Syndesmotic Ankle Injuries: Diagnosis and Treatment

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Disclosures

• Consultant:
  – Stryker
  – Smith and Nephew
  – Globus Medical
Objectives

• Anatomy and injury

• Clinical and radiographic evaluation

• Reduction and fixation techniques

• Clinical and functional outcome data
Syndesmotic Anatomy

- AITFL
- PITFL
- IO
- ITL/POL

Van Heest et al. JBJS 2014
Osseous Anatomy

- Incisura
  - Ebraheim et. al FAI 1998
- Posterior Malleolus
- Fibula
  - Distal
  - Proximal
Posterior Malleolar Anatomy

- PITFL and ITL/POL attached
- Fx pattern
- When to fix?
  - CT?
  - Size?
  - Instability?

Magnus et al. JOT 2015
Injury

- Injury/pre-reduction films
- Fibula fracture patterns
- Radiographic parameters
- Radiographic exams
  - External rotation stress
  - Gravity stress
Radiographic Diagnosis

• A) Tibiofibular overlap
  – >6mm on AP
  – >1mm on mortise

• B) Tibiofibular clear space: <6mm on AP and mortise

• C) Medial clear space: symmetric

Van Heest et al. JBJS 2014
Provocative Examinations

• Squeeze Test

• External Rotation Stress Exam
  – Medial clear space widening ≥5mm
  – (+) with incompetent deltoid

• Direct lateral (Cotton) Test
  – >2mm fibular displacement
  – (+) with incompetent IOM
2 groups (7 cadaveric pairs)
  1. AITFL → IOL → Deltoid
  2. Deltoid → AITFL
• ER stress and lateral stress
• Lateral stress test w/tib-fib clear space more useful
• Tib-fib overlap less reliable
• Deltoid disruption → med clear space widening
Intraoperative Assessment of the Stability of the Distal Tibiofibular Joint in Supination-External Rotation Injuries of the Ankle

Sensitivity, Specificity, and Reliability of Two Clinical Tests

Harri Pakarinen, MD, Tapio Flinkkilä, MD, PhD, Pasi Ohtonen, MSc, Pekka Hyvönen, MD, PhD, Martti Lakovaara, MD, Iuhana Leppilähti, MD, PhD. and Iukka Ristiniemi, MD, PhD

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- 140 SER ankle fractures
- ER and lateral exams performed after ORIF
- ER: (sens: 0.05, spec: 0.96)
- Lateral (sens: 0.25, spec 0.98)
- Excellent IOR for both
- Sensitivity of tests inadequate to detect syndesmotic instability
Syndesmotic Reduction

- Closed v. open
- Position of foot (Tornetta et. al JBJS 2001)
- Clamp assisted
- Order of fixation
- Remember...the talus follows the fibula
Clamp Reduction/Malreduction

• Common errors:
  – anterior translation
  – rotational
  – over-compression?

• Literature
  – Miller et al. JOT 2013
  – Phisitkul et al. JBJS 2012
Open Reduction

- Anterior
- Posterior
- “Thumb” reduction
- Provisional stabilization
- Imperfect (2009 FAI Miller et al.)
  - 16% ORIF malreduced >2mm
  - 52% fluoro reduction >2mm
Advanced options

Hsu et al. FAI 2013
• 18 consecutive patients
• Uninjured mortise and talar dome
• ORIF using uninjured side as template
• Intra-op CT to confirm reduction
• 17/18 anatomic reduction
Intra-operative Fluoroscopy
Posterior Malleolus Fixation

- Fibular reduction
- Fixation order
- Method of fixation
  - A→P screws
  - P→A screws
  - Plate
- Syndesmosis stability
  (Gardner et al. CORR 2006)
Fixation

- One screw
- Two screws
- Tri- v. Quadricortical
- Stainless steel v Ti
- Locking?
- Bioabsorbable implant
- Suture device (x 1 or x2)
- Suture device + screw
- Trans- v. Suprasyndesmotic
Fixation
Cost

- 3.5mm fully threaded cortical screw (Synthes)
  -$36 (?? >$3k)

- Knotless suture button (Arthrex)
  -$1,258
A Prospective Randomized Multicenter Trial Comparing Clinical Outcomes of Patients Treated Surgically With a Static or Dynamic Implant for Acute Ankle Syndesmosis Rupture

Mélissa Laflamme, MD,* Etienne L. Belzile, MD,† Luc Bédard, MD,‡ Michel P. J. van den Bekerom, MD,§ Mark Glazebrook, MD,‖ and Stéphane Pelet, MD, PhD, FRCSC†‖

J Orthop Trauma • Volume 29, Number 5, May 2015

• 70 pts (34 dynamic / 34 static)
• 12m follow up (1º – OM, 2º – AOFAS, VAS, ROM, RTW, reduction)
• Improvement (p<0.05) for dynamic fixation
  – OM at 12 mo. only
  – AOFAS at 3 mo. only
• No evaluation (CT) of reduction
• Authors conclusion: dynamic fixation superior
Outcomes

- Poorer outcomes with syndesmotic injury
- Increased complication rate
  - Failure of fixation
  - Bothersome hardware
  - Need for revision surgery
- Correlated with syndesmotic reduction
- Improve with static hardware loosening/failure/removal after healing
Common Pitfalls
The Functional Consequence of Syndesmotic Joint Malreduction at a Minimum 2-Year Follow-Up

H. Claude Sagi, MD, Anjan R. Shah, MD, and Roy W. Sanders, MD

*J Orthop Trauma* • Volume 26, Number 7, July 2012

- 68 patients
- Syndesmosis injury, post op CT of both ankles
- SF-MA and OM
- 39% malreduction
  - 15% open
  - 44% closed
- Patients with malreduction did worse (p<0.05)
  - OM
  - SMFA (functional)
• 155 patients
• Single surgeon
• SER and PER IV
• Syndesmotic screw only v. "anatomic" fixation
• No difference in FAOS outcome scores
• Improved reduction (CT) in anatomic group (p<0.05)
Conclusion

• Ankle syndemosis → consistent components w/variable anatomy
• Do not miss the injury
• We are bad at reducing it, even with ORIF
• Fixation can be with static or dynamic fixation
• Clinical evidence supports superior outcomes with anatomic reduction