EVALUATION AND MANAGEMENT OF ANKLE INSTABILITY

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DISCLOSURES

- Arthrex – Paid Instructor MIS Bunion
- ROM Tech - Investor

Arthrex

ROMTech
The Modern Technology of Rehabilitation

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WHO AM

- Undergrad – Biomedical Engineering - University of Tennessee
- Medical School – University of Tennessee Health and Science Center
- Residency – University of Mississippi Medical Center
- Fellowship – Hospital for Special Surgery, NYC
- Practice
  - 2.5 years with Vanderbilt University
  - 6.5 years with Bone and Joint Institute

BJI
BONE AND JOINT INSTITUTE

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OVERVIEW

- Anatomy
- Mechanism
- H&P
- Differential diagnosis
- Classification
- Treatment

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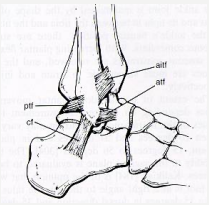
ANATOMY

Lateral ligament complex
- ATFL
- CFL
- PTFL



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FUNCTION

- *Makhani - J Int Coll Surg - 1962*
  - ATFL and CFL ligament play significant roles in different ankle positions
  - ATFL prime stabilizer in PF
  - CFL prime stabilizer in DF

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FUNCTION

- *Renstrom - J Foot Ankle 1988*
- *Colville - AJSM 1990*
  - Independently evaluated strain characteristics of ligaments in varying positions
  - ATFL ↑ Strain with DF
  - CFL ↑ Strain with PF

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LATERAL ANKLE SPRAIN

- Biomechanics
  - ATFL sectioned
    - ↑ Talar tilt in PF
    - No change in DF
  - CFL sectioned
    - ↑ talar tilt in DF
    - No change in PF
  - PTFL sectioned
    - Allows ↑ ankle DF
    - No effect on lateral instability
  - ATFL & CFL
    - ↑ talar tilt by 20° on avg.
- Additional Injuries occur
  - Disruption of normal capsular mechanoreceptors
    - Loss of afferent fibers
    - Loss of Proprioceptive feedback
    - Loss of effective motor coordination
  - Possibly a major contributor to
    - *Recurrent instability*

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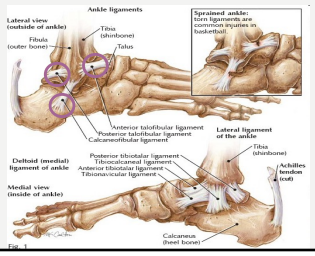
ANATOMY



Lateral ligament complex involvement

ATFL almost all

CFL 50-75%

PTFL <10%

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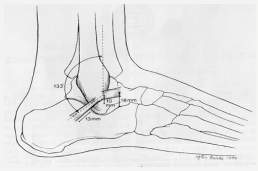
ANATOMY

Burks and Morgan -AJSM 1994

- Detailed anatomic study of lateral ligamentous complex
- Measured ligament length, insertion and orientation
- Recommended these points for anatomic ligament reconstruction



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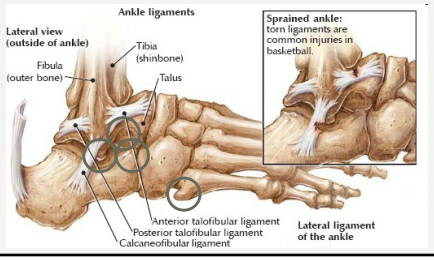
BONY ANATOMY



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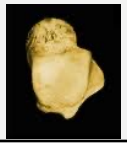
ANATOMY

Functional interplay between osseous and ligamentous supports

Plantar flexion Osseous support

Talus
Anterior margin
2.4mm wider than
posterior margin
PF=↓ stability
DF=↑ stability



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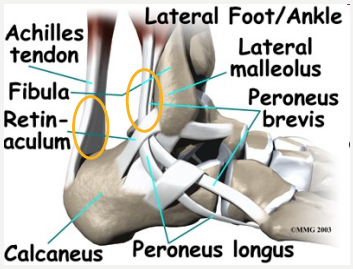
TENDONS



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MECHANISM

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HISTORY AND MECHANISM

- 85% lateral injuries
- Inversion and internal rotation of foot with external rotation of leg
  - Foot often in PF
- Prior ankle sprains
- Ability to bear wt

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INJURY PATTERN

- Vast majority of ankle sprains occur in
- Injury pattern

ATFL
CFL
PTFL

PF/ADD/INVERSION

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PHYSICAL EXAM

- Neurovascular exam
- Localize site maximum TTP
- Examine sitting with knee bent as well as standing
  - Examine both legs
    - Squeeze test
  - CV foot alignment
- Instability
  - ATFL laxity: anterior drawer
  - CFL laxity: lat tilt test

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EVALUATION

- Anterior Drawer
  - Rupture of ATFL
  - Neutral to 10 degrees PF
  - Compare to other side
  - Negative test essentially excludes ATFL rupture

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EVALUATION

- Talar Tilt Test
  - Rupture of CFL
  - Neutral to 10 degrees DF
  - ? Subtalar involvement

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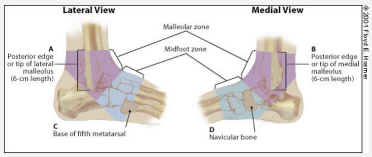
OTTOWA ANKLE RULES



- Ankle XRs if malleolar TTP with
  - bone tenderness at A,
  - bone tenderness at B
  - inability to bear weight immediately and in the emergency department (or physician's office).

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XRAY EXAM

- AP, lateral, mortise ankle
- +/-foot xrays
- CT scan/MRI not indicated acutely (6-8 wks?)
  - CT: If suspect fracture
  - MRI: If suspect tendon injury

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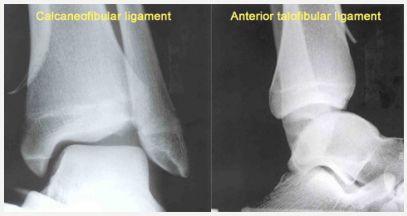
STRESS XRAYS



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LATERAL ANKLE INSTABILITY

- Associated Injuries
  - Osteochondral 22%
  - Articular cartilage
    - 89% acute injuries
    - 95% chronic injuries
    - Most commonly AM tibial surface
  - Bone Bruise 27%
  - Anterolateral ankle impingement
    - Distal fascicle of AITFL strikes talar dome during DF
      - Improvement by arthroscopic resection
    - Capsular entrapment
  - Peroneal instability
  - Nerve Palsy: SPN
  - Subtalar sprain
  - Bifurcate ligament sprain
  - Tib-fib synostosis
  - 5th MT base fx

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DIFFERENTIAL DIAGNOSIS

- Fractures
  - Ankle
    - Lateral malleolus
    - Medial malleolus vs clear space widening
    - Posterior malleolus
    - Maissonneuve fracture
  - Talus
    - OCD/loose body
    - Lateral process talus
    - Talar neck
  - Base 5th MT
  - Anterior Process calcaneus
- Soft Tissue
  - Peroneal pathology
  - Ankle instability-CV foot
  - Achilles rupture
  - Sinus tarsi syndrome
  - RSD
  - Tumor
  - Impingement

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ANKLE FX

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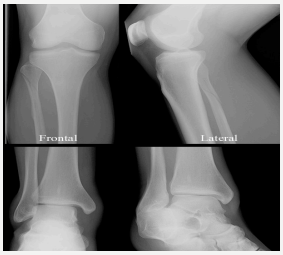
MAISONNEUVE FRACTURE



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SYNDESMOTIC INJURY

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TALAR OCD

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LATERAL PROCESS OF THE TALUS

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TALAR NECK FRACTURE

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5TH MT FX

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ANTERIOR PROCESS CALCANEUS FRACTURE

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PERONEAL PATHOLOGY

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ACHILLES RUPTURE

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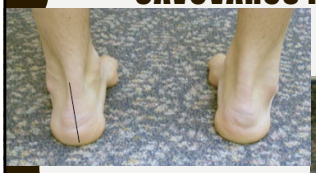
CAVOVARUS FOOT



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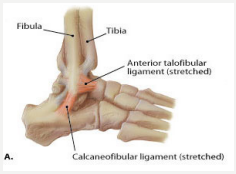
CLASSIFICATION

- Grade I
  - Incomplete tear/stretch of ATFL
  - Mild swelling/pain
  - No instability/loss of motion
  - Able to bear wt with min pain



Am Fam Physician. 2001 Jan 1;63(1):93-104.

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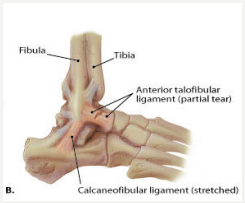
CLASSIFICATION



- Grade 2
  - Incomplete tear of CFL with incomplete vs complete tear ATFL
  - Moderate pain swelling
  - +/- mild instability, some motion loss
  - Pain with wt bearing

Am Fam Physician. 2001 Jan 1;63(1):93-104.

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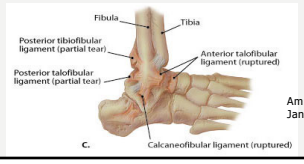
CLASSIFICATION

- Grade 3
  - Complete tear ATFL and CFL +/- stretch/tear of PTFL
  - Severe swelling (>4cm above tip lat malleolus)
  - +instability, severe motion loss
  - Unable to bear wt



Am Fam Physician. 2001 Jan 1;63(1):93-104.

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INITIAL MANAGEMENT

- Prevent swelling and regain ROM
  - RICE
  - Alphabet
  - Crutches/WBAT
  - Brace vs CAM

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RICE APPROACH

- **Rest**--You may need to rest your ankle, either completely or partly, depending on how serious your sprain is. Use crutches for as long as it hurts you to stand on your foot.

  Ice--Using ice packs, ice slush baths or ice massages can decrease the swelling, pain, bruising and muscle spasms. Keep using ice for up to 3 days after the injury.

  Compression--Wrapping your ankle may be the best way to avoid swelling and bruising. You'll probably need to keep your ankle wrapped for 1 or 2 days after the injury and perhaps for up to a week or more.

  Elevation--Raising your ankle to or above the level of your heart will help prevent the swelling from getting worse and will help reduce bruising. Try to keep your ankle elevated for about 2 to 3 hours a day if possible.

American Academy of Family Physicians

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FUNCTIONAL REHABILITATION

- 4 stages
  - ROM
  - Strengthening
  - Proprioception
  - Activity specific training

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CHRONIC ANKLE INSTABILITY

- Despite appropriate initial treatment for acute, complete rupture of the lateral ligaments 20% will develop persistent functional instability.

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CHRONIC ANKLE INSTABILITY

- Functional
  - *Freeman JBJS 1965*
  - Subjective feeling of giving way, usually during physical exercise
  - Motion beyond voluntary control, however, not beyond physiologic limits

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CHRONIC ANKLE INSTABILITY

- Functional Instability
  - Neural (proprioception, reflexes)
  - Muscular (strength, power, endurance)
  - Mechanical (ligamentous laxity)

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CHRONIC ANKLE INSTABILITY

- Functional Instability - Treatment
  - Same principles as acute injury
  - Stress proprioception, muscle training
  - Peroneal strengthening
  - Bracing, etc.

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CHRONIC ANKLE INSTABILITY

- Mechanical Instability
  - Motion beyond physiologic range
  - Demonstrated by anterior drawer and talar tilt
  - Incompetence of lateral ligaments
  - No true correlation exists between mechanical and functional instability
    - *Tropp -1985*

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CHRONIC ANKLE INSTABILITY

- Treatment
  - Functional Rehab
  - Bracing when at risk
  - Surgery
    - Recurrent instability despite rehab and on a day to day basis when bracing is not practical

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INSTABILITY CRITERIA

- AP Ankle
  - Greater than 10 degrees of varus
  - 5 degrees greater than opp side
- Lateral Ankle
  - ant translation 1 cm or greater
  - 5 mm greater than opp side

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CHRONIC ANKLE INSTABILITY SURGICAL OPTIONS

- Goal: Restore functional and mechanical stability
- General categories
  - Anatomic
  - Augmented

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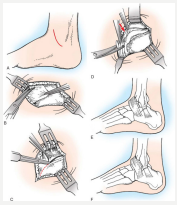
CHRONIC ANKLE INSTABILITY NON-AUGMENTED REPAIR

- Brostrom (Acta Chir Scand 1966)
  - Direct mid-substance repair of ligaments
  - Advantages
    - No normal tissue sacrificed
    - No tenodesis effect restricting motion
    - No donor site morbidity / eversion strength
    - Preserve tibio-talar and subtalar motion
    - Less pain
  - Disadvantages
    - Frayed ligaments often difficult to find
    - Ligaments often stretched, not simply torn



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CHRONIC ANKLE INSTABILITY NON-AUGMENTED REPAIR

- Brostrom procedure
  - Results of six series with 460 patients
    - 87-95% good/excellent results
    - 120/140 returned to pre-injury play
    - Poor results with
      - >10 years instability
      - lig laxity
      - ATFL reconstruction alone

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CHRONIC ANKLE INSTABILITY NON-AUGMENTED REPAIR

Twenty-six-Year Results After Brostrom Procedure for Chronic Lateral Ankle Instability
S. Josh Bell, Timothy S. Mologne, David F. Sitler and Jay S. Cox
Am J Sports Med 2006 34: 975

22 patients
93% functional score
92% return to sport

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AUGMENTED REPAIR

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AUGMENTED REPAIR

- Ulku et al[32] reported outcomes of 61 patients
  - 31 treated with arthroscopic Broström repair
  - 30 in whom the arthroscopic Broström repair had been augmented with suture tape
  - There was no significant difference in postoperative Foot and Ankle Outcome Score
- A recent comparative work on 83 patients
  - 22 managed with internal brace
  - 63 without internal brace
  - followed up for 6 months after a modified arthroscopic Broström procedure
  - showed that patients in the InternalBrace group were able to quickly return sports activity, with a statistically significant ($P < .05$) improvement in AOFAS score in the InternalBrace group after 2 weeks from surgery but no differences at 6 weeks
- Yoo JS, Yang EA. Clinical results of an arthroscopic modified Broström operation with and without an internal brace. *J Orthop Traumatol*. 2016;17(4):353-360.

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CONCLUSIONS

- Use the anatomy to guide your exam and diagnosis
- Look for associated injuries and pathology
  - Cavus Foot type and Generalized Ligamentous Laxity
- MRI for lack of improvement after 6-8 weeks
- RICE + rehab for acute injuries
- Consider Brostrom for failed conservative management

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THANK YOU

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