Medial Ankle Instability/Deltoid Ligament Injuries in the Athlete

Robert B. Anderson, MD
Chief, Foot and Ankle Service
Carolinas Medical Center
OrthoCarolina
Assistant Team Orthopaedist,
Carolina Panthers
Charlotte, North Carolina

Disclosures
Wright Medical/Arthrex:
Consultant, Royalties, Research
Amniox: Consultant
DJO: Royalties

No off-label uses of materials are presented during this lecture

Sprain Types
• Types/mechanism
  – Lateral ankle sprains
    • Inversion/plantarflexion mechanism
  – Medial ankle sprains
    • Deltoid ligament injury
      – Eversion injury mechanism
  – “High ankle sprain”
    • Syndesmotic injury
      – Ext rotation mechanism
      – Increasing incidence
**Xray Analysis**

- Usually normal
  - Assess for occult fractures, tarsal coalition, OCD
- Syndesmotic injuries
  - Only helpful if diastasis noted
  - Static test – encourage WB to accentuate
    - Single limb if feasible
    - Compare to contralateral

---

**Xray Analysis**

Need to induce stress to determine instability

- Stress views
- Fluoroscopic = dynamic

---

**Stress Ankle Radiographs**

- Fluoro very helpful *(if positive)*
  - Can be performed in office setting but difficult to get patient relaxed

---
Imaging
• MRI
  Use to determine the degree and extent of the ligament/tendon injury and intra-articular lesions
  *Static test – does not assess instability*

Arthroscopy
• Probably the best diagnostic tool
  – To assess medial = anterior drawer with ext rot
• Very helpful in cases of negative x-ray, positive MRI and protracted recovery with vague pain
• Lu et al. found that arthroscopic evaluation was superior to fluoroscopic stress testing
  – *Arthroscopy* 2005

Treatment: Acute Medial Ankle Sprain
• I prefer to place a cast for one week – WBAT
  – Cast insures compliance
  – Calms things down
  – Keeps trainers away
Treatment: Acute Medial Ankle Sprain

- Injection?
  - PRP/BMAC?
  - Cortisone?
  - 2 NFL studies have shown that it can improve RTP in stable syndesmotic injuries
  - Mansour et al:
    - Inject the AITFL within 72 hours of injury
    - RTP hastened by 11 day avg (44% improvement)

Medial Ankle Sprains

Treatment

- Nonoperative vs. Operative
  - Eversion sprains: always start conservative
  - Take twice as long to recover...
  - R/O syndesmotic involvement
    - Operative if present in association with deltoid

Medial Ankle Sprain

- Bad injury - can develop chronic symptoms and dysfunction
  - Swelling, calcific changes around medial malleolus
  - Tibial neuritis
  - Posterior tib tendinitis
  - Instability (tendon, ligament)
Chronic Medial Ankle Instability

• What is it?
  – B Hintermann
  • Articles, chapters
    – Advanced Reconstruction of
      the Foot and Ankle (AAOS)
  • Tib-navic portion of deltoid
    is most often injured
  • Spectrum of severity
    – Relationship to progressive
      flatfoot; spring ligament

Chronic Medial Ankle Instability

• What is it?
  – Very vague presentation = “giving way”;
    pain; feeling of collapse

<table>
<thead>
<tr>
<th>Stage</th>
<th>Giving Way</th>
<th>Failure/Impairment of Foot</th>
<th>Pain to Medial Gaggar</th>
<th>Pain in Medial Instability of Foot</th>
<th>Posterolateral Tenderness</th>
<th>Deltoid Insufficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>Stage 2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>Stage 3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>Stage 4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>No</td>
</tr>
</tbody>
</table>

Chronic Medial Ankle Instability

• What is it?
  – Players just can’t get
    back after appropriate
    treatment
  • Feeling of “giving way”
  • Difficulty cutting and
    decelerating
  – Pain descending stairs
    is a hallmark!
**Chronic Medial Ankle Instability**

- Exam often “vague”
  - Chronic swelling
  - Tender over anterior/inferior medial malleolus
  - Anterior drawer with external rotation
    - Rarely eversion laxity
  - Assess PTT for stability

---

**Majority are Subtle…**

- Diagnosis not just about images
- Need to also consider clinical/functional exam
  - Inability to perform heel rise
  - Persistent pain with activity
  - Lack of improvement

*May point to subtle instability pattern*

---

**Chronic Medial Ankle Instability**

- Imaging
  - Get xrays, MRI and CT
    - Will see medial edema and possible avulsed fragment
    - Superficial or deep deltoid rupture
    - Spring ligament difficult to assess
Medial Ankle Instability

• Intraop pathology
  – Scope best to confirm laxity
    • Drawer with external rotation
  – May see defect along anterior margin of medial malleolus

Missed/Neglected Medial Instability

• Concern = chronic/persistent instability can lead to progressive chondral injury and joint degeneration
• Serial MRIs helpful = look for worsening

Medial Ankle Instability

• Open Treatment
  – Repair the defect
    • A medial "Brosstrom"
    • Anchor to bone
  – Add a medial displacement calcaneal osteotomy if early midfoot collapse
  – Often global instability - may need to address lateral side as well
**Medial Ankle Instability**

- Postop – *protracted course*
  - Splint, NWB x 2 weeks
  - SLWC x 4 weeks
  - Boot x 4-6 weeks
  - Gentle DF/PF until 12 weeks; strengthen PTT, work out in brace
  - Run at 4 months; RTP usually 5-6 months

**Medial Ankle Instability**

- Consider this diagnosis with vague symptoms, inability to decelerate, anteromedial tenderness and prior/failed scope
  - Or progressive flatfoot deformity *but with the* ability to perform a single limb heel raise
    - Superficial deltoid/spring ligament combination
    - Fortunately deep deltoid rarely requires reconstruction

**And the acute deltoid ligament injury…**

I was taught that deltoid ruptures were mid-substance and did not require repair – *will heal in like an MCL of the knee*
Cal Harper – 80’s
Deltoid Repair not Needed

Dogma vs myth: deltoid ruptures are not repairable… *open only if irreducible joint to remove interference*
Deltoid Injury on T2 MRI = often difficult to determine which part is injured or avulsed.

Acute deltoid complex avulsion off of the medial malleolus is an under-recognized injury in athletes.

Medial

* = bare medial malleolus

= deltoid complex avulsion

Acute deltoid complex avulsion off of the medial malleolus is an under-recognized injury in athletes.
Surgical Technique: Stress exam ➔ Scope

- Medial clear space
- Syndesmotic disruption
- Medial ecchymosis
- Deltoid injury

Surgical Technique: Fibula + Syndesmosis ORIF ➔ Deltoid complex direct repair

- Bare medial mal
- Lag screws + nonlocking/locking screws + plate
- 1-2 suture anchors in medial mal 5mm above tip
- 2-0 Fiberwire sutures for horizontal mattress stitches
- Ankle slightly inverted during suture tying
- Repair reinforced with remaining 2-0 Fiberwire
- 2 divergent Tightrope 2-4 cm above joint

Example

30 y/o NBA player = Maisonneuve Fx
MRI

Intraop: EUA

Intraop: Medial Exploration
Intraop: Final Stress

10 year review of NFL players

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>NFL Players (n=14)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ave age (years)</td>
<td>25 ± 2</td>
</tr>
<tr>
<td>Ave BMI</td>
<td>34.4 ± 4.0</td>
</tr>
<tr>
<td>Ave f/u (years)</td>
<td>1.8 ± 0.6</td>
</tr>
<tr>
<td>Injury to surgery (days)</td>
<td>7.5 ± 6.6</td>
</tr>
<tr>
<td>Operative time (min)</td>
<td>101 ± 32</td>
</tr>
<tr>
<td>Return to play (RTP)</td>
<td>83%</td>
</tr>
</tbody>
</table>

*No significant differences in playing experience before vs. after surgery

Deltoid Ligament Injuries

As a result of this study and my experience, I now openly explore every deltoid in the athlete with a Weber C/Maissoneuve/unstable syndesmotic injury.
Deep Deltoid Ligament Injuries

• Repair not feasible; reconstruction?
  – Hamstring allograft with endobutton on lateral tibia
    • Two arms: one to medial talus and the other to calcaneus
  – Low threshold to add medial displacement calcaneal osteotomy

---

Thank You!

---

OrthoCaro