

High Ankle Sprains: Diagnosis & Treatment

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Syndesmosis Injuries

AKA “High ankle sprains”

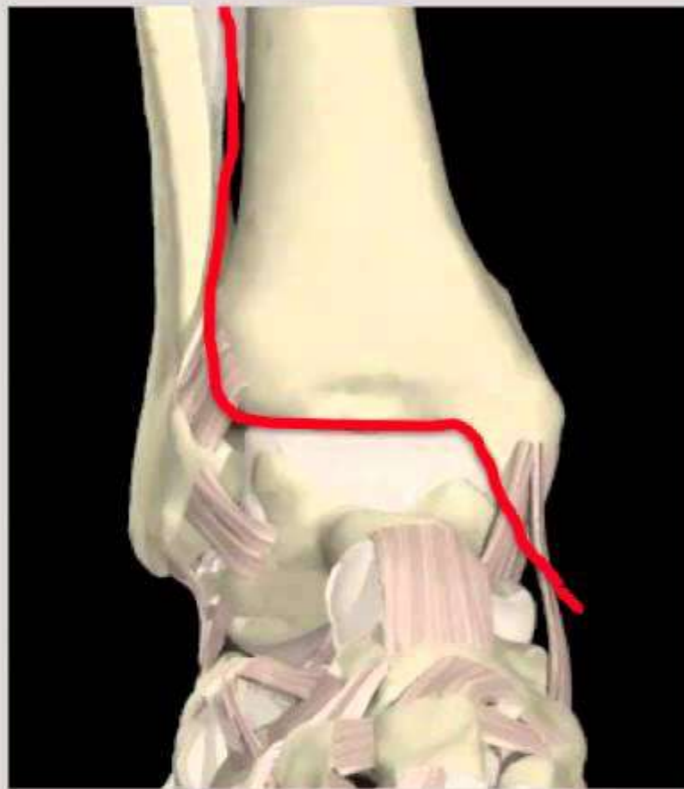
Injury to the ligamentous complex stabilizing the interconnection between the distal fibula and tibia forming the lateral ankle joint.

Occurs in 0.5% of all ankle sprains without fracture

15% of all ankle fractures involve syndesmosis injuries.



High Ankle Sprain



mysportsdoc



It Is Only an Ankle Sprain





Evaluate Degree of Ecchymosis & Edema

If Not Properly Treated

Chronic Pain & Ankle Instability



Epidemiology

Waterman et al. JBJS 2010 states:

- ✦ 2 million ankle sprains per year = 2 billion in health care cost
- ✦ Injury results in time lost and disability in 60% of patients
- ✦ 30% of all sport injury

Epidemiology



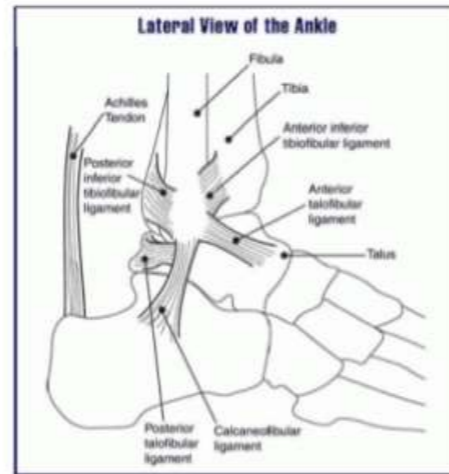
Syndesmotic Injuries:

- 1% to 18% of all ankle sprains
- 32% develop calcification and chronic pain
- High incidence of post traumatic arthritis

Greater source of impairment than the typical lateral ankle sprain

High Ankle Sprain in the NFL

A [high ankle sprain](#) is a serious injury uncommon in most activities, but more common in football due to the intense twisting forces involved in the sport. Currently several NFL players are on the bench due to high ankle sprains.



As of September 2012, Aaron Hernandez of the New England Patriots has a high ankle sprain. Also, Matt Forte of the Chicago Cubs was suspected of having a high ankle sprain, but has been shown to not be so serious.

High ankle sprains (also called syndesmotic ankle sprains) are a stretching or tearing of the ligaments in the ankle. Specifically, it's the ligaments attaching the tibia and fibula, the two long bones of the lower leg. These ligaments aren't meant to be very mobile, so damage to them can be painful and often needs a long time to heal.

High ankle sprains are often treated similarly to other sprains, at least initially. Doctors and trainers follow the [RICE method](#) to manage the pain and swelling immediately. RICE is an acronym for Rest, Ice, Compression and Elevation. However, due to the instability often found in high ankle sprains, the injury is often immobilized with a cast or boot to allow it to heal. Click [here](#) for more details on [how to treat a high ankle sprain](#).

Since high ankle sprain can be extremely serious and can bench a player for weeks or months, a lot of attention has been devoted to improving recovery time. A recent study in the NFL specifically has demonstrated that for milder high ankle sprains, recovery time may be as short as two weeks. Likewise, the immobilization and stabilizing treatments should only be continued for a short time.

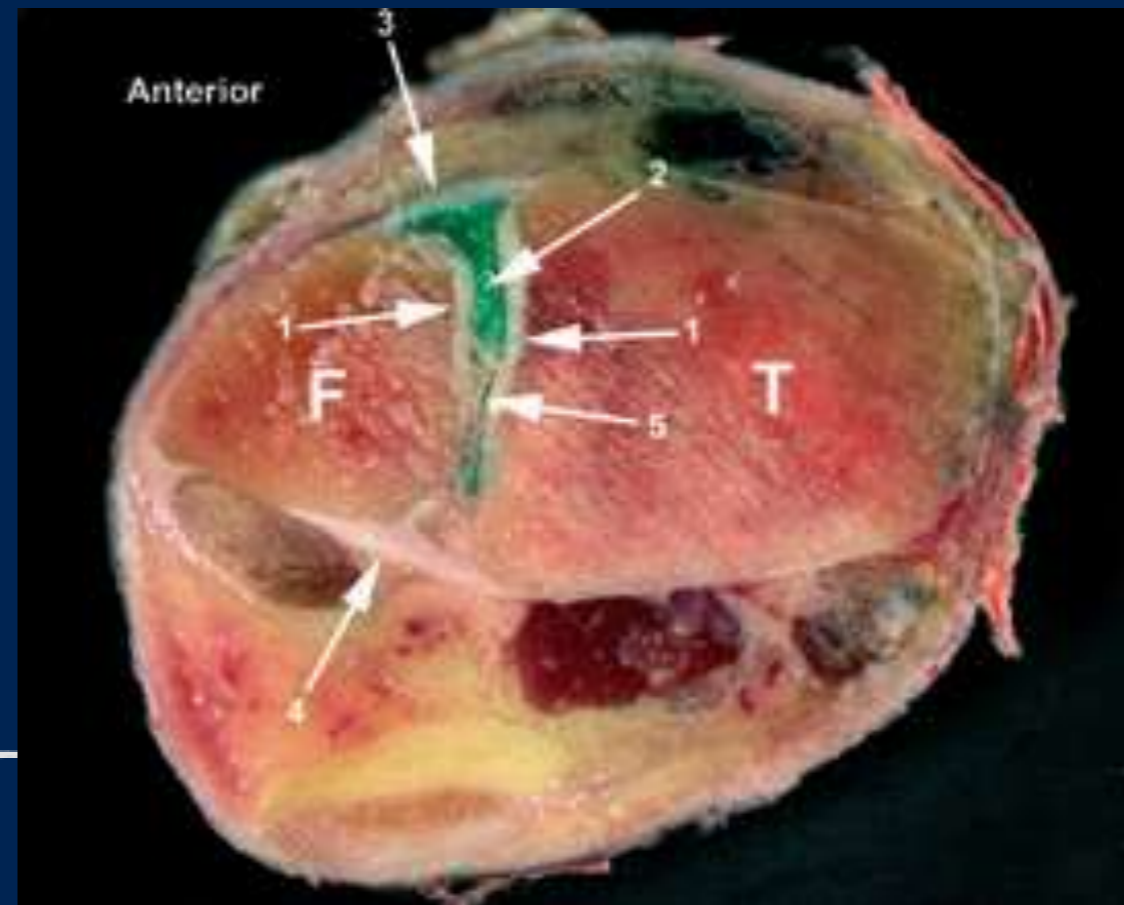
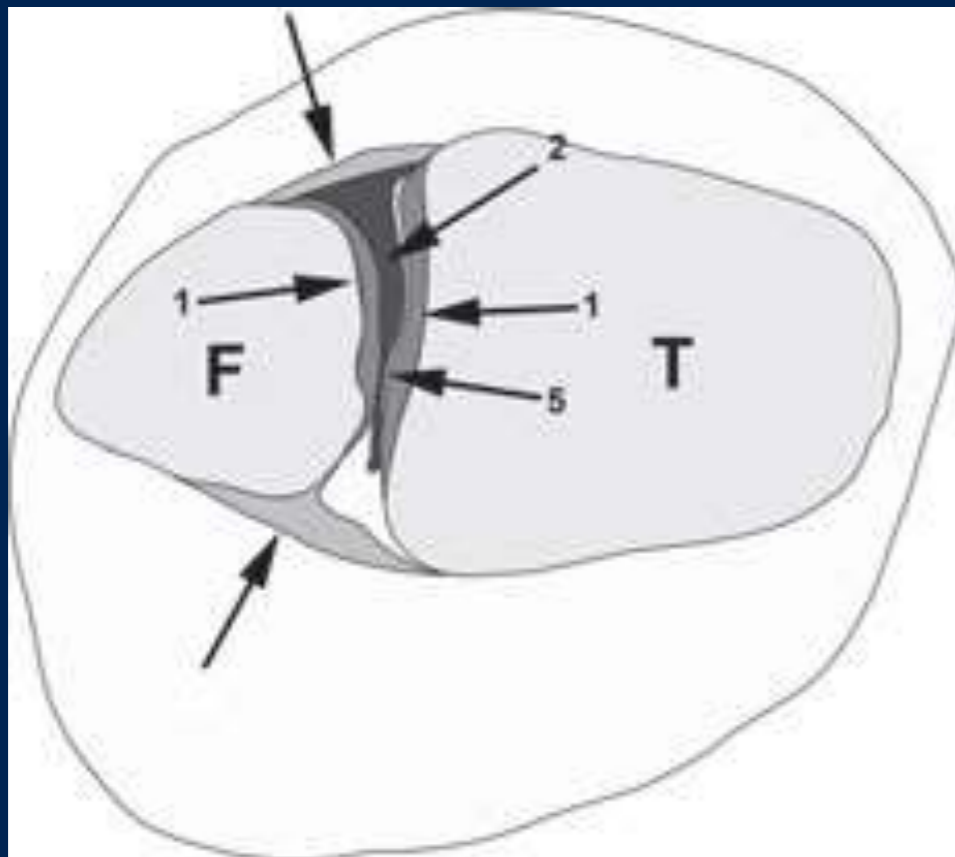
In extreme cases the tibia and fibula are separated due to damaged ligaments meant to be holding them together. In these cases, surgery is the only available treatment to get an athlete

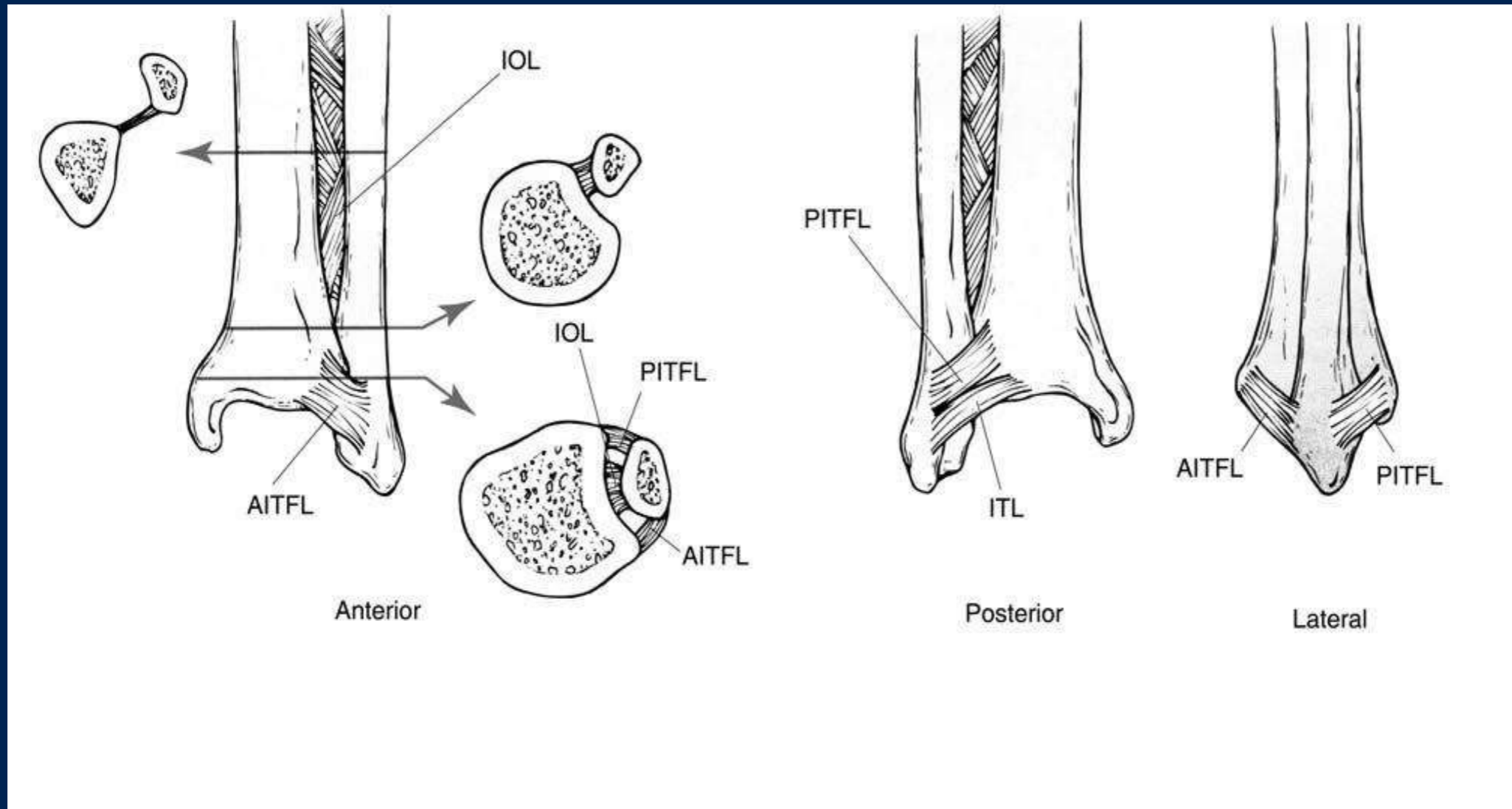
Anatomy

Inferior Tibiofibular Joint:

defined as a syndesmotic articulation which consists of five separate portions

Motion in all three planes





Anatomy

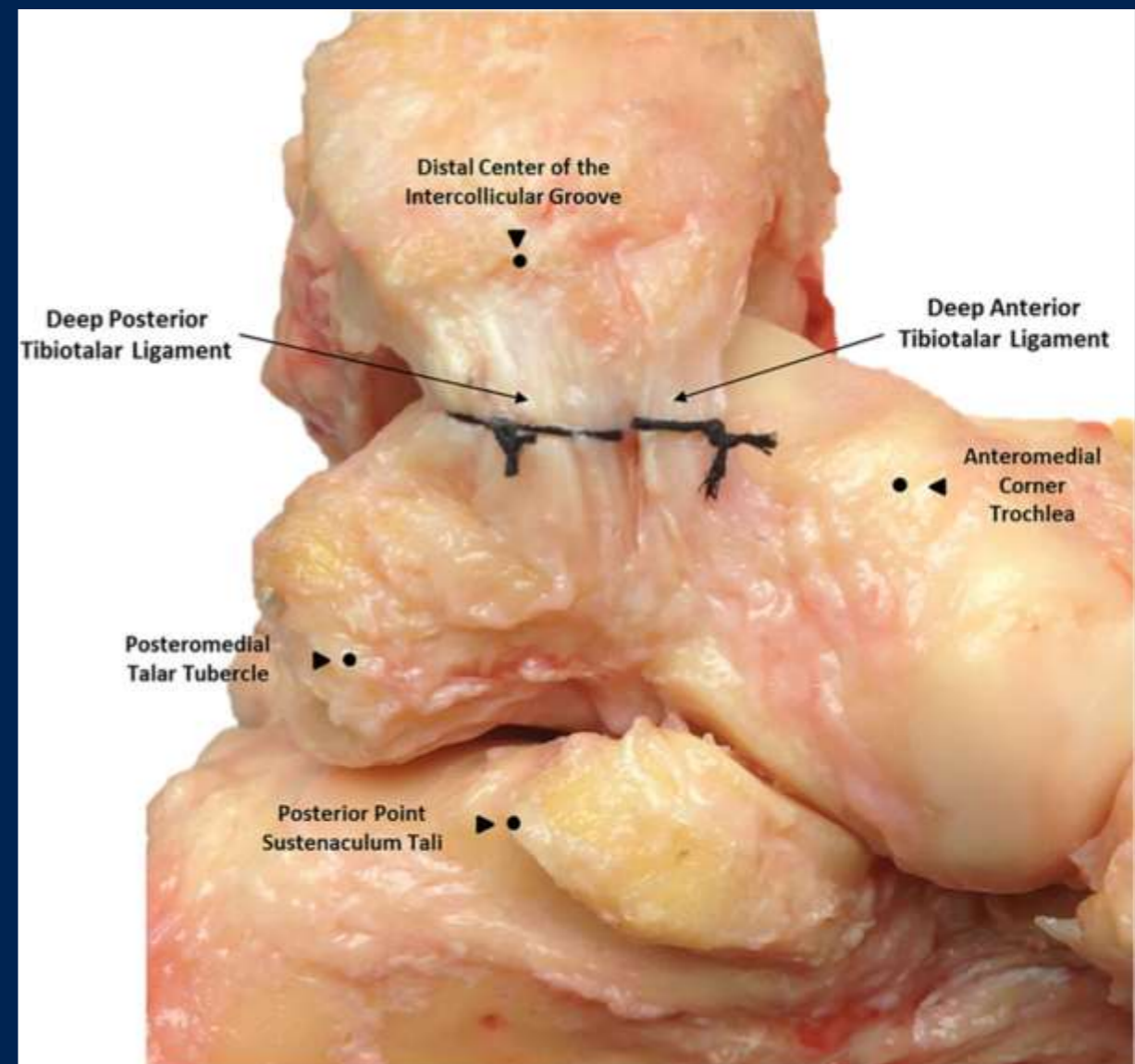
“Syndesmotic Ligaments:

- Anterior Inferior Tibio Fibular Ligament
- Posterior Inferior Tibio Fibular Ligament
- Transverse Tibio Fibular Ligament
- Interosseous Ligament
- Interosseous Membrane

Deltoid Ligament

The deep portion of the deltoid ligament also contributes to syndesmotic stability

Acting as a restraint against lateral shift of the talus



Biomechanics of Syndesmosis

RELEVANT ASPECTS OF ANKLE:

A considerable clearance takes place between the talus and the distal fibula, which is limited by the tibiofibular syndesmosis

○ With normal stance, almost no twisting and shearing forces act on the ankle joint = **static tibfib tension**

○

○ Axial loading tensions AITF and PITF with increase of 10 -17% of body weight

○ Intact syndesmosis, the intermalleolar distance increases with dorsiflexion of the talus by 1.0 to 1.25 mm

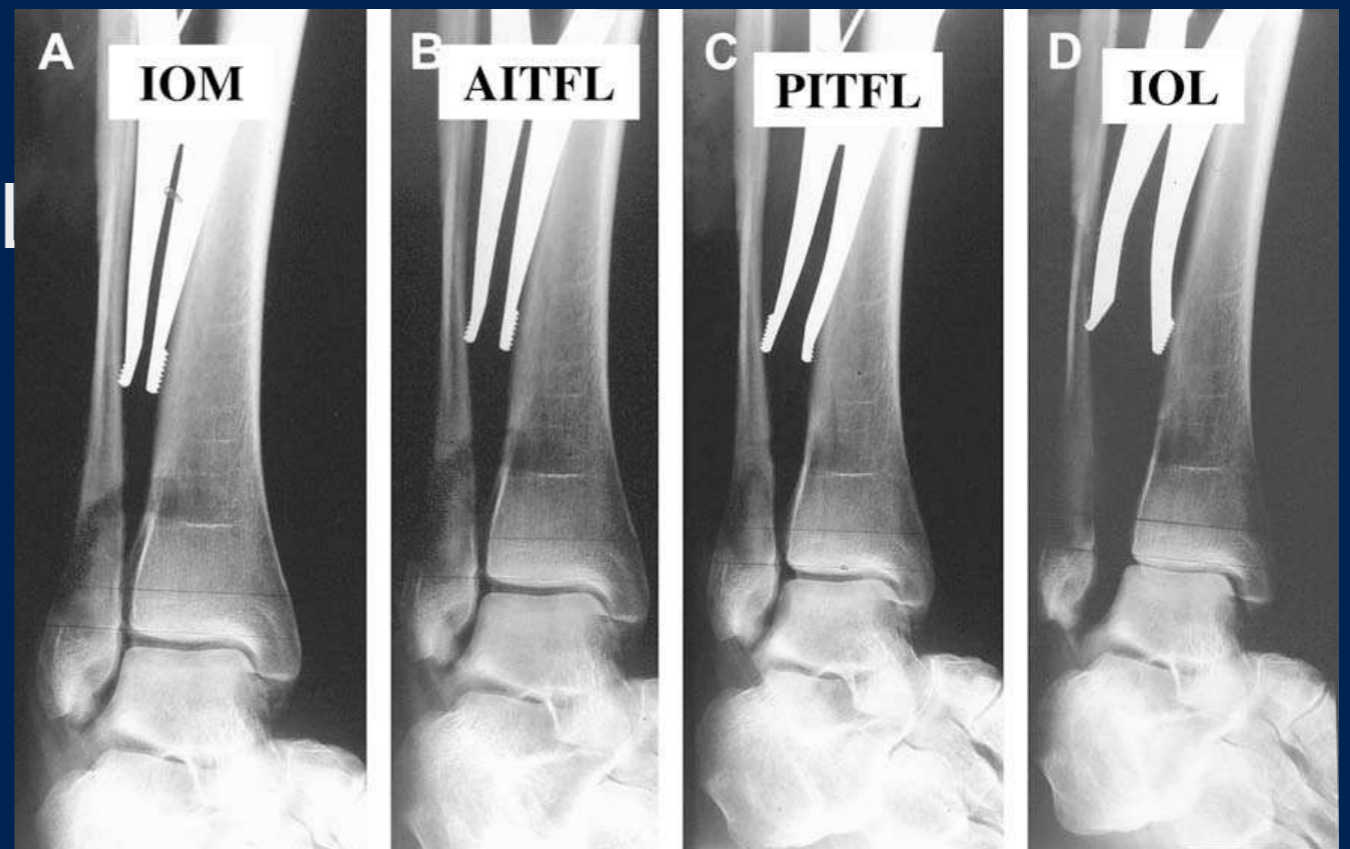
Haraguchi et al. 2009

- Intact syndesmosis Fibula ROTATES 2 * externally
- Equals ~ 2.4 mm distally
- 0.2-0.4 mm Anterior -posteriorly
- **THUS Fibula moves in 3 D**

Ogilvie & Harris 1994

Study on Individual Ligaments for Syndesmotic Stability

- 35% ATIFL
- 33% TRANSVERSE I
- 22% IOL
- 9% PTIFL

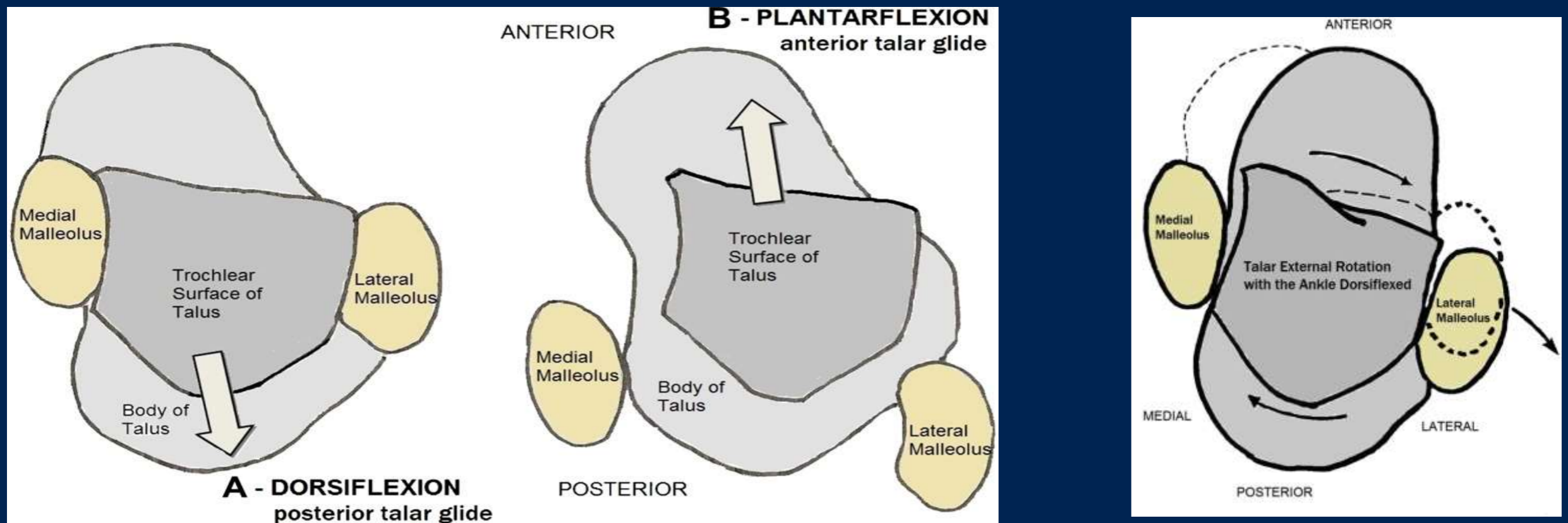


MECHANISM OF INJURY



- HIGH VELOCITY INJURIES
- COLLISION SPORTS
- SKIING
- X GAMES

FORCED EXTERNAL ROTATION SEVERE INVERSION & PLANTARFLEXION



CLASSIFICATION

Box | 1. Classification of syndesmotic disorders

- I. Congenital
- II. Acquired: atraumatic (eg, osteochondroma of distal ends of tibia or fibula near syndesmosis)
- III. Acquired: traumatic
 - A. Acute
 1. Sprain without diastasis
 2. Latent sprain
 3. Frank diastasis (per Edwards and DeLee)
 - Type I. Lateral subluxation without fracture
 - Type II. Lateral subluxation with plastic deformation of fibula
 - Type III. Posterior subluxation/dislocation of fibula
 - Type IV. Superior subluxation/dislocation of talus into mortise
 - B. Subacute (3 weeks to 3 months)
 1. Without tibiotalar arthritis
 2. With tibiotalar arthritis
 - C. Chronic (more than 3 months)
 1. Without tibiotalar arthritis
 - a. Without synostosis
 - b. With synostosis
 2. With tibiotalar arthritis

□ ACFAS 1997

□ EDWARDS & DELEE 1984

□ Gerber et al 1998

Data from Edwards GS Jr, Delee JC. Ankle diastasis without fracture. Foot & Ankle 1984;4(6):305–12.

Perform Thorough History & Physical

- Underlying Etiological Conditions (Ligamentous Laxity)
- Understand Mechanism of Injury
- Establish Realistic Goals & Time Table

Inversion Ankle Sprain Examination

- Proximal Fibula
- Distal Fibula
- Peroneal Tendons
- Sinus Tarsi / Anterior Process Calcaneus
- Calcaneal - Cuboid Joint
- Base of Fifth Metatarsal
- Deltoid Ligaments





SQUEEZE TEST

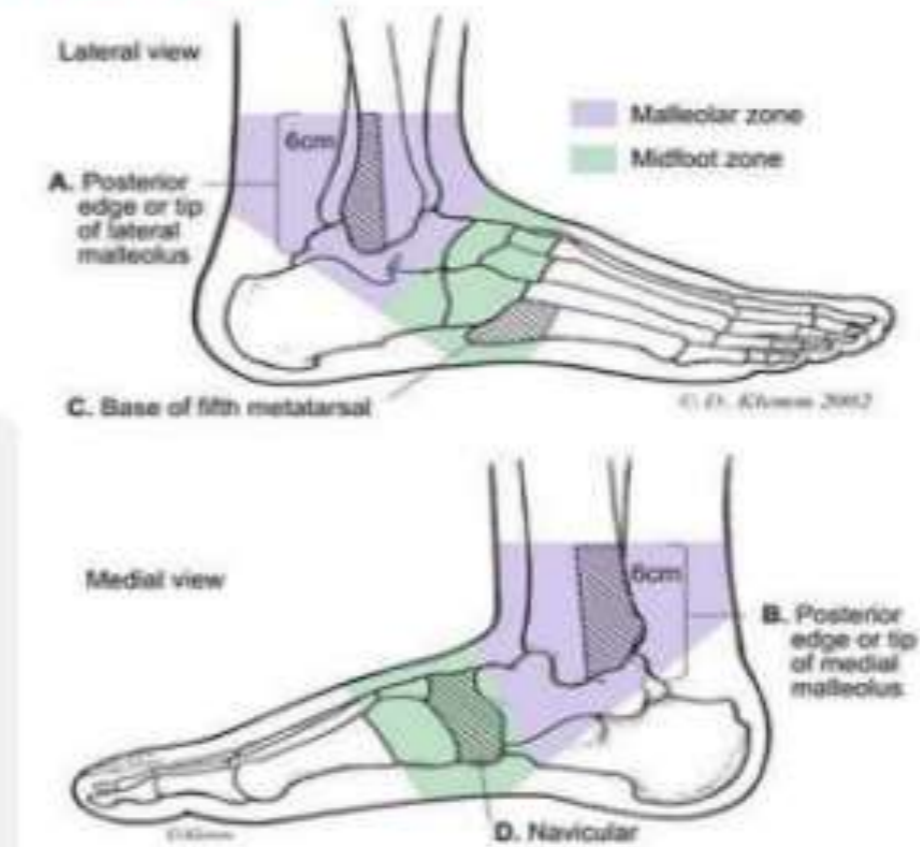
Other Clinical Testing For High Ankle Sprains



- Dorsiflexion Compression
- Dorsiflexion External Rotation
- Crossed Leg Test
- Heel Thump

Ottawa ankle rules

- ⊙ The **Ottawa ankle rules** are a set of guidelines for clinicians to help decide if a patient with foot or ankle pain should be offered X-rays to diagnose a possible bone fracture.
- ⊙ Sensitivity: 98.5%



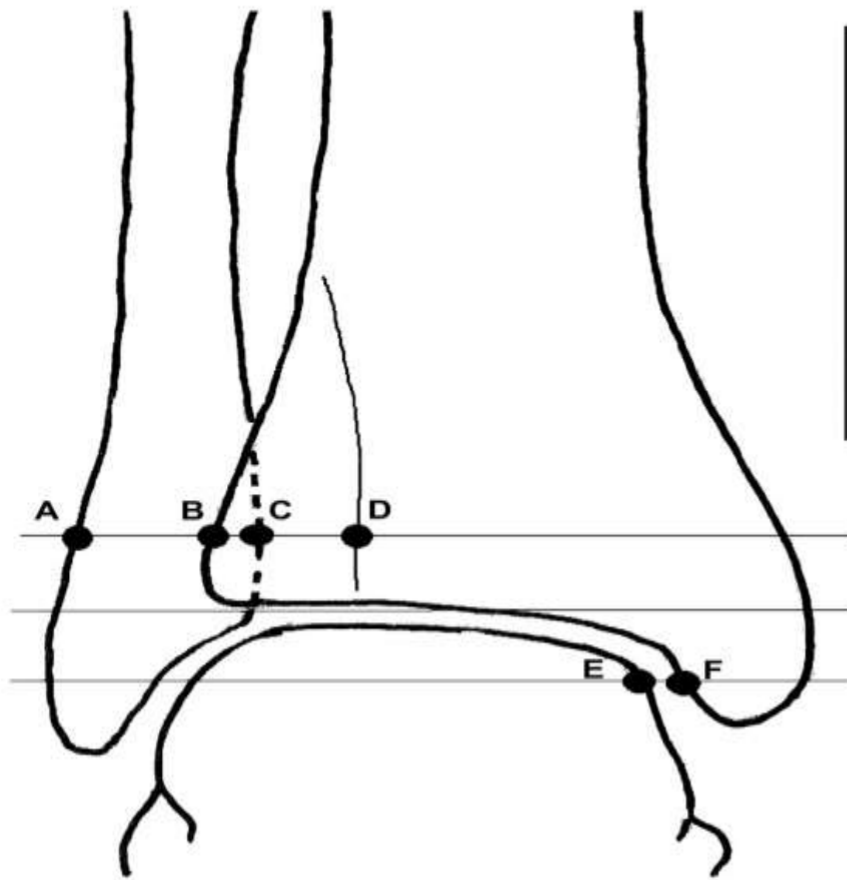
Bachmann LM, Kolb E, Koller MT, et al. Accuracy of Ottawa ankle rules to exclude fractures of the ankle and mid-foot: systematic review. BMJ 2003; 326:417.

Radiographic Exam



- 3 views: AP, Mortise, Lateral
- Contralateral X-Rays
- Tibiofibular Clear Space
- Medial Clear Space
- Tibiofibular Overlap

A – Normal radiograph; B – Abnormal radiograph with no tibiofibular overlap and increased tibiofibular and medial clear space.



- A - Lateral fibular border
- B - Lateral tibial border
- C - Medial fibular border
- D - Lateral border of posterior tibial malleolus (incisura fibularis)
- E - Medial talar border
- F - Lateral medial malleolus border

- CD - Tibiofibular clear space
- BC - Tibiofibular overlap
- EF - Medial clear space

Radiographic Finding	View	Measured at:	Normal Parameters
Tibiofibular clear space	A/P	1 cm above the tibial plafond	< 6 mm or < than 44% of the fibular width
Tibiofibular overlap	A/P	1 cm above the tibial plafond	> 6 mm or > 24% of the fibular width
	Mortise		> 1mm
Medial clear space	Mortise	At the level of the talar dome	> 4 mm or > 2mm than uninvolved side

Radiographic Exam

External Rotational Stress Test

As static radiograph or intra operatively

Shows widening of tib-fib clear space and can show deltoid disruption



Associated Injuries



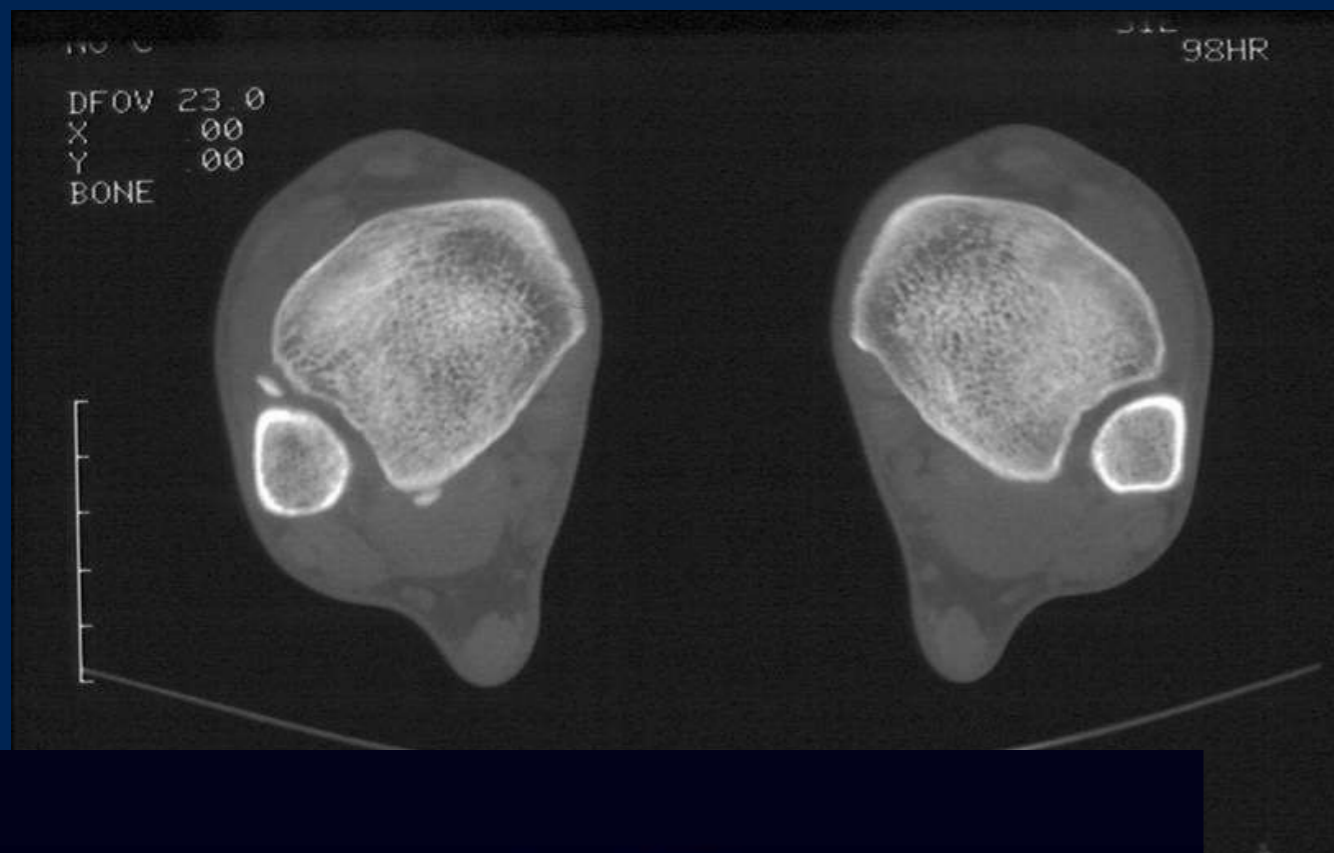
- Ankle Fractures: PER 3, SER 4, PAB
- Maisonneuve
- Posterior Malleolar Fractures
- Tillaux Chaput Fractures

Associated Injuries Cont.

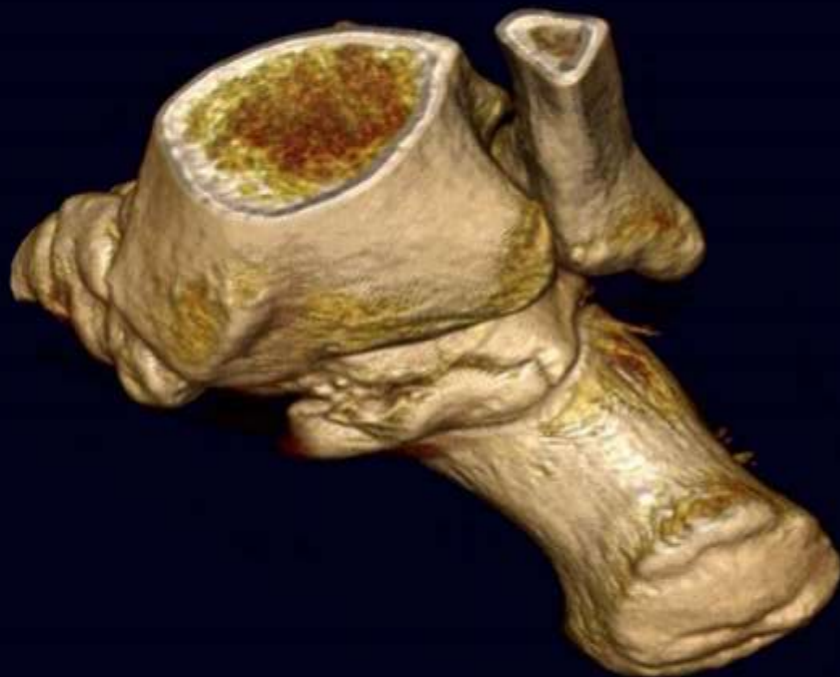


Diagnostic Testing

CT Scan



- Accurate
- Detect Diastasis of 2-3 mm
- Bilateral observes: fibular shift, rotation, shortening avulsions



Diagnostic Ultrasound



- Perform in Office
- Quick & Inexpensive
- No Radiation
- Learning Curve****
- Mei-Dan et al AM.Journ. Sports Med 2011
- 89% specificity/sensitivity
AITFL 0.4 mm

MRI

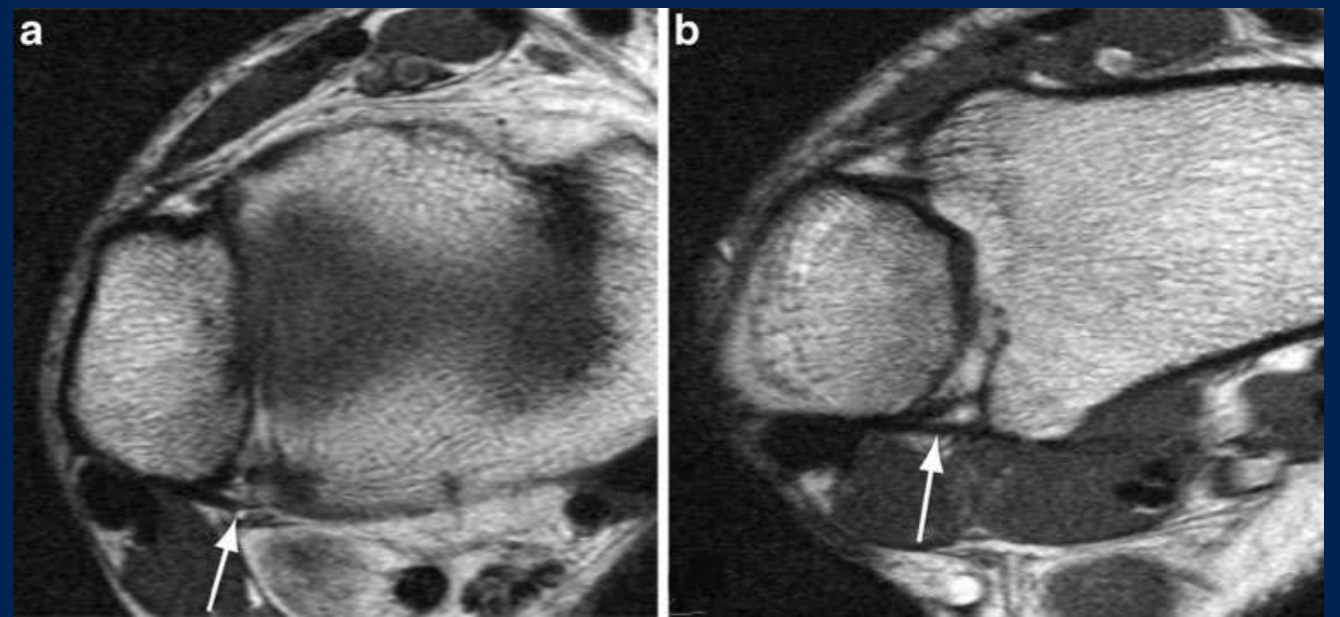
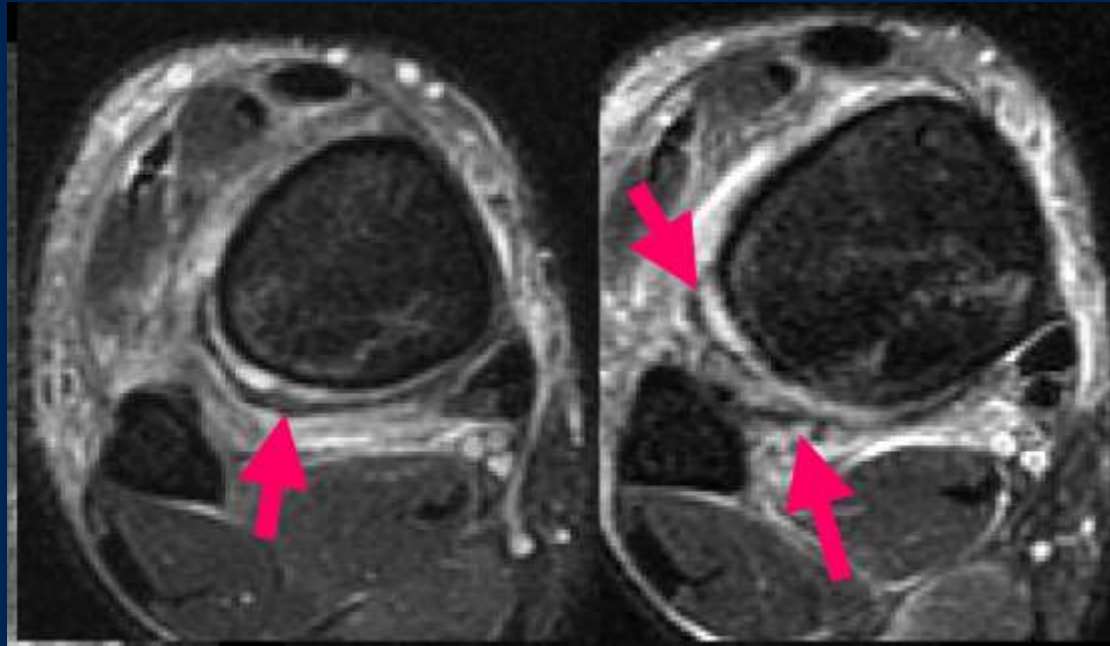
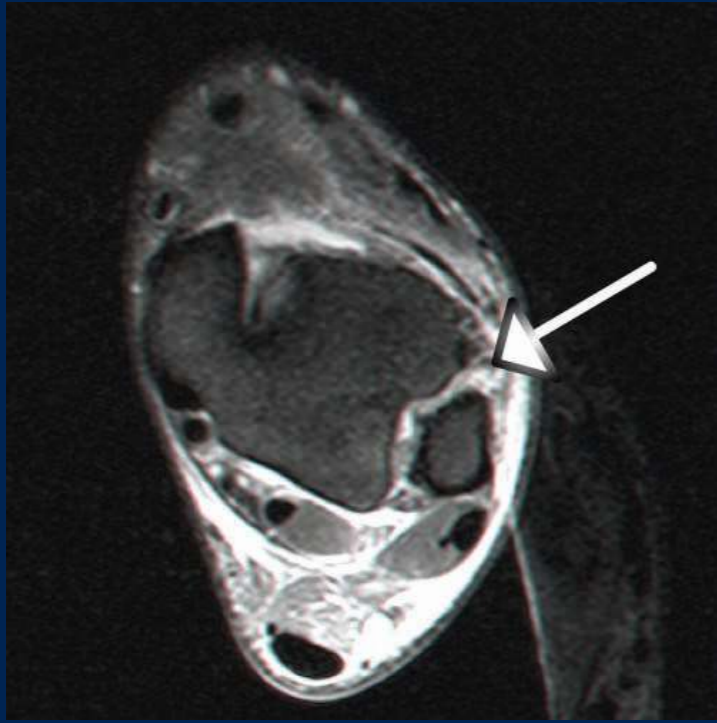
Gold Standard

Shown to effectively display the components of the syndesmotic complex with

93% specificity and 100%

sensitivity for injury of the AITFL, and 100% specificity and sensitivity for injury

the PITFL compared with arthroscopy in acute injuries



Diagnostic Arthroscopy

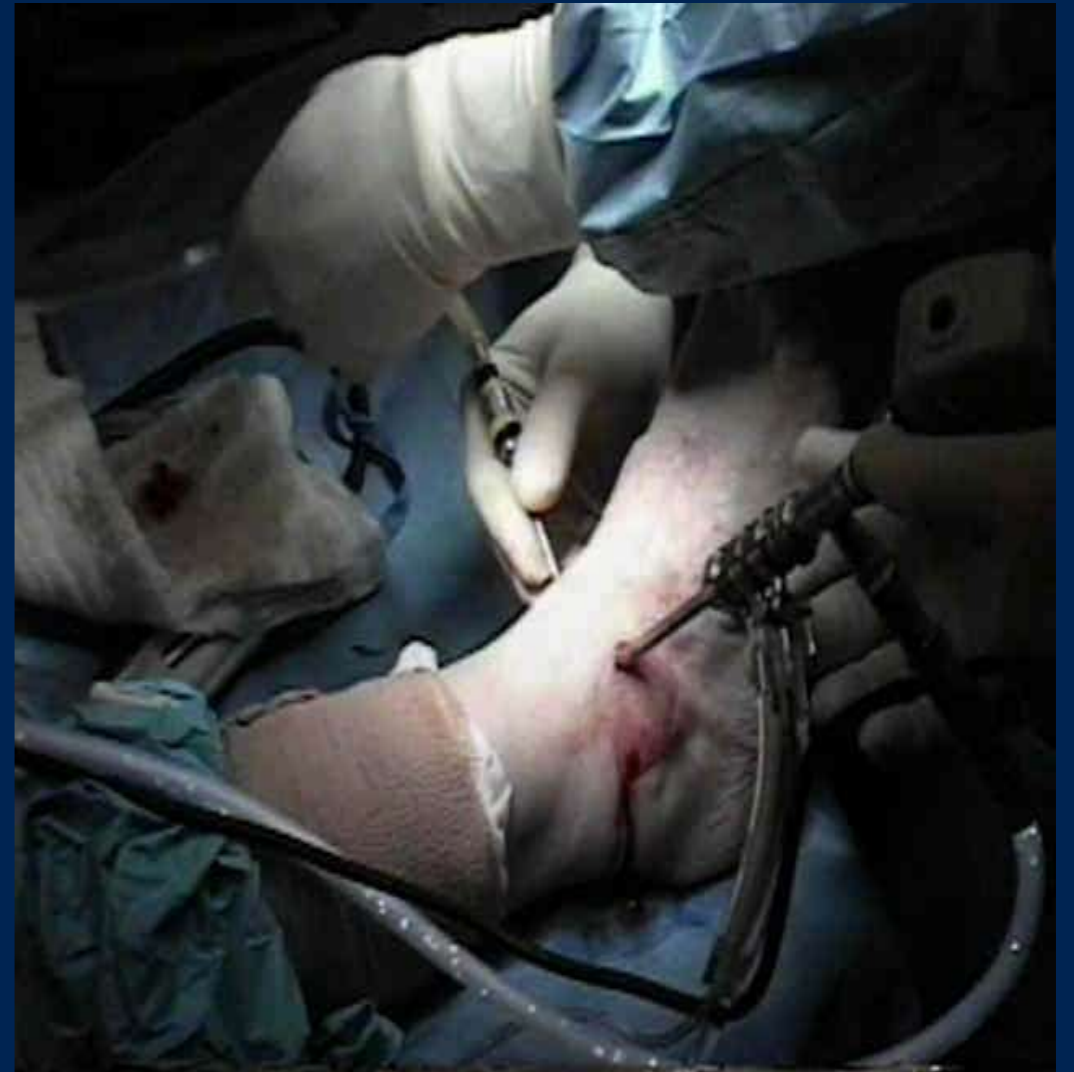
Direct visualization of AITFL and PITFL

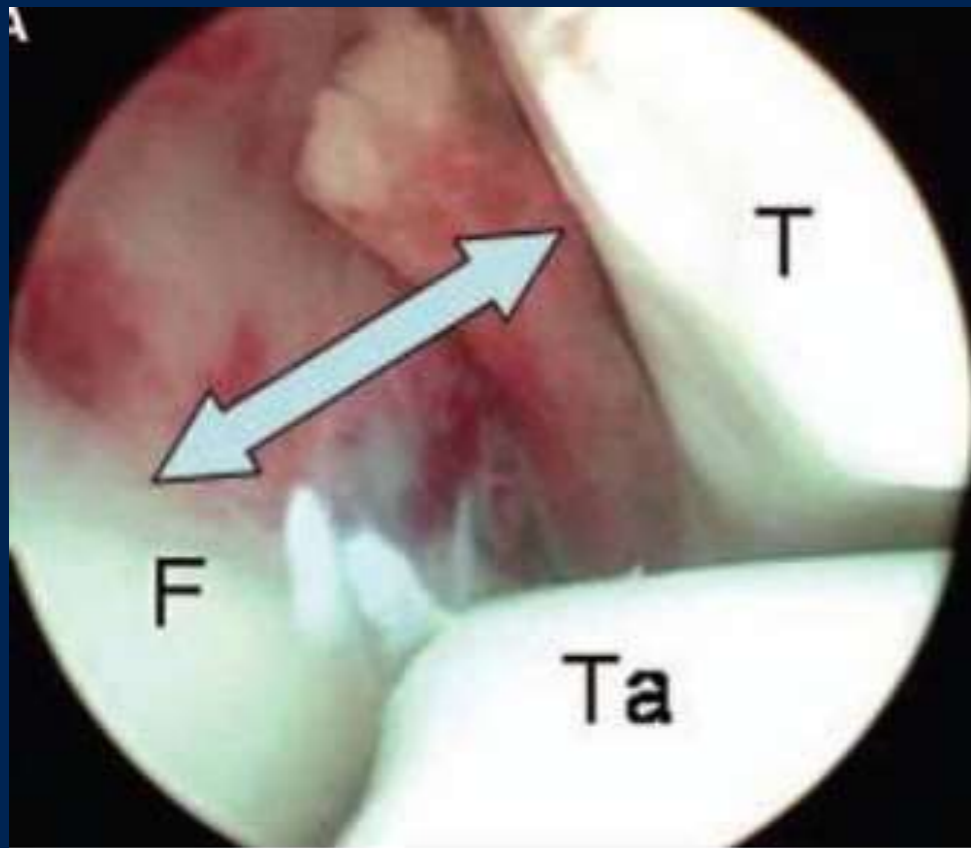
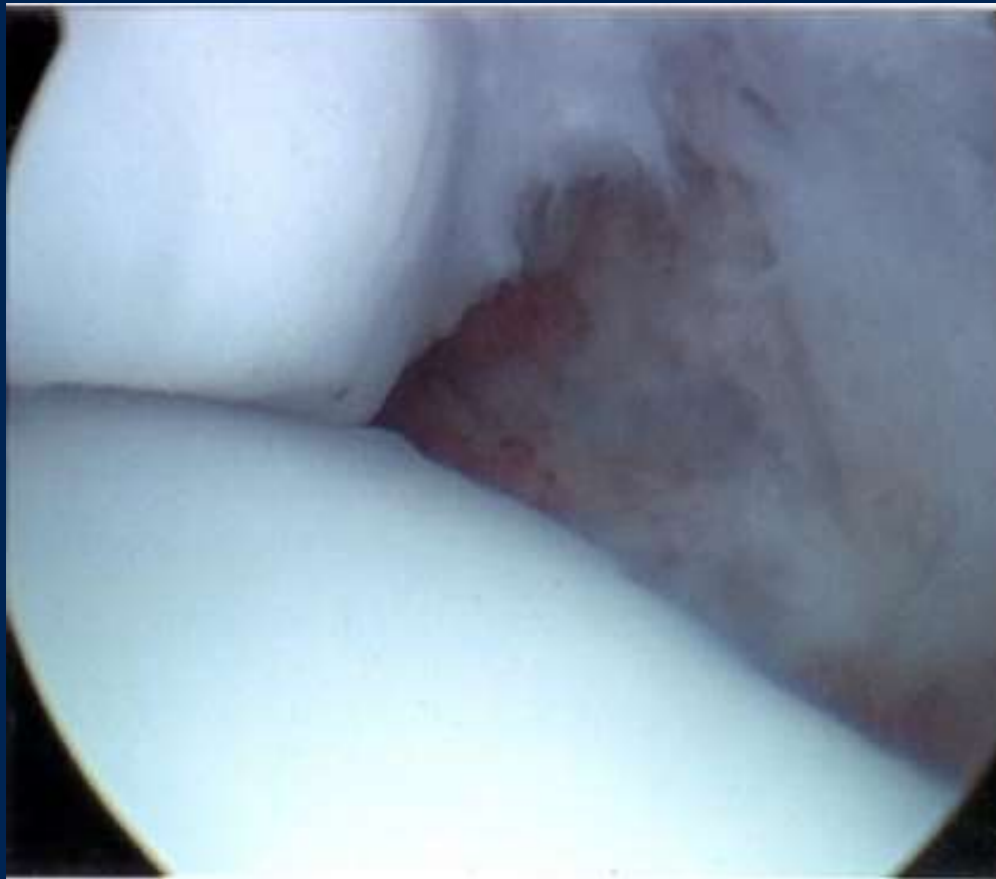
Must use both anterior and posterior portals

Intraoperative Dx

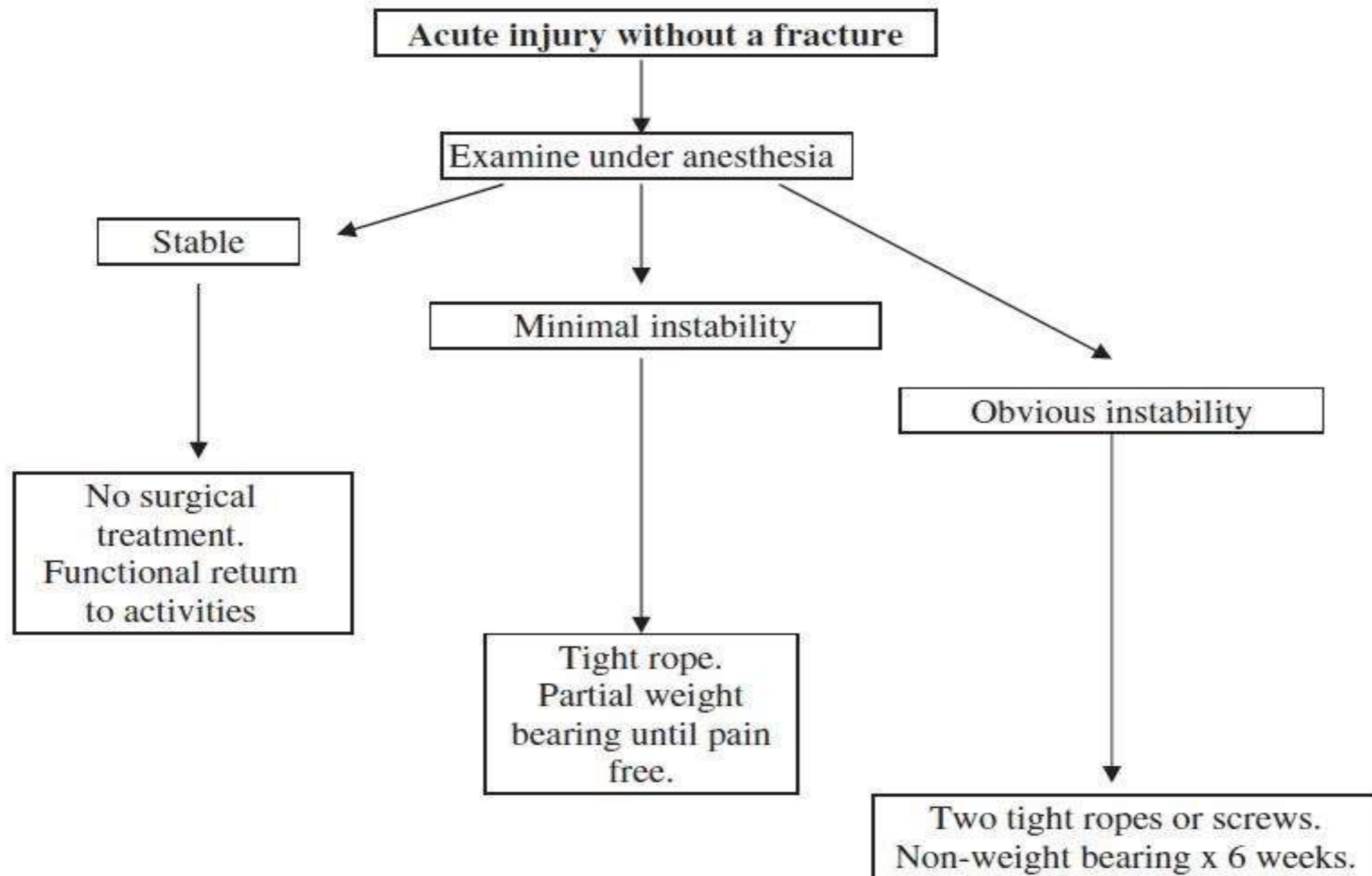
User dependent, learning curve

Can perform complete direct repair





Treatment Protocol



Conservative Treatment

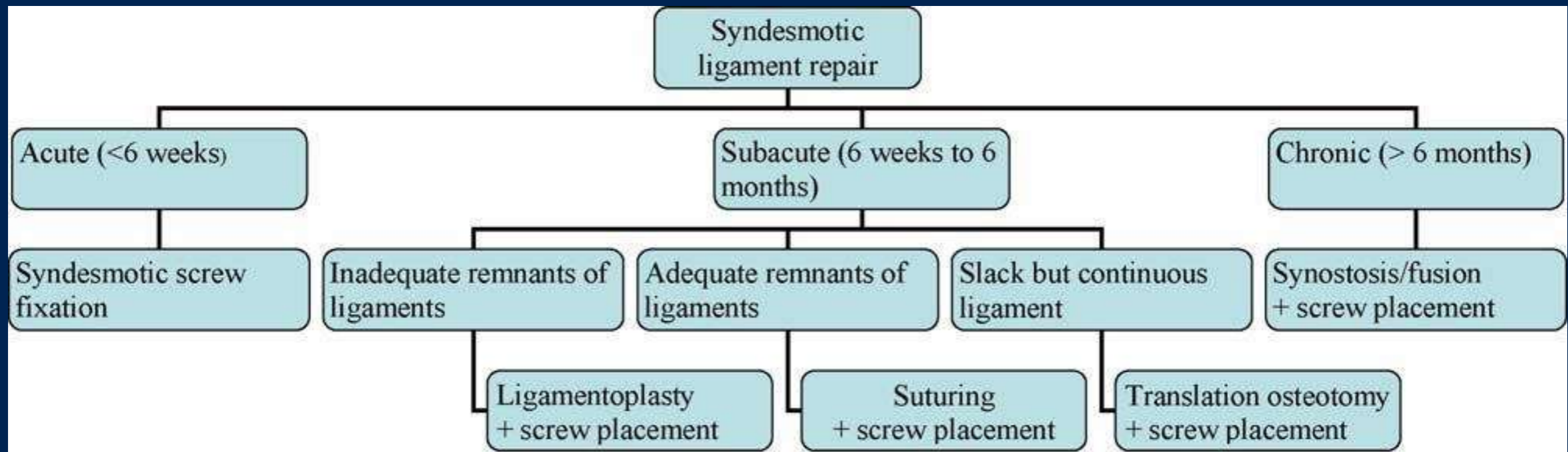
- RICE
- NSAIDS
- NWB
- Boot
- Physical Therapy
- **Favorable results:** 86 - 100% Good to Excellent Outcomes

Surgical Indications

Diastasis > 2mm isolated or with
Fractures

REQUIRES SURGERY

Surgical Algorithm



Surgical Treatment

Percutaneous repair:

- ✦ Single or double screws with or w/out plate or washers
- ✦ Absorbable screws
- ✦ Suture button (single or double)

Direct repair:

- ✦ Arthroscopic debridement with direct ligament repair
- ✦ Open with tendon graft

Surgical Treatment



Approach:

✦ Anterolateral linear over distal fibula

Allows complete debridement

of avulsed ligaments tissue or debris that may block proper reduction

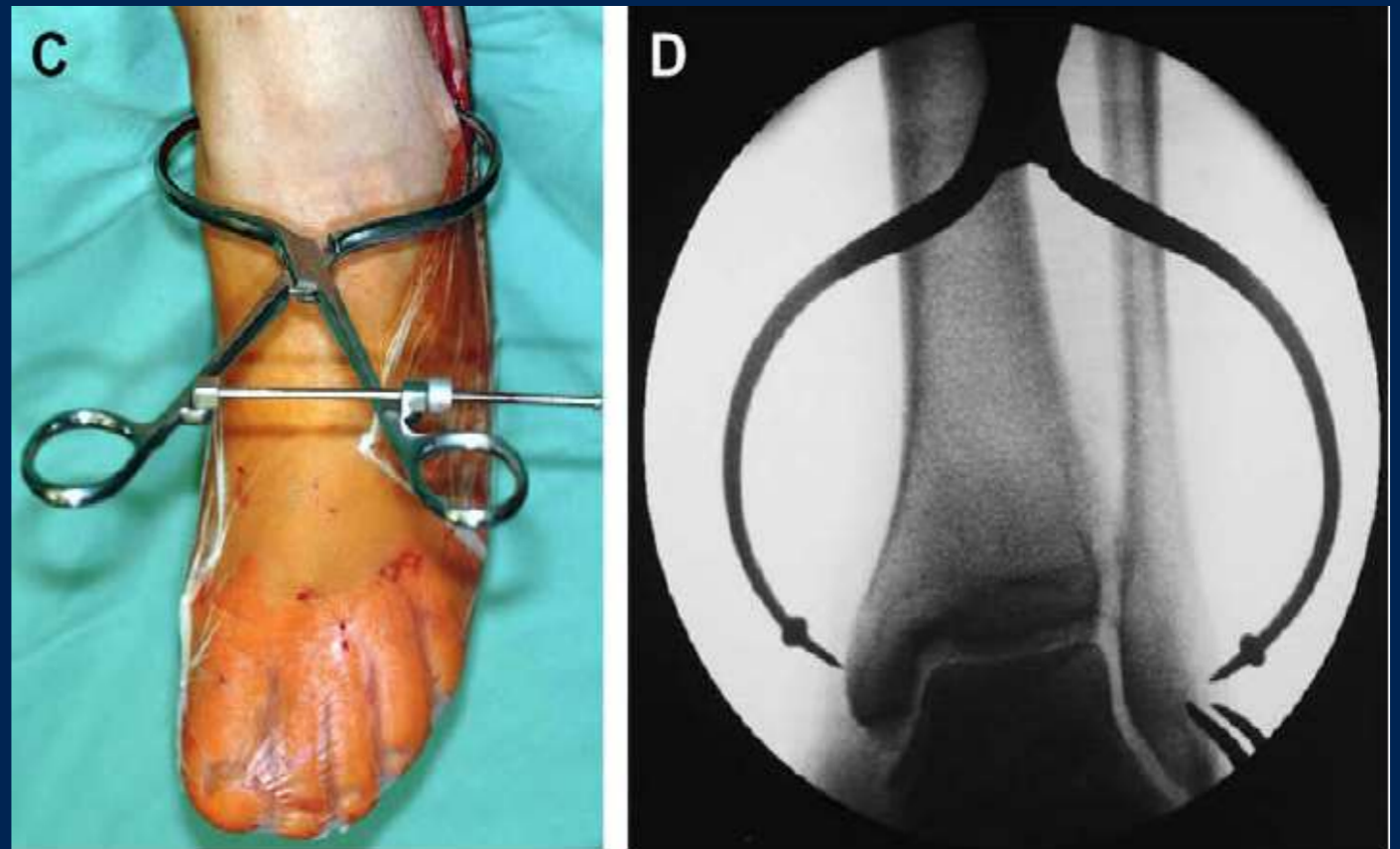
Surgical Treatment

Reduction:

position the fibula properly into the incisura fibularis

of the tibia, which is best achieved with a bimalleolar (pelvic) reduction clamp

The anterior rim of the fibula should align with Chaput's tubercle

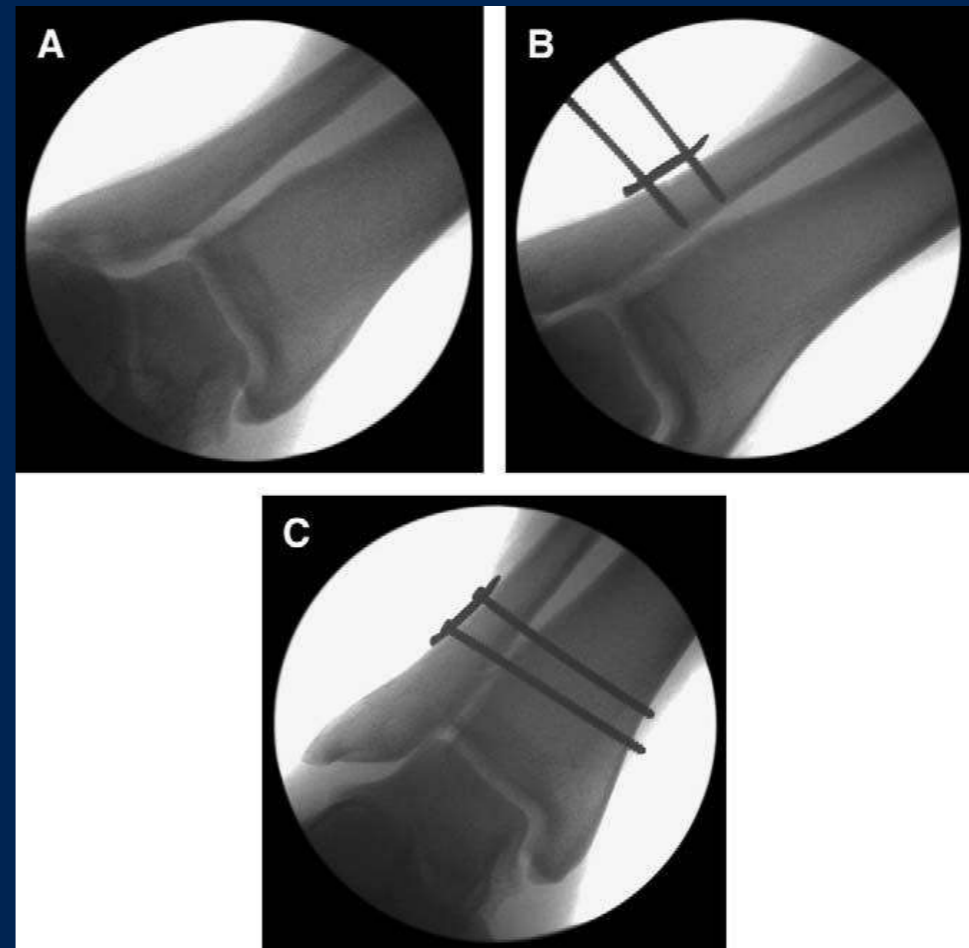


Surgical Treatment

In cases of malreduction the medial aspect of the ankle and the deltoid ligament should be explored via arthrotomy

All ligamentous or capsular debris is removed

After proper reduction, the position of the fibula may be secured temporarily with a Kirschner wire



- Ensure that a proper tibiofibular distance is obtained in Neutral Ankle Position

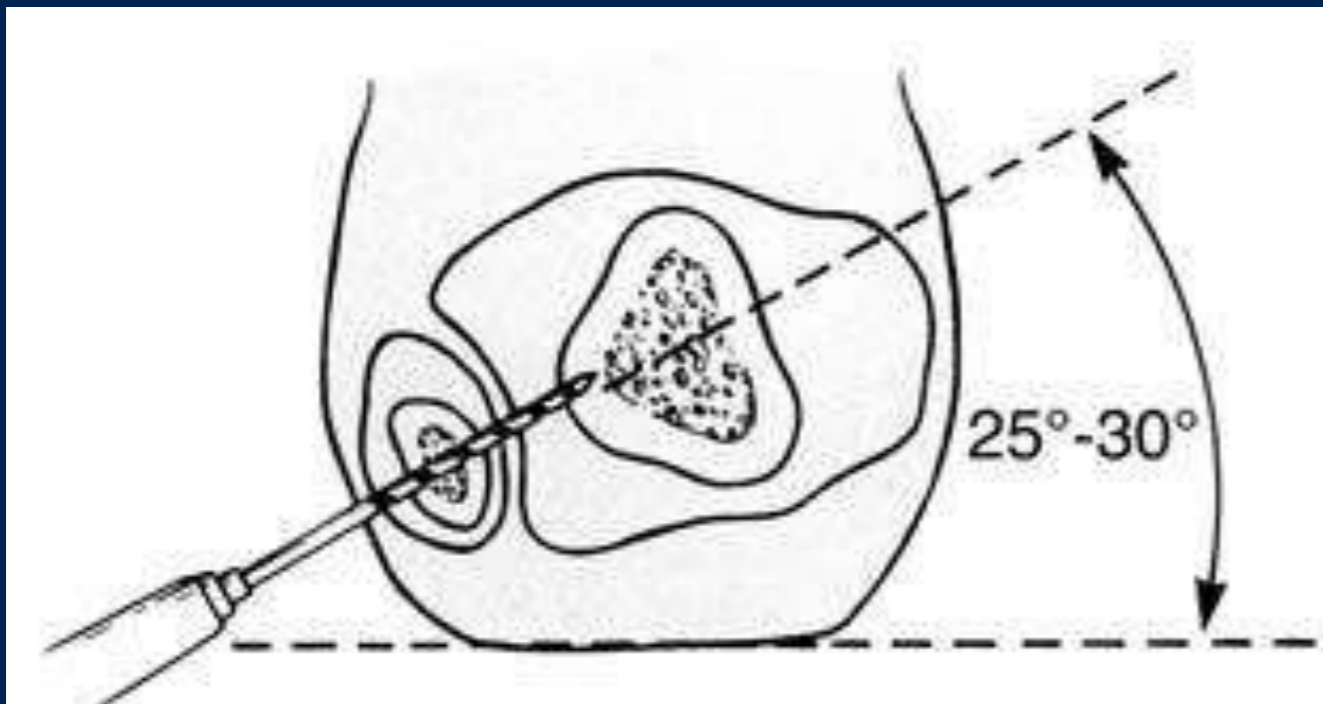








Pearls for Screw Placement



- screws applied 30 degrees posterolateral-anteromedial
- screws placed 2 cm -4.5 cm above joint line
- obtain minimum 3-4 cortices
- Full Threaded Screws
- Washers vs. Plates

Outcomes of screw treatment:

Leeds and Ehrlich + Fritschy

✦no recurrence after open reduction, screw fixation, and suture of the AITFL
Edwards and DeLee

✦4-year results of 34 patients = adequacy of syndesmosis reduction and arthritis at followu

✦Proper syndesmosis reduction is key

Surgical Treatment

Suture button:

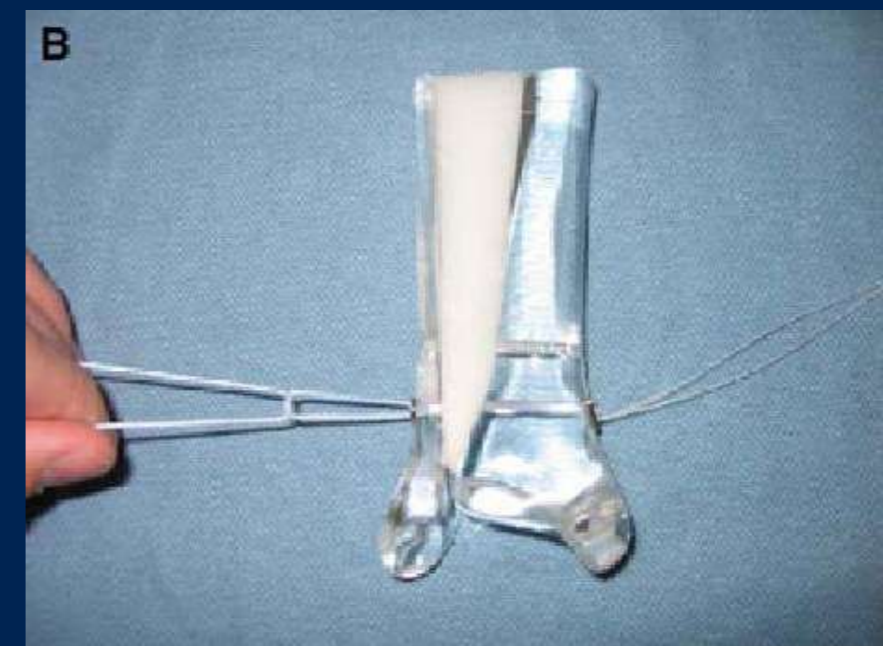
Follows same principles as screw fixation

Faster rehabilitation?

1 vs. 2

Clinical studies show relatively equal rigidity as compared with screws

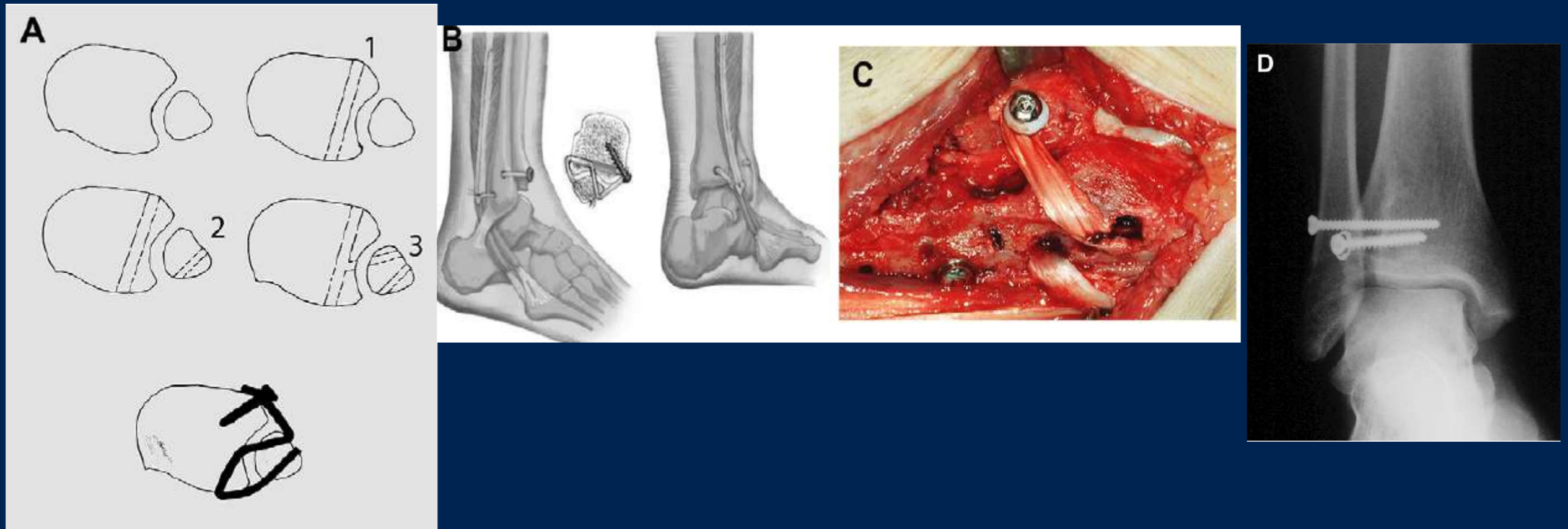
Allows more normal motion of joint



Surgical Treatment

Open with Tendon Graft

Well suited more for chronic diastasis



Post Operative Care

- screws removed 10 -12 weeks
- NWB 2-4 weeks cast
- WB as tolerated 4- 6 weeks
- Physical Therapy after screws removed

Post Op Complications

- Typical Post Op Complications
- Heterotopic Ossifications ~ 32%
- Tib- Fib Synostosis with persistent pain
- **CHRONIC INSTABILTY DUE TO MISSED DIAGNOSIS OR MALREDUCTION**



Review

- Syndesmotic Complex provides a dynamic support to the ankle for normal motion
- Understanding Anatomy, Biomechanics & Mechanism of Injury is Paramount
- Appreciated Clinical Exam & Special Testing
- Recognize Diagnostic Testing
- Appreciate Surgical Indications & Techniques



DAYS TO GO:

019

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