

Syndesmotic Ankle Injuries: Diagnosis and Treatment

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Disclosures

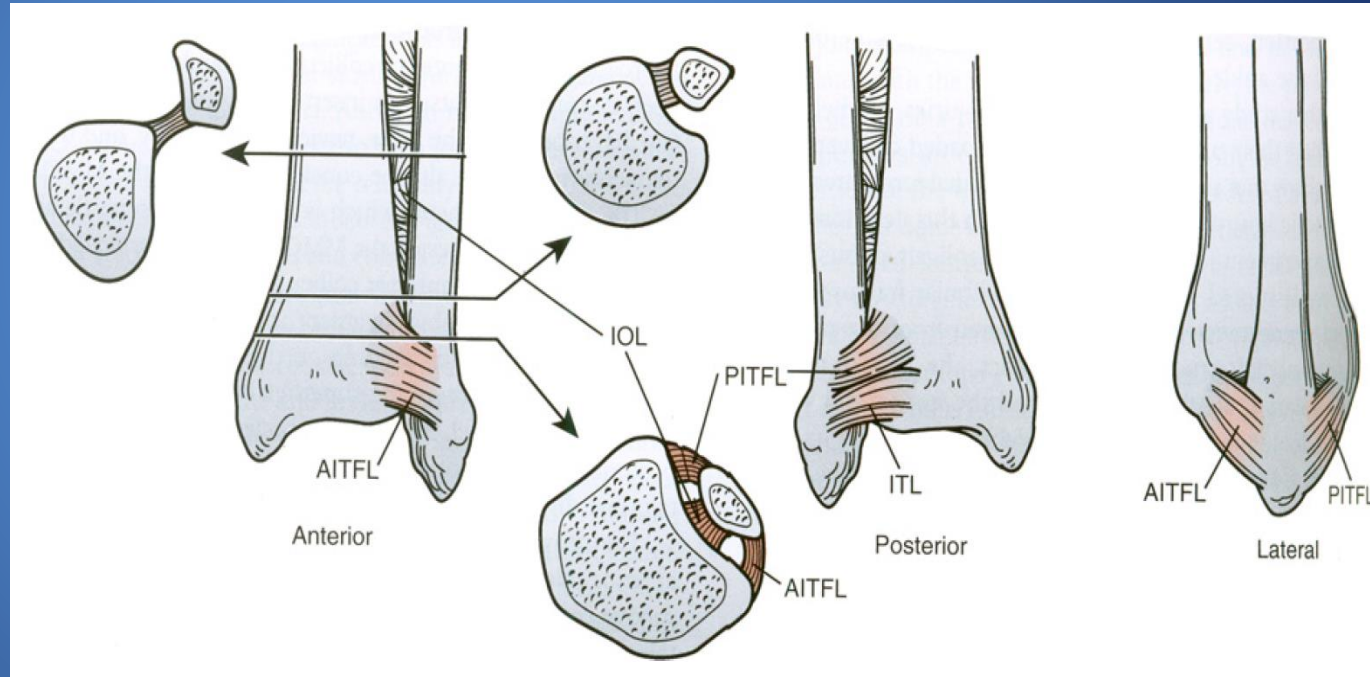
- Consultant:
 - Stryker
 - Smith and Nephew
 - Globus Medical

Objectives

- Anatomy and injury
- Clinical and radiographic evaluation
- Reduction and fixation techniques
- Clinical and functional outcome data

Syndesmotic Anatomy

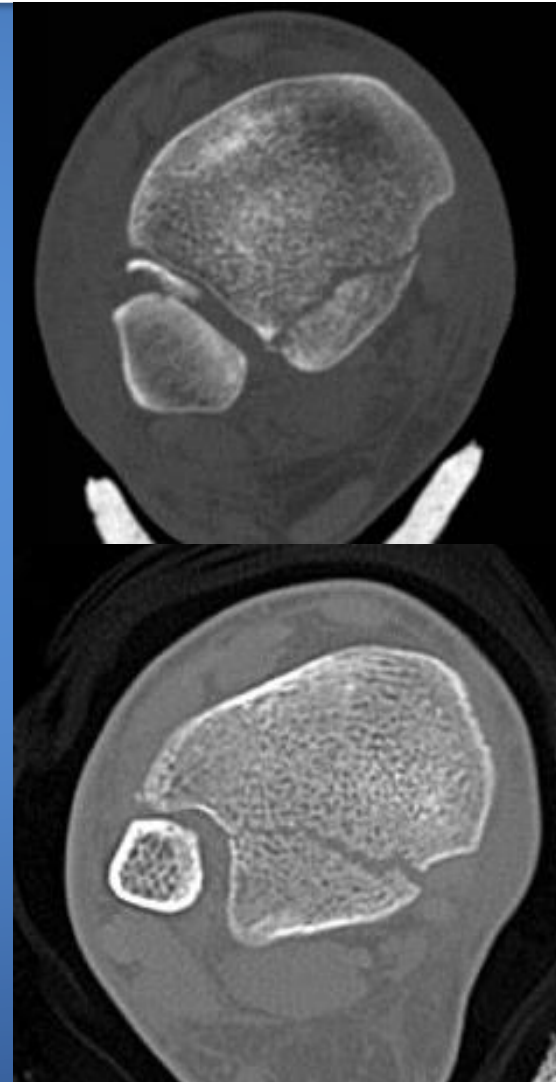
- AITFL
- PITFL
- IO
- ITL/POL



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?



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 $\geq 5\text{mm}$
 - (+) with incompetent deltoid
- Direct lateral (Cotton) Test
 - $>2\text{mm}$ fibular displacement
 - (+) with incompetent IOM

Comparison of Two Intraoperative Assessment Methods for Injuries to the Ankle Syndesmosis

A Cadaveric Study

By Karl Stoffel, MD, PhD, FRACS, David Wysocki, MBBS, Edward Baddour, MBBS,
Rochelle Nicholls, BAppSci, MSc, PhD, and Piers Yates, MBBS(Hons), BSc(Hons), MRCS, FRCS(Tr&Orth)

*Investigation performed at the Department of Orthopaedic Surgery, Fremantle Hospital, Fremantle; and the
Fremantle Orthopaedic Unit, The University of Western Australia, Crawley, Western Australia, Australia*

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VOLUME 91-A • NUMBER 11 • NOVEMBER 2009

- 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, Juhana Leppilähti, MD, PhD, and Jukka Ristiniemi, MD, PhD

THE JOURNAL OF BONE & JOINT SURGERY • JBJS.ORG

VOLUME 93-A • NUMBER 22 • NOVEMBER 16, 2011

- 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



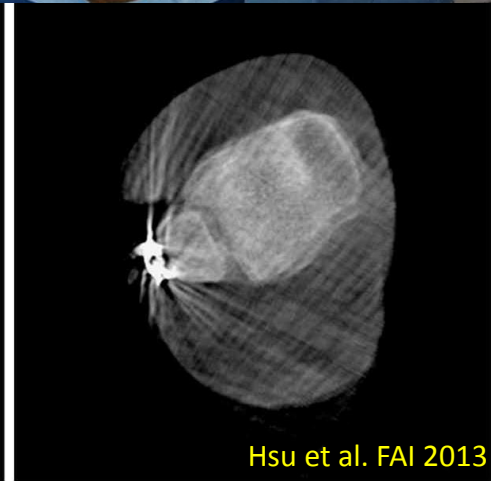
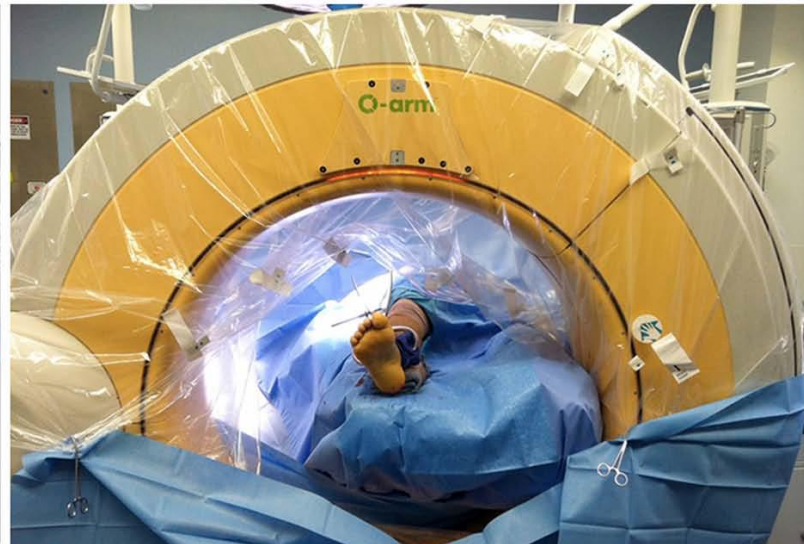
- Common errors:
 - anterior translation
 - rotational
 - over-compression?
- Literature
 - Miller et al. JOT 2013
 - Phisitkul et al. JBJS 2012

Open Reduction

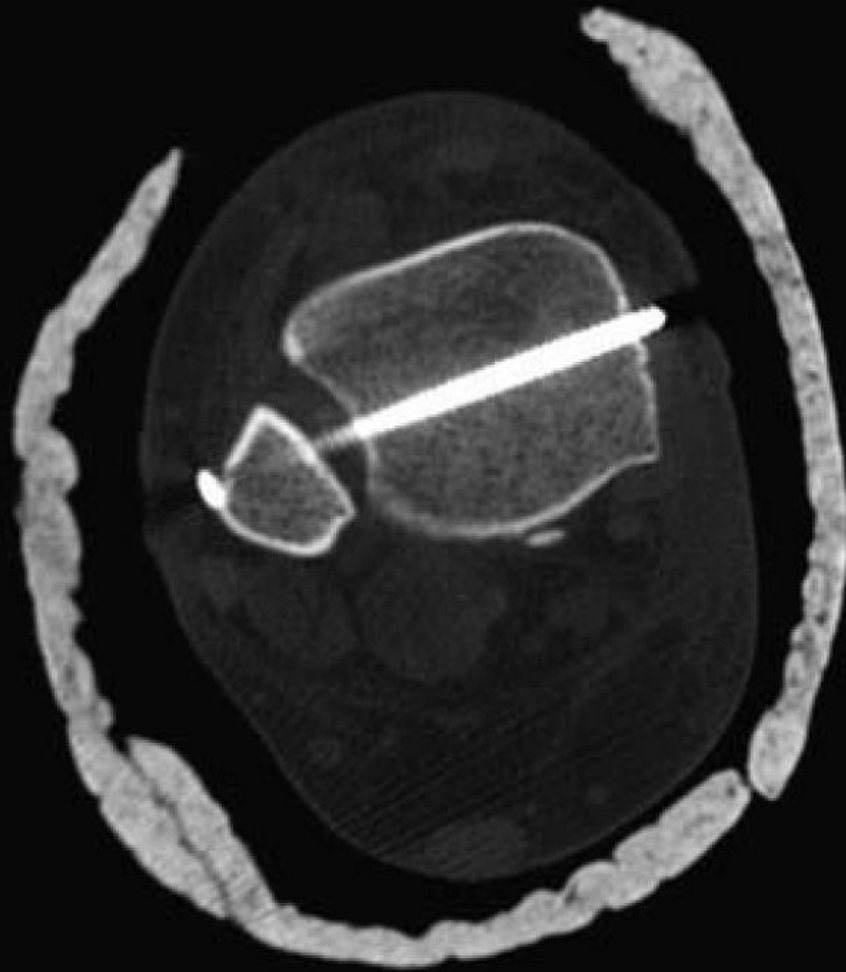
- Anterior
- Posterior
- “Thumb” reduction
- Provisional stabilization
- Imperfect (2009 FAI Miller et al.)
 - 16% ORIF malreduced >2mm
 - 52% fluoro reduction >2mm



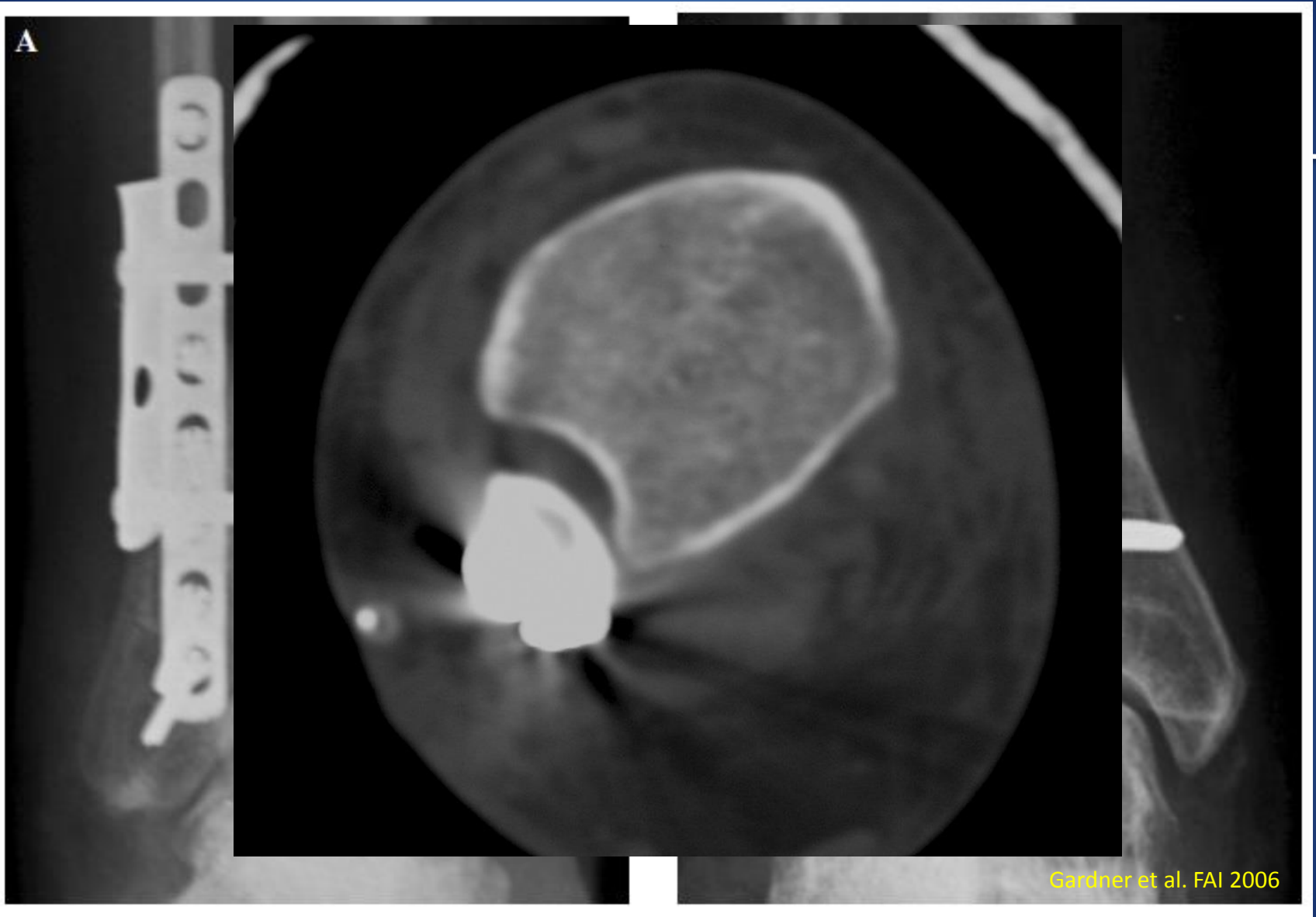
Advanced options



Hsu et al. FAI 2013



Sagi et al. JOT 2012



A Reliable Method for Intraoperative Evaluation of Syndesmotic Reduction

Hobie D. Summers, MD, Micah K. Sinclair, MD, and Michael D. Stover, MD
J Orthop Trauma • Volume 27, Number 4, April 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
 - 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 (1° – OM, 2° – 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)

The Measurement and Clinical Importance of Syndesmotic Reduction After Operative Fixation of Rotational Ankle Fractures

Stephen J. Warner, MD, PhD, Peter D. Fabricant, MD, MPH, Matthew R. Garner, MD, Patrick C. Schottel, MD,
David L. Helfet, MD, and Dean G. Lorch, MD

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VOLUME 97-A • NUMBER 23 • DECEMBER 2, 2015

- 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