

## P1

### Does urinary cotinine level correlate with post-operative complications in elective foot and ankle surgical patients?

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**Introduction:** Smoking is associated with adverse post-surgical outcomes. Cotinine is a nicotine metabolite and raised levels have been associated with increased complications in head and neck surgery. However, to date no clinical study has investigated the link between cotinine levels and complications following orthopaedic surgery.

**Method:** A single centre prospective study was conducted between September 2013 and July 2014 on 127 patients undergoing an osteotomy or fusion of the foot or ankle. Patients were followed up post operatively at weeks two, six, twelve, twenty-four, fifty-two or until union. Non-unions, delayed unions, deep surgical site infections and wound complications were recorded. Urinary cotinine level was measured on the day of admission using the Concateno Urine Cotinine enzyme-linked immunosorbent assay (ELISA).

**Results:** 20 (15.8%) patients reported being a current smoker. 26 (20.5%) of 127 patients had a complication. The mean cotinine value for patients with complications was 353.8 +/- 1035.6. This was not statistically different from those without complications, 1168.3 +/- 4953 (p=0.41). Spearman rank order correlation demonstrated no statistical significance between assay level and complication rate at weeks 2, 6, 24 or overall. There was a statistically significant but negligible correlation at weeks 12 (r=0.194, p=0.29) and 52 (r=0.237, p=0.007).

**Conclusion:** Our results did not demonstrate a correlation between cotinine level and post-operative complications following elective foot and ankle surgery.

## P2

### Silastic arthroplasty versus 1<sup>st</sup> metatarsophalangeal joint arthrodesis: a prospective comparative series

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Both 1<sup>st</sup> MTPJ arthrodesis and silastic arthroplasty have been shown to provide good long-term outcomes for end-stage hallux rigidus. Novel implants are compared against arthrodesis as a historical gold standard. Although there is good evidence to demonstrate long term survival from the established Swanson silastic arthroplasty there are no published studies comparing this to arthrodesis. We present a comparison of outcomes in patients who had these procedures performed after a shared decision-making process. Consecutive patients who received 1<sup>st</sup> MTPJ arthrodesis or silastic arthroplasty for hallux rigidus between June 2014 and November 2015 were included. Demographics, complications and prospectively collected pre-operative and 6-months post-operative PROMS (MOXFQ and VAS) were reviewed. 61 patients received silastic arthroplasty (52 female, mean age 63 years) and 61 patients received arthrodesis (25 female, mean age 60 years). Complete PROMS data was available for 53% of patients. There was a significant improvement in MOXFQ and VAS following both silastic arthroplasty (MOXFQ mean change 18, p=0.005; VAS mean change 24, p=0.0004) and arthrodesis (MOXFQ mean change 38, p< 0.0001; VAS mean change 44, p< 0.0001). There was a significant difference in mean improvement of both MOXFQ and VAS in favour of arthrodesis (MOXFQ p=0.0004, VAS p=0.002). There was 1 post-operative infection and 1 reoperation (conversion to fusion) in the silastic arthroplasty group, and 1 post-operative infection and 6 reoperations (4 removal of prominent metalwork, 2 revision fusions) in the arthrodesis group. Both silastic arthroplasty and arthrodesis have shown a significant improvement in pain and function with low complication rates. Patients may choose arthroplasty over arthrodesis to maintain motion. In these cohorts, arthrodesis showed a greater improvement over silastic arthroplasty in patient reported outcomes but a higher reoperation rate and this should be considered in the shared decision-making process.

## P3

### Peroneal tendon dislocation - is the fleck sign being overlooked?

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**Introduction:** Peroneal tendon dislocation (PTD) is frequently overlooked and missed. The presence of a lateral malleolar bony fleck is a pathognomonic sign. Classification systems only describe the presence of small bony flecks, and we aimed to see if a new classification with a large bony fragment should be included.

**Method:** All calcaneal fracture admissions were retrospectively identified from a prospectively collated Fracture Outcomes Research Database (FORD) between (insert dates). CT scans were reviewed by two of the authors, to identify PTD, and the presence of a fleck sign. Radiographs, multiplanar reconstructed (MPR) CT images were reviewed and the fleck sizes measured, as well as using an integrated software programme (Vitrea, Toshiba, Holland). Interobserver agreement by way of Cohens Kappa was calculated.

**Results:** A total of 79 patients were identified. PTD was present in 20/79. Plain radiographs identified 14/20 (70%), the remaining 6 were seen on CT imaging. All flecks were appreciated on CT.

Mean fleck size was 3420mm<sup>3</sup> (range 2-19,152 mm<sup>3</sup>). Cohens Kappa for coronal, axial and sagittal measurements demonstrated statistically significant ( $p < 0.001$ ) interobserver agreement (0.721, 0.764, 0.706 respectively). Use of the Vitrea software to perform volumetric analysis demonstrated a fleck size  $< 100 - 21,000\text{mm}^3$ , with significant interobserver agreement ( $k=0.688$ ,  $p < 0.01$ ).

**Conclusions:** Our results demonstrate that the fleck sign is pathognomonic of PTD. The presence of a large fragment, as opposed to a "fleck", would direct the surgeon to have to repair ORIF of the distal fibula and anatomical restoration of the ankle joint in managing these injuries.

## P4

### Experience from a dedicated physiotherapist led Achilles rupture service

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**Introduction:** Conservative management is preferred for the majority of acute Achilles tendon ruptures. Implementing specific treatment regimes is difficult in traditional fracture clinic settings. We established a dedicated service with the key objective of improving patient care.

**Methods:** Eligible patients were treated in dedicated clinics led by a specialist physiotherapist. Functional VACOPed orthoses (weight-bearing) regimes were initiated from day 1 (all patients). Movements were permitted within the boot from 4 weeks, with a total treatment time of 8 weeks followed by accelerated rehabilitation. Six months after treatment ATRS and FOAS scores, calf muscle girth, heel raise height, heel raise repetitions and satisfaction scores were collected for all patients. Conversion to surgery, re-rupture and DVT rates was recorded.

**Results:** Between January 2014 and November 2015, 245 patients were treated, 164 having completed 6 months follow-up. There were 134 men (81.2%). Mean age was 51 years (26-86). Mean interval between injury and treatment was 6 days (0-33). Mean ATRS score 6 months following treatment was 69 (SD = 21), which compared to the Swansea Morrision Achilles Rupture Treatment programme (mean=67.8;  $t= 0.96$ ;  $p= 0.83$ ). Mean 6 month FOAS score was 81 (48-100). Difference in mean calf girth was 1.18cm ( $t=7.89$ ;  $df=40$ ;  $p < 0.001$ ). Mean heel raise height was 6.8 vs. 10.6cm on the contra-lateral side ( $t=10.34$ ;  $df=39$ ;  $p < 0.001$ ), and mean heel raise repetitions were 13.1 vs. 14.5 ( $t=2.44$ ;  $df=40$ ;  $p=0.02$ ). Three cases were converted to surgery due to failure to heal (3/164; 0.02%). There was 1 case of re-rupture (1/245; 0.004%), and 9 DVTs (9/245; 0.04%) diagnosed during treatment. Overall patient satisfaction scores were 93.5%.

**Discussion:** A dedicated service for the treatment of acute Achilles tendon ruptures using a functional orthoses regime provides excellent outcomes. Early physiotherapist involvement enhances continuity of care that is not seen in standard fracture clinic management.

## P5

### Scarf osteotomy or Lapidus procedure in the treatment of severe Hallux valgus. Does the patient have a choice?

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**Background:** There are a variety of accepted surgical techniques to treat severe Hallux Valgus. This study looked at separate case series between two surgeons preferring different techniques. The correction of hallux valgus angle (HVA), intermetatarsal angle (IMA) and scores of the validate Manchester-Oxford foot questionnaire (MOxFAQ) were compared between the scarf osteotomy (Group A) and the Lapidus procedure (Group B).

**Methods:** A retrospective cohort study was conducted between September 2013 and August 2015. Patients were identified through the hospital database who had a Scarf osteotomy ( $n=21$ ) and Lapidus procedure ( $n=17$ ). We defined severe HV as having HVA  $>40^\circ$  and IMA  $>17^\circ$ . Only patients meeting this criteria were included. In Group A the surgeon adopted a more extreme osteotomy by shifting the first metatarsal head by greater than the 50% of its width. In Group B the method of fixation was with a medially placed plate plus an additional compression screw. Post-operative radiological measurements were taken six weeks after surgery. MOxFAQ scores were collected prior and at six months after surgery.

**Results:** The mean correction for HVA in Groups A and B were  $29.68^\circ$  ( $25.94^\circ-33.42^\circ$ ) and  $29.78^\circ$  ( $25.12^\circ-34.43^\circ$ ) respectively. For IMA the values were  $10.38^\circ$  ( $8.63^\circ-12.13^\circ$ ) and  $11.25^\circ$  ( $9.91^\circ-12.59^\circ$ ). There was no significant difference in HVA ( $p=0.98$ ,  $CI=-6.20-6.01$ ) or IMA ( $p=0.46$ ,  $CI=-3.24-1.49$ ) correction between the groups. There was an overall improvement in MOxFAQ scores six months after surgery for both groups and the

difference between them was not significant ( $p=0.08$ ).

**Conclusion:** The post-operative correction of HVA and IMA was similar between the two surgical techniques. At six months after surgery both groups reported an improvement in symptoms based the MOxFAQ scores which was no different between the two groups. Our study showed that performing a more extreme scarf osteotomy can produce similar results to the Lapidus procedure in correction of severe HV.

## P6

### Which factors influence the decision to perform computed tomography for primary ankle fractures?

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**Background:** Plain radiographs can underestimate and misrepresent the morphology and severity of primary ankle fractures, whilst the role of CT scanning in the investigation of ankle fractures is poorly defined. The study aimed to identify clinical factors and features of ankle fractures presenting to our unit resulting in investigation with a CT scan.

**Methods:** A retrospective analysis of primary ankle fractures presenting to a University Teaching Hospital between January 2012 and December 2014 was performed. Following retrieval of demographic and injury data through case notes, the association of high mechanism of injury, ankle joint dislocation on admission, lateral malleolar fracture configuration, and presence of a posterior malleolar fracture with a decision to CT scan was examined. Statistical analysis was performed using chi-square tests.

**Results:** 366 cases were identified of which 104 received a CT scan. Of patients receiving a CT scan 27 (26%) had a high mechanism of injury ( $P < 0.05$ ), and 81 (78%) were dislocated on admission ( $P < 0.05$ ), compared to 41 (16%) and 105 (40%) in patients who did not. Lateral malleolar fracture pattern had no correlation with decision to perform CT. Patients who had a posterior malleolar fracture were likely to receive a CT scan ( $P < 0.05$ ) versus those without. Overall 67 (74%) of those with a tri-malleolar fracture investigated.

**Conclusions:** In comparison to existing literature our centre was more proactive in performing CT for malleolar ankle fractures. The presence of a posterior malleolar fracture was strongly associated with decision to perform a CT. High mechanism of injury and ankle joint dislocation were also associated with further CT investigation.

**Implications:** This study provides an insight into the injury and fracture patterns which can influence a clinician's decision to perform a CT scan in primary ankle fractures.

## P7

### The role of the virtual fracture clinic in the management of foot and ankle fractures: a review of patient outcomes and satisfaction

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**Background:** Most patients presenting to the emergency department with foot and ankle injuries can be managed as outpatients. Virtual fracture clinics (VFC) are becoming increasingly popular and help reduce the workload on outpatient clinics. Our study aimed to assess patient outcomes and satisfaction after discharge from a virtual fracture clinic without a face-to-face follow up.

**Patients and methods:** 200 patients with foot and ankle injuries referred to the virtual fracture clinic over a period of 4 months from October 2015 to January 2016 were reviewed. Data regarding the number of subsequent clinic appointments was collected for both patients discharged from the VFC and those that were referred for follow up. Radiographs for both these groups of patients were reviewed. A telephone survey was conducted on 33 patients to assess their satisfaction.

**Results:** 82 (41%) patients were discharged from the virtual fracture clinic without follow up. Of these, 4 (4.87%) patients needed to return to the clinic for further appointments and 6 (7.32%) required repeat imaging. Out of the 33 patients surveyed 94% rated the service as good or excellent and 97% said they would be likely or extremely likely to recommend the service to a family member or friend.

**Conclusions:** The virtual fracture clinic in our institution is safe and effective with high patient satisfaction. Discharged patients have good outcomes with a very low percentage returning to clinic for further review or needing subsequent x-rays. VFC s will help bring down costs and improve the efficiency of our fracture clinics without compromising quality of care and maintaining high patient satisfaction rates.

## P8

### Identification of the medial column line collapse variation is crucial in flat foot management

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**Introduction:** It is clear that injury to both dynamic and static structures in the foot are responsible for acquired pes planus deformity. The aim of this study was identify the anatomical location of the midfoot break in symptomatic pes planus deformity, and its relationship with other pes planus radiographic foot measurements.

**Methods:** We completed radiographic evaluation of 75 feet diagnosed with symptomatic pes planus. The break in the medial column line (Meary's line) was measured on the lateral radiograph at the intersection of the anatomical axis of the talus and 1<sup>st</sup> metatarsal. Pes planus measurements were performed on each the weight-bearing AP and lateral radiographs, including talonavicular coverage angle, talar 1&2 metatarsal angle, talar uncoverage, talocalcaneal angle, Meary's angle, line break, calcaneal and talar inclination, talocalcaneal angle, C1MT, tarsal joints angles and distances. Due to Gaussian distribution, unpaired t-test and ANOVA tests were used.

**Results:** The medial column line collapse was at talonavicular in 77.3% naviculocuneiform in 20%, and cuneiformmetatarsal in 2.6%. The line angle severity was proportional to the talonavicular coverage angle and talar uncoverage ( $p < 0.001$ ,  $R^2 0.4915$  and  $P < 0.003$ ,  $R^2 0.223$ ). On comparison of the 3 line-break groups, the talocalcaneal angle was significantly higher when the line break was at talonavicular joint ( $P < 0.001$ ) although Meary's angle was not significantly more severe.

**Conclusion:** The apex of the medial column collapse occurs not only at the talonavicular joint but also distal to the spring ligament and tibialis posterior insertion. Foot abduction increases with the increase in the line collapse regardless of the breaking point. Talus flexion is worse if the arch collapse is at the talonavicular joint, suggesting incompetency of the spring ligament. Assessing the apex of deformity is essential to decide the correct operative strategy.

## P9

### Does ankle arthritis cause more disability than other pathologies of the foot and ankle?

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**Introduction:** Ankle arthritis is been extensively studied for disease severity and outcomes of surgery. It is a condition resulting in significant pain and disability. There is a lack of literature on pain and disability in ankle arthritis compared to other pathologies of the foot and ankle. We aimed to study the level of disability caused due to ankle arthritis and how it compares to other commonly reported conditions of the foot and ankle.

**Methods:** We collected PROMs using MOX-FQ questionnaire from newly diagnosed patients under the care of 1 consultant from May 2014 to July 2014. Data was collected for 13 commonly reported conditions for forefoot (3), midfoot (3), hindfoot (5) and ankle arthritis. We grouped patients as Group A, B, C and D for forefoot, midfoot, hindfoot disorders and ankle arthritis respectively. The responses to each of the 3 domains of MOX-FQ were analysed using statistical tests for analysis of variance.

**Results:** 136 patients took part in this study. This included 52 patients with ankle arthritis, 56 patients with forefoot conditions; 22 patients with midfoot and 31 patients with hindfoot disorders. Group D patients reported highest scores for difficulty with walking/standing ( $p=0.008$ ) and similar levels of pain to other foot conditions ( $p>0.05$ ). For Social interaction domain, all 4 groups reported similar level of restrictions in social activity, ( $p=0.679$ ).

**Conclusion:** Patients with ankle arthritis experienced higher levels of difficulty with walking/standing and similar levels of pain and restriction with social activities to patients with other foot and ankle pathologies. Further research is required to explore general health and functional limitations in lines with ICF for ankle arthritis.

(We aim to present a breakdown of domains by each foot condition in comparison to ankle arthritis in the event of this abstract being accepted)

Evidence: Level III

## P10

### Access to talar dome surface with different ankle approaches

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**Introduction:** Access to the talar dome for treatment of osteochondral lesions (OCLs) can be achieved by different approaches to the ankle joint. Osteotomies are used in cases where the area to treat is not fully accessible. The recent description of an anatomical nine-grid scheme of the talus has proven useful to localize OCLs but no studies have demonstrated what approaches are indicated to access each of these zones.

**Methods:** Four standard soft tissue ankle approaches were performed simultaneously in ten fresh-frozen cadavers (anterolateral - AL, anteromedial - AM, posterolateral - PL, posteromedial - PM). The area of the talus that was accessible with an instrument perpendicular to the surface was documented for each of the approaches. Using ImageJ software the surface area exposed with each approach was calculated. The talar dome was divided in a nine-grid scheme and exposure to each zone was documented.

**Results:** The AL, AM, PL and PM approaches allow for exposure of 24%, 25%, 5%, 7% of the talar dome respectively. The AL gives access to zones 3 (completely) and 2, 5, 6 (partially); the AM to zones 1 (completely) and 2, 4, 5 (partially); the PL to zones 9 and 8 (partially); and the PM to zones 7 and 8 (partially).

**Conclusions:** A large area of the talar dome cannot be easily accessed with the use of standard soft tissue approaches (39%). Minimal or no access is achieved for grid zones 4, 5, 6 and 8. Extended exposure can be achieved with the use of osteotomies, section of the ATFL or through modified approaches. Careful preoperative planning is necessary when attempting techniques that require full exposure of a particular area of the talar dome like OATs, ACI, or MACI.

## P11

### Randomised control trial of the effectiveness of metatarsal block versus ultrasound-guided ankle block in osseous first ray surgery

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**Introduction:** Osseous first ray surgery is a common day case procedure. Patients are often given regional blocks as an adjunct to general anaesthesia. We sought to find if there is a difference between ultrasound guided ankle block and metatarsal block in this group of patients, in providing effective post-operative analgesia.

**Methods:** After ethical approval was granted and power analysis performed, 25 patients were recruited into each arm of the study. These patients were having either an osteotomy or arthrodesis. All patients had standardised general anaesthesia and received 20mls of 0.5% chirocaine for the blockade. The cohort having the ankle block had infiltration under ultrasound guidance in the anaesthetic room; and the cohort receiving the metatarsal block had infiltration at the end of the procedure. The timings of both the anaesthesia and the operation were recorded for each patient. Patients scored their pain level at 2, 6 and 24 hours. The amount of post-operative analgesia used in the first 24 hours was also recorded by the research nurse. All patients were discharged home with a standardised prescription of analgesia.

**Results:** Analysis of the pain scores showed that there was no difference between the two blocks at any measured time period. Nor was there a difference in the analgesic requirement in the first 24 hours. There was, however, a difference in the time taken for the whole procedure: with the ankle block taking an average of ten minutes more.

**Conclusion:** We conclude that metatarsal blocks are as effective as ultrasound guided ankle blocks in providing analgesia after osseous first ray surgery with a smaller potential for morbidity. Metatarsal blocks may also be a more efficient use of time.

## P12

### Investigating how the degree of radiological correction corresponds to patient reported outcomes in scarf osteotomy

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**Background:** Patient-reported outcome measures (PROMs) are important in modern healthcare systems. Previous studies on PROMs in hallux-valgus (HV) surgery show links with age/gender. We investigated the relationship between pre-/post-op radiological appearance and PROMs in hallux-valgus surgery.

**Patients and methods:** Prospective study of 40 patients with hallux-valgus undergoing scarf-osteotomy. Data collection performed using EQ-5D VAS, EQ-5D Health-Index, and the Manchester-Oxford Foot Questionnaire (MOxFAQ). All radiological measurements (HVA- hallux-valgus angle and IMA- Intermetatarsal angle) calculated by two independent blinded foot and ankle surgeons on PACS. Comparative analysis done between degree of radiological correction and pre-/post-op PROMs. Statistical tests carried out using IBM-SPSS Statistics (V19).

**Results:** Patient demographics- 40 patients included in the study with female predominance, equal side distribution and no bilateral procedures. Average age at time of surgery- 60.7 years (Range 29-88). Mean pre-op MOxFAQ=50.6 (10.0-98.7), mean post-op MOxFAQ=23.6 (0-91.3) and mean improvement in MOxFAQ=27.1 (-81.3-73.3). All MOxFAQ scores showed statistically significant improvement post-operatively. Greatest improvement in over 65s and female subgroups.  $p < 0.05$ .

For HVA- average pre-op angle=34.6° (13.2°-57.0), average post-op angle=14.9° (2.0-39.1). Mean HVA correction angle= 20.0 (3.2- 47.5). There was statistically significant correlation between pre-op/post-op HVA measurements and pre-op/post-op PROMS values respectively ( $p < 0.05$ ). There was direct correlation between HVA correction and improvement in PROMS.

For IMT, average Pre-op angle=17.3° (10.4-27.6), average Post-op angle=12.1° (6.0-21.1). Mean IMA

Correction=5.29 (0.2-15.8). There was statistically significant correlation between pre-op/post-op IMA measurements and pre-op/post-op PROMS values respectively ( $p < 0.05$ ). There was direct correlation between IMA correction and improvement in PROMS.

**Conclusion:** Hallux-valgus surgery is an effective procedure with high PROMS. Maximal improvement is seen in over 65s and female subgroups. There is a positive correlation between PROMS and degree of deformity. As HVA/IMA increase, PROMs decrease. As HVA and IMA correction increases, PROMs improves. Better surgical correction leads to better PROMS.

## P13

### Surgical fixation of type 2 navicular fractures - evolution of a technique

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Fractures of the Navicular are both rare and potentially devastating injuries. The type 2 or medial displacement fracture pattern is particularly associated with bony comminution. Various techniques for surgical fixation have been proposed in an attempt to restore and maintain reduction with variable results.

The senior surgeon has developed a reduction manoeuvre which greatly simplifies the process of reduction and fixation. We report on six patients with a Type 2 injury managed in this way and the one-year follow-up.

All patients underwent dual anteromedial and anterolateral incisions. The key to the technique is the constant large medial fragment. Upon relocation and temporary fixation of this fragment the medial column length is restored. This allows excellent access to the comminuted lateral half of the navicular for appropriate reduction and fixation. All cases were held with a navicular specific plate and an additional bridge-plate from the talus to the cuneiforms. The bridge-plate was removed at approximately nine months.

All six patients were successfully treated with the technique. The mean age was 22 years. Five patients sustained the injury in high-energy motorcycle or road traffic accidents. Post operatively all remained non-weight bearing for 6-8 weeks then protected weight bearing in a walker boot for a further 4-6 weeks. At six months post-surgery all patients had no or minimal symptoms and all had returned to their previous occupation. Twelve month radiographic follow up confirmed maintenance of the reduction and no loss of either the medial arch or medial column length.

## P14

### Hindfoot nail for acute management of the elderly ankle and distal tibia fragility fractures - a safe and effective treatment

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**Introduction:** Fragility ankle fractures in the elderly are usually of complex pattern, intra-articular, unstable and the surrounding soft tissues are compromised. In this study, we looked at our cohort of the ankle fragility fractures that were managed acutely with a hindfoot nail to assess the outcomes and efficacy of this method of fixation.

**Methods:** We retrospectively reviewed the surgical logbooks of ankle fracture fixation performed in our department from February 2015- July 2016. Inclusion criteria were elderly patients who underwent a hindfoot nail for an ankle or distal tibia metaphyseal fracture, with poor soft tissue condition or open fractures, poor pre-injury mobility and multiple co-morbidities. Outcomes were analysed with emphasis on post-operative wound complications, post-operative infection, peri-prosthetic fractures, fracture healing and mal-union, metal ware failure and functional outcomes.

**Results:** We identified 18 patients who matched the inclusion criteria, 5 men and 13 women. Age ranged between 65 and 93. Follow up 2 to 17 months. Five patients had open ankle fractures, of which one was complicated with wound infection post-operatively. 17 patients had a **VALOR**® hindfoot nail implant. One was managed with a short femoral nail, as a hindfoot nail, due to the limitation of available **VALOR**® nail lengths. All patients returned to pre-injury functional status within 3 weeks. One patient had malunion. One patient died 6 months post-operatively due to cardiac disease. No patients had peri-prosthetic fractures or metal-ware failure.

**Conclusion:** Our cohort of patients had good short term outcomes with early return to pre-injury functional status, reducing the risk of prolonged hospitalisation and complications. Malunion and non-union, stress proximal fractures and late infection are all long-term potential risks. We conclude that hindfoot nail is a safe and effective method of treatment of complex ankle and distal tibia metaphyseal fractures in this age group.

## P15

### The role of pre-operative computed tomography in operative planning for ankle fractures involving the posterior malleolus

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**Background:** CT scans are increasing being utilised in preoperative planning to delineate the exact morphology of posterior malleolar fractures. We examined the influence of CT scans on patient positioning, surgical approach and method of fixation in posterior malleolar ankle fractures.

**Methods:** A retrospective analysis of 121 primary ankle fractures involving the posterior malleolus presenting to a University Teaching Hospital were identified between January 2012 and December 2014. Fracture morphology was assessed with the Haraguchi classification for all cases undergoing CT. Differences in patient positioning, surgical approach and method of fixation were compared between posterolateral oblique and medial extension type posterior malleolar fractures. Statistical analysis was performed with the chi-square test.

**Results:** 88 ankle fractures involving the posterior malleolus received a CT scan. 51 (58%) had a type I: posterolateral oblique injury, 32 (36%) a type II: medial extension injury, and 5 (6%) a type III: shell type injury. A lateral or sloppy lateral position was favoured in 21 of the 36 (58%) posterolateral oblique fractures managed surgically, compared to 11 of the 31 (35%) medial extension fractures ( $P < 0.05$ ). Posterolateral oblique injuries were treated exclusively through posterolateral approaches whilst 16 (52%) medial extension injuries were approached through a posteromedial incision ( $P < 0.05$ ). Medial extension fractures with a 'two part' appearance readily required fixation with a posteromedial plate (48%) which was not clinically necessary in the posterolateral group ( $P < 0.05$ ). Shell type injuries were managed conservatively.

**Conclusions:** Pre-operative CT scans can provide essential clinical information which may influence the patient position, surgical approach and method of fixation in patients with a posterior malleolar fractures, in particular the presence of a medial extension injury.

**Implications:** We advocate CT scans for all posterior malleolar ankle fractures to distinguish between posterolateral oblique and posteromedial injuries to aid pre-operative surgical planning.

## P16

### Adult flat foot reconstruction using arthroereisis

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**Introduction:** The use of an arthroereisis screw is well described in the paediatric population for the correction of flexible flat feet. In this study, we aimed to evaluate the functional and radiographic results when a subtalar arthroereisis screw was used to augment reconstruction in adult patients with Posterior Tibialis Tendon insufficiency (PTTI).

**Materials and methods:** We included 23 feet with stage 2 PTTI that underwent flexor digitorum longus transfer, reefing of the spring ligament, translational medialising calcanaeal osteotomy and augmentation with arthroereisis screw (Kalix, Integra). In all cases the screw was removed 6 months later. Functional and radiographic values were assessed pre- and post-operatively at a minimum of 1 year follow-up.

**Results:** The mean age of patients at operation was 58 years. The calcaneal pitch was raised, Meary's angle decreased, the medial cuneiform height increased and the talonavicular coverage angle improved post-operatively compared to pre-operative measurements ( $p < 0.05$ ). The Manchester Oxford Foot Questionnaire, EQ-5D and VAS scores for pain improved in all cases post-operatively when compared to pre-operatively ( $p < 0.05$ ).

**Conclusion:** We conclude that the use of an arthroereisis screw is a promising adjunct to conventional reconstruction in adult PTTI that protects the corrective surgery during the initial healing time of the soft tissues. Excellent radiological and functional results were obtained in our series.

## P17

### Failed hindfoot fusion with intra-medullary nails - outcomes following limb salvage with circular frames for infected nonunions

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**Introduction:** Ankle and hindfoot salvage following infected nonunions is challenging. Revision with a two-stage procedure using internal stabilisation risks retention of bacteria on any implanted metalwork. A circular frame minimises this risk, and we present our experience at a tertiary referral limb reconstruction unit.

**Methods:** A prospective database was interrogated from 2009 to 2016 to identify patients who presented with infected hindfoot nonunions following hindfoot nails. One patient elected for a primary amputation, and the remainder were treated with open debridement, sampling, dead space management, soft tissue cover, and application of a circular frame using the Ilizarov technique. Outcome scores were collected using the Olerud and Molander score and EQ5D-5L.

**Results:** 9 patients were treated over a 7-year period. Demographics were 7 male: 2 female, average age 58 years (range 46-73 years). Follow up to latest outcome scorings was 47 months (Range 18-76 months), with one patient deceased. One patient required a local flap, and the rest were primarily closed. All patients

achieved fusion across the prepared joints. Olerud and Molander score averaged 52.9 (Range 5-80), EQ5D-5L VAS 59.3 (5-95). Complications included 1 valgus malunion, 1 chronic pain syndrome, and 1 patient who eventually required an amputation secondary to vascular compromise.

**Discussion:** Revision fixation with a circular frame produced fusion in all cases and is useful for infective cases when internal fixation methods are limited. However clinical outcomes were varied, with chronic pain and vascular compromise leading to a poor result for now, with one considering amputation and the other needing stump revision. With acceptable results in the medium term, salvage with a circular frame should be considered for complex infected hindfoot revision fusion.

## P18

### The use of tranexamic acid in foot and ankle surgery

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The role of tranexamic acid in foot and ankle surgery has yet to be established. Its use in elective hip and knee arthroplasty and trauma is well documented. The safety and efficacy of the drug in these applications has been proven thanks to large scale high quality feasibility studies. We present a study demonstrating the safe use of tranexamic acid in setting of foot and ankle surgery.

**Methods:** Over an 18 month period all patients undergoing major foot and ankle reconstructions received an intraoperative dose of tranexamic acid (1g IV infused over 2 minutes). All patients deemed at significant risk of developing a haematoma or wound dehiscence received the drug. These cases were a mix reflected a tertiary UK foot and ankle practice. Case notes were interrogated for patient demographics, thrombosis history, anticoagulation history and wound related complications.

**Results:** 81 patients were identified as having received 1 g of tranexamic acid intraoperatively. Of these patients the primary pathology in 55% was degenerative (n= 45), 2.5% Diabetes related reconstruction (n=3), 17% were traumatic (n=14) and 23% for deformity (n=19). Five patients (6%) experienced a wound complication, all of which were minor. No patient required a return to theatre and no clinically significant post-operative thrombo-occlusive events were recorded.

**Discussion:** The use role of tranexamic acid is not yet routine during surgery about the foot and ankle. Its role has been clearly established in trauma and large joint arthroplasty. Similar beneficial effects can be seen in this series of trauma and elective foot and ankle patients. No adverse events occurred.

**Conclusion:** Tranexamic acid can be safely administered to patients undergoing the full spectrum foot and ankle surgery with minimal risk of adverse events. Further work is required to determine a positive relationship on wound healing complications.

## P19

### Medial soft-tissue release for a lateralizing calcaneal osteotomy - a cadaveric study

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**Introduction:** A lateralizing calcaneal osteotomy (LCO) for pes cavus is generally regarded to be harder to shift than a medializing calcaneal osteotomy for pes planus. LCO can also cause a significant reduction of tarsal tunnel volume and some surgeons recommend releasing the tarsal tunnel routinely.

**Aim:** Determine all the structures which restrain a lateral shift in lateralising calcaneal osteotomies using a cadaveric study.

**Method:** Permissions were obtained to dissect 8 embalmed below-knee cadavers. LCO was performed on 4 cadavers using a standard lateral approach, and the lateral shift was measured before and after the release of tarsal tunnel. However, our approach changed due to our findings after the first 4 cadavers.

**Results:** We found no significant change in lateral shift before and after tarsal tunnel release. We performed further dissection around the osteotomy and found the Abductor hallucis muscle to be the main restraint to a lateral shift. We changed the method in the subsequent 4 cadavers to LCO with abductor hallucis fascia and plantar fascia release, instead of tarsal tunnel release. By releasing the fascia over Abductor hallucis muscle as well as the plantar fascia, it was possible to increase the lateral shift in LCO by at least another 5mm on average.

**Discussion:** Limitation of lateral shift with LCO is generally considered to be due to tight soft-tissues in pes cavus, and several variations of LCO are practiced to overcome this limitation. However, no attempt has been made so far to identify any particular structure contributing to the limitation of lateral shift.

**Conclusion:** Our study suggests that the Abductor hallucis muscle the main structure limiting lateral shift in LCO, and release of the fascia over the abductor hallucis as well as the plantar fascia should be an essential part of the lateralizing calcaneal osteotomy.