Audit changes practice;

Simple education intervention can lead to better outcome for ankle fractures undergoing surgery

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No conflicts of interest
Aim of study

• To assess the quality of anatomical reduction and internal fixation in ankle fractures (primary)

• To identify fixation failure or revision surgery within 12/52 post-op (secondary)
Study design

Methodology

- **Audit closed loop:**
  - Audit Phase 1: retrospective, 114 cases
  - Audit Phase 2: prospective, 72 cases

- **Variables:**
  - Demographic (age, gender)
  - Fracture morphology
  - Time to theatre (within 24, 24-48 or > 48 hours)
  - Pre/ post-op radiographs (2, 6 & 12 weeks)

Selection criteria

- **Inclusion:**
  - Unstable ankle fractures underwent ORIF

- **Exclusion:**
  - Age <16
  - Posterior malleolus > 25 %
  - Weber A
  - Open fractures with bone loss
  - Pathological fracture
  - Revision surgery
  - No initial or follow-up radiographs
Radiological parameters
(assessment of quality of reduction)

Pettrone’s criteria
(medial clear space/ syndesmosis):

Weber’s dime test
(Fibular length/ rotation):
Results (Phase 1)

Fracture patterns

- Fibular fractures (Weber)
  - B 68
  - C 46

- Medial malleolus 63%

- <25% posterior malleolus 24%

- + Syndesmostic disruption 31%

- Overall malreduction 25% (29/114)
  - inadequate fibular length (Weber’s dime) 10%
  - inadequate Pettrone’s criteria 11%
  - inadequate in both 4%
Interventions

- Intervention in the form of teaching session at post-graduate teaching and poster development

- Information delivered at consultants’ meeting

- Re-audit of quality of ankle fracture fixation
Results (Phase 2)

Fracture patterns

- Fibular fractures (Weber)
  - B 43
  - C 29

- Medial malleolus involved 48% (38/72)

- <25% posterior malleolus involved 22% (15/72)

- + Syndesmotic injury 27% (19/72)
Results (Phase 2)

- Overall malreduction = 9 out of 72 (12.6%)
  - 4 inadequate fibular length (Weber’s dime test)
  - 3 inadequate Pettrone’s criteria
  - 2 inadequate in both
Results

• Malreduced ORIF in phase 1 study → 25%

• *After implementation of interventions:*  
  – Malreduction reduced to → 12.6% *(Chi² test; p<0.003)*

• No significant correlation between:  
  – Age, gender, time to surgery AND fixation failure

• Inter-observer reliability *(mean kappa):*  
  – Phase I: 82% (78–84)  
  – Phase II: 79% (73–86)
Discussion

- Malreductions were more likely to occur in complex fractures with syndesmotic injuries

- Simple education intervention leads to better results

- Pettrone’s criteria + Weber’s Dime test → a reliable and reproducible tool to assess the quality of surgical fixation
• Pettrone et al, Quantitative criteria for prediction of the results after displaced ankle fractures; JBJS (Am) 1983.

• Molloy et al, Outcome following the failed anatomical reduction of ankle fracture; BOFAS 2013.

• Dattani et al, Injuries to the tibiofibular syndesmosis; JBJS (Br) 2008.


• Gardner et al, Malreduction of the tibiofibular syndesmosis in ankle fractures; FAI 2006.

• Marmor et al, Limitations of standard fluoroscopy in detecting rotational malreduction of the syndesmosis in an ankle fracture model; FAI 2011.