Controversies: Fractures of the Fifth Metatarsal

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Prem Moras and Andy Jones
Controversies

- Diagnosis and classifying
- Importance of acuity or chronicity of prodromal symptoms
- Incidence and potential cause of delayed and non-unions
- Most optimal method of treatment
Anatomy of the fifth metatarsal

- **Tuberosity avulsion fractures**
- **Jones fracture**
- **Metaphysial-Diaphysial stress fracture**

- **Tuberosity Apophysis (9 – 13yrs)**
- **Os-Peroneum** – within the PB tendon
- **Os-Vesalianum** – proximal to PB attachment
Blood Supply

- Smith JW et al: Intraosseous blood supply and fracture healing
Tuberosity / Avulsion fractures

- Most common

- Mechanism: Foot in Equinus with hind foot inversion

- Only P B tendon sufficiently strong to cause avulsion with inversion or adduction forefoot injury. Anatomical series of 20 dissected specimen; Dameron report

- Transverse fracture through base – avulsion by lateral cord of plantar aponeurosis 1984, Richli and Rosenthal
Avulsion # Treatment

- Large number of papers with low levels of evidence

- Weiner et al 1997
  - RCT of Cast vs Compressive bandaging only
  - No difference in time in support or outcome
  - Time to regain full activity less for bandage group (33 vs 46 Days)
The Jones Fracture

- Acute
- No prodromal symptoms
- Stewart et al: True Jones fracture at junction of the diaphysis and metaphysis
  May involve 4-5 interMT articular facet, but not MT-cuboid joint
- Mechanism: adductor moment across a relatively fixed 4 & 5<sup>th</sup> MT bases causes fracture between insertions of PB & PT
FRACTURE OF THE BASE OF THE FIFTH METATARSAL BONE BY INDIRECT VIOLENCE.

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Some months ago, whilst dancing, I trod on the outer side of my foot, my heel at the moment being off the ground. Something gave way midway down my foot, and I at once suspected a rupture of the peroneus longus tendon. By the help of a friend I managed to walk to my cab, a distance of over 300 or 400 yards. The following morning I carefully examined my foot and discovered that my tendon was intact. There was a slight swelling over the base of the fifth metatarsal bone. I endeavored to obtain crepitus and failed. A finger on the spot gave exquisite pain. Body pressure on the toes, even the slightest, was painful; but when the pressure was deviated to the outer side the pain was still greater. Extension of the ankle and flexion of the toes were immediately felt at the base of the fifth metatarsal.
Jones fracture: evidence

- **Stewart et al**: delayed or non-union associated with non-operative treatment (good number were diaphyseal stress fractures)

- **Dameron et al**: 5 out of 5 treated with bone grafts healed at 8 weeks
  12 of 15 treated by immobilisation healed at 12 months
  3 of 15 treated non-operatively healed at 21 months

- **Kavanaugh et al**: high refracture rate with those treated non-operatively

- **Mark S Myerson, George E Quill, Ortho Clinics of N America**: 75% will heal with prolonged casting. However 1/3 of these managed closed will re-fracture if followed long enough. 25% of all 5th MT base fractures other than tuberosity fractures will not heal with closed treatment. Since 50% (1/4 plus 1/3 of ¾) treated closed will either not heal primarily or will refracture one could make an argument for early surgical intervention.
Proposed treatment

- **Acute, non displaced Jones fracture**
  - NWB short leg cast 6 – 8 wks
  - If no radiographic evidence of healing at 6 wks – Prolonged immobilisation Vs surgery
  - If intramedullary sclerosis and a lucent fracture line - relative indication for surgery

- **Acute Jones fracture displaced**: Early operative treatment

**Surgical options**: closed medullary cannulated screw fixation / tension band wiring / mini-fragment screws and plates that are low profile / cross-pinning with K-wires with further immobilization. +/- bone grafting
Intra-medullary cannulated screw fixation
The Use of External Fixation for Treatment of the Acute Jones Fracture: A Retrospective Review of 10 Cases

Charles M. Lombardi, DPM,1 Fiona G. Connolly, DPM,2 and Alison D. Silhanek, DPM3

The purpose of this retrospective clinical study was to evaluate the clinical outcome of patients who underwent external fixation of acute Jones fractures. There were 10 patients with a mean age of 25.2 years; 9 of the patients were actively involved in athletics. Chart and radiograph review showed the mean clinical and radiographic healing times to be 5.7 and 6.5 weeks, respectively. Patients returned to preinjury activity levels at a mean 9 weeks postoperatively. Complications included 1 case each of localized cellulitis, asymptomatic nonunion, and refracture. Telephone inquiry performed at a mean 46 months postoperatively determined all patients to be pain-free and continuing to participate at their preinjury activity levels. External fixation is quick and easy to perform and provides a viable alternative to intramedullary screw fixation of Jones fractures in the young, active patient. (The Journal of Foot & Ankle Surgery 43(3):173-178, 2004)

Key words: Jones fracture, fifth metatarsal, external fixation

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Shock Wave Therapy Compared with Intramedullary Screw Fixation for Nonunion of Proximal Fifth Metatarsal Metaphyseal-Diaphyseal Fractures

By John P. Furia, MD, Paul J. Juliano, MD, Allison M. Wade, MD, Wolfgang Schaden, MD, and Rainer Mittermayr, MD

Investigation performed at the Evangelical Community Hospital, Milton S. Hershey Medical Center, Hershey, Pennsylvania, and the AUVA Trauma Center, Vienna, Austria
Proximal Fifth MT diaphyseal stress fractures

Devas has defined the stress fracture as a spontaneous fracture of normal bone which results from the summation of stresses, any of which by themselves would be harmless.

Associated with prodromal symptoms

Acute on chronic presentation

Mechanism: Cyclical loading

Reparative responses: cortical stress hypertrophy, narrowing of medullary canal, periosteal reaction
Evidence : fifth MT stress fractures

- Kavanaugh et al reported that 41 percent of the patients in their series with fractures of the fifth metatarsal had prodromal symptoms.

- Zelko and Torg identified in 14 of their 21 patients (67 percent) a lucent fracture line with periosteal reaction at the initial presentation.

- DeLee et al reported a series of athletes who all had a history of prodromal symptoms over the lateral aspect of the foot prior to the acute episode which precipitated presentation to the orthopaedist, roentgenographic evidence of stress phenomenon in all of the fifth metatarsals in the series.
Classification of Stress fractures 5 MT (Torg)

- **Type 1:** acute on chronic, periosteal reaction; prolonged NWB and immobilisation

- **Type 2:** delayed, medullary sclerosis with lucent fracture line; medullary fixation +/- bone grafting

- **Type 3:** established non-union, medullary obliteration; cannulated medullary fixation

Torg et al: popularised inlay autogenous bone graft
Hansen et al: Bone graft + IM screw
George Quill: Series of 35, 14 AT- Closed, 12 JT- IM, 9 DT-IM, Union 6-7wks
### FRACTURES OF THE PROXIMAL FIFTH METATARSAL

<table>
<thead>
<tr>
<th>FRACTURE</th>
<th>MECHANISM</th>
<th>LOCATION</th>
<th>INCIDENCE</th>
<th>EPONYM</th>
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<tbody>
<tr>
<td>Avulsion</td>
<td>Inversion Hindfoot</td>
<td>Tuberosity</td>
<td>Most common</td>
<td>&quot;tennis&quot; fracture</td>
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<tr>
<td>True Jones</td>
<td>Adduction Forefoot</td>
<td>Metaph/Diaphjunct</td>
<td>Uncommon</td>
<td>&quot;Jones&quot;/&quot;Dancer's&quot;</td>
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<tr>
<td>Diaph. Stress</td>
<td>Cyclical Loading</td>
<td>Proximal Diaphysis</td>
<td>Rare</td>
<td>type of &quot;March&quot; fractur</td>
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<tr>
<td>Torq Type I</td>
<td>Narrow fx line</td>
<td>Acute on Chronic</td>
<td>NWB/SLC or Surgery</td>
<td>Fair to Good</td>
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<td></td>
<td>No med sclerosi</td>
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<tr>
<td>Torq Type II</td>
<td>Wide fx line</td>
<td>Delayed Union</td>
<td>Surgery</td>
<td>Variable</td>
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<td></td>
<td>Some med scler</td>
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</tr>
<tr>
<td>Torq Type III</td>
<td>Complete med sclerosis</td>
<td>Nonunion</td>
<td>Surgery</td>
<td>Variable</td>
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