7:43 am  
The Syndesmotic Injury: From Subtle to Severe  
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I. Anatomy  
a. Syndesmosis = fibrous articulation in which opposing surfaces are united by ligaments; often a “true” joint that is cartilage lined; rotates/pistons  
b. Posterior tibiofibular ligament  
   i. Now accepted that posterior-inferior ligament is most important restraint to the syndesmotic joint  
   ii. Relationship to posterior malleolar fractures and reason to fix if displaced  

II. Incidence of syndesmotic injuries  
a. Relatively uncommon; 1% of ankle sprains but likely much higher  
   i. “Low” high ankle sprain – isolated anteroinferior tib-fib ligament  
   ii. NFL Data Base – increasing overall rate and increased incidence on certain surfaces  
      1. Presented at 2009 AAOS: 30% increased rate of “eversion” ankle injuries in NFL players on Field Turf  

III. Mechanism of injury  
a. Subtle to severe = some poorly recalled by athlete and non contact while others from direct “high energy” forces to lateral leg  
b. External rotation common to all types  
   i. Also dorsiflexion and eversion  
c. Occur more commonly with a fracture  
   i. Fibular  
      1. Weber C most common  
         a. 20% of Weber B  
      2. Maisonneuve  
      3. Lauge-Hansen pronation-external rotation  
      4. Lauge-Hansen supination-external rotation  
   ii. Posterior malleolar fractures  

IV. Clinical evaluation where no obvious fracture  
a. “Squeeze test”
i. Hopkinson – highly reliable; 9/10 patients with positive test later developed interosseous calcification

b. External rotation stress test
   i. Sitting: pain reproduced in syndesmosis with foot and ankle externally rotated while the knee is held flexed at 90 degrees
   ii. Standing: single limb stance on affected side and then rotate body - pain reproduced in syndesmosis

c. Calf rise – inability to perform suggestive of more severe injury

V. Radiographic evaluation
   a. Plain radiographs (including proximal leg) assessed for bony injury or gross syndesmotic disruption
      i. Frank diastasis without fracture or applied stress is rare
      ii. Avulsion fracture at posterior tibial tubercle can occasionally be seen on lateral view (Boytim)
      iii. Mortise and AP views assessed for increased medial clear space (> 6 mm)
      iv. Interosseous calcification often visible after 6 weeks
   b. Stress views
      i. Traditional = external rotation and lateral displacement applied
         1. Compare to contralateral uninjured ankle
         2. Assess mortise/AP views for increased medial clear space and lateral view for posterior fibular displacement
      ii. Single limb standing AP may accentuate diastasis (pain permitting)
      iii. Fluoroscopic assisted (in office or training room)
   c. MRI
      i. Very sensitive for syndesmotic injuries but not predictive for instability = static test
      ii. Hemorrhage/edema with interosseous space – variable and not prognostic
      iii. Anecdotally it seems that posterior t-f lig involvement correlates with more severe injury and perhaps recovery
         1. Edema in FHL muscle
   d. CT
      i. Axial cuts with comparison very helpful in identifying subtle diastasis or subluxation (anterior-posterior)

VI. Treatment
   a. Syndesmotic injury without fracture
      i. Clinical signs of syndesmotic injury without frank diastasis or instability with stress can be treated nonoperatively
         1. WBAT
            a. SLC helpful for 1-2 weeks
            2. Ankle devices to limit external rotation
            3. 15-step single limb hop test to determine when to return to athletics
ii. Those **with instability on stress testing but no diastasis** can be managed with NWB cast for 4 weeks then boot for 2-4 weeks, with serial radiographs
   1. I prefer fixation in athlete – improved rehab and quicker recovery
   2. Arthroscopy/EUA very helpful in identifying subtle cases
      a. Consider for those patients failing to improve with nonop care in 8-12 weeks

iii. **Any diastasis** requires reduction and fixation

iv. Percutaneous vs. open reduction of the syndesmosis
   1. Open if anatomic reduction not obvious
   2. May require medial incision and decompression/repair of deltoid ligament if syndesmotic reduction not possible
   3. Arthroscopic assisted?

v. Protect fibula from stress fractures thru syndesmotic screw holes with fibular buttress plate
   1. One-third tubular plate with screws proximal and distal and syndesmotic screws or suture button in center
   2. Very helpful in the athlete returning to play

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b. **Syndesmotic injuries with fractures**
   i. Always stress under flouro after fracture(s) fixed
   ii. Have a low threshold to stabilize syndesmosis
   iii. Open reduction of syndesmosis if proximal fibular fracture that is rotated or short and not being fixed - malrotation more common that previously thought
   iv. Open medially/repair deltoid if unable to reduce syndesmosis or medial clear space
   v. **Controversies of syndesmotic fixation**
      1. One study showed no biomechanical advantage of larger screw (3.5 – 4.5mm) *(Thompson, FAI, 2000)*
      2. Location of screw
         i. 2.0 cm above ankle joint ideal? (McBryde et al, FAI, 1997)
            a. Syndesmosis is a joint – stay out of it!
      3. Compression with ankle in plantarflexion (Toretta, JBJS 2001); can not overtighten
4. Screw removal
   i. Necessity?
      a. Needleman/Steihl – recommended due to loss of external rotation
      b. Only if 4 cortices and fails to loosen or break
   ii. Timing
      a. 8, 10, 12 weeks?
      b. Ligament injury – needs time
      c. Why remove at all?
         i. OTA literature shows no ill effect of broken syndesmotic screws

5. Option to screw fixation
   i. Suture button
      a. Can place one or two; can use thru plate hole
      b. No long term studies – conflicting reports

VII. Postop
   a. Surgeon preference
   ii. Depends on presence of fracture, size of individual, timing of sport
   iii. General program
      1. NWB x 4-6 weeks, then boot
      2. Begin pool rehab when wound sealed – 2 weeks
      3. Sport when symptoms/function allow, based on 15 hop test etc
      4. Remove 4 cortices screw after 12 weeks (or after season)
         a. Advantage of suture button – no removal or evidence of failure
         b. Can fill empty screw hole with a suture button device

VIII. Late symptoms/chronic injuries
   a. Recurrent/persistent widening
      i. Syndesmotic debridement with joint reduction
      1. Screw fixation
         a. Controversy – is grafting and fusing joint better than debridement/reduction alone
            i. Harper: delayed reduction and screw stabilization successful in 5/6
      ii. Use of “biologic” reconstruction of ligaments has been proposed
         1. Peroneus longus
         2. Extensor tendon
         3. Allograft
   b. Painful syndesmosis
      i. Attempt injection of syndesmosis under flouro
      ii. Debridement vs. fusion
         1. Fuse if significant degeneration/incongruity of syndesmosis or failed prior reconstruction
Bibliography


