



**British Orthopaedic Foot & Ankle Society  
Annual Scientific Meeting 2012**

14th - 15th - 16th November 2012, Celtic Manor Resort, Newport

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Dear delegate,

Croeso y Cymru

A warm Welsh welcome to the Celtic Manor Resort for the Annual Scientific Meeting of BOFAS, which is being held in Wales for the very first time in its long history.

The Education Committee has put together an exciting and stimulating programme and I am sure you will enjoy the varied and novel topics that will be covered over the next 3 days.

We have a distinguished international and national faculty who have been extremely kind in offering their time, expertise and knowledge and I am sure you will enjoy the robust debates and questions that the topics are bound to bring up!

The Allied Health Professions Programme is on the Thursday morning and covers sports injuries of the foot and ankle. This session is a unique inter-face between AHPs and Orthopaedic surgeons and is very popular every year! In addition, on the Thursday morning, there are industry workshops as well as the Difficult Cases session. Please do make the most of them!

A large trade show is also available and I do hope you will make the effort during the breaks in the programme to visit our trade partners who, as always, have been ever so generous in sponsoring the meeting and making it possible.

The annual dinner on Thursday evening will, I am sure, be a memorable one and I would love to see as many of you as possible for a great evening of camaraderie, friendship and banter.

I do hope that you have an enjoyable and memorable stay in Newport. I am personally looking forward to seeing you all here and am sure that you will enjoy flavours of the famous hospitality that Wales is well known for.

There are so many people I would like to thank for their help and support in making this meeting happen but in particular, the members of the various Committees, members of Council and of course our Executive Assistant Ms. Rosemarie Maio for all of their hard work and dedication. I am ever so grateful to all of you for attending and making this meeting a grand success.

Diolch yn fawr  
With best wishes

Kartik Hariharan  
President BOFAS 2012-13

## BOFAS Exhibition Caernarfon Suite BAR 1 & 2

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# Biographies



## Alastair Younger

Alastair Younger grew up in Scotland and is a graduate of the University of Aberdeen. After house officer posts in Scotland, he did a Masters degree at Simon Fraser University in Vancouver and stayed to perform his Orthopaedic residency at the University of British Columbia. After a fellowship in Arthritis Surgery in Boston, and a foot and ankle fellowship in Seattle with Sig Hansen, he returned to start a foot and ankle practice at St. Paul's Hospital in Vancouver. He was invited to be a North American Travelling fellow in 1997 and an American British Canadian fellow in 2007.

He has been a founding member and president of COFAS. He has been a key member of the research group of COFAS. At St Pauls hospital with Dr. Murray Penner and Dr. Kevin Wing he has initiated a research office, a fellow ship and a residency training program in foot and ankle care. He is currently an Associate Professor at the University of British Columbia.

His research interests are growth factors and outcomes research in end stage ankle arthritis. His clinical practice includes an extensive arthroscopic practice and a University based tertiary referral practice within western Canada.

He and his associates have won the AOFAS Roger Mann award twice, and a 3M award for Quality improvement in health care in Canada.



## Dr Ashok N Johari

Dr Ashok N. Johari is a Paediatric Orthopaedic surgeon connected with many public and private hospitals in Mumbai. After a brilliant post-graduate career in orthopaedics, Dr Johari started specializing in paediatric orthopaedics since early 1980s. He had further exposure in this field in Japan, England, France, USA & the then USSR. He started a paediatric orthopaedic unit at one of Mumbai's medical colleges in end 1985 and then went on for specialized paediatric orthopaedic practice including paediatric disabilities and spinal deformities in addition to routine paediatric orthopaedics.

Dr Johari has been a pioneer in developing the field of Paediatric Orthopaedics in India and was the President (2005 – 2011) and Founder Secretary (1994 – 2001) of Pediatric Orthopaedic Society of India (**POSI**). He has also been the President of the Indian Orthopaedic Association (IOA) in 2010 and of the Indian Academy of Cerebral Palsy (IACP) between 2008 to 2011. Dr Johari is the National Delegate for SICOT, the International Society of Orthopaedics and Traumatology and also Chairman of its Education Committee.

He is the President for the SICOT 2013 World Congress to be held in India and also the Scientific Chairman for the World Congress of the International Society for Prosthetics and Orthotics (ISPO) also to be held in 2013. Dr Johari has a number of distinctions, fellowships, awards and numerous papers, publications to his credit. He has conducted many workshops on paediatric orthopaedics, spinal deformities, cerebral palsy, spasticity management, use of botulinum and on surgery in Cerebral Palsy. He is a fellow member of American Academy of Cerebral Palsy and Developmental Medicine and is an Active Fellow of the Scoliosis Research Society and was awarded its prestigious International Traveling Fellowship. Dr Johari has the distinction of being the Editor in Chief of the prestigious international journal, the Journal of Pediatric Orthopaedics (B).

Dr Johari was awarded the FRCS from the London College and also honored as a Fellow of the prestigious National Academy of Medical Sciences of India (FAMS).



## Frank Horan MSc FRCS

Qualified at St Mary's. Trained at St Bartholomews, St Mary's, RNOH and McGill (Canadian MRC Fellow). Consultant Orthopaedic Surgeon Princess Royal Hospital, Haywards Heath 1976-1994, (Medical Director 1989-1994).

Pilot Officer RAF (National Service) 1954-56.

Consultant Orthopaedic Surgeon to the English and Irish and GB Basketball Federation 1977-1996.

Consultant Orthopaedic Surgeon to the MCC, Middlesex CCC, the Test and County Cricket Board, and the ECB 1976-2006.

Associate Editor 'International Orthopaedics' 1976, English Language Editor 1982-2008,

Chairman of the Editorial Board 1990-2008.

Associate Editor, Member of the Editorial Board, Deputy Editor, Editor and Emeritus Editor of the JBJS(B) 1977-2011.

Membre d'honneur of SICOT. Honorary Fellow of the British Orthopaedic Association.





## Dr Gary O'Driscoll

Gary qualified at Imperial University having completed a degree in Physiology & Pharmacology. He became Ireland's U21 Rugby Doctor for three 6 Nations tournaments and three World Cups before being appointed Doctor to the senior squad in 2002 covering 70 Internationals with a squad that won 3 Triple Crowns & The Grand Slam.

He was a Team Dr on the British & Irish Lions tours to New Zealand 2005 and South Africa 2009 and has also worked with Saracens & Melbourne Storm rugby league. In December 2008 he was appointed Medical Director & Team Doctor to Arsenal Football Club.

He is a Fellow of the Faculty of Sports & Exercise Medicine of Ireland, a Member of the FA Medical Committee and Vice-Chairman of the Premier League Drs Group.

Gary was a member of the Medical Steering Group to the 2012 London Olympics and was a Medical Team Leader at the Main Stadium throughout the 2012 Games.



## James Calder

James is a consultant orthopaedic surgeon at The Chelsea and Westminster Hospital, London and The Fortius Clinic, London. He specialises in foot and ankle surgery and has a particular interest in sporting injuries.

He completed his higher surgical training in London and his MD at Imperial College through a research fellowship from the Royal College of Surgeons in England.

He completed fellowship training in Foot and Ankle Surgery with Terry Saxby in Brisbane, Australia and was an AOFAS travelling fellow in 2006.

He is on the Editorial board of the British Journal of Bone and Joint Surgery and is Associate Editor of the Journal of Knee, Sports Surgery, Traumatology and Arthroscopy. He is current Chairman of the international Achilles Tendon Study Group.

He continues to be actively involved in research projects at Imperial College, UCLH and QMW, London. Current research programmes are investigating the pathophysiology of and endoscopic treatments for sports injuries, genetic polymorphism in tendinopathy, cartilage regeneration in the ankle and biomechanical considerations following fracture fixation in the elite athlete.



## Neil Rushton

Neil Rushton studied medicine at The Middlesex Hospital in the late sixties and subsequently went on to a career in surgery and eventually orthopaedics. He started The Orthopaedic Research Unit at the University of Cambridge more than twenty five years ago to study the reasons for failure of joint replacements. He was first to recognise the role of polyethylene wear particles in the failure of hip replacements.

The research developments led to a strong relationship with material science and with cell biology but particularly the effects of materials on natural tissues. The ORU is now a thriving research centre increasingly developing materials to influence and aid the repair of articular cartilage, bone and tendon. The general concept is to provide a friendly environment for naturally occurring cells to colonise so that healing can take place. Recent developments have been the investigation of minor ionic changes within scaffolds, the incorporation of growth factors and the use of "stem cells".

His research into loosening of prostheses led to the consideration of modulus mismatch being responsible in part for the failure of joint replacements. Over a long period he has been involved in the design and development of more appropriate prostheses in order to ameliorate this complication. New prostheses have been produced and implanted in association with Stryker. He has been involved in medical publishing for many years as a board member of a number of journals and spent a decade as Research editor of The Journal of Bone and Joint Surgery. He was editor of British Orthopaedic News from 2003-6. He was awarded an Hunterian professorship by the Royal college of Surgeons in 1990 and the Watson Jones Medal and Lecture in 2002. He was awarded the Chapman Medal in 2012.

He is Emeritus Professor of Orthopaedics, University of Cambridge and a Professorial Fellow of Magdalene college, Cambridge where, among other roles, he was Fellow's Wine Steward for twenty –five years! He has been President of The European Orthopaedic Research Society and currently maintains an active involvement with The British Orthopaedic Association and specialist orthopaedic societies.

He enjoys big boat sailing, wine, skiing and diving interspersed with cycling and non-productive salmon fishing.



## Dr T R Daniels, MD, FRCSC

Dr Timothy R. Daniels obtained his Orthopaedic Specialty from University of Saskatchewan in 1991. He completed a 12-month foot and ankle fellowship with Dr J. Smith and Dr L. Fleming at Emory University in Atlanta, Georgia and an additional three months at the Milwaukee County Medical Complex with Dr J. Gould and Dr G. Harris in their gait mechanics lab with emphasis on biomechanics of the foot and ankle.

Dr Daniels began his foot and ankle practice at the Wellesley Hospital in Toronto, Ontario in June 1993. In 1994 he established a Foot Clinic, a multi-disciplinary centre for patients with various kinds of foot and ankle pathology. Presently, he is Associate Professor and Head of the Foot and Ankle Program at University of Toronto, and Head of Division of Orthopaedics at St. Michael's Hospital.

Dr Daniels serves as Associate Editor to the journal *Foot and Ankle International* and has been on the editorial board of *Journal of Bone and Joint Surgery (Am)* and *Journal of American Academy of Orthopedic Surgeons* as a Reviewer. Other notable positions held to date:

- 1993-pres: Co-founder and Coordinator of the *Biennial Foot and Ankle Symposia* held in Toronto (since 2003 this meeting has become a bi-coastal annual event renamed the *Canadian Orthopaedic Foot and Ankle Symposium*, alternating between Toronto, Ontario and Vancouver, British Columbia)
  - 1999-02: Canada's Representative, AOFAS (Am. Orthopaedic Foot and Ankle Society) International Committee
  - 2002-04: Co-Founder and Past President, COFAS (Canadian Orthopaedic Foot and Ankle Society)
  - 2004-07: Canada's Representative, IFFAS (International Federation of Foot and Ankle Societies)
  - 2010-13: Research Chair, AOFAS
  - 2011-pres: Chair and PI, COFAS 5-Yr Ankle Arthritis Study Group
  - 2012: Chair, Foot and Ankle Research, St. Michael's Foundation
- He is the recipient of the following awards:
- Orthopaedic Chair's Teaching Award - for contributions to orthopaedic education as selected by the residents: Division of orthopaedics, Department of surgery, University of Toronto
  - Jameel Ali Continuing Education Award (Department of Surgery, U of T)
  - The COA award of merit (Canadian Orthopaedic Association).



## Noel Fitzpatrick Duniv MVB CertVR CertSAO MRCVS

Noel Fitzpatrick qualified from University College Dublin in 1990. Following a short period in mixed practice, he worked in small animal practice and spent periods training at several universities in the USA over the following two decades. He founded Fitzpatrick Referrals in 1997 and staff numbers have grown to 97 at the end of 2012. Noel has published widely with more than 30 peer-reviewed papers and more than 200 abstracts presented. Many of these studies have focussed on everyday procedures such as those for developmental elbow disease, cruciate disease, hip arthritis, spinal surgery and fracture management, with the aim of improving patient care through evidence-based medicine.

Noel lectures regularly at national and international meetings of both veterinary and human surgery and has spearheaded the evolution of several new implant and operative systems. These include internal and external prostheses for limb salvage, cartilage transplant technologies, spinal fusion systems, partial and total joint replacements, fracture fixation systems and novel osteotomies for correction of congenital or traumatic bone disorders. He has a special clinical interest in arthroscopic and minimally invasive surgery.

The Fitzpatrick Education Foundation (One Life One Medicine) was founded by Noel in 2010 to foster and fund collaboration between scientists in all disciplines of human and veterinary surgery. He is also the CEO of Fitzbionics which aims to fund research yielding innovative and practical solutions for orthopaedic and neurological problems in dogs and cats.

Noel mentors masters, PhD and residency students at several universities. He is an assistant professor at The University of Florida, visiting professor at The University of Surrey and a research fellow at The Ohio State University. He was awarded a Doctorate by The University of Surrey in 2010 and he founded The Fitzpatrick Learning Academy in 2011. Awards include The Mark S Bloomberg Award for contribution to veterinary sports medicine, The Simon Award for outstanding contribution to veterinary surgery and The Vet Science Award for innovations in health and wellbeing.

## **Lt Col David Standley FRCS RAMC**

### **Biosketch AAOS EWI**

Lieutenant Colonel David Standley joined the Royal Army Medical Corps in 1988 while at medical school in London. In 1996, following basic medical and surgical training in London and Germany, he started his specialist orthopaedic training in the Southwest of England.

He became a consultant in Trauma and Orthopaedics (T&O) in 2003 and was immediately posted to Operation TELIC. For the initial stages of the Iraq war he headed orthopaedic surgery at 22 and 33 Field Hospitals. Later that year he served in the NATO hospital in Bosnia. He has deployed 4 times to Afghanistan, to both Role 2 and Role 3 surgical facilities, most recently in September 2011.

In 2004 he moved his clinical practice to the Princess Elizabeth Orthopaedic Centre, Exeter, where he is the Clinical Director of orthopaedics.

His training background includes being part of the faculty for the Military Operational Surgical Training course, which is the main clinical course in pre-deployment and is hosted by the Royal College of Surgeons of England, London.

David Standley also holds a seat on the Specialist Advisory Committee, which advises the Royal College of Surgeons on all matters of orthopaedic training in the UK.

On 1st January 2012 he started a new position as the Consultant Advisor (T&O) to the Director General Army Medical Services.

## **Lt Col David Standley**

### **Preparing for Deployed operations**

Since 2009 the Military Operational Surgical Training (MOST) Course has formed a major part of pre-deployment training within the Defence Medical Services of the UK.

The course was developed by the Defence Professor of Surgery, Surgeon Captain Mark Midwinter, and is hosted by the Royal College of Surgery of England, London. From the start MOST has involved the wider surgical team and this allows a unified understanding of the unit's goals for treatment and surgical strategies that will be employed.

The course is over one week and is largely practical-based, with formal lectures kept to a minimum. As well as "hands on" cadaveric surgery there are anatomy demonstrations; Emergency Department exercises within a simulator suite; group discussions include onward care at UK Role 4, the role of the Deployed Medical Director and the team management of challenging cases.

MOST is resource-intensive with the last course requiring 57 faculty, 8 cadavers, surgical sets and equipment, as well as the Raven Department of Education at the Royal College of Surgeons.

To date 7 courses have been run with nearly 400 delegates being trained. As well as the UK delegates, teams have been sent from 3 other countries prior to their tours in the Role 3 hospital at Camp Bastion.

The course continues to progress and will soon increase the involvement of Emergency Medicine, so bringing together the whole resuscitation stage within a deployed medical facility. With the Defence Medical Services moving towards a "contingency planning" MOST is expected to become the method of maintaining lessons-learned as well as eliminating any "learning curves".

## **Lt Col Michael Butler MA FRCS(Tr&Orth) RAMC**

### **Biosketch BOFAS 2012**

Lieutenant Colonel Michael Butler joined the Royal Army Medical Corps in 1993 while at Cambridge University before moving to the London Hospital Medical College. In 2003, following basic medical and surgical training he started his specialist orthopaedic training in the Southwest of England.

He became a consultant in Trauma and Orthopaedics after Foot and Ankle training in Exeter, Bristol and Oxford. Militarily, Michael has served in Belize, Kenya, Germany and has completed 3 Northern Ireland tours and in 2003 deployed to the Iraq war under Lt Col David Standley. Since becoming a consultant, he has completed 2 tours to Afghanistan returning most recently in August 2012.

His consultant practice is at The Royal Cornwall Hospital in Truro as colleague to Steve Parsons whose registrar he had been in 2005.

His training background includes being part of the faculty for the Military Operational Surgical Training course, hosted by the Royal College of Surgeons of England, organising the Instructional Course for the Combined Services Orthopaedic Society and is keenly involved in the Peninsula Deanery Training Programme.

Mike conducts military clinics in Germany 2-3 times per year and is a reviewer for *Foot and Ankle Surgery*, *The Knee* and *Injury*.

## **Lt Col Michael Butler**

### **Emergency Care of the Trauma patient- from Point of Wounding to Definitive care**

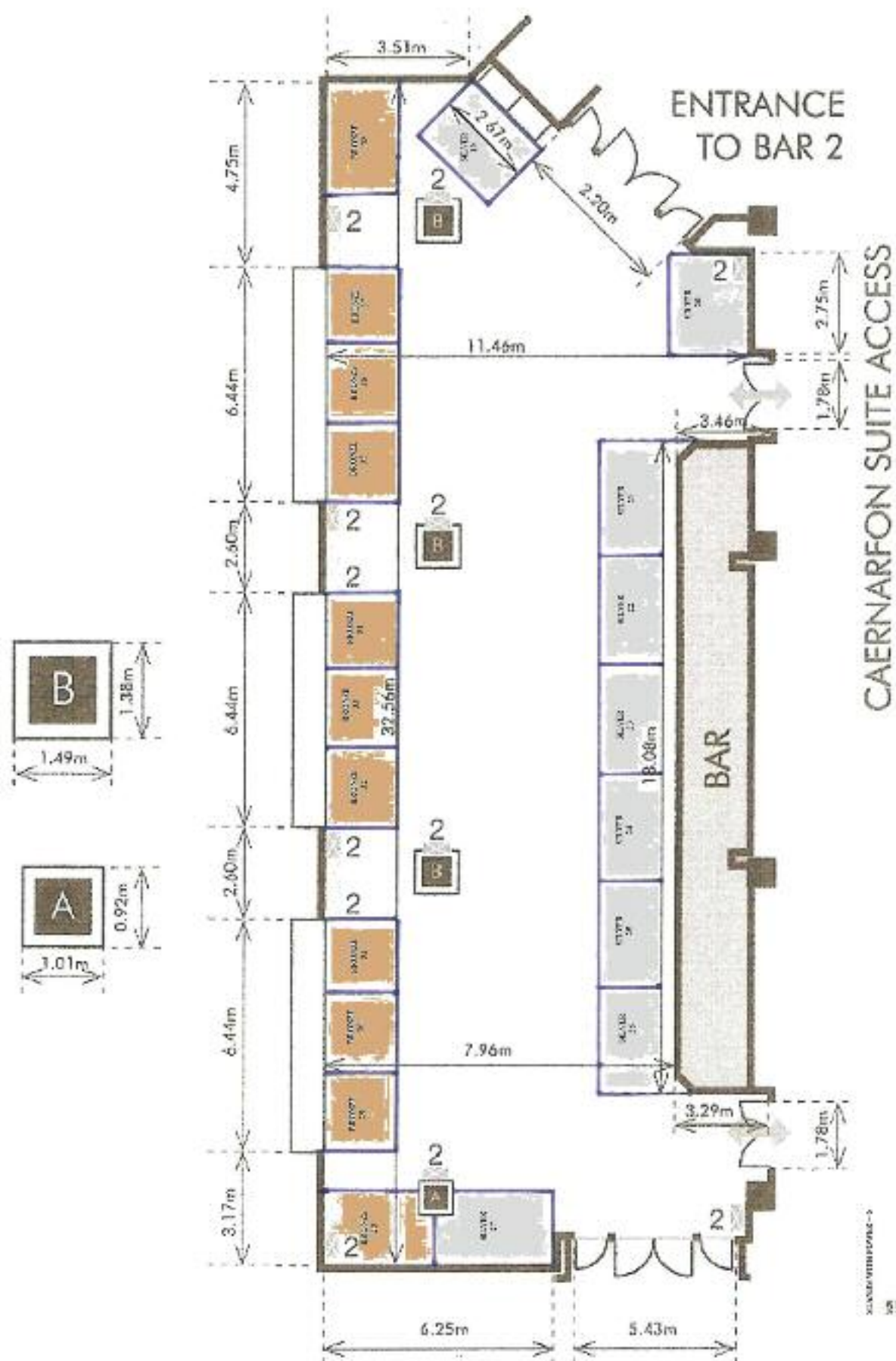
Military Surgeons are currently seeing and gaining experience in high-energy trauma due to ballistic and blast injury which are often devastating to the extremities- which are the most frequently injured anatomical zones.

The remit of the military medical chain is to save life primarily and then to save limb and sight where possible and this has led to a rapid evolution of emergency healthcare from point of wounding through to transport back to definitive healthcare and subsequent reconstruction and rehabilitation.

The emphasis in the pre-hospital phase is of life-saving interventions to prevent and halt life-threatening haemorrhage with a number of treatments and adjuncts. In hospital treatment is characterised by a team-based approach to facilitate rapid assessment and investigation of all injuries and expeditious transfer to the operating facility.

Surgery is team-based with the aim of life and limb saving surgery to facilitate a safe and rapid transfer to the Role 4 facility. Team Work and Communication are a critical part of this process and the military facilities have been seen to lead the world in advanced patient care in the severely traumatised patient.

## CAERNARFON SUITE BAR 1







British Orthopaedic Foot and Ankle Society  
 Annual Scientific Meeting  
 The Celtic Manor Resort  
 Coldra Woods  
 Usk Valley  
 Newport NP18 1HQ

**Wednesday 14th November**

8.00	Registrations
8.45	Welcome
8.50	Minister for Health and Social services, <b>Lesley Griffiths AM</b>
9.00am	The Olympic foot and ankle
09.00 – 09.20	Injuries in the Olympic foot and ankle: an overview <b>TBC</b>
09.20 – 09.30	Diagnosis and imaging <b>Dr Jay Lee</b>
09.30 – 09.50	Surgical principles in the management of foot and ankle injuries in international sports <b>Mr Mark Davies</b>
09.50 – 10.00	Rehabilitation of the Olympic foot and ankle <b>Dr Bryan English</b>
10.00 -10.15	Career ending foot ankle injuries in athletes <b>Mr James Calder</b>
10.15 – 10.45	Discussion / cases <b>All Faculty</b>
11.15 – 12.30	Foot and Ankle Trauma; a personal perspective: 15 mins each  Africa <b>John Cashman</b> America <b>Bruce Sangeorzan</b> Military foot and ankle trauma <b>TBC</b>

12.30 – 13.00	Guest Lecture:  'Ilizarov frame management of distal tibial fractures and their complications: The Indian Perspective' <b>Mangal Parihar</b>	
13.00 – 14.00	Lunch	
14.00 – 15.45	<b>Free papers</b>	
15.45 – 16.15	Tea and Trade	
16.15 – 17.15	Ankle arthritis	
	Mobility results: Canada; <b>A. Younger</b> , UK; <b>Sunil Dhar</b>	15mins
	Alternatives to TAR – <b>Daniels</b>	15mins
	Revision TAR – <b>Sangeorzan</b>	15mins
	The painful TAR – <b>Rippstein</b>	15 mins
	Discussion	30 mins
17.30 – 18.00	'Distal extremity arthrosis, trauma and neoplasia in dogs and cats – Novel technologies to Repair or Replace.'  <b>Dr Noel Fitzpatrick</b>	
18.00	Drinks at Bar Dinner individual arrangements	

## Thursday 15th November

09.00 – 13.00	Industry workshops
09.00 – 13.00	Problem cases symposium AHP programme: Sports injuries
13.00	Lunch
14.00	Research  Levels of evidence: <b>James Scott</b>  ‘Preparing a paper for the British Journal’: <b>Frank Horan</b>  Basic science research: <b>Neil Rushton</b>  Discussion
15.00	Guest Lecture: <b>Mr Martyn Porter</b> , BOA President
15.30	Tea and trade
16.00	<b>Free papers</b>
17.30	Guest lecture: TAR in deformity: <b>Dr Tim Daniels</b>
18.00	Adjournment
19.30	Drinks Reception
20.00	<b>Annual Dinner</b>



## Friday 16th November

08.00 – 08.15	BOFAS educational course: <b>Hiro Tanaka/Chris Blundell</b>	
08.15 – 08.30	HRG coding: <b>T. Allen</b>	
08.30 – 08.45	Surgical Podiatry: <b>Fred Robinson</b>	
08.45 – 0900	Visiting fellowships: <b>K Hariharan</b>	
09.00	<b>Free papers</b>	
10.45	Coffee and Trade	
11.15	Symposium: The adolescent foot	
	The relapsed clubfoot. <b>Johari</b>	15 mins
	Adolescent foot and ankle trauma: <b>Sangeorzan</b>	15mins
	The foot in Cerebral Palsy <b>Johari</b>	20 mins
	Discussion	25mins
12.30	Presidential Guest lecture – <b>Bruce Sangeorzan</b> : 'Calcaneal fractures: the current state of play'	
13.00	Lunch with AGM	
	Reports	
	Prizes	
	Handover to <b>Simon Henderson</b>	

## Wednesday, 14th November

### FREE PAPERS

**Chairmen:** Trish Allen & Jitendra Mangwani

### Free paper session

**14.00**

- |       |     |   |
|-------|-----|---|
| 14.00 | 107 | <b>Ankle replacement: a 14-year experience</b><br><i>R.S. Ahluwalia, P. Cooke, M. Rogers, R. Sharp</i><br>University of Oxford, UK  |
| 14.05 | 054 | <b>Early to medium-term results of the Mobility™ Total Ankle Replacement</b><br><i>A.E. Fox, C.M. Blundell</i><br>Sheffield Teaching Hospitals NHS Foundation Trust, UK   |
| 14.10 | 051 | <b>The Zenith total ankle replacement – early results of the first 50 cases in a non-inventor series</b><br><i>T. Millar, S. Garg</i><br>University Hospitals of Morecambe Bay, Lancaster, United Kingdom                                       |
| 14.15 |     | Discussion  |
| 14.22 | 090 | <b>Outcomes in total ankle replacement – a meta-analysis and systematic review</b><br><i>R. Zaidi, S. Cro, K. Gurusamy, A. Goldberg, A. Macgregor</i><br>I UCL, Institute of Orthopaedics and Musculoskeletal Science, Stanmore, United Kingdom |
| 14.27 | 041 | <b>Outcomes of ankle arthroplasty for post-traumatic arthritis following pilon fractures</b><br><i>R. Kakwani, J. Ramaskandhan, M. Siddique</i><br>Freeman Hospital, Orthopaedics, Newcastle-upon-Tyne, United Kingdom                          |
| 14.32 | 014 | <b>Ankle distraction for post-traumatic ankle arthritis in young adults – a prospective study with functional outcomes</b><br><i>H. Shalaby</i><br>NHS Lothian, Orthopaedic Department, Edinburgh, United Kingdom                               |
| 14.37 |     | Discussion  |
| 14.44 | 159 | <b>Obesity in total ankle replacement (TAR): a prospective cohort study</b><br><i>A. Singh, J. Ramaskandhan, M. Siddique</i><br>Freeman Hospital, Orthopaedic Surgery, Newcastle upon Tyne, United Kingdom                                      |

14.49	030	<b>Management of ankle pain following ankle arthroplasty</b> <i>R. Kakwani, J. Ramaskandhan, M. Almaiya, M. Siddique</i> Freeman Hospital, Orthopaedics, Newcastle-upon-Tyne, United Kingdom
14.54	110	<b>Cyst formation after Mobility total ankle replacement</b> <i>H. Majeed, D. Sundarmoorthy, S. Dhar</i> Nottingham University Hospitals, Trauma and Orthopaedics, Nottingham, United Kingdom
14.59		Discussion
15.07	121	<b>Revision of failed Scandinavian total ankle replacement (STAR)</b> <i>H. Majeed, D. Sundarmoorthy, S. Dhar</i> Nottingham University Hospitals, Trauma and Orthopaedics, Nottingham, United Kingdom
15.12	178	<b>Chondrogenic differentiation potential in clonal MSC populations derived from synovial tissue for osteochondral tissue for osteochondral defects</b> <i>J. Bhamra, W. Khan, T. Hardingham</i> Royal National Orthopaedic Hospital, Stanmore, United Kingdom
15.17		Discussion
15.22	063	<b>Ultrasound-guided radiofrequency ablation in the management of interdigital (Morton's) neuroma</b> <i>G.S. Chuter, Y.P. Chua, D.A. Connell, M.C. Blackney</i> The Park Clinic, Orthopaedics, Melbourne, Australia. University of Malaya, Dept of Orthopaedic Surgery, Kuala
15.27	095	<b>Results of PRP injections in the treatment of recalcitrant plantar fasciitis</b> <i>T. Millar, G. Jackson, T. Clough</i> Wrightington Hospital, Wigan, United Kingdom
15.32	162	<b>Extracorporeal shockwave treatment (ESWT) for refractory Achilles tendinopathy: a NICE driven audit</b> <i>S.N. Dunkerley, P.M. Guyver, D.A.T. Silver, A.C. Redfern, N.J. Talbot, I.T. Sharpe</i> Royal Devon and Exeter Hospital, Princess Elizabeth Orthopaedic Centre, Exeter, United Kingdom
15.37		Discussion
15.45		Tea and trade

## Thursday, 15th November

9.00 – 13.00 **Industry Workshops**

**Conwy & Denbigh suites**

Hosted by:

- Orthosolutions
- Biomet
- Integra
- Stryker
- WG Healthcare
- Wright Medical

9.00 – 13.00 **Allied Healthcare Professionals Programme**



## Thursday 15th November

### FREE PAPERS

Chairmen: Mr Andy Molloy & Anthony Perera

#### Free paper session 16.00

- 16.00 070 **Lesser toe plantar anatomy – considerations for minimally invasive surgery**  
*D. Loveday, A. Robinson*  
Norfolk & Norwich University NHS Trust, Orthopaedics, Bury St Edmund's, UK
- 16.05 003 **Our initial experience using minimally invasive Chevron and Akin osteotomies for Hallux Valgus correction: short term results**  
*N. Hossain, M. Budgen*  
York Teaching Hospital, Trauma & Orthopaedics, York, United Kingdom
- 16.10 085 **Minimally invasive arthrodesis of the first metatarsophalangeal joint**  
*R.N. Fanous, S. Horriat, S. Ridgers, A.H. Sott*  
Epsom & St Helier University Hospital NHS Trust, Foot and Ankle Unit, London, United Kingdom
- 16.15 Discussion
- 16.22 080 **Patient-reported outcomes (MOxFQ) and satisfaction eight years following Hallux valgus surgery**  
*J. Dawson, M. Rogers, G. Lavis, R. Sharp, P.H. Cooke*  
1University of Oxford, Oxford, United Kingdom, 2Nuffield Orthopaedic Centre, Oxford, United Kingdom
- 16.27 138 **Outcome of first metatarso-phalangeal total joint replacement (ToeFit): a clinical outcome and survival-ship analysis**  
*M. Al-Maiyah, P. Rice, T. Schneider*  
Melbourne Orthopaedic Group, Melbourne, Australia
- 16.32 125 **Long term outcome of first MTPJ replacement using ceramic prosthesis with press fit design**  
*M.T. Nagy, C.R. Walker, S.P. Sirikond*  
Royal Liverpool University Hospital, Orthopaedic Surgery – Foot and Ankle Unit, Liverpool, United Kingdom
- 16.37 Discussion

- 16.44      057      **An assessment of how bone stress across the first metatarsophalangeal joint varies in different foot structures, utilising finite elemental analysis**  
*R. Russell, R. Mootanah, A. Truchetet, S. Rao, H.J. Hillstrom*  
 Broomfield Hospital, Essex, United Kingdom. Anglia Ruskin University, Essex, United Kingdom. New York University, New York, United States. Hospital for Special Surgery, New York, United States
- 16.49      086      **The hallucal metatarso-sesamoid articulation – a three dimensional quantitative analysis**  
*B. Jamal, A. Pillai, Q.A. Fogg, S. Kumar*  
 Southern General Hospital, Department of Trauma & Orthopaedics, Glasgow, United Kingdom. University of Glasgow, Department of Human Anatomy, Glasgow, United Kingdom. Glasgow Royal Infirmary, Department of Trauma & Orthopaedics, Glasgow, United Kingdom
- 16.54      044      **Can modification of the Weil osteotomy reduce the risk of a floating toe deformity – a biomechanical cadaveric analysis**  
*A. Perera, O. Helguera- Mendoza, M. Myerson*  
 University Hospital of Wales, Trauma and Orthopaedics, Cardiff, United Kingdom. Hospital Puerto de Hierro, Orthopaedics and Trauma, Guadalajara, Mexico. Institute of Foot and Ankle Reconstruction, Baltimore, United States
- 16.59           Discussion
- 17.06      117      **Lengthening Scarf osteotomy for recurrent Hallux valgus**  
*B. Rose, N. Bowman, H. Edwards, A. Skyrme*  
 Eastbourne District General Hospital, Eastbourne, United Kingdom
- 17.11      088      **Intraoperative radiography for Scarf osteotomies of the first metatarsal**  
*P. Holland, A.P. Molloy*  
 Aintree University Hospital, Department of Orthopaedics, Merseyside, United Kingdom. Aintree University Hospital, Department of Orthopaedics, Liverpool, United Kingdom
- 17.16      149      **The Stainsby procedure for rheumatoid forefoot arthroplasty: 5 year prospective follow up study**  
*K.S. Rankin, A. Singh, J. Jalali, P. Briggs*  
 Freeman Hospital, Orthopaedic Surgery, Newcastle upon Tyne, United Kingdom
- 17.21           Discussion

## Friday 16th November

### FREE PAPERS

Chairmen: Mr William Harries & Derek Robinson

#### Free paper session 0900

- 09.00 188 **Bone marrow oedema syndrome of foot and ankle**  
*A. Ferrero, N. Cullen, D. Singh*  
Royal National Orthopaedic Hospital, Foot and Ankle Unit, Stanmore, United Kingdom
- 09.05 169 **Simple stress fractures? Are they under-investigated?**  
*G. Chami, N. Harris*  
Leeds Teaching Hospitals, Leeds, United Kingdom
- 09.10 072 **Do nerve conduction studies help with the diagnosis and management of patients who present with non specific foot pain?**  
*J. Stevenson, A. Tong, Y. Joshi, P.W. Laing, N. Makwana*  
1Wrexham Maelor Hospital, Trauma and Orthopaedics, Wrexham, United Kingdom, 2The Robert Jones and Agnes Hunt Orthopaedic Hospital, Trauma and Orthopaedics, Oswestry, United Kingdom
- 09.15 Discussion
- 09.22 059 **The home therapy ankle pathway – a novel and cost effective method of initial management of ankle fractures**  
*N. Baraza, S. Lever, G. Waight, V. Dhukaram*  
University Hospital Coventry and Warwickshire, Trauma and Orthopaedics, Coventry, United Kingdom
- 09.27 104 **Fifth metatarsal fractures – is routine follow-up necessary?**  
*J.D. Bone, L.A. Rymaszewski, C.S. Kumar, N.J. Madeley*  
Glasgow Royal Infirmary, Department of Trauma and Orthopaedics, Glasgow, United Kingdom. University of Glasgow, School of Medicine, Glasgow, United Kingdom
- 09.32 017 **The restoration of anatomy following ankle fractures. Does grade of surgeon influence radiographic outcome?**  
*J. Jackson, M. Parry, S. Mitchell*  
Bristol Royal Infirmary, Bristol, United Kingdom
- 09.37 Discussion

- 09.44      049      **The IED blast foot: outcomes from foot and ankle blast injuries**  
*A. Ramasamy, S. Masouros, R. Phillip, I. Gibb, A. Bull I, J. Clasper*  
 Imperial College London, The Royal British Legion Centre for Blast Injury Studies, London, United Kingdom. Defence Medical Rehabilitation Centre, Epsom, United Kingdom. Centre for Defence Imaging, Gosport, United Kingdom
- 09.49      039      **Clinical, radiological and functional outcomes after gradual correction of stiff equino-cavo-varus deformity with the V-osteotomy and the Ilizarov technique**  
*H. Shalaby, A. Wood, A. Keenan, C. Arthur*  
 NHS Lothian, Orthopaedic Department, Edinburgh, United Kingdom
- 09.54      140      **Surgical outcomes of Lisfranc fixation – a single surgeon series**  
*J.R. Eyre, S. Gudipati, G. Chami, R. Monkhouse*  
 Leeds Teaching Hospitals, Department of Orthopaedic and Trauma Surgery, Leeds, United Kingdom
- 09.59           Discussion
- 10.06      152      **Management of middle facet tarsal coalitions with concomitant severe flat foot. Would resection alone suffice?**  
*O. Akilapa, H. Prem*  
 Birmingham Children's Hospital, Orthopaedics, Birmingham, United Kingdom
- 10.11      093      **Arthroscopic fixation of displaced calcaneal fractures – percutaneous arthroscopic calcaneal osteosynthesis**  
*P. Harnett, P. Rosenfeld*  
 Imperial College, London, United Kingdom
- 10.16      050      **An anatomical and cadaveric study examining the risk of sural nerve injury in percutaneous Achilles tendon repair using the Achillon device**  
*K.J. Porter, P. Karia, M. Szarko, A. Amin*  
 St George's Hospital, Trauma and Orthopaedics, London, United Kingdom. St George's Hospital, Medical School, London, United Kingdom. St George's Hospital, Anatomy, London, United Kingdom
- 10.21           Discussion
- 10.28      043      **The role of venous stasis and endothelial damage in VTE in trauma patients treated with a cast- where does the clot occur?**  
*H. Jones, B. Hickey, A.G. Ghaffar, A. Perera*  
 University Hospital of Wales, Trauma and Orthopaedics, Cardiff, United Kingdom. University Hospital of Wales, Cardiff, United Kingdom



10.33	116	<b>Venous thromboembolism in ankle ORIF – the case against pharmacological prophylaxis, a 5 year retrospective review</b> <i>C.L. Cozon, M.J. Welck, P.S. Ray</i> Barnet General Hospital, London, United Kingdom
10.38		Discussion
10.45		Coffee And trade



## **2012 Annual Scientific Meeting**

### **Abstracts of Podium Presentations**

## Ankle replacement: a 14-year experience

R.S. Ahluwalia<sup>1,2</sup>, P. Cooke<sup>1,2</sup>, M. Rogers<sup>1,2</sup>, R. Sharp<sup>1,2</sup>

<sup>1</sup>University of Oxford, Nuffield Department of Orthopaedic, Rheumatology and Musculoskeletal Sciences, Oxford, United Kingdom, <sup>2</sup>Abertawe Bro Morgannwg University Health Board, Orthopaedic Department, Swansea, United Kingdom

**Introduction:** Ankle replacement is now common in the UK.

In a tertiary referral NHS practice, between 1997-2011 we implanted two types of cementless mobile bearing total ankle replacements (TAR).

**Methods:** We reviewed our operative database and electronic patient records and confirmed the number of prosthesis with our theatre records. All case notes and radiographs were reviewed. Failure was taken as revision, and patients were censored due to death or loss to follow-up. The survivorship was calculated using a life table (the Kaplan-Meier method), with 95% confidence intervals.

**Results:** We found a total of 358 NHS patients had a TAR from Jan 1997 to April 2012 total ankle replacements; the mean follow up was 76 months. The principle indications for surgery included primary OA (n=146) and inflammatory arthritis in (n=79). Overall survival was 90.9% (94-84) at 10 years.

A complication requiring revision developed in 42 ankles and 36 were revised or fused. Thirty-two TAR's underwent further hind foot fusions which were not attributed as a failure of the prosthesis. We arthroscoped 6 TAR's for heterotrophic calcification.

When we separated the implants we found the STAR (implanted from 1997-2004) had a 5-year survival of 95.2% (98-91) and the Mobility (implanted from 2004-11) of 92.6% (96-88). We found early failures (within 2 years of implantation) were higher within 2 years of introduction of TAR and on changing our prosthesis.

**Conclusion:** In a study of TAR undertaken at one centre principally by an experienced surgeon and team, we have shown a learning curve.

Cementless mobile bearing total ankle replacements (TAR) conducted on a routine basis with careful patient selection has a 90.9% survivorship over a 10-year period. The difference in survival for two implants is not statistically significant.

## Early to medium-term results of the Mobility™ Total Ankle Replacement

A.E. Fox<sup>1</sup>, C.M. Blundell<sup>1</sup>

<sup>1</sup>Sheffield Teaching Hospitals NHS Foundation Trust, Foot & Ankle Unit, Sheffield, United Kingdom

**Introduction:** The Mobility™ prosthesis [Depuy] is the most extensively used TAR in the UK, though there are few published results. We present our complete experience of the Mobility prosthesis in a diverse population.

**Methods:** From March 2005 to December 2009, 84 consecutive Mobility ankle replacements were performed by the senior author, in 79 patients (28 female, 51 male) with mean age 64.5 years (43-80). This complete cohort included the first and last cases with this implant. Mean follow-up was  $50.1 \pm 18.2$  months (range 14-86).

Patients with ankle replacements in situ, were reviewed clinically and radiologically. Clinical outcome measures were: AOFAS score, MOXFQ (adapted for the ankle), and VAS for pain. Post-operative radiographs were reviewed to assess component position and examine for zones of lucency.

### Results:

At final review, 1 patient had died (unrelated), 13 had been revised as follows:

Arthrodesis 7

Further TAR 2

Talus only revised 1

Tibia only revised 1

Amputation 2 (one for an unrelated problem)

Exchange of bearing had been carried out in 4.

Intra-operative malleolar fractures occurred in 4.8% and were internally fixed.

62 patients attended for clinical review and 8 completed postal questionnaires.

At follow up:

Mean AOFAS hindfoot score was  $72.4 \pm 17.5$  (0-100).

Mean MOXFQ scores were:

Walking/Standing  $40.8 \pm 28.4$

Pain  $31.6 \pm 20.8$

Social  $23.1 \pm 23.0$ .

Mean VAS  $2.7 \pm 2.3$ .

Survival of the implant was:

91.7 (CI 83.4-96.0) at 2 years

89.2 (CI 80.2-94.2) at 3 years

84.1 (CI 73.4-90.8) at 4 years

84.1 (CI 73.4-90.8) at 5 years

78.9 (CI 62.6-88.7) at 6 years

**Conclusion:** This study is a complete review and our failure rate is comparable to other publications. Early failures included some poor case selections with large pre-operative deformity and reflects the initial period of the learning curve of TAR. Longer term follow up is needed to evaluate for ongoing failures and monitor progressive radiolucency.



## The Zenith total ankle replacement – early results of the first 50 cases in a non-inventor series

T. Millar<sup>1</sup>, S. Garg<sup>1</sup>

<sup>1</sup>University Hospitals of Morecambe Bay, Lancaster, United Kingdom

**Introduction:** Total ankle replacement (TAR) surgery remains a reasonable alternative to arthrodesis in a select group of patients with end stage ankle joint arthritis. We describe the early results of a prospective study of the first 50 Zenith total ankle replacements performed by a single surgeon (SKG).

**Methods:** Demographic details, Visual Analogue Score (VAS) for pain (0, no pain; 10, worst possible pain), AOFAS scores, 'would have surgery again' and satisfaction levels were collated, pre-operatively and at their most recent outpatient review. Any post-operative complications were noted. Radiographs were also assessed for evidence of loosening, progressive osteolysis, subsidence and overall alignment of the implant.

**Results:** One patient died at 25 months following surgery from unrelated causes. No patients have been lost to follow up. A review of 50 patients (35 males, 15 females; mean age 65 years, range 44-88 years) with a mean follow up of 30 months (range 11-48) included 48 patients with osteoarthritis and two patients with rheumatoid arthritis. There was one medial malleolar fracture at the time of surgery which required fixation and one fracture of the lateral malleolus which was picked up at the six week review. At their latest review the VAS and AOFAS score had improved significantly and 46 patients were satisfied and 4 patients unsatisfied with the outcome of surgery. One patient has cyst formation around the tibial component but is pain free with a stable implant and does not wish further intervention. The components were satisfactorily aligned in the vast majority of patients.

**Conclusion:** This non-inventor series of the Zenith TAR has shown excellent results in the short term. We feel that the instrumentation allows for more reproducible cuts which appear to be technically easier than with some other designs. However, studies looking at long term results will be necessary.

## Outcomes in total ankle replacement – a meta-analysis and systematic review

R. Zaidi<sup>1</sup>, S. Cro<sup>2</sup>, K. Gurusamy<sup>3</sup>, A. Goldberg<sup>1</sup>, A. Macgregor<sup>1</sup>

<sup>1</sup>UCL, Institute of Orthopaedics and Musculoskeletal Science, Stanmore, United Kingdom, <sup>2</sup>MRC, Clinical Trials Unit, London, United Kingdom, <sup>3</sup>UCL, Division of Surgery and Interventional Science, London, United Kingdom

**Introduction:** Surgeons, commissioners and patients are increasingly seeking more in depth details on outcomes of total ankle replacement (TAR). We set out to perform a detailed and up to date meta-analysis of the outcomes of TAR, with a focus on PROMS.

**Methods:** We searched MEDLINE, Cochrane, EMBASE, CINAHL and the Science Citation Index databases using the terms “total”; “ankle”; “arthroplasty” or “replacement” to April 2012. We included all languages; series with greater than 20 TAR; minimum 2 years follow-up. We excluded papers on revisions; prostheses no longer marketed; and kin studies. We worked with the Cochrane Collaboration to adopt their methodology including the creation of a risk profile assessing all forms of bias.

**Results:** Of 1841 papers identified, 51 remained for analysis, with a pool of 6719 patients. The mean patient age was 59.3(17-95) and mean BMI was 28.8(19.4-44). 53% of patients were male. The most common indication was posttraumatic osteoarthritis. The majority of the studies were level IV and more than half the studies had several forms of bias.

Intraoperative complication rate was 9%, with medial malleolar fracture (4.4%) being the most common.

The pooled mean pre-op VAS was 7.6 which improved to 1.5 at 4-5 years. The mean pre-op AOFAS was 39.7, improving to 79.9 for up-to 10 years.

Range-of-motion increased after TAR from **22.8°** preoperatively to **33.6°** postoperatively.

Radiographic abnormalities were found in 22% of cases with a mean follow up of 53 months, of which 7.9% were re-operated upon.

Gait velocity, cadence, stride length and power all improve following TAR.

Survival at 8-10 years was 89.4%, with a cumulative failure rate of 1.9%.

**Conclusion:** This is the most comprehensive meta-analysis carried out on TAR to date. TAR provides patients with an increased range of motion and improvement postoperative PROMS maintained up to 10 years.

## Outcomes of ankle arthroplasty for post-traumatic arthritis following pilon fractures

R. Kakwani<sup>1</sup>, J. Ramaskandhan<sup>2</sup>, M. Siddique<sup>2</sup>

<sup>1</sup>Freeman Hospital, Orthopaedics, Newcastle-upon-Tyne, United Kingdom, <sup>2</sup>Freeman Hospital, Newcastle-upon-Tyne, United Kingdom

**Aim:** A prospective cohort of patients undergoing total ankle arthroplasty for arthritis following pilon fractures was included in the present study. This group of patients generally have poor soft tissue envelope and have had previous surgical interventions prior to the ankle arthroplasty, making the arthroplasty more difficult as well as prone to complications.

**Methods:** The data collected included patient demographics, American Orthopaedic Foot and Ankle Score (AOFAS) and patient reported outcomes (FAOS, SF-36, patient satisfaction) The data was collected preoperatively and at 1 & 2 years postoperatively. The minimum follow-up period was 2 years post-operatively.

**Results:** A total of 167 total ankle arthroplasties were performed by the senior author between Jan 2006 and June 2010. Of this cohort, the indication for 12 arthroplasties was arthritis following pilon fractures of the distal tibia. The average of the patients at the time of the surgery was 64.2yrs. The average number of previous surgeries prior to the ankle arthroplasty was 1.5. There were significant improvements in the AOFAS scores from an average of 18 to 75 at final review. The WOMAC scores improved from 31 to 71 for pain, stiffness improved from 31 to 60 and function improved from 33 to 63. The improvement of the SF36 and patient satisfaction score is similar to the ones for primary ankle osteoarthritis. The complications were: 1 case of superficial wound infection which settled with antibiotics, one fracture of medial malleolus and one case of undisplaced distal tibial fracture treated conservatively to union.

**Conclusion:** The Indications for TAR can be safely broadened to include younger patients with arthritis following pilon fractures of the tibia. The Outcomes after TAR for patients with arthritis following pilon fractures are comparable to those for primary osteoarthritis of the ankle.

## **Ankle distraction for post-traumatic ankle arthritis in young adults – a prospective study with functional outcomes**

*H. Shalaby<sup>1</sup>*

<sup>1</sup>NHS Lothian, Orthopaedic Department, Edinburgh, United Kingdom

**Aim:** Young patients with ankle arthritis that remains symptomatic in spite of conservative treatment and following arthroscopic debridement are usually offered either ankle fusion or ankle replacement. Both these options are far from ideal in this age group. The aim of this study was to evaluate functional outcomes following ankle distraction to determine whether it is a reliable alternative for the treatment of ankle arthritis in young adults.

**Material and methods:** Data was collected prospectively for 15 patients (9 males and 6 females, mean age 31.9 years) with “stage 2” ankle arthritis who failed conservative treatment and continued to be symptomatic following arthroscopic ankle debridement. Distraction of 8 mm was done using a dynamic constrained ankle circular frame and all patients were allowed full weight bearing all through the distraction process. The subjective functional evaluation was based on the American Orthopaedic Foot and Ankle Score (AOFAS), the Foot Disability Index (FADI) and the Visual Analogue Score (VAS). In 10 patients the Manchester Oxford Foot questionnaire (MOXFQ) and the Short Form (SF) 12 patient satisfaction questionnaire were also filled preoperatively and at final follow up.

**Results:** At a minimum follow-up of 24 months (mean 34.4) none of the patients required fusion or replacement. There was a significant improvement in all the functional outcome scores. There was also a significant improvement in the ankle joint space on weight bearing x-rays.

**Conclusion:** Based on these results the use of ankle distraction can be considered a useful option for the treatment of symptomatic “stage 2” ankle arthritis in young adults. Longer-term follow-up and comparison with alternative techniques will be required to evaluate the true effectiveness of this treatment option.

## Obesity in total ankle replacement (TAR): a prospective cohort study

A. Singh<sup>1</sup>, J. Ramaskandhan<sup>1</sup>, M. Siddique<sup>1</sup>

<sup>1</sup>Freeman Hospital, Orthopaedic Surgery, Newcastle upon Tyne, United Kingdom

**Aim:** We aimed to study the effect of BMI on clinical and patient-reported outcomes in patients with TAR with a minimum follow-up of three years.

**Method:** Patients who underwent a TAR between March 2006 and May 2009 were invited to take part in the hospital patient registry. Patients were divided into two groups based on BMI (Group A – BMI < 30 and Group B – BMI > 30). Patient demographics, co-morbidities, clinical (AOFAS), patient reported outcomes (FAOS, SF-36, patient satisfaction) and complications were collected pre-operatively and at 1, 2 and 3 years and comparison made between groups.

**Results:** There were 50 patients in group A and 31 in group B. There was no significant difference between age (Mean 64.5 (A) and Mean 61.3 (B), gender and side of operation between the groups ( $p > 0.05$ ). Group A had higher percentage of patients with OA and RA compared to Group B ( $p = 0.027$ ). Group B (1.16) reported higher co-morbidities than Group A (1.81);  $p = 0.012$ . There was no difference in AOFAS scores, FAOS scores (for pain, function and stiffness) and SF-36 scores reported between groups at 1, 2 and 3 years post-operatively ( $p > 0.05$ ). At 3 years, Group B reported less patient satisfaction with return to ADL 84.6 % (A) vs. 50.1 % (B) and recreational activities 73.1 % (A) vs. 43.8 % (B);  $p < 0.05$ . There was no significant difference in overall satisfaction and pain relief and also in the number of reported complications between Groups A and B ( $p > 0.05$ ).

**Conclusion:** Patients with BMI > 30 reported higher co-morbidities pre-operatively and less patient satisfaction (return to ADL and recreation) at 3 years when compared to patients with BMI < 30. There was no difference in clinical, complications and patient reported outcomes between these groups.

## Management of ankle pain following ankle arthroplasty

R. Kakwani<sup>1</sup>, J. Ramaskandhan<sup>2</sup>, M. Almaiya<sup>2</sup>, M. Siddique<sup>2</sup>

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**Introduction:** Postoperative pain following the 3 component ankle arthroplasty (AA) (Mobility TM) is a recognised problem without any apparent cause. This study aimed to determine pattern of postoperative pain following Total Ankle Arthroplasty (TAA) and its management options.

**Materials and methods:** In prospective observational study 167 patients who had (AA) and minimum follow-up of 24 months were included. FAOS ankle score, patients' satisfaction, SF36 and diagrammatic mapping of postoperative pain among other parameters were collected preoperatively and postoperatively at 3 months, 6 months and the annually. 20 Patients (12%) had moderate to severe postoperative ankle pain following the ankle arthroplasty.

**Results:** Most of patients with mild pain and low AOFAS score during first year improved by the 2 year review. The pain was localised to the medial aspect of the ankle in 10 patients, lateral side in 8 patients, and both medial and lateral side in 1 patient and global in 1 patient with complex regional pain syndrome. 8 patients with medial or lateral pain needed a re-operation. 5 patients with medial pain were treated by complete release of deltoid ligament along with bony decompression of the medial compartment. None of the above implants were loose intra-operatively. 2 AA with lateral pain needed subtalar arthrodesis. 1 patient needed removal of metalwork from the calcaneum for relief of symptoms. A significant improvement of pain and AOFAS scores was observed in 3 out of the 5 patients who underwent medial compartment decompression and both patients who underwent subtalar arthrodesis.

**Conclusion:** There are 10- 13 % of low AOFAS scores following Ankle Arthroplasty due to pain. In our series, the pain did not co-relate to implant loosening. Our treatment protocol of mapping of pain and re-do surgery could improve the long term outcome in a significant proportion of the patients.



## Cyst formation after Mobility total ankle replacement

H. Majeed<sup>1</sup>, D. Sundarmoorthy<sup>1</sup>, S. Dhar<sup>1</sup>

<sup>1</sup>Nottingham University Hospitals, Trauma and Orthopaedics, Nottingham, United Kingdom

**Introduction:** Periprosthetic cyst formation following ankle replacement, requiring revision surgery, has previously been reported. The exact pathogenesis of cyst formation is unclear but considered to be due to a combination of biological and mechanical factors. Our objective was to review the incidence of periprosthetic cyst formation following Mobility ankle replacement and their outcome.

**Patients and methods:** We reviewed all the Mobility ankle replacements performed by the senior author from Oct 2005 till May 2012. Serial radiographs were reviewed to identify the presence of cystic lesions in the tibia or the talus.

**Results:** 124 Mobility ankle replacements were performed in 116 patients during our study period. Average age was 65 years (22 to 88) with male to female ratio of 2:1. Average follow-up was 32 months (7 to 73). Radiographic review of the most recent available radiograph showed cystic changes in the distal tibia in 10 patients (8%). One patient had cystic appearance pre-operatively which was not found to be progressive after replacement. Seven patients were asymptomatic. Three patients presented with ankle pain, which was thought to be due the cyst. One of the symptomatic patients had undergone revision of tibial component and bone grafting of the cyst 32 months after primary surgery. The second patient is awaiting surgery for exploration and possible bone graft (40 months after primary surgery). The 3rd patient is awaiting CT scan for further evaluation of the cyst.

**Conclusion:** Our study shows that cystic changes were present in 8% of TAR at medium term review. 70% (7 patients) were asymptomatic and 30% required intervention for being symptomatic. Regular review of the TAR patients is essential to identify the patients who develop cyst formation.

## Revision of failed Scandinavian total ankle replacement (STAR)

H. Majeed<sup>1</sup>, D. Sundarmoorthy<sup>1</sup>, S. Dhar<sup>1</sup>

<sup>1</sup>Nottingham University Hospitals, Trauma and Orthopaedics, Nottingham, United Kingdom

**Introduction:** With increasing numbers of primary total ankle replacements being performed, the number of revision ankle surgeries is expected to rise also. We present the results of the revision procedures for failed Scandinavian total ankle replacements.

**Patients and methods:** We retrospectively reviewed all the Scandinavian TAR done by the senior author from March 1999 till Jan 2006. Patients who underwent revision surgery were identified and their data was collected including indications for revision surgery, procedure performed, symptoms and the overall outcome.

**Results:** 25 patients underwent revision of Scandinavian TARs between April 2000 and April 2012 out of a total of 213 primary STARs (11%). Average age was 68 years (45 to 82), with male to female ratio of 4:1. The causes of failure of primary implants included broken polyethylene inserts in 12 patients, aseptic loosening in 6 and ankle instability in 7 patients. No septic loosening was found in any of our patients.

Revision procedures which were performed in these patients included exchange of inserts in 13 patients, revision of all components in 2, revision of tibial component in 3, talar component in 2 and ankle arthrodesis with hindfoot nail in 4 and with ilizarov frame in 1 patient. The average time from the primary procedure to revision surgery was 78 months (12 to 156). The average follow up after revision surgery was 26.5 months (2 to 57). Four patients have died. Two patients were symptomatic with mild pain and stiffness while the rest are asymptomatic after their revision surgery.

**Conclusion:** In our study the mechanical failure was found to be the most common cause of failure of Scandinavian TARs. The outcome of revision surgery has been found to be satisfactory and comparable to other series that is reported in the literature.

## Chondrogenic differentiation potential in clonal MSC populations derived from synovial tissue for osteochondral defects

*J. Bhamra<sup>1</sup>, W. Khan<sup>1</sup>, T. Hardingham<sup>1</sup>*

<sup>1</sup>Royal National Orthopaedic Hospital, Stanmore, United Kingdom

**Introduction:** Mesenchymal stem cells (MSCs) are a potential source of cells for the repair of articular cartilage and osteochondral defects (OCD) in the ankle. Synovial tissue has been shown to be a rich source of MSCs with the ability to undergo chondrogenic differentiation. Although these cells represent a heterogeneous population, clonal populations have not been previously studied.

**Methods:** MSCs were isolated from synovial tissue of a patient undergoing joint arthroplasty and expanded in culture. Six clonal populations were also isolated and expanded. The cells from the mixed parent population and the derived clonal populations were characterised for stem cell surface epitopes, and then cultured in chondrogenic mediums. Various assays were determined to analyse for features of differentiation.

**Results:** Cells from the mixed parent population and the derived clonal populations stained strongly for markers of adult mesenchymal stem cells including CD44, CD90 and CD105, and they were negative for the haematopoietic marker CD34 and for the neural and myogenic marker CD56. Interestingly, a variable number of cells were also positive for the pericyte marker 3G5 both in the mixed parent and clonal populations. The clonal populations exhibited a variable chondrogenic response.

**Conclusion:** Pericytes are a candidate stem cell in many tissues and our results show that all six clonal populations derived from the heterogeneous synovium population express the pericyte marker 3G5. The chondrogenic potential of synovial tissue could be optimised by the identification of clonal populations with a propensity to differentiate down particular differentiation pathways. Our study demonstrates a role for MSCs in of osteochondral defects (OCDs) and areas of focal cartilage damage in the ankle joint.

## Ultrasound-guided radiofrequency ablation in the management of interdigital (Morton's) neuroma

G.S. Chuter<sup>1</sup>, Y.P. Chua<sup>2</sup>, D.A. Connell<sup>3</sup>, M.C. Blackney<sup>1</sup>

<sup>1</sup>The Park Clinic, Orthopaedics, Melbourne, Australia, <sup>2</sup>University of Malaya, Dept of Orthopaedic Surgery, Kuala Lumpur, Malaysia, <sup>3</sup>Monash University, Dept of Medicine, Melbourne, Australia

**Introduction:** Up to 70% of patients with symptomatic Morton's neuroma proceed to surgery having failed non-operative management. The success of surgical excision is up to 85% but carries with it significant morbidity. Radiofrequency ablation (RFA) is a less invasive alternative.

**Methods:** We studied a consecutive cohort of patients with Morton's neuroma that had failed non-operative treatment. Instead of undergoing surgical excision, these patients were referred for RFA. Under a local anaesthetic nerve block, RFA was performed under ultrasound-guidance, as an out-patient procedure, by a single radiologist. The procedure was repeated after 4 weeks if necessary. We followed patients for a minimum of 6 months to assess their change in visual analogue pain scores (VAS), overall symptom improvement, complications and progression to surgical excision.

**Results:** 30 feet in 25 patients were studied. There were 4 males and 21 females with an average age of 55 years (range 33-73y). All had tried previous methods of non-operative management. 40% presented with 2nd space neuromas and 60% with 3rd space. The average number of treatment sessions was 1.6 (range 1-3, mode 1). Prior to treatment, all patients had pain on activity (VAS average: 6.0, range 3-9). At 6 months post treatment, there was a statistically significant reduction in pain scores (post RFA VAS average: 1.7, range 0-8,  $p < 0.001$ ). The average overall symptom improvement was 76%. There was one minor complication of temporary nerve irritation. 3 neuromas (10%) have progressed to surgical excision. 1 patient has ongoing, unchanged pain with no obvious cause. At 6 months, 26 out of 30 feet had a satisfactory outcome.

**Conclusion:** RFA has potentially reduced the need for surgical excision of Morton's neuromas by >85%.

## Results of PRP injections in the treatment of recalcitrant plantar fasciitis

*T. Millar<sup>1</sup>, G. Jackson<sup>1</sup>, T. Clough<sup>1</sup>*

<sup>1</sup>Wrightington Hospital, Wigan, United Kingdom

**Introduction:** Whilst most cases of plantar fasciitis can be resolved with existing conservative established treatment options, a few intractable cases can be difficult to resolve. New biologic treatments have been proposed for a variety of soft tissue tendon problems. We evaluated the results of PRP in the treatment of recalcitrant chronic cases of plantar fasciitis.

**Methods:** Patients with plantar fasciitis that had not responded to a minimum of 8 months standard conservative management (eccentric stretching, physiotherapy, cortisone injection, night splints) were offered PRP therapy. The injection into the tender spot at the proximal plantar fascial insertion was performed in theatre as a day case. Roles Maudsley (RM) scores, Visual analogue scores (VAS) for pain, AOFAS scores and would have injection again were collated pre-operatively, at three and six months.

**Results:** Prospective data was collected on 39 patients (44 heels – 15 males, 24 females; mean age 51 years, range 25-79 years). No complications were noted. At six months review RM score improved from 3.8 to 2.5 ( $p < 0.001$ ), VAS improved from 7.7 to 4.2 ( $p < 0.001$ ) and AOFAS improved from 61 to 82 ( $p < 0.001$ ). 21 patients had complete relief of symptoms on 3 months review. 25 patients were very satisfied with the clinical improvement and would have the injection again. Whilst there was a slight improvement in scores from 3 to 6 months, this was not significant. 3 patients with bilateral injections on the same sitting did not improve, though 2 patients with bilateral injections on separate sittings did improve.

**Conclusion:** In this series of chronic intractable cases, PRP injection produced a 64% satisfaction rate from patients. The procedure was safe with no reported complications. The authors feel PRP for plantar fasciitis may have some role in treatment and merits further study with a prospective randomised trial.

## **Extracorporeal shockwave treatment (ESWT) for refractory Achilles tendinopathy: a NICE driven audit**

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**Introduction:** Achilles tendinopathy is chronic degeneration of the Achilles tendon, usually secondary to injury or overuse. It involves a triad of pain, swelling and impaired function. Primary treatment is rest, analgesia, corticosteroid injections and physiotherapy (eccentric training and heel pads to correct gait). Some patients remain symptomatic and further treatment options need considering.

**Methods:** NICE produced a document from the Interventional Procedures Advisory Committee in 2009 which reviewed the literature and evidence for extracorporeal shockwave treatment (ESWT). Low energy shock wave treatment (SWT) is thought to stimulate soft tissue healing, inhibit pain receptors and promote angiogenesis. NICE guidance was that ESWT could be used in refractory Achilles tendinopathy if used for clinical governance, audit or research.

Patients with refractory Achilles tendinopathy were enrolled between October 2010 and 2011. They received three sessions of ESWT over three weeks. Patients completed visual analogue scale (VAS) scores for pain at rest and on activity and the Victorian Institute of Sport Assessment-Achilles (VISA-A) questionnaire pre-treatment. These outcome measures and a six-point Likert satisfaction scale (six points, high is worsening) were reassessed at 6 and 16 weeks post treatment.

**Conclusion:** 51 patients completed follow up. The mean age was 56 (34-80) years and mean length of symptoms 34 (4-252) months. There was a significant improvement ( $p < 0.05$ ) in VAS scores observed from baseline and 16 weeks post treatment. This was also the case in the VISA-A scores. The mean Likert score was 3 (somewhat improved) at 16 weeks but there was no statistical significance.

This study suggests that ESWT improves subjective and objective outcomes in patients with refractory Achilles tendinopathy. Patients over 60 possibly have a worse outcome along with patients who had symptoms for over 25 months. Follow up scores at one year are due to be collected and the data will be submitted to NICE.



## Lesser toe plantar anatomy – considerations for minimally invasive surgery

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**Introduction:** The aim of this study is to better understand the anatomy of the forefoot to minimise surgical complications following minimally invasive forefoot surgery.

**Methods:** The study examines the plantar anatomy of the lesser toes in ten cadaver feet. The tendons, nerves and bony anatomy are recorded.

**Results:** The anatomy of the flexor tendons reveals the short flexor tendon bifurcates to allow the long flexor tendon to pass through it reliably at the level of the metatarsophalangeal joint (MTPJ) in the lesser rays. The division of the intermetatarsal nerves to digital nerves relative to the MTPJ is more variable. This nerve division is more consistently related to the skin of the web between the toes. In the first webspace the division is on average 3cm proximal to the skin at the deepest part of the cleft. In the second, third and fourth webspaces this distance is reduced to 1cm. The level of the deepest part of the webspace to the MTPJ is also variable.

**Discussion:** Surgical release of the flexor tendons is recommended just proximal to the MTPJ for releasing both tendons and distal to the proximal interphalangeal joint for the long flexor tendon. The webspace skin and MTPJ's are easily identifiable landmarks clinically and radiologically. Awareness of the intermetatarsal nerve division will help to reduce nerve injuries with minimally invasive surgery to the plantar forefoot.

## **Our initial experience using minimally invasive chevron and akin osteotomy for Hallux valgus correction: short term results**

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Minimally invasive chevron and akin osteotomy are being used in a few centres in the UK. The purpose of our study was to analyse our early results and present our early experience of minimally invasive chevron and akin osteotomy (MICA) for the correction of mild to moderate hallux valgus. This study assessed the radiological and clinical measurements, American Orthopaedic Foot and Ankle Society (AOFAS) scores, pain scores and patient satisfaction associated with performance of the MICA, for the treatment of hallux valgus.

Between September 2010 and April 2012, 96 consecutive patients (122 feet) who underwent MICA were assessed. The overall satisfaction rate was over 90%. The mean total AOFAS score was 89.7 points. VAS for pain reduced from a mean of 7.4 to less than 1 point. On weightbearing anterior-posterior foot radiographs there was a significant improvement in the mean IMA and HVA. Complications included 2 episodes of superficial infection (1.6%), 1 fracture (0.8%), 4 incidence of nerve injury (3.3%) (numbness) and 9 patients requiring removal of screw (7.4%). However, these screw removals occurred early on in the study and diminished after a slight modification in surgical technique.

Based on our findings we concluded that MICA is an effective procedure with good patient satisfaction in the treatment of mild to moderate hallux valgus.

## Minimally invasive arthrodesis of the first metatarsophalangeal joint

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First metatarsophalangeal joint (MTPJ) arthrodesis plays a significant role in the management of symptomatic hallux rigidus. Several open and very few percutaneous techniques have been described in the literature. The authors present a new minimally invasive technique along with patient reported outcome, radiological parameters and a discussion on this novel technique.

A total of fifteen cases of first MPTJ arthrodesis were included in this prospective continuous series from September 2011 to June 2012. Mean age was 56 years and the indication for surgery was hallux rigidus in 13 of 15 cases. All patients underwent the same minimally invasive procedure by the same primary surgeon (AHS), 13 of 15 as day cases. Clinical outcome and patient satisfaction were assessed by the Manchester-Oxford Foot Questionnaire (MOXFQ) preoperatively and at most recent follow up. Radiographic and clinical evaluation of fusion was also assessed. No patients were lost to follow up and all scores were collected by an independent surgical practitioner to avoid bias. Mean follow up was six months (range 1 to 9 months).

The MOXFQ score for cases where fusion was achieved (n=14) improved from a mean 40/64 preoperatively to a mean 15/64 at last follow up ( $p=0.001$ ). Patient satisfaction was overall very good. This minimally invasive technique for first MTPJ arthrodesis is simple and can achieve results similar or better than open techniques in experienced hands. Further cases are needed to expand this series and evaluate for further complications.

## Patient-reported outcomes (MOxFQ) and satisfaction eight years following Hallux valgus surgery

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**Background:** Evaluation of outcomes and satisfaction following hallux valgus (HV) surgery is usually retrospective and rarely uses patient-reported outcome measures (PROMs).

**Design:** Prospective Cohort Study. Postal evaluation survey of patients who had provided pre-operative PROMs data.

**Methods:** Consecutively recruited patients completed the Manchester-Oxford Foot Questionnaire (MOxFQ) prior to surgery. Of 91 patients (124 feet) proceeding to one-stage HV surgery, 69 of 88 eligible patients (78%; 95/124=77% feet) returned a postal follow-up questionnaire including the MOxFQ and a standard satisfaction rating for surgical outcome around 8 years (range 7.4 to 8.9) later.

**Results:** Of the 69 respondents, patients' mean pre-operative age was 49.8 (SD 12.5) years; 66 (95.7%) were female. Of the 95 feet, 78 (82.1%) patients were 'Very pleased' or 'Fairly pleased' with the outcome, with 17/95 (17.9%) 'Not very pleased/very disappointed'. Change in all 3 MOxFQ scales showed a significant linear relationship with satisfaction ratings (ANOVA  $p < 0.001$ ) with MOXFQ pain change scores for the 'very pleased' response in particular being significantly different from those of other response groups.

**Conclusions:** At around 8 years following HV surgery, the majority of patients were pleased with the outcome. Change in the MOXFQ pain scale is particularly important in interpreting patients' satisfaction with surgery.

## **Outcome of first metatarso-phalangeal total joint replacement (ToeFit): a clinical outcome and survival-ship analysis**

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**Introduction:** Hallux Rigidus affects 2-10% of population, usually treated with cheilectomy or arthrodesis, however, for the subclass of patients who refuse to undergo fusion, Arthroplasty is an alternative solution, it maintain some degree of motion and provide pain relief. Toefit; is one of the prostheses being used. It is a total joint replacement with polyethylene insert.

The aim of this study is to find clinical and radiological outcomes of Toefit arthroplasty.

**Method:** A prospective study. Ethical committee approval was obtained. Patient who have received Toefit Arthroplasty with at least 12 months follow-up and were willing to participate in the study were included. Patients were reviewed by independent surgeon. Questionnaires were completed followed by clinical examination. This followed by radiographic assessment. Patients, who were willing to take part in the study but could not attend a clinical review, were invited to participate in telephone questionnaire. Pre and postoperative AOFAS scores were compared, patients' satisfaction and clinical and radiological outcome were assessed using descriptive statistics, t-test and survivalship analysis were done.

**Results:** 180 patients had Toefit (September 2004- June 2011). 160 patients participated in the study (170 prostheses), 87% were females. Age range (38-89) year. AOFAS improved significantly from 38 to 83, with average arc of movement of 37 degrees. Patient satisfaction was high, VAS score 1. Failure rate of 4.9%, there was high rate of revision of 29% due to sesamoid pain or stiffness in the initial group of patients, decreased to 8% in the second group. Radiological review showed asymptomatic aseptic loosening of 20%, mainly of the proximal phalanx components.

**Conclusion:** First MTP joint replacement can provide pain relief and maintain good range of movement. However, this study highlighted high rate of revision and aseptic loosening. Long term review is required.

## Long term outcome of first MTPJ replacement using ceramic prosthesis with press fit design

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**Introduction:** There are a number of options available for surgical management of hallux rigidus. Ceramic implants of the first metatarsophalangeal joint (MTPJ) have been available for years; however there are no published long-term results existing.

**Methods:** We performed a retrospective review of all consecutive first MTPJ replacements carried out for later stage hallux rigidus using second generation MOJE ceramic implant with press-fit design. Two specialised foot and ankle surgeons performed these operations at a tertiary referral centre. Patient underwent regular follow ups including clinical review, functional scoring (AOFAS and FFI) and assessment of radiographs. Kaplan Meyer Survival analysis was performed.

**Results:** Our study included 31 prostheses in 24 female patients. Average age at operation was 55.3 years and average follow up time was 80 months. No patients were lost until follow up. Complications included one case of superficial infection and five cases of revision, reasons being fracture of the prostheses (1), unexplained pain (1), subluxation (1) and loosening/sinkage of the implant (2). Prosthesis survival rate was 85.2% at seven years. Assessment of the radiographs showed considerable sinkage of the prosthesis in 43%, tilting in 33% and loosening of the implant in 40.9%. Average postoperative AOFAS score was 71.6 and the average FFI was 27.7. 84% of the patients were satisfied with the results of their operation.

**Conclusion:** Surgery has failed to preserve the function and increase the range of movement in most cases in the long duration. From the patients perspective however the satisfaction with the procedure suggests a success of the implant. Due to poor radiological results and high revision rate we do not recommend the routine use of this prosthesis and all patients that have this type of prosthesis need regular follow up consultations at least yearly with radiographs to assess the position of the implant.



## **An assessment of how bone stress across the first metatarsophalangeal joint varies in different foot structures, utilising finite elemental analysis**

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**Introduction:** Osteoarthritis commonly affects the first metatarsophalangeal joint. Stress across this joint has been postulated to increase the incidence of osteoarthritis. Certain foot structures have been associated with a higher incidence of osteoarthritis of the big toe. Utilizing finite elemental analysis, bone stress across the first metatarsophalangeal joint was calculated during mid stance phase of gait and compared in different foot structures.

**Method:** A geometrically accurate three dimensional model of the first metatarsophalangeal joint was created utilising a high resolution 7 tesla MRI and Mimics v14 imaging software. Planus, rectus and cavus feet were simulated by varying the metatarsophalangeal declination angle to 10.1, 20.2 and 30.7 degrees, respectively . A non-manifold computer aided design technique in Mimics v14.2 and finite element method in ANSYS v12 FE were utilised to create the boundary conditions, representing the double support stance phase of gait. Using information from 61 asymptomatic patients with different foot types walking over a Novel emed-x plantar pressure measuring system, plantar loading conditions were applied. Finite elemental analysis was used to predict stress in the first metatarsophalangeal joint in the different foot types.

**Results:** The peak stresses in the distal first metatarsophalangeal joint cartilage were  $1.1 \times 10^6$  Pa,  $6.0 \times 10^5$  Pa and  $9.7 \times 10^5$  Pa for planus ,rectus and cavus foot types, respectively. This corresponds to 83.3 percent and 61.6 percent increases in first metatarsophalangeal joint contact stress for the planus and cavus feet relative to the rectus foot.

**Conclusion:** The results suggest there is a higher contact stress of the first metatarsophalangeal joint in patients with pes planus and pes cavus compared to the rectus foot. This may account for the increase risk of first metatarsophalangeal joint osteoarthritis in patients with pes planus. Further work has been initiated utilising this model to measure first metatarsophalangeal joint stress with different hindfoot loading.

## The hallucal metatarso-sesamoid articulation – a three dimensional quantitative analysis

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**Introduction:** The anatomy of the first metatarsophalangeal (MTP) joint and, in particular, the metatarsosesamoid articulation remains poorly understood. The movements of the sesamoids in relation to the metatarsal plays a key role in the function of the first MTP joint. Although the disorders affecting the sesamoids are described well, the movements of the metatarsosesamoid joints and the pathomechanics of these joints have not been described. We have performed a cadaver study detailing and quantifying the three dimensional movements occurring at these joints.

**Methods:** Fresh frozen cadaveric specimens without evidence of forefoot deformity were dissected to assess the articulating surfaces throughout a normal range of motion. The dissections were digitally reconstructed in positions ranging from 10 degrees of dorsiflexion to 60 degrees of plantarflexion using a MicroScribe, enabling quantitative analyses in a virtual 3D environment.

**Results:** The sesamoids demonstrated excursion both in the sagittal and coronal plane. The tibial sesamoid had a mean sagittal excursion of 14.2 mm; the mean excursion of the fibular sesamoid was 8.7 mm. The mean coronal excursion of the tibial sesamoid was 2.8 mm while that of the fibular sesamoid was 3.2 mm. We also describe the mean sagittal and coronal excursion of the sesamoids during smaller, incremental motions of the MTP joint.

**Conclusion:** There appears to be differential tracking of the hallucal sesamoids. The tibial sesamoid has comparatively increased longitudinal excursion whilst the fibular sesamoid has comparatively greater lateral excursion.

**Clinical relevance:** The greater excursion of the tibial sesamoid could explain the higher incidence of pathology in this bone. The differential excursion of the sesamoids is also a factor that should be considered in the design and mechanics of an effective hallux MTP joint arthroplasty.

## Can modification of the Weil osteotomy reduce the risk of a floating toe deformity – a biomechanical cadaveric analysis

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**Background:** The Weil osteotomy is successful in the management of metatarsalgia and toe deformity. The aim is to achieve controlled shortening whilst avoiding plantarflexion. Recognised complications of the Weil osteotomy include a 'floating toe' in up to 20% or more of cases.

**Aim:** Can modification of the Weil osteotomy avoid the metatarsal head plantarflexion and subsequent dorsal subluxation of the interosseous muscle that is implicated in the development of a 'floating toe'.

**Methodology:** The 2nd, 3rd and 4th rays were dissected out en bloc with all tendons attached from 6 pairs of fresh frozen cadavers. The ray was fixed to a board and the tendons physiologically balanced via low-friction pulleys and light weights. This model is highly sensitive to alterations in moment arm of the tendons. Once the MTP joint was balanced these weights were not altered. After standard release of the dorsal capsule a Maceira or 'triple-cut' osteotomy was performed. This osteotomy was developed in order to permit shortening without plantar flexion of the metatarsal head.

The osteotomy was performed using a image intensifier in order to maintain uniformity of the osteotomy cut. The neck was shortened by removing a 2mm slice of bone made with parallel cuts. The ray was photographed and x-rayed pre and post 'surgery' and the relationships of the interosseous tendon and centre of rotation of the metatarsal head, tendon balance and toe posture were recorded.

**Results:** The Maceira osteotomy can avoid plantarflexion of the metatarsal head. The line of pull of the interosseous tendon can maintain its normal relationship with the centre of rotation of the metatarsal head. None of the toes developed dorsiflexion. In fact, plantarflexion at the MTP joint could be seen. PIP 'fusion' resulted in dorsiflexion at the MTP joint in some toes.

## Lengthening scarf osteotomy for recurrent Hallux valgus

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**Introduction:** Hallux valgus surgical correction has a variable but significant risk of recurrence. Symptoms result from an iatrogenic first brachymetatarsia following the index surgical procedure. First metatarsal shortening has been shown to correlate with the onset of transfer metatarsalgia. We describe the use of the scarf osteotomy to both correct the recurrent deformity and lengthen the shortened first metatarsal.

**Methods:** 36 lengthening scarf osteotomies were undertaken in 31 patients. Clinical (AOFAS and SF12 scores) and radiographic measures (IMA, HVA) were taken pre- and post-operatively. The maximum theoretical lengthening was 10mm, to prevent first MTP joint stiffness post-operatively. The actual lengthening was determined and measured intra-operatively.

**Results:** There were 28 female and three male patients, with mean age at presentation 53.4 years. The mean follow-up was 3.9 years. Four cases were lost to follow-up. The mean first metatarsal lengthening achieved was 4.9mm (range 1 – 8mm). All of the osteotomies united without complication. The mean IMA reduction was 4.0° ( $p < 0.001$ ) and HVA 13.0° ( $p < 0.001$ ). The mean AOFAS score increase was 33.8 ( $p < 0.001$ ). There was no correlation between change in IMA and AOFAS score ( $r = -0.13$ ) or between improvement in HVA and AOFAS score ( $r = -0.02$ ). There was a positive trend but no correlation ( $r = 0.28$ ) between amount of metatarsal lengthening and change in AOFAS score. The inter- and intra-observer correlation was excellent. The SF12 physical sub-domains improved more than the mental sub-domains.

**Conclusion:** We describe the largest series of lengthening scarf osteotomies for recurrent hallux valgus and symptomatic iatrogenic first brachymetatarsia. The significant improvement in both clinical and radiographical measures suggests the procedure is successful, with a low complication rate. Lengthening did not reduce the MTPJ range of movement. We hypothesise that restoring both the length and alignment enables greater weight-bearing under the first metatarsal head, reducing biomechanical transfer metatarsalgia.

## Intraoperative radiography for scarf osteotomies of the first metatarsal

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**Introduction:** When performing scarf osteotomies some surgeons use intraoperative radiography and others do not. Our experience is that when using intraoperative radiography we often change the osteotomy position to improve the correction of the hallux valgus angle and sesamoid position. We report the results of a single surgeon series of 62 consecutive patients who underwent a scarf osteotomy for hallux valgus. The first 31 patients underwent surgery without the use of intraoperative radiographs and the subsequent 31 patients underwent surgery with the use of intraoperative radiographs, this reflects a change in the surgeons practice. Hallux valgus angle, intermetatarsal angle, distal metatarsal articular angle and sesamoid position using the Hardy Clapham grading system were recorded. All patients had measurements recorded from weight bearing radiographs taken pre operatively as well as at 6 and 12 weeks post operatively. Intraoperative measurements were also recorded for all patients in the intraoperative radiography group.

The mean hallux valgus angle preoperatively was 28.5° in the control group and 30.5° in the intraoperative radiography group. The mean hallux valgus angle in the control group at 6 weeks was 12.4° and at 12 weeks was 12.6°. The mean hallux valgus angle in the intraoperative radiography group at 6 weeks was 10.5° and at 12 weeks was 9.8°.

The median sesamoid position pre operatively was 4 for both groups. At 6 and 12 weeks the sesamoid position improved by a median of 1 position in the control group and 2 positions in the intraoperative radiography group ( $p < 0.05$ ).

We recommend that surgeons who do not routinely use intraoperative radiography undertake a trial of this. We have found that the use of intraoperative radiography improves the correction of hallux valgus angle and sesamoid position. These have been shown to increase patient satisfaction and reduce recurrence.

## **The Stainsby procedure for rheumatoid forefoot arthroplasty: 5 year prospective follow up study**

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**Introduction:** Excision of prominent metatarsal heads for severe rheumatoid forefoot deformity is well established in clinical practice but results may deteriorate with time. The Stainsby forefoot arthroplasty however, recognises the pathological anatomy of the deformity and is designed to preserve the metatarsal heads by repositioning the plantar plates and forefoot fat pad underneath them.

**Design:** A prospective case series observing the clinical outcomes and changes in pedobarograph patterns in rheumatoid arthritis patients with severe deformity undergoing Stainsby forefoot arthroplasty.

**Materials and methods:** Twelve patients (21 operated feet) were reviewed at 5 years. AOFAS scores and pedobarographs were recorded pre-operatively and at 5 years post-operatively.

**Results:** AOFAS scores improved significantly from  $21 \pm 15$  pre-operatively to  $61 \pm 12$  at 5 years ( $p < 0.0001$ ) with most of the improvement occurring in the pain score.

Pre-operative pedobarographs showed a concentration of forefoot loading, either under the 1st metatarsal or metatarsals 2 and 3, in 38% of patients. Post-operatively there was a significant reduction of peak loading under the 1st metatarsal and metatarsals 2 and 3 and a more even distribution of loading under the forefoot.

The duration of the forefoot stance phase as a percentage of total stance phase improved from 24% pre-operatively to 31% post-operatively.

**Conclusions:** Patient reported outcomes indicate the Stainsby procedure provides increased function and lasting pain relief. This is further supported by pedobarograph data showing improvement in the pressure distribution and stance times during gait. We therefore recommend this procedure for management of severe rheumatoid forefoot deformity.

## Bone marrow oedema syndrome of foot and ankle

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**Introduction:** Bone Marrow Oedema Syndrome (BMOS) is an unusual and poorly understood condition. It commonly affects the hips and knees and is reported to have a tendency to recur. The foot and ankle are less frequently involved but nevertheless patients can be severely impaired. Only case reports of BMOS of the foot and ankle have been published.

The aim of this study is to evaluate the sites of occurrence, risk factors, efficacy of immobilisation, response to intravenous biphosphonates and local or remote recurrence over the following years.

**Methods:** A retrospective review of 25 adult patients who have been diagnosed with BMOS have been followed-up for an average of 5.8 years (range: 2-11). Six patients have not been traced.

**Results:** There were 6 males and 13 females with an average age at presentation of 45.8 and 58.8 years respectively. No statistically significant risk factors could be identified.

The talus was the commonest affected bone (68% of the cases) followed by the intermediate cuneiform and the adjacent second metatarsal (21%) and the cuboid with the adjacent third and fourth metatarsals (15%).

All 19 patients were treated initially with a pneumatic walker: 5 patients had a resolution of their symptom at an average time of 7 weeks. Of the 14 patients who had not improved by approximately 8 weeks, nine received intravenous zoledronate along with the same pneumatic walker and 5 continued with the pneumatic walker alone. The 9 patients who received a single dose of zoledronate experienced significant improvement within an average of 3.6 weeks. Eight patients out of the 19 continue to have pain.

**Conclusion:** BMOS is often a diagnosis of exclusion. The talus is the most affected bone in the foot and ankle. The majority of patients in this study have improved with a brace and or intravenous zoledronate.



## Simple stress fractures? Are they under-investigated?

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**Introduction:** Stress fractures in the foot are common; the common practice is to look for any factor in the history or for any foot deformity that could cause the fracture. Once found, it is common to treat the fractures without further investigations. The aim of this study is to assess if we are missing any underlying metabolic disorder associated with such injury.

**Materials and methods:** We studied 34 sequential cases referred for chronic foot pain. Stress fractures were confirmed either by classic x-ray's features or MRI. Clinical examination and further tests were performed for Vitamin D levels, Thyroid function, PTH, DEXA scan, Biochemical and bone profile. All stress fractures were treated conservatively.

**Results:** Mean age was 50 (13-72) (22 Females, 9 Males), 29 patients were fit and healthy ASA 1, 5 cases were ASA 2. 12 cases presented with a precipitating event. 14 cases had a minor foot deformity (such as hallux valgus or minor pes planus). mean BMI 27.6. The blood tests newly diagnosed: 17 Vitamin D deficiencies cases, 2 hyperparathyroidism cases, one case of Cushing's Syndrome secondary to adrenal adenoma and one case of delay in puberty in addition to 3 osteoporosis cases. All fractures responded to conservative means of treatment and none needed surgical interventions.

**Discussion:** The study shows that the incidence of endocrinological disorders in patients presenting with stress fractures is much higher than the incidence in the general population; for example the incidence of Cushing's syndrome is 1 per 130000 individuals while in our series was 1 per 34. This study raises the question if all patients presenting with stress fractures should be investigated for endocrinological disorders.

## Do nerve conduction studies help with the diagnosis and management of patients who present with non specific foot pain?

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**Introduction:** Patients who present with atypical foot pain in a non specific sensory distribution may benefit from having nerve conduction studies (NCS). The aim of this study was to confirm whether NCS is a useful tool.

**Methods:** Between July 2005 and March 2011, 78 patients had NCS to investigate foot pain. The management following NCS was compared with the initial management plan.

**Results:** Complete data was available for 60 patients, of whom 31 were male. The mean age at presentation was 54.4 years (range 18 – 89.7). Eighteen patients had bilateral symptoms. The predominant symptom was pain in 47 patients. Aching, burning, throbbing, shooting, pins and needles, proximal/distal radiation, numbness, and paraesthesia were also described in 23 patients. Twenty patients had a history of trauma and five developed symptoms following elective lower limb surgery. Eight patients had a cavovarus foot.

There were 22 normal results. The NCS diagnosed peripheral nerve (13) / nerve root (8) pathology, Charcot-Marie-Tooth (1), amyotrophic lateral sclerosis (1), tarsal tunnel syndrome (3), and nonspecific neuropathy (12).

Surgery was initially considered for 9 patients. Following a normal result, 4 out of 7 had surgery. One patient with an abnormal result proceeded to surgery. The NCS was abnormal in 70.1% (36/51) of patients who were for nonoperative management, 4 of whom proceeded to have surgery. None of the patients who had a normal NCS had an operation.

**Conclusion:** NCS provided a diagnosis for 63.3% of the patients. Following NCS, the management plan changed in 44% of patients who were initially considered for surgery (4/9) and in 7.8% of patients who were initially considered for nonoperative management (4/51). This investigation is a useful adjunct in guiding the management of patients who present with atypical non specific foot pain.

## **The home therapy ankle pathway – a novel and cost effective method of initial management of ankle fractures**

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**Introduction:** Operative fixation of ankle fractures is often deferred due to swelling to avoid the risk of wound problems. The routine practice is to admit the patient and operate once the swelling has subsided. We introduced a new pathway to manage these ankle fractures at home preoperatively to improve service efficiency. We studied the impact of home therapy on length of inpatient stay and associated problems.

**Methods:** A control group was studied from December 2009 to March 2010, where patients were treated normally. The home therapy ankle pathway was then introduced in August 2010. Patients presenting with excess ankle swelling were placed in a back slab following reduction of ankle to a satisfactory position. The patients were provided limb care advice, thromboprophylaxis, an emergency contact number and discharged home on crutches with a predetermined operative slot, usually 6 days following injury. Patients were also contacted by a member of staff to ensure they were coping with the injured limb at home. Patients who are unsafe to be discharged on home therapy were admitted. This cohort of patients was studied between August 2010 and December 2011.

**Results:** In the control group, 49 ankle fractures required operative intervention. The mean pre-operative length of stay and post op length of stay were 5 days and 2.88 days respectively. Between August 2010 and December 2011, following implementation of the pathway, 195 ankle fractures required operative treatment. Of these, 107 patients were eligible for home therapy. The average pre-op length of stay was 0.17 days. Home therapy was carried out for an average of 6.63 days. There were no soft tissue or home therapy complications. The average post op length of stay was 1.72 days ( $P < 0.001$ ).

**Conclusion:** The home therapy ankle pathway is a safe and cost-effective method of initial management of ankle fractures.

## Fifth metatarsal fractures – is routine follow-up necessary?

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**Introduction:** Fifth metatarsal fracture is a common injury. Current practice supports conservative management, with surgery in the event of non-union. Early fracture clinic review is not perceived to improve patient experience or increased detection of non-union. A new protocol standardises treatment to symptom level and discharges patients from ED with advice but without any routine follow-up arranged. A leaflet advises on management, prognosis and helpline details and there is an open-access policy for those whose symptoms persist to investigate potential non-union.

**Method:** A prospective audit evaluated the protocol, surveying patients at 8-weeks and 6-months post-injury. A minor injuries unit continued to refer to fracture clinic and was the control group. During 6-months 46 acute fractures were recorded in the new protocol (group 1) and 47 in the control (group 2). 1 patient in each group was known to experience non-union. 31 of group 1 and 22 of group 2 responded to at least one survey.

**Results:** Satisfaction with information provided at initial presentation was high for both protocols. 87%(27/31) satisfied in group 1 and 90%(20/22) group 2 ( $p = 1.0000$ ). At 8-weeks 82%(19/23) were satisfied with their progress following the new protocol compared to 89%(17/19) in the control ( $p=0.6729$ ). At 6-months 88%(22/25) were satisfied compared to 76%(13/17) respectively ( $p=0.4133$ ). The new protocol is not associated with a significant symptoms increase. At 8 weeks 22%(5/23) described their pain severity as  $>5/10$  reducing to 8%(2/25) by 6-months. Compared to 10%(2/19) of the control at 8-weeks and 6%(1/17) at 6-months. Patients rating fracture management overall as 'good or excellent' were comparable between both new, 67%(21/31) and traditional, 77%(17/22) protocols ( $p=0.5441$ ).

**Conclusion:** No significant difference in patient satisfaction and symptom levels between the old and new protocol was found. The new protocol reduces unnecessary patient appointments. This reduces demands on fracture clinic while maintaining a safe, resource efficient service.

## **The restoration of anatomy following ankle fractures. Does grade of surgeon influence radiographic outcome?**

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**Introduction:** Post-traumatic arthritis is the commonest cause of arthritis of the ankle. Development of arthritis is dependent on the restoration of pre-injury anatomy. To assess the effect of grade of lead surgeon on the accuracy of surgical reduction, we performed a retrospective radiographic analysis of all ankle fractures undergoing open reduction and internal fixation, in a single institution.

**Method:** All patients treated by surgical intervention in an 11 month period (January to November 2011) were included, with the grade of lead surgeon performing the operation recorded. 105 patients, 48 males and 53 females, were included with a mean age of 41 years (range: 17 – 89 ). Standard antero-posterior (AP) and mortise views were analysed for tibiofibular overlap, ankle clear space and talocrural angle and compared to standardised values from the literature. Lead surgeon grade was stratified as either, trauma consultant, senior registrar (years 4+) or junior registrar (years 1 -3).

**Results:** Radiographic reduction within accepted margins was achieved in 78% of ankles on the AP radiograph and 81% on the mortise view. Trauma consultants achieved the highest rate of anatomical reduction, followed by senior registrars, with junior registrars achieving the lowest rate; the rates of anatomical reduction on the mortise view were 83.3%, 79.2% and 75%, respectively. However, senior registrars performed the majority of cases (70%).

**Conclusion:** Radiographic reduction in this institute is comparable to that in the literature. The majority of cases are performed by senior trainees who are able to restore to anatomical reduction radiographically. Junior registrars achieved the lowest rate of anatomical reduction, which may reflect their level of experience and a greater need for supervision in the early years of specialty training.

## The IED blast foot: outcomes from foot and ankle blast injuries

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**Background:** The conflict in Afghanistan has been epitomised by the emergence of the Improvised Explosive Device (IEDs). Improvements in protection and medical treatments have resulted in increasing numbers of casualties surviving with complex lower extremity injuries. To date, there has been no analysis of foot and ankle blast injuries as a result of IEDs. Therefore the aims of this study are to report the pattern of injury and determine which factors were associated with a poor clinical outcome.

**Methods:** Using a prospective trauma registry, UK Service Personnel who sustained lower leg injuries following an under-vehicle explosion between Jan 2006 and Dec 2008 were identified. Patient demographics, injury severity, the nature of lower limb injury and clinical management was recorded. Clinical endpoints were determined by  
(i) need for amputation and  
(ii) need for ongoing clinical output at mean 33.0 months follow-up.

**Results:** 63 UK Service Personnel (89 injured limbs) were identified with lower leg injuries from explosion. 50% of casualties sustained multi-segmental injuries to the foot and ankle complex. 26(29%) limbs required amputation, with six amputated for chronic pain 18 months following injury. Regression analysis revealed that hindfoot injuries, open fractures and vascular injuries were independent predictors of amputation. Of the 69 limbs initially salvaged, the overall infection rate was 42%, osteomyelitis 11.6% and non-union rates was 21.7%. Symptomatic traumatic osteoarthritis was noted in 33.3% salvaged limbs. At final follow-up, 66(74%) of injured limbs had persisting symptoms related to their injury, with only 9(14%) fit to return to their pre-injury duties.

**Conclusions:** This study demonstrates that foot and ankle injuries from IEDs are frequently associated with a high amputation rate and poor clinical outcome. Although, not life-threatening, they remain a source of long-term morbidity in an active population. Primary prevention of these injuries remain key in reducing the injury burden.

## **Clinical, radiological and functional outcomes after gradual correction of stiff equino-cavo-varus deformity with the V-osteotomy and the Ilizarov technique**

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**Introduction:** Longstanding complex multiplanar foot deformities represent a significant challenge. The traditional surgical techniques involve excessive dissection and excision of large bony wedges or modifications of the triple fusion to correct the deformity. The majority of the reports in the literature present collective data on different deformity patterns and also mix paediatric and adult patients, even with multiple correction techniques. The aim of this study was to evaluate the clinical, radiological and functional outcomes of the gradual correction of a single common deformity pattern of equino-cavo-varus using a single correction technique of the V-osteotomy and the Ilizarov frame.

**Material and methods:** We present prospectively collected data on 40 feet in 35 adult patients with stiff longstanding equino-cavo-varus deformity. All patients had a V-osteotomy and gradual correction using an Ilizarov frame, with a mean follow-up of 20 months. We collected the American Orthopaedic Foot and Ankle Society score (AOFAS), the Foot and Ankle Disability Index (FADI) and a Visual Analogue Pain score (VAS) for all patients preoperatively and between 1 and 2 years following frame removal.

**Results:** In 33 patients (38 feet) a stable plantigrade foot was achieved with significant improvement in the gait and the foot alignment. The mean equinus, heel varus and metatarsus adductus improved significantly as measured on x-rays. The mean AOFAS score improved from 38.2 to 73.2, the mean FADI improved from 51.1 to 70.6 and the mean VAS improved from 4.5 to 0.5. Pin-site infection was encountered in 7 feet, premature consolidation in 2 feet and undercorrection in 4 feet. In 2 patients the correction had to be stopped.

**Conclusion:** The results of this report on a single deformity pattern of equino-cavo-varus support the use of this technique for the management of these challenging cases, as a safe, versatile and powerful tool with predictable outcome.

## **Surgical outcomes of Lisfranc fixation – a single surgeon series**

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**Background:** Lisfranc / midfoot injuries are complex injuries with a reported incidence of 1 in 55000 in literature and frequently overlooked. But, recently they are becoming more commonly diagnosed with advent of CT scan and examination under anaesthetics (EUA) for suspicion fractures. Here we present a case series results of a single surgeons experience over the last 6 years.

**Methods:** Retrospective review of 68 patients treated by a single surgeon over the last 6 years. Injuries were diagnosed on plain Xrays, clinic examination. Any suspicious injury were further assessed by a CT scan, all injuries were confirmed by EUA and treated with open reduction and internal fixation within 4 weeks of injury. Post-operative immobilisation in full cast for 6 weeks then a removal boot with non-weight bearing for a total of 3months. They were followed up regularly initially at 3, 6 and 12months. At final review the following data was collected: clinical examination, plain x-ray looking for : late deformity, signs of OA in Lisfranc joint, Auto fusion rate, rate of metal work failure. The x-rays findings were correlated with: (1) type of fixation. (2) The following scores: FAOS, AOFAS-M, specially designed new foot and ankle score.

**Results:** 43 males: 25 females. 37 right: 31 left sided injuries. 90% were fully weight bearing with minimal discomfort after 6months. In 12 months all of them returned to their normal daily life activities. Wound complications: 2 of them had initial wound complications which were treated successfully with 2 weeks of oral antibiotics, 2 had lateral scar tenderness. One had loosened metal work, revised to fusion.

**Conclusion:** Early operative intervention with good anatomical reduction can minimise the potential chronic disability associated with these injuries. This is a largest series of Lis-franc injuries of a single surgeon with good clinical outcome following surgical fixation.



## **Management of middle facet tarsal coalitions with concomitant severe flat foot. Would resection alone suffice?**

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**Introduction:** Historically, surgeons have focused on isolated simple coalition resection in symptomatic tarsal coalition with concomitant rigid flat foot. However, a review of literature suggests that coalitions with severe preoperative planovalgus malposition treated with resection alone are associated with continued disability and deformity. We believe that concomittant severe flatfoot should be considered as much as a pathological component and pain generator as the coalition itself. Our primary hypothesis is that simple resection of middle facet tarsal coalitions and simultaneous flat foot reconstruction can improve clinical outcomes.

**Methods:** Thirteen consecutively treated patients (eighteen feet) were retrospectively reviewed from the senior author's practice. Clinical examination, American Orthopaedic foot and Ankle Society (AOFAS) hindfoot scores, and radiographic assessments were evaluated after resection of middle facet tarsal coalitions with simultaneous flat foot reconstruction.

**Results:** All patients with resection and simultaneous flat foot reconstruction (calcaneal lengthening, medial cuneiform osteotomy) were satisfied and would have the same procedure again. Most patients were able to return to a higher level of sporting activity compared with preoperative ability. None of the patients had a fair or poor outcome as adjudged by their AOFAS scores.

**Conclusion:** Our study shows that concomittant flatfoot reconstruction in patients with symptomatic middle facet tarsal coalition increased hindfoot motion, corrected malalignment and significantly improved pain. We believe that coalition resection and concomitant flatfoot reconstruction is better option than surgical resection alone or hindfoot fusion in this cohort of patients. Triple arthrodesis should be reserved as a salvage procedure.

## **Arthroscopic fixation of displaced calcaneal fractures – percutaneous arthroscopic calcaneal osteosynthesis**

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**Introduction:** We present a consecutive series of 19 patients with 22 intra-articular calcaneal fractures treated by percutaneous arthroscopic fixation (percutaneous arthroscopic calcaneal osteosynthesis “PACO”). Traditional open reduction and fixation regularly has significant wound complications. PACO has the advantage of direct visualization of the joint surface reduction with the benefit of minimal soft tissue trauma and wound complications.

**Methods:** Between July 2010 & April 2012, 39 isolated closed intra-articular calcaneal fractures were admitted to St Mary’s Hospital. All Sanders type 2 and type 3 fractures were included. Undisplaced fractures (13) were treated non-operatively and comminuted type 4 fractures (4) were treated with primary arthroscopic fusion. Surgery was performed on the next list with no delay for swelling. All patients had pre and post op CT scans. Patients were discharged in a temporary cast with routine follow up at 2, 6 and 12 weeks.

**Technique:** Arthroscopy was performed in the lateral position with a 4.0mm arthroscope, using two sinus tarsi portals and a posterolateral portal. The fracture fragments were reduced percutaneously, held with wires before definitive fixation.

**Results:** There were 10 three-part fractures (Sanders 3AB) and 12 two part (Sanders 2A/2B). Bohler’s angle improved from 9.9 (7 – 18) to 27.7 (23 – 32)  $P < 0.001$ . The mean time to surgery was 4 days (1-7), mean post-op stay was 1.9 days. Mean articular step of 0.9mm (0.4-1.9mm) on post-op CT. There were no deep wound infections.

**Conclusions:** PACO is an accurate and reliable technique for fixation of calcaneal fractures, with a low complication rate, and minimal pre and post-operative delay.

## **An anatomical and cadaveric study examining the risk of sural nerve injury in percutaneous Achilles tendon repair using the Achillon device**

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**Introduction:** Minimally invasive Achilles tendon repair has recently gained popularity amongst foot and ankle surgeons. This study aims to quantify the risk of sural nerve injury when using the Achillon device (Integra), as well as delineate its anatomical relationship to the Achilles tendon.

**Methods:** In 15 cadaveric specimens, the Achilles tendon was transected through a 2cm transverse incision made 4cm proximal to the palpable Achilles tendon insertion point. The Achillon device was inserted beneath the paratenon both proximally and distally and six needle passers mounted with sutures were introduced percutaneously into the tendon (x3 proximal and x3 distal). We dissected around the Achillon jig to determine whether the needle and suture had punctured the sural nerve. We also documented the position of the sural nerve in relation to the Achilles tendon.

**Results:** The mean horizontal distance from the Achilles tendon insertion to the sural nerve was 22.5mm (15.9mm – 30.2mm). The mean vertical distance from the Achilles tendon insertion to the point where the sural nerve crosses the lateral border of the tendon was 96.1mm (77.4mm – 134.9mm).

In 4 out of 15 cadaveric specimens (27%) the sural nerve was punctured. In total, the sural nerve was punctured 6 times (twice in 2 specimens) in 90 needle passes (6.7%).

Five out of the 6 punctures occurred when the Achillon device was inserted into the distal tendon portion with the most proximal hole being responsible for 3 of the punctures.

**Conclusions:** The sural nerve displays a highly variable anatomical course and our findings highlight a significant risk of puncture during percutaneous Achilles tendon repair using the Achillon device. More studies are needed to clarify whether this risk equates to a significant clinical problem and whether a change in technique or instrumentation can decrease this risk.

## **The role of venous stasis and endothelial damage in VTE in trauma patients treated with a cast- where does the clot occur?**

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**Background:** Despite the suggestion by Virchow in 1856 that thrombosis was the result of venous stasis, endothelial dysfunction and hypercoagulability there are some fundamental questions which remain to be answered. The published studies fail to provide specific details such as cast type and anatomical location of the thrombosis, but instead focus on the incidence of VTE and which chemical thromboprophylaxis is most effective. Previous studies of VTE in trauma patients have involved small numbers of patients and have not look at the risk medium to long term risk. Most importantly they have not looked at the site of the VTE. This makes interpretation of the link between cast and VTE even more complex.

**Methodology:** We analysed 1479 consecutive trauma cast applications and the incidence of symptomatic VTE in the six months following the injury. The diagnosis, cast type and site of the VTE was recorded.

**Results:** The overall incidence of DVT was 2.5% (2.2% distal and 0.3% proximal), 50% occurred in the first 3 weeks, the rest were between 6-13 weeks. The incidence of PE was 0.7%, there was 1 death due to PE.

Achilles tendon injury was a statistically significant risk factor, there were no other conditions with a specific risk. There was no difference between above and below knee cast immobilisation. However all symptomatic DVTs occurred in the casted leg.

**Discussion:** This is the first study to look at long term VTE risk and the site of thrombosis, these findings have implications for VTE prophylaxis. It would appear that the risk of developing symptomatic VTE extends beyond the currently advised treatment period. It also suggests that venous stasis and endothelial damage are more important than hypercoagulability in the development of VTE after cast treatment for trauma. We recommend a programme of exercises within the cast to reduce this risk.

## **Venous thromboembolism in ankle ORIF – the case against pharmacological prophylaxis, a 5 year retrospective review**

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**Introduction:** Venous thromboembolism (VTE) represents a major cause of morbidity, mortality and financial burden to the NHS. Acquired risk factors are well documented, including immobilisation, lower limb plaster cast and surgery. NICE guidance on VTE prophylaxis within orthopaedics currently excludes operative ankle fracture fixation (ankle ORIF).

**Aims:** Ascertain the local incidence of VTE; compare our local VTE rates with published data from other institutions; review guidelines, scientific literature and other hospitals policies; formulate a local policy for VTE prophylaxis.

**Method:** Retrospective analysis of records of all patients undergoing ankle ORIF in our hospital over a continuous 5 year period, identifying cases of VTE, individual risk factors and surgical duration.

**Results:** 380 patients underwent ankle ORIF; 3 developed VTE; no mortality. VTE incidence 0.79% (0.26%DVT; 0.53%PE). Operative duration 88+/-34mins (mean+/- I.S.D); in those with VTE, duration was 35, 90&85min. There is no statistically significant difference ( $p=0.18$ ) observed between our local and national VTE incidence rates. Operative duration was not a significant factor in those developing VTE. Additional risk factors were identified in one patient with VTE.

**Discussion:** The incidence of heparin induced thrombocytopenia is 0.5%, its associated mortality 10% (i.e. 1:2000). To prevent one fatal PE in foot & ankle surgery, 10,000 must receive VTE prophylaxis. Therefore, heparin associated mortality exceeds VTE associated mortality in foot & ankle surgery.

**Conclusion:** Our local VTE rates are comparable to national rates. Risk of pharmacological prophylaxis exceeds benefit; therefore routine use not justified. Individual risk should be assessed; higher risk patients may benefit.

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Ms Liz Austen (ASICS)

**Morning session topics to include:**

- The use of injections & cold therapy
- Physiotherapy treatment for Achilles pathology
- A sports physician's approach to metatarsal fractures and Lisfranc sprains
  - Physiotherapy for ankle ligament and syndesmotic sprains
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## **2012 Annual Scientific Meeting**

### **Winning Abstracts for Podium Presentation**

## ABSTRACT I

### **Long term (10-15 year) results of silastic hinge arthroplasty for Hallux rigidus in patients under 65 years of age**

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**Aim:** A consecutive series of patients aged under 65 yrs, undergoing silastic hinge arthroplasty for first metatarso-phalangeal joint arthritis by the senior author from 1997-2002 were included in the present study.

**Methods:** The data collected retrospectively included patient demographics, foot and ankle disability index and patient reported outcomes (patient satisfaction). The minimum follow-up period was 10 years post-operatively.

**Results:** 55 patients underwent the silastic hinge arthroplasty from 1997-2002. The average age of the patients was 54 years, range (41-65). There are 11 males and 44 females. 3 females and 1 male has bilateral first mtp joint replacements.

The mean Foot & ankle disability index at the time of the final review was 81.7. The improvement in the scores was statistically significant: paired t-test,  $p < 0.005$ .

None of the patients had revision surgery. 3 patients had metatarsalgia treated conservatively with insoles

**Conclusion:** The long term (10 – 15 years) review in our series was comparable to published results using other implants and arthrodesis of the first metatarso-phalangeal joint.



## ABSTRACT 2

### Replacement of the first metatarsophalangeal joint using a metallic hemi-arthroplasty

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**Introduction:** There is a paucity of published studies reporting on the long-term outcomes following a first metatarsophalangeal joint (MTPJ) hemi-arthroplasty. The purpose of this study was to evaluate the functional outcomes following this procedure to determine whether it is a reliable option for the treatment of hallux rigidus in selected patients.

**Methods:** Between 2008 and 2011 we implanted metallic first MTPJ hemiarthroplasties using the BioPro implant (BioPro, Inc., Port Huron, MI) in 72 patients. The cohort included 19 men and 53 women with a mean age of 55.4 years (range 35 to 74 years). The subjective functional evaluation was based on the Manchester Oxford Foot questionnaire (MOXFQ) and the Short Form (SF) 12 patient satisfaction questionnaire.

**Results:** At a minimum follow-up of 1 year (mean 1.7 years, range 1.1 to 3.5 years) 68 patients were available for follow up. One patient required a revision hemiarthroplasty and 2 patients were converted to an arthrodesis for ongoing pain. Complications included superficial wound infection in 7 patients which was treated successfully with antibiotics and one patient required an excision arthroplasty for chronic infection. There was a significant improvement in the MOXFQ score ( $p < 0.001$ ) and both the physical and mental components of the SF12 scores ( $p < 0.001$ ).

**Discussion:** Based on these results the use of a metallic hemiarthroplasty can be considered a useful option for the treatment of hallux rigidus. Longer term follow-up and comparison with alternative techniques will be required to evaluate the true effectiveness of this surgical option.

## ABSTRACT 3

### 1st hemiartroplasty for Hallux rigidus. Just another way to fuse the joint?

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**Introduction:** Hallux rigidus is a condition resulting from degenerative change at the first metatarsophalangeal joint (MTPJ). Some studies have shown good results in treatment with hemiarthroplasties however arthrodesis remains the gold standard of treatment yielding the best patient satisfaction. This study is aimed to assess the clinical outcome and patient satisfaction specifically for the HemiCap® hemiarthroplasty at a mean follow up of 5 years.

**Methods/results:** Retrospective study of 11 patients (12 feet) with Grade 2 Hallux Rigidus. All patients underwent a first MTPJ hemiarthroplasties using the HemiCap® prosthesis. Patient satisfaction was assessed with the AFOAS and FADI scoring system and the patients were clinically and radiologically examined by a clinician at their last follow up appointment. Mean time of follow up 5 years (range 4-5). Mean AFOAS score 66.5 (range 22-92). Mean FADI score 46.9 (range 26.9-98.1). Mean subsidence 2.71 (range 1-4). All patients had severe restriction of movement of the 1st MTPJ.

**Discussion:** Previous studies showed variable results with most studies reporting good patient satisfaction following 1st MTPJ hemiarthroplasty at short term follow up. To our knowledge this is the first study with a mean follow up of 5 years. Although patient satisfaction was reasonable, 1st MTPJ movement was severely restricted. None of the patients had more movement than 5 degrees in the sagittal plane and we therefore question whether the 1st MTPJ hemiartroplasty is just another way to fuse the joint?

## ABSTRACT 4

### A prospective audit of surgical coding and HRG payments for Hallux valgus surgery

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**Introduction:** Hallux Valgus is a deformity of the foot in which the great toe deviates towards the lesser toes. It is more common in females and causatively linked with footwear. It is one of the commonest presentations to the foot and ankle surgeons. Pain arising from the prominent medial eminence warrants surgery, which includes a variety of osteotomies and soft tissue procedures. Multiple operative procedures required to carry out hallux valgus correction can generate problems for clinical coders potentially affecting the overall income to the hospital. An audit was conducted to investigate whether the same sequence of codes were uniformly awarded to hallux valgus operations of similar nature.

**Methodology:** Twenty consecutive and similar cases were included in this study where patients had undergone a soft tissue release, SCARF and AKIN osteotomy. The clinical coding and finance teams were contacted to obtain the HRG codes provided and tariff.

**Results:** A series of 20 consecutive patients who were matched for type of surgery, anesthesia, post operative management and length of inpatient stay were included in this study. No immediate per operative or post operative complications were noted. This completely matched series was broken down into minor, intermediate and major foot surgery cases by the coding department. Based on this the tariff ranged from GBP 822 to 5409 with an average of 1760.

**Conclusion:** The results of the study were fed back to the clinical coding and local finance departments for explanation. The variation in coding between similar procedures was the result of nationally agreed sequencing rules for procedure clusters. Although nationally agreed conventions for coding hallux valgus surgery are designed to lower the financial award for this operation, regular dialogue with the coding department and regular audits of the codes awarded are necessary to ensure appropriate payment award for this surgery.

## ABSTRACT 5

### **A comparative study of metatarsal shortening and bone loss with use of a burr versus saw blades in corrective surgery for Hallux valgus**

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**Introduction:** The aim of this study was to assess the thickness of the cut made and bone loss whilst using a burr for percutaneous hallux valgus correction by comparison with that of more traditional saw cuts in open procedures.

**Methods:** Twelve blocks of 'Sawbones' were used. Cuts of same depth were made in each block with two different saw blades and one burr. Each block was assessed for bone loss and thickness of the cut, and hence the potential for metatarsal shortening.

**Results:** There was statistically significant ( $p < 0.05$ ) increased bone loss and thickness of the cuts with use of the burr as compared to use of two different saw blades. The use of a burr resulted in 3-fold increase of loss of bone material and 4-fold increased thickness of the cut as compared to use of two different saw blades.

**Conclusion:** While the benefits of minimal access are widely acknowledged elsewhere, metatarsal shortening, and hence metatarsalgia, is a risk factor in percutaneous hallux valgus surgery with use of a burr osteotomy.

## ABSTRACT 6

### Outcomes following scarf osteotomy for Hallux valgus correction

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**Introduction:** Hallux valgus is a common condition often leading to significant symptoms, however its correction has recently been suggested by some to be a procedure of limited clinical value. There is belief that it may lead to pathology and symptoms elsewhere in the foot. Scarf osteotomy is one of the most commonly performed operations for hallux valgus correction. Although technically demanding, it is powerful in its capacity to correct the hallux valgus deformity and sufficiently robust with internal fixation to allow early weight bearing.

**Methods:** We prospectively collected data for consecutive scarf osteotomies performed by four fellowship trained foot and ankle consultant surgeons, one foot and ankle fellow and specialist registrars between 2008 and 2011.

Pre operative and 6 week post operative assessment was made using radiographic measurements (HVA (hallux valgus angle) and IMA (inter metatarsal angle)). The modified AOFAS (American Foot and Ankle Society) hallux clinical scores were collected pre operatively and at most recent follow up (average 18 weeks post operation).

**Results:** We evaluated 130 scarf osteotomies, 117 female, 13 male (mean age 53). 60 Left, 70 Right sided.

The mean HVA improved from 29.5 pre-operatively to 12.6 post correction (16.9 degree reduction). The mean IMA improved from 12.4 pre-operatively to 8.1 post correction, (4.3 degree reduction mean average).

The AOFAS hallux scores improved from an average of 55 pre op to 79 post operation.

**Conclusion:** The results suggest that hallux valgus correction does have clinical value and that scarf osteotomy is a reproducible procedure, with a generally good to excellent results in the short term. We believe that if newer minimally invasive techniques are to be used to correct similar deformities the results should be compared to those using this technique as the gold standard.

## ABSTRACT 7

### Long term outcomes of open plantar fascial release

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**Introduction:** Plantar fasciitis is thought to be a self limiting condition best treated by conservative measures, but despite this many patients have a prolonged duration of symptoms and surgery may be indicated. Partial plantar fascial release is reported to have a short term success rate of up 80%, but anecdotally this was not thought to represent local experience.

**Methods:** An audit of long term patient reported outcomes following surgery was performed. A total of 26 patients (29 feet) were identified retrospectively and case notes were reviewed. Patients were asked to complete two validated patient reported outcome score questionnaires (foot and ankle visual analogue scale (VAS) and MOXFQ).

**Results:** Mean time from operation to questionnaire feedback was 65 months (range 14-128). The average age was 42.4(range 28-61) for males and 46.2 (range 33-60) for female patients, with a female:male ratio of 2.7:1. The average duration of conservative treatment prior to surgical intervention was 3.1 years (range 1-5). The average MOXFQ score was 52.5 (range 0-100), while the average VAS score was 57.9 (range 24.2-100). Only 4 (15.4%) patients achieved an excellent result, 7 (26.9 %) a satisfactory result and 15 (57.7 %) a poor result. The best outcomes were achieved in excess of 80 months post operatively, which questions whether the operation alters the natural history of the disease.

**Conclusion:** We conclude that the results from open partial plantar fascial release are poor and it is a technique of dubious clinical value.

## ABSTRACT 8

### The economic outcomes of cryotherapy on isolated acute ankle fracture's

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**Introduction:** Ankle fractures regularly require operative fixation. Fixation is often delayed due to soft tissue swelling. We introduced continuous cryotherapy combined with an Aircast Boot ® to attempt to reduce preop delay due to swelling, benefiting patients and generate savings.

**Methods:** A retrospective audit was undertaken to establish current practice in a large hospital. The audit loop was completed with a change of practice that was introduced from the orthopaedic department in tandem with the emergency department. An algorithm of accepted fractures patterns was implemented along with additional training in the application of the cryocuff cryotherapy and Aircast boot® in the emergency department. A prospective audit was implemented with the primary aim of time to theatre and secondary aims of loss of position or associated complications.

**Results:** During the initial audit an average pre-op delay 3.3 days (range 0-14, median 2) was noted. For the prospective audit 25 cases were recorded. 6 patients were subsequently placed into a moulded back slab. In each case the boot was applied correctly but the reduction was inadequate, a repeat attempt should have been undertaken. 19 patients had an average 1.6 days pre-operatively (range 0-5, median 1). An unpaired t test demonstrated the reduction of 1.7 days was statistically significant (p 0.01).

**Conclusions:** The cost of a trauma bed is estimated at £225 per day. The difference in pre-operative hospital stay between the 2 groups was 1.7 days. When this is offset against the extra cost of £60 per boot, the saving would be reduced to £32250 based upon 100 fixations per year. The cryoboot reduced time to fracture fixation. However, this system was associated with loss of fracture reduction and skin complications in 24% (6/25). Therefore, this system cannot be recommended for use in reducing hospital stay until these problems are resolved.

## ABSTRACT 9

### Recreating blast injuries to the foot and ankle complex

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**Introduction:** Current military conflicts are characterised by the use of the Improvised Explosive Device (IED). Improvements in personal protection, medical care and evacuation logistics have resulted in increasing numbers of casualties surviving with complex musculoskeletal injuries, often leading to life-long disability. Thus, there exists an urgent requirement to investigate the mechanism of extremity injury caused by these devices in order to develop mitigation strategies. In addition, the wounds of war are no longer restricted to the battlefield; similar injuries can be witnessed in civilian centres following a terrorist attack. Key to mitigating such injuries is the ability to deconstruct the complexities of an explosive event into a controlled, laboratory-based environment.

**Method:** A unique anti-vehicle underbelly injury simulator (AnUBIS), capable of recreating in the laboratory the impulse from an anti-vehicle (AV) explosion (impacts up to 25 m/s), is presented and characterised. Tests were then conducted to assess the simulator's ability to interact with human cadaveric legs. Two mounting conditions were assessed, simulating a typical seated and standing vehicle passenger using instrumented cadaveric lower limbs.

Based on finite element modelling and experimental characterisation, an operational map was developed, so that a 43kg projectile could be accelerated up to velocities exceeding 20 m/s within 5ms. At a velocity of 8.3 m/s, no injuries were noted in the seated position. However at the same velocity, multisegmental injuries to the foot and ankle complex was noted in both standing cadaveric specimens.

**Results:** Our initial data suggests that limb orientation plays a significant role in injury creation from blast. This internationally unique test bed will allow researchers

- (a) to gain comprehensive understanding of the load-transfer mechanisms through the lower limb,
- (b) to characterize the dissipating capacity of mitigation technologies, and
- (c) to assess the biofidelity of surrogates as well as validate numerical models of the lower limb within the blast environment.



## ABSTRACT 10

### **Cadaveric analysis of the structures at risk during calcaneal fracture plate fixation – which screw holes are the riskiest?**

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**Aim:** We present two cases of tarsal tunnel syndrome following calcaneal fracture fixation. Investigations demonstrated medial neural irritation from the screws. We aimed to define the structures at risk during a calcaneal fracture ORIF. Identify the safe zone and determine which screw holes pose greatest risk.

**Methodology:** We performed a sham calcaneal ORIF on 20 fresh frozen cadavers. The fixation was performed from the lateral side using an extended lateral incision as we would in routine practice. The plate was fixed onto the lateral wall and then medial hindfoot was dissected. 8 Synthes plates, 6 Depuy plates and 6 Orthohelix plates were used. The skin was excised and deep dissection through the fat was performed with cotton buds and saline to minimise soft-tissue disruption. Metallic strips were placed over the nerves of the tarsal tunnel and the foot was x-rayed from the lateral side to demonstrate the anatomy of the tarsal tunnel in relation to the screw holes.

**Results:** The danger zone of the calcaneum can be accurately and reproducibly demarcated. The band is a 1.5cm wide area whose posterior margins start 1 cm posterior to the superior end of the posterior facet. This then arcs inferiorly with an apex at the bisector of a line drawn from the inferior calcaneal tubercle to the anterior end of the posterior facet and a line drawn from the inferior end of the calcaneocuboid joint to the superior calcaneal tuberosity. It ends 1.5 cm posterior to the inferior end of the calcaneocuboid joint. The band extends forward for 1.5cm. The superior and middle landmarks were entirely consistent but occasionally the inferior landmark was more posterior.

**Discussion:** This has particular implications for the subchondral screws, care needs to be taken when drilling and to ensure that the screws are not too long when inserted.

## ABSTRACT 11

### **Radiosynovectomy in chronic recurrent haemophilic haemarthrosis: the northeast experience**

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**Introduction:** Radiosynovectomy is used to manage recurrent haemophilic haemarthrosis. The primary aim of this study was to observe the effectiveness of radiosynovectomy in reducing the incidence haemarthrosis in the ankle joint. The secondary aims were to assess benefit in pain reduction, joint movement, and duration of improvement, and complications related to the procedure.

**Material and methods:** We performed 13 radiosynovectomies in 12 patients with recurrent haemarthroses. Intra-articular injection with Rhenium was performed under local or general anaesthetic. All the patients were males with an age range from 11 to 29 years (median 17). Eleven patients had haemophilia-A and one had haemophilia-B. Eleven patients had severe haemophilia and one had mild disease. All of the patients were receiving alternate to twice weekly prophylaxis of factor replacement. One of the patients had circulating inhibitor. One of the patients had ankle arthrodesis two years after the radiosynovectomy.

**Results:** The rate of bleeding episodes in the target-joint was 9 per person per year prior to the radiosynovectomy. This reduced by 80% to 1.83 after treatment, which was maintained up to five years later (77%) (Fig. 1). Improvement was found in ankle plantar flexion (5°) and dorsiflexion (7°). One of the patients had repeat radiosynovectomy at 3 years, and adequate reduction in bleeding rate was achieved. One patient had ankle arthrodesis for painful advanced degenerative changes two years after radiosynovectomy. No complications of radiosynovectomy were observed in this study.

**Conclusion:** Radiosynovectomy appears to be a safe and effective procedure in the reducing rate of haemophilic hemarthrosis and joint pain, and improves joint function. There was a reduced need for therapeutic factor replacement. Longer term benefits in terms of joint preservation remain to be demonstrated, but the short term benefits justify continuation of radiosynovectomy for the target joints in haemophilia.

## ABSTRACT 12

### Ewing's Sarcoma of the foot: experiences of a bone tumour unit

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**Introduction:** The accepted surgical treatment of Ewing's Sarcoma of the foot was until very recently, limb ablation. We present the outcomes of The Bone Tumour Unit, Royal National Orthopaedic Hospital (Stanmore) in relation to those patients diagnosed with Ewing's Sarcoma of the foot within the past 10 years and treated with limb salvage surgery.

**Methods:** Retrospective study of the cases identified from the pathology database. Notes reviewed for presentation, treatment and follow up. TESS (Toronto Extremity Salvage Score) and MSTS (Musculoskeletal tumour score) were calculated.

**Results:** 6 patients identified with positive diagnosis of Ewing's Sarcoma of the Foot. Male:Female ratio of 5:1. Age range 15-31 (Mode 25). 4 cases skeletal, 2 extra skeletal. All cases reviewed by supra-regional MDT and received adjuvant and neo-adjuvant chemotherapy. All except one patient underwent limb-salvage surgery. MDT decision for remaining patient was amputation as only viable surgical option (patient and parents requested radiotherapy without surgical treatment). Mean survival 40 months (15-107 months). All patients survive at time of submission. Mean MSTS/TESS scores 93% (80-100%) and 94.6% (85-100) respectively.

**Discussion:** All patients reported a delay between first presentation and referral to the sarcoma unit. This experience is common across the literature for this rare pathology. Lowest scores submitted by the two patients who had amputation of their great toe. All patients happy with their outcome and decision to salvage their limb. All patients scored themselves as "not at all disabled" and two stated this would not have been their response if they had lost their foot.

**Conclusion:** Amputation is psychologically difficult to accept and patients are more receptive to limb salvage surgery. Our patients demonstrate good functional outcome. Our experience at Stanmore suggests that limb salvage surgery with adequate MDT surveillance for Ewing's Sarcoma of the Foot can be a viable alternative to amputation.

## ABSTRACT 13

### **Why do daycases stay overnight? Audit & reaudit of an intervention to improve foot & ankle daycase throughput by early communication with the multidisciplinary team**

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**Aims:** Daycase surgery has numerous advantages for patients, clinicians and trusts. The Best Practice Tariff uplift is £200 per Minor Foot Procedure performed as a daycase. Foot & Ankle daycases in Cheltenham General Hospital require physiotherapy assessment & frequently an orthotic aid before discharge. This audit analysed length of stay of daycase patients on a Foot and Ankle list. The standard was 100% of daycase patients to be discharged on the same day as surgery.

**Methods:** A consecutive series of patients was generated from all daycase procedures in a three month period from October 2010 to December 2010. Length of stay was calculated using Patient Admissions System (PAS) data and formulated on a Microsoft Excel spreadsheet. This data was compared with a second three month period from October 2011 to December 2011 after an intervention comprising a weekly multidisciplinary bulletin from the Orthopaedic Consultant to highlight post-operative weight-bearing instructions and orthotic requirements for forthcoming daycase patients to physiotherapists, nursing staff and junior doctors.

**Results:** The first series included 38 listed daycases. 61% (23 patients) were discharged the same day. The second series comprised 41 listed daycases. This group received pre-operative physiotherapy assessment and provision of required orthotic aids. 85% (35 patients) of the second group were discharged the same day. Data analysis using Fisher's exact test reveals this intervention had a statistically significant impact on the number of patients discharged the same day ( $p < 0.0207$ ).

**Conclusions:** The financial implications are increased revenue for Best Practice Tariff with an uplift of £1800 over the period and an associated reduction in the estimated cost of 20 unnecessary overnight stays of £4640 over the 3 month period. Improved multidisciplinary communication via a weekly team bulletin can significantly improve the patient experience, impact on bed occupancy and cost of care.

## ABSTRACT 14

### Tourniquet use in ankle arthroscopy: time for a re-think

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**Introduction:** It is standard practice to use a tourniquet during ankle arthroscopy. However, there is no literature proving the superiority of using a tourniquet. The main perceived advantage of using a tourniquet during ankle arthroscopy would be to provide a 'bloodless' visual field. The theoretical disadvantages of a tourniquet application include an increased risk of nerve palsy, vascular injury, muscle damage, post-op swelling and stiffness.

This study proposes that an ankle arthroscopy can be performed just as effectively without a tourniquet.

**Methods:** We conducted a prospective non-inferiority study to assess complications as the primary end-point and time of procedure for ankle arthroscopies without tourniquet compared to historic controls of ankle arthroscopies with tourniquet. All parametric data were analysed using unpaired t-tests and the non-parametric data using the Chi-Square test. A p-value < 0.05 was considered statistically significant.

**Results:** There were 31 patients in the tourniquet group (n=31) and 32 in the non-tourniquet group (n=32). The mean follow-up, in the tourniquet group was 57.9 weeks (SE=7.9) and in the non-tourniquet group 36 weeks (SE=5.34),  $p=0.02$  (sig.). The mean duration of surgery was 52.10 mins (SE=3.75) and 57.19 mins (SE=9.51) in the tourniquet and non-tourniquet group respectively,  $p=0.29$  (ns). There was a single complication in the tourniquet group with one patient developing a superficial peroneal nerve neuroma in close proximity to the anterolateral portal. This did not reach statistical significance with a  $p\text{-value}=0.99$ .

**Conclusion:** This study demonstrates that it is perfectly feasible to carry out ankle arthroscopies in the absence of a tourniquet. A larger study in the form of a randomised controlled trial between tourniquet vs no tourniquet would allow for better control of patient variables.

## ABSTRACT 15

### Outcome of the primary closure of diabetic foot amputations

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**Introduction:** Limited amputation can be used to treat diabetic foot ulcers complicated by osteomyelitis. The wounds can be closed primarily or left to heal by secondary intention. We present a retrospective analysis of a series of patients who had undergone a limited foot amputation with primary closure.

**Methods:** All patients had diabetic foot ulcers complicated by osteomyelitis and were operated on under a single surgeon. Amputations were recorded as either minor (toe) or major (ray, metatarsal or transmetatarsal). Patient demographics, co-morbidities and the duration of post-operative stay, antibiotic therapy and wound healing were recorded. The outcome was recorded as healed, re-ulceration, re-amputation or death. All patients were followed-up in the multidisciplinary diabetic foot clinic.

**Results:** 75 patients with a mean age of 67 were included. 38 (51%) patients had minor amputations and 37 (49%) had major amputations. Post-operatively the mean length of stay was 24 days, length of antibiotic therapy was 34 days and all the wounds healed at a mean of 45 days. Following initial amputation, 52 (70%) of patients did not require a second operation and did not develop re-ulceration. Six of these patients died at a mean of 379 days.

23 patients developed re-ulceration at a mean time of over 11 months (353 days, range 42-1084 days). Half of these patients were managed conservatively and half required a second amputation.

**Conclusion:** Diabetic foot ulcers with underlying osteomyelitis can be successfully treated with amputation and primary closure. Approximately 1:3 patients will re-ulcerate and 1:6 will require further surgery. Post-operatively these patients may require prolonged inpatient stay and IV antibiotics for approximately 1 month. Follow-up should be continued for several years to ensure that re-ulceration is not missed.

## ABSTRACT 16

### **Incidence of symptomatic subtalar nonunion following tibiototalcalcaneal arthrodesis using retrograde intramedullary nail with preparation of the subtalar joint**

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**Introduction:** Tibiototalcalcaneal (TTC) arthrodesis using a retrograde nail is a common salvage procedure for a range of indications. Previous work has suggested subtalar joint preparation is unnecessary to achieve satisfactory results but more recently some authors have acknowledged the symptomatic subtalar joint to be a significant complication following this procedure. We examine the incidence of symptomatic subtalar nonunion following tibiototalcalcaneal fusion in a series of patients, all of whom had full preparation of the subtalar joint.

**Methods:** We performed a retrospective review of all patients who underwent TTC arthrodesis from 2004-2010. All fusions were performed by the same surgeon with full preparation of both tibiotalar and subtalar joints.

**Results:** 61 tibiototalcalcaneal arthrodeses were performed in 55 patients (mean age = 59 years) using an intramedullary retrograde nail. Mean follow-up was 18 months (6-48 months). Fifty-six ankles (92%) achieved satisfactory union. Four patients (7%) had symptomatic non-union of the subtalar joint, with 3 patients undergoing revision subtalar arthrodesis. One patient (2%) had a symptomatic nonunion of the tibiotalar joint. Nine patients required removal of the calcaneal screw (16%) – all had evidence of isolated subtalar nonunion prior to metalwork failure. Eight of these patients achieved asymptomatic union following screw removal.

**Conclusion:** Symptomatic subtalar nonunion is becoming increasingly recognized as a complication of TTC arthrodesis using an intramedullary nail. This has resulted in changes to nail design in recent years, attempting to address this by increasing stability across the subtalar joint. Our results demonstrate a favourable rate of symptomatic subtalar nonunion and this would suggest that full preparation of the subtalar joint should also be considered a key factor in reducing the incidence of this problem.

## ABSTRACT 17

### Follow up results of patients treated with extra corporeal shock wave treatment for plantar fasciitis

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**Background:** Plantar fasciitis is a common cause of heel pain, affecting 10% of the general population. Extracorporeal shock wave therapy has been recommended as treatment for chronic plantar fasciitis in patients unresponsive to conservative treatment. Extracorporeal shock wave therapy is an effective treatment for chronic heel pain that can be administered to outpatients without anesthesia. There is a paucity of evidence in literature over the long term results of this treatment.

**Study:** A cohort of 42 patients were recruited in the study who were in rolled for ESWL for heel pain syndrome. 4 patients were lost to follow up and 2 could not complete the treatment. The remaining 36 patients were followed for an average follow up of 2.3 years (5-1 year). All patients had been suffering from plantar fasciitis for at least 12 months. They were all treated with analgesia, orthotic devices, Physiotherapy with Ultra sound treatment, Heel injections with corticosteroids with no benefits before being offered ESWL. All patients had an ESWL treatment as outpatient basis. Three interventions of extracorporeal shock wave therapy (Av 12micro Joules/mm<sup>2</sup>; 2000 impulses) was given over three months period at monthly intervals. Patients prospective VAS pain score was recorded pre procedure and during follow-up. Patients were also sent satisfaction questionnaire at the end of follow-up period.

**Results:** During the follow-up after treatment, the all of patients showed an improvement in pain score and majority of patients were able to return to the pre pain occupation and could enrol in physical activities. There were no systemic or local complications of treatment. Most of the patients were satisfied with the treatment and would recommend it to others.

**Conclusion:** Shock wave therapy is effective and safe for the treatment of chronic heel pain with good long term results.



## ABSTRACT 18

### **Extra-Corporeal Shock Wave treatment for refractory plantar fasciopathy: a retrospective review with minimum 1 year follow up**

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**Background:** Randomised trials have produced conflicting results regarding the efficacy of Extra Corporeal Shock Wave therapy (ESWL) for treating refractory plantar fasciopathy. National Institute for Health and Clinical Excellence (NICE) recommends regular audit and review of all patients having ESWL for refractory plantar fasciopathy. There is a paucity of evidence over the long term results of this treatment.

**Methods:** 42 patients (77 heels) received ESWL for recalcitrant plantar fasciopathy between 2005-2010. All of them had persistent intrusive symptoms after treatment with analgesia, orthotics, physiotherapy and heel injections. All patients had ESWL treatment on outpatient basis. Three interventions of ESWL therapy (average 14 micro Joules/mm<sup>2</sup>; 2000 impulses) was given at monthly intervals. Visual Analogue Pain Scale (VAS) was recorded pre procedure and during follow-up. Patients were interviewed by telephone and also sent a satisfaction questionnaire by post at the end of follow-up period. 4 patients were lost to follow up and 2 could not complete the treatment. The remaining 36 patients (66 heels) were followed up for an average follow up of 2.3 years (1-5 year).

**Results:** 31/36 reported significant pain relief with improvement in VAS score from pre treatment (mean 8.7) to post treatment follow up score (mean 4.2). 29/36 were able to return to their previous occupation, 3 patients were retired and 4 were on benefits. 26/36 could undertake their recreational activities of choice after ESWL treatment. There were no systemic or local complications of treatment. 3/36 required further surgery. Majority of the patients (29/36) expressed overall satisfaction with ESWL therapy and most (31/36) would recommend it to others.

**Conclusion:** ESWL therapy resulted in significant pain relief and high patient satisfaction for patients with refractory plantar fasciopathy over a minimum follow-up period of 1 year.

## ABSTRACT 19

### Report on short-term experience with Zenith ankle replacement

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**Introduction:** Ankle replacement is attractive option to relieve pain and retain range of motion of ankle joint in ankle arthritis. We conducted this study to report our experience with Zenith Ankle experience, especially the survival and rate of complications.

**Material and methods:** Twenty three consecutive Zenith TAR in twenty patients were included. There were 13 females and 7 males. Mean age at operation was 69.8 years (range 51 to 80). The mean follow-up duration was 2 years (range 0.44 to 3.65). Indications were osteoarthritis, rheumatoid arthritis, post-traumatic arthritis and in one patient TAR was performed for failed ankle arthrodesis.

**Results:** The median hospital stay was 5 days. Post-operatively, range of ankle movements was 6.6 degree of dorsiflexion and 11.6 degree of plantar flexion. Additional procedures were done in 12 patients and included os-calcis osteotomy, subtalar fusion, TMTJ fusion and tendon transfers. Radiographic analysis indicated that the sagittal and coronal alignment of the tibial component was 89.7 and 91.9 degrees with the vertical. Talar component subtended an angle of 24 degrees with the talar body. Bone-prosthesis interface was graded A in 20 and B on three radiographs. One patient had revision ankle replacement after two years and one patient had conversion of TARt to Tibio-talo-calcaneal fusion after two years. Other complications included Tarsal tunnel syndrome in one patient which required decompression, medial side pain in one patient which required debridement of medial gutter, and persistent pain in five patients. CT scans of these five patients revealed areas of bone lysis and cysts in the peri-implant area. Biopsies reveal foreign body reaction and cultures were negative for infection.

**Conclusion:** In conclusion, the overall clinical outcome is satisfactory but the cause of aseptic osteolysis around the prosthesis is not known and at the moment we have kept these patients in regular follow-up.

## ABSTRACT 20

### Mobility vs Salto total ankle replacement – is post-operative medial pain an issue?

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**Background:** Total ankle replacement offers an alternative treatment modality to arthrodesis in the treatment of severe ankle osteoarthritis. It has the advantage of preserving ankle joint motion and can preserve gait kinematics if successful. Medial ankle pain is a recognised complication of total ankle replacement. The aim of our study was to determine if medial ankle pain was more prevalent dependent on the type of prosthesis used.

**Method:** The study was a retrospective case series. From September 2006 to June 2011, all total ankle replacements (Mobility or Salto prosthesis) performed by the senior author at the Cumberland Infirmary (Carlisle, UK) were included. The case notes, operative details and x-rays were analysed for demographic details, operative information and post-operative complications. Medial pain specifically was assessed at 3 months, 6 months and 1 year.

**Results:** A total of 41 ankle replacements (19 Mobility, 22 Salto) were performed during this period. The mean age was 69.0 years and 68% of patients were male. At 1-year, 12 patients (63%) with the Mobility prosthesis had medial pain, compared to no patients with the Salto prosthesis ( $p < 0.001$ ). Evidence of bone remodelling on radiographs was evident in 16 (84%) Mobility prostheses and 1 (5%) Salto prosthesis ( $p < 0.001$ ).

**Conclusion:** The Mobility prosthesis is associated with a significantly higher proportion of medial pain compared to the Salto prosthesis. This may be due to a stress riser effect from the implant as shown in post-operative radiographs.

## ABSTRACT 21

### The role of pre-operative foot and ankle group in improving patient care and efficiency

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**Introduction:** Benefits of day case foot and ankle surgery include reduced hospital stay with associated cost savings for the hospital, high patient satisfaction and quicker recovery with no increased complication rates.

In 2007, we set up the preoperative foot and ankle group. Patients were seen three weeks before surgery by a specialist nurse, physiotherapist and preoperative evaluation is carried out. The therapist explains the patient's weight bearing status and mobility aids are given.

Our aim was to reduce inpatient hospital stays and increase our day case foot and ankle operative procedures.

**Methods:** We evaluated length of stay and physiotherapy intervention for all our patients during the first three months of 2007 to 2011. Mean length of stay was calculated and Mann-Whitney U test was performed using median.

**Results:** Mean length of stay for combined forefoot and midfoot group reduced by 1.92 days and median reduction was statistically significant ( $p < 0.01$ ). For forefoot surgery alone, the mean length reduced by 2.14 and median reduction was significant ( $p < 0.001$ ) and for midfoot surgery alone, the mean stay reduced by 1.34 days and median was significant ( $p < 0.001$ ).

Hind foot patient's mean length of stay reduced by 6.78 days and the median was significant ( $p < 0.001$ ). But for the ankle group the mean length of stay did reduce but the median was not statistically significant ( $p = 0.225$ ).

Day case surgery increased by 43.5% for forefoot, 23.2% for midfoot and 14% for ankle surgeries but not for hindfoot.

**Conclusions:** The overall results show that the preoperative foot and ankle group has resulted in reduction of inpatient stay and increase in daycase surgery performed.

A pre-operative group is a highly efficient method of enhancing patient care and improving length of stay at the hospital for the patient. The cost saving for the hospital is around £35,400 per annum.

## ABSTRACT 22

### Evaluating response shift and its influence on treatment effects with the MOXF-Q scoring system after foot and ankle surgery

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**Objective:** To determine response shifts in patients' pre-operative scores, patient-perceived improvement (i.e adjusted treatment effects) and true improvement (i.e unadjusted treatment effects) after foot and ankle surgery.

**Methods:** Patients undergoing foot and ankle surgery during September- November 2011 at the Robert Jones and Agnes Hunt Orthopaedic Hospital, Oswestry were prospectively studied for their surgical outcomes. Patients responded to the self- administered MOXF-Q questionnaire provided during their visit to the hospital. Pre-operative scores were collected to evaluate severity of symptoms. Post-operative scores, comprising of patients' current scores and their recollection of pre-operative scores at 3 and 6 months after operation, were collected with the same questionnaire. Response shift (RS) was calculated as difference between prospectively collected pre-operative scores and patient's recollection of pre-operative scores during follow-up. Unadjusted treatment effect (UTE) was calculated as the change in patients' current scores from actual pre-operative scores; adjusted treatment effect (ATE) was the change in current scores from patient-perceived pre-operative scores.

**Results:** A total of 30 patients (23 females, 7 males) were studied; average duration between pre-operative scoring and surgery was 20 days (range 5-46, SD-12). Statistically significant improvement was observed at 3 and 6 months when compared with true and recollected pre-operative scores. Paired t-test analysis showed no statistically significant difference between RS, ATE and UTE at 3 and 6 months for all dimensions except the social dimension for scoring at 6months (p-value-0.03).

**Conclusion:** Patients can accurately self score severity of their pre-operative symptoms with MOXF-Q for upto 3 months after operation. At 6 months, patient's recollections of their pre-operative symptoms related to social dimensions were significantly more than actual pre-operative symptoms; this can magnify patient- perceived treatment effects at that time point. A bigger sample size needs to be studied to identify the influence of retrospective scoring on treatment effects.

## ABSTRACT 23

### Calculation of force by EMED system and AMTI platform – do they agree or disagree?

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**Introduction:** EMED®-M and AMTI® platforms are two important foot pressure analysis devices used frequently for gait analysis purposes. This study aims to compare the repeatability of both systems and examine the agreement between both platforms' measurements.

**Method:** Thirty healthy volunteers were employed for this study. Mean age of the candidates was 35 (range 20-55). The foot pressure measurements were recorded on two separate sessions for each individual one week apart. A total of ten dynamic trials and two static trials were recorded on each session. The results have been statistically analysed with SPSS 17.0 programme. P-value less than 0.05 was considered to be of significant statistical difference. Coefficient of Repeatability percentage (CR%) less than 10% was considered highly repeatable.

**Results:** This study confirmed that EMED®-M results are clinically repeatable and comparable. The CR% confirmed excellent high dynamic repeatability in 100% of cases compared to moderate to high repeatability in 67% of static measurements. Statistical analysis shows there is no significant difference in 82% of dynamic trials and 97% of static trials on repeated measurements. The research also shows good clinical repeatable foot pressure measurements on AMTI® platform in both dynamic and static trials. The CR% was less than 15% in 100% of dynamic trials measurements. Similarly, the static measurements showed excellent repeatability with CR% of 1.37%. When EMED®-M and AMTI® force plates' results were compared, the results were comparable only in the beginning and end of each stance phase. There was significant difference in the measurements in midstance (18%). A final aim of this study was to test the possibility of drawing a relation between AMTI® shear forces and EMED®-M force and pressure parameters. Two variables, Force-Time Integral (FTI) and Pressure-Time Integral (PTI), were mainly tested in relation to shear force results. The research did not support any correlation between AMTI® shear force results with both parameters.

## ABSTRACT 24

### **Application of UMEX® mini-external fixators in complex congenital foot deformities: results of 8-years of experience**

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**Introduction:** Complex congenital foot deformities pose a challenge to the surgeon and extensive surgery leads to poor results. We report the clinical outcomes of children with complex congenital foot deformities treated with UMEX® (Universal mini-external fixator System) frames.

**Methods:** This is a prospective review of our experience in patients treated in this way, from 2004 to 2011. The indications for treatment included resistant/recurrent Congenital Talipes Equino Varus (CTEV), cavo-varus deformity secondary to Charcot-Marie-Tooth disease, arthrogryposis, fibular hemimelia and other congenital abnormalities. A total of 32 children (35 feet) have been treated, out of which 22 were male and 10 were female patients. Age at surgery ranged from 3 to 15 years (median age -7 years). Three patients underwent bilateral procedures; the remainder (29 patients) underwent unilateral foot operations. Twenty-eight patients had undergone previous surgery including soft-tissue and/or bony corrective procedures.

**Results:** The frames were removed at an average of 69 days after application, and the patients spent a further 6 weeks in a walking cast. Good functional outcomes were noted in 19 patients in the fifth postoperative year. Six of the 8 patients with less than five-years follow-up had good outcomes. Further operations were needed in 10 patients. Complications occurred in 10 patients, predominantly pin-site infections, one case of bony overgrowth at pin-site and one of proximal tibio-fibular diastasis.

**Conclusion:** This is a simple fixator to use with a short learning curve. In groups of patients with complex congenital abnormalities, we achieved good functional outcome with low-complication rates.

## ABSTRACT 25

### **Achilles tendon ruptures: an analysis of a new physiotherapy rehabilitation programme at the Royal Devon and Exeter Hospital**

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There are longstanding debates regarding surgical versus conservative management of Achilles tendon ruptures, however there is limited focus on rehabilitation. The Royal Devon and Exeter Hospital initiated a specific rehabilitation programme in 2008 to unify the management and improve patient outcomes. We present the results at three and a half years.

In October 2008 management was streamlined under the foot and ankle surgeons and a dedicated physiotherapy service. Operative management used mainly the Achillon device (Integra) and the VACOPED boot with a specific rehabilitation protocol. This protocol was modified in 2010.

We prospectively collected data on all patients with Achilles tendon ruptures from October 2008 to March 2012. There were 246 patients in total and four were lost to follow up as they were out of area. 80 were treated with the Achillon system, 18 had an open repair and 144 were treated conservatively (of which 56 were partial or musculocutaneous junction tears).

There were three patients who re-ruptured (1.2%), all initially treated conservatively. Two patients re-ruptured due to further trauma at the 10 week stage during weaning from the boot. One patient re-ruptured at the 6 week stage in the boot after a twisting injury. They all then underwent Achillon fixations with good clinical outcomes.

There were two operative complications (2%), both wound breakdowns. One patient required single wound debridement and closure whilst the second patient needed extensive VAC and plastic surgery intervention. Two patients suffered PE's, confirmed on VQ scan or CTPA (one operative, one conservative). One non-compliant patient healed functionally long and required a shortening procedure.

The results show that the re-rupture rate of patients treated at the Royal Devon and Exeter Hospital. The authors experience has been that using the VACOPed boot with our custom rehabilitation programme in dedicated physiotherapy clinics has produced excellent results.





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