

**Journal Club:** 5 April 2013

**Chairmen:** Mr BA Rogers & Mr DM Ricketts

**Attendees:** BA Rogers-Cons, DM Ricketts-Cons, V Voon-SpR, S Yousaf-SpR, J Timms-F2, W Kieffer-SpR, K James-SpR, E Lindisfarne-SpR, P Bowles-CT1, J McGavin-JCF, C Savage-F1, E Maynarol-F1, I Machanas-Clinical Fellow

Department of Trauma & Orthopaedics  
Brighton & Sussex University Hospitals

**Theme:** Adult Lower Limb Trauma

### Presented Papers

**1. Unilateral lower limb loss following combat injury: Medium-term outcomes in British military amputees**

P. M. Bennett, I. D. Sargeant, M. J. Midwinter, J. G. Penn-Barwell  
*Bone Joint J* 2013;95-B:224-229.

**2. Severe open tibial fractures in combat trauma: Management and preliminary outcomes**

J. G. Penn-Barwell, P. M. Bennett, C. A. Fries, J. M. Kendrew, M. J. Midwinter, and R. F. Rickard  
*Bone Joint J* 2013;95-B:101-105.

**1. Unilateral lower limb loss following combat injury: Medium-term outcomes in British military amputees**

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**Reviewer:** Mr Ed Lindisfarne

### Summary

#### Purpose

In British service personnel with unilateral lower limb amputation, to describe:

- Injuries
- Treatment
- Outcomes

#### Methods

- Inclusion criteria:
  - March 2004 - March 2010
  - UK Military Trauma Registry
  - Primary, unilateral lower limb amputation
- Exclusion criteria:
  - Ankle or below amputation
  - Amputation >7days after injury
- SF-36 questionnaire

- Other Outcomes:
  - NISS scores
  - Number of procedures per limb
  - Critical care stay
  - Physical/mental/pain components
  - Self –declared ability to walk 500m
  - Unplanned re-admission

## Results:

- Injury: 48 patients total
  - 21 trans-tibial (TT)
  - 9 knee disarticulation (KD)
  - 18 trans-femoral (TF)
- New ISS:
  - Median 24 (mean 27.4 (9-75))
  - Higher in patients with more proximal amputation
- No of procedures:
  - Median 4 (mean 5 (2-11))
- Critical care stay:
  - Mean 4.9 days (SD 6.3)
- Walking distance/pain/mental component:
  - No difference between three groups
- Physical Component score of SF36:
  - declined significantly for more proximal amputation level
- Follow up period:
  - mean 40 months (25-75; SD 16)

## Conclusion

Quality of life is largely related to the performance of the functional unit...of the prosthesis and the residual limb

Superior quality of life outcomes occur in patients with longer residual limbs

## Critique

### Overview

- Is this a Case Series or a retrospective cohort study?
- Does not meet criteria for either:
  - Case Series: should not pretend to prove a hypothesis
  - Retrospective Cohort: should attempt to control for bias in results

### Strengths

- 1<sup>st</sup> study of this kind:
  - compares level of amputation in combat injuries
- Good length of follow up
- High energy trauma patients (not chronic vascular insufficiency)

### Methodological Concerns

- Case Series or Cohort study?
- Appears to conclude they support a hypothesis that is not mentioned in the abstract or introduction
- 9 lost to follow up
- Arbitrary 7 day cut off for “primary” amputation
- Other injuries?

–Contralateral limb/ Soft tissue: perineal/genital?

•No attempt to control for difference between the Transfemoral (TF)/Knee Disarticulation (KD)/Trans Tibial (TT) groups

–E.g. in physio/ employment/ time since injury

•TF group : wide range of differences between above knee/ below hip

•Mean used instead of median for non-parametric data

•Incorrect data

Graph p227 and NISS data p226, also mean & median for number of surgical procedures is different in abstract and text (p226)

### **Conclusion of Critique**

•Interesting article

•Conclusions are not justified

•Limited application

•What is the NEW take home message for us in a trauma centre?

–Longer leg length gives better function

•But is this new?

•Could they have focussed on new techniques?

e.g. Skin grafts/plastics to maximise leg length?

## **2. Severe open tibial fractures in combat trauma: Management and preliminary outcomes**

J. G. Penn-Barwell, P. M. Bennett, C. A. Fries, J. M. Kendrew, M. J. Midwinter, and R. F. Rickard  
*Bone Joint J* 2013;95-B:101-105.

**Reviewer:** Mr Victor Voon

### **Summary**

#### **Purpose**

•Characterize the pattern of severe open tibial fractures in combat settings

•Identify factors associated with poor outcome 12 months post injury

–Revision, bone grafting, and amputation after the 3rd surgical episode

#### **Methods**

•Retrospective study from coding department

•Data from United Kingdom Military Joint Theatre Trauma Registry (JTTR) from 1/4/2006 – 30/9/2010 (53 months)

•Inclusion

–All patients admitted to British military medical facilities

–Patients demographic, injury, surgical management

–Outcomes at 12 months post injury

•Exclusion

–injuries not involving tibial diaphyseal,

–Injuries classified < Gustillo-Anderson grade 3

–Primary amputation within first 3 surgical episodes

- The following factors were analysed
  - NISS (New injury severity score)
  - Degree of bone loss
  - Fixation (Internal fixation, Ex-fix)
  - Soft tissues coverage (If more than 1 plastic intervention – the most complicated was recorded)
  - Infection (Limb deemed to be infected only when surgical treatment for infection was undertaken)

## Results

### Patterns of Combat trauma

49 patients with 57 tibia  
 Mean age 26 years (19-43)  
 35 patients (71%) blast injury  
 7 patients (14%) had traumatic amputation of contralateral leg  
 3 patients (5%) had contralateral closed tibia #  
 27 limbs (47%) 4 compartmental fasciotomies  
 40 limbs (70%) initially stabilised with external fixator, the remaining 17 by plaster of Paris  
 Median number of orthopaedic and plastic procedures per limb was 3 (2-8)

### Outcomes

- In 12 months
  - 44 patients (52 tibiae) – 5 incomplete data
- 26 (50%) achieved union, or progressing clinically or radiologically towards union according to the surgeon
- 19 fractures (36%) had been revised
  - Failure of fixation or non-union
- 7 fractures (13%) required amputation due to
  - Ischemia (1)
  - Infection (3)
  - Pain/deformity (1)
  - Unsalvageable calcaneal fracture (2)

### Analysis of factors with poor outcome

- Median NISS 22 (4 to 45)
  - Good outcome NISS 19.5 (IQR 10 – 26.75)
  - Bad outcome NISS 22 (IQR 17 – 27)
  - Not statically significant between bad and good outcome (P=0.179)
- Degree of bone loss
  - Nonunion or amputation/revision surgery
  - No statistically significant (P=0.046)
- Definitive fixation
  - 29 fractures (51%) IM nail
  - 14 (25%) Plates and screws
  - Ex-Fix/Conservative the rest
  - Definitive on paper but initial on graph with 57 patients ?typing error
  - No statistically significant (P=1.0)
- Soft tissue coverage
  - SSG 22 fractures (39%)
  - Flap coverage 18 fractures (32%)
  - No statistically significant (P=0.538)

- Deep infection requiring surgical treatment
  - 12 out of 52 fractures (23%)
  - Statistically significant (P=0.008)

### Conclusion

- Poor outcome was associated with deep infection
- Neither NISS/Bone loss/Soft tissue coverage/types of fixation were associated with poor outcome

### Critique

#### Overview

- Did authors achieve purpose of study?
  - Yes they answered what they want but NO the criteria to define it is subjective
- Are the conclusions supported by the data presented
  - Yes, only infection has statistically significant association with poor outcome
- Validity of the data
  - Selection bias
- Data included all patients that have other significant injuries. Author never mentioned any other systemic injuries delaying surgery, etc? (range from 1-51 for definitive fixation)
- GA classification inter and intraobservational variability

#### Strengths

- Satisfactory paper on blast open tibia fracture
- Looking at multitude of factors affecting outcomes
- Highlighted the significance of infection in open Grade 3 tibia fracture

#### Methodological Concerns

- Retrospective study
- Level 4 study (Case series)
- Data from coding department have many inaccuracies. It depends on the quality of coding and what is in the data they collected.
- Power of study is small
- Different surgical techniques, treatments, and surgeons
- Infection is only classified when surgical intervention was involved
  - But it does not mean it is not infected when wound is breaking down?
  - Deep infection mentioned but no mentioned of tissue samples taken
- Validity of the data
  - Treatment bias
- Different surgical techniques, improving surgical techniques, different surgeons affect outcome. The most complicated plastic surgery was recorded ,i.e patient could have SSG then flap but only flap recorded??
- Amputation after 3rd surgical episode (Not an objective data, no evidence to back this up)
- Progressing towards union (Not an objective data, it was a surgeon's opinion)
- It is only considered infected if had any surgical intervention
  - Evaluation bias
- Power of study is small
  - Inter and intra-observer reliability of classification of GA open fracture
  - Looking at multitude of factors will be very time consuming and possibly the small sample
  - This is a group of healthy soldiers and does the finding apply to the general population?
  - Follow up bias
- 12 month follow up is very short
- Not a PROM study

**Conclusion of Critique**

- It answered what they want to get it published
- Data is not statistically significant apart from infection and poor outcomes
- It would need a larger sample to get the power of study and I believe this would change the p-value statistically significant