



BRITISH LIMB RECONSTRUCTION SOCIETY

**Annual Meeting 23 – 24 March 2017
The Metropole Hotel, Leeds**



WELCOME

Thank you for attending the British Limb Reconstruction Society annual meeting held in Leeds for the first time.

The two themes of the meeting are adult trauma and paediatric deformity, which for many represents the core of limb reconstruction. We have two keynote speakers of international reknown this year to address these themes; Dr Dmitry Popkov from the Ilizarov Institute in Kurgan, and Professor Peter Giannoudis, based in Leeds but in demand across the world.



BLRS has always been the most inclusive of orthopaedic societies in terms of its multidisciplinary membership which is in keeping with the true team work required to care for our often complex patients. The Associated Health Professionals have put together a programme for one break-out session each day with different themes.

The standard of free papers and posters has been of high quality this year and the prizes on offer will be judged by a panel of three experts in the field.

The BLRS meetings have consistently grown in size and profile over the past few years and this trend has continued in 2017. This is reflected by the generous support from our industry partners without whom we would not be able to perform our work. Please visit the stands and see what they have to offer, and enjoy Leeds.

FACULTY LIST

D Bose, Birmingham

Deepa Bose has been a Consultant at the Queen Elizabeth Hospital Birmingham since 2009. Her practice is exclusively in adults, and includes general and major trauma, post-traumatic limb reconstruction. She is Chair of the Specialist Training Committee for Core Surgical training in the West Midlands, and is a member of the Training Standards Committee of the British Orthopaedic Association (BOA).



Ms Bose is keen to promote teaching in orthopaedics in developing nations, and she gained the Diploma in Medical Care of Catastrophes from the Worshipful Society of Apothecaries in 2011. She has been the secretary of World Orthopaedic Concern UK since 2009. Moreover she has been on the International Emergency Trauma Register of the UK, a first response team for international disaster relief, since 2012.

S Britten, Leeds

Simon Britten was appointed to Leeds Teaching Hospitals as a Consultant Trauma & Orthopaedic Surgeon and Honorary Senior Lecturer in 2002. His clinical practice includes the treatment of severe lower limb fractures and post-traumatic limb reconstruction. Mr Britten was formerly an officer in the Royal Army Medical Corps, and gained experience in trauma and disaster management.



He was elected to the committee of the BLRS in 2016. He was the President of the Leeds and District Medico-legal Society for 2016-7. He is currently studying for a Master of Laws (LLM) degree in Medical Law and Ethics at De Montfort University Leicester.

G Bourke, Leeds

Grainne Bourke is a Consultant in plastic and reconstructive surgery at the Leeds Teaching Hospital Trust since 2004. She completed her basic surgical training in Dublin, Ireland before moving to Yorkshire to train in Plastic and Reconstructive surgery. She completed an international fellowship in children hand surgery and major nerve injuries in 2003\2004. She has specialist interests in microsurgery in children and adults, children's hand surgery and nerve injuries in adult and children.



She has research interests in nerve repair, congenital hand anomalies and plastic surgery reconstruction.

Mr Tim Nunn, CURE Ethiopia

Tim Nunn has worked at CURE Ethiopia Children's hospital for 3 years. His interest in limb reconstruction began when he worked in South Africa and continued throughout his training on the Leeds rotation. He undertook his fellowship training in Paediatric Orthopaedics and Limb Reconstruction at Sheffield Children's Hospital. His research interests are neglected clubfoot and burn contracture reconstruction which are frequent problems for the Paediatric Orthopedist in Ethiopia. He is married to Rachel who is a GP and they have 3 children.



FACULTY LIST

Dr Louise Johnson, Leeds

Louise Johnson qualified as a Clinical Psychologist in 2015. She completed an undergraduate degree in Psychology at the University of Newcastle, followed by a Doctorate in Clinical Psychology at the University of Leeds. Following qualification, She chose to specialise in working in a physical health setting. I currently work as a Senior Clinical Psychologist at Leeds General Infirmary, providing clinical psychology input to the Major Trauma Centre, Orthopaedics and Plastic surgery departments. Her specialist interest is in trauma and paediatrics. Prior to her current position, I spent my elective placement at Great Ormond Street Hospital, London, working into neonatal and paediatric intensive care.



J McGregor-Riley, Sheffield

Jon McGregor-Riley is a consultant in the Northern General Hospital in Sheffield. He specialises in total hip replacements, major trauma, pelvic fractures and limb reconstruction.

Dr Quinnan, Miami

Dr. Quinnan graduated from the Columbia University College of Physicians and Surgeons in 2002. He works in Miami, Florida and specializes in Orthopaedic Surgery. Dr. Quinnan is affiliated with University of Miami Hospital.



P Giannoudis, Leeds

Professor Peter Giannoudis is the Professor of Trauma & Orthopaedic Surgery at the University of Leeds. He served as the President of British Trauma Society (2003-2006), President of the European society of Pelvis and acetabulum (2008-2012), Secretary of European Society of Tissue Regeneration in Orthopaedics and Traumatology (2012-2016) and Chair of Masters AO Davos courses (2010-2013). He is an instructor of AAOS, chair of the OTA international committee and Editor in Chief of Injury Journal. He has written 10 orthopaedic/trauma textbooks. He has over 600 peer reviewed publications and delivered 350 key note lectures at international level. He has a major clinical and research interest in bone regeneration.



Dr D Popkov, Kurgan

Dmitry Popkov has been the Head of the Scientific Clinical Laboratory for limb lengthening and deformity correction (4 orthopedic departments and experimental unit), and Head of the Orthopedic Departement №6 (Neuroorthopedics) (from December 2014) Russian Ilizarov Scientific Center “Restorative Traumatology and Orthopaedics”, RUSSIA from 9 April 2012.



He is Membre correspondant étranger de l'Académie Nationale de Médecine de la France.

B Narayan, Liverpool

Badri Narayan was appointed as a consultant in Liverpool since 2002 and is a world expert in adult trauma and complex limb reconstruction.



FACULTY LIST

P Calder, Stanmore

Mr Calder has been a Consultant Limb Reconstruction Surgeon since 2005. His clinical practice includes all non-spinal orthopaedic paediatric conditions. He also sees adult patients with limb deformity including shortening, mal-union and non-union of fractures. He has extensive experience in external frame techniques including both the Ilizarov and Taylor Spatial Frames. He has published in peer review journals on paediatric and limb reconstruction topics including several chapters in Orthopaedic textbooks. He is frequently invited to lecture on courses both for paediatric conditions including deformity correction and external fixation application.



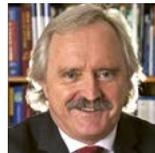
J Fernandes, Sheffield

He is a full time Consultant Paediatric Orthopaedic Surgeon at the Sheffield Children's NHS Foundation Trust and Honorary Senior Clinical Lecturer at University of Sheffield. He has special interests in the areas of limb reconstruction, skeletal dysplasias, DDH and metabolic bone disease. He is the past president of the BLRS, Committee member of the ASAMI-ILLRS and BSCOS. He is actively involved in research and teaches nationally and abroad.



I Winson, Bristol

Mr Winson is a NHS Consultant and Honorary Senior Lecturer in Trauma and Orthopaedic Surgery, Southmead Hospital, Bristol. Mr Winson specialises in foot and ankle surgery and Sports Injuries. He is Vice President Elect British Orthopaedic Association, Editor JTO and Review Editor European Journal Foot and Ankle Surgery, Past President European Foot and Ankle Society and BOFAS



S Nayagam, Liverpool

Mr. Nayagam is a Consultant Orthopaedic & Trauma Surgeon at the Royal Liverpool University Hospital and also a Consultant Paediatric Orthopaedic Surgeon at the Royal Liverpool University Children's (Alder Hey) Hospital. He is a Senior Faculty Member of the British Orthopaedic Association, Open Tibial Fracture Management Committee. He is also a Senior Faculty Member of Ilizarov Training Courses, a Faculty & Founding Member of the Essentials of Fracture Management Courses. Additionally he is also an International Faculty Member of the Orthofix Fracture & Limb Reconstruction Courses. He is the Editor-in-Chief of Strategies in Trauma & Limb Reconstruction. He is also a Reviewer of The Journal of Bone & Joint Surgery. Furthermore he is the Editor & Author of the core Orthopaedic text entitled Apley's System of Orthopaedics & Fractures amongst other texts and publications.



DELEGATE LIST (AS OF 6 MARCH 2017)

Alwyn Abraham

Ioannis Aktseles

Christopher Andrews

Muhammad Arif

Jo Bailey

Matthew Barry

Emir Battaloglu

Sarah Beattie

Andrew Bing

Jillian Black

Deepa Bose

Niall Breen

Philippa Bridgeman

Simon Britten

Helen Bryant

Peter Calder

Sharon Carrie

Simon Chambers

Warren Corbett

Clare Cormack

Gavin de Kiewiet

Mick Dennison

Laura Deriu

Angela Dudley

Matthijs Elzinga

Katy Emberton

Ruth Farrell

Ross Fawdington

Paul Fenton

David Ferguson

Jamie Ferguson

James Fernandes

Ben Fischer

Patrick Foster

Sharon Fugazzotto

Andrew Gaffey

Georgios Giannakopoulos

Peter Giannoudis

Richard Gibson

Steve Giles

Nikolaos Giotakis

Nicola Glossop

William David Goodier

A F Graeme Groom

Enis Guryel

Christopher Hand

Ziad Harb

William Harrison

Megan Harrison Brown

Paul Harwood

David Haughton

Dorian Hobday

Tony Houghton

Efthymios Iliopoulos

Debbie Jackson

Philippa Jackson

Bilal Jamal

Leroy James

Arshad Khaleel

Aiman Khunda

Nigel Kiely

Om Lahoti

Andraay Leung

Xuan Li

Dimitrios Manoukian

Subramanyam Naidu Maripuri

DELEGATE LIST (AS OF 6 MARCH 2017)

Gerry McDermott

James McEvoy

Raymond McKenna

Nisarg Mehta

Edward Mills

Richard Montgomery

Badri Narayan

Haris Naseem

Selvadurai Nayagam

Tim Noblet

Maria Noonan

Tim Nunn

Niamh O'Mahony

Luke Ogonda

Ulrik Kaehler Olesen

Jonathan Pagdin

Dhawal Patel

Nick Peterson

Sarah Phillips

Chris Prior

Tahir Rafiq

Mark Raven

Gautam Reddy

Lucy Reipond

Mark Rogers

Tracy Roskrow

Jane Rowett-Harris

David Rowland

Simon Royston

Hemant Sharma

David Shaw

Andrew Shaw

Karen Shepherd

Amer Shoaib

Hamish Simpson

Simon Smith

Gavin Spence

David Stubbs

Imtiyaz Talkhani

Martin Taylor

Anna Timms

Ulrika Vach

Stephan Verborg

Maria Vincent

Andrew Wainwright

Caroline Waite

Christopher Walker

George White

Stephen Williams

Ian Winson

Sally Wright

Jonathan Wright

PROGRAMME

Thursday 23 March 2017

0800 Registration and coffee

0900 Welcome P Foster

SESSION 1 - Chair: Mr J A Fernandes

0915 Bone infection registry D Bose

0930 Medicolegal aspects of limb reconstruction:
Consent in the post Montgomery era S Britten

0950 Major Nerve injury- current strategies to optimise
functional outcome G Bourke

1010 Reconstructing neglected foot conditions in
Ethiopia T Nunn

SESSION 2 – Chair: Mr D M Taylor

1030 Patient Experience of limb reconstruction T Battye

1040 Clinical psychology in trauma and limb
reconstruction L Johnson

1100 Coffee and exhibits

SESSION 3 – Chair: Mr H K Sharma

1130 **Platinum Sponsor symposium:** ‘Reconstruction
and dead space management in infected cases’ Bone Support

1230 **Keynote Speaker -**
Use of Flexible Intramedullary Nailing in limb
lengthening D Popkov

1300 Lunch and exhibits

SESSION 4 – Chair: Mr D Goodier

1400 BLRS fellow summary D Ferguson

1410 **Platinum Sponsor: Orthofix Clinical Summit –**
Case discussion focusing on circular frames for
lower limb trauma and limb reconstruction A Shoaib

1410 **Allied Health Professionals session –**
Pain management with limb reconstruction
patients A Barker, P J Smitham,
C Scarsbrook, P Calder – RNOH

1510 **Trauma debate - pilon fracture** (plates) B Narayan
(frames) J McGregor-Riley

1545 Coffee and exhibits

PROGRAMME

SESSION 5 – Chair: Mr P J Harwood

1600	Free papers. Moderators: P J Harwood, A Abraham	
1600	Outcomes of correcting paediatric lower limb angular deformities using temporary hemiepiphysiodesis – an 8 year study.	D Patel
1609	Severe Infantile Blounts: Hemiplateau elevation and metaphyseal correction with use of the Taylor Spatial Frame	J Wright
1618	Complications Following Fassier-Duval Rodding of Femur and Tibia in Children	AH Leung
1627	External fixation for closed pediatric tibial shaft fractures. A cohort study	Reddy
1636	Treatment of complex paediatric and adolescent tibial fracture with the Ilizarov method.	J Messner
1645	The management of open paediatric tibia fractures	DN Haughton
1654	Managing Soft Tissues in Severe Lower Limb Trauma in an Ageing Population	T Noblet
1703	Lower Limb Free Tissue Transfer: Orthoplastic Outcomes	D Hobday
1712	Soft Tissue Coverage of Complex Open Tibial Fractures	T Noblet
1721	Open tibial fractures: Has a major trauma centre improved management measured by BOAST-4 guidelines?	K Shepherd
1730	Day one close	P Foster
1900	Course Dinner, Iberica, Leeds	

PROGRAMME

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Friday 24 March 2017

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SESSION 1 – Chair – Mr S Britten

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0900 **Platinum Sponsor Smith & Nephew:** Dr Quinnan
“Optimizing Bone Defect Reconstruction – Balanced Cable
Transport with Circular External Fixation”

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SESSION 2 – Chair – Mrs L Deriu

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1030 **Precise nail user group update** P Calder

1045 **Sheffield experience of Surgical techniques in
Metabolic bone disease** Fernandes

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1100 Coffee and exhibits

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SESSION 3 – Chair – Mr B Narayan

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1130 Free papers –
Moderators: Mr B Narayan, Ms D Bose

1130 Walking alternations after severe tibial plateau fractures E Iliopoulos
(Schatzker IV-VI) treated with circular Ilizarov frame.

1139 Clinical and Functional outcome following Distal Tibial V Giannoudis
fracture treated by Circular External Fixation

1148 Congenital absence of the fibula: outcome of the amputation P Calder
or extension prosthesis in the management of severe lower
limb deformity

1157 Indirect Radial Head Reduction in Children using the D Ferguson
circular frame

1206 Retrieval Analysis of the Precise Limb Lengthening System Panagiotopoulou

1215 ‘Rail and Nail’ – Bifocal Management of Femoral Non-Union K Davda

1224 Ilizarov Treatment Protocols In The Management Of infected J Ferguson
Non-Union

1233 The epidemiology of patients in a limb reconstruction service W Harrison

1242 Patterns of acute referrals for limb reconstruction, and N Mehta
recommendations

1251 Development of the Chertsey Outcome Score for Trauma E Iliopoulos
(COST)

1300 Lunch and exhibits

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SESSION 4 – Chair – Mr S Nayagam

1400	Platinum Workshop - SmartCorrection - Trauma & Deformity Correction - A Simpler Software Solution"	Int2Med
1500	Keynote Speaker: Combined surgical techniques in limb deformity correction in children with metabolic bone disorders	D Popkov
1530	BOA President address	I Winson
1545	Coffee	
1600	BLRS AGM / Registry update	O Lahoti, London
1630	BLRS president	Nayagam, Liverpool
1650	Closing remarks and presentations Fill in evaluation forms Receive Certificates	

ABSTRACTS

Outcomes of correcting paediatric lower limb angular deformities using temporary hemiepiphysiodesis. An 8 years study.

D. Patel, N. Howard, S. Nayagam

Alder Hey Children's Hospital, Trauma & Orthopaedics, Liverpool, United Kingdom

Background: Temporary hemiepiphysiodesis using 8 plate guided growth has gained widespread acceptance for the treatment of paediatric angular deformities. This study aims to look at outcomes of coronal lower limb deformities corrected using temporary hemiepiphysiodesis over an extended period of follow up.

Methods: A retrospective analysis was undertaken of 56 children (92 legs) with coronal plane deformities around the knee which were treated with an extraperiosteal 2 holed titanium plate and screws between 2007 and 2015. Pre and post-op long leg radiographs and clinic letters were reviewed.

Results: The mean age was 11.9 years (range 3 to 16) with a mean angular deformity of 12.3 degrees (5.1 to 33.5). The mean rate of correction was 0.8 degrees per month. Isolated distal femur correction occurred at a mean rate of 0.6 degrees per month (0.2 to 1.4) and isolated tibia at a rate of 0.5 degrees per month (0.0 to 1.7). Children treated with concurrent treatment of both femur and tibia corrected at a rate of 1.4 degrees per month (0.1 to 2.7). Similar rates of correction occur in children aged 10 and over compared to those younger than 10 (0.8 degrees per month compared to 0.7). We also saw similar rates of correction with extended follow up.

The average rate of correction over the first 9 months post op was 0.8 degrees compared to 0.6 degrees over the following 10 months.

Conclusion: This study is the largest long term follow up of 8 plate hemiepiphysiodesis which highlights the rate of correction in all age groups.

Implications: With this knowledge surgeons can make a more informed decision regarding placement of hemiepiphysiodesis plates and length of time required for correction of angular deformities. It may also lead to consideration of alternative, more powerful techniques if the rate of correction is insufficient.

Severe Infantile Blounts: Hemiplateau elevation and metaphyseal correction with use of the Taylor Spatial Frame.

J Wright, P Calder

Limb Reconstruction Unit, Royal National Orthopaedic Hospital, Stanmore, UK

Background: Severe infantile Blount's disease can result in a multiplanar deformity of the proximal tibia with both intra-articular and metaphyseal components. Correction can represent a significant surgical challenge. We describe our results using the Taylor spatial frame for acute tibial hemiplateau elevation combined with gradual metaphyseal correction in patients with severe infantile blounts with an associated physeal bony bar.

Methods: Eight patients (10 knees) underwent tibial hemiplateau elevation and metaphyseal correction with use of the Taylor Spatial Frame between

ABSTRACTS

2012-2016. We undertook a retrospective case note and radiographic review of all patients to assess clinical and radiographic outcomes. Mean age at the time of surgery of was 11.7 years and mean length of follow up was 16.8 months.

Results: At time of latest follow up all patients reported no hip, knee or ankle pain. All knees were clinically stable without lateral thrust during gait.

Improvement in radiographic parameters was seen in all patients. The mean tibiofemoral angle improved from -28.3 to 5.9 degrees post operatively. The angle between femoral condyles and the tibial shaft improved from a mean of 56.3 degrees to 90.3 degrees. The joint depression angle was also seen to improve from mean 47.4 degrees to 9.8 degrees. No significant complications were seen.

Conclusion: This technique has been shown to be an effective method of correction of the complex deformity encountered in severe infantile Blount's disease. Use of the Taylor spatial frame may provide certain advantages in comparison to previously described approaches.

Complications Following Fassier-Duval Rodding of Femur and Tibia in Children.

AH Leung, RD Duncan

Royal Hospital for Children, Glasgow

Background: The Fassier-Duval (FD) rod, which offers a single-entry design and allows elongation for growth, has been widely adopted in paediatric deformity correction over the past decade, although evidence is limited

in literature regarding the associated complications from its use.

Methods: All FD roddings carried out in a Scottish tertiary referral centre were identified. The electronic records and radiographs of each procedure were reviewed. The follow-up duration, indications for surgery, complications arisen and further operations were recorded.

Results: 21 procedures in 11 patients were identified between 2009-2016. The mean age at operation was 6 years and 2 months. The median follow-up period was 3 years and 9 months. The main underlying pathology was osteogenesis imperfecta (71.4%, n=15). The main indication of surgery was deformity correction (61.9%, n=13). 11 (52.4%) FD roddings were for femur and the remainder were for tibia. The commonest complication was proximal migration (n=6, 28.6%). In our cohort we did not have negative telescoping or non-union. Two procedures (9.5%) were complicated by deep infections which were successfully treated. There were 3 further operations (14.3%), including one revision to a locked intramedullary nail for fracture and one below knee amputation for recurrent pseudarthrosis.

Conclusions: We compared our results with those from Birke and co (J Paediatr Orthop 2011) from Australia. Our results are comparable and with a longer follow-up period.

Implications: Although FD rodding allows children to maintain their mobility and prevent fractures, there are significant complications associated with its use. We hope in the future other centres can publish their results to allow improvements in surgical practice

ABSTRACTS

and implant design.

External fixation for closed pediatric tibial shaft fractures. A cohort study.

G Reddy, R Davies, L JAMES

Alder Hey Children's Hospital,
Liverpool.

Background: Most closed tibial fractures in children can be treated conservatively. On the occasions that surgical intervention is required, there are various options available to stabilise the fracture. We would like to present our experience of using monolateral external fixators in the management of closed tibial fractures.

We sought to assess the time to healing, limb alignment, and complications observed in a cohort of tibial fractures treated with external fixation.

Methods: Our limb reconstruction database was used to identify patients who underwent monolateral external fixation for a closed tibial fracture between January 2008 and December 2016. Radiographs of all patients were assessed to determine the original fracture pattern. Time to union was assessed as the time when the fixator was removed and the patient allowed to mobilise independently without any further support of the limb. The presence or absence of residual deformity was assessed on final follow-up radiographs.

Results: 22 patients fulfilled the inclusion criteria. 78% of patients had both tibial and fibular fracture. The mean age at injury was 12 years. The mean time taken for the fracture to heal was 18 weeks. The total duration

of follow-up averaged 9 months. The mean Valgus deformity at the final follow up was 4 degrees and the mean Varus deformity was 4 degrees. The mean procurvatum was 4.2 degrees and the mean recurvatum was 6 degrees. 50% of patients had pin site infection. Two patients had tibio fibular synostosis. None of them had leg length discrepancy or refractures. There were no episodes of osteomyelitis.

Conclusions: Five degree of coronal plane deformity and ten degree of sagittal deformity were considered as acceptable in children due to their potential for remodeling. All our patients had acceptable levels of residual deformity. In our opinion monolateral external fixation represents a safe and effective option.

Treatment of complex paediatric and adolescent tibial fractures with the Ilizarov method.

J. Messner, L. Johnson, N. Perera, M. Taylor, P. Harwood, S. Britten, P. Foster
Leeds General Infirmary, Leeds

Methods: We analysed the functional and psychological outcomes in children and adolescents with complex tibial fractures treated with the Ilizarov method at our frame unit.

An observational study with prospective data collection and retrospective analysis of clinical data was undertaken. Patients younger than 18 years and an open physis were included. The Ilizarov method (combined with percutaneous screw fixation in physeal injuries) was applied and immediate weightbearing recommended.

Results: Sixty four patients (50 male,

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14 female) aged between 4 and 17 years were admitted to our Major Trauma Centre from 2013 until 2016 (25 tertiary referrals). Thirty one (48%) patients were involved in road traffic accidents, 12 (19%) sustained injuries in full contact sports. The average weight was 51 kg (range 16-105 kg). Twenty three open tibial fractures (14 Gustilo 3A and 9 Gustilo 3B) and 15 associated physeal injuries were treated among a cohort of closed tibial fractures with significant displacement (10 failed conservative treatment prior to frame treatment).

We report a 100% union rate with a median hospital stay of 4 days (range 2-19) and a median frame time of 105 days (range 62-205 days). Malunions (> 5 degrees in any plane) were not observed. Three patients required bone transport. At the time of submission, 70% of patients and their parents reported functional outcomes using the Paediatric Quality of Life Inventory (PedsQL) at minimum six months post frame. The PedsQLTM 4.0 Generic Core Scales are comprised of parallel child self-report and parent proxy-report formats. Children's physical average scores were 79 out of 100 and average psychosocial scores were 80 out of 100 and for parent average physical scores were 78 out of 100 and the same for parent average psychosocial scores. These results suggest high levels of quality of life on the PedsQL. The median visual analogue health score (0-100) was 81 out of 100 (71-100), median Lysholm knee scores 98 (range 49-100) and median Olerud & Molander ankle scores 75 (range 40- 100).

Conclusions: Regardless of age, weight and soft tissue damage and complexity of fracture pattern, the Ilizarov method

has shown to be safe and effective treating tibial fractures in the paediatric and adolescent population admitted to our Major Trauma Centre. Furthermore, patients reported high physical and psychosocial functioning following treatment. Level of evidence: IV (case series)

The management of open paediatric tibia fractures.

D.N Haughton, F. Ali, I. Majid.

Royal Manchester Children's Hospital, Manchester.

Background: To analyse the management of open paediatric tibial fractures treated at a children's Major Trauma Centre (MTC), comparing fixation methods, union and complications.

Methods: We retrospectively identified all patients admitted to RMCH with an open tibia fracture between 2008 - 2016. Demographics, mechanism, inpatient stay and follow-up management were reviewed. There were a total of 44 patients, with an average age = 10 years (3-15). 93% of cases were caused by road traffic accidents, commonly pedestrian versus car. Older children were more likely to sustain higher grade injuries, requiring increased length of stay. 35 patients had primary / delayed wound closure, 1 patient required fasciotomies and 4/44 needed skin grafts and/or flap. 7 patients were treated in plaster, 9 by elastic nailing, 15 had mono-lateral fixators and 12 with circular frame. The average number of surgeries = 3 (1-7) with older children having increased risk of revision surgery. Monolateral fixators were the most common primary fixation method (n=15), however 60%

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required revision to ring fixator due to displacement or delayed union. The main risk factor for displacement was inadequate fracture reduction in theatre, as well as those fracture patterns involving butterfly fragments.

Results: Union (defined as RUST score = 3 on >3 cortices) was achieved in all patients (ave 6 months). Delayed union was associated with higher grade injuries, those treated with elastic nails demonstrated the longest union time (ave 7.3 months). 21/44 (47.7%) patients had complications, with pin site infection being the most commonly seen. 18% patients suffered a major complications needing further surgery.

Conclusions: Various fixation methods can be successfully used to treat these fractures. They demonstrate a high complication rate and often require multiple surgeries, with union taking an average of 6 months. Mono-lateral fixators demonstrate a high revision rate, particularly if the fracture is not well reduced.

Managing Soft Tissues in Severe Lower Limb Trauma in an Ageing Population.

TM Noblet¹, PC Jackson¹, P Foster², DM Taylor², PJ Harwood², JD Wiper¹

¹ Department of Plastic & Reconstructive Surgery, Leeds General Infirmary

² Department of Trauma & Orthopaedics, Leeds General Infirmary

Background: With an ageing population, the incidence of traumatic injuries in those aged over 65 years is increasing. As a result, strategies for dealing with these patients must be developed. At present the standard

management of open tibial fractures is described by the BOAST⁴ guidelines. We describe our experience of managing elderly patients presenting with open tibial fractures to our Major Trauma Centre.

Methods: Patients were identified via prospectively collected national and departmental databases. Data collated included patient demographics, injury details, orthopaedic and plastic surgery operative details, and long term outcomes.

Results: Between April 2013 and January 2016, 97 patients aged over 65 were admitted with open fractures, 38 of these were open tibial fractures. 10 patients required soft tissue reconstruction for Gustillo and Anderson IIIB tibial fractures (age range 67-95). In this group there were 4 midshaft (AO 42), 1 proximal (AO 41) and 5 distal (AO 43) fractures. Five patients were treated with internal fixation and 5 with circular frames. The median length of hospital stay was 33 days (range 16-113 days), 50% longer than comparable patients under 65.

Four patients received pedicled local flaps and six underwent free tissue transfer. Of the 6 patients treated with free tissue transfer, one required pre-operative femoral angioplasty. There were no flap losses. Two patients had fasciocutaneous flaps, one an EDB flap and one gastrocnemius flap.

All patients went on to unite and return to their pre-morbid weight-bearing status (2 using frames, 3 using sticks, 5 independent).

Conclusions: Although the literature suggests a significantly higher complication rate in elderly

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patients with open fractures, we have demonstrated comparable rates of flap survival and bony union to those observed in younger patients. Challenges are presented in terms of patient physiology and these must be carefully managed pre- and post-operatively. These challenges are reflected in the significantly longer length of stay in comparably injured patients under the age of 65.

Lower Limb Free Tissue Transfer: Orthoplastic Outcomes.

D Hobday, EF O'Connor, A Din, V Rose, PI Harnett

St Thomas' Hospital & Kings College Hospital.

Background: Complex lower extremity injuries involving significant soft tissue defects and fractures require an integrated multi-disciplinary approach. This study reviews the management and outcomes in such patients over a 32 month period who presented to Kings College Hospital Major Trauma Centre.

Methods: A prospective audit of all patients with lower limb injuries requiring free tissue transfer for reconstruction was performed. Information was gathered through a comprehensive review of medical notes. Care was measured against BOAST 4 Standards and NICE Guidelines.

Results: There were 95 free flaps performed for 85 trauma patients during this period. 81 patients had open fractures and 4 suffered degloving injuries with no fracture. 7 patients were delayed in presentation. Of those who presented acutely 97% had debridement of their wound within 24 hours (BOAST-4 standards). Where indicated,

internal fixation was performed on a joint orthoplastic list at the same time as definitive cover in 83% of cases. Median time to definitive soft tissue cover was 6 days (2-36). 75% of flaps were performed within 7 days. In 22% of cases definitive cover was within 72 hours (2016 NICE guidelines). Flap loss occurred at a rate of 8%. Minor complications of deep space infection, venous congestion and haematoma occurred collectively at a rate of 13%. Serial X-ray analysis by an Orthopaedic team established median time to bony union in the Tibial Gustilo 3b/3c group as 26 weeks.

Conclusion: It is clear from our work and that of others that an integrated orthoplastic approach involving joint consultant led operating lists for both debridement and definitive fixation / coverage has undoubtedly improved outcomes for this cohort of patients with complex injuries.

Soft Tissue Coverage of Complex Open Tibial Fractures.

TM Noblet ¹, PC Jackson ¹, P Foster ², DM Taylor ², PJ Harwood ², JD Wiper ¹

¹ Department of Plastic & Reconstructive Surgery, Leeds General Infirmary

² Department of Trauma & Orthopaedics, Leeds General Infirmary

Background: Large numbers of patients with open tibial fractures are treated in our major trauma centre. Previously, immediate definitive skeletal stabilisation and soft tissue coverage has been recommended in the management of such injuries. We describe our recent practice, focusing on soft tissue cover, including patients treated by early soft tissue cover and delayed definitive skeletal stabilisation.

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Methods: Between September 2012 and January 2016, more than 120 patients with open tibial fractures were admitted to our unit. Patients were identified through prospective databases. Data collected included patient demographics, injury details, orthopaedic and plastic surgery procedures. Major complications were recorded. Paediatric cases were excluded and one patient was lost to follow up.

Results: Fifty-seven patients (median age 41 years (range 16-95)) were identified with open tibial fractures classified grade IIIB or IIIC requiring soft tissue coverage.

Of these 57 patients, 39 were treated by initial temporary external fixation, soft tissue cover, and circular frame and 18 by initial temporary external fixation, soft tissue cover and internal fixation (ORIF). Of the 57 patients, 51 were acutely managed by Leeds MTC, and 6 were tertiary referrals primarily managed elsewhere.

Soft tissue cover constituted free tissue transfer in 43 patients (19 gracilis, 15 ALT, 6 LD, 2 radial forearm and 1 groin flap), pedicled flap in 12 patients (6 gastroc, 4 fasciocutaneous, 1 soleus, 1 EDB), and skin graft in 2 patients. Complications included flap failure (n=3), return to theatre (n=1). Long term soft tissue cover was definitely achieved in 100% of cases. Chronic deep infection was reported in 1 acutely managed case. There were no cases of soft tissue failure after delayed circular frame fixation following soft tissue reconstruction.

Conclusions: Evolution of orthopaedic techniques has meant that the management of these complex

fractures using delayed definitive fixation with a circular frame is increasingly commonplace. This case series demonstrates that a joint orthoplastic approach, with circular frame application undertaken a short time after soft tissue reconstruction (including free flap surgery) is safe and can be undertaken without risk to the soft tissue coverage.

Open tibial fractures: Has a major trauma centre improved management measured by BOAST-4 guidelines?

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Background: Open fractures are managed in the UK guided by standards issued by the BOAST-4 standards written in combination by the BOA and BAPRAS in 2009. A study was undertaken to evaluate compliance with these standards in a regional trauma unit (MTU), and compared the same standards following upgrading to a Major Trauma Centre (MTC).

Methods: Compliance was assessed against 11 of the 15 BOAST-4 standards (7,9,10 and 15 were not assessed). Data was collected retrospectively from case notes, radiology and theatre databases. Patients were included with open diaphyseal tibial fractures (AO 42-), admitted to the department in the year before (MTU) and the year after the Major Trauma Centre opened (MTC).

Results: A total of 78 patients were

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evaluated; 30 within the MTU and 48 as a MTC. Of the 11 standards assessed, 6 (at least in part), achieved 100% compliance in the MTU study, and 5 in the MTC study. Compliance was poor for; antibiotic use in relation to definitive wound closure, formulating a joint plan, and undergoing surgery on a planned trauma list. In contrast, following MTC status antibiotic compliance had improved, as had evidence of joint planning, although antibiotic administration time on admission had declined. Consultant-level orthopaedic and plastic surgeon involvement at first intervention had improved, although plastic surgical input remained predominantly registrar-led.

Time from injury to definitive stabilisation improved following MTC status from 12 days (median; range 1-28 days) to 7.5 days (range 1-25). In the MTU group, time to final stabilisation was longer in the group of patients referred from other units (18 days) compared to the direct admission patients. This trend continued post MTC, but was less marked (11 days). Patients who were referred also underwent additional procedures in both the MTU and MTC studies. Time to closure with intervention reduced from 7 days to 3.5 days (MTU:MTC range 0-16 and 0-23).

Conclusions: This study demonstrates improvements in many aspects of care for open fracture since the MTC opened. However, further improvements can be made, particularly regarding the early treatment pathway. Since this audit a plastic surgeon with specific interest in lower limb reconstruction has been appointed resulting in the

introduction of a joint orthoplastics list and clinic. We also intend to introduce standardised documentation to help improve compliance further. These standards require re-auditing in light of these new developments.

Walking alternations after severe tibial plateau fractures (Schatzker IV-VI) treated with circular Ilizarov frame.

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Background: Tibia plateau fractures are severe knee injuries which have a great impact on the patients' lives, but in what extend is not clear yet in the literature. The purpose of this study was to investigate the gait alternations after treatment of patients who had severe tibia plateau fractures which were treated with circular ilizarov frame.

Methods: We have evaluated the gait pattern of patients who were treated with circular Ilizarov frame after severe tibia plateau fractures (Schatzker IV-VI) in our department. The gait was tested by using a force plate in a walking platform. Ground Reaction Forces (GRF) data were collected during level walking at self-selected speeds. The patients performed two walking tasks for each limb and the collected data were averaged for each limb. Demographic, clinical, radiological and quality of life questionnaire (SF-12) data were also collected.

Results: We have analysed the gait through the GRF of fifteen patients (aged 50.8 ±17.3 years), who had

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undergone treatment with circular Ilizarov frame following severe tibia plateau fractures (Schatzker IV-VI). Nine were male and six were female. The tests were performed at an average of 13.2 months after the initial treatment. SF-12 Mental scores have returned to normal (mean 54.6 \pm 12.3) but physical scores remained impaired (mean 40.6 \pm 10.8).

A one-way repeated measures ANOVA was conducted to compare the GRFs and gait timing data of the affected limb with the normal one. Single limb support interval was significantly reduced to the affected limb ($p=0.001$) and terminal stance phase was prolonged for the normal limb ($p=0.035$). During this phase of the gait circle the knee is on its maximum flexion and the quadriceps contracts to bring the femur above the tibia. It seems that these patients during the gait circle reduce the flexion of their affected knee to make their single stance shorter. To the normal limb the patients manage to reduce more the GRFs during the mid-stance phase (F_2 force), this difference do not reach significance, but illuminates the tendency of reduced knee flexion in that phase. The rest of the GRF and gait timing data did not had significant differences.

Conclusions: One year after severe tibia plateau fracture treated with circular ilizarov frame the patients manage to return to almost normal gait pattern. Reduce single limb stance and terminal stance phase to the affected knee can be explained by the tendency of not flexing their deficient knee as much during that gait phase.

Clinical and Functional outcome following Distal Tibial fracture treated by Circular External Fixation.

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Background: Distal tibial fractures are notoriously difficult to treat and a lack of consensus remains on the best approach. This study examined clinical and functional outcomes in such patients treated definitively by circular external fixation (Ilizarov).

Methods: Between July 2011 and May 2016, patients with fractures extending to within 1 muller square of the ankle were identified from our prospective Ilizarov database. Existing data was supplemented by review of clinical records. Fractures were classified according to the AO/OTA classification. Functional outcome data, including general measures of health related quality of life (SF-12 and Euroqol) and limb specific scores (Olerud and Molander Score and Lysholm scores) had been routinely collected for part of the study period. Patients in whom this had not been collected were asked to complete these by post. Adverse events were documented according to Paley's classification of: problems, obstacles and complications.

Results: 142 patients with 143 fractures were identified, 40 (28%) were open, 94 (66%) were intra-articular, 85 (59%) were tertiary referrals. 32% were type 1, 28%, type 2 and 40% type 3 AO/OTA severity. 139 (97%) of the fractures united (2 non-unions, 1 amputation and

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2 delayed unions who remain in frames), at a median of 165 days (range 104 to 429, IQR 136 to 201). 62% united by 6 months, 87% by 9 months and 94% by 1 year. Both non-unions have united with further treatment. Closed fractures united more rapidly than open (median 157 vs 185 days; $p=0.003$) and true Pilon (43C3) fractures took longer to unite other fractures (median 156 vs 190 days; $p<0.001$).

34% of patients encountered a problem, 12% an obstacle and 10% a complication. Of the complications, 6 (4%) were minor, 5 (3.5%) major not interfering with the goals of treatment and 4 (3%) major interfering with treatment goals (including the 2 patients with non-union and 1 who underwent amputation as well as 1 significant mal-union). This will increase to 4% if the 2 delayed unions fail to unite. Overall 56% reported good or excellent ankle scores at last report, 28% fair and 16% poor. Closed, extra-articular and non-43C3 fractures had better functional outcome scores than open, intra-articular and 43C3 fractures respectively.

Conclusions: This study demonstrates a high union and low serious complication rate, suggesting that external ring fixation is a safe and effective treatment for these injuries.

Congenital absence of the fibula: outcome of amputation or extension prosthesis in the management of severe lower limb deformity.

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Purpose: This study compares outcomes in patients with complete congenital fibula absence treated with an amputation protocol to those using an extension prosthesis.

Background: Complete fibula absence presents with significant lower limb deformity. Parental counselling regarding management is paramount in achieving the optimum functional outcome. Amputation offers a single surgical event with minimal complications and potential excellent functional outcome.

Method: 32 patients were identified. 9 patients (2M: 7F, median age at presentation of 22yrs) utilized an extension prosthesis. 23 patients (16M: 7F, median age at presentation of 10 months) underwent 25 amputations during childhood: only two underwent tibial kyphus correction. Mobility was assessed using SIGAM and K scores. Quality of life was assessed using the PedsQL inventory questionnaire; pain by a verbal severity score.

Results: 19 Syme and one Boyd amputation in 19 patients were performed early (mean age 15 months). 4 Syme and one trans-tibial amputation in 4 patients took place in older children (mean age 6.6 years).

K Scores were significantly higher (mean 4 versus 2) and pain scores lower in the amputation group allowing high impact activity compared to community ambulation with an extension prosthesis. The SIGAM and PedsQL scores were all better in the amputation group, but not significantly so.

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Conclusions: Childhood amputation for severe limb length inequality and foot deformity in congenital fibula absence offers excellent short term functional outcome with prosthetic support. The tibial kyphus does not need routine correction and facilitates prosthetic suspension. Accommodative extension prostheses offer reasonable long term function but outcome scores are lower.

Frame Assisted Radial Head Reduction in Children.

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² Sheffield Children's Hospital

Background: Chronic acquired radial head dislocations pose a complex problem in terms of surgical decision making, especially if surgery has already previously failed. There are several underlying causes that should be investigated, including previous trauma resulting in a missed Monteggia fracture.

Aim: To review the clinical and radiological outcomes for children up to 18 years of age, with a radial head dislocation treated with circular frame surgery.

Method: A retrospective study was designed to identify patients from our departmental database who had undergone circular frame surgery to reduce the radial head during the past 6 years.

Results: 20 patients were identified with a mean age of 11 years (3 -17). Fourteen patients had a diagnosis of missed Monteggia fracture, three

patients had Hereditary Multiple Exostoses, one had Nail Patella syndrome, one had Osteogenesis Imperfecta and one had rickets. The average delay between trauma and frame surgery was three years (0 - 7). All patients achieved union of their ulnar or radial osteotomy. The average frame duration was 167 days (61 - 325) and complications included delayed union and residual radial head subluxation. Thirteen patients achieved at least 40 degrees of supination, and 10 patients achieved at least 40 degrees of pronation. Eighteen patients achieved an arc of movement from full extension to at least 110 degrees of flexion. Eleven patients reported their pain level at final follow-up, of which 9 had no pain at all.

Conclusions: Circular frame surgery was a reliable and consistent method of reducing chronic radial head dislocations and improving function. Radiological appearances of mild residual subluxation of the radial head were clinically well tolerated and generally required no further treatment.

Retrieval Analysis of the Precice Limb Lengthening System.

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Background: The Precice nail is the latest intramedullary lengthening nail with excellent early outcomes. Implant complications have led to modification

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of the nail design. The aim of this study was to perform a retrieval study of Precice nails following lower limb lengthening. To assess macroscopic and microscopic changes to the implants and assess differences following design modification, with identification of potential surgical, implant and patient risk factors.

Method: 15 nails were retrieved from 13 patients following lower limb lengthening. Macroscopic and microscopic surface damage to the nails were identified. Further analysis included radiology and micro-CT prior to sectioning. The internal mechanism was then analysed with Scanning Electron Microscopy and Energy Dispersive X-ray Spectroscopy to identify corrosion.

Results: 7 male and 3 females underwent 12 femoral lengthenings, 9 antegrade and 3 retrograde. 3 females underwent tibial lengthening. All patients obtained the desired length with no implant failure and full regenerate consolidation.

Surface degradation was noted on the telescopic part of every nail design, less on the latest implants. Microscopic analysis confirmed fretting and pitting corrosion. Following sectioning black debris was noted in all implants. The early designs were found to have fractured actuator pins and the pin and bearings had evidence of corrosive debris. The latest designs had evidence of biological deposits suggestive of fluid ingress within the nail.

Conclusions: This study suggests fluid ingress occurs with every generation of Precice nail despite modifications. The presence of biological fluid could be an early warning sign of potential

corrosion. This in theory could lead to actuator pin fracture and implant failure. The clinical relevance is the potential re-use of a “dormant” nail in patients requiring secondary limb segment lengthening. Retraction of the nail in-situ and re-use for further lengthening requires careful consent for potential implant failure.

‘Rail and Nail’ – Bifocal Management of Femoral Non-Union.

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²The Royal London Hospital, Barts Health NHS Trust, London

Background: The management of a significant bone defect following excision of a diaphyseal atrophic femoral non-union remains a challenge. Traditional bone transport techniques require prolonged use of an external fixator with associated complications. We present our clinical outcomes using a combined technique of acute femoral shortening, stabilised with a deliberately long retrograde intramedullary nail, accompanied by bifocal osteotomy compression and distraction osteogenesis to restore segment length utilising a temporary monolateral fixator.

Method: 9 patients underwent the ‘rail and nail’ technique for the management of femoral non-union. Distraction osteogenesis was commenced on the 6th post-operative day. Proximal locking of the nail and removal of the external fixator was performed approximately one month after length had been

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restored. Full weight bearing and joint rehabilitation was encouraged throughout. Consolidation was defined by the appearance of 3 from 4 cortices of regenerate on radiographs.

Results: 7 males and 2 females of adult age underwent treatment between 2009 and 2016. The mean lengthening was 6.6cm (3-10cm). The external fixator was removed at a mean 123 days (57-220), with an external fixation index of 20 days/cm. The regenerate healing index was 28 days/cm. There were no deep infections. Significant complications were seen in 4 patients including knee stiffness, a foot drop, delayed union of the non-union osteotomy (requiring exchange nailing and bone grafting) and revision nailing due to a prominent proximal tip.

Conclusion: The combined over-sized intramedullary nail and external fixator enables compression of the femoral osteotomy, alignment of the bone and controlled lengthening. Once the length has been restored, removal of the external fixator and proximal locking of the nail reduces the risk of complications associated with the fixator and stabilises the femur with the maximum working length of the nail. This small retrospective study demonstrates encouraging results for this complex clinical scenario.

Ilizarov treatment protocols in the management of infected non-union of the tibia.

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The Limb Reconstruction Unit, Nuffield Orthopaedic Centre, Oxford

Aims: To investigate a treatment

algorithm of various Ilizarov methods in managing infected tibial non-union, using the non-union viability, mobility and segmental defect size to govern treatment choice. Primary outcome measures were infection eradication and union.

Methods: A consecutive series of 76 patients with infected tibial non-union were treated with one of four Ilizarov protocols, consisting of; monofocal distraction (25 cases), monofocal compression (18), bifocal compression/distraction (16) and bone transport (17).

Median duration of non-union was 10.5 months (range 2-546 months). All patients underwent at least one previous operation, 36 had associated limb deformity and 49 had non-viable non-unions. Twenty-six cases had a new muscle flap at the time of Ilizarov surgery and 24 others had pre-existing flaps reused.

Results: Infection was eradicated in 74 cases (96.1%) at a mean follow-up of 42 months (range 8-131). Both infection recurrences were in the monofocal compression group. Union was achieved in 66 cases (86.8%) with the initial Ilizarov method alone. Union was highest amongst the monofocal distraction and bifocal compression/distraction groups, 96% and 93.8% respectively.

Monofocal compression was successful in only 77.8% of mobile non-unions. Bone transport secured initial union in 76.5% with a 47% unplanned reoperation rate. However, following further treatment union was 100% in the bone transport group compared to 88.9% in the monofocal compression group. Six cases sustained a refracture, with 5/6 occurring in the monofocal

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compression group, representing a 27.7% refracture rate. ASAMI scores were also significantly lower for the monofocal compression group with only 55.6% and 66.7% achieving 'excellent' or 'good' outcomes in the bone and functional domains, respectively.

Conclusion: We do not recommend monofocal compression in the treatment of infected, mobile non-unions. Distraction (monofocal or bifocal) was more effective achieving higher rates of infection clearance, lower refracture rates and better ASAMI scores.

The epidemiology of patients in a limb reconstruction service.

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Trust, Merseyside

Background: Limb reconstruction requires high levels of patient compliance and impacts heavily on social circumstances. The epidemiology and socioeconomic description of trauma patients has been well documented, however no study has assessed the epidemiology of limb reconstruction patients. The aim of this project is to describe patients attending Limb Reconstruction Services (LRS) in order to highlight and address the social implications of their care.

Method: All LRS cases under a single surgeon in a district general hospital were included from 2010 - 2016. Demographics, ASA grade, smoking status, mental health status and employment status were collated. Postcode was converted into an Index of Multiple Deprivation score using GeoConvert® software. Patient

socioeconomic status was then ranked into national deprivation score quintiles (quintile 1 is most affluent, quintile 5 is most deprived). Deprivation scores were adjusted by census data and analysed with Student's T-test. The distance from the patient's residence to the hospital was generated through AA route planner®. Patient attendance at clinic and elective or emergency admissions was also assessed. Patient outcomes were not part of this research.

Results: There were 53 patients, of which 66% (n=35) were male, with a mean age of 45 years (range 21-89 years). Most patients were smokers (55%, n=29), 83% (n=42) were ASA 1 or 2 (there were no ASA 4 patients). The majority of indications were for acute trauma (49%), chronic complications of trauma (32%), congenital deformity (15%) and salvage fusion (4%). Mental health issues affected 23% (n=12) of cases and 57% of working-aged patients were unemployed. Mental health patients had a higher rate of trauma as an indication than the rest of the cohort (93% vs. 76%). Deprivation quintiles identified that LRS patients were more deprived (63% in quintiles 4 and 5 vs. 12% of 1 and 2), but this failed to reach statistical significance (p=0.9359). The mean distance from residence to hospital was 12 miles (range 0.35-105 miles, median 7 miles). The patients derived from a large region made up of 12 local authorities. There was a mean of 17 individual LRS clinic attendances per patient (range: 3-42). Cumulative distance travelled for each patient during LRS treatment was a mean of 495 miles (range 28 - 2008 miles). The total distance travelled for all 53 patients was over 26,000 miles.

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Conclusion: The results largely mirror the findings of trauma demographic and socioeconomic epidemiology, due to the majority of LRS indications being post-traumatic in this series. The high rates of unemployment and mental health problems may be a risk factor for requiring LRS management, or may be a product of the treatment. Clinicians may want to consider a social care strategy alongside their surgical strategy and fully utilise their broader MDT to address the social inequalities in these patients. This strategy should include a mental health assessment, smoking cessation therapy, sign-posted support for employment circumstances and a plan for travel to the hospital. The utilisation and cost of ambulance services was not possible with this methodology. Further work should prospectively assess the changes in housing circumstances, community healthcare needs and whether there was a return to employment and independent ambulation at the end of treatment.

Patterns of acute referrals for limb reconstruction, and recommendations.

N Mehta, B Narayan

Royal Liverpool & Broadgreen University Teaching Hospitals

Background: Care of complex and open fractures may provide better results if undertaken in larger units, typically Major Trauma Centres (MTCs) or Orthopaedic units. Some 'complex injuries' may still be admitted to units lacking specialist services potentially delaying definitive treatment. The aim of this study was to analyse the referral pattern for acute inpatient transfer in an

adult limb reconstruction unit for one calendar year.

Methods: Prospectively collected data from an electronic database for 2016 was reviewed. All records were evaluated for, diagnosis, time from injury to referral, nature of initial treatment, time to transfer, details of definitive surgery, and time to repatriation.

Results: There were 91 formal electronic referrals, 84 of which considered appropriate for inpatient transfer. 74 were for fresh complex fractures, including 22 pilon fractures and 23 bicondylar tibial fractures. Median delay to request transfers for acute trauma was 3 days (0d-19d), delay from referral to transfer was 8.5 days (1d-31d) and delay from date of injury to definitive surgery was 13 days (1d-52d). 9 patients with Grade 3 open fractures and had primary debridement at the referring institution with a median delay to definitive orthopaedic surgery of 9 days (5d-20d). Only 17 of 61 peri-articular fractures had spanning external fixation at the referring institution. Delay to repatriation was 8 days (0d-72d).

Conclusion: This study demonstrates organisational failures in acute orthopaedic care: open fractures not being primarily treated in orthopaedic centres or MTCs, delays in transfers due to bed-blocks, and significant delays in repatriation. It also demonstrates scope for improvement in clinical practice, and in particular, the need to reinforce the advantages of spanning external fixation of periarticular fractures.

Implications: Our data serves to highlight continuing problems in delivery of acute fracture care, despite widely publicised recent national guidelines.

ABSTRACTS

Development of the Chertsey Outcome Score for Trauma (COST).

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Background: Patient Reported Outcome Measures (PROMs) are used as outcome of many surgical treatments such as Hip and knee joint replacements, varicose vein and groin hernia surgery. Outcome scores in orthopaedics tend to be site and/or pathology specific. Trauma related pathology uses a surrogate outcome scores. A unified outcome score for trauma is needed to help with the measurement of outcomes in trauma patients and evaluate the actual impact that trauma inflicts to patients' lives.

Methods: We have designed a PROM especially for Trauma patients, in order to measure the extent of recovery to pre-injury state. This score uses as baseline the pre-injury status of the patient and has the aim to determine the percentage of rehabilitation after any form of treatment. This PROM is not site specific and can be used for every Trauma condition. It uses simple wording, user friendly and accessed via phone conversation.

The outcome score consists of eleven questions. The first ten questions use the 5-point Likert scale and the final question a scale from zero to ten. The questions are divided into three subgroups (Symptoms, Function and Mental status). The final question assesses the extent of return to pre-injury status.

The SF-12v2 questionnaire was used for the validation of the COST questionnaire.

We gathered COST and SF-12v2 questionnaires from patients who were at the end of their follow-up after treatment for various trauma conditions, treated either conservatively either operatively.

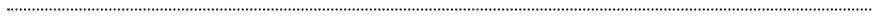
Results: A total of 50 COST questionnaires were gathered in our outpatients department. The participants were 33 male and 17 female patients (aged 44.2 ± 18.9 years) and the questionnaires collected at mean 9.7 months post-injury. A Cronbach's Alpha value of 0.89 was identified for the whole construct. The three dimensions of the scale had good internal consistency as well (Cronbach's Alpha test values 0.73, 0.85 and 0.81 for symptoms, function and mental status respectively). Strong/moderate correlation (Spearman's Rho test 0.45-0.65) was observed between the respective physical/mental dimensions of the COST and SF-12v2 questionnaires.

Conclusion: There is a need for a specific PROM for Trauma pathology which is not site specific and easy to use and understand. COST is a useful tool to Trauma surgeons to measure the outcomes of their patients and has high internal consistency.

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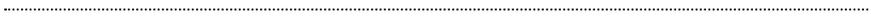
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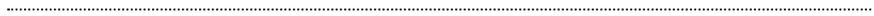
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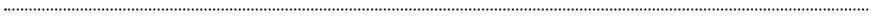
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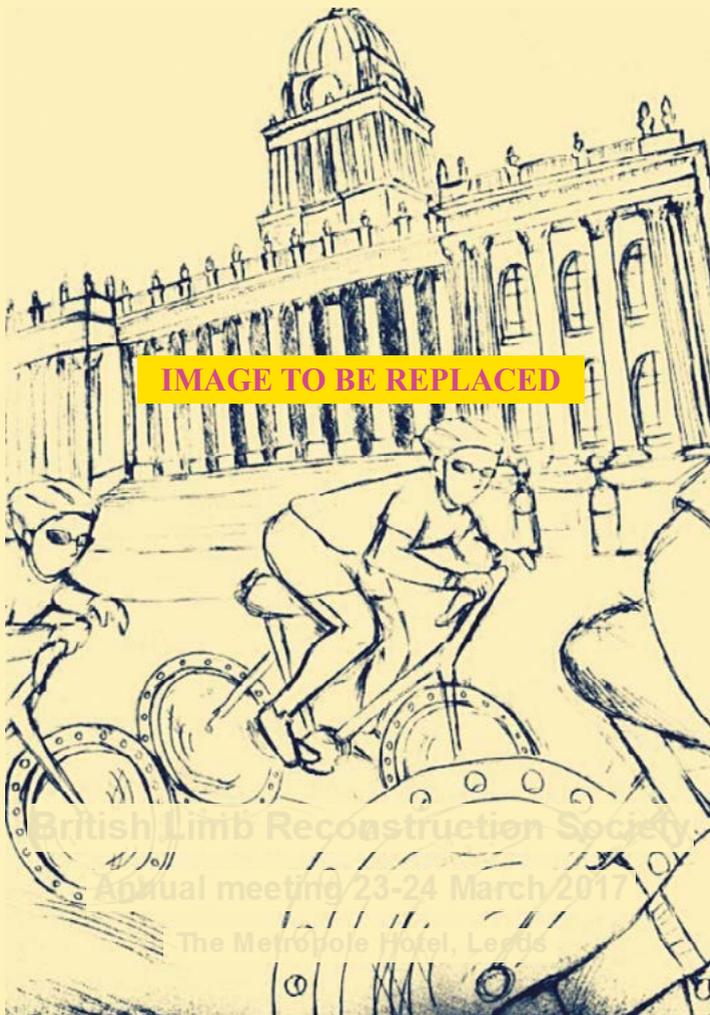
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