVE MANAGEMENT OF ASSOCIATED MEDIAL MALLEOLUS FRACTURES IN UNSTABLE ANKLE FRACTURES'**

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This prospective randomised trial aimed to assess the superiority of internal fixation of well-reduced medial malleolar fractures (displacement  $\leq 2$ mm) compared with non-fixation, following fibular stabilisation in patients undergoing surgical management of a closed unstable ankle fracture.

A total of 154 adult patients with a bi- or trimalleolar fracture were recruited from a single centre. Open injuries and vertically unstable medial malleolar fractures were excluded. Following fibular stabilisation, patients were randomised intra-operatively on a 1:1 basis to fixation or non-fixation after satisfactory fluoroscopic fracture reduction was confirmed. The primary outcome was the Olerud Molander Ankle Score (OMAS) at 12 months post-randomisation. Complications were documented over the follow-up period.

The baseline group demographics and injury characteristics were comparable. There were 144 patients reviewed at the primary outcome point (94%). The median OMAS was 80 (IQR, 60-90) in the fixation group vs. 72.5 (IQR, 55-90) in the non-fixation group ( $p=0.165$ ). Complication rates were comparable, although significantly more patients ( $n=13$ , 20%) in the non-fixation group developed a radiographic non-union ( $p<0.001$ ). The majority ( $n=8/13$ ) were asymptomatic, with one patient requiring surgical re-intervention. In the non-fixation group, a superior outcome was associated with an anatomical medial malleolar fracture reduction.

Internal fixation is not superior to non-fixation of well-reduced medial malleolar fractures when managing unstable ankle fractures. However, one in five patients following non-fixation developed a radiographic non-union and whilst the re-intervention rate to manage this was low, the longer-term consequences of this are unknown. The results of this trial may support selective non-fixation of anatomically reduced fractures.

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## **PREDICTED FUTURE LENGTH OF WAIT FOR ORTHOPAEDIC PATIENTS AWAITING ROUTINE ELECTIVE SURGERY IN SCOTLAND**

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The COVID-19 pandemic has seen huge growth in the number of patients waiting for routine elective orthopaedic intervention. The NHS Inform website suggests that median waiting times for elective orthopaedics are 26 weeks, although this does not delineate the number of long waits, or how this is impacted by patient priority.

We therefore set out to assess current and potential future waits for those awaiting routine (Federation of Surgical Speciality Association priority category 3&4) orthopaedic surgery in Scotland, utilising data freely available on the Public Health Scotland waiting times dashboard. This included assessment of the feasibility to achieve current Scottish Government targets for a 1 year wait by September 2024. Sensitivity analyses including different scenarios of activity levels (for example additional National Treatment Centre [NTC] capacity) were also included. Calculations by individual health board were performed.

We identified that for a patient listed in July 2022 the best-case scenario waits (full additional NTC capacity and a return to pre-COVID activity in November 2022) would be 1.3 years nationally. Comparatively the worst-case scenario (no overall increase from recent 1-year historical activity) would see a wait of 2.3 years nationally, and up to 7 years within an individual health board. Even with a return to pre-COVID activity and full additional NTC capacity current Scottish Government targets will not be met.

This study emphasizes the substantial questions surrounding the future of elective orthopaedic care within Scotland. Considerable expansion of current operative workflow is required to prevent further deterioration in patient waiting times.

## **THE QUICKDASH AND PATIENT-RATED WRIST EVALUATION (PRWE) SCORES ARE NOT OPTIMAL PATIENT-REPORTED OUTCOME MEASURES FOLLOWING A FRACTURE OF THE DISTAL RADIUS DUE TO THE CEILING EFFECT: POTENTIAL IMPLICATIONS FOR FUTURE RESEARCH**

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The aims of this study in relation to distal radius fractures were to determine (1) the floor and ceiling effects for the QuickDASH and PRWE, (2) the floor and ceiling effects when defined to be within the minimal clinically important difference (MCID) of the minimal or maximal scores, (3) the degree to which patients with a floor or ceiling effect felt that their wrist was 'normal', and (4) patient factors associated with a floor or ceiling effect.

A retrospective cohort study of patients sustaining a distal radius fracture during a single year was undertaken. Outcome measures included the QuickDASH, PRWE, EQ-5D-3L and normal wrist score.

There were 526 patients with a mean age of 65yrs and 77% were female. Most patients were managed non-operatively (73%, n=385). The mean follow-up was 4.8yrs. A ceiling effect was observed for both the QuickDASH (22.3%) and PRWE (28.5%). When defined to be within the MCID of the best score, the effect increased to 62.8% for the QuickDASH and 60% for PRWE. Patients that achieved the best functional outcome according to the QuickDASH and PRWE felt their wrist was only 91% and 92% normal, respectively. Sex (p=0.000), age (p=0.000), dominant wrist injury (p=0.006 for QuickDASH and p=0.038 for PRWE), fracture type (p=0.015), and a better health-related quality of life (p=0.000) were independently associated with achieving a ceiling score.

The QuickDASH and PRWE demonstrated ceiling effects following a distal radius fracture. Patients achieving ceiling scores did not consider their wrist to be 'normal' for them.

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## A ROOT CAUSE ANALYSIS OF DISSATISFACTION IN PATIENTS UNDERGONE SUB-ACROMIAL DECOMPRESSION SURGERY

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Sub-acromial decompression surgery (SAD) has been widely used to treat shoulder impingement. Its validity has been questioned in multi-centric clinical trials and dissatisfaction rates can be high (35%). It is difficult to predict which patients will benefit operatively as research into predictive factors is limited. The study aim was to conduct a root-cause analysis of reasons for dissatisfaction in a cohort of operated patients.

All patients with SAD dissatisfaction in the local Upper Limb database between 2015-19 (n=74/296) formed our study cohort. Patients were scored on Oxford shoulder score (OSS), QuickDASH score, EQ-5D-3L (TTO+VAS) at weeks 26 and 52 post-operatively. Patients' clinical history, radiographs, consultation and operative notes were reviewed.

28% of patients were dissatisfied with surgery. Mean age =52.3±13.4 years with equal gender distribution. 87% were operated arthroscopically. 67% were in physically demanding occupations. There was a significant increase in OSS and QuickDASH at weeks 26 and 52 post-operatively (p<0.05), similar improvement was not noted in VAS pain score. Pain followed by stiffness were the main contributors of dissatisfaction. Multiple implicating factors were noted, the most common being acromio-clavicular joint arthritis (25.7%), suggesting concomitant pathologies as an additional cause for patient dissatisfaction.

This is the first study to evaluate reasons for dissatisfaction following SAD. We noted high rates (28%) of dissatisfaction and a predilection for those involved in physically demanding occupations. We recommend meticulous pre-operative workup to identify co-existing pathologies and appropriate pre-operative counselling to improve outcomes in selected patients needing SAD following failure of conservative management.

## OUR CTEV ACHILLES TENOTOMY JOURNEY - FROM CONSULTANT-DELIVERED CARE UNDER GENERAL ANAESTHETIC TO PHYSIOTHERAPY-DELIVERED CARE IN OUTPATIENT CLINIC - OUTCOMES FROM 45 FEET

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To our knowledge, we are the only centre in the UK where Achilles tenotomies (TA) for CTEV Ponseti correction are performed in outpatient clinic under local anaesthetic by an Advanced Physiotherapy Practitioner (APP) in orthopaedics. This study aims to present the outcomes and safety of this practice.

Retrospective analysis of cases of idiopathic CTEV undergoing Ponseti correction January 2020 to October 2022. Demographic data: Pirani score and number of casts before boots and bar. Patients were divided into five groups: Group 1: TA performed by an Orthopaedic consultant under general anaesthetic (GA) in theatre. Group 2: TA performed by an Orthopaedic consultant under local anaesthetic (LA) in theatre. Group 3: TA performed by APP under GA in theatre. Group 4: TA performed by APP under LA in theatre. Group 5: TA performed by an APP under LA in outpatient clinic. Complications recorded: revision TA, infection, neurovascular injury or need for re-casting. Mean follow up 18 months.

45 feet included. Mean Pirani score 5.5, age started casting 33 days and total number of casts 6. No significant difference in demographic details between groups. 6, 4, 20, 5 and 10 tenotomies were performed in groups 1, 2, 3, 4, and 5 respectively. Complications were 1 revision tenotomy from group 2, one from group 4 and 1 renewal of cast from 3.

This study demonstrates that TAs performed in outpatient clinic under LA by an APP is safe and feasible. No increase in complications were observed compared to TAs performed by orthopaedic consultants.

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### MULTILIGAMENT KNEE INJURIES: GOOD FUNCTIONAL OUTCOMES AFTER RECONSTRUCTIVE SURGERY

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Multiligament knee injuries (MLKI) are associated with significant morbidity and healthcare requirements. The primary aim of this study is to report the patient reported outcomes measures (PROMs) after reconstructive surgery.

Patients undergoing surgery for MLKI between 2014 and 2018 in the single large-volume trauma centre were included. Electronic patient records were reviewed for demographic data, details of surgery and complications. PROMs collected were EQ-5D-5L, Lysholm Knee Score (LKS), UCLA Activity and Sport and patient satisfaction.

Thirty-five patients were included. Mean age was 31 years (range 16-66), and 71% were male. The most common mechanism of injury was sports-related (71%). Obesity was present in eight (23%) patients. No vascular injuries were recorded and four patients sustained nerve injuries. PROMs were available for 18 patients (51%) with a median follow up of 4.5 years. Median EQ-5D-5L was 0.78 (IQR 0.14). Median LKS was 84.5 (IQR 21) and there was no correlation with time to surgery ( $p=0.43$ ). Grade of MLKI did not impact LKS ( $p=0.09$ ). Fifteen patients (83%) saw a reduction in their activity level. All patients were satisfied with their surgical treatment. Recurrent instability was noted in four patients (11%). Three patients (8%) required further surgery (one revision reconstruction, one meniscectomy, one conversion to a hinged knee replacement).

This study demonstrates two groups of patients who sustain MLKI: the sporting population and obese patients. Health related quality of life, functional outcomes and satisfaction are high after surgery. Time to surgery did not impact on functional outcomes.

### SURGICAL RIB FRACTURE FIXATION IN THE NORTH OF SCOTLAND: EARLY OPERATIVE INTERVENTION IMPROVES OUTCOMES

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This study aimed to assess the outcomes of patients with complex rib fractures undergoing operative or non-operative management at our center over a six-year time period.

Retrospective analysis was performed to identify all patients with complex rib fractures at our center from May 2016 to September 2022. Outcome measures included mechanical ventilation, tracheostomy, pneumonia, and mortality at one year.

388 patients with complex rib fractures were identified. 37 (10%) patients fulfilled criteria for surgical management and underwent rib fracture fixation; 351 patients were managed non-operatively with anaesthetic block or analgesia alone. The fixation group had a significantly higher proportion of patients with flail chest (30 (81%) vs 94 (27%),  $p<0.001$ ) and were significantly more likely to require ICU admission (30 (81%) vs. 16 (5%),  $p<0.001$ ) than the non-operative group. At one year follow-up, no significant differences were seen for mortality between these groups (1 (3%) vs. 27 (7%),  $p=0.276$ ).

Of the surgical management group, those that underwent fixation <72 hours post injury were significantly less likely to develop pneumonia than those who were delayed >72 hours (2 (18%) vs 15 (58%),  $p=0.038$ ), with downward trends noted for ICU length of stay (6 vs 10 days,  $p=0.140$ ) and duration of mechanical ventilation (5 vs 8 days,  $p=0.177$ ); no significant differences were seen for tracheostomy (3 vs. 5,  $p=0.588$ ) or mortality (0 vs 1,  $p=0.856$ ).

Surgical fixation of complex rib fractures improves outcomes in selected patient groups. Early surgical fixation led to reduced rates of pneumonia and may improve other outcome measures.