Lateral Ankle Instability

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Lateral Ankle Sprains

• Most common ligamentous injury
• 1 sprain per 10,000 people/day
  – 30,000 per day in US
  – 25% of all athletic injuries
  – 21-53% of basketball injuries
  – 17-29% of soccer injuries
  – 1/3 West Point cadets sustain an ankle sprain in their tenure

Lateral ligamentous complex of the ankle

• Primary static stabilizers of the ankle
• Lateral ligamentous complex of the ankle
  – Anterior Talofibular Ligament (ATFL)
    • 1° restraint to inversion in PF
    • Lies within capsular layer
  – Calcaneofibular Ligament (CFL)
    • 1° restraint to inversion in neutral, DF
    • In line with SPR, spans ankle + ST
  – Posterior Talofibular Ligament (PTFL)
    • Strongest; usually not disrupted
Lateral Ankle Sprains
- Commonly missed fractures
  - Osteochondral lesion talus
  - Lateral Process of the Talus
  - Anterior process of calcaneus
  - Fifth metatarsal
  - Lisfranc injuries

Lateral Ankle Sprains
- MRI rarely indicated in the acute setting
  - Elite athlete: help guide time out of sports and timing of rehab exercises
- Commonly missed diagnoses
  - Concomitant syndesmosis injury
  - Peroneal tendon injuries
  - Achilles tendon injury
- Cavovarus foot

Ankle sprains - Treatment
- Physical therapy program
  - Proprioceptive training
  - Peroneal strengthening
  - Lace-up or stirrup brace
Ankle Sprains

- Majority of patients recover with non-operative treatment
- Acute surgical repair not supported by literature

**BUT:**
- 20-40% have chronic instability
- 40% still symptomatic 6.5 yr later

Verhagen et al, Br J Sp Med 2015

Ankle Sprain → Chronic Ankle Instability

- Laterally deficient ankle
- Recurrence, buckling, “giving way”
- Synovitis, chondral damage, peroneal tendon injury
- Osteochondral lesions of the talus, ankle arthritis

Surgery

- Anatomic repair
  - Open Brostrom-Gould
  - Arthroscopic Brostrom
  - Augmented Brostrom
    - Suture tape, allograft, autograft, allograft
- Semianatomic repair
  - Brostrom with slip of peroneus brevis
- Nonanatomic tenodesis
Surgery: Nonanatomic Repair

- Tenodesing/"checkrein" procedures
  - Evans Procedure: recon using entire PB
  - Watson-Jones: ½ or entire PB anatomic recon ATFL
  - Chrisman-Snook: recon ATFL and CFL using split peroneus brevis graft

- Sacrifice normal anatomic structures
- Higher complication rates than Brostrom
- Long-term results deteriorate with time
  - Residual eversion weakness, abnormal ST/ankle kinematics, ↓ROM, ↑ wound infection/dehiscence, sural nerve injury

Surgery: Chronic Ankle Instability

- Anatomic repair/reconstruction procedures
- Most closely restore normal anatomy and mechanics of ankle and subtalar joints
- Technically simple, maintain full ROM
- E/G 85-95%
- Modified Brostrom procedure
Modified Brostrom
The “Gold Standard”

- Repair of the ATFL +/- CFL
- Reinforcement with IER (Gould modification)
- Achieve full ankle ROM while preserving ST ROM
- No disruption of peroneal tendon

Modified Brostrom

- Regional anesthesia
- Supine
- Elevate ipsilateral buttock
- Bump under knee and ankle
  - Heel floats to avoid anterior talus in pseudo-drawer position during repair

Modified Brostrom

- Skin approach: anterior J or extensile over lateral fibula curved at fibular tip to sinus tarsi
- Full thickness flaps of skin, subQ tissue down to capsule
- Mobilize lateral segment IER for later repair
Modified Brostrom

- Examine peroneal tendons
  - Retract posteriorly and distally

- Divide capsule and ligaments leaving 2-3 mm cuff on distal fibula
  - Stretched out ATFL seen as a thickening of the anterior capsule
  - CFL seen as attenuated or avulsed

Modified Brostrom: ATFL and CFL Share a Common Fibular Insertion

- Elevate subperiosteal sleeve off distal fibula
- Roughen bony surface with rongeur, curette
- Advance the ligaments through drill holes or use of suture anchors
  - Do not violate joint with anchors
  - Repair in neutral DF, slight eversion
Modified Brostrom
3 passes of sutures
1) Pass thru ligament/capsule, secure to distal fibula
2) Secure periosteal sleeve over newly anchored ATFL/capsule in vest over pants
3) Capture and reef inferior extensor retinaculum

Ankle Arthroscopy with Modified Brostrom
- Arthroscopic exam at same time may be beneficial
  - 93-100% pts with instability have associated probs
  - Only 20% can be seen at open procedure
- Hintermann et al. (2002): 66% chondral damage
- Cannon & Slater (2005)
  - 29% chondral injuries, 24% loose bodies, 41% anterior phytes
- Ferkel & Chams (2007)
  - 95% had intra-articular pathology
  - 63% synovitis/fibrosis, 17% OCLs, 12% impingement

Ankle Arthroscopy with Modified Brostrom: My Routine
- Supine with bumps
- 2.7mm and 3.5mm arthroscopes
- Standard AM, AL portals
- Intra-articular pathology treated scope before open stabilization
- +/- Non-invasive distraction
- Close portals, re-prep, new gloves
Arthroscopic Brostrom: Shoulder and Knee Arthroscopy Evolution

1990s
- Open RTC repair
- Open Bankart
- Arthroscopically assisted ACL
- Arthroscopically assisted meniscal repair

Today
- Arthroscopic RTC repair
- Arthroscopic Bankart
- "All inside" ACL
- "All inside" meniscal repair

Arthroscopic Brostrom

- Same indications as open
- No difference in clinical or radiographic outcome between the all-inside and open modified Brostrom repairs
  - Decreased pain, swelling vs open
  - Equal strength, stiffness of repair vs open

Arthroscopic Brostrom

- Contraindications
  - Extremely high demand athletes, laborers
  - Morbid obesity
  - Collagen d/o, hyperelasticity
  - Failed previous open or arthroscopic Brostrom
  - ?use of tobacco products
  - Additional large peroneal tear

Yeo et al, F AI 2016
Arthroscopic Brostrom
- Supine, distraction
- Mark out “safe zone” in neutral DF
- Standard AM, AL portals
- Debride
  - Lateral gutter extensively
  - Anterior distal fibula for anchor placement, capsuloligament adherence
- +/- flouro assistance for anchor placement

Acevedo and Mangone, FAI 2015

Arthroscopic Brostrom
- Anchor placement
  - 1 cm above distal fibula tip
  - 1 cm above 1st anchor (just below level of talar dome)
- Sutures out AL portal
- Sharp suture passer thru capsule/ligament/IER
  - 1.5 cm distal to fibula tip
  - Just superior to peroneals

Acevedo and Mangone, FAI 2015

Arthroscopic Brostrom
- Pass sutures 1 cm anterior
  - Inferior to intermed br SPN
- Central 4mm skin incision to pass sutures with probe
- Tie sutures in DF/eversion with posterior drawer
- Check
  - Anterior drawer, talar tilt
  - Scope view of repair
Brostrom Is Not Always Enough
Augmented Repair for Lateral Ankle Instability

- Maffulli et al, AJSM 2013, Brostrom+scope
  - 58% back to pre-injury level activity at 9 yr
  - 16% ↓ level of activity
  - 26% abandoned all activity
  - 30% radiographic signs DJD

Brostrom Is Not Always Enough
Augmented Repair for Lateral Ankle Instability

- Generalized ligamentous laxity
- Attenuated tissues 2° recurrent instability
- Failed cases, revisions
- High-demand patients
- Obesity
- + tobacco use?
- Workers comp patients?

Augmented Repair for Lateral Ankle Instability

- Anchors, additional anchors
- Graft options
  - Autograft, Allograft
    - Peroneal
    - Semitendinosus
    - Gracilis
  - Internal bracing
  - Freeze-dried human dermal collagen scaffold
Augmented Repair for Lateral Ankle Instability: Non Absorbable Suture Tape Augmentation

- Vien et al. AJSM 2014
  - Brostrom has early 50% inferior strength and need early protection against elongation
  - Strength of brostrom + suture tape equals strength of native ATFL so theoretically safe to advance rehab quickly
    - ↑ load to failure, stiffness vs ATFL
    - Minimize elongation over time

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Augmented Repair for Lateral Ankle Instability: Non Absorbable Suture Tape Augmentation

- Flat, knotless
- Technical ease
- Minimal ↑ in time
- No donor site morbidity
- Immediate stability
- Less immobilization
- Begin rehab earlier
- ↓ long-term elongation
- No long term studies
- Increased cost

Non Absorbable Suture Tape Augmentation

- Lateral approach slightly extended proximal, distal
- Ankle bump to avoid any anterior talar subluxation
- I use flouro to place my talar anchor first
  - Drill hole at neck-body junction angled into the body
  - 40° lateral to medial
Non Absorbable Suture Tape Augmentation

• Brostrom repair with tissue overlap
  – Make sure the repair/anchors are close to their anatomic positions
  – Shorten, repair anterolateral capsule

• Then I place my fibular anchor between my 2 Brostrom anchors or sutures
• The suture tape is extraarticular (outside of the Brostrom)
• Place a freer/hemostat under the suture tape during insertion of 2nd anchor
  – Do not overconstrain!
  – Do not stress shield your repair

Augmented Repair for Lateral Ankle Instability: Semitendinosus allograft (14cm)

• Interference screw lateral talus
• Drill fibular sockets for ATFL, CFL
  – Screw into anterior fibular tunnel
  – Tension CFL with neutral ankle flexion slight eversion
  – 1 cm posterior to fibula
  – 13 cm distal to ST joint in calc
  – Pull suture thru medially to tension graft
• Supplemental capsular reefing
When to do Suture Tape Augmentation vs Tendon Graft/Tenodesis Reconstruction?

- Use graft reconstruction
  - Native tissue not good enough to function as a lateral repair
  - Multiple previous procedures
  - Failed previous peroneal rerouting procedures
  - Cavus foot alignment

Lateral Ankle Ligament Repair: Post-op

- Splint, NWB x 2 wks
- FWB, walking boot, lateral heel wedge x 4 wks
  - Gentle DF/PF out of boot, no inversion
  - Quicker recovery with suture tape
  - NWB, cast x 6 wks for revision
- ASO x 6 wks, begin PT/ROM
- Full activities at 3-4 mos

Conclusions

- Lateral ligament injuries very common, especially in active population
- Most successfully treated non-operatively
- 20-40% pts develop chronic pain and limitations with activities, recurrent instability, persistent swelling
Conclusions

• Minimally invasive anatomic reconstruction

• Address intra-articular pathology concurrently

• Failure rate or suboptimal outcome is much higher than we believe

Conclusions

• Repair augmentation
  – Stronger repair
  – Early joint mobilization improves outcomes

• Minimize chances for repair to loosen over time and lead to re-injury and/or DJD
  – Younger patients, higher demand athletes

Thank You For Your Attention