Peroneal Tendon Tears and Instability
(Outline)

1. ANATOMY
   - Injection and immunohistochemical study (more accurate)
   - Peroneal artery via the mesotenon
     • Enters posteriorly
   - Vessels within tendon (intratendinous network) much less than mesotenon
     • Distribution is non-homogenous
       a. Peroneus brevis avascular zone
         - Fibular groove (squeezed between longus and bone)
       b. Peroneus longus avascular zone
         - Between curve of fibula and peroneal trochlea of calcaneus (anterior portion against trochlea)
         - Tendon changes direction as courses around cuboid
   c. These are the locations of most tears

b. Interestingly, correlates exactly with Burman’s 1934 description of the location of peroneal tenosynovitis (Ann Surg 100, 1934)
   - Posterior to the lateral malleolus (brevis)
   - Peroneal trochlea of the calcaneus (longus)
   - Cuboid (longus)

2. FUNCTION
a. 63% hindfoot eversion
   - Longus 35%
   - Brevis 28%

b. 4% total plantarflexion strength
   - Gastroc 87% overall

3. RUPTURES
a. Concomitant tears of peroneus longus and brevis (Myerson, FAI 25(10), 2004)
   - 29 feet over 4.6 years follow-up
   - 91% received normal or moderate peroneal strength
   - Concurrent procedures performed on all patients to correct deformity simultaneously
     • Lateral ligament reconstruction
     • Closing wedge calcaneal osteotomy
   - Complications in 31% of feet
     • Adhesive tendonitis
     • Sural neuritis
     • Wound dehiscence

4. HARDWARE IRRITATION
a. Weber (FAI 26(4), 2006)
   - Antiglide plate for lateral malleolar fracture
     • 70 patients
     • 30 patients (43%) had hardware removed for peroneal tendon irritation
       a. Peroneal tendon lesions identified in 9 (30%) of these pts.
     • Placing the distal end of the plate distal to the proximal third of the lateral malleolus did not cause lesions (location of the plate was not important)
       a. UNLESS a screw was placed in the most distal hole, and the head was prominent or set obliquely in the hole

5. PERONEAL TENDON SUBLUXATION/DISLOCATION
a. Monteggia (1803)
   - First description of peroneal tendon dislocation
b. Acute dislocation often mistaken as an ankle sprain
- 0.5% of all ski injuries
- 71% related to alpine skiing

c. Anatomy
- Peroneal tendons run through fibro-osseous tunnel at the distal fibula
- Bounded posterolaterally by the superior peroneal retinaculum
  - Main restraint to prevent dislocation
  - Averages 10mm to 20mm in width
  - Inserts in calcaneus in 30%, the Achilles tendon sheath 60%, and the Achilles tendon in 10%
- Depth of groove variable
  - enhanced by osseous ridge with fibrocartilaginous cap
  - SPR blends with periosteum in on lateral fibula

d. Mechanism
- Sudden forced dorsiflexion and inversion injury
- Simultaneously violent contracture of peroneal tendons
- Typically retinaculum stripped off the fibular insertion or avulsed with small fleck of fibular cortex

e. Distal Peroneus Brevis Muscle
- Implicated in chronic SPR attenuation
- Peroneal tendon dislocation
- Peroneus brevis split tears
- Freccero (FAI 27(4), 2006)
  - Group 1 = surgery revealed documented tear in peroneal tendon
  - Group 2 = lateral ankle pain, surgery revealed NO tear within peroneal tendon
  - Group 3 = patients undergoing MRI ankle for different reasons (NO lateral ankle pain)

f. Physical Examination
- Passive circumduction of the ankle may reveal subluxation or dislocation
- Patient dorsiflexes and everts the foot from a plantarflexed and inverted position
  - Add resistance in an attempt to reveal dislocation


g. Grades
- Eckert and Davis (JBJS, 1976)
  - Grade 1
    - retinaculum is elevated from the lateral malleolus with the tendons lying between the bone and periosteum
  - Grade 2
    - Fibrocartilaginous ridge elevated with the retinaculum attached
    - Tendons displaced beneath the ridge
  - Grade 3
    - Thin cortical fragment is avulsed from the fibula with the tendons displaced beneath the fibular fragment
    - Only one visible on plain radiographs

h. Imaging
- Routine AP, lateral, mortise radiographs may show small flake of fibular cortex
  - Ankle stress x-rays may rule out ankle instability as the source of pain
  - CT scan may reveal shallow groove on axial cuts
  - 18% of chronic dislocation patients
  - MRI may reveal peroneal tendon injury

6. RECONSTRUCTION
a. Clancy (JBJS 61A, 1979)
b. First to suggest fibula groove deepening procedure…
c. Posterolateral incision, hugging posterior fibula
d. Open retinaculum 3mm posterior to posterior border of fibula

Fig. 1. Algorithm for peroneal tendon surgery

Courtesy of Mark Myerson, MD
– Leave a cuff posterior to this attachment to the fibula
– Carry this dissection past tip of fibula
e. Reflect retinaculum anteriorly to expose lateral wall fibula
– Full thickness flap created
f. Cut posterior fibula very thin, with microsagittal saw
– Cut 3 cm segment, beginning at tip and moving proximally
  • cut is made from lateral to medial, leaving medial cortex intact
– Leave periosteum intact to minimize scar
– Cut superior and inferior limbs (lateral to medial) using thin osteotome or chisel
– Reflect this posterior fibula bone flap using a wide, straight osteotome
– Use curette and high speed burr (iced irrigation) to create depth of groove, removing 1 cm bone
  • make sure burr is used at proximal segment, to insure appropriate flap replacement within lateral cortex of fibula
– make 4 drill holes in lateral fibula, spacing 7 mm, with .062 K-wire
– repair any tears within peroneal tendons
– tamp flap of fibula under “shelf” of lateral fibula cortex
– suture pattern (using 2-0 ethibond) is from lateral fibula (lateral to medial), then through lateral retinaculum (suture placed in a horizontal mattress fashion, with 1 cm bridge, preserving at least 6 mm of retinaculum for imbrication beneath fibula shelf). Final limb of suture from medial to lateral through the next proximal hole.
  • tie both sutures over the lateral wall of fibula (there will be 2 horizontal mattress sutures through the 4 holes)
  • this draws the retinaculum beneath the lateral wall of the fibula, protecting the tendons from the exposed bone
– suture the remaining retinaculum (that which was reflected over the fibula) back over the newly sutured retinaculum (posterior portion) using absorbable suture
  • provides second level of stability
  • provides coverage for ethibond sutures
– let down tourniquet to achieve meticulous hemostasis
  • limits scar
– immobilization no longer than 3 wks
  • begin passive ROM no later than 3 wks, to limit scar
g. Pressure Effects of Groove Deepening Procedures
– Title, et.al. (FAI, 26(6), 2005)
  • Biomechanical study of pressure reduction with groove deepening
    · Placed Tekscan sensor pads at 3 locations in the fibular groove (proximal, middle, and distal)
    · determine change in tendon pressure following groove deepening procedure
  • Loaded ankle to simulate WB
– Statistically significant decrease in pressure at middle and distal groove following deepening
– Suggest that groove deepening assists in relieving pressure on the tendons
  • In addition to prevention of dislocation
h. Results
– Porter, et.al. (FAI 26(6), 2005)
  • 13 athletes, average age 24 yrs, 35 mos f/u
  • Complete removal of posterior groove (not hinged)
  • Aggressive rehab protocol
    · Active ROM begun 1 week after surgery
    · Biking with stirrup brace at 3 wks after surgery
  • All returned to sport 3 months after surgery
    • 8/14 (57%) same sport
    • 9/14 (64%) equal ROM ankles
    • Remaining 36% within 5° opposite ankle
    • 4/14 (29%) pain free
    • 71% with mild pain that did not limit activity

7. SUMMARY
a. Peroneal tendon pathology is wide ranging
b. Look for split tears/ruptures within tendons at points of decreased vascularity within tendon
c. Use fluoroscopic imaging during hardware placement in sensitive areas
d. Repair symptomatic dislocating peroneal tendons to avoid rupture