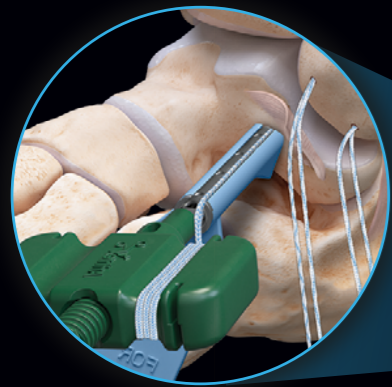


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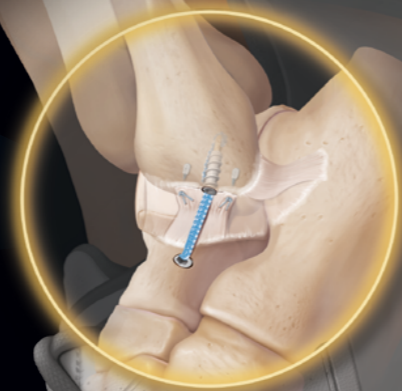
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B FAS

FREE PAPERS ABSTRACT DETAILED

FREE PAPER SESSION 1

Wednesday 9th March

FP1

The survival of total ankle replacements: a data linkage study from the National Joint Registry

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Introduction: Despite the increasing numbers of ankle replacements that are being performed there are still limited studies on the survival of ankle replacements and comparisons between different implants

The primary aim of this study is to link NJR data with NHS digital data to determine the true failure rates of ankle replacements. Secondary outcomes include analysis risk factors for failure, patient demographics and outcomes of individual prosthesis.

Methods: A data linkage study combined National Joint Registry Data and NHS Digital data. The primary outcome of failure is defined as the removal or exchange of any components of the implanted device inserted during ankle replacement surgery. Life tables and Kaplan Meier survival charts demonstrated survivorship. Cox proportional hazards regression models with the Breslow method used for ties were fitted to compare failure rates.

Results: 5,562 primary ankle replacement were recorded on the NJR. The 1-year survivorship was 98.8% (95% CI 98.4%-99.0%), 5-year survival in 2725 patients was 90.2% (95% CI 89.2%-91.1%), and 10-year survival in 199 patients was 86.2% (95% CI 84.6%-87.6%).

When using a Cox regression model for all implants with over 100 implantations using the Infinity as the reference, only the Star (Hazard ratio 1.60 95% CI 0.87-2.96) and Inbone (HR 0.38 95% CI 0.05-2.84) did not produce significantly worse survivorship.

Conclusion: Ankle replacements have increased in numbers over the past decade, and the currently used implants have lower failure rates than older prosthesis. It is expected that in the future the outcomes of ankle replacements will continue to improve.

FP2

2 to 5 year outcomes of 503 fixed bearing ankle arthroplasties

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Introduction: This is a multi-centre, prospective, observational study of 503 INFINITY fixed bearing total ankle arthroplasties. We report the minimum two-year results of this prosthesis which was introduced to the UK Market in 2014 and is now the most used ankle arthroplasty in the National Joint Registry of England and Wales.

Methods: Patients were recruited from 11 centres in the United Kingdom between June 2016 and November

2019. Demographic, radiographic, and functional outcome data (Ankle Osteoarthritis Scale, Manchester Oxford Foot Ankle Questionnaire and Euroqol 5D-5L) were collected preoperatively, at 6 months, 1 year and 2 years and 5 years. The average age was 67.8 (range 23.9 to 88.5) and average BMI 29.3 (18.9 to 48.0). The COFAS grading system was used to stratify deformity. There were 261 (51.9%) COFAS Type 1, 122 (24.2%) COFAS Type 2, 31 (6.2%) COFAS 3 and 89 (17.7%) COFAS type 4. 38 patients (7.6%) presented with inflammatory arthritis. 99 (19.7%) implantations utilised patient specific instrumentation. Complications and reoperations were recorded as adverse events. Radiographs were assessed for lucencies, cysts and/or subsidence.

Results: The mean follow up was 34.2 months (range 24-64). 15 patients have died, 8 withdrawn and 3 lost to follow up. 8 implants (1.6%) have been revised. According to the Glazebrook classification there were low grade complications in 6.6%, medium grade in 1.4% and high grade in 1.6%. There have been an additional 13 non revision re-operations (2.6%) at the latest follow up. There was a significant ($p<0.01$) improvement across all functional outcome scores at a minimum of 2yr follow up.

Discussion and conclusion: This large cohort has shown a low early revision rate and high functional outcomes with a low-profile fixed bearing prosthesis.

FP3

Clinical and radiographic outcomes of revision total ankle arthroplasty using the INBONE II prosthesis

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Background: The literature on the outcome of revision total ankle arthroplasty (TAA) remains limited. We aim to report the clinical and radiological outcomes of revision TAA at a high-volume centre in the UK.

Methods: Retrospective review of 28 patients that underwent 29 revision TAA procedures using INBONE II prosthesis. Demographic, radiological, and patient reported outcome measures data were analysed.

Results: The mean (range) duration from primary TAA to revision was 87.5 (16-223) months. The main indication for the revision was aseptic loosening of the primary TAA (82.8%). Additional procedures were required in 75.9% of patients. At mean (range) follow-up of 40 (24- 60) months, the infection, re-operation, and implant survival rates were 6.9%, 6.9% and 96.5% respectively. A significant postoperative improvement in the component alignment radiographic measures was observed. Osteolysis, subsidence, loosening and heterotopic ossification rates were comparable to other reports and did not influence the clinical outcome. A significant improvement was observed in the MOXFQ (all domains) and the EQ-5D (three domains) at 24 months postoperatively.

Conclusions: Revision TAA using INBONE II was associated with good short-term survival and improvement in the postoperative scores at 2 years. Maintenance of the postoperatively improved alignment was documented at follow up. The relatively high survival rate in this series supports the notion that revision TAA is a satisfactory option for failed primary TAA.

FP4

Blasting BMAC: a novel therapy to improve healing in fusion surgery

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Introduction: Fusion represents an effective treatment option in patients affected by end-stage arthritis. To minimise the risk of non-union following fusion, biological preparations such as bone marrow aspirate concentrate (BMAC) are commonly used intra-operatively. Mechanotransduction represents an emerging field of research whereby physical stimuli can be used to modulate the behaviour and differentiation of cells. Blast waves (a subtype of shock waves) are one such physical stimulus. The aim of this study was to investigate whether the osteogenic potential of BMAC can be enhanced using a blast wave, and thus improve its efficacy in fusion surgery.

Methods: Human BMAC samples were obtained from three healthy patients and exposed to a single blast wave (peak overpressure= 50psi), before being placed in a suspension of mesenchymal stem cells, to represent the biological environment of the fusion site. Three test groups were used: MSC (the experimental control); MSC + BMAC; MSC + BMAC + blast wave. Calcium mineralisation assays were performed on the MSCs on Day 7 and 14 to assess for osteoblastic transformation.

Results: Calcium mineralisation on Day 7 was significantly increased in the MSC + BMAC group compared to the MSC group (mean percentage change 42.12 vs 0.0, $p=0.012$). The MSC + BMAC + blast wave group also demonstrated significantly increased levels compared to the MSC + BMAC group (84.56 vs. 42.14, $p=0.039$). The difference in calcium mineralisation between the MSC and MSC + BMAC + blast wave groups was strongly significant (0.00 vs. 84.56, $p=0.003$).

Conclusion: Exposure of BMAC to a single blast wave enhances its osteogenic potential. This represents a potential novel way to improve healing following fusion surgery and reduce the rates of non-union.

FP5

Anatomy of the tibial nerve in relation to the tarsal tunnel: a cadaveric study

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Introduction: Tibial nerve anatomy has not been studied profoundly in comparison to Tarsal Tunnel Syndrome (TTS). Assuming symptoms are caused by an anatomical variant or mechanical cause regarding the tibial nerve, it is essential to investigate the anatomy of this structure taking in consideration that surgical and conservative treatments have shown poor results.

Methods: 40 lower-leg specimens were obtained. Dissection started 20 centimeters proximal to the Dellon-McKinnon (DM) line towards the medial aspect of the naviculo-cuneiform joint distally. Anteriorly, dissection began at the tibio-talar medial gutter until the medial aspect of the Achilles tendon posteriorly. The plantar aspect extended from medial to lateral within the parameters previously described, ending at the level of the second metatarsal.

Results: The flexor retinaculum had a denser consistency in 22.5% of the cases and the average length was 51.9 mm. The flexor retinaculum as an independent structure was found absent and 77.2% of cases as undistinguished extension of the crural fascia. The lateral plantar nerve (LPN) and abductor digiti minimi (ADM) nerve shared same origin in 80% of cases, 34.5% bifurcated proximal to the DM line, 31.2% distally and 34.3% at the same level. The medial calcaneal nerve (MCN) emerged proximal to the DM line in 100% of specimens. The medial plantar nerve (MPN) has its origin proximal to the DM line in 95% of cases.

Conclusion: The flexor retinaculum is an extension of the crural fascia and not an independent structure. The LPN and ADM have the same origin in most cases and this presents as an important finding that must be studied in detail for clinical correlations between the motor and sensory affections of the ADM and LPN respectively.

Finally, the branches of the MCN and MPN are the most constant in their distribution and proximal origin in relation to the Dellon-McKinnon line.

FP6

Plantar structures in relation to a straight retrograde hind foot (RHF) nail inserted through a midline heel pad approach – a cadaveric study

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Background: RHF nail is an important tool for simultaneous ankle and subtalar joint stabilisation +/- fusion. Straight and curved RHF nails are available to use, but both seem to endanger plantar structures, especially the lateral plantar artery and nerve and Baxter's nerve.

There is a paucity of literature on the structures at risk with a straight RHF nail inserted along a line bisecting the heel pad and the second toe (after Stephenson et al). In this study, plantar structures 'at risk' were studied in relation to a straight nail inserted as above.

Methods: Re-creating real-life conditions and strictly following the recommended surgical technique with regards to the incision and guide-wire placement, we inserted an Orthosolutions Oxbridge nail into the tibia across the ankle and subtalar joints in 6 cadaveric specimens. Tissue flaps were then raised to expose the heel plantar structures and studied their relation to the inserted nail.

Results: The medial plantar artery and nerve were always more than 10mm away from the medial edge of the nail, while the Baxter nerve was a mean 14mm behind. The lateral plantar nerve was a mean 7mm medial to the nail, while the artery was a mean 2.3mm away with macroscopic injury in one specimen. The other structures 'at risk' were the plantar fascia and small foot muscles.

Conclusion: Lateral plantar artery and nerve are the most vulnerable structures during straight RHF nailing. The risk to heel plantar structures could be mitigated by making incisions longer, blunt dissection down to bone, meticulous retraction of soft tissues and placement of the protection sleeve down to bone to prevent the entrapment of plantar structures during guide-wire placement, reaming and nail insertion.

FP7

3D automated vs manual assessment of alignment in normal and cavus feet using weight-bearing CT scans – does it differ?

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Background: The complex deformities in cavovarus feet may be difficult to assess and understand. Weight-bearing CT (WBCT) is increasingly used to evaluate complex deformities. However, the bone axes may be difficult to calculate in the setting of severe deformity. Computer-assisted 3D-axis calculation is a novel approach that may allow for more accurate assessment of foot alignment / deformity. The aim of this study was to assess differences in measurements done manually on 2D slices of WBCT versus 3D computer models in normal and cavus feet.

Methods: We retrospectively analyzed WBCT scans from 16 normal and 16 cavus feet in patients with Charcot-Marie Tooth. Eight measurements were assessed: Talus-1st metatarsal angle (axial plane), Forefoot arch angle (coronal plane), and Meary's angle, calcaneal pitch, cuneiform to floor, cuneiform to skin, navicular to floor and navicular to skin distance (sagittal plane). 2D measurements were performed manually and 3D measurements were performed using specialised software (BoneLogic, DISIOR).

Results: There was no significant difference in the measured variables (2D manual versus 3D automated) in normal feet. In the cavus group, 3D assessment calculated increased values for the sagittal angles: Meary's 7.3 degrees greater ($p=0.004$), calcaneal pitch 2.4 degrees greater ($p=0.011$), and lower values for the axial talus-1st MT angle, 10.6 degrees less ($p=0.001$).

Conclusion: There were no significant differences in the normal group. This suggests 3D automated techniques can reliably assess the alignment of bony axes. However, the 3D axis calculations suggest there may be greater sagittal and lesser axial deformity in cavus feet than measured by 2D techniques. This discrepancy may be on account of the rotation seen in cavovarus feet, which may not be readily assessed manually. 3D automated measurements may therefore have a role in better assessing and classifying the cavus foot which may ultimately help inform treatment algorithms.

FP8

Inverted and everted slope walking leads to increased knee compensation in ankle fusion compared to total ankle replacement

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Ankle fusion (AF), a durable intervention for ankle arthritis, has been the management of choice but restricts mobility. Recently, total ankle replacement (TAR) has been offered to patients looking to maintain mobility. The aim was to compare the biomechanics of AF and TAR while walking on inverted and everted slopes which create a greater demand for complex foot mobility than level walking.

A ten-camera motion detection setup captured trials as patients walked in both directions over a 5° lateral slope with embedded force plates. Moments (Nm/Kg) across the knee and ankle were exported from Visual 3D in the sagittal and frontal plane, and data were reported as means with 95% confidence intervals.

15 patients were recruited (6 TAR, 9 AF). The median age, follow-up and BMI was 67 years, 4 years and 35.8 kg/m² in AF, and 73 years, 7 years and 28.1 kg/m² in TAR, respectively. During inverted slope walking (4 TAR, 7 AF), abduction moments across (i) the knee: TAR 0.38 (0.37-0.39) vs AF 0.37 (0.27-0.52) and (ii) the ankle: TAR 0.20 (0.13-0.27) vs AF 0.25 (0.18-0.32), and extension moments across (i) the knee: TAR 0.68 (0.38-0.97) vs AF 0.85 (0.69-1.01) and (ii) the ankle: TAR 1.46 (1.30-1.62) vs AF 1.30 (1.08-1.52). During everted walking (5 TAR, 7 AF), abduction moments across (i) the knee: TAR 0.41 (0.30-0.52) vs AF 0.46 (0.27-0.66) and (ii) the ankle: TAR 0.24 (0.11-0.38) vs AF 0.26 (0.18-0.33), and extension moments across (i) the knee: TAR 0.76 (0.54-0.99) vs AF 0.93 (0.72-1.14) and (ii) the ankle: TAR 1.39 (1.19-1.59) vs AF 1.26 (1.04-1.48).

There were no differences in abduction moments during inverted or everted slope walking. However, patients with AF had increased extension moments across the knee, particularly on inverted slopes, suggesting that AF creates a greater demand for knee compensation than TAR.

FP9

A 'STRONG regime' for safe ankles: a prospective study to validate an early mobilization programme after a lateral ankle ligament repair with suture tape augmentation

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Objective: To evaluate early mobilization with the 'STRONG regime' is safe after lateral ankle ligament repair with suture tape augmentation.

Background: The ESSKA-AFAS ankle instability group presented in 2016 evidence-based guidelines for rehabilitation and return to activity after lateral ankle ligament repair. Early mobilization is considered an important element of postoperative rehabilitation. Patients have to be immobilized for approximately six weeks to protect the delicate repair. Lateral ankle ligament repair with suture tape augmentation results in greater strength compared with standard repairs and early mobilization proved to be successful in small sample size studies. Augmented surgery technique is getting increasingly popular. However, it is unknown which rehabilitation regimes are used. It is essential to establish a clear evidence-based guideline for rehabilitation after surgery.

Methods: A systematic literature search was performed to obtain the best evidence research regarding this surgery. In cooperation between the orthopaedic- and physical therapy department a post-operative rehabilitation protocol with early mobilization was established. This STRONG protocol (figure 1) is based on milestones and three stages.

Results: In February 2016 the first patients were selected for the early mobilization regime. In total 102 patients with a lateral ankle ligament repair were treated with the STRONG protocol. No re-ruptures were observed with a follow up of a year. In a subgroup of athletes hop tests showed a symmetry index of 100,5% for triple hop, 98,6 for side hop and 103,6 for figure of 8 hop. First return to sport was achieved between 9-12 weeks, with full return to competition after a mean of 4 months.

Conclusions: An early postoperative mobilization regime based on supervised exercises seems to be a safe intervention after a lateral ankle ligament reconstruction.

Clinical implications: Augmented ankle ligament surgery with early mobilization could be an important advancement in treating patients with chronic ankle injuries.

FREE PAPER SESSION 2

Thursday 10th March

FP10

Rate of COVID-19 infection and 30 day mortality between Blue and Green (Dedicated COVID-19 free) pathways? Results from UK-FAICoN audit

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Objectives: The primary aim was to determine the differences in COVID-19 infection rate and 30 day mortality in patients undergoing foot and ankle surgery between different treatment pathways over the two phases of the UK-FALCON audit, spanning the first and second national lockdowns.

Design: Multicentre retrospective national audit.

Setting: This was a combined retrospective (Phase 1) and prospective (Phase 2) national audit of foot and ankle procedures in the UK in 2020.

Participants: All adult patients undergoing foot and ankle surgery in an operating theatre during the study period included from 46 participating centres in England, Scotland, Wales and Northern Ireland. Patients were categorised as either a green pathway (designated COVID-19 free) or blue pathway.

Results: 10,846 patients were included, 6,644 from phase 1 and 4,202 from phase 2. Over the 2 phases the infection rate on a blue pathway was 1.07% (69/6,470) and 0.21% on a green pathway (9/4,280). In phase 1, there was no significant difference in the COVID-19 perioperative infection rate between the blue and green pathways in any element of the first phase (pre-lockdown (p=.109), lockdown (p=.923) or post-lockdown (p=.577)). However, in phase 2 there was a significant reduction in perioperative infection rate when using the green pathway in both the pre-lockdown (p<.001) and lockdown periods (p<.001). There was no significant difference in COVID-19 related mortality between pathways.

Conclusions: There was a five-fold reduction in the perioperative COVID-19 infection rate when using designated COVID-19 green pathways; however the success of the pathways only became significant in phase 2 of the study. The study shows a developing success in using green pathways in reducing the risk to patients undergoing foot and ankle surgery.

FP11

Functional outcomes of dorsal bridge plating for Lisfranc injuries with routine metalwork retention: a major trauma centre experience

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Background: Anatomical reduction of unstable Lisfranc injuries is crucial. Evidence as to the best methods of surgical stabilization remains sparse, with small patient numbers a particular issue. Dorsal bridge plating offers rigid stability and joint preservation.

The primary aim of this study was to assess the medium-term functional outcomes for patients treated with this technique at our centre. Additionally, we review for risk factors that influence outcomes.

Methods: 85 patients who underwent open reduction and dorsal bridge plate fixation of unstable Lisfranc injuries between January 2014 and January 2019 were identified. Metalwork was not routinely removed.

A retrospective review of case notes was conducted. The Manchester-Oxford Foot Questionnaire summary index (MOXFQ-Index) was the primary outcome measure, collected at final follow-up, with a minimum follow-up of 24 months. The American Orthopedic Foot and Ankle Society (AOFAS) midfoot scale, complications, and all-cause re-operation rates were secondary outcome measures. Univariate and multivariate analyses were used to identify risk factors associated with poorer outcomes.

Results: Mean follow-up 40.8 months (24 - 72). Mean MOXFQ-Index 27.0 (SD 7.1). Mean AOFAS score 72.6 (SD 11.6). 48/85 patients had injury patterns that included an intra-articular fracture and this was associated with poorer outcomes, with worse MOXFQ and AOFAS scores (both p<0.001).

18 patients (21%) required the removal of metalwork for either prominence or stiffness. Female patients were more likely to require metalwork removal (OR 3.89, 95% CI 1.27 to 12.0, p=0.02). Eight patients (9%) required secondary arthrodesis.

Conclusions: This is the largest series of Lisfranc injuries treated with dorsal bridge plate fixation reported to date and the only to routinely retain metalwork. The technique is safe and effective. The presence of an intraarticular fracture is a poor prognostic indicator. Metalwork removal is more likely to be needed in female patients but routine removal may not be essential.

FP12

Is the diagnosis of 5th metatarsal fracture subtype consistent? An inter-observer reliability study

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Introduction: Treatment pathways of 5th metatarsal fractures are commonly directed based on fracture classification, with Jones types for example, requiring closer observation and possibly more aggressive management.

Primary objective: To investigate the reliability of assessment of subtypes of 5th metatarsal fractures by different observers.

Methods: Patients were identified from our prospectively collected database. We included all patient referred to our virtual fracture clinic with a suspected or confirmed 5th metatarsal fracture. Plain AP radiographs were reviewed by two observers, who were initially trained on the 5th metatarsal classification identification. Zones were defined as Zone 1.1, 1.2, 1.3, 2, 3, diaphyseal shaft (DS), distal metaphysis (DM) and head. An inter-observer reliability analysis using Cohen's Kappa coefficient was carried out, and degree of observer agreement described using Landis & Koch's description. All data was analysed using IBM SPSS v.27.

Results: 878 patients were identified. The two observers had moderate agreement when identifying fractures in all zones, apart from metatarsal head fractures, which scored substantial agreement (K=.614). Zones 1.1 (K=.582), 2 (K=.536), 3 (K=.601) and DS (K=.544) all tended towards but did not achieve substantial agreement. Whilst DS fractures achieved moderate agreement, there was an apparent difficulty with distal DS, resulting in a lot of cross over with DM (DS 210 vs 109; DM 76 vs 161). Slight agreement with the next highest adjacent zone was found when injuries were thought to be in zones 1.2, 1.3 and 2 (K=0.17, 0.115 and 0.152 respectively).

Conclusions: Reliability of sub-categorising 5th metatarsal fractures using standardised instructions conveys moderate to substantial agreement in most cases. If the region of the fracture is going to be used in an algorithm to guide a management plan and clinical follow up during a virtual clinic review, defining fractures of zones 1-3 needs careful consideration.

FP13

Intra-articular haematoma block vs procedural sedation for manipulation of closed ankle fracture dislocations: an efficacious, resource sparing solution?

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Background: Procedural sedation (PS) requires two suitably qualified clinicians and a dedicated monitored bed space. We present the results of intra-articular haematoma blocks (IAHB), using local anaesthetic, for the manipulation of closed ankle fracture dislocations and compared resource use with PS.

Methods: Patients received intra-articular ankle haematoma blocks for displaced ankle fractures requiring manipulation between October 2020 to April 2021. The technique used 10ml of 1% lignocaine injected anteromedially into the tibiotalar joint. Pain scores (VAS), time from first x-ray to reduction, and acceptability of reduction were recorded. A comparison was made by retrospective analysis of patients who had undergone PS for manipulation of an ankle fracture over the six month period March – August 2020.

Results: During the periods assessed, 25 patients received an IAHB and 28 received PS for ankle fractures requiring manipulation (mean age 57.8yr vs 55.1yr). Time from first x-ray to manipulation was 65.9 min (IAHB) vs 82.9 min (PS) (p = 0.087).

In the IAHB group mean pain scores pre, during and post manipulation were 6.1, 4.7 and 2.0 respectively ('pre' to 'during' p <0.05; 'pre' to 'post' p <0.01).

In the IAHB group, 23 (92%) had a satisfactory reduction without need of PS or general anaesthetic. In the PS group 23 (82%) had a satisfactory reduction. There was no significant difference in the number of unsatisfactory first attempt reductions between the groups. There were no cases of deep infection post operatively in either group.

Conclusion: Intra-articular haematoma block of the ankle appears to be an efficacious, safe and inexpensive means of providing analgesia for manipulation of displaced ankle fractures. Advantages of this method include avoiding the risks of procedural sedation, removing the requirement of designated clinical space and need for qualified clinicians to give sedation, and the ability to re-manipulate under the same block.

FP14

Elderly ankle fracture management: putting the evidence into practice

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Introduction: Following publication of the Ankle Injury Management (AIM) trial in 2016 which compared the management of ankle fractures with open reduction and internal fixation (ORIF) versus closed contact casting (CCC), we looked at how the results of this study have been adopted into practice in a trauma unit in the United Kingdom.

Methods: Institutional approval granted to identify eligible patients from a trauma database. 143 patients over 60 years with an unstable ankle fracture between 2017 and 2019 (1 year following publication of the AIM trial) were included. Open fractures, and patients with insulin-dependent diabetes or peripheral vessel disease were excluded (as per AIM criteria). Radiographs were reviewed for malunion and non-union. Clinical notes were reviewed for adverse events. Minimum follow up was 24 months.

Results: Of the 143 patients, 42 patients (29.4%) received a moulded cast with a return to theatre rate of 21.4%, malunion rate of 30.1%, and infection or wound problem rate of 4.8%. When the exact phrase "close contact cast" was specified in 21 patients (14.7%), there was a 19.0% return to theatre rate, 28.6% malunion rate, and a 4.8% infection or wound problem rate. 101 patients (70.6%) had ORIF with a return to theatre rate of 10.9%, malunion rate of 5.0%, and infection or wound problem rate of 13.9%.

Discussion: Our results show a high rate of complication with cast management of unstable ankle fractures in this older population. This was improved where CCC was specified, but remains higher even than those published in the AIM trial. Whilst there is certainly a role for CCC in carefully selected patients, we would advise caution in the widespread adoption of a close contact casting technique.

FREE PAPER SESSION 3

Friday 11th March

FP15

The predictive value of vascular calcification on plain radiographs of the foot to diagnose diabetes mellitus

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Introduction: There are nearly 500,000 people with undiagnosed diabetes mellitus in the UK. The incidental finding of vascular calcification on plain radiographs in patients with undiagnosed diabetes has the potential to alter patient management in those presenting with pathology. We hypothesised that the presence of vascular calcification on plain radiographs of the foot may predict the diagnosis of diabetes.

The primary aim of this case control study was to determine the positive predictive value of vascular calcification to diagnose diabetes. Secondary aims were to determine the odds of having diabetes dependent on other known risk factors for calcification.

Methods: A retrospective case control study of 130 diabetic patients were compared to 130 non-diabetic patients that were matched for age and gender. The presence of vascular calcification in anterior, posterior or plantar vessels, and length of calcification were measured on plain radiographs. McNemar's Chi-squared test and positive predictive values were calculated. Conditional logistic regression models were used to estimate the association between calcification and diabetes.

Results: 28 patients had type I diabetes and 102 had type II diabetes. The mean age was 58.0 in both groups and 31.5% were females.

89.2% of those with diabetes had calcification present, and 23.1% in those without ($p < 0.0001$).

Calcification in two vessels predicts diabetes with a positive predictive value of 91.2% (95% CI 82.1%-100%).

The odds ratio for having diabetes is 78 (95% CI: 7.8 – 784) times higher in a person who has calcification in the blood vessels of their foot than in a person without calcification after adjusting for confounders.

Conclusion: This study has demonstrated that vascular calcification in 2 vessels is over 90% predictive of a diagnosis of diabetes. This screening test could be used in future clinics when interpreting radiographs, aiding in the diagnosis of diabetes and altering patient management.

FP16

Prevalence of symptomatic venous thromboembolism in patients with diabetic feet treated in total contact cast in a tertiary referral diabetic foot unit

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Introduction: Total contact casting (TCC) is one of the most commonly utilized modalities in the management of diabetic feet. We undertook a retrospective review to determine the prevalence of symptomatic VTE events in patients treated in a weight bearing TCC in our diabetic foot unit, and to formulate guidelines for VTE prophylaxis.

Methods: Electronic records were reviewed to identify all patients treated in a TCC between 2014 and 2021. Data collection included patient demographics, comorbidities, period of immobilization in TCC, the incidence of VTE events, and any VTE prophylaxis prescribed during their period in TCC.

Results: 549 patients were identified who had at least one episode of TCC. Mean age was 67 years (range 28 to 94 years) and the mean duration in cast was 10.2 weeks (range 0.3-46 weeks). Only 6 patients (1.1%) were prescribed chemical thrombo-prophylaxis during their period in TCC. Mean body mass index (BMI) for these patients was 32.3 (Range 18.4-58.9). Other significant comorbidities: 81% (n=444) of patients had associated cardio-vascular comorbidities; 54 % (n=296) had renal comorbidities including 22% (n=121) having had dialysis and 4.2% (n=23) with renal transplants.

Eight of the 549 patients (1.5%) had suffered a VTE event of which only 2 (0.36%) were during the period of immobilization in TCC. One was a symptomatic DVT (0.18%) and the other was an asymptomatic (incidental) finding of pulmonary embolism (PE). There was no mortality related to the VTE episodes.

Conclusion: NICE guidelines state that one should "Consider pharmacological VTE prophylaxis for patients with lower limb immobilization". Our study finds that patients treated in a weight bearing TCC do not require routine pharmacological VTE prophylaxis, in spite of an extended period of lower limb immobilization and significant medical comorbidities.

FP17

Predictors of metalwork failure and non-union after hindfoot Charcot reconstruction

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Introduction: Surgical reconstruction of deformed Charcot feet carries high risk of non-union, metalwork failure and deformity recurrence. The primary aim of this study was to identify the factors contributing to these complications following hindfoot Charcot reconstructions.

Methods: We retrospectively analysed patients who underwent hindfoot Charcot reconstruction with an intramedullary nail between 2007 and 2019 in our unit. Patient demographics, co-morbidities, weightbearing status and post-operative complications were noted. Metalwork breakage, non-union, deformity recurrence, concurrent midfoot reconstruction and the measurements related to intramedullary nail were also recorded.

Results: There were 70 patients with mean follow up of 50±26 months. Seventy-two percent were fully weightbearing at 1 year post-operatively. The overall union rate was 83%. Age, BMI, HbA1c and peripheral vascular disease did not affect union. The ratio of nail diameter and isthmus was greater in the united compared to the non-united group (0.90±0.06 and 0.86±0.09, respectively; $p=0.03$). Supplemental compression devices were used for 33% of those in the united compared to 8% in the non-united group ($p=0.04$). All patients in the non-union group did not have a miss-a-nail screw. Metalwork failure was seen in 13 patients (19%). There was a significantly greater distal screw metalwork failure in those with supplementary bridging of tibia to midfoot (23% vs. 3%; $p=0.001$). An intact medial malleolus was found more frequently in those with intact metalwork (77% vs. 54%, respectively; $p=0.02$) and those with union (76% vs. 50%; $p=0.02$). Broken metalwork occurred more frequently in patients with non-unions (69% vs. 8%; $p < 0.001$) and deformity recurrence (69% vs. 9%; $p < 0.001$).

Conclusion: Satisfactory clinical and radiographic outcomes occur in over 80% of patients. Union after hindfoot reconstruction occurs more frequently with an isthmic fit of the intramedullary nail, supplementary compression and miss-a-nail screws. An intact medial malleolus is protective against non-union and metalwork failure. Broken metalwork is linked to deformity recurrence and non-union.

FP18

First metatarsal rotation after scarf osteotomy for hallux valgus

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Introduction: Recurrence after surgical correction of hallux valgus may be related to coronal rotation of the first metatarsal. The scarf osteotomy is a commonly used procedure for correcting hallux valgus but has limited ability to correct rotation. Using weightbearing computed tomography (WBCT), we aimed to measure the coronal rotation of the first metatarsal before and after a scarf osteotomy, and correlate these to clinical outcome scores.

Methods: We retrospectively analyzed 16 feet (15 patients) who had a WBCT before and after scarf osteotomy for hallux valgus correction. On both scans, hallux valgus angle (HVA), intermetatarsal angle, and anteroposterior/lateral talus-first metatarsal angle were measured using digitally reconstructed radiographs. Metatarsal pronation (MPA), alpha angle, sesamoid rotation angle and sesamoid position were measured on standardized coronal CT slices. Preoperative and postoperative (12 months) clinical outcome scores (MOxFAQ and VAS) were captured.

Results: Mean HVA was 28.6±10.1 degrees preoperatively and 12.1±7.7 degrees postoperatively. Mean IMA was 13.7±3.8 degrees preoperatively and 7.5±3.0 degrees postoperatively. Before and after surgery, there were no significant differences in MPA (11.4±7.7 and 11.4±9.9 degrees, respectively; $p=0.75$) or alpha angle (10.9±8.0 and 10.7±13.1 degrees, respectively; $p=0.83$). There were significant improvements in SRA (26.4±10.2 and 15.7±10.2 degrees, respectively; $p=0.03$) and sesamoid position (1.4±1.0 and 0.6±0.6, respectively; $p=0.04$) after a scarf osteotomy. There were significant improvements in all outcome scores after surgery. Poorer outcome scores correlated with greater postoperative MPA and alpha angles ($r=0.76$ ($p=0.02$) and 0.67 ($p=0.03$), respectively).

Conclusion: A scarf osteotomy does not correct first metatarsal coronal rotation, and worse outcomes are linked to greater metatarsal rotation. Rotation of the metatarsal needs to be measured and considered when planning hallux valgus surgery. Further work is needed to compare postoperative outcomes with rotational osteotomies and modified Lapidus procedures when addressing rotation.

FP19

Does a high pre-operative Pain Catastrophisation Score influence the outcomes following hallux surgery

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Background: Surgical intervention for hallux valgus and hallux rigidus is an option for patients presenting with severe pain and deformity. Literature suggest that patients with high Pain Catastrophisation Scores (PCS) have poorer outcomes in spinal and to a lesser extent in arthroplasty surgery. There is however very little evidence pertaining to foot and ankle surgery.

Aim: We aimed to study whether catastrophisation as measured by PCS influenced the outcomes following surgery for Hallux valgus and rigidus.

Methodology: Ethical approval for this prospective portfolio study was obtained from NRES Committee South Central and Oxford. Approval was granted from the local R&D department prior to data collection.

All patients listed for surgery for hallux pathology to the four senior authors were invited to participate. Recruitment into the study started in September 2017 and is ongoing.

Pain catastrophising score (PCS), Manchester Oxford Foot Questionnaire (Mox-FQ), Visual analog scale (VAS) for pain and EQ-5D-3L questionnaires were completed Pre-op (baseline), and at 3, 6 and 12- months post-surgery.

Results: 93 patients with minimum follow-up of 6 months were analysed using SPSS software. A P-value of less than 0.05 was considered significant. The mean age of the patients was 58.5 years and 83% were women.

70% of the patients had surgery for hallux valgus and rest for rigidus.

Both PROMS and PCS improved significantly following surgical intervention.

Patients with higher pre-operative PCS had a worse 6-month PROM score and more pain.

Conclusion: This study confirms that pre-operative catastrophisation as demonstrated by a high PCS score has an adverse effect on outcomes following hallux surgery.

Risk stratifying patients based on their Pre-op PCS scores may be a useful strategy to identify those at risk of poorer outcomes. We recommend that behavioural change interventions should be considered to try to improve outcomes in patients with pre-op PCS.

FP20

Five year follow up of third-generation percutaneous Chevron and Akin osteotomies (PECA) for hallux valgus

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Background: Recent large studies of third-generation minimally invasive hallux valgus surgery (MIS) have demonstrated significant improvement in clinical and radiological outcomes. It remains unknown whether these clinical and radiological outcomes are maintained in the medium to long-term. The aim of this study was to investigate the five-year clinical and radiological outcomes following third-generation MIS hallux valgus surgery.

Methods: A retrospective observational single surgeon case series of consecutive patients undergoing primary isolated third-generation percutaneous Chevron and Akin osteotomies (PECA) for hallux valgus with a minimum 60 month clinical and radiographic follow up. Primary outcome was radiographic assessment of the hallux valgus angle (HVA) and intermetatarsal angle (IMA) pre-operatively, 6 months and ≥60 months following PECA. Secondary outcomes included the Manchester-Oxford Foot Questionnaire, patient satisfaction, Euroqol-5D Visual Analogue Scale and Visual Analogue Scale for Pain.

Results: Between 2012 and 2014, 126 consecutive feet underwent isolated third-generation PECA. The mean follow up was 68.8±7.3 (range 60-88) months. There was a significant improvement in radiographic deformity correction; IMA improved from 13.0±3.0 to 6.0±2.6, (p<0.001) and HVA improved from 27.5±7.6 to 7.8±5.1. There was a statistically significant but not clinically relevant increase of 1.2±2.6° in the HVA between 6 month and ≥60 month radiographs. There was an increase in IMA of 0.1±1.6° between 6 month and ≥60 month radiographs which was not statistically or clinically significant. MOXFQ Index score at ≥follow up was 10.1±17.0. The radiographic recurrence rate was 2.6% at final follow up. The screw removal rate was 4.0%.

Conclusion: Radiological deformity correction following third-generation PECA is maintained at a mean follow up of 68.8 months with a radiographic recurrence rate of 2.6%. Clinical PROMs and patient satisfaction levels are high and comparable to other third-generation studies with shorter duration of follow up.

FP21

The impact of hallux valgus on function and quality of life in females

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Background: The effect of hallux valgus (HV) on health-related quality of life (HRQOL) and the relationship between radiographic severity of deformity and patient reported outcome measures (PROMs) is poorly understood.

The aim of this study was to compare the HRQOL of female patients with HV to the UK population. The secondary aim was to assess the correlation between PROMs, including HRQOL, with radiographic severity of deformity.

Methods: Weight bearing radiographic data (hallux valgus (HVA) angle; intermetatarsal (IM) angle) were measured in consecutive female patients presenting with HV. Each patient prospectively completed the Euroqol EQ-5D-5L questionnaire (EQ-5D), Visual Analogue Scale for Pain (VAS-Pain) and Manchester Oxford Foot Questionnaire (MOXFQ). Data were stratified into age ranges and compared with an EQ-5D United Kingdom general population reference dataset. Pearson R correlation values were calculated for the PROMs and radiographic deformity.

Results: Between July 2015 and March 2020, 425 consecutive female patients presented with HV for consideration for surgery. EQ-5D-5L data were prospectively collected for 396 of these patients (93.2%). Females less than 65 years with HV had a statistically significantly worse quality of life compared with females of the same age group in the general population. Above the age of 65, there was no statistically significant difference in EQ-5D-5L Index score between the two groups. There was no correlation between radiographic HV deformity and HRQOL measures or MOXFQ scores.

Conclusion: Female patients presenting with HV deformity have a significantly reduced quality of life compared with the UK general population. The radiographic severity of deformity did not correlate with HRQOL measures or foot and ankle specific PROMs. Foot and ankle specific clinical PROMs moderately correlate with HRQOL and may be a better marker of the negative effect of symptomatic hallux valgus deformity on quality of life.

FP22

Factors affecting outcomes of arthroscopic ankle fusion: pre-existing triple fusion and the risk to non-union

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Background: Open or arthroscopic ankle fusion (AAF) is a successful operative treatment for end-stage ankle arthritis. Evidence suggest that AAFs have better outcomes. In addition to the operative technique other patient-factors can influence outcomes. The most significant complication of ankle fusion is a non-union. To better understand the risk factors related to this we undertook a retrospective investigation of primary AAFs.

Methods: We reviewed all AAFs conducted at our institution over a 10-year period. Patients excluded if they had simultaneous fusion of neighbouring joints or were lost to follow-up. The primary outcome variable was radiographic union. Other operative complications were analysed as secondary outcomes. Two hundred and eighty-four eligible AAFs in 271 patients were performed over the study period.

Results: The overall non-union rate was 7.7 %. Univariate logistic regression analysis found that smoking (6.2% non-union in non-smokers vs 24% in smokers) and prior triple fusion (5.5% non-union in the absence of prior triple fusion vs 70% in the presence of a prior triple fusion) were independent risk factors for non-union. Multivariate analysis showed that only prior triple fusion was predictive (OR 40.0 [9.4,170.3], p<0.0001). Increasing age, obesity (BMI>30), surgical grade (trainee vs consultant), diabetes or the degree of weightbearing status post-operatively were not significant risk factors of non-union. The leading cause of reoperation was the removal of metal (18%). There were 5 superficial (1.8%) and 4 deep (1.4%) infections. Kaplan-Meier survival analysis showed a 75% 'survivorship' of the subtalar joint at 10 years following an arthroscopic ankle fusion.

Conclusion: This is the largest case series of AAFs in the literature and the first to demonstrate that patients who had an AAF performed after a previous triple fusion have unacceptably high non-union rates and may benefit from other surgical options. This study data could also useful for patient consenting purposes.

FP23

How does Cartiva interpositional arthroplasty compare to arthrodesis in the treatment of hallux rigidus? A retrospective comparative study with 12 month follow up

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Background: Hallux rigidus is a common condition characterised by first metatarsophalangeal joint (MTPJ) degeneration, pain and limited range of motion (ROM). The gold standard surgical treatment is arthrodesis, providing good pain relief but sacrifices ROM. Recently the Cartiva synthetic cartilage implant (SCI) has been utilised as an interpositional arthroplasty, aiming to reduce pain whilst preserving range of motion.

Current evidence for Cartiva SCI is largely based on a single cohort with mixed outcomes. We sought to evaluate the clinical outcomes of Cartiva SCI compared to arthrodesis undertaken in our centre.

Methods: Retrospective review of patients undergoing Cartiva SCI or arthrodesis for treating hallux rigidus was conducted. Preoperative arthritis was radiographically graded using the Vanore classification. Patient reported outcomes (PROMs) were assessed using EuroQol 5-dimension score (EQ-5D-5L) and Manchester-Oxford Foot Questionnaire (MOXFQ).

Results: Between 2017 and 2020 there were 33 cases (17 Cartiva, 16 arthrodesis, mean age 59.0±9.9 years) with a mean follow up of 2.3 years. For the first MTPJ arthrodesis cohort, the MOXFQ domain scores were: Index 3.9±5.8, Walking/Standing 5.1±7.6, Pain 3.2±5.0, and Social Interaction 2.6±4.0. EQ-5D-5L Index score was 0.828±0.270 and the EQ-VAS was 72.5±23.3.

For the Cartiva cohort, the MOXFQ domain scores were: Index 7.7±6.0, Walking/Standing 8.9±7.9, Pain 7.1±5.0, and Social Interaction 6.4±5.4. EQ-5D-5L Index score was 0.631±0.234 and the EQ-VAS was 74.8±20.8.

There was no statistically significant difference between any MOXFQ domain or EQ-5D-5L scores. However, a negative trend in MOXFQ domains was identified for the Cartiva group, as well as a reoperation rate of 23.5%.

Conclusions: The Cartiva SCI demonstrated no advantage over arthrodesis in PROMs, despite the presumed benefit of preserved ROM. A significant reoperation rate was also observed. Surgeons should be cautious in the use of this novel implant.



POSTERS

ABSTRACT SUMMARY

P1

Arthroscopic assisted anterior talo-fibular ligament (ATFL) reconstruction with InternalBrace™ augmentation

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Lateral ankle sprain are the commonest ankle injuries comprising up to 85% of all ankle injuries. The usual mode of injury is twisting / sports injury. The ATFL is the commonest involved structure, though the Calcaneo-fibular ligament (CFL) and Posterior Talo-fibular ligament (PTFL) may be also involved in some. Most of them are successfully treated conservatively, however, 20 – 30% may land up with chronic instability.

Anatomical repair has been the mainstay of treatment but has longer recovery period with occasional recurrence. We present our study which involved anatomical repair (Modified Brostrom Gould) with InternalBrace™ augmentation.

Our study was a retrospective, single centre study comprising of 72 patients over a period of 2 years. The patients included had failed conservative therapy at 6 months post injury. Only adult patients with no previous ankle surgery / injury were included. Sixty-one patients fulfilled our inclusion criteria, with an average age of 37.5 (14.7 SD) years, predominantly females 42 (68.8%). Mode of injury was almost all due to simple twisting / sports injury and time to surgery was on an average of 14.1 months. Mean follow up was 14.6 (6-30 months).

The visual analogue scores for pain improved from 6.3 (1.1SD) to 1.7 (1.4SD) and the MOXFQ from 62.1 (9.2 SD) to 18.2 (20.4 SD), both statistically significant. Patient subjective satisfaction was 'Good – Excellent' in 54 (88.5%) patients with most achieving pre-injury activity level at 12.5 (2.3SD) weeks.

We had 5 patients with complications – 2 had persistent instability (BMI >40 + Hypermobility), 1 had infection, 1 had Complex Regional Pain Syndrome and 1 failed due to re-injury.

We conclude that Arthroscopic assisted ATFL reconstruction with InternalBrace™ augmentation is a reproducible, safe and successful procedure for lateral ankle instability and significantly reduces the rehabilitation times for patients.

P2

Minimally invasive surgery for severe hallux valgus in 106 feet

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Background: There is widespread variation in the optimal procedure for correction of severe hallux valgus deformity defined as hallux valgus angle (HVA) ($\geq 40^\circ$) and/or 1-2 intermetatarsal angle (IMA) ($\geq 20^\circ$). There is limited evidence investigating the clinical or radiological outcomes following treatment of severe hallux valgus deformity with third-generation minimally invasive chevron and akin osteotomies (MICA).

Methods: This was a prospective observational single surgeon series of consecutive patients who underwent primary third-generation MICA with screw fixation for severe hallux valgus. The primary outcome was a validated patient reported outcome measure (PROM), the Manchester-Oxford Foot Questionnaire (MOXFQ), assessed minimum 2 years following MICA. Secondary outcomes were radiographic deformity correction (assessed 6 weeks post-operatively), complication rates and other quality of life PROMs (EQ-5D and Visual Analogue Pain Scale).

Results: Between September 2014 and November 2018, 106 consecutive feet (n=78 patients; 73 female, 5 male) met the inclusion criteria. Prospectively collected pre- operative and 2 year PROM MOXFQ data was available for 86 feet (81.1%). At two years following surgery, the MOXFQ score significantly improved for the Pain, Walking and Standing and Social Interaction domains from 39.2 to 7.5, 38.2 to 5.9 and 48.6 to 5.5, respectively (p<0.001). Pre- and 6 week post-operative radiographic data was available for all 106 feet. Mean IMA improved from 18.2° to 6.3° (p<0.001) whilst mean HVA improved from 45.3° to 10.9° (p<0.001). The complication rate was 18.8% and the screw removal rate was 5.6%.

Conclusion: This study has demonstrated third-generation MICA for the treatment of severe hallux valgus deformity enables substantial deformity correction and is associated with significant improvements in clinical PROMs 2 years following surgery.

Level of Evidence: IV

Notes:

P3

Clinical outcomes following surgical management of insertional Achilles tendinopathy using a double row suture bridge technique with mean two year follow up

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Background: The clinical outcomes following surgical management of insertional achilles tendinopathy (IAT) vary depending on the surgical technique used to reattach the achilles tendon following debridement. The aim of this study was to investigate the clinical outcomes of patients with IAT who underwent surgical management with a double row suture bridge technique used to reattach the achilles tendon.

Methods: A retrospective review of consecutive patients diagnosed with IAT, who underwent surgical management utilising a double row suture bridge technique (Arthex Speedbridge) and a minimum of 3-month follow up were included. The primary outcome was the Manchester- Oxford Foot Questionnaire (MOXFQ) Index score which is a patient reported outcome measure (PROM). Secondary outcomes included EuroQol EQ-5D-5L health-related quality of life PROM and complication rates.

Results: Between July 2013 and June 2020, 50 consecutive patients (23 male; 27 female) were included. The mean age (\pm standard deviation) was 52.3 \pm 11.3 (range 29.0-84.3). Pre- and post-operative PROM data was available for all cases. The mean follow up was 2.4 \pm 1.9 years. The MOXFQ Index score improved from 48.5 to 12.4 (p<0.01), EQ-5D-5L improved from 2.7 \pm 0.46 to 1.2 \pm 0.37 (p<0.01), and EQ-VAS improved from 48.0 \pm 18.4 to 84.1 \pm 12.6 (p<0.01). 6 patients had complications, of which 4 were of minimal clinical relevance and caused no deviation from routine recovery. There were no cases of tendon rupture.

Conclusion: This study has demonstrated that surgical management of IAT is safe and effective with clinical improvement in both clinical and general health-related quality of life outcome PROMs.

P4

The position and morphology of the peroneus longus tubercle in hallux valgus – a weight-bearing CT assessment

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Introduction: The peroneus longus tendon, as one of the only dynamic stabilisers of the first ray has the theoretical possibility to be defunctioned in hallux valgus (HV). In this study, our primary outcome was to report and compare the position and morphology of the peroneus longus tubercle (PLT) in feet with and without HV, using weight-bearing CT (WBCT).

Methods: A retrospective analysis of WBCT scans was completed using 40 feet in 23 patients. Feet were divided into two groups – the normal, 'non-hallux valgus' (non-HV) group and the 'HV' group. The morphology and position of the PLT was assessed between groups. We assessed the tubercle-to-floor distance (T-F distance), the bisecting angle, tubercle-to-metatarsals angle (T-MT angle) and metatarsal cross-sectional area.

Results: Between the non-HV group and the HV group, significant differences were found in the T-F distance, illustrating a lower medial column in the HV group. There was a moderate correlation between Intermetatarsal angle (IMA) and T-F distance (r = -.463, p < .001) confirming depression of the first ray with increasing IMA. The bisecting angle was also significantly lower in the HV group as compared to the non-HV group, demonstrating the pronation of the PLT in relation to the floor in the HV group. There was no statistical difference in T-MT angle between the HV and non-HV group thus the pronation appeared to represent the entire forefoot not only the 1st metatarsal. The size of the cross-sectional area of the PLT was significantly smaller in the HV group as compared to the non-HV group.

Conclusions: In this study we have demonstrated a difference in both the position and morphology of the PLT between HV and non-HVA individuals, with a pronated and hypoplastic PLT noted in individuals with HV.

Notes:

P5

Inter- and intra-observer reliability of posterior malleolus fracture classifications systems

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Introduction: Posterior malleolar fracture morphology is increasingly being recognised as an important variable in the management of ankle fractures. In this study we compare the interobserver and intraobserver reliability of three different posterior malleolar classification systems.

Methods: Forty computed tomography scans demonstrating ankle fractures with posterior malleolar components were reviewed by four reviewers on two separate occasions. The Mason & Molloy, Haraguchi and Bartonicek classification systems were used by the reviewers. The reviewer group included two consultant foot & ankle surgeons, one foot & ankle fellow and one specialist registrar, all familiar with the three classification systems. An interobserver and intraobserver reliability study were completed using Fleiss kappa (k) and Mean Cohen's kappa (k) coefficient respectively. This was completed using R software.

Results: The Fleiss kappa statistic for interobserver reliability was 0.43 (95% CI 0.35 – 0.50) for Bartoní ek, 0.65 (0.56 – 0.75) for Haraguchi and 0.63 (0.55 – 0.72) for Mason & Malloy classifications. Mean Cohen's kappa for intraobserver reliability was 0.66 (range 0.58 – 0.78) for Bartoní ek, 0.73 (range 0.63-0.84) for Haraguchi and 0.65 (range 0.61 – 0.70) for Mason & Malloy classifications.

Conclusion: The Haraguchi classification had the highest interobserver and intraobserver reliability. The interobserver reliability agreement was 'substantial' (0.61 – 0.80) for all classifications except Bartoní ek. While the Haraguchi classification is descriptive and has been utilised widely in previous research, the Mason & Malloy classification has prognostic value, which can aid in decision making whilst retaining substantial interobserver reliability. The Bartoní ek classification emphasises the importance of syndesmotic incisural involvement and its role in decision making but demonstrated the lowest interobserver reliability.

P6

Comparison of results of open and endoscopic flexor hallucis tendon longus (FHL) transfer for management of chronic Achilles' tendon rupture

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Introduction: FHL transfer is a well-known technique of managing chronic Achilles' tendon ruptures. Traditionally it was done as an open procedure in conjunction with a repair of the Achilles tendon. Recently there have been several publications describing endoscopic FHL transfer and publishing good, comparable outcomes with this technique. But there are no published studies comparing open and endoscopic results.

We believe that a comparative study can provide a good insight into the advantages and disadvantages of this procedure and provide clinicians good evidence and guidance.

Materials and methods: Fourteen patients were treated endoscopically while 26 with an open technique. Of the 26, fourteen had an open Achilles tendon repair and FHL transfer while 12 has only open FHL transfer. All the endoscopic patients had only an FHL transfer.

We compared the demographics, pre op gap documented by ultrasound, complications of the procedure, recovery times, return to work and strength after 1 year and ATRS.

We also conducted an MRI scan of three patients each of the three groups to determine the state of Achilles tendon and FHL tendon after 1 year of surgery.

Results: Demographic data and pre op characteristics of the only endoscopic groups, both open and endoscopic were comparable. There were similar complication rates for both only FHL groups but the open FHL + Achilles' repair had more complications (wound, neuropraxia). Return to work and ATRS at 6 weeks was better for the endoscopic group than the other groups. The strength and ATRS at 6 months and 1 year were similar for all three groups.

Conclusion: Endoscopic FHL transfer is a safe and effective method of managing chronic Achilles' tendon rupture providing an earlier return to work and 6 weeks patient satisfaction, less complications and similar strength as the other techniques.

Notes:

P7

Percutaneous subtalar joint screw fixation of comminuted calcaneal fractures – a salvage procedure

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Introduction: Malunited comminuted calcaneal fractures result in poor function due subtalar joint arthritis and altered biomechanics. We aimed to assess whether percutaneous subtalar joint screws after fracture reduction provide good outcomes for these injuries.

Methods: We retrospectively analysed 15 comminuted calcaneal fractures treated with percutaneous subtalar screw fixation. All patients had a minimum of 6 months follow up. Six patients had open injuries. On the preoperative and the latest postoperative radiograph, Bohlers angle, Gissane angle, calcaneal inclination, width and length, absolute foot height, and posterior facet height were measured. Preoperative computed tomography scans were used to classify the fractures by Sanders classification. Clinical outcome scores were recorded postoperatively.

Results: Mean age was 34.2±14.2 years. Minimum follow-up was 12 months (mean 17.2±4.4 months). Nine patients had Sanders 4, 3 had Sanders 3AB, 2 had Sanders 3BC, and 1 had Sanders 3AC fractures. Eighty percent of patients had their angle of Gissane, absolute foot height, calcaneal length and inclination restored by this technique. Bohlers angle was restored back within the normal range in 54% of patients. Mean postoperative AOFAS score was 74±11. AOFAS scores positively correlated with postoperative Bohlers angle (Pearson's correlation coefficient 0.85;p=0.004). One patient (7%) had a wound breakdown postoperatively and 3 patients (20%) had heel pain from the screws, which improved after removal.

Conclusion: Percutaneous subtalar screws offer a reliable option to restore calcaneal anatomy in comminuted calcaneal fractures, with low complication rates. Over 80% of patients had their angle of Gissane, calcaneal length and inclination restored, and over 50% of patients had all radiological parameters restored by this technique. It offers the benefits of percutaneous reduction and fixation and may be considered an effective first stage prior to definitive subtalar fusion. Further work is needed to review longer-term outcomes and conversion rate to arthrodesis.

P8

Functional outcome and risk of non-union for 5Th metatarsal base fractures treated via a new virtual fracture clinic

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Objectives: Treatment of 5th Metatarsal Fractures via discharge direct from Virtual Fracture Clinic (VFC) has become common practice in the NHS. After introduction of a VFC in a regional trauma centre there was hesitancy to discharge Zone 2 and 3 injuries due to a fear of non-union rates. We aim to assess the functional outcome and incidence of non-union in 5th Metatarsal base fractures, exposed to 1-year of follow-up.

Methods: 194 consecutive patients who sustained a 5th metatarsal fracture were referred to a VFC between 2019 to 2020 were included. X-ray imaging was reviewed to classify which zone as per the Lawrence & Bottle classification the fracture occurred in and union on subsequent follow-up.

Telephone follow up was used to measure patient functional outcomes (EQ-5D health questionnaire/ foot and ankle ability measure (FAAM) survey) and satisfaction with the VFC service.

Results: Of 194 patients', 53 were zone 1, 99 were zone 2, and 42 were zone 3 fractures. 80 were discharged directly from VFC. 114 patients were offered at least one face to face clinic follow up. We found 6 (3.1%) patients had a clinical and radiological evidence of non-union. 4 non-unions in zone 2, and 2 in zone 3. No Zone 1 injuries were identified with a non-union. Ultimately only 2 patients came to having surgery for symptomatic non-union. 104 patients completed functional outcome surveys. 93.3% of patients were satisfied with their level of functioning and recovery from injury.

Conclusion: The VFC is an effective way of managing 5th metatarsal fractures, with high patient satisfaction. Conservative management has excellent outcomes, with a low percentage of patient's, with Zone 2 and 3 injuries, developing a symptomatic non-union. Functional outcome surveys provide further reassurance. This study would support direct discharge of Zone 1 injuries from VFC.

Notes:

P9

Radiological outcomes following open versus percutaneous fixation versus arthroscopically assisted percutaneous fixation of calcaneal fractures: a retrospective observational study

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Background: Calcaneal fractures are often major injuries associated with considerable morbidity. The optimal surgical management of displaced calcaneal fractures remains contentious with open, percutaneous and arthroscopically-assisted percutaneous approaches all offering potential benefits for patients. The aim of this study was to assess which of these three separate surgical approaches to the management of displaced calcaneal fractures provides the best radiographic deformity correction.

Methods: A retrospective observational study of all calcaneal fractures undergoing operative fixation at a single major trauma centre in the United Kingdom. The primary outcome was pre and post-operative assessment of the deformity correction using radiographic parameters (angle of Gissane and Bohler's angle). Secondary outcomes included fracture configuration, complications, and re-operation rate.

Results: Between 01/01/2009 and 31/21/2019, 152 calcaneal fractures in 134 patients underwent operative management via either an open, percutaneous or arthroscopically assisted percutaneous approach. Three-way ANOVA testing of the pre- and post-operative radiographic parameters demonstrated that an open approach offered superior post-operative correction of Bohler's angle when compared to percutaneous alone ($p < 0.05$) however there was no difference in post-operative Angle of Gissane. The mean follow-up for complication and re-operation data was 3.5 years (range 0.1-12.4). Overall complication rate following surgical fixation was 7.2% with a further 32.2% requiring further long term surgical intervention for subtalar arthritis or removal of metalwork.

Conclusion: The optimal surgical approach for the management of displaced calcaneal fractures remains contentious. Arthroscopically assisted percutaneous fixation does not offer superior radiographic deformity correction compared to percutaneous technique alone. Complication and reoperation rates following surgical fixation of calcaneal fractures is high and patients should be counselled accordingly.

P10

Plating of distal tibial extra-articular fractures: is there a lesson to be learnt?

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Introduction: The surgical care of extra-articular distal tibial fractures remains controversial. Numerous studies have been conducted comparing intramedullary nailing with plate fixation, but almost no studies have been done comparing the outcomes of different plating techniques. This study looks at the radiological outcomes of distal tibial fractures treated with either a direct medial or anterolateral plate, with or without plating of the fibula, to assess the outcome and complications associated with these 2 approaches.

Methods: This is a retrospective review of 80 patients with distal extra-articular tibial fractures, treated with an open reduction and plating, between 2008 and 2019 at Glasgow Royal Infirmary. Case notes and x-rays were reviewed to compare the rate of union, malunion and requirement for further surgery after these 2 types of plating.

Results: Of those tibial fractures fixed with only a medial plate, 78% united (28/36), 5% (2/36) had a non-union and 17% (6/36) a malunion. In the group treated with a combination of medial tibial and fibular plating, the figures were; 71% (15/21) united, 19% (4/21) non-unions and 10% (2/21) malunions. However, in the group treated with anterolateral plating of the tibia alone, only 53% (8/15) united, with a 20% (3/15) non-union and 13% (2/15) malunion rate. Additionally in this group, there were 2 patients (13%) with loss of fracture reduction within the first two months of fracture fixation, requiring revision surgery. Interestingly, of the 8 patients treated with anterolateral tibial and fibular plating, 88% (7/8) showed full union and only one (12%) had a non-union, with no malunions in this group.

Conclusion: It would appear that medial tibial and combination medial tibial and fibular plating, have superior outcomes compared to anterolateral plating. Results suggest, if anterolateral plating is done, this should be augmented by fibular fixation.

Notes:

P11

Hindfoot nails or protibial screw fixation: what is the best option for a complex ankle fracture?

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Introduction: Surgical options for ankle fractures in patients with multiple co-morbidities (including osteoporosis) include hind-foot intramedullary nail fixation (HFN) or fibula pro-tibia screw fixation (PTS) to retain function. We compared their outcomes.

Methods: 31 patients identified with AO44 fractures underwent HFN (17) and PTS (14) fixation. Patient demographic data, co-morbidities, Charlson Co-morbidity Index Score (CCIS), weightbearing status, peri-operative information and post-operative complications were recorded. Radiographs were assessed for metalwork breakage, non-union, and anatomical reduction.

Results: The mean age between fixation groups was different 77 (HFN) vs. 63 (PTS) ($p = 0.03$). Estimated 10-year survival was 22.4±25.5% for the HFN group and 54.6±38.7% for the PTS group ($p = 0.001$). There were 12 open-fractures in the HFN group (71%) and 8 in the PTS group (57%). Eight open fractures had an in-situ fixation without joint preparation, 4 had joint preparation with shortening.

Mean time to full weightbearing was 2.1±3.8 in HFN and 9.9±3.8 weeks in PTS-pts ($p < 0.001$); but more patients were independently weightbearing after an HFN (24% vs. 29%). Closed fractures had no metalwork failures or infection. Two open fractures (12%) in the HFN group had superficial infection and 1(6%) had metalwork failure. One patient (7%) in the PTS open-fracture group developed a deep infection, two patients (14%) had metalwork failure. There were 4 non-unions in each surgical group. In the HFN group 4 patients (24%) had a venous thromboembolism (VTE) post-operatively and 3 patients(18%) with open fractures in the HFN group died within 1-year of surgery.

Discussion: HFN allows earlier weightbearing in patients with a higher CCIS with accepted functional loss, but higher intraoperative blood-loss, mortality and VTE than PTS fixation. Further studies to stratify utilisation of these technique in both open and closed fractures is required, as similar union rates, metalwork/wound complications rates are only observed in closed fractures.

P12

Access to the talar articular surface without osteotomy to treat osteochondral lesions of the talus using autologous membrane induced chondrogenesis (AMIC) and autologous bone graft

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Introduction: Recent cadaveric studies appear to provide conflicting opinions regarding possible access to some zones of the talar articular surface without the use of an osteotomy and / or ligament release in the approach. We report a series of cases involving AMIC treatment of larger osteochondral lesions of the talus (OLT) without use of osteotomy or release in talar zones potentially considered inaccessible (zone 4 medially and zone 6 laterally).

Methods: 18 consecutive cases involving potentially inaccessible talar zones were retrospectively identified. All had undergone open treatment of OLT via mini arthrotomy with subsequent autologous bone grafting & AMIC. No osteotomies or ligament releases were performed. Extra-articular distraction was used in all anterior approaches, though no posterior approaches. Pre-op MR scans imaging were reviewed by a single experienced MSK radiologist; zonal involvement, area, volume and AMADEUS (Area Measurement Depth & Underlying Structures) score was recorded in each case.

Results: There were 8 female and 10 male patients with a mean age of 45 years (range 16 to 84). 13/18 (72%) OLT were medial (zone 4) and 5/18 (28%) were lateral (zone 6). The mean AMADEUS score was 46 (range 10 to 65). The mean area was 189mm² (range 91 to 345) and the mean volume of cystic defects was 423mm³ (range 180 to 728). All 18 OLT were accessed without osteotomy or ligament release to allow thorough curettage / debridement / nanofracture / autologous bone grafting and AMIC treatment. The approaches utilised were posteromedial 3/18, anteromedial 10/18 and anterolateral 5/18 respectively. None have required further intervention at mean FU 3.2 years from index scan (range 0.4 to 5.2).

Conclusion: Larger OLT in zones 4 and 6, including those with a significant cystic component, can be accessed safely and treated without the need for malleolar osteomy or ligament release.

Notes:

P13

Patient-specific Instrumentation and total ankle arthroplasty

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Total Ankle Arthroplasty (TAA) can now be performed using Patient Specific Instrumentation (PSI). Advantages include the ability to pre-operatively plan bone resections and implant position and reduce the number of intra-operative surgical steps. The aim of this study was to compare PSI with Standard Instrumentation (SI) in a non-randomised retrospective cohort study with respect to patient reported outcomes, tourniquet time, fluoroscopy time and post-operative alignment.

159 patients (111 male, 48 female) undergoing a total of 168 INFINITY TAA using PSI (Prophecy, Wright Medical Technology) or SI between 2014 and 2020 were included with a minimum follow up of 12 months. Patient reported outcome measures (PROMS) were obtained pre-operatively and at one year and included the Manchester-Oxford Foot Questionnaire (MOXFQ), Ankle Osteoarthritis Scale (AOS) and EQ-5D Index. Coronal plane deformity correction was assessed using the midline tibiotalar angle (MTTA). Demographics, tourniquet time and intra-operative fluoroscopy times were obtained from the hospital records.

There were 106 TAA in the SI group and 62 TAA in the PSI group. There was no significant difference in total MOXFQ, AOS or EQ5D. There was however a significant difference ($p=.032$) in favour of PSI in the walking/standing domain of the MOXFQ at 12 months. There was a significantly reduced tourniquet time (PSI mean: 95.39 mins, SI mean: 116.87 mins, $p<.001$) and radiation exposure (PSI mean: 31 seconds, SI mean: 53 seconds, $p<.001$). The angular correction was more accurate in the PSI group (PSI mean: 1.29° , SI mean: 2.26° , $p=.005$).

This study supports the use of patient-specific instrumentation to decrease operative time, reduce intraoperative fluoroscopy and improve the accuracy of implantation in TAA. The walking/standing domain of the MOXFQ has been shown to be the most sensitive to change and in this study demonstrated a further potential benefit.

P14

Does finite element simulation have a role to play in foot and ankle surgery?

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Finite Element Analysis (FEA) can provide invaluable insight into the mechanical function of the joints and long bones. For the hip and knee numerous validated FEA models have been successfully developed to study forces, stress and strain patterns and to predict failure of implants. The foot and ankle complex, however, consists of multiple bones and articulations and is heavily reliant on soft tissues for stability with complex material behaviours. These features mean that such FEA simulations require more computational effort and expertise to simulate, which is a significant barrier to research in this area. Consequently very little progress has been made despite the potential of this methodology.

The goal of this research project is to facilitate the use of FEA of the foot and ankle through creation of an open-source ankle model, which could be mapped on to patient-specific scans. A preliminary model has been created using the open CT dataset: Visible Human Project Female (National Library of Medicine). The model was created using open-source FEA software, FEBio (University of Utah). Linear materials were assigned to the bones ($E=7300\text{MPa}$, $\nu=0.3$, $\rho=1730\text{kg/m}^3$) and cartilage ($E=10\text{MPa}$, $\nu=0.4$, $\rho=1100\text{kg/m}^3$). Spring elements were used to represent the ligaments with properties taken from Mondal et al. [1]. A standing load case was modelled, assuming even distribution of load between the feet, and the results match closely to published work.

This model is a promising first step and future work will incorporate more complexity to better represent the soft tissues, different patient geometries and load cases; which could revolutionise research into foot and ankle conditions. It will provide a valuable tool for simulating mechanical testing conditions on a human ankle joint without the necessity of complex, and often expensive, in-vitro or in-vivo experiments.

[1] Mondal et al. (2017). J Orthop, 14(3), 329–335.

Notes:

P15

A cohort study of union following subtalar fusion dependent on the presence of an adjacent ankle fusion

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Introduction: Subtalar fusion is the surgical treatment of subtalar arthritis. There is a concern that subtalar fusions may have a higher non-union rate if there is an adjacent ankle fusion.

The aim of this cohort study was to determine the rates of union for subtalar fusions with and without an adjacent ankle fusion. Secondary outcomes were to assess risk factors for non-union.

Methods: A retrospective cohort study of all patients that underwent a subtalar fusion in a single centre between 2010 and 2020. The primary outcome of union was determined based on bridging callous on radiographs. Chi squared test and Mann-Whitney tests compared differences in demographics and risk factors for non-union between groups. A logistical regression model was performed to determine risk factors for non-union.

Results: There were 18 patients without an adjacent ankle fusion and 53 patients with. There were no significant differences in demographics between the two groups.

Overall 46 (86.8%) of those without an ankle fusion fused, compared to 8 (44.4%) of those with an ankle fusion above ($p=0.000$).

On multivariate logistic regression an adjacent ankle fusion was the only significant risk factor for non-union. When taking account of other risk factors for non-union the odds ratio of union of the subtalar joint with an ankle fusion present 0.1753 (95% CI 0.0449 - 0.6843) compared to a subtalar fusion with a native ankle joint ($P=0.012$). 9.4% of patients without an ankle fusion underwent a revision subtalar fusion compared to 44.4% of those with an ankle fusion ($P=0.001$).

Conclusions: Patients undergoing a subtalar arthrodesis with an adjacent ankle fusion have a significantly increased risk of non-union compared to those without a native ankle. Patients with a previously fused ankle need counselling about the high risk of non-union and additional surgery.

Notes:

P16

The learning curve of third-generation percutaneous chevron and Akin osteotomy (PECA) for hallux valgus

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Background: The learning curve to reach technical proficiency for third-generation percutaneous or minimally invasive chevron and Akin osteotomies (PECA/MICA) is recognised to be technically challenging however it is poorly defined in the literature.

Methods: Retrospective review of the first 58 consecutive PECA cases of a single surgeon. The primary outcome was the number of cases required to reach technical proficiency as defined by the tourniquet time. Secondary outcomes included radiation exposure, radiographic deformity and complication rates.

Results: Between November 2017 and March 2019, 61 consecutive PECA cases were performed with outcome data available for 58 of these (95.1%). Technical proficiency was reached after 38 cases. Tourniquet time and radiation exposure significantly decreased after this transition point ($p < 0.05$). There was no difference in complication rate or radiographic deformity correction regardless of position along the learning curve ($p > 0.05$).

Conclusion: The mean number of cases required to reach technical proficiency in third-generation PECA is 38 cases. The complication rate does not correlate to the number of cases performed, therefore surgeons interested in learning minimally invasive surgery can be reassured that they are unlikely to cause additional risk of harm to a patient during the learning curve. This information is useful to inform the consent process.

P17

Correction of valgus lesser toe deformity using a closing wedge osteotomy of the proximal phalanx: percutaneous technique and 2 year results

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Introduction: Coronal plane deformities of the lesser toes are common yet challenging to treat. Traditional open releases and translational Weil osteotomies can be unpredictable and lead to postoperative stiffness. We present the results of a novel percutaneous closing wedge unfixed osteotomy of the proximal phalanx to treat valgus deformity of the 2nd toe.

Methods: 31 patients underwent 40 percutaneous osteotomies at a mean age of 58.3 ± 9.4 years. Through a 2mm dorsomedial incision, a percutaneous proximal metaphyseal medial closing wedge osteotomy of the second toe (\pm other lesser toes if indicated) is performed leaving the dorsolateral cortex intact. An irrigated low speed, high torque 2x8mm burr is used under image guidance. The toe is then kinked at the osteotomy site and taped for 2 weeks. Mean follow up was 2.0 ± 1.5 years.

Results: Questionnaire data was available for 89.7% ($n=35$) of cases. 91.4% of cases were satisfied or extremely satisfied with the procedure. Radiographs were available for 90.0% of osteotomies. Mean lesser toe valgus angle (LTVA) decreased from $17.3 \pm 10.7^\circ$ to $6.5 \pm 7.0^\circ$ ($p < 0.001$) at final follow up. All osteotomies united with no delayed union. There were no wound complications or infections. There was no statistically significant change in LTVA between radiographs taken at 6 weeks and final follow up. There were 2 cases of radiographic recurrence.

Conclusion: Percutaneous proximal phalanx base metaphyseal closing wedge osteotomies of lesser toes to correct coronal plane deformity is useful adjunct to first ray corrective surgery with a comparable recurrence rate to the open alternative and high patient satisfaction.

Notes:

P18

Patient reported anxiety and depression following hallux valgus surgery: a comparative cohort study of two year clinical outcomes

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Introduction: The role and impact of pre-operative mental health, anxiety and depression on the clinical outcome of hallux valgus surgery is poorly understood with limited literature available despite the high prevalence of anxiety, depression and musculoskeletal pathology in the general population.

Methods: A prospective comparative observational study of consecutive patients who underwent third-generation minimally invasive hallux valgus deformity correction. Patients who reported anxiety or depression on a pre-operative EQ-5D-5L questionnaire were allocated to the anxiety/depression cohort (A/D) whilst patients who reported no anxiety or depressive symptoms were allocated to a control cohort. The primary outcome measure was the Manchester Oxford Foot Questionnaire (MOXFQ). Secondary outcome measures were the EQ-5D-5L, Visual Analogue Scale for Pain (VAS-Pain), and radiographic deformity correction. Patients were followed up for a minimum of two years.

Results: Between July 2014 and July 2019, 265 feet ($n=182$ patients) underwent hallux valgus corrective surgery with 40 of these feet allocated to the A/D cohort. Patients in the A/D cohort had significantly worse pre-operative quality of life and MOXFQ scores compared to the control cohort. Both cohorts reported a statistically significant improvement in all MOXFQ domains two years following surgery ($p < 0.001$). There was no difference between the two cohorts for any of the MOXFQ domains at 2 years followup. 80% of patients in the A/D cohort reported an improvement in their anxiety/depression symptoms following surgery. There was no difference between the cohorts for radiographic deformity correction or VAS-Pain. Patients with anxiety/depression had a worse quality of life compared to the control group at two years following surgery.

Conclusion: This study has demonstrated that two years following surgery, patients with anxiety and/or depression symptoms have no difference in foot-related clinical outcomes compared to those without anxiety and/or depression symptoms despite having significantly worse symptoms pre-operatively.

P19

Morphology of occult posterior malleolar fractures associated with tibial shaft fractures

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Diaphyseal tibial fractures account for approximately 1.9% of all adult fractures. Several studies have demonstrated a high proportion of diaphyseal tibial fractures have ipsilateral occult posterior malleolus fractures, this ranges from 22-92.3%. We hypothesize a rotational element will be highlighted in the Mason & Molloy Classification of occult posterior malleolus fractures associated to tibial shaft fractures.

Our primary outcome was to identify any extension of tibial fractures to the posterior malleolus and describe its morphology.

A retrospective review of a prospectively collected database was performed at Liverpool University Hospitals NHS Foundation Trust between 1/1/2013 and 9/11/2020. The inclusion criteria was age over 16, with a diaphyseal tibial fracture and who underwent a CT. The Mason and Molloy posterior malleolus fracture classification system was used to describe the morphology of the fracture.

764 diaphyseal tibial fractures were analysed, of these 300 had a CT and could be included. There were 127 intra-articular fractures. A total of 83 (27.7%) cases were classifiable using the Mason and Molloy classification. There were 8 type 1 (9.6%), 43 type 2 (51.8%), 5 type 2B (6.0%) and 27 type 3 (32.5%). The majority of the posterior malleolar fractures ($n=75$, 90.4%) were undisplaced pre-surgical intervention. The majority of PM fractures occurred in type 42A1 (65 of 142 tibia fractures) and 42B1 (11 of 16).

PM fractures associated with tibial fractures occur as a rotational mechanism. Unlike, the PM fractures of the ankle, the majority of PM fractures were undisplaced. We theorise that unlike the force transmission in ankle fractures where the rotational force is in the axial plane in a distal-proximal direction, in the PM fractures related to fractures of the tibia, the rotational force in the axial plane progresses from proximal-distal. Therefore, the force transmission which exits posteriorly, finally dissipates and thus unlikely to displace.

Notes:

P20

Midfoot Charcot Neuroarthropathy- is there an ideal configuration of superconstruct?

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The Aim of this paper is to describe an ideal combination of intramedullary and extramedullary stabilisation for Midfoot Charcot Neuroarthropaty (CN).

Patients and methods: Consecutive group of patients who had internal stabilisation of Midfoot CN operated by a single surgeon from Mar 2018 and were followed with radiographs for a minimum of 12m were included in the analysis.

Intramedullary beams in isolation or combination with extramedullary plates were used. When used in isolation, 4 intramedullary beams were used to stabilise the 3 column of the foot. In some patients, supplemental plates were used to stabilise the medial and lateral columns.

Radiographic parameters of dorsal and lateral Meary's angles and cubod height were calculated for each patient and progression of the deformity due to failure of metalwork was recorded.

Results: A total of 68 patients underwent stabilisation of midfoot CN since 2018, 48 patients were followed for a minimum of 12m (12-32m). Two patients died of unrelated causes and of the remaining, revision of metalwork was needed in 12 patients (26%). None in these group needed major limb amputation.

Intramedullary beams when used in isolation provide adequate axial and rotational stability, however offered least stability in the coronal plane regardless of the length of the beams. The combination of intramedullary beam and medial plate provided the best construct for the medial and middle column which provided stability in all planes. When the intramedullary beam alone was used to stabilise the lateral column in combination with medial plate and beam, late failure in the coronal plane was noted. A lateral plate stabilised this column satisfactorily.

Conclusion: Internal fixation based on the principles of Superconstruct with a combination of intramedullary beam and supplemental medial plate effectively stabilised the medial column; and a lateral plate the lateral column.

P21

Does a 1st metatarsophalangeal fusion in a patient with pes planus improve the pes planus deformity? A retrospective case series

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Introduction: Fusion of the 1st metatarsophalangeal joint (MTPJ) is the most common orthopaedic operation in the treatment of 1st MTPJ arthritis. In patients with concomitant pes planus deformity, what is unknown is if stabilising the distal aspect of the medial ray improves the pes planus deformity.

Primary objective: Our primary objective was the analyse the pes planus deformity pre and post 1st MTPJ fusion with the nul hypothesis that there was no difference.

Methods: We identified patients who underwent 1st MTPJ fusion using our electronic database from January 2011 to October 2021. Inclusion criteria were pre- and post-operative weightbearing plain radiographs, with a Meary's angle of >4 degrees on pre-operative radiographs. Routine pes planus measurements were undertaken. Pre- and post-operative measurements were tested for significant change using Wilcoxon Signed Rank or Paired T-Tests. Data was analysed using IBM SPSS v.27.

Results: 26 feet were identified. The mean patient age was 62 years (range=38-76). There was no pre-operative correlation between Meary's angle (MA) and the hallux valgus angle (HVA) (p=.923). A significant improvement between the pre- and post-operative measurements was identified in MA (mean reduction=3.69°; range: 13.47-0.05, p<.001), medial cuneiform height (mean increase=2.48mm; range: -8.26-3.7, p=.035), talo-navicular coverage angle (mean decrease=2.23°; range -6.94-13.14, p=.03), talar 1stmetatarsal angle (mean decrease=3.64°, range -5.71-20.12, p=.021) and intermetatarsal angle (mean decrease=4.17°, range -4.2-15.32, p<.001). As expected, the HVA was also significantly decreased post-operatively. Talo-navicular angle (p=.819), medial cuneiform 1st metatarsal angle (p=.594) and calcaneal pitch angle (p=.120) were not significantly changed. A post-operative MA of <4° was only achieved in 5/26 (19%) of cases.

Conclusions: Our results suggest that 1st MTPJ fusion improves axial alignment of the foot as well as reducing MA by a significant amount, although diagnostic criteria for pes planus remained in many cases.

Notes:

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Validity of a new classification system for Midfoot Charcot Neuroarthropathy to describe the progression of the deformity and guide treatment

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Introduction: The aim is to describe a new classification system which is sensitive to detect progression of midfoot Charcot deformity and guide treatment based on the stage of the disease.

Patients and methods: The New classification was designed based on clinical and radiological parameters on weight-bearing radiographs. We evaluated the sensitivity of this classification on radiographs of patients who presented to Basildon Diabetic Foot clinic since 2013. Based on the findings, clinical and radiological parameters were charted and early intervention has shown to slow or stabilise the midfoot deformity.

Inter-observer and intra-observer reliability was tested using kappa coefficient. A group of 12 experienced members of the MDT were given a set of 10-radiographs to stage the deformity and the process repeated a week later.

Results: We evaluated a set of 256 radiographs and compared the radiographic and clinical findings from patient records. Based on this, a new classification system based on 4 stages was described.

In stage 1, the features are similar to Eichenholtz stage 1 with minimal radiographic changes. Stage 2a, where there is a break in Meary's line but positive cuboid height; clinically have no significant plantar bony prominence. In stage 2b, there is break in Meary's line with negative cuboid height; clinically have features of 'Rocker bottom deformity'. Stage 3 is a stage of plantar ulceration, while stage 4 has features of combined midfoot and ankle/subtalar Charcot deformity.

Inter-observer agreement was k=0.86 for read 1 and k=0.96 for read 2, indicating excellent inter-observer agreement. Intra-observer agreement ranged from 0.93-1.00 for the double read, indicating excellent intra-observer agreement.

Conclusion: The new classification system is easy to use, reliable, reproducible and sensitive to detect changes in the disease progression. Early intervention such as Tendo-Achilles lengthening has shown to regress the progression of the deformity.

Notes:

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Outcomes of out-patient Tendo-Achilles lengthening and weight-bearing total contact casts for patients with diabetic forefoot ulcers

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The aim is to describe safety and efficacy of percutaneous Tendo-Achilles lengthening (TAL) in out-patient clinics for the management of diabetic forefoot ulcers.

Patients and methods: Consecutive patients, who presented to the Basildon Diabetic Foot clinic from 2018 with forefoot ulcers or a callosity, who underwent the TAL in the out-patient clinic and were followed for a minimum of 12m were included in the final analysis.

After a written consent, percutaneous Hoke hemisection were performed in the clinic followed by a weight-bearing plaster cast for 6-weeks in neutral ankle position, with one change of cast at week-2. At week-6, patients were advised to walk in an Aircast boot for further 4-weeks and referred to physiotherapy for rehabilitation. Forceful dorsiflexion of the ankle was avoided to prevent risk of over-lengthening.

Results: A total of 162 patients with 196 feet underwent TAL in the clinic by 3 consultants, of these 124 patients were followed for a minimum of 12m (12-36m). None had infection or wound related problems. Complete transection of the tendon was noted in 3 patients and one-patient developed callosity in the heel, hence forceful dorsiflexion is avoided.

In 118 patients, the forefoot ulcers healed within an average of 8 weeks (6-12weeks) with no further ulcer recurrence at 12m follow-up. The ulcer recurred in 4 patients, and in 2 patients, the ulcer did not heal. Radiological analysis of these patients showed plantar flexed metatarsals with joint subluxation. Ulcers healed following proximal dorsal closing wedge osteotomy in this subgroup of patients.

Conclusion: TAL is a safe procedure in the Out-patient clinic with no wound related complications. Patients were pleased with improved range of movements and early weight bearing status. Patients are however, cautioned about the weakness in leg following TAL which gradually improved with physiotherapy.

Notes:



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