



# The Journal of Bone & Joint Surgery

**Journal club:** 4 October 2012

**Attendees:** Mr A.Khan, Miss A.Fishlock, Mr G.Hannant, Miss Z.Sun, Dr A.Howard, Mr K.Malhotra, Mr S.Bokhari, Mr S.Hassan

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**Theme:** Trauma - Tibial Fractures

1. **MM McQueen, C Gaebler, V Vecsei, CM Court-Brown.** Reamed versus minimally reamed nailing: A prospectively randomised study of 100 patients with closed fractures of the tibia. *Injury* 2011;42:S4, S17–S21.
2. **C Mauffrey, K McGuinness, N Parsons, J Achten, ML Costa.** A randomised pilot trial of “locking plate” fixation versus intramedullary nailing for extra-articular fractures of the distal tibia. *J Bone Joint Surg [Br]* 2012;94-B:704–8.
3. **JJ Guo, N Tang, HL Yang, TS Tang.** A prospective, randomised trial comparing closed intramedullary nailing with percutaneous plating in the treatment of distal metaphyseal fractures of the tibia. *J Bone Joint Surg [Br]* 2010;92-B:984-8.

1. Reamed versus minimally reamed nailing: A prospectively randomised study of 100 patients with closed fractures of the tibia. **Reviewer Mr G Hannant**

## Summary

### 1. Purpose

To assess whether the clinical effects of reaming are cumulative. To determine if extensive reaming is better than minimal reaming.

## 2. Methods

This European Level 1 trauma centre collected data prospectively from November 1999 to June 2002, the main author having worked at both centres. The oncall surgeon evaluated patient suitability for entry into the trial. Inclusion criteria were all closed diaphyseal tibial fractures in patients aged 18-65 years that could be stabilised within 24 hours of trauma. Those excluded were polytrauma patients, intramedullary canals less than 9 mm, additional lower extremity injuries limiting mobility, brain trauma, massive lung contusion, ARDS, pathological bone conditions, Pagets, patients with terminal diseases, alcoholics and IV drug users. Randomisation was by closed envelopes opened once consented into the trial. The extensively reamed group were reamed up to 12 mm and a 11 mm tibia nail was inserted (Stryker/Howmedica GK nail). The minimally reamed group was reamed to 10 mm with a 9 mm nail. Nails were locked distally without fracture distraction which was countered by back hammering were necessary. Full weight bearing as tolerated began straightaway. Patients were followed up at 4, 8, 12, 16, 26 and 52 weeks with 270 parameter outcomes collected each.

## 3. Results

100 adult patients, 66 males and 34 females, were included with sports being the main source of injury at 28%. 50 patients were in each arm of the trial. Technical complications were low with 2 misdrillings in the extensively reamed group, none in the minimally reamed group. Three cases (6%) had additional fractures with extensive reaming and 7 (14%) with minimal reaming this was not significant even when surgeon seniority was investigated. There were no superficial infections in either group. Compartment syndrome occurred in 11 (22%) of the extensively reamed group and 13 (26%) of the minimally reamed group which was not significant. Statistics showed no significant influence of treatment on compartment syndrome, non-union, union by 16 weeks, time to union, return to activities, prevalence of deep infection, range of motion or pain but a tendency towards earlier healing and less re-operations was noted.

## 4. Conclusions

The Authors believe that there is a tendency for faster fracture healing and earlier return to sports and working activities with more aggressive reaming compared with minimal reaming although no statistical evidence has been produced.

## 5. Critique

This paper aimed to answer a clear question as to which is better between extensive and minimal reaming in tibial fracture nailing but failed to power the study to prove this answer conclusively.

### Strengths

Good comprehensive inclusion and exclusion criteria

Prospective randomised controlled trial

Excellent follow-up

Multiple end points assessed

Functional scoring used

### Methodological Concerns

Lack of power mentioned but no explanation of numbers needed

Carried out at specialist centres

Grades of surgeons discussed but not declared

2. A randomised pilot trial of “locking plate” fixation versus intramedullary nailing for extra-articular fractures of the distal tibia. **Reviewer: Zoe Sun**

## Summary

### 1. Purpose

Assess functional recovery after open reduction and internal fixation with “locking plate” compared with intra-medullary nail for extra-articular tibial fractures.

### 2. Methods

Prospective randomised controlled trial of locking plate or intra-medullary nail for adults with closed extra-articular distal tibial fracture.

Functional outcomes measures assessed using validated questionnaires, primary outcome measure - Disability Rating Index (DRI - functional disability for climbing stairs, running). A difference of 8 points represents difference between ‘healthy’ and ‘minor disability’.

### 3. Results

24 patients were randomised, 12 in each treatment group, well balanced for gender, BMI and baseline DRI. Mean DRI at 6 months was 32.1 (95% CI 15.4-54.2) and 39.2 (95% CI 24.2- 54.2) for

IM nail and plate respectively  $p=0.498$ . At 12 months, mean DRI was 23.4 (95% CI 4.2-42.6) and 27.3 (95% CI 9.2-45.2) for IM nail and plate respectively  $p=0.493$ , both in favour of IM nail. Difference in mean DRI at 6 months was 7-points, the age adjusted difference in mean DRI score was 13 -points.

#### **4. Conclusions**

There may be clinically meaningful differences in functional outcome between the two treatment groups, in favour of the IM nail, which are not statistically significant, note the small sample size. This provides rationale for a further larger trial.

#### **5. Critique**

##### **Strengths**

Robust randomisation and blinded assessment of outcomes

Validated outcome measures

Rationale for statistics given, thorough and relevant analysis

Intentions of study clear and weaknesses addressed

##### **Methodological Concerns**

Small sample size, but pilot study which will lead onto larger trial.

- 3.** A prospective, randomised trial comparing closed intramedullary nailing with percutaneous plating in the treatment of distal metaphyseal fractures of the tibia. **Reviewer: Karan Malhotra**

#### **Summary**

##### **1. Purpose**

To compare the outcome in terms of fracture healing and mobility of Intramedullary Nailing (IMN) of distal tibial fractures vs Minimally Invasive Plate Osteosynthesis (MIPO). To also compare the operating time, and radiation exposure in these patients. Hypothesised that IMN patients would recover better than patients with MIPO.

##### **2. Methods**

Randomised control trial over a 3 year period at a single centre. Exclusion criteria applied and no further exclusions after randomisation. Standard techniques used for IMN and MIPO. Only

included fractures with a distal fragment length of at least 3 cm. Some patients requiring MIPO had delayed surgery due to swelling. Standardised intra-operative and post-operative care according to local protocols

### **3. Results**

111 patients included, 44 IMN and 41 MIPO followed-up for one year after surgery. No statistical difference in union times. Patients with IMN had slightly higher pain scores but slightly better functional scores on AOFAS. No statistical difference in wound complication incidence. Significantly shorter operating times and radiation exposure in the IMN group vs MIPO (81.23 mins vs 97.9 mins and 2.12 mins vs 3.0 mins). Metalwork removed in 84.1% of IMN and 92.7% MIPO - not statistically significant.

### **4. Conclusions**

Authors concluded no real difference between fracture healing or outcome in IMN vs MIPO but showed significantly shorter operating times and radiation exposure in IMN groups. Their preference is therefore to use IMN where possible.

### **5. Critique**

#### **Strengths**

Equal distributions between groups

Looked at a specific question

Randomised control trial

Answered their study question

#### **Methodological Concerns:**

Unclear how patients were randomised - ? selection bias

Study power not reported

#### **Overall Conclusions**

These three papers offer support for the use of reamed IM nails for the treatment of closed tibial shaft fractures. Results demonstrated faster healing times with reamed nails (not significant), plus improved clinical outcome and shorter operating times with IM nails when compared with plate fixation.