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Poster Presentation Abstracts.

P1

Donor leg morbidity after Vascularised Free Fibula Flap: is there a difference between patients reported outcomes and dynamic ankle stability as assessed by Star Excursion Balance Test

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Aim: To look at the morbidity in the donor leg with vascularised free fibular Flap (VFFF) by using patient reported outcome measures, clinical examination and dynamic ankle stability assessment by using Star Excursion Balance Test (SEBT).
Method: Series of 13 consecutive cases of VFFF done at Hull Royal Infirmary between Aug 2009 and Aug 2012. For subjective assessment American Orthopaedic Foot and Ankle Society Score (AOFASS), Foot and Ankle Disability Index (FADI), Visual analog pain (VAP) score (0 to 10) and feeling of instability were recorded.
Clinical assessment included recording range of movements (ROM), drawer test, clawing of toes, abnormal gait, muscle weakness, any loss of sensation in leg-ankle-foot and SEBT was used for assessment of dynamic ankle stability.
Results: Mean age of patients was 57 years, mean follow up period was 14 months. Three patients had superficial infection, five patients had persistent pain (mean VAP score was 3.5), three patients had reduced ROM and four patients reported feeling of instability in the ankle joint, but did not have instability on assessment. Mean AOFASS was 85 and mean FADI was 84. There was very good correlation between AOFASS and FADI ($\rho = 0.95$). There was no significant differences between the corresponding reach distances by operated and non-operated legs during SEBT. Six patients had sensory loss (all had loss in the superficial peroneal nerve distribution area and 3 in addition also had in the sural nerve distribution area)
Conclusion: This study demonstrates over all very good patient reported outcomes following VFFF and this corresponds with SEBT finding that the dynamic ankle stability of the donor leg is not affected as compared to opposite non-operated leg. Some morbidity like pain, loss of sensation or restriction of movement of ankle joint can occur as a price for the procedure.

P2

Fifth metatarsal fractures: is routine follow-up necessary?

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Introduction: Fifth metatarsal fractures are common and the majority unite regardless of treatment. A sub-type of these fractures carries a risk of non-union and for this reason many centres follow up all 5th metatarsal fractures. In 2011, a standardised protocol was introduced to promote weight-bearing as tolerated with either a tubigrip or Velcro boot. No routine fracture clinic appointments were made from A&E but patients were provided with information and a help-line number to access care if required. Some patients still attended fracture clinics, but only after review of their notes/X-rays by an Orthopaedic Consultant, or after self-reported "failure to progress" using the special help-line number.
Methods: Audit of a year prior to the introduction of the protocol and the year following it was performed. Patient satisfaction surveys sent at 1 year.
Results: During 2009/2010, 279 patients presented to A&E with a 5th metatarsal fracture and were referred to a fracture clinic. 106(38%) attended 1 appointment, 130(47%) attended 2 appointments and 31 (11%) attended 3 or more appointments --- 491 appointments in total. 3% failed to attend the clinic. Operative fixation was performed in 3 patients (1.07%).
In 2011/2012, of 339 A&E fractures, only 67 (20%) attended fracture clinic. 38 (11%) attended 1 appointment, 14 (4%) 2 and 9 (3%) 3 or more appointments --- 102 appointments in total. 5 patients (1%) required operative fixation.
Conclusion: Our study did not demonstrate any added value for routine outpatient follow-up of 5th metatarsal fractures. Patients can be safely allowed to weight bear and discharged at the time of initial presentation in the A&E department if they are provided with appropriate information and access to a "help line" run by experienced fracture clinic staff. The result is a more efficient, patient- centred service. 77% of surveyed patients were satisfied with the service.

P3

Pilot study of local anaesthetic peripheral nerve block in forefoot day case surgery: does it work better when administered before the start of the surgical procedure?

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Introduction: The success of Day-case forefoot surgery depends on good post-operative pain relief to ensure that patients are confidently discharged home. We routinely perform all forefoot surgery as day-case procedure with pre-operative regional local anesthetic block with 0.5% Levo-Bupivacaine involving the superficial and deep peroneal, sural, posterior tibial and saphenous nerves. We hypothesized that pre-operative regional block has similar effectiveness if not better, compared to block administered after the surgical incision has been sutured.
Methods: 42 consecutive patients undergoing day-case bony forefoot surgery were recruited and randomized to receive regional local anesthetic block performed by senior author, with 20mls of 0.5% Levo-bupivacaine either before the surgical incision or after the surgical incision has been sutured. Patient and the member collecting data were blinded to the allocation. Intra-operative and post-operative analgesia was standardized in consultation with the anesthetists and all patients received general anesthesia.Post-operative visual analogue pain scores at 2 and 6 hours were collected. Data collection also included time at which they required rescue analgesia and the amount of analgesia used in the first 24 hrs.

Results: 3 patients required overnight hospital stay due to social reasons. Mean age of patients undergoing surgery was 59±1 years. Mean surgery time was 49±1 minutes in Post-operative group & 39±1 minutes in pre-operative group. Average of the sum of the pain scores at 2&6 hours were 2 and 1 respectively. Mean time to rescue analgesia was 9±1 hours in the post-operative group and 11±1 hours in the pre-operative group. The amount of non-opiate analgesia used after discharge was more in the post-operative group.
Conclusion: Pilot study power calculation suggests a sample size of at-least 67 patients to prove a statistical significance between groups. Results suggest Pre-operative regional anaesthetic block is better for longer pain relief in the initial 24 hours.

P4

The effect of different methods of stability assessment on the rate of fixation in SER2/4 ankle fractures

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Introduction: Non weight-bearing plain radiographs are frequently unreliable in distinguishing between stable Supination-External Rotation (SER) 2 and unstable SER 4 injuries. Gravity stress radiographs and, more recently, weight-bearing radiographs have been introduced to aid surgical decision-making. The aim of this study was to assess the effect of different radiographic stability assessments on the rate of fracture fixation.
Methods: Radiographs of 1500 ankle injuries were assessed to identify SER 2/4 injuries. We determined inter- and intra-rater agreement of the need for stress radiography and divided patients into three groups. These were: Phase 1- the 'before gravity stress views' period (BS), phase 2- the 'gravity stress view' period (GS) and, phase 3 - the 'weight-bearing radiograph' period (WB). The rate of fixation was assessed based on the time-period and also the type of assessment.
Results: We indentified 558 patients with SER2/4 injuries. Minimum follow-up was 8 months. Of those, 327 were classified as SER2/4 on initial radiographs. Median age was 50 years (IQR 35 to 65). Mean Inter-observer agreement (Kappa) for the need for stress radiographs was 0.82 whilst intra-observer agreement was 0.85. Only 51% of patients requiring a stress view received one. Significantly fewer fractures were fixed during the BS and the WB period than during the GS period (8.9% and 7.0% vs 25.7%, Chi Squared P=0.0001). In the BS period, two patients underwent late fracture fixation. In the GS period, two patients underwent metalwork removal. In the WB period, no patient underwent re-operation. Thirty of 58 patients assessed with Gravity Stress underwent fixation, compared with 3 of 55, assessed with weight-bearing views.
Conclusion: Patients assessed with gravity-stress radiographs for SER2/4 fractures were eight times more likely to undergo surgery than those assessed with weight-bearing radiographs. We recommend the routine use of weight-bearing views in assessing the need for fixation.

P5

Using service line reporting software to evaluate income and cost of hallux valgus surgery in an NHS Hospital: coding is critical!

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Introduction: Service line reporting (SLR) is a business intelligence software model that is a tool for evaluating a hospital's income and expenditure. We used our trust's SLR software to evaluate hallux valgus surgery.
Methods: We used SLR software to search for the primary procedure codes of w153 (1st metatarsal osteotomy) and w791 (soft tissue correction of hallux valgus) for two Consultants patients in 1 year (2012/2013). 51 cases were analysed.
Results: For 32 cases, the primary procedure code was W153 (1st metatarsal osteotomy). SLR showed these cases generated a mean income of £3280 (range £1955 --- £4209). The mean cost per case was £1993. Mean profit per cases coded as W153 was £1,287.
In 19 cases, the primary procedure was coded as w791 (soft tissue correction of hallux valgus) and in all these cases a 1st metatarsal osteotomy was also performed. The mean income was £1168 (range £1048 --- £1605). Mean cost was £1829. This resulted in a mean loss of £661 per case coded as W791.
Discussion and conclusion: Cases with a primary procedure code of W791 (soft tissue correction of hallux valgus) received a mean income that was £2112 less than those cases coded as W153 (1st metatarsal osteotomy). The W153 code generates an "intermediate foot procedure" HRG tariff for the majority of cases, compared to a "minor foot procedure HRG tariff" for W791.
This has resulted in an estimated £40,128 loss of income to our hospital for the 19 cases identified.
The soft tissue correction is coded as the primary procedure code, even if a metatarsal osteotomy is also recorded, as per the national NHS coding rules, which specifically state that the W791 code must be used as the primary procedure code. National coding guidelines may need to be changed to address this issue.

P6

Hyaluronic acid injection for ankle sprains: a randomised controlled trial

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Introduction: A double blinded randomised controlled trial was conducted to ascertain the effectiveness of hyaluronic acid injection in acute ankle sprains, confirmed with magnetic resonance imaging (MRI). Primary end points were that of return to optimal ankle function as assessed by both visual analogue pain scores (VAS) and American foot and ankle score (AFAS). A secondary endpoint was to investigate, in the case that, peri-articular injection (PI) showed benefit, that a perhaps more technically straight forward technique of intra-articular injection (II) produced similar results.
Methods: Patients were selected through identification by either emergency department or general practice referrals on clinical suspicion of a grade 2 or 3 ankle

sprains, and MRI was performed to confirm lateral ligament injury. Patients with occult fractures or other significant pathology were excluded. Those identified as having lateral ligament injury were then randomised to Hyaluronic acid (HA) or placebo (PL) injection, either peri-articular or intra-articular. Patient outcomes were assessed at day 10 and day 42, with the VAS and AFAS.
Results: Among the 4 groups of 8 patients, those who received HA injection rather than PL, showed improved pain and function scores at day 10, assessed with both, VAS (Intra-articular HA v Peri-articular placebo : Mean difference 1.63 p=0.02 CI 95% 0.3-2.95) and AFAS (IAHA v PAPL, Mean difference =13.88, P=0.0016 CI 95% 6.24-21.51) scores. However, results were similar in all groups at day 42. There was no significant statistical difference between both the PI and II groups.
Conclusion: This study finds that early identification and intervention with hyaluronic acid injection of lateral ligament complex injuries can result in a more swift resolution of symptoms, and earlier return to function, which is statistically significant. It also suggests delivery of the therapeutic agent can be either peri or intra-articular.

P7

Complications of tibio-talo-calcaneal fusion using hindfoot nails

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Introduction: There are many methods of achieving fusion in the hindfoot utilising internal or external fixation. Hindfoot nails have been increasingly used particularly in patients with significant deformity or compromised soft tissues. Good results in terms of union and clinical outcomes have been reported. However significant complications can occur. The purpose of this study was to assess the rate and type of complications following use of hindfoot nails at our institution.
Methods: We identified patients from a prospective database. All underwent hindfoot nailing under the care of the senior author using a standard technique. Casenotes, operation notes and radiographs were reviewed for all patients. Union at the fusion site was assessed together with the final hindfoot alignment. Details of complications were recorded.
Results: We identified 52 patients undergoing 55 procedures. Mean follow up was 44.8 months (18-69). Eleven had a neuropathic cause of hindfoot deformity, 17 idiopathic arthritis, 12 previous fracture. Nineteen required additional procedures. Forty patients achieved ankle fusion and 36 subtalar joint fusion.
The commonest complication was prominent metalwork with 13 patients requiring metalwork removal. In addition 5 patients developed CRPS and 1 sustained a peri-prosthetic fracture at the tip of the nail. Nine patients developed a deep infection. In six patients limb salvage was achieved by removal of metalwork, debridement and insertion of antibiotic loaded cement beads. One patient required a period of stabilisation in a monolateral external fixator. Three of the infected cases underwent below knee amputation.

Conclusion: Hindfoot fusion with tibio-talo-calcaneal nails can achieve good clinical and radiological results. However significant complications can occur resulting, in a small minority, in amputation although limb preservation was possible in most cases of deep infection. We believe hindfoot nailing should be used as salvage procedure in selected cases.

P8

The radiological prevalence of degenerative arthritis of the 1st metatarsophalangeal joint

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Introduction: The prevalence of osteoarthritis of the 1st metatasphalangeal (mtpj) joint has been incompletely defined in a population-based study. The aim of the study was to determine the age and gender related prevalence of radiological 1st mtpj arthritis.
Methods: 517 consecutive radiographs of adult patients who presented with acute foot injuries to the accident and emergency department over a six month period were used. X rays were assessed independantly by the 2 authors using the Hattrup and Johnson grading system for osteoarthritic changes in the 1st MTPJ. Grade 1 --- mild osteophytes with good joint space preservation, grade 2 --- moderate osteophyte formation with joint space narrowing and subchondral sclerosis and grade 3 --- marked osteophytes with loss of visible joint space, with or without subchondral bone cysts. If there was a discrepancy between the 2 authors results the x ray was graded by a consultant radiologist.
Results: The radiographic prevalence of MTPJ arthritis in our population was 25%. Overall incidence was higher in females with 31% affected in comparison to 18% of males. Variance between the 2 sexes was insignificant until the age of 60 where the prevalence rose to 66% in females compared to 47% in males of the same age.
Conclusions: The development of 1st MTPJ arthritis follows a typical pattern as degenerative arthritis in other joints, with increasing age being an important factor. The results of this study suggest that it is a condition that begins to appear in most cases in middle age and is more apparent in females.

P9

Surgical management of haemophilia-associated ankle arthropathy: open and arthroscopic ankle arthrodesis outcomes

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Introduction: Arthroscopic ankle arthrodesis has been shown in non-haemophiliac patients to provide similar or superior rates of fusion to open ankle fusion. However, the literature regarding ankle arthrodesis in patients with haemophilia is markedly limited. The aim of this study was to compare the rate of successful fusion between open and arthroscopic approach in patients with haemophilic arthropathy of the ankle and subtalar joints performed at a single orthopaedic unit supported by the regional haemophilia centre.

Methods: Retrospective analysis of all patients with haemophilia who underwent ankle arthrodesis at our tertiary referral centre was undertaken. Information on patient demographics, type and severity of haemophilia, surgical approach, surgical outcomes including peri- and post-operative complications were extracted from paper chart review and electronic patient records. The rate of successful arthrodesis was determined from radiographs.
Results: We identified 12 cases of surgical fusion for haemophilia-associated ankle arthropathy from a regional haemophilia centre and performed by a single orthopaedic unit. The mean age at the time of primary fusion procedure was 42 years (range 23-62). There were 8 patients with severe haemophilia of which 7 were of Type A. There were 4 cases of primary arthroscopic fusion and 7 primary open procedures, with a mean follow-up period of 9.2 years.
The success rates of arthroscopic and open tibiotalar arthrodesis were 100% and 85.7% respectively. There were 3 reported complications following open procedures, including revision arthrodesis, wound haematoma, and a superficial wound infection. In the arthroscopic group, one patient had surgical resection of a painful tibiofibular pseudoarthrosis.
Conclusions: Our study demonstrates that arthroscopic ankle fusion for haemophilia-associated arthropathy has a rate of successful fusion comparable to open procedure, albeit in a limited patient group. The results were also comparable with the reported rate of success in the literature for non-haemophiliac patients undergoing similar procedures.

P11

Minimally invasive cheilectomy for the treatment of grade I-III hallux rigidus: a prospective study reporting on early patient outcome

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Introduction: Hallux rigidus is a benign condition that tends to be slow to progress that commonly affects adults of working age, leading to significant restriction of everyday function and recreational activities. We report a prospective case series of 41 patients treated for grade I to III hallux rigidus with minimally invasive cheilectomy. Patients were evaluated and outcomes quantified using the AOFAS-HMI scoring system
Methods: 54 feet formed our patient cohort. The mean age was 43 (range, 16-61).
A 1cm incision is made proximally and over the dorsomedial aspect of joint capsule. The tissues are cleared off the bone and a 3.1mm conical burr is used to shave the dorsal osteophytes. All patients were discharged on the same day.
Results: Mean follow up AOFAS-HMI scores at 17 months (range 6-30 months) was 87.1. Most patients (88%) return to the clinic in their own shoes at two weeks (36 out of 41) and all of them at six weeks. Thirty patients (73%) had returned to some sporting activities by six weeks post the procedure, 24 (59%) to non impact (swimming, cycling, cross trainer) and six patients (14%) had return to impact activities (tennis, squash). The rest of the patients did not participate in any sports or reported postoperative problems. There were no intra operative or post operative wound complications. All

patients were discharged home on the day of operation. Isolated cases of painful scars and altered sensation on the dorsum of the great toe completely resolved by three to six months
Conclusion: Minimally invasive cheilectomy is a new, attractive and currently successful method of treating grade I to III hallux rigidus. The minimally invasive approach has the benefit of less soft tissue disruption which causes minimal pain and hence a fast return to daily activities and work.

P12

Patient expectations of hallux valgus surgery

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Background: There is a paucity of research regarding patient expectations of corrective hallux valgus surgery. The assumption is that improved cosmesis is one of the main reasons why patients undergo surgery, however, there is no substantive evidence to support this. The hypothesis therefore, is that cosmetic improvement is the main factor that motivates patients into wanting surgery.
Method: Thirty female patients took part in a semi-structured interview. They filled in a questionnaire rating factors on a scale of 1-10 on how important each factor was. Secondly, they were encouraged to discuss their bunion and post-operative expectations.
Results: The most important pre-operative expectation was reducing pain at the site of deformity (median score of 10). Improving the appearance of the toe (median score of 7.5) and achieving a narrower foot overall (median score of 6.5) were rated lower down the scale.
Conclusion: Inevitably, appearance of a bunion and prospect of narrower feet is a natural desire amongst patients when it comes to opting for hallux valgus surgery, however, the overwhelming reason for surgery is pain caused by the bunion which in turn leads to inability to find suitable footwear and be able to walk in comfort. Cosmetic improvement was not demonstrated to be a main factor influencing patients' decisions to want corrective surgery.

P13

Ankle arthroscopy for managing the sequelae of fractures involving the ankle and distal tibia

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Introduction: The role of ankle arthroscopy in managing the consequences of ankle fractures remains controversial. This study aims to assess this procedure in terms of the accuracy of pre-operative diagnosis, re-operation rate and patient-reported outcomes.
Methods: We identified 66 patients (mean age 40 years, range 17-81) who had undergone ankle arthroscopy following a fracture of the distal tibia or fibula. Medical

case-notes were reviewed to ascertain details of the index injury, intra-operative findings and identify any further procedures. Patients were then contacted using a standardised questionnaire to assess satisfaction and return to normal function.
Results: Injury occurred a median of 2 years 8 months before arthroscopy (Range 6 months to 24 years). Forty nine of 66 fractures (74%) had been managed operatively. The commonest indication for arthroscopy was anterior impingement (45%) followed by degenerative change (30%) and osteochondral lesion(OCL) (18%). Intra-operative findings revealed an unexpected OCL or frank degenerative change in 20% of patients. Using a Kaplan Meier estimate one year after arthroscopy 10% of patients had undergone further surgery. This had increased to 34% by four years after arthroscopy. Four patients underwent ankle fusion.
Questionnaires were completed by 55/66 patients (84%). Only 28 patients (50%) felt surgery allowed them to return to normal activity. Thirty nine patients reported a benefit from surgery (75%) whilst 43 were satisfied (77%) and 48 (86%) would recommend the procedure to a friend.
Conclusions: Intra-articular pathology was significantly underestimated pre-operatively for one patient in five. Arthroscopy may improve symptoms in 75% of patients who complain of ankle symptoms after fracture of the ankle or distal tibia. However further procedures may be required in 34% of cases.

P14

Proximal first metatarsal opening wedge osteotomy: geometric analysis on saw bone models

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Introduction: For hallux valgus correction, a general consensus exists with regards to the use of distal first metatarsal osteotomy for minor to moderate deformities and diaphyseal osteotomy for moderate to severe deformities, with basal osteotomy reserved for severe deformities with a large intermetatarsal angle. Several types of basal osteotomy have been described, but all have disadvantages, so there has been renewed interest in opening wedge basal osteotomy. Little has been written about the geometry of this osteotomy, so we undertook this study in order to understand its power and limitations.
Methods: Proximal opening wedge osteotomies were performed in four orientations on saw bone models: 1. Perpendicular to the ground (PG); 2. Perpendicular to the shaft (PS); 3. Perpendicular to shaft with 30 degrees of declination (DEC); 4. 30 degree oblique (OB). Pre- and post-osteotomy measurements were made using reference wires to compare axial and plantar translation and change in intermetatarsal angle.
Results: Plantar translation and intermetatarsal angle correction all increased with increasing wedge size. The DEC osteotomy produced the largest increase in length of metatarsal shaft, while the PS osteotomy gave the least. Good plantar translation was achieved with the PS and DEC osteotomies. Overall, the PS osteotomy gave the best correction of the intermetatarsal angle.
Conclusion: The proximal metatarsal opening wedge osteotomy is a powerful

osteotomy in achieving hallux valgus correction. An osteotomy perpendicular to shaft is ideal for achieving correction of the intermetatarsal angle and plantar translation with minimal lengthening. This study provides useful information about the geometry of the basal opening wedge osteotomy of the first metatarsal, which may be used for correction of a severe hallux valgus deformity, often in conjunction with a distal chevron and/or Akin osteotomy.

P15

Post-operative patient satisfaction after tarsal tunnel decompression

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Introduction: Tarsal tunnel syndrome (TTS) is a compressive neuropathy of the tibial nerve within the fibro-osseus tibial tunnel posterior and inferior to the medial malleolus. This study examines the management of TTS in a secondary care setting correlating duration of symptoms and the investigations organised and with clinical outcome and patient satisfaction.
Methods: Retrospective case note review of 30 patients diagnosed with TTS who underwent 34 tarsal tunnel decompression procedures between April 2008 and April 2011 at Calderdale and Huddersfield NHS Trust.
Data collected included duration of symptoms, presence of Tinel's sign, ratio of patients undergoing nerve conduction studies and other imaging modalities. Clinical outcome was recorded from clinic letters.
In 2013, 24 patients were interviewed using the validated Association of Foot and Ankle Surgery Outcome Survey about pain, activity and level of function. Patient satisfaction and recommendation to relatives with surgery were recorded.
Results: Out of the 30 patients, 16 were male with average age 54 (21-83). 18 patients were symptomatic for more than 12 months. For the remainder, the average was 4.6 months. 18 patients were positive for Tinel's sign. All patients underwent nerve conduction studies. Median duration between initial presentation and surgery was 174 days. 24 patients demonstrated good outcome up till discharge. 3 patients showed slight improvement. Median time for follow-up was 1212 days.
17 (70.8%) said they were satisfied with the surgery. 15 (62.5%) patients said they experienced no to mild, occasional pain. 13 (54.1%) patients said they faced no limitation in their daily activities. 16 (66.6%) patients said they could walk between 4-6 or greater than 6 blocks (1/3 mile) non-stop.
Conclusion: Tarsal tunnel decompression offers symptomatic relief to most patients. Most patients enjoy a good quality of life post-operatively. Further research is needed to understand why satisfactory outcomes are sometimes not achieved.

P16

The pharmacological management of Charcot neuroarthropathy

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Acute Charcot neuroarthropathy is a devastating condition and its incidence is increasing. Currently, treatment consists of immobilisation and off-loading of the involved extremity. Outcomes are frequently poor and novel treatments are being sought urgently. This review aims to outline advances in the pharmacological treatment of this condition.
PubMed and the Cochrane Database of systematic reviews were searched. Relevant papers were cross referenced.
Eleven original studies and three reviews were found. The limited data available suggest pamidronate, alendronate and calcitonin provide some clinical and biochemical improvements while zoledronic acid is deleterious and increases off-loading times. However, the data is not robust enough to convincingly demonstrate clinically meaningful effects. The studies were predominantly low quality and heterogeneous. They differed markedly in study type, pharmacological agent used, dosing regimen, disease aetiology/stage/location, concurrent off-loading regimen, outcomes and follow-up. Few were rigorous in controlling for associated confounding variables and none investigated long term outcomes.
The routine use of pharmacological treatment modalities for this condition is not recommended in the United States by the Food and Drug Administration or in the United Kingdom by the National Institute for Health and Clinical Excellence. Given the evidence available this is justified and further, higher quality, research is required.

P17

Could Weber type A fractures result in long term ankle problems?

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Introduction: The literature contains few studies providing more than 5 year follow up respect to ankle fractures. Our aim was to objectively score long term outcome in respect to fracture injury patterns at our institution.
Methods: Our trauma database identified 152 adult ankle fracture patients from 2004-2007 (5-8years follow up) treated with ORIF or conservative management appropriately according to standard fixation techniques for simple fracture patterns. 70 patients were unavailable at time of follow up due to incorrect contact details, death or inability to participate due to confusion or medical illness leaving 82 patients (42 male, 40 female) mean age 52 years (range, 19 to 92) for analysis. Each patient completed the foot and ankle disability index (FADI) score (0-100). Radiographs were analysed for fracture pattern.
Results: Overall mean FADI score was 90 (range, 15 to 100). 3 fracture patterns were associated with above average functional scoring ($p < 0.01$): uni malleolar fractures of the medial side (n = 6, FADI: 99), isolated Weber B (n = 30, FADI: 93) and Weber C (n = 3, FADI: 100) injuries. Fracture patterns with below average outcomes were: tri-

malleolar (n = 12, FADI: 87), bi-malleolar (n = 17, FADI: 86), isolated Weber A (n = 11, FADI: 85) and miscellaneous injuries including isolated posterior malleolus or syndesmotic injuries (n = 3, FADI: 88). These injury patters were significantly associated with worse functional outcome at 5-8 year follow up (p< 0.01, unpaired students t test).
Conclusions: Although Weber A injury patterns are traditionally considered benign our study suggests below average functional recovery for a large proportion of these injuries, this may be due to unreported fiberous / non union, instability or peroneal symptoms for this patient group. We aim to undertake further investigation into possible causes for these findings.

P18

The use of extracorporeal shockwave therapy (ESWT) for severe resistant plantar fasciitis

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Introduction: Plantar fasciitis (PF) is typically self-limiting and the vast majority of patients are successfully treated with conservative measures. However, for a small number of patients, symptoms persist and may require alternative treatment. In 2009, NICE found ESWT to be a safe treatment option for refractory PF and recommended further clinical research. This audit aimed to investigate the effectiveness of ESWT for resistant PF.
Methods: Patient enrolment took place during an 18-month period in an outpatient department of a DGH. Patients were recruited from referring primary care providers (GPs, podiatrists, physiotherapists). Inclusion criteria included a history of at least 3 months of chronic plantar heel pain that proved resistant to at least 3 months of conservative treatment. Patients with bilateral symptoms were not excluded. Diagnosis was confirmed by clinical examination and by excluding other causes of pain with an MRI scan.
A total of 32 heels (25 patients) received 3 shockwave interventions, each two weeks apart. 2000 pulses were delivered each intervention using the Swiss Dolorclast radial shockwave device without local anaesthetic. Effectiveness was measured using the Foot Function Index (FFI) pre-treatment and 3 months post-treatment. A reduction in FFI >10% was defined as a responder.
Results: There were 7 missing outcomes at 3 months, giving a total of 25 completed outcome scores. At baseline, the mean FFI score was 53.0% +/-21.0. At 3 months, the mean FFI score was 28.7% +/-26.6. The mean difference was 24.3% (95% CI: [13.88-34.84]: P< 0.0001).
14/25 heels (56%) achieved >10% reduction in FFI scores at 3 months. No side effects were observed.
Conclusion: This audit demonstrated that ESWT is a safe treatment option for the management of severe resistant PF. However, due to the small sample, it is not possible to provide robust clinical evidence of its effectiveness. Further research is warranted.

P19

What proportion of patients eventually require joint fusion following simple ankle fractures?

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Introduction: The literature contains few outcome studies providing long term follow up for ankle fractures, to our knowledge no studies have defined the medium to long term probability of significant further surgery for this group of patients.
Methods: Using our institutions coding database we identified a cohort of patients (n = 2137) treated for ankle fractures over a 10 year period (Jan 2001 to Dec 2011). Primary data of interest was collected in respect to whether the fracture was managed conservatively or with open reduction internal fixation (ORIF) and further procedures each patient underwent at our institution.
Results: 73% of the identified fractures were managed non-operatively (n = 1552), 28% (n = 585) underwent ORIF. Of patients treated with ORIF, 58 (8.8%) required metalwork removal. Ankle joint fusion was the eventual outcome for 15 patients (0.7%). 10 patients required ankle joint injections (0.5%) and 2 patients underwent ankle arthroscopy following their fracture (0.1%). Significantly more of the patients requiring eventual joint fusion were from the ORIF group (p = 0.001 Pearson Chi-Squared test, n = 10 vs 5 patients, relative risk 5.3, CI 1.7-17.7). Mean time to fusion or arthroscopy was at 23months (range 1-50months) and 30months (range 9-52months) respectively.
Conclusion: It is practical to assume that more serious fracture patterns would prompt treatment with ORIF and be more likely to result in subsequent ankle arthritis and eventual fusion. Our data supports this hypothesis as the relative risk for ankle fusion was over five times higher for fracture patterns treated with ORIF. Patients can be reassured that overall the probability for significant surgical procedures other than metal work removal is low however our sample may underestimate the additional surgical morbidity and fusion rate.

P20

Tendo-Achilles electromyography (EMG) activity and ground reaction force during functional rehab: a comparison of two designs of walker boot

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Introduction: Functional rehabilitation has been advocated for both post-operative and non-operative management of achilles injuries. A key component is weight bearing in a plantar-flexed walker boot. There are two different designs: an articulated boot with a hinge at the ankle and no heel support, versus a static boot where equinous is effected by the insertion of heel wedges within the boot.
We conducted a study to explore whether there was a difference between the achilles load in each different type of boot. We measured ground reaction force and the EMG activity of the gastrosoleus in healthy volunteers wearing the boots.
Hypothesis: There will be no difference in ground reaction force or muscle activity

when weight bearing with either walker boot.
Methods: 10 male and 10 female volunteers were recruited and each walked on a running track with embedded force plates while wearing EMG electrodes on the gastrosoleus. The experimental conditions were: control (trainers), ProtecROM at 20 degrees, and Aircast FP with adjustment wedges at 20 degrees. Results were controlled for walking speed and body weight.
Results: Both boots lead to a significant decrease in both EMG muscle activity and ground reaction force when compared with normal trainers. The articulated boot had lower muscle activity than the fixed boot ($p=0.0005$). The fixed boot lead to lower ground reaction force than the articulated ($p=0.001$). Males had more muscle activity than females while wearing the walker boots ($p=0.03$).
Discussion: This study demonstrates significant differences between two types of boot commonly used in functional rehabilitation of achilles rupture. There were also significant differences between male and female subjects. We recommend that these findings are considered when designing rehabilitation protocols and when evaluating the literature.