

Ankle Instability

18 yo recreational soccer player with
an “Ankle sprain” 2 days ago



Treatment ?



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- NSAIDS
 - Acetaminophen
 - Tiger Balm
 - Elastic ankle support



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- Short leg walking cast 6wks (weekly changed)



EVIDENCE

No Treatment?

- No RCTs supported
- Consensus: immobilization is more effective than no treatment. (BMJ clinical evidence 2007: Struijs P, Kerkhoffs G)

NSAIDS

- Reduce swelling and pain after ankle injuries and may decrease the time it takes for the patient to return to usual activities.
- Evidence rating B

Slatyer MA. A randomized controlled trial of piroxicam in the management of acute ankle sprain in Australian Regular Army recruits. The Kapooka Ankle Sprain Study. *Am J Sports Med* 1997;25:544-53.

Petrella R. Efficacy of celecoxib, a COX-2-specific inhibitor, and naproxen in the management of acute ankle sprain: results of a double-blind, randomized controlled trial. *Clin J Sport Med* 2004;14:225-31.

Sx vs Conservative for Acute Inj

- GMMJ Kerkhoffs (Cochrane 2007)
 - Insufficient evidence
 - Conservative: higher incidence of objective instability
 - Surgery: longer recovery, ankle stiffness, complications

Immobilization vs Functional treatment

- GMMJ Kerkhoffs (Cochrane 2002)
 - Slightly favored Functional treatment
 - time to return to work
 - Time to return to sport (WMD 4.88 days)
 - Return to work at short term follow-up (RR 5.75)
 - Time to return to work (WMD 8.23 days)
 - Persistent swelling at short term follow-up (RR 1.74)
 - objective instability as tested by stress X-ray (WMD 2.60)
 - Satisfaction with their treatment (RR 1.83)
 - No different between No treatment/Immob/Immob+PT
 - No results were significantly in favor of immobilization

Different Functional Strategies

- GMMJ Kerkhoffs (Cochrane 2002)
 - Best method is **unclear**
 - **Lace-up ankle support**: reduce swelling
 - **Semi-rigid ankle support**: shorter time to return to work & sport, less symptomatic instability at short-term follow-up (Evidence rating B)
 - **Tape treatment**: More complications esp. skin irritation
 - **Elastic bandage**: More Instability, Slower return to work and sports



Graded exercise regimens

- Reduce the risk of ankle sprain.
- Evidence rating B

Handoll HH. Interventions for preventing ankle ligament injuries. Cochrane Database Syst Rev 2001;(3):CD000018.

Verhagen E. The effect of a proprioceptive balance board training program for the prevention of ankle sprains: a prospective controlled trial. Am J Sports Med 2004;32:1385-93.

Other Modalities

- **Therapeutic Ultrasound** : DAWM Van der Windt (Cochrane 2002)
 - Results do not support the use of ultrasound
- **Hyperbaric oxygen therapy** : M Bennett (Cochrane 2005)
 - Insufficient evidence
- **Cryotherapy**: Wilkerson GB (J Orthop Sports Phys Ther 1993)
 - Insufficient evidence

Interventions for preventing ankle ligament injuries

- Handoll HHC (Cochrane 2001)
 - **Semi-rigid orthoses or air-cast braces** can prevent ankle sprains during high-risk sporting activities (e.g. soccer, basketball) (RR 0.53, 95% CI 0.40 to 0.69)
 - Participants with a history of previous sprain can be advised that wearing such supports may reduce the risk of incurring a future sprain.
 - any potential prophylactic effect should be balanced against the baseline risk of the activity, the supply and cost of the particular device, and for some, the possible or perceived loss of performance.
- Evidence rating B

Recommendations

When to go see a doctor?

- Unable to bear weight
- Significant swelling
- Significant deformity
- Getting worse or no improvement in 2-3 days

R.I.C.E. Protocols

- **"Rest"** limit weight bearing, crutches if necessary, an ankle brace helps control swelling and adds stability
- **"Ice"** No ice directly on the skin, no ice more than 20 minutes at a time to avoid frost bite.
- **"Compression"** can be helpful in controlling swelling and is usually accomplished with an ACE bandage.
- **"Elevate"** above the waist or heart as needed

Rehabilitation Goals

- Weight bearing
- ROM
- Strength and Proprioception

Stretching Exercise



Strengthening Exercise



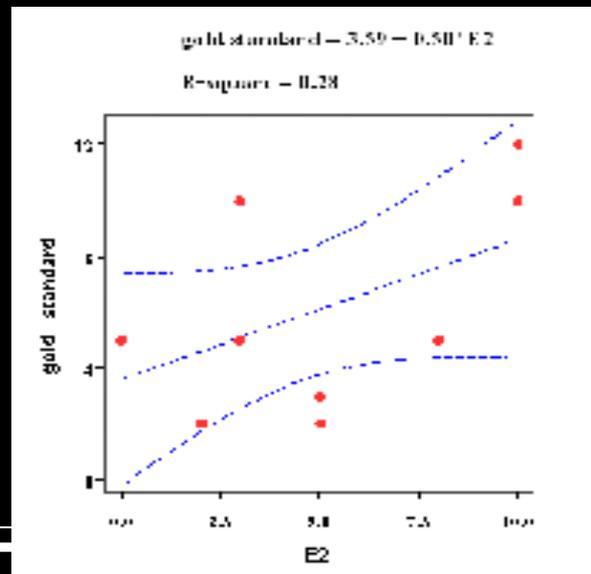
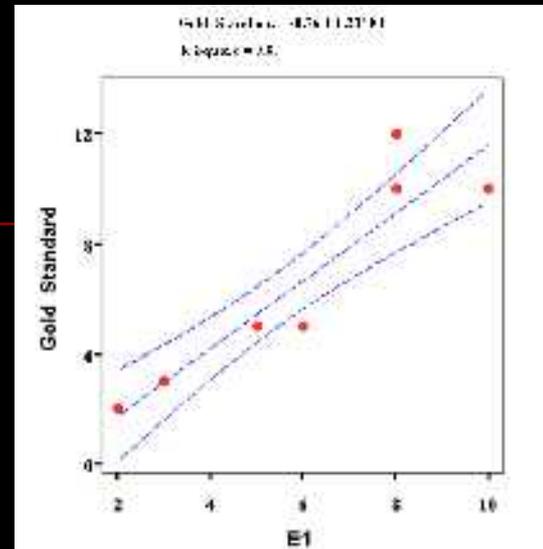
Proprioceptive Exercise



Role of Physicians ?

Making the Diagnosis

- Good physical examination
- R/o Fracture : Ottawa's rules
- R/o other associated injuries
- Evaluate the degree of instability
- Proper investigation



Treatment

- Immobilization
- Functional treatment
- Surgical treatment (rare) *
 - Open injuries
 - Frank dislocations
 - Large avulsion fractures.

AAOS recommendations

- Gr I : RICE
- Gr II: RICE +/- Splinting
- Gr III: SLC or walking boot for 2-3 weeks

BOX 26-2 Classification Systems for Lateral Ankle Sprains⁶³¹

ANATOMIC SYSTEM

- Grade I: ATF sprain
- Grade II: ATF and CF sprains
- Grade III: ATF, CF, and PTF sprains

AMA STANDARD NOMENCLATURE SYSTEM

- Grade 1: ligament stretched
- Grade 2: ligament partially torn
- Grade 3: ligament completely torn

CLINICAL SYSTEM⁶³⁸

- Mild sprain: minimal functional loss, no limp, minimal or no swelling, point tenderness, pain with reproduction of mechanism of injury
- Moderate sprain: moderate functional loss, unable to rise on toes or hop on injured ankle, limp when walking, localized swelling, point tenderness
- Severe sprain: diffuse tenderness and swelling, patient prefers crutches for ambulation

AUTHOR'S SYSTEM (RELATED TO TREATMENT)

- Type I: stable ankle by clinical testing (with anesthesia if necessary); symptomatic treatment
- Type II: unstable ankle with positive anterior drawer and/or positive talar tilt test, by clinical examination
- Group 1: nonathlete or older patient, functional treatment*
- Group 2: young athlete
 - type A: negative stress x-ray findings, treat functionally
 - type B: positive tibiotalar stress x-ray findings (talar tilt >15 degrees; anterior drawer >1 cm), treat by surgical repair
 - type C: subtalar instability, treat functionally

My Practice (Level VI evidence)

- Stable ankle: RICE, NSAIDs, Rehab
- Unstable ankle: Functional treatment (Semirigid brace + above Rx)
- Cannot bear weight: Walking Cast or Boot for 1 wk

Ankle Braces



Short Leg Walking Cast / Walking Boot



Ankle Taping



Predictive factors for repetitive ankle sprains

- Sex
- Height & Weight
- Alignment (cavus foot, posterior positioned fibular)
- Ligamentous laxity

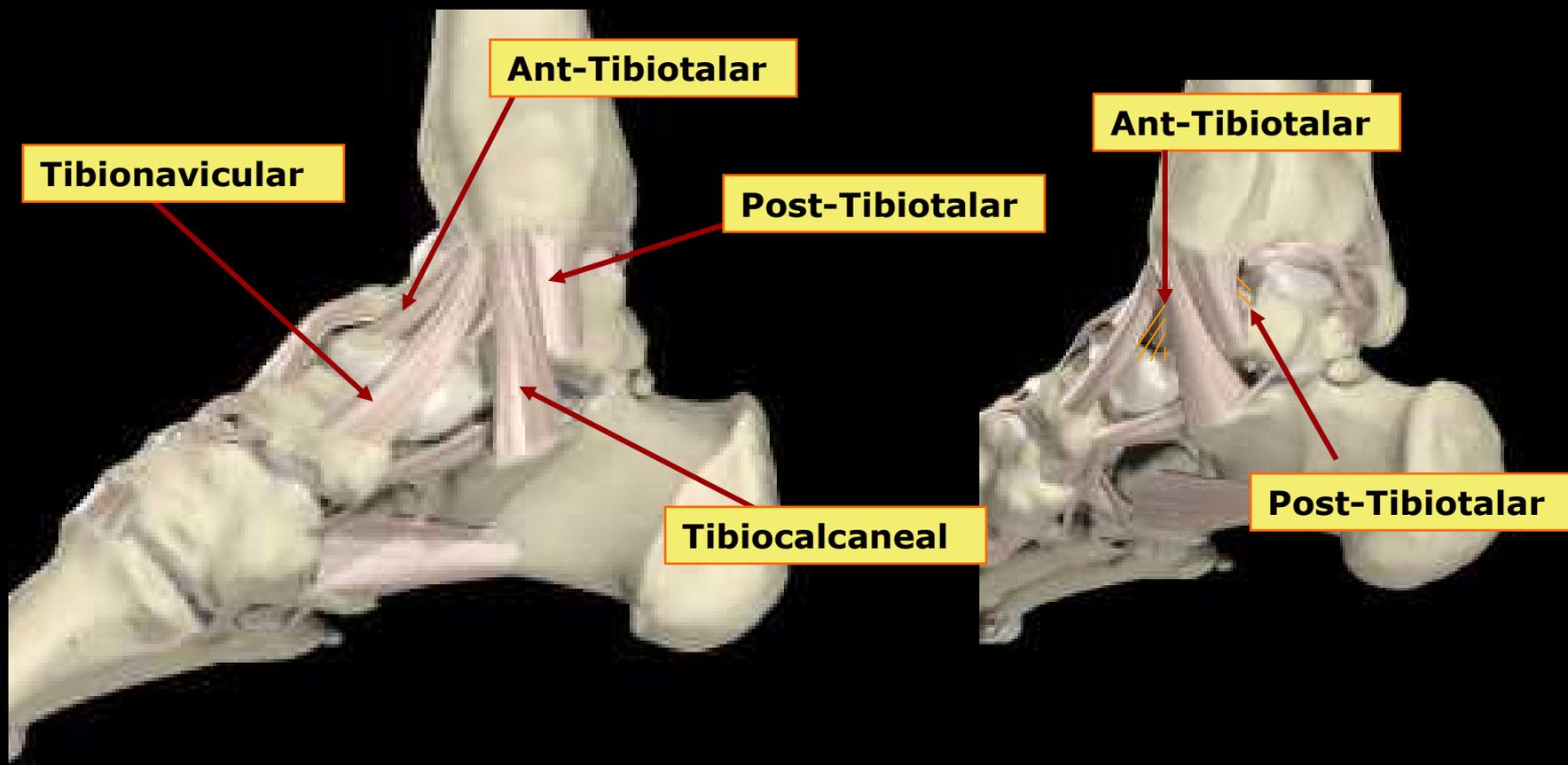
Chronic Ankle Instability



2 types of Instability

- Mechanical instability
 - pathologic hypermobility of the tibiotalar joint
- Functional instability
 - unreliable ankle, no demonstrable radiographic signs of instability

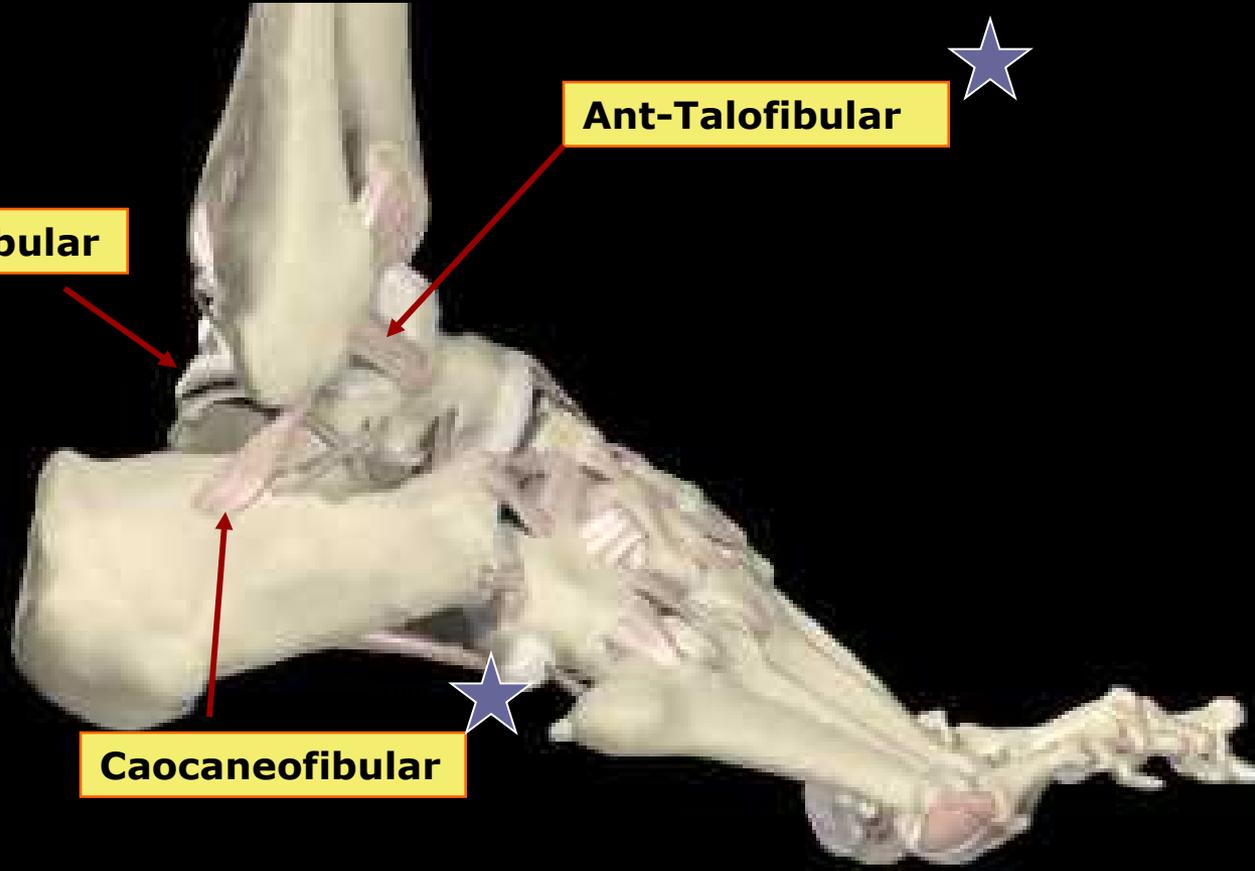
Anatomy and Biomechanics



Post-Talofibular

Ant-Talofibular

Caocaneofibular



Associated Injuries

- Most common (DiGiovanni)
 - peroneal tenosynovitis
 - anterolateral ankle impingement
 - and ankle synovitis
- Arthroscopic findings (93%)
 - Synovitis
 - loose bodies
 - Osteochondral lesions
 - osteophytes

Preferred Treatment?

- Insufficient evidence to support any specific surgical or conservative intervention
- After surgical reconstruction, early functional rehabilitation better than 6-week immobilization (time to return to work and sports)

de Vries JS, Krips R, Siervelt IN, Blankevoort L. Interventions for treating chronic ankle instability. Cochrane Database Syst Rev. 2006 Oct 18; (4):CD004124. Review. PMID: 17054198

Operative Treatment

- Excellent results with late repairs up to 13 years
- Indication for operative repair
 - Persistence lateral ankle instability after nonoperative treatment
- Overlapping subtalar instability

Role of Ankle Arthroscopy

- Insufficient evidence exists for routine arthroscopic evaluation of the ankle joint
- Ferkel : 25% chondral injury (all had pain)
- Arthroscopy before open surgery may have a role in painful unstable ankles

Intraarticular lesions and Patient Dissatisfaction

- 96.9% found
 - Soft tissue impingement 81.5%
 - Lateral malleolus ossicles 38.5% (OR 4.5)
 - Syndesmosis widening 29.2% (OR 11.1)
 - OCD talus 23.1% (OR 8.5)
 - Osteophyte formation 10.8%

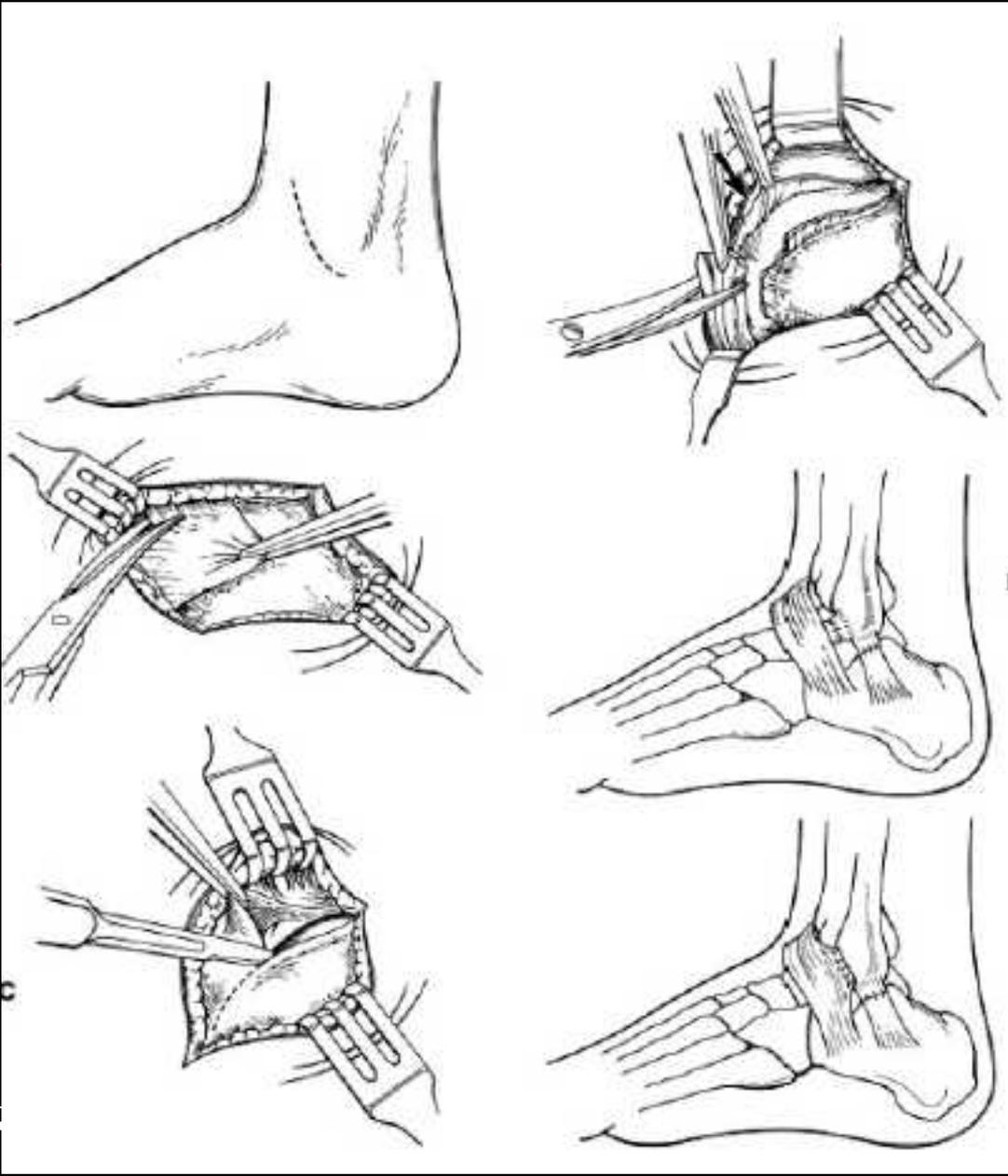
Chronic Lateral Ankle Instability *Am J Sports Med* 2008 36: 2167
Woo Jin Choi, Jin Woo Lee, Seung Hwan Han, Bom Soo Kim

Options

- Anatomic repair +/- augmentation
- Non-anatomic reconstruction using tenodesis
- Anatomic reconstruction using tenodesis

Anatomic repair +/- augmentation

- Brostrom procedure (1966)
- Gould's modification (1980)
 - reinforcement with the lateral talocalcaneal ligament, CFL, and inferior extensor retinaculum.
- Good or Excellent results of > 85%



Risk factors of operative failure

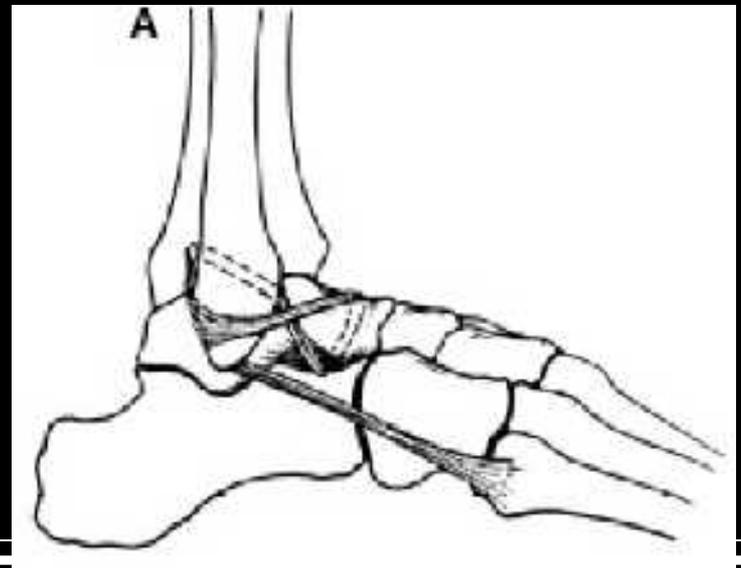
- long-standing instability with poor tissue quality
- history of previous repair
- Generalized ligamentous laxity
- Cavovarus foot deformity

Augmentation of Repairs

- Carbon substitutes
- Local periosteal flap (Glas et al)
- Free tendon graft
 - Autologous
 - Semitendinosus
 - fascia lata
 - bone-patellar tendon
 - Gracilis
 - palmaris longus
 - Plantaris
 - toe extensors
 - Allograft

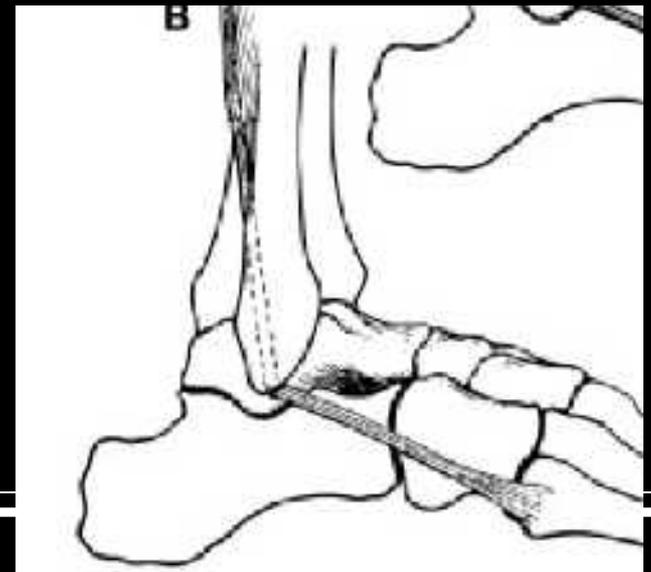
Non-anatomic reconstruction using tenodesis

- Watson-Jones (1952)
 - Failure to duplicate anatomy of CFL
 - Does not limit talar tilt
 - Subtalar stiffness



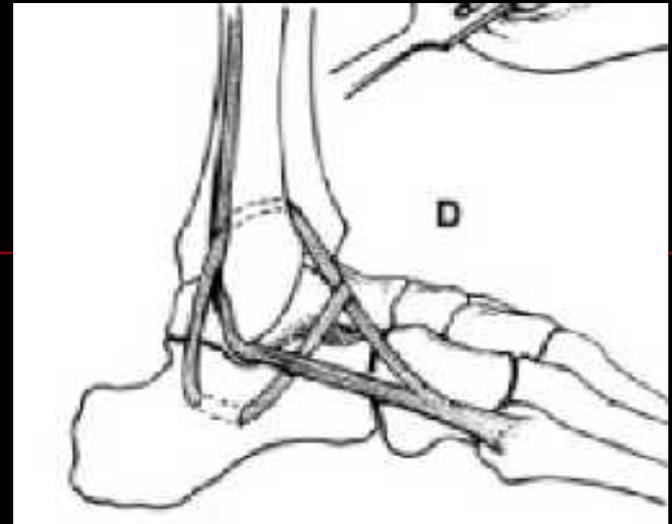
- Evans procedure (1953)

- Permanently altered ankle joint kinematics
- Residual anterior talar instability and reduced subtalar motion



- Chrisman-Snook reconstruction

- Based on Elmslie procedure
- several advantages over other early tenodeses
 - not sacrifice significant peroneal strength
 - more anatomic
 - ATFL & CFL
- same anatomic shortcomings: subtalar stiffness and nonphysiologic kinematics



Anatomic reconstruction using tenodesis

- Colville and Grondel, 30 in 1995
 - split peroneus brevis tendon to augment the repair of the ATFL and CFL
 - maintenance of normal ankle kinematics and subtalar motion comparable to Brostrom repair
 - Graft placement and correct tensioning are paramount

Post-operative management

- immobilization for 4 to 8 weeks
- Weight bearing as tolerated within the first 2 weeks
- Physical therapy is initiated after cast or boot removal
 - stretching, strengthening, and proprioceptive training

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- gradual increase to full athletic activity at 3 to 6 months
 - Ankle brace wear is routinely recommended for 3 months after surgery and indefinitely thereafter during any high-risk activities by some authors

Complications

- Major complications : rare
- Wound complications
 - 1.6% after anatomic repair
 - 4% after non-anatomic tenodeses
- Nerve complications
 - 3.8% with anatomic repair
 - 1.9% with anatomic tenodesis
 - 9.7% with nonanatomic tenodesis

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- Recurrent instability
 - Early : from acute injury
 - Late : from chronic minor injuries
 - Anatomic tenodesis : lowest rates of recurrent instability
 - Use calcaneal osteotomy in varus heel

■ Stiffness

- common after both anatomic and nonanatomic reconstruction but is generally well tolerated
- more frequent after nonanatomic tenodesis
- grafts tensioned at 5 to 8 degrees of eversion

Summary

- Most ankle sprains can be successfully treated with a standardized proprioceptive-based rehabilitation program
- Mechanical and functional instability must both be corrected
- Indication for Sx: failed nonoperative treatment in patients with mechanical ankle instability

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- Treat associated periarticular injuries
 - Adjunctive procedures may be needed with bony malalignment and generalized ligamentous laxity
 - To date, anatomic repairs have shown better long-term results than nonanatomic repairs, although both have high success rates

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- Anatomic tenodesis procedures may become more useful in treating chronic lateral ankle instability, further studies are needed.

Thank you for your attention

