

# Surgical Options for the Patient with Recurrent Ankle Instability



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## Introduction

- 25% of all injuries of the musculoskeletal system
- >20,000 patients seen in the US every day for this injury
- Recurrent or Chronic Lateral Ankle Instability (CLAI) develops in 20% of patients after acute ligament rupture



Ajis FAC 2006  
Krips FAC 2006  
Waterman JBJS 2010

# Acute Instability

- RICE
- Functional rehabilitation over cast immobilization
- Trend toward worse outcome with surgery
  - Increased stiffness
  - Surgical complications
  - Longer recovery times



Karlsson FAC 2006

Younger Evidence Based Orthopedics 2008

# Treatment of acute sprains

- Faster return to sport, work, and better ROM with functional rehab vs cast immobilization
- 40% with symptoms @ 6 months
- 7 year follow-up:
  - 32% with chronic pain
  - CLAI in 19%



Pijnenburg AC et al. JBJS Br 2003

Gerber JP. FAI 1998

Kerkhoffs GM Cochrane Database  
Syst Rev 2002

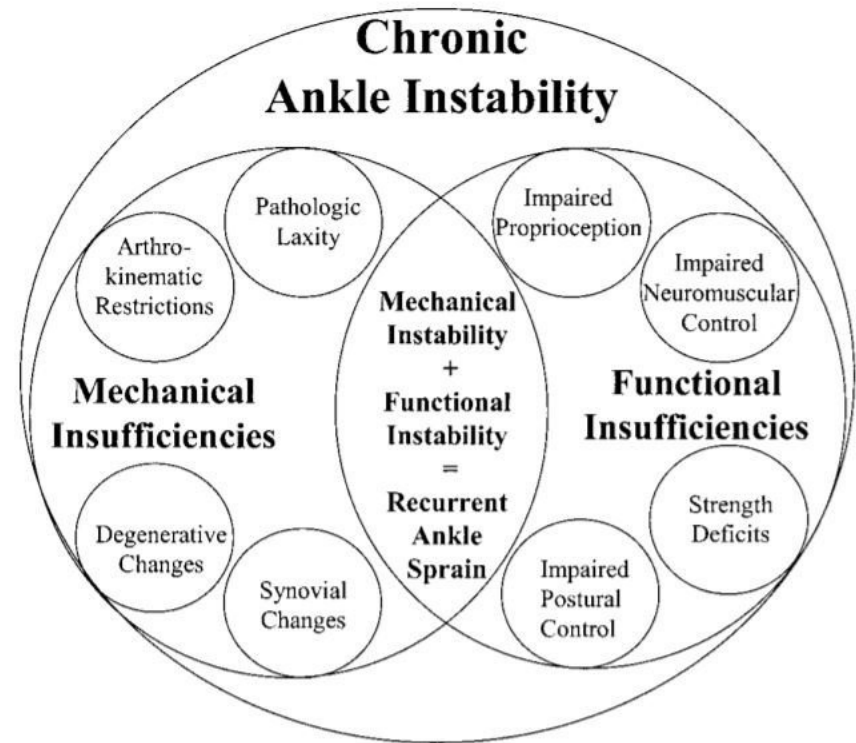
# Classic Definitions

## Chronic Mechanical Instability:

- Documented pathologic hypermobility
- Displacement of talus in mortise upon stress

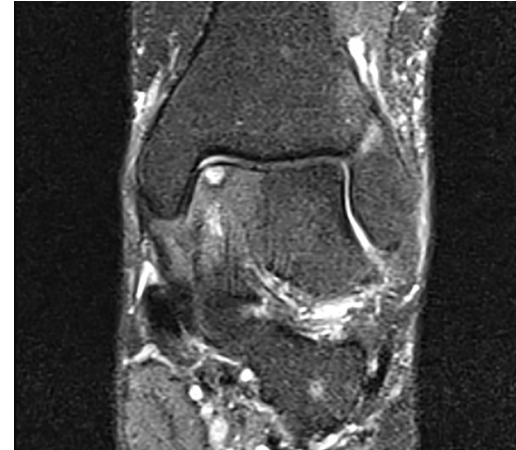
## Chronic Functional Instability:

- Subjective feeling of “giving way,”
- No radiographic evidence of instability
- Best managed non-op?



# Associated Injuries

- Peroneal tenosynovitis (77%)
- Anterolateral impingement lesion (67%)
- Intra-articular loose body (26%)
- Peroneus brevis tear (25%)
- Osteochondral lesion of talus (23%)



# Anatomy

Knee Surg Sports Traumatol Arthrosc (2010) 18:557–569  
 DOI 10.1007/s00167-010-1100-x

ANKLE

## Anatomy of the ankle ligaments: a pictorial essay

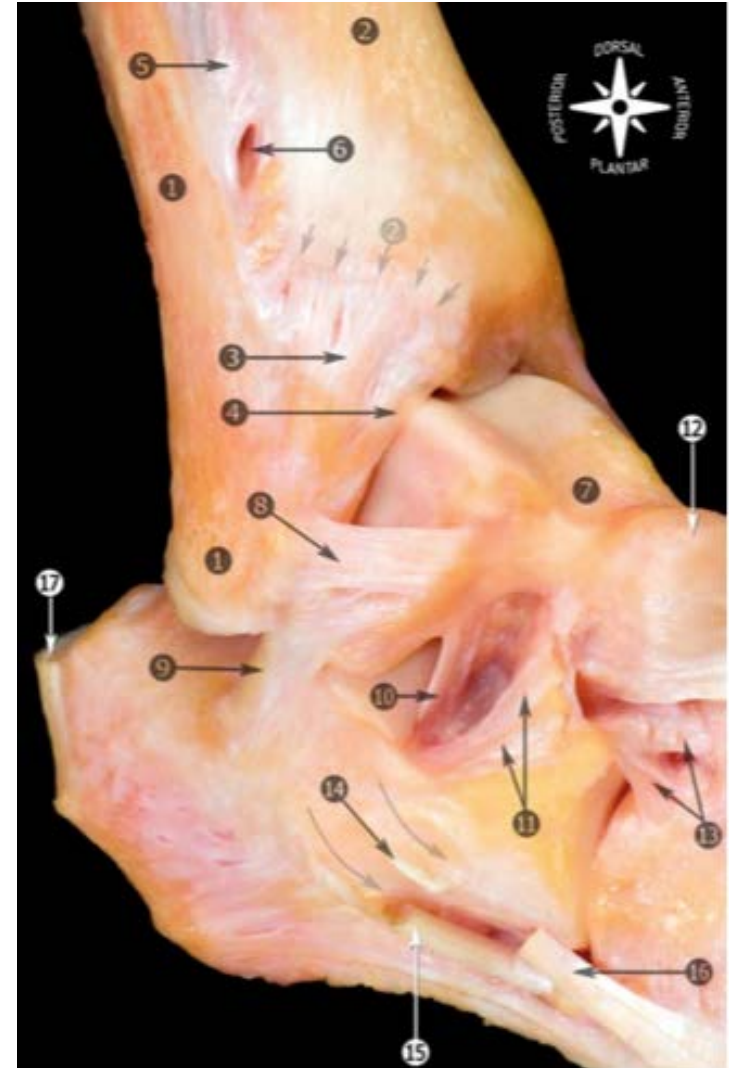
Pau Golanó · Jordi Vega · Peter A. J. de Leeuw ·  
 Francesc Malagelada · M. Cristina Manzanares ·  
 Víctor Götzens · C. Niek van Dijk



Relative strength CFL:ATFL 3:1

ATFL prevents anterior translation

Combined function of the ATFL and CFL prevents talar tilt.



# Working up CLAI





# History

- “Does your ankle feel unstable?”
  - Some patient’s don’t know what that means
- “Do you trust your ankle?”
- “Does your ankle give out on you?”
- “Does your ankle give way?”
- “Do you trust your ankle if you have to cut or pivot?”
- “Do you trust your ankle on gravel, rocks or uneven terrain?”



# History and Physical - Predisposing Factors

- Extrinsic:
  - Training errors
  - Type of Sport
  - Level of competition
  - Equipment
- Intrinsic:
  - Anatomy
    - **Alignment**
  - Strength
  - Joint laxity





# Physical Examination

## Inspection

- Hindfoot alignment
  - Valgus or Varus
  - If Varus – is it forefoot or hindfoot driven
    - Coleman Block Test



# Physical Examination

## Palpation

- Often non-tender
  - Palpate the origin of the ATFL and CFL
- Deep pain: Osteochondral lesion of talus
- Pain posterior to the fibula: Peroneal Tendon pathology
- Consider fracture: anterior process, lateral process of the talus



# Physical Examination

- **Range of motion:**
  - Passive: coalition
  - Extremes of motion: impingement
- **Special Tests:**
  - Anterior drawer test
    - Test in slight plantar flexion
  - Talar tilt
  - Peroneal Tendons
  - Check for Hyperlaxity
- **Always compare to the other side!**





# Imaging

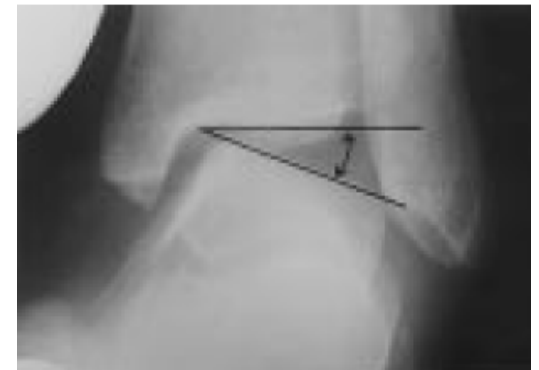
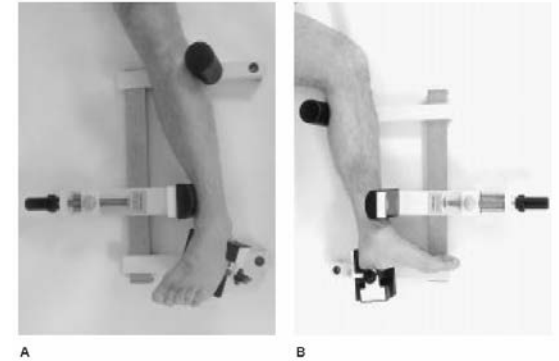
- Radiographs:
  - Weightbearing
- MRI:
  - Osteochondral Lesions
  - Peroneal tendons
- Ultrasound:
  - Peroneal tendons



# Imaging

Stress views:

- “In CLAI, variability in anterior drawer and talar tilt precludes their routine use”
  - Anterior drawer
    - Anterior translation between 5-10mm
    - Increase in translation 3mm or greater when compared to the contralateral
  - Talar Tilt:
    - $> 9^\circ$  (absolute)
    - Twice as much as the contralateral
    - $15^\circ$  for WC patients
- Workers Comp Patients
  - Official Disability Guidelines (ODG) states there must be documented instability on talar tilt radiographs of 15 degrees
  - This is dependent on the carrier and the peer reviewer

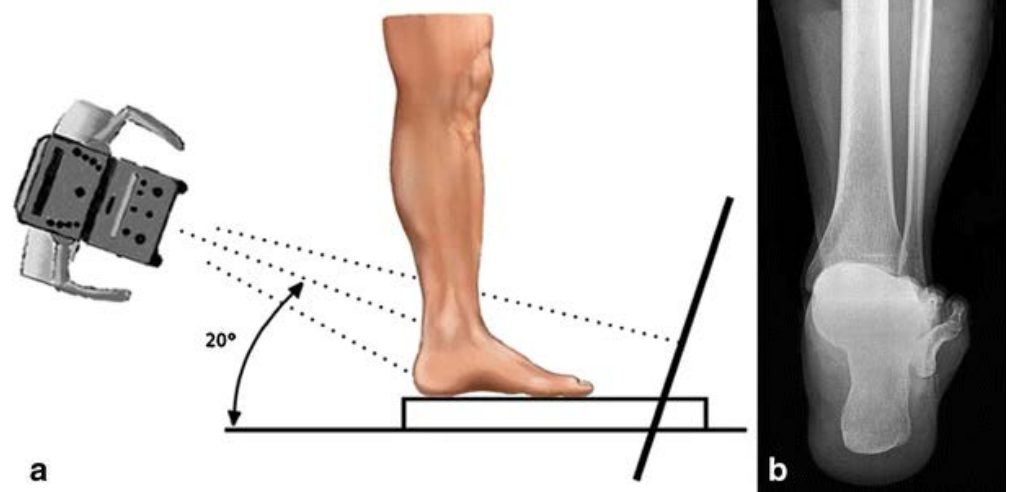


Amendola Clin J Sports Med 1999  
 Krisp FAC 2006

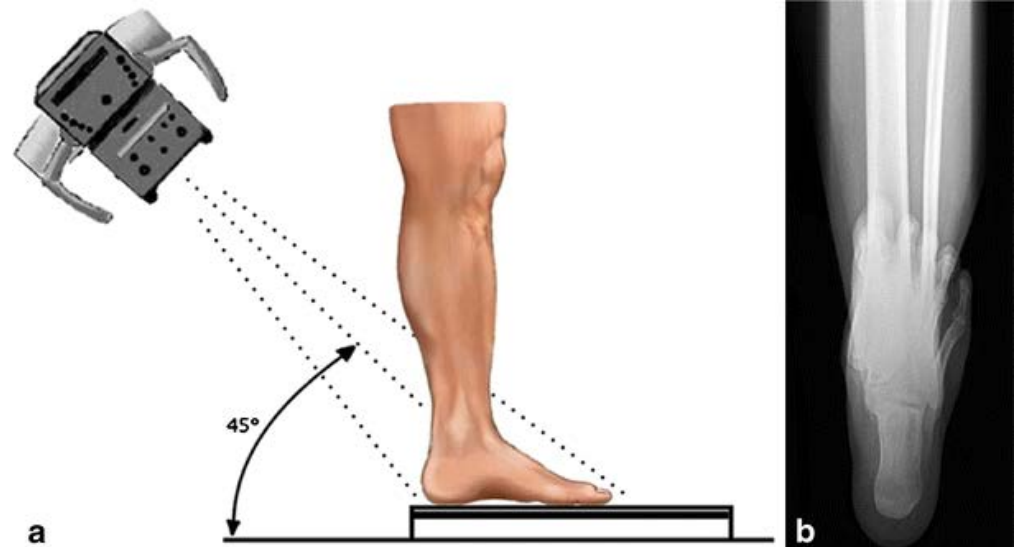
# Imaging

## Varus hindfoot

- Hindfoot Alignment View
  - Need a specialized cassette holder



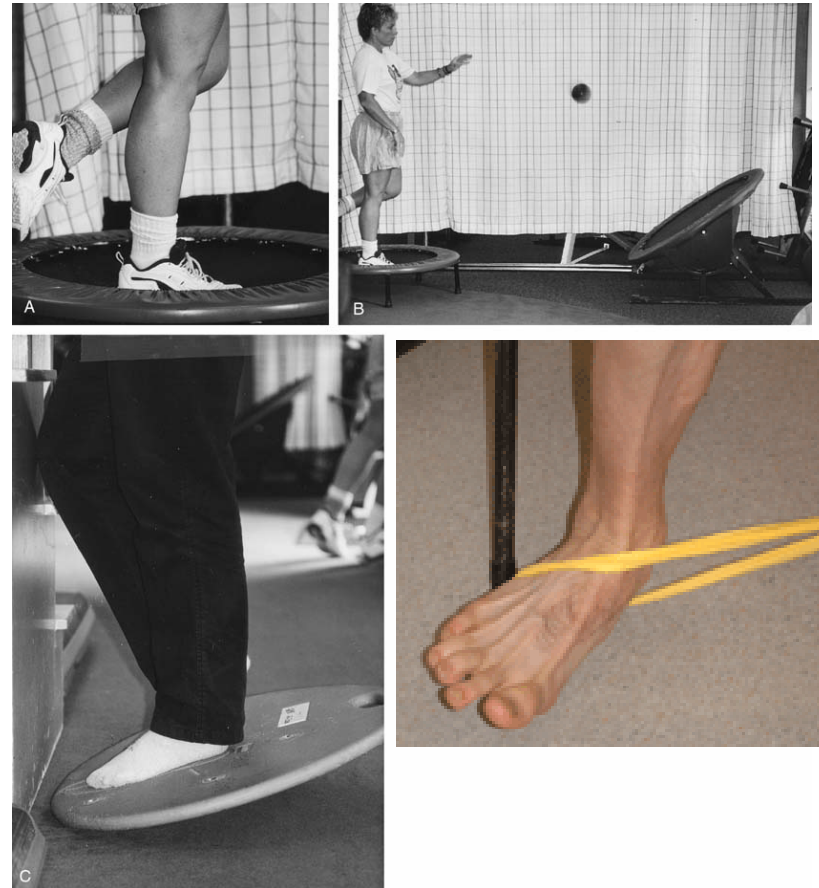
- Long Axial View
  - Cassette on the floor
  - More reliable





# Non-operative Treatment

- >50% of patients will regain functional stability after a 12-week program
  - Worthwhile if the patient has not undergone a formal supervised program
- Peroneal muscle strengthening and proprioceptive training





# Surgical treatment

- Anatomic repair
- Anatomic reconstruction
- Non-anatomic reconstruction

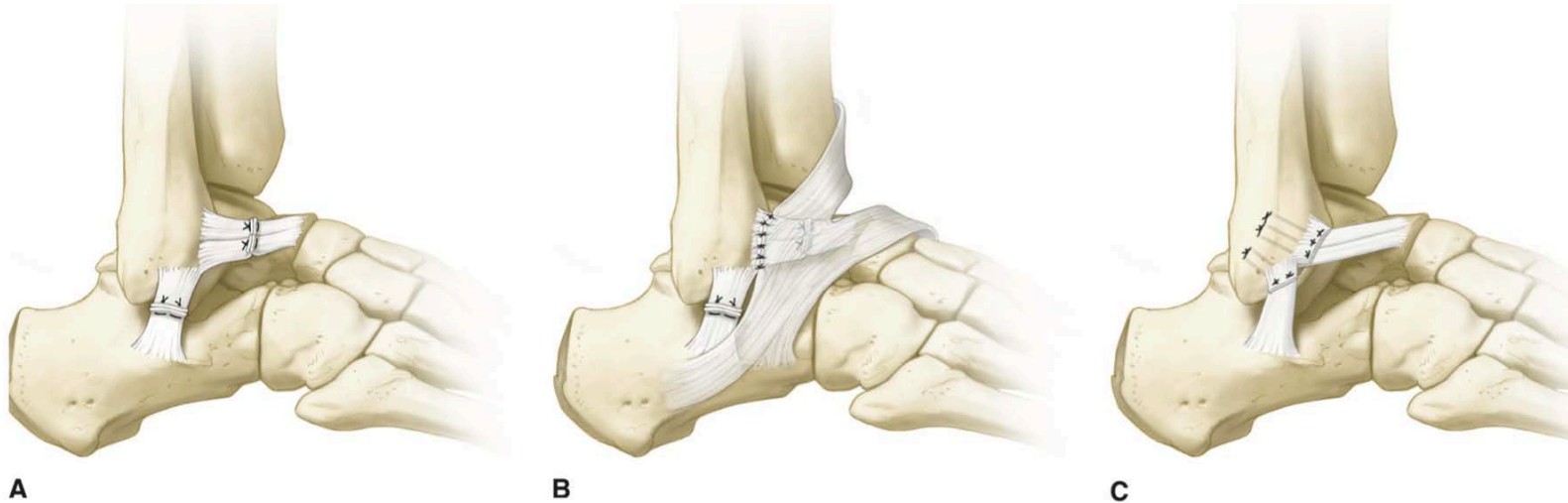


# Surgical treatment

- **General Rules:**
  - Restore joint kinematics
    - Allow normal inversion but prevent pathologic inversion
  - Do not sacrifice tendons
  - Preserve subtalar motion



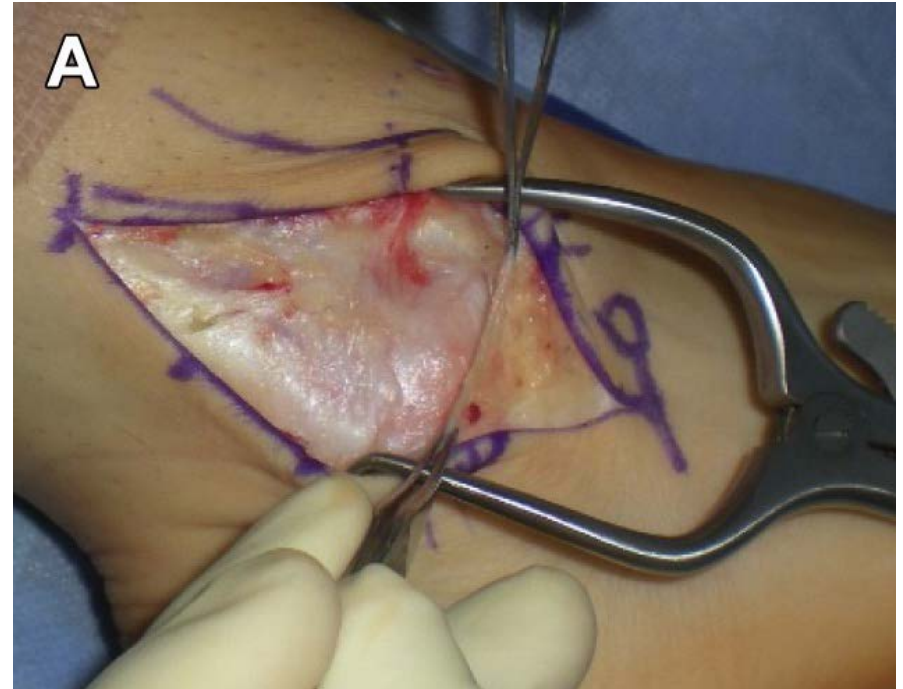
# Anatomic Direct Repair



- A – Brostrom
  - Imbrication/Repair of the ATFL and CFL
- B - Gould Modification
  - Brostrom with Inferior Extensor Retinaculum Augmentation
- C – Karlsson
  - Imbrication/Repair of the ATFL and CFL through tunnels

# Brostrom-Gould with Periosteal Flap

Exposure and Isolation  
of the Inferior Extensor  
Retinaculum



J Orr, J Robbins; Clin Sports Med, 2014

# Brostrom-Gould with Periosteal Flap

Exploration of the  
Peroneal Tendons



J Orr, J Robbins; Clin Sports Med, 2014

# Brostrom-Gould with Periosteal Flap

Marking the periosteal flap



# Brostrom-Gould with Periosteal Flap

Elevation of the  
Periosteal Flap

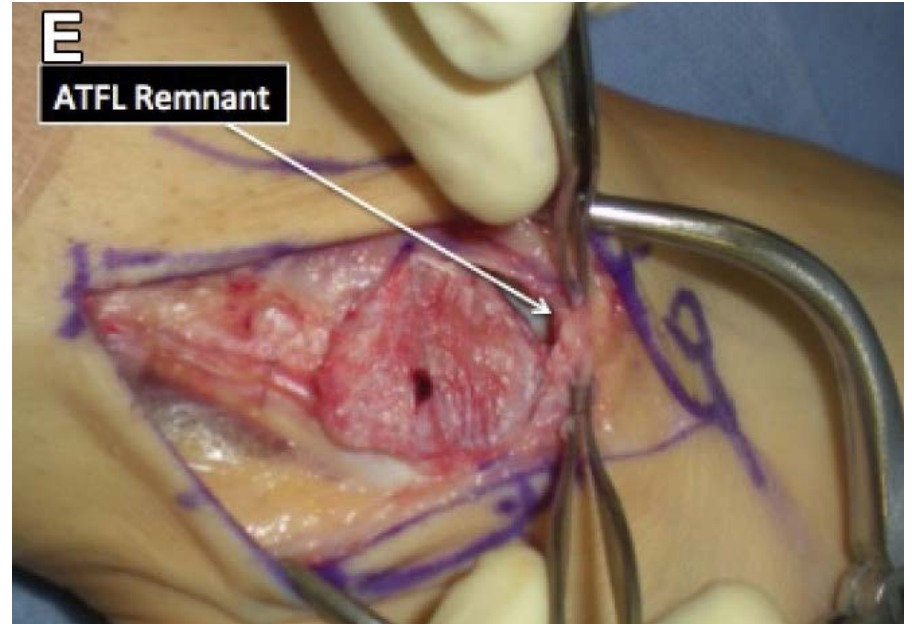


J Orr, J Robbins; Clin Sports Med, 2014



# Brostrom-Gould with Periosteal Flap

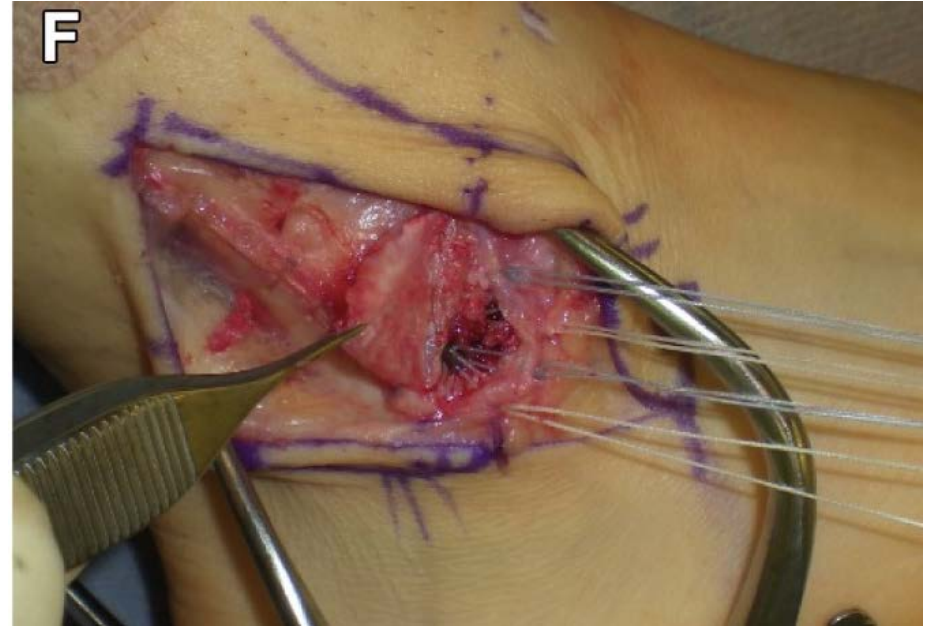
Capsulotomy with  
identification of the ATFL



J Orr, J Robbins; Clin Sports Med, 2014

# Brostrom-Gould with Periosteal Flap

Double-loaded suture anchors with sutures through the ATFL and IER



# Brostrom-Gould with Periosteal Flap

Sutures placed back through the periosteal flap



# Brostrom-Gould with Periosteal Flap

Final Repair



J Orr, J Robbins; Clin Sports Med, 2014

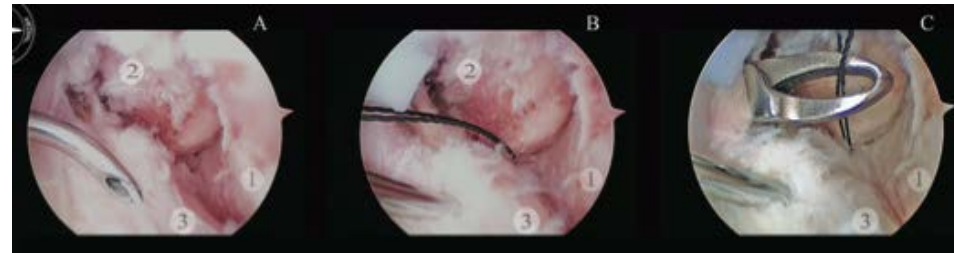
# Arthroscopy at the time of open repair

- Allows for assesment of intra-articular pathology
  - OLT
  - Loose Bodies
  - Synovitis
  - Bony/Soft Tissue Impingment
- Associated pathology in 66-95% of CLAI cases



# Anatomic Repair - Arthroscopic

- Arthroscopic Repair
  - No difference in load-to-failure between open anatomic and arthroscopic repair
    - Drakos FAI 2014
  - No difference in clinical outcomes between open anatomic and arthroscopic repair
    - Yao FAI 2016
    - Matsui AOTS 2016





# Anatomic Repair with Augmentation

- Internal augmentation w/ ultra high-strength suture
- Role in revision surgery, may be able to speed up rehab?
- Improvement in outcomes seen in clinical series with short term follow up
  - Long term follow up needed
    - Cho FAI 2015



# Anatomic Direct Repair

- Brostrom-Gould:
  - Gold-Standard
- Caution in patients with:
  - Hyperlaxity
  - Failed stabilization surgery
  - Poor tissue quality
  - Cavovarus foot deformity



Espinosa FAC 2010  
Vega FAI 2013  
Boyer FAC 2006

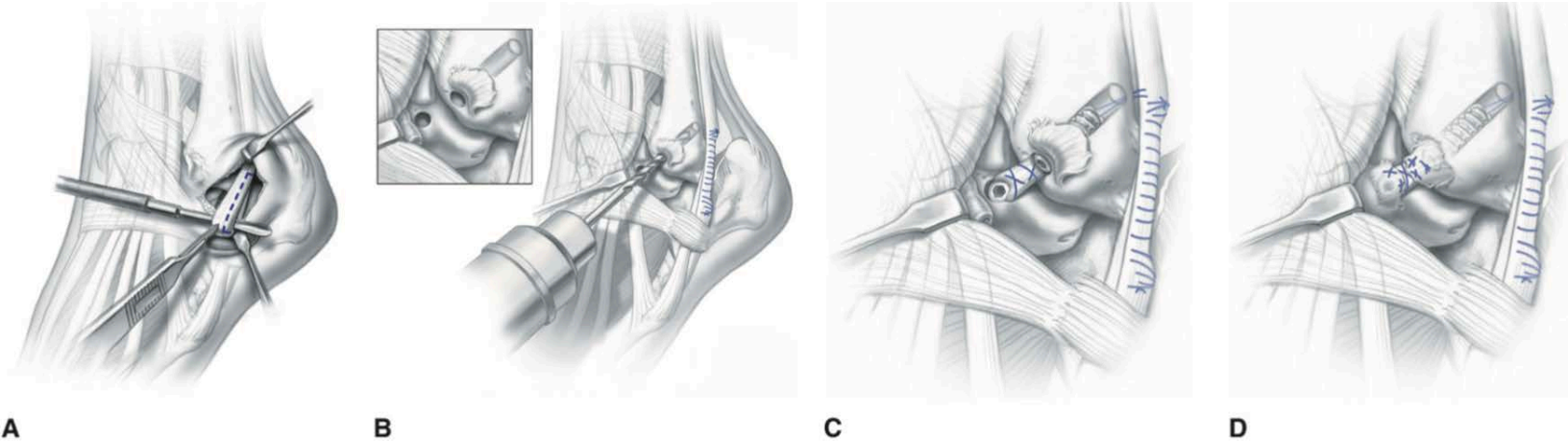


# Anatomic Reconstruction

- When?
  - Poor Tissue Quality
    - 20% of Patients
    - Ferkel AJSM 2015
  - Failed Anatomic Repair
  - Hyperlaxity
- With What?
  - Autograft
    - Peroneal Tendons
    - Gracilis
    - Semitendinosus
  - Allograft



# Anatomic Reconstruction - Autograft



- Slip of Peroneus Longus
- Tunnels in Talus and Fibula with interference screws
- 57 athletes, mean follow-up 32 months
  - All reported improvement in stability
  - 91% returned to previous level of sport

# Anatomic Reconstruction - Allograft

## Pro:

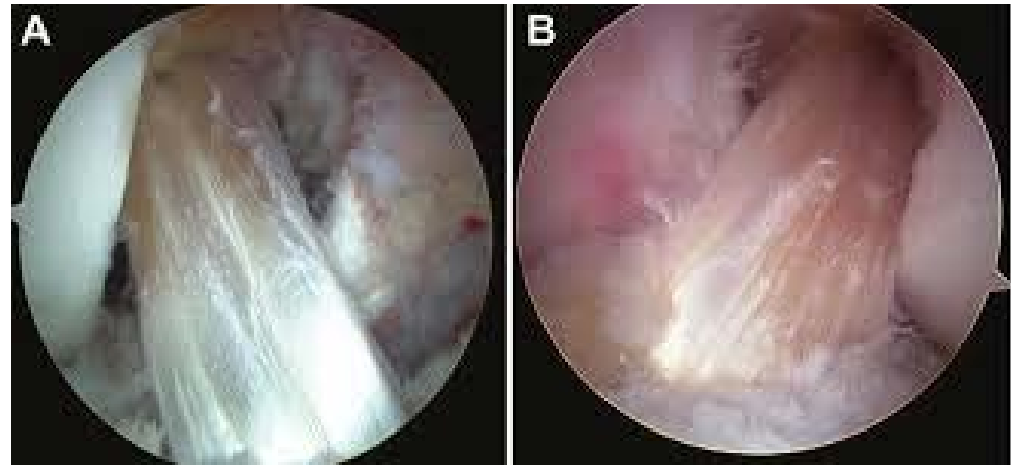
- Avoid donor site morbidity
  - Potentially less surgical pain
  - Potentially shorter surgical time

## Con:

- Disease Transmission
- Cost

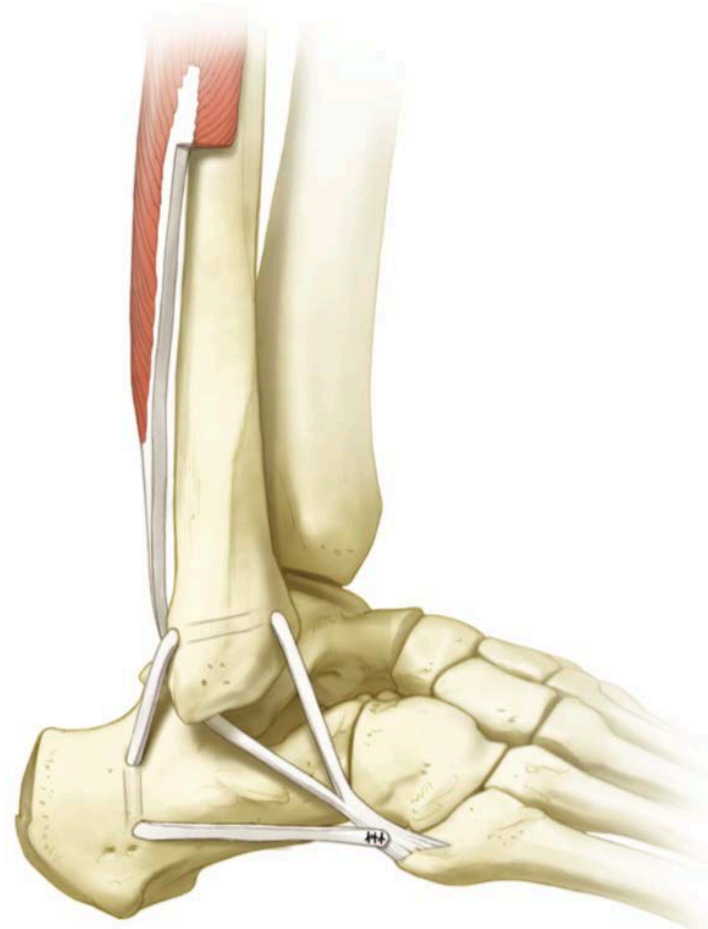
## Is there a difference?

- No difference in Tensile Strength
  - Clanton AJSM 2015
- No difference in Clinical Outcomes
  - Jung FAI 2015
  - Xu FAI 2014



# Non Anatomic Reconstructions

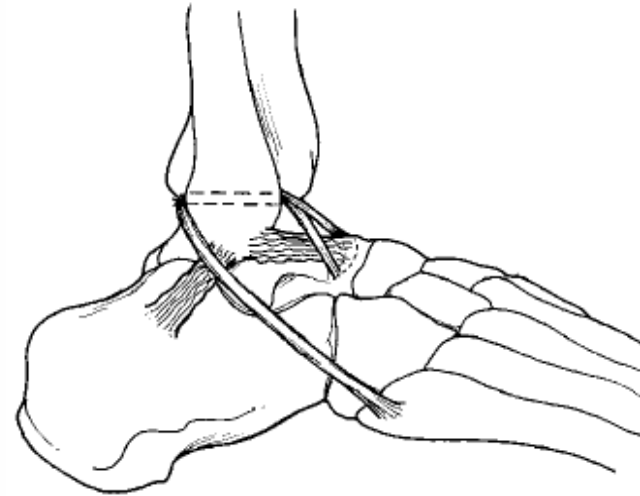
- Chrisman-Snook
  - Tenodesis of the Peroneus Brevis to the fibula and calcaneus
- Only one stabilizing ST joint
- Does not restore proper ankle mechanics
- In the short term: stiffness
  - Ankle OA in 19-28%



# Non Anatomic Reconstructions

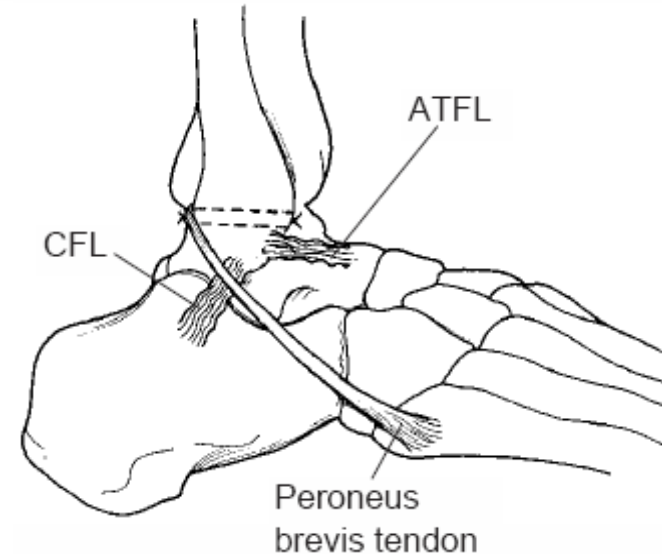
- **Watson - Jones**

- Reconstruction of AFTL only



- **Evans**

- Tenodesis of peroneus brevis to fibula
- Can be a split



# Non Anatomic Reconstructions

1. Sacrifice normal anatomic structures
2. Limitation of motion and gradual deterioration
3. Higher number of complications



# Postoperative Protocol

- Weeks 0-2
  - Initial Protection Phase – Boot vs. Splint
- Weeks 2-6
  - Progressive Protection Phase - Boot vs. Cast
- Weeks 6-8
  - Initial Strengthening Phase
- Weeks 8-12
  - Advanced Strengthening Phase
- Months 3-4
  - Initial Functional Training Phase
- Months 4-6
  - Advanced Functional Training Phase
- Month 6 and Beyond
  - Return to Sport

- Can speed up recovery time with suture tape augmentation?



# Revision Surgery

- Why did it fail?
  - Alignment
  - Technique
  - Associated Injuries
  - Patient Factors
- Look at the scars
- Document nerve function
  - Sural
  - SPN
- Document Peroneal Function
- Assess integrity of the joint
  - Plain Radiographs and MRI
- What real estate is left?
  - Op-report
  - CT





# Revision Surgery

- Do they need Bony Re-alignment?
  - Calcaneal Osteotomy
  - Dorsiflexion Osteotomy of the first metatarsal
  - Cavovarus Foot Reconstruction
- Soft tissue reconstruction
  - Do another Brostrom
  - Reconstruction
    - Allograft or Autograft
  - Non-Anatomic Reconstruction
    - More severe deformity
    - Available “real estate” for bone tunnels may dictate this



# Medial Ankle Instability

- Can be isolated or combined with CLAI
- Up to 72% of CLAI patients have injury to some component of the deltoid
  - 43% involve both superficial and deep components of the deltoid
- Isolated Medial Ankle Instability
  - Giving way, medially. Problem with uneven ground or down stairs
  - Pronation traumatic event
  - Arthroscopy is diagnostic

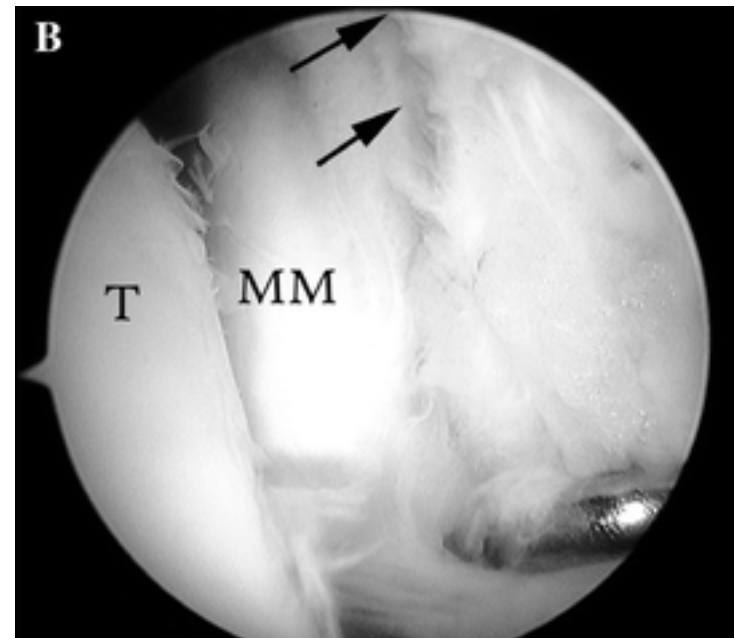


Table 1

Classification of medial ankle instability [33]

Type	Localization	Involved ligaments	n	(%)	Surgical procedure	After treatment
I	proximal "interval"	tibionavicular ligament tibiospring ligament (spring ligament)	39	72%	repair, reattachment	stabilizing shoe
II	intermediate	tibionavicular ligament tibiospring ligament (spring ligament)	5	9%	repair, reattachment (two flap technique)	plaster
III	distal	tibionavicular ligament spring ligament	10	19%	repair, reattachment	plaster

# Medial Ankle Instability

## Diagnostic Criteria:

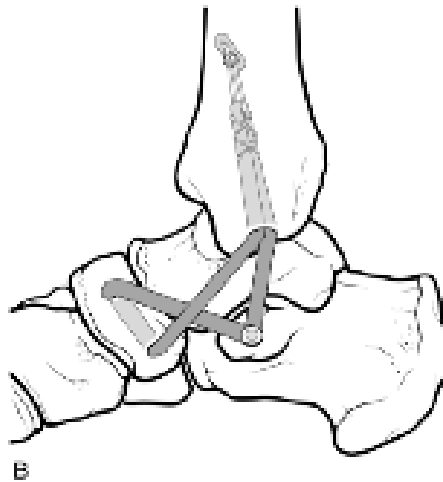
- **Feeling of giving way (81%)**
- **Pain on medial gutter of ankle (100%)**
  - Pain along PTT (27%)
  - Pain along anterior border of lateral malleolus (25%)
- **Deformity that corrects with use of posterior tibialis**
  - Hindfoot valgus (60%)
  - Forefoot pronation (50%)



Leith FAI 1997

Hintermann AMJS 2004

# Deltoid Repair/Reconstruction



## Take home points

- Clinical Diagnosis.
- Look for associated pathology.
- Anatomic Repair (Modified Brostrom-Gould) remains the standard of care.



# Take home points

- Arthroscopy:
  - Concomitant pathology
  - Assess for Medial ankle instability
- Revision Surgery: Re-do Brostrom, but be prepared to do a calcaneal osteotomy, a reconstruction or a non-anatomic procedure
- Don't forget about the Deltoid



Thank you





