Subtalar Dislocations

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Disclosures

• I have no disclosures.

• There are industry pictures/names used in this presentation, taken for representation purposes without bias.

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Roadmap

• Background
• Classification
  – Medial, Lateral, etc
• Evaluation
• Treatment
• Complications
• Case Examples
• Review

Author. Journal, Year. PMID#
BACKGROUND
Subtalar Dislocation

- Dislocation of the articulations of the talus:
  - Talocalcaneal joint
  - Talonavicular joint
  - +/- Talo-crural joint
    - Ankle disruption can occur, but with ankle osseous fracture, the injury is classified “differently”
    - Total talar dislocation different entity

- STJ dislocation = No “fracture”
  - Bony avulsion across STJ typically present due to ligamentous attachments
Other Info...

• ≈ 1-2% of all dislocations
  – 15% of all peri-talar injuries
  – High Energy: MVA (50%), FFH (20-30%), Sport (14%)
• 20-25% Open
  – Lateral > Medial
• 3rd decade; Male > Female (6-10x)
• Up to 45% associated fracture rate (M vs. L)
  – Associated Injuries: OCD, Ankle Fx*, 5MT base fx, Navicular/Cuboid fx
CLASSIFICATION
Broca Classification (1853)

- 1811 – Dufaurest and Judcy (1st description)
- Dislocations can be in 4 main directions (1853, Broca)
  - Medial
  - Lateral
  - Anterior (added 1855, Malgaigne and Henke)
  - Posterior
- Do NOT confuse with Lauge-Hansen/Weber ankle fractures
  - STJ dislocations have NO “fracture(s)”; talus “IN” mortise
- MISC
  - Deltoid ligament frequently ruptures
  - CC ligaments usually remain intact → rupture = Peritalar d/l
<table>
<thead>
<tr>
<th>Classification</th>
<th>Medial</th>
<th>Lateral</th>
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<tbody>
<tr>
<td><strong>Incidence</strong></td>
<td>~85%</td>
<td>~15%</td>
</tr>
<tr>
<td><strong>Foot Position</strong></td>
<td>• Foot/Calc = MEDIAL, to talus; “Clubfoot”</td>
<td>• Foot/Calc = LATERAL, to talus; “Acquired FF” • Toes PFX’d</td>
</tr>
<tr>
<td><strong>Talar Head (Prom.)</strong></td>
<td>• Dorso-LATERAL</td>
<td>• MEDIAL</td>
</tr>
<tr>
<td><strong>MOI</strong></td>
<td>• Forceful INV of PFX’d foot</td>
<td>• Forceful EV of PFX’d foot</td>
</tr>
<tr>
<td><strong>XR / CT</strong></td>
<td>• Foot (nav)/Calc MEDIAL • Talar head SUPERIOR to navicular</td>
<td>• Foot (nav)/Calc LATERAL • Talar head COLLINEAR/OVERLAP med to navicular</td>
</tr>
<tr>
<td><strong>Concomitant Injuries</strong></td>
<td>• TNJ d/l • Fx = talar head, post process; navicular</td>
<td>• TNJ d/l • Fx = cuboid, ant calc process; LTP; talus OCD; fibula</td>
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Broca Classification

Medial

Lateral
Broca – Other

**Anterior (≈ 1%)**
- MOI = traction, hyper-dfx
  - I/O lig tear → posterior facet slides beyond tuber
- Highly unstable → lateral d/l
- XR
  - Talar Post Facet on Calc Tuber
  - “Elongated” foot

**Posterior ≈ 2.5%**
- MOI = Plantar hyper-flexion
  - I/O lig tear → talus dorsal to navicular
- Highly unstable → medial d/l
- XR
  - Talus dorsal to navicular
  - Post Talus in post STJ facet
  - “Shortened foot” on AP
EVALUATION
Physical Exam

- Gross deformity
  - Define: M (vs) L
- Closed (vs) Open
- Ankle/hindfoot pain, swelling
- Limited ROM
- Blisters, Pressure, Necrosis
  - Med d/l = LM, DL talar head
  - Lat d/l = MM, med talar head
- NV Status (pre/post)
- 88% concomitant injuries f/a
Imaging

• XRs (Foot and Ankle)
  – AP = talar head/navicular
  – **MED** d/l= talar head **superior** to navicular
  – **LAT** d/l = talar head **colinear/inferior** to navicular

• CT (up to 60% fxs^)
  – Post-reduction evaluation
  – Associated injuries
    • STJ debris / fragments
  – “Invaluable tool” where in 44% cases, altered treatment course*

*Bibbo C. FAI, 2001. 11354446
^Rammelt S. FACaNa, 2015. 26043242
TREATMENT
Reduction

• Prompt reduction under anesthesia
  – Prevent skin necrosis and NV compromise
  – CR delay may require OR

• Closed vs Open
  – One attempt/session at Closed
  → Trans to operative Open
Non-Operative

• Closed Reduction (60-70% successful)
  – Position
    • (1) Knee flexion / Ankle PFX
    • (2) Distraction, Inc Deformity...then, Reverse Hindfoot...
      – Medial/“Supinated” = Invert, then Eversion/Pronation
      – Lateral/“Pronated” = Evert, then Inversion/Supination
      – Pressure on Talar head, foot in PFX
  – Assess stability post-reduction (stress)
  – Splint (in direction of reduction)
    • NBW x4-6 wks → Progress
      – Medial = 4 weeks
      – Lateral = 6 weeks

• Post-Op CT

• 30% require open reduction
<table>
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<tr>
<th>Surgical (OR)</th>
<th>Medial</th>
<th>Lateral</th>
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<td>~10%</td>
<td>~20%</td>
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**Blocked Reduction**

- TNJ Capsule; Peroneals; Impaction
- PTT (MC @ 40%); FDL/FHL; Flexor Retinaclum

**Incision**

- Ant - med longitudinal over talus
- Manipulate, release interposed tissue

**Post-Op**

- Relatively stable, no IFx
- NWB 4-6 wks → begin A/P-ROM, WB
- More unstable → trans-art pin (TN/STJ)
- CFL reconstruction (?)
- LTP fx = small frag ORIF (2.0-2.7mm)

*Rammelt S. FACNa, 2015. 26043242
Leitner B. JBJSam 1954. 13152139
Pinning Techniques

• **KW v Steinmann Pins**
• **Joints**
  – TNJ, STJ; CCJ?
• **Removal 4 wks**

Figure 8. A 33 year-old with unstable isolated medial TCN dislocation who underwent percutaneous pinning with steiman pins.
Post-Reduction CT

- **Purpose:**
  - Assess reduction
  - Evaluation for:
    - Fractures (LTP, Sust tali, post process, etc)
    - Bony blocks
    - OCDs
- Go back 2° for ORIF of necessary fxs
Open Injuries

• ≈ 25%
• Lateral >> Medial
• More likely 2° fractures
  – Calcaneus, fibula, midfoot
• Lavage → Reduction → Lavage
  – 1°Close vs VAC, DPC
• ExFix Stabilization (tib/met)
  – 4-6 wks
• RT OR 3-5d for Lavage and Closure
Post-Operation Protocols

• In stable injuries:*
  • Medial >> Lateral
    – 3-5d = A/ROM Ankle (P.T.)
    – 3-4 wks = PWB CAM; A/P-ROM Ankle, foot strengthening exercises
    – 5 wk = → FWB CAM
    – 6-7 wks = WBAT ASO
      • DFX/PFX w ltd INV/EV

• In unstable injuries:
  • Lateral >> Medial
    – If joints pinned, remove at 3-4 wks
    – NWB 4-6 wks → begin A/P-ROM, WB

**Imaging at 6-8 wks s/p injury = XR, CT, MRI = Eval for AVN**

*Lasanianos NG. JOT, 2011. PMC3052431
Prognosis

• Purely ligamentous: medial = lateral
• Energy?
  – Low E = up to 100% excellent functional outcome
  – High E = up to 15% “””
• Hoexum and Heetveld et al.
  – N = 329; functional results
    • Good = 52%, Fair = 25%, Poor 23%
COMPLICATIONS
Complications

• Overall 20% rate

• Post-traumatic Arthritis (40-89%^)
  – Mostly to STJ
  – Long term studies = up to 90% STJ / 72% Midfoot radiographic PTA; 15-60% symptomatic PTA*
  – OCDs 80-100%
  – Long term prognosis worse w/ Lateral

*Bibbo C. FAI, 2003. 12627624
^Rammelt S. FACNa, 2015. 26043242
Complications

• AVN
  – Case reported
    • 0-10% closed / up to 50% open
  – Pending talar fx level
  – W/ mortise intact, maintained blood supply
  – Tx = grafting, talectomy, fusion

Rammelt S. FACNa, 2015. 26043242
Complications

• Infection
  – Skin necrosis
  – 30% rate with open injuries
    • Total extrusion → semi-perm ABX/PMMA spacer (?)

• Ligamentous Instability

• Sinus Tarsi Pain

• MISC: Nerve injury (Tib N w lat); CRPS; DVT/PE, Chronic pain; tendon lacerations (PT w lat)
CASE EXAMPLES
A.R. – 48m

- **HPI = s/p MVA**
  - L-Knee pain and foot pain
- **PMH = neg**
- **Ø T/A/D**
- **PE (Lat d/l)**
  - No gross deformity
  - Mild med talar head prominent
  - Ø NV Compromise
  - Pain @ hindfoot, knee
A.R. – 48m
A.R. – 48m

- MRI (4/26/17)
  - Talar subchondral impaction/fx posterior dome
  - Tear = ATFL (FT), CFL (FT), PTFL (G2), Deltoid (PT); TNL (FT), I/O and Cervical (FT)
  - Synd = AITFL/PITFL (G1-2) w mild widening
  - MISC = fibular avulsion fx;
  - Intact = Tendons

- MRI (9/26/17)
  - Talar dome BME resolution
  - New BME Lat Post Facet
  - Chronic Tear = ATFL, CFL, Spring
  - Tendinosis = PB/L
  - Sinus Tarsi = edema/STS
  - Intact = PTFL, Deltoid, Synd, LisF; PT/FDL/FHL
L.L. – 33F

• HPI = s/p MVA
  – L-Arm pain
  – R-Ankle pain
• PMH = neg
• Ø T/A/D
L.L. – 33F

- Phys Exam
  - Ortho = mild gross foot deformity, talar head medial prominent; toes PFSx; gross A-ROM intact
  - Neuro = grossly intact to light touch
  - Vasc = DP/PT palpable and dopplerable
  - Derm = mild visual medial deformity, no pressure skin changes
L.L. – 33F

• Plan:
  – Operative CR
    • Successful OR closed reduction
  – Jones/Posterior Splint
  – Monitor NV and d/c
  – NWB 4 wks, w/ progression through therapy
L.L. – 33F

• CT
  – Small avulsion fractures of post-med/lat talus
  – Talar head impaction fracture
J.C. – 52M

- HPI = s/p incidious onset of LEFT foot pain and deformity
- PMH = DM w neuropathy;
- PSxH = R-5\textsuperscript{th} toe amp
- Ø T/A/D
- PE (LLE)
  - Neuro = diminished
  - Vasc = initact
  - Derm = submet 2 ulcer to SQ; heel ulcer to SQ
  - Ortho = medial bulge hindfoot w local erythema/edema/calor
Then a lot of stuff happened…

- Pin removal, biopsy, splint
- Acute Navicular OM (?)
- Started IV - Abx x 6 - 8wks
- Circular frame
  - “broke” at 4 wks when stepped down once
- Frame removal, splinted, finish IV - Abx
- 2 wks s/p Abx  WBC Scan = appears cleared
- Lost to follow-up
REVIEW
In Review

• Medial >>>> Lateral >>>> Anterior/Posterior
• Full P/E eval w films (XR foot/ankle)
  – Medial much more obvious than Lateral, visually
• Reduction
  – Closed = knee flex, ankle pfx, distract and reverse mechanism/dislocation type
  – Open = sweep away blocking structures
    • Pinning more common in Lateral > Medial
  – CT invaluable / a MUST post reduction
• High rate of STJ & TNJ DJD, both XR and symptomatically
• Prognosis:
  – Lateral worse than Medial (Lateral ↑ er E)
  – I/A fracture = worse prognosis
References

- eORIF. Available at <http://www.eorif.com/subtalar-dislocation-s93316a-83801>
- Musculoskeletal Key. Available at <https://musculoskeletalkey.com/dislocations-of-the-foot/>
- Orthobullets. Available at <https://www.orthobullets.com/trauma/1050/subtalar-dislocations>
- Physiopedia. Available at <https://www.physio-pedia.com/Subtalar_dislocation>
- Wheeles Online. Available at <http://www.wheelessonline.com/ortho/sub_talar_dislocation>
Any Questions?
Thank you

Question?
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