FAMILY MEDICINE MSK REVIEW: FOOT & ANKLE

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UNM ORTHOPAEDICS

DIVISION OF FOOT AND ANKLE

http://www.fammedrcr.com/access-curriculum/Musculoskeletal-and-Sports-Medicine

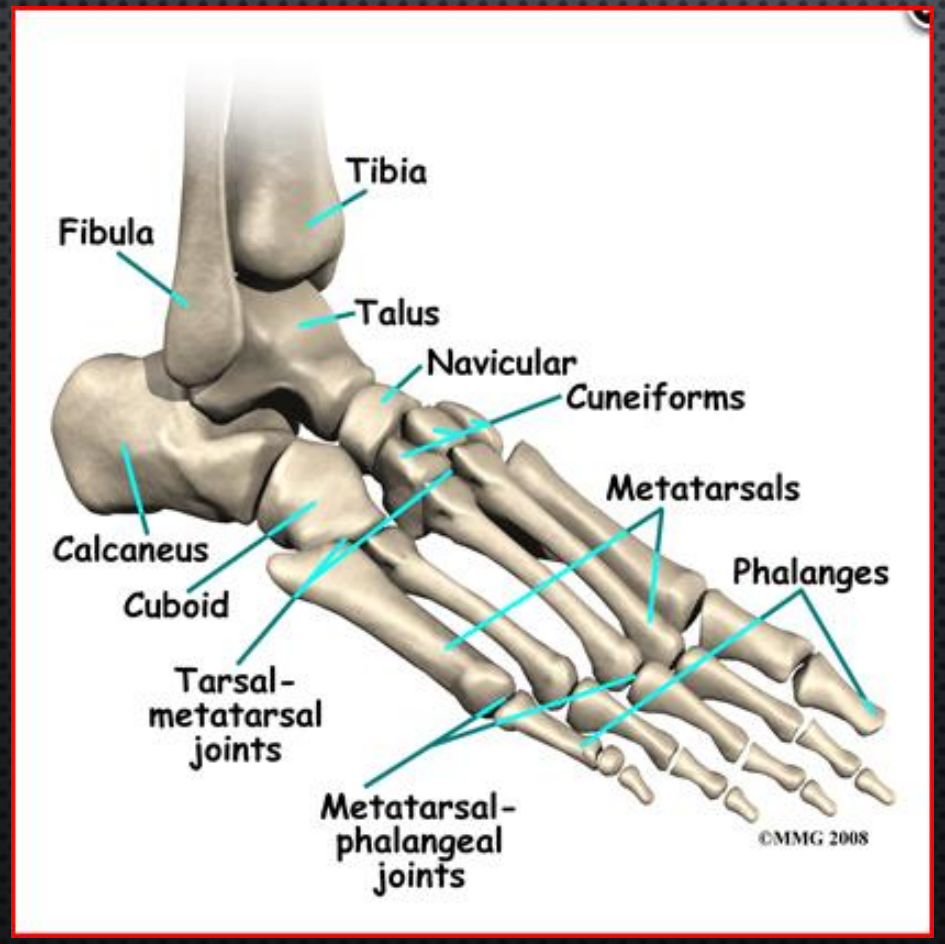
GOALS

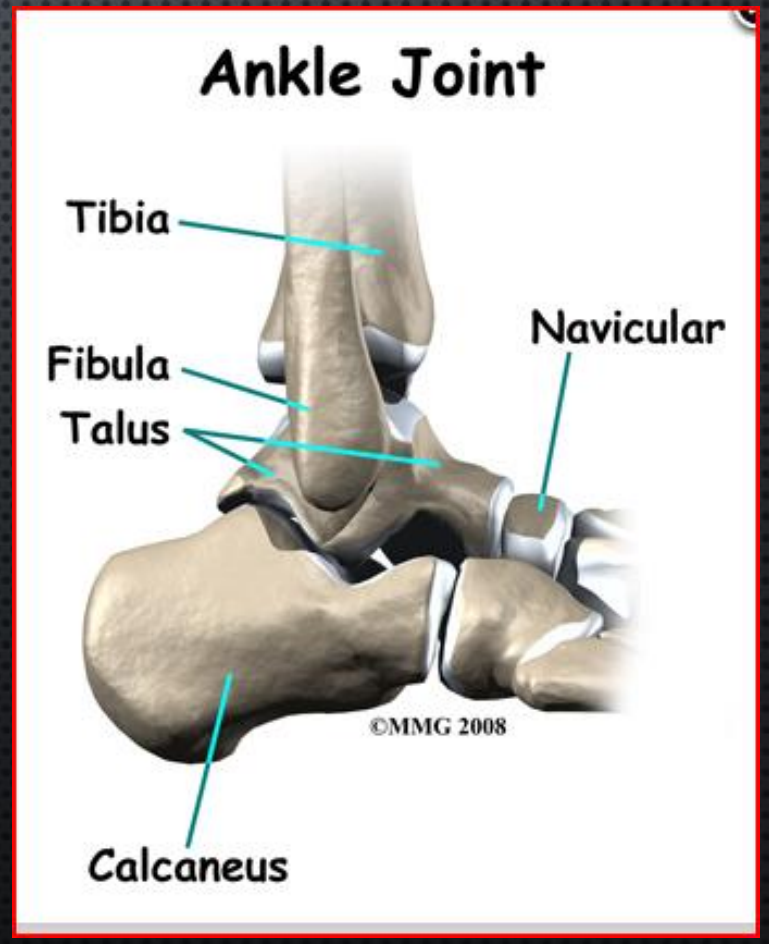
- Diagnosing common pathology of the foot and ankle based on history, physical exam, and imaging modality (if warranted)
- Using the Ottawa Foot and Ankle Rules in practice
- Treating common causes of foot and ankle pain
- Knowing when referral is indicated based on disease course and/or radiographic findings

Background

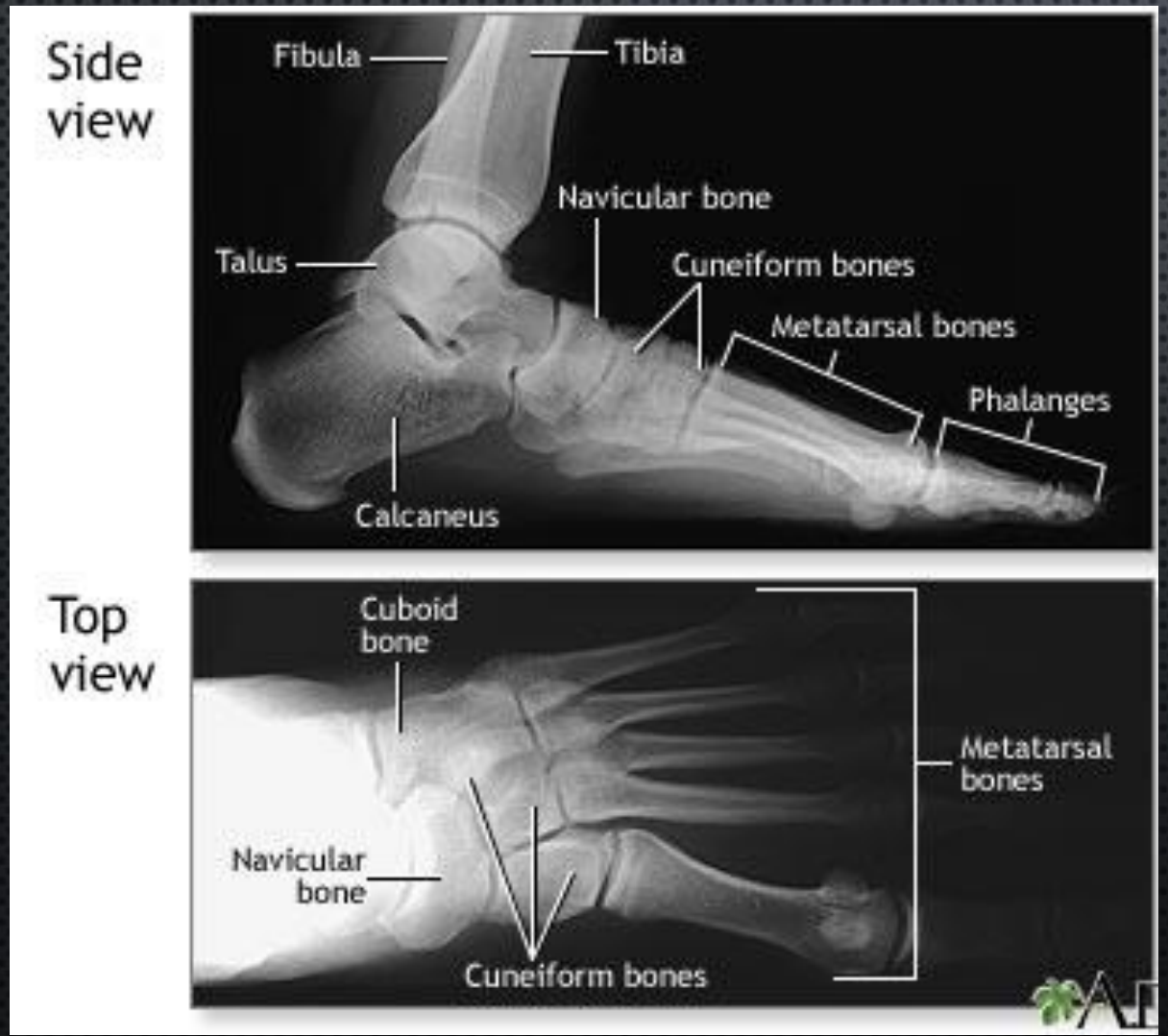
- Your future jobs are going to be very diverse
- I don't know what is on the test
- Much of this is common sense
- The internet is auseful source of information
  - www.orthobullets.com
  - Foot Care MD (AOFAS)
    - http://legacy.aofas.org/footcaremd/Pages/footcaremd.aspx

FOOT AND ANKLE ANATOMY





3 VIEW: FOOT XRAY
AP, LATERAL, OBLIQUE



WEIGHTBEARING XRAYS SHOW MAXIMUM DEFORMITY

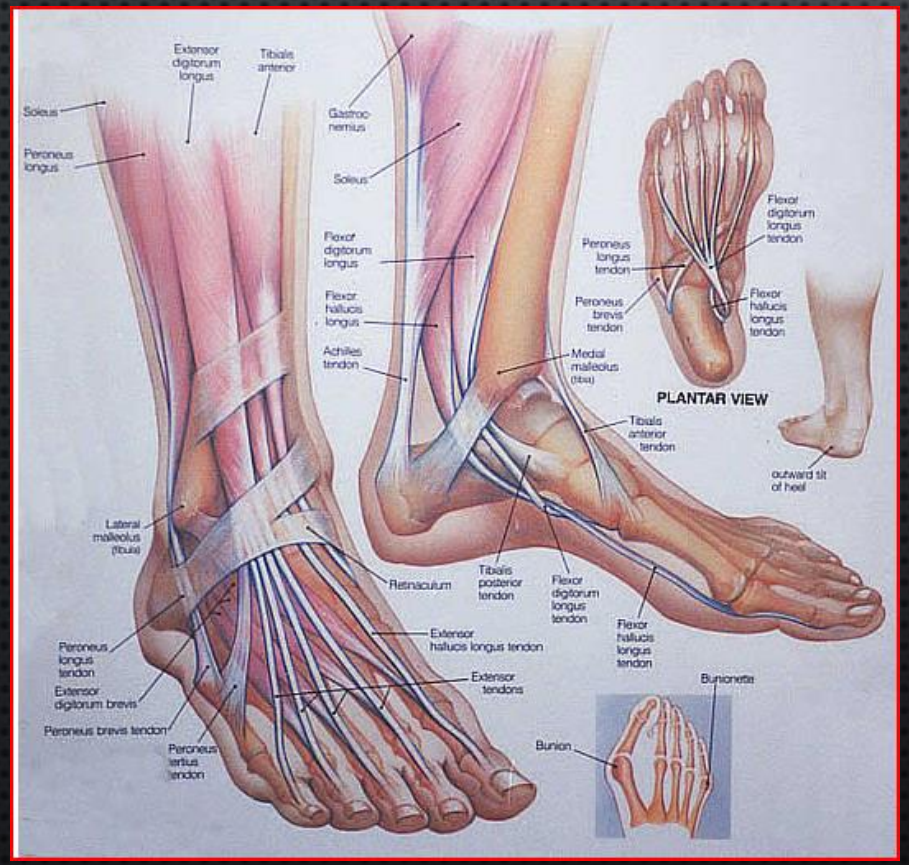
WEIGHTBEARING!!!!!

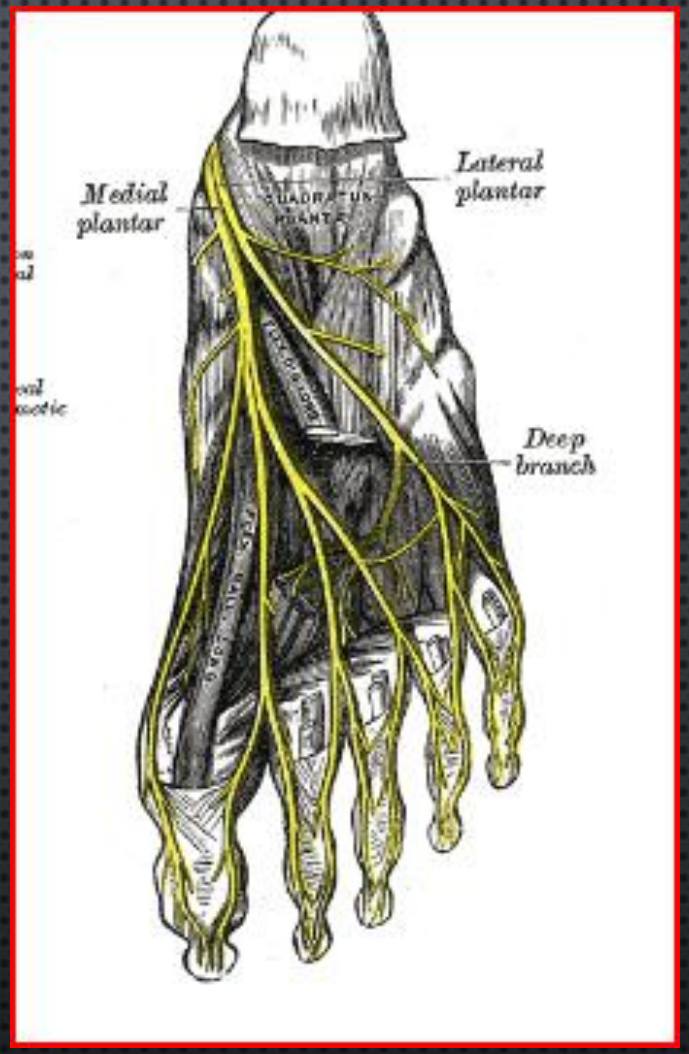
ANKLE XRAY: 3 VIEWS
AP, MORTISE, LATERAL

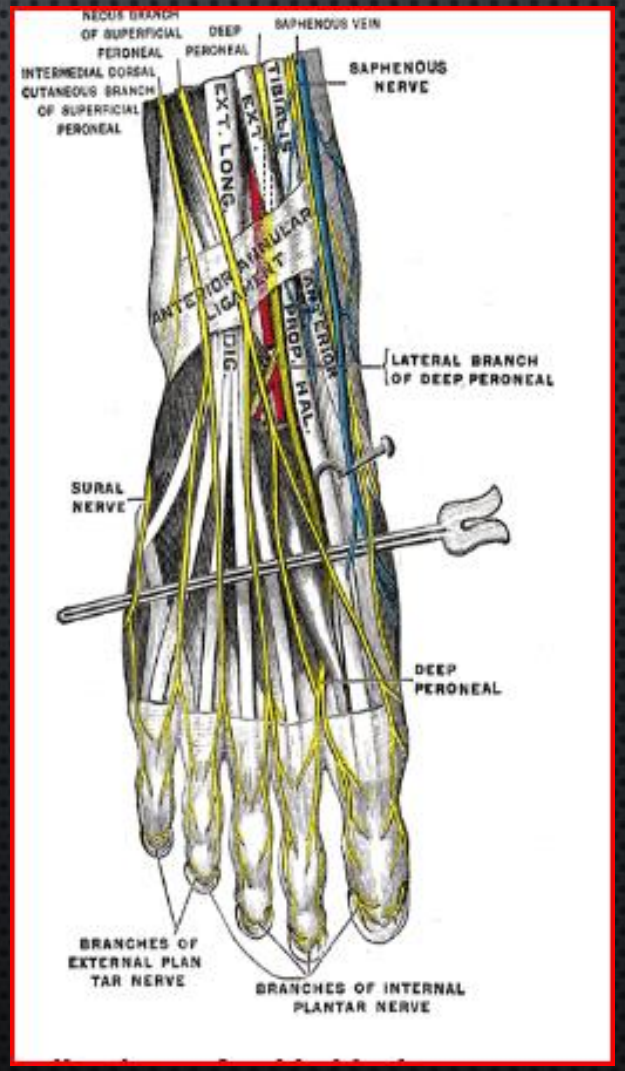
AP View

Weightbearing

ANATOMY


Extensor digitorum longus
Tibialis anterior
Soleus
Peroneus longus
Gastrocnemius
Soleus
Flexor digitorum longus
Flexor hallucis longus
Achilles tendon
Medial malleolus (tibia)
PLANTAR VIEW
Peroneus longus tendon
Peroneus brevis tendon
Flexor digitorum longus tendon
Flexor hallucis longus tendon
Tibialis anterior tendon
outward tilt of heel
Lateral malleolus (fibula)
Retinaculum
Tibialis posterior tendon
Flexor digitorum longus tendon
Flexor hallucis longus tendon
Extensor hallucis longus tendon
Extensor tendons
Peroneus longus tendon
Extensor digitorum brevis
Peroneus brevis tendon
Peroneus tertius tendon
Bunionette
Bunion

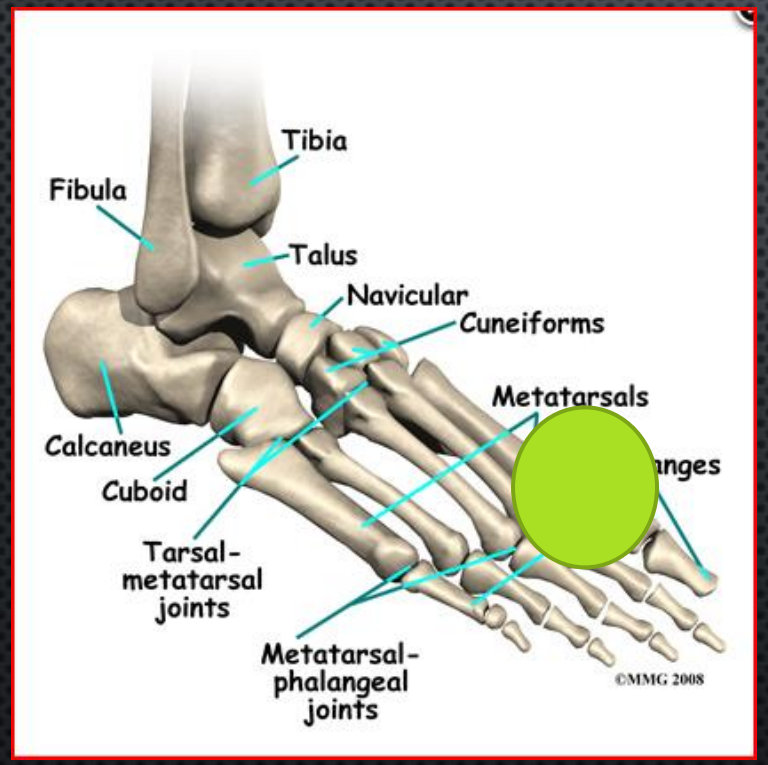

Medial plantar
Lateral plantar
Deep branch


INTERMEDIAL DORSAL CUTANEOUS BRANCH OF SUPERFICIAL PERONEAL
DEEP PERONEAL
SAPHENOUS VEIN
SAPHENOUS NERVE
LATERAL BRANCH OF DEEP PERONEAL
SURAL NERVE
DEEP PERONEAL
BRANCHES OF EXTERNAL PLAN TAR NERVE
BRANCHES OF INTERNAL PLANTAR NERVE

Foot and Ankle: Evaluation and Basic Principles

- Get History, Physical Exam and Proper Radiographs
- Consider foot and/or ankle films
- Look at everything not just the obvious on Xray
- Document

WHERE DOES IT HURT?



- WHAT IS THERE THAT CAN CAUSE PAIN?

- BONE
- JOINT
- TENDON
- NERVE
- LIGAMENT
- SKIN

KNOW YOUR ANATOMY!! IT WILL CHANGE YOUR LIFE.

PHYSICAL EXAM

- INSPECT
- PALPATE
- RANGE OF MOTION
- SENSATION
- VASCULAR
- GAIT
- SPECIAL TESTS **

MAY NEED BOTH FOOT AND ANKLE RADIOGRAPHS

- PEOPLE DO NOT KNOW WHERE THEIR ANKLE IS
- YOUR HISTORY(WHERE DOES IT HURT), INSPECTION, AND PALPATION CAN HELP DETERMINE WHICH XRAYS TO OBTAIN

TWISTING INJURY COMPLAINING OF ANKLE PAIN

ANKLE XRAY READ NORMAL

FOOT XRAY SHOWS DISLOCATIONS

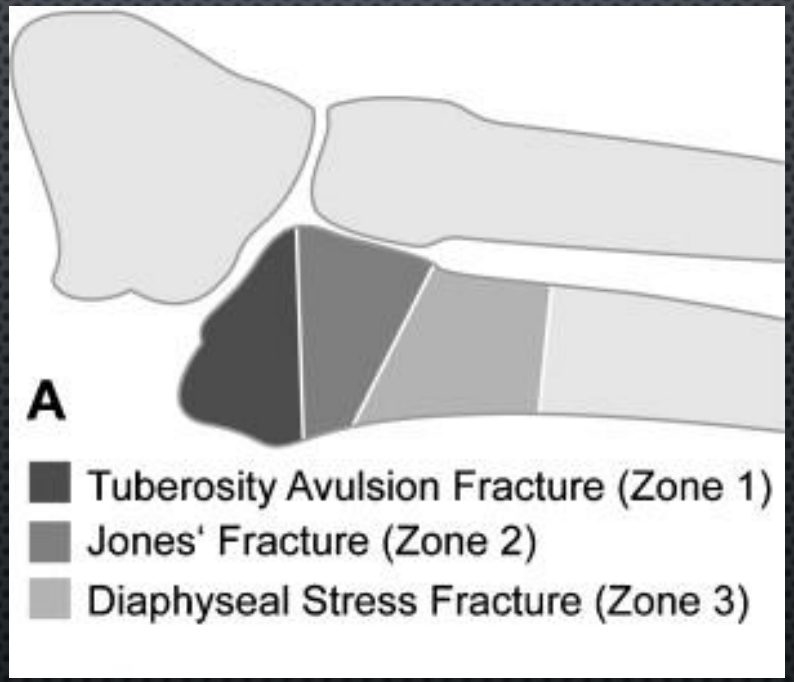
TOE FRACTURES

- DIGITAL BLOCK
- PULL STRAIGHT
- BUDDY TAPE (LOOSE)
- PROTECTIVE (POST OP SANDAL)
- CRUTCHES IF NEEDED
- PAIN PLAN: MEDS, TOPICALS, ICE, ELEVATE

- BONES TAKE 3-4 MONTHS TO HEAL
  - SWELLING AND PAIN CAN PERSIST!

1. A 19-year-old male basketball player presents to the emergency department with lateral left foot pain after landing awkwardly during a game. Exam is remarkable for tenderness over the midfoot. Plain films reveal a fracture of the 5th metatarsal at its base. Which of the following is an indication for orthopedic referral?
   a. Inability to bear weight immediately after the injury
   b. Radiographic displacement >1mm
   c. Radiographic non-displacement after >6 weeks of conservative treatment
   d. Fracture involvement of the tarsometatarsal joint

5TH METATARSAL BASE FRACTURES



JONES FRACTURE OF FIFTH METATARSAL: ZONE 2

- HIGHER RATE OF DELAYED AND NONUNION
  - WATERSHED BLOOD FLOW ZONE
- CAST AND NONWEIGHTBEARING 4-6 WEEKS FOLLOWED BY BOOT

1. An 18-year-old male football player presents to clinic with 3 months of vague soreness over the left medial midfoot. He cannot recall specific injury. Physical exam reveals point tenderness over the navicular bone. CT scan shows a non-displaced, partial-thickness fracture through the medial portion of the tarsal navicular bone. What is the recommended treatment?
   a. Rest, ice, NSAIDs
   b. Walking boot immobilization
   c. Non-weight bearing cast
   d. Surgical fixation

STRESS FRACTURES

- Repetitive stress over time rather than one injury
- May have increased weightbearing activities such as training for marathon
- May have weaker bone
- Pain worsens with activity
- Pain over the bone
- Underlaying conditions: low vitamin D, osteoporosis

STRESS FRACTURES

CASE EXAMPLE: FOOT PAIN

- **HISTORY:**

WHAT HAPPENED?

WHERE DOES IT HURT, HOW BAD IS IT, WHAT'S BEEN DONE FOR IT

- **PHYSICAL** : INSPECT, PALPATE, MOTION, SENSATION, VASCULAR
- **X-RAYS**: 3 VIEW OF THE FOOT: WEIGHT BEARING

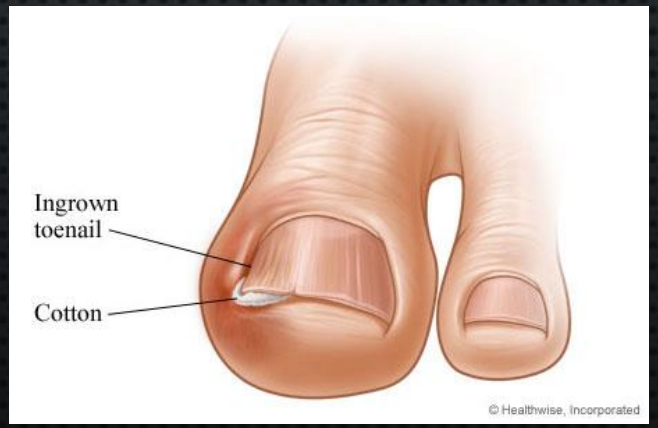
CASE EXAMPLE: FOOT PAIN

- DIAGNOSIS: STRESS FRACTURE
- REST, ICE
- VITAMIN D, NSAIDS
- HARD SHOE/BOOT

INGROWN TOENAIL

- ANTIBIOTICS
- SOAK
- DECOMPRESS
- DIG IT OUT

- DIABETES ALERT



INGROWN TOENAIL

Quiz

- A 24-year-old female runner presents to the office complaining of 3 weeks of bilateral shin pain. On exam, she is tender to palpation 10cm proximal to the medial malleoli of both lower extremities. You suspect tibial stress fractures. What is the initial imaging modality recommended evaluate for the suspected etiology?
  - X-ray
  - Bone scan
  - CT scan
  - MRI

Shin Splints – Medial Tibial Stress Syndrome

- Microtrauma to muscle/tendon/bone
- Exacerbated by:
  - Flat feet/over pronation
  - Poor warm-up and cool-down; no stretching
  - Bad shoes
  - High impact

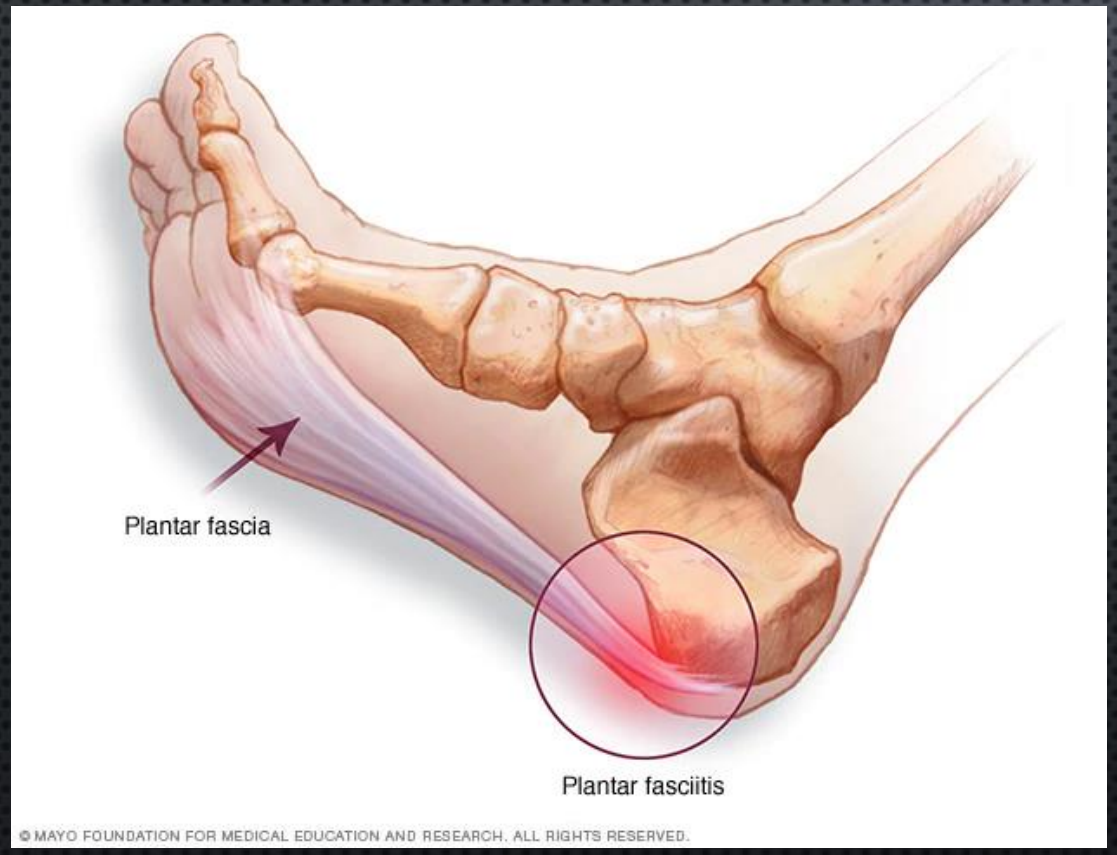
Acute gout: uric acid crystals on exam of joint fluid

- Get history
  - Can't sleep or hardly bear weight; even sheet touching is not tolerable
- What else looks like this?
- Refer to Rheumatology
- May or may not have elevated uric acid levels
  - Urate crystal deposits
- Flare: indomethicin or colchicine
  - Prevention after multiple attacks: allopurinol

CHRONIC GOUT: ARTHRITIS

- WHAT HAPPENED?
- WHERE DOES IT HURT?
- HOW BAD IS IT?
- WHAT'S BEEN DONE FOR IT?

Causes of heel pain



- Bone
  - Fracture (acute or stress)
- Tendon
  - Achilles tendonitis
  - Plantar fasciitis
- Joint
  - Subtalar joint arthritis
- Nerve
  - Tarsal tunnel syndrome

- History: Location (where on heel does it hurt?)_
- Physical – touch all around
- Radiographs

1. A 35-year-old male runner presents to clinic for a preventative health exam. His wife was recently diagnosed with plantar fasciitis and he is concerned that he too may be at risk. What of the following risk factors is NOT associated with plantar fasciitis?
   a. Intoeing
   b. Leg length discrepancy
   c. Pes planus
   d. Pes cavus

PLANTAR FASCIITIS

- Pain in the area of the plantar-medial heel
- Typically worse first steps out of bed in AM and start-up pain after heavier WB activities
- Heel spur may or may not be present on X-Ray or may develop over time
- Prolonged course – months to years

NONOPERATIVE TREATMENT EFFECTIVE IN 90 % OF PATIENTS

- PHYSICAL THERAPY
  - ECCENTRIC STRETCHING AND STRENGTHENING
- NSAIDS
- NIGHT SPLINTS
- CAST BOOT
- ORTHOTICS
- INJECTION – STEROID (ONCE OR MAYBE TWICE)
- SURGERY RARELY INDICATED

1. A 52-year-old male hiker presents to clinic with 2 months of posterior right heel pain. On exam you note tenderness of the Achilles tendon proximal to its insertion. You diagnose a midsubstance Achilles tendinopathy. What is the preferred first-line treatment?
   a. Rest, ice, NSAIDs
   b. Intense eccentric strengthening program
   c. Walking boot immobilization
   d. Surgical fixation

ACHILLES TENDINOPATHY

Treatment: Midsubstance

- First line is intense eccentric strengthening program of the gastrocnemius/soleus complex.
- Ultrasound, E-stim, iontophoresis, massage, stretching are inconsistent in helping patients.
- Surgical repairs are inconsistently successful and carry additional risk.

Treatment: Insertional

- More difficult to treat.
- Shockwave therapy is an option, but further studies need to be performed.
- Preferred initial therapy is eccentric strengthening following 4-6 weeks of immobilization in a walking boot.

(Tu, 2018)

TARSAL TUNNEL SYNDROME

- IMPINGEMENT OF THE POSTERIOR TIBIAL NERVE THROUGH THE TUNNEL CAUSES BURNING/SHOOTING PAIN IN THE POSTEROMEDIAL ANKLE AND HEEL.
  - "AFTER BURN"
- THE TARSAL TUNNEL IS FORMED BY THE FLEXOR RETINACULUM, MEDIAL CALCANEUS, POSTERIOR TIBIALIS, MEDIAL MALLEOLUS, AND ABDUCTOR HALLUCIS.
- EXAM:
  - TINEL SIGN
  - DORSIFLEXION-EVERSION OR PLANTARFLEXION-INVERSION TESTS
  - MUSCLE ATROPHY (EXTREME CASES) – ON MRI

(Tu, 2018)

Tarsal Tunnel Syndrome

- Diagnosis
  - MRI (preferred)
  - EMG - helpful to confirm and differentiate
- Treatment
  - Conservative (activity modification, NSAIDs, orthotics)
  - Corticosteroid injection (?)
  - If conservative measures fail, may consider surgery
    - Tarsal tunnel release

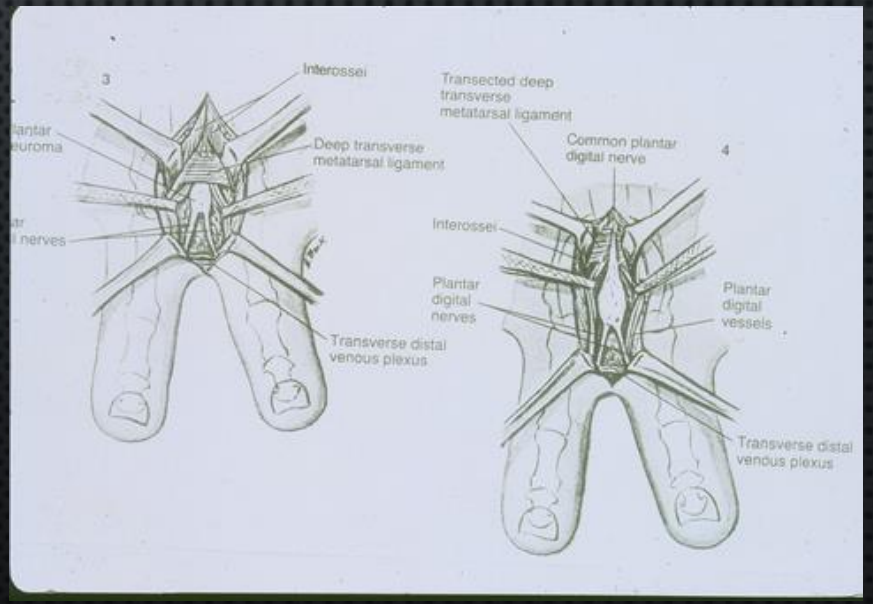
(Tu, 2018)

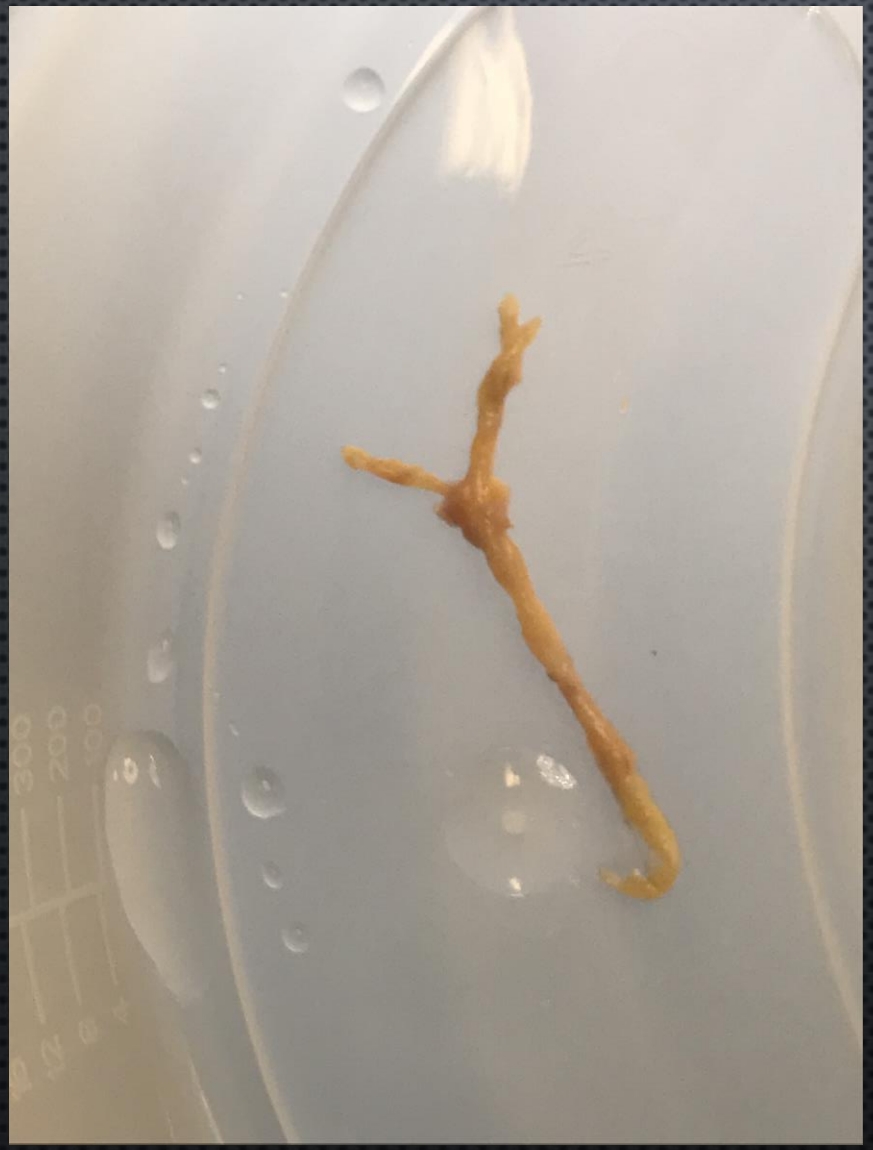
MORTON'S NEUROMA
USUALLY SECOND OR THIRD INTERSPACE

- PAIN BETWEEN THE METATARSAL HEADS
  - SQUEEZE METATARSALS: PAIN + CLICK
- RADIATES TO THE ADJACENT TOES
- NERVE SYMPTOMS: NUMBNESS, TINGLING
- FEELS BETTER *WITHOUT* SHOES

NONOPERATIVE TREATMENT

- STEROID INJECTION CAN CONFIRM DIAGNOSIS AND MAY BE THERAPEUTIC
- ORTHOTICS, METATARSAL PADS, WIDER SHOES






MEDLINE

ACHILLES TENDON RUPTURE

- SPORTS, POP POSTERIOR ANKLE
- FLUOROQUINOLONES, STEROIDS
- DIAGNOSIS MISSED 20 % OF THE TIME

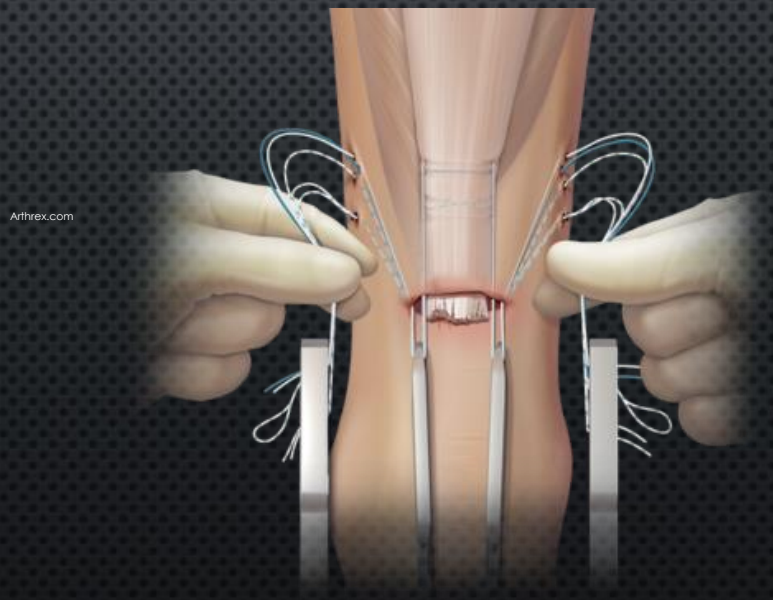
THOMPSON TEST

<u>99% SENSITIVE FOR ACHILLES TENDON RUPTURE:</u>
PALPABLE DEFECT
POSITIVE THOMPSON
DECREASED RESTING PLANTAR FLEXION

<u>NO MRI</u>

ACHILLES TENDON RUPTURE

- SPLINT OR BOOT IN **SLIGHT PLANTAR FLEXION PREFERRED**
- OPERATIVE AND NONOPERATIVE OPTIONS
  - SIMILAR PATIENT OUTCOMES IF TREATED EARLY



ACHILLES TENDON RUPTURES

- What should you do?
- Thorough clinical exam
- Ankle xrays
- Urgent ortho referral
- Splint in **PLANTARFLEXION!!**
- Non-weight bearing
- No boot (unless you have 3 wedges)

BUNION (HALLUX VALGUS) NONOPERATIVE TREATMENT

- WIDER SHOES
- PAD
- ACTIVITY MODIFICATION
- NSAIDS, ORAL AND TOPICAL

BUNION (HALLUX VALGUS)

- SURGERY: ENOUGH SYMPTOMS, SURGICAL CANDIDATE, THEY HAVE DONE SOME NONOPERATIVE TREATMENT
  - ~200 DESCRIBED TECHNIQUES FOR BUNION CORRECTION
- MONTHS OF RECOVERY TIME

Toe Deformities

Hammer Toe

- Breakdown of trans-metatarsal ligaments and plantar plate transverse arch collapse→metatarsal head drop→toe flexion→**MTP hyperextension, PIP flexion**
- More common in women, >60

Claw Toe

- **MTP dorsiflexion, PIP and DIP plantar flexion**
- More common in pes cavus deformity, neurologic issues, mult toes

(Fields, 2016)

QUIZ

- A 12-year-old male soccer player presents to clinic 1 week after rolling his ankle during practice. He has pain, erythema, and bruising over the lateral aspect of the right ankle. On your assessment you note laxity of the anterior talofibular and calcaneofibular ligaments. Functional loss is minimum and there is no instability of the ankle.

- What is the most sensitive exam technique to diagnose the suspected etiology?
  - External rotation test
  - Squeeze test
  - Anterior drawer test
  - Talar tilt test

- What type and grade of injury do you suspect?
  - Type I, grade I
  - Type I, grade II
  - Type II, grade I
  - Type II, grade II
-
- Which of the following exam findings would NOT prompt you to order imaging to evaluate his pain?
  - Inability to bear weight immediately after the fall
  - Pain with passive plantarflexion and inversion
  - Tenderness at the tip of the lateral malleolus
  - Tenderness at the base of the 5TH metatarsal

Ankle Sprains

- Merriam-Webster definition of sprain:
  - "A sudden or violent twist or wrench of a joint with stretching or tearing of the ligaments."

https://www.merriam-webster.com/dictionary/sprain

ANKLE SPRAINS

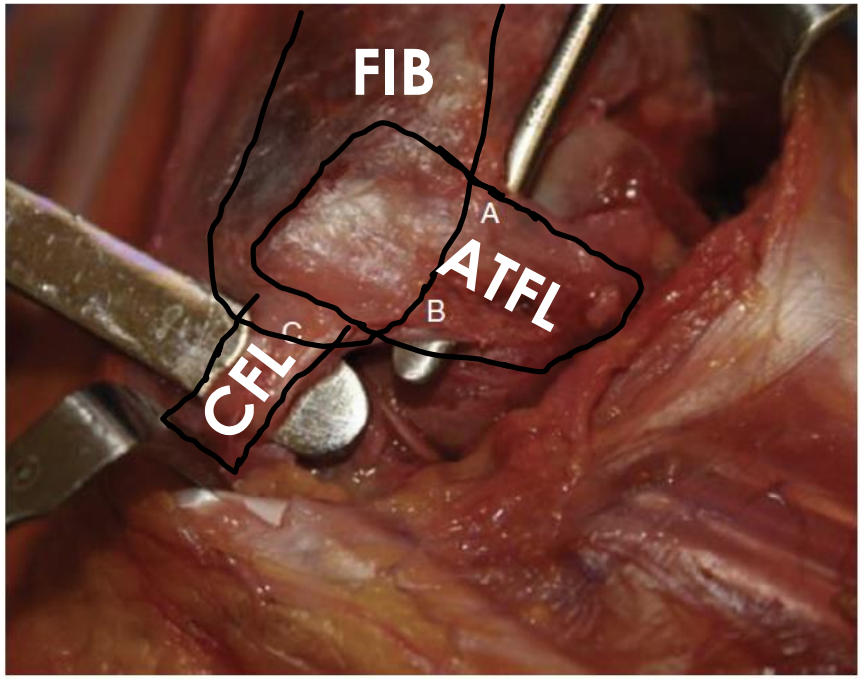


Figure 30-25 Anatomic specimen of right ankle showing lateral ligament structures from lateral view. *(A)* Anterior talofibular ligament, dorsal band. *(B)* Anterior talofibular ligament, inferior band. *(C)* Calcaneofibular ligament.

Avulsion fracture

≠

Ankle fracture

ATFL = Anterior Talofibular Ligament

CFL = Calcaneofibular Ligament

ANKLE SPRAINS

Anterior Drawer and Talar Tilt ------->>>>>

MILD
MODERATE
SEVERE

PUSH on Anatomic Landmarks

Box 30-2 Classification Systems for Lateral Ankle Sprains

Anatomic System[463]
- Grade I: ATF sprain
- Grade II: ATF and CF sprains
- Grade III: ATF, CF, and PTF sprains

AMA Standard Nomenclature System[668]
- Grade 1: ligament stretched
- Grade 2: ligament partially torn
- Grade 3: ligament completely torn

Clinical System[562]
- 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 immobilization or surgical repair
    - Type C: subtalar instability; treat functionally

*Functional treatment in the unstable group includes 2 to 3 weeks of immobilization in a cast or walking boot followed by a stirrup brace and ankle rehabilitation with Achilles stretching, peroneal strengthening, and proprioceptive reeducation.
AMA, American Medical Association; *ATF,* anterior talofibular; *CF,* calcaneofibular; *PTF,* posterior talofibular.

ANKLE SPRAIN

Type	Ligaments Involved
Type I	ATF
Type II	ATF + CF
Type III	ATF + CF + PTF

Grade	Functional Loss	Instability
Grade I	Minimum	None
Grade II	Moderate	Moderate
Grade III	Maximum	Marked

(Tiemstra, 2012)

ANKLE SPRAINS

- **ANKLE X-RAY SCREENING QUESTIONS (OTTAWA)**
  - CAN YOU TAKE 4 STEPS (ITS OKAY IF NEED TO LIMP)? NO? –> **GET AN XRAY**
  - DO YOU HAVE TENDERNESS/PAIN AROUND YOUR MEDIAL OR LATERAL MALLEOLI (THE LITTLE BONE BUMPS ON EITHER SIDE OF YOUR ANKLE)? SPECIFICALLY THE BACK SIDE OF THE BONES? YES? –> **GET AN XRAY**
  - DO YOU HAVE TENDERNESS/PAIN AROUND THE BASE OF THE 5TH METATARSAL (BUMP ON THE LATERAL/OUTSIDE PORTION OF YOUR FOOT; HALFWAY BETWEEN YOUR HEEL AND YOUR LITTLE TOE)? YES? –> **GET AN XRAY**
  - DO YOU HAVE TENDERNESS/PAIN AROUND THE NAVICULAR BONE (BUMP ON THE MEDIAL/INSIDE PORTION OF YOUR FOOT?) YES> –> **GET AN XRAY**

ANKLE SPRAINS

- So who gets an MRI?
  - Some professional and NCAA athletes get them immediately due to sig financial interest in their quick RTP
  - Syndesmosis tenderness
  - Inability to bear weight and SEVERE swelling and ecchymosis (global at ankle)
  - Questionable weight bearing x-rays (widening)
  - Ankle sprains that fail 6-8 weeks of conservative therapy: RICE and rehab

ANKLE SPRAINS

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How to Strengthen Your Ankle After a Sprain

Following an ankle sprain, strengthening exercises should be performed once you can bear weight comfortably and your range of motion is near full. There are several types of strengthening exercises. The easiest to begin with are isometric exercises that you do by pushing against a fixed object with your ankle.

Once this has been mastered, you can progress to isotonic exercises, which involve using your ankle's range of motion against some form of resistance. The photos below show isotonic exercises performed with a resistance band, which you can get from your local therapist or a sporting goods store.

Place your ankle in the "down and in" position against a fixed object such as a couch.
Hold this position for a count of 10.
Repeat 10 times.

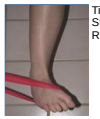
Place your ankle in the "up and out" position against the same object.
Hold this position for a count of 10.
Repeat 10 times.

Push your ankle down against a fixed object and hold for a count of 10. Repeat 10 times.

Push your ankle up against a fixed object and hold for a count of 10. Repeat 10 times.

Using a resistance band around your forefoot, hold the ends of the band with your hand and gently push your ankle down as far as you can and then back to the starting position.
Repeat 10 times.

Tie the resistance bands around a fixed object and wrap the ends around your forefoot.
Start with your foot pointing down and pull your ankle up as far as you can.
Return to the starting position and cycle your ankle 10 times.



Tie the bands around an object to the outer side of your ankle.
Start with the foot relaxed and then move your ankle down and in.
Return to the relaxed position and repeat 10 times.

Tie the ends of the bands around an object to the inside of your ankle and hold your foot relaxed.
Bring your foot up and out and then back to the resting position.
Repeat 10 times.

AOFAS FootCareMD®

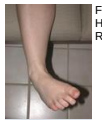
How to Stretch Your Ankle After A Sprain

You should perform the following stretches in stages once the initial pain and swelling have receded, usually within five to seven days. First is restoration of ankle range of motion, which should begin when you can tolerate weight bearing.

Once ankle range of motion has been almost or completely restored, you must strengthen your ankle. Along with strengthening, you should work toward a feeling of stability and comfort in your ankle, which orthopaedic foot and ankle specialists call proprioception.

Consider these home exercises when recuperating from an ankle sprain. Perform them twice per day.

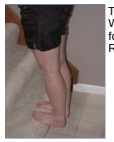
While seated, bring your ankle and foot all the way up as much as you can.
Do this slowly, while feeling a stretch in your calf.
Hold this for a count of 10.
Repeat 10 times.



From the seated starting position, bring your ankle down and in.
Hold this inverted position for a count of 10.
Repeat 10 times.

Again from the starting position, bring your ankle up and out.
Hold this everted position for a count of 10.
Repeat 10 times.

From the starting position, point your toes down and hold this position for a count of 10.
Repeat 10 times.



This stretch should be done only when the pain in your ankle has significantly subsided.
While standing on the edge of a stair, drop your ankles down and hold this stretched position for a count of 10.
Repeat 10 times.

Do this stretch only when the pain from your ankle sprain has significantly subsided.
Stand 12 inches from a wall with your toes pointing toward the wall.
Squat down and hold this position for a count of 10.
Repeat 10 times.

PERONEAL TENDINOPATHY

- History
  - Persistent lateral ankle swelling, popping, and retrofibular pain.
  - Subjective feeling of ankle instability is common.
- Physical
  - Tenderness/swelling of the peroneal tendon.
  - Lateral foot pain with single heel raise or resisted plantar flexion of great toe.

(Simpson, 2009)

PERONEAL TENDINOPATHY

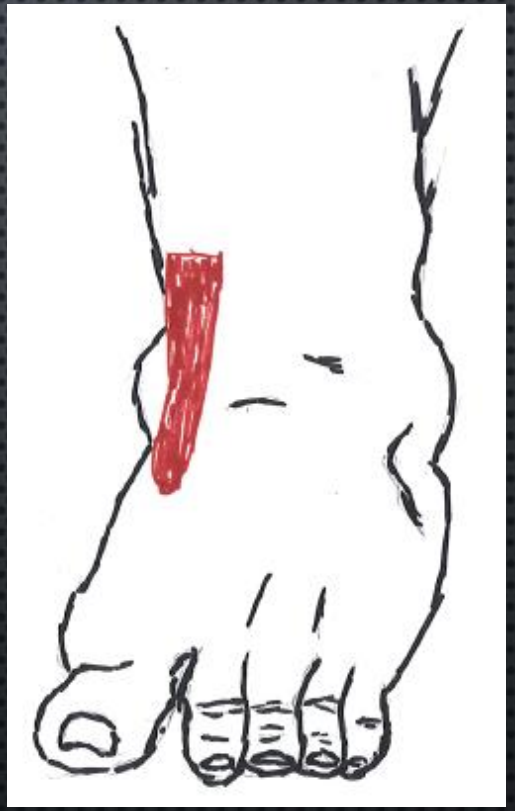
- TREATMENT
  - LATERAL HEEL WEDGES AND ANKLE TAPING
  - PHYSICAL THERAPY
  - IMMOBILIZATION: ANKLE SUPPORT ORTHOSIS
  - SURGERY IF NO IMPROVEMENT WITH CONSERVATIVE TREATMENT, PERONEAL INSTABILITY OR PERONEAL TENDON RUPTURE.

Simpson (2009)

1. A 50-year-old male presents to the emergency department with right-sided ankle pain. He has been training for a triathlon over the past 6 months and during that time had noted worsening anteromedial ankle pain. Earlier in the day, he was running and felt a pop. He is now unable to dorsiflex his right foot. Based on his history and exam, what tendon do you suspect he has ruptured?
   a. Anterior tibialis
   b. Posterior tibialis
   c. Achilles
   d. Peroneal

Anterior Tibialis Tendinopathy

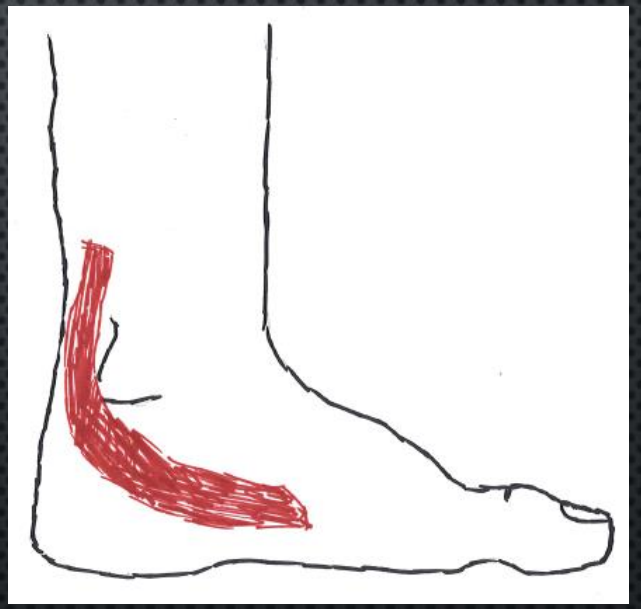
- Chronic overuse injury, usually age >45.
- Anteromedial pain
- Can cause foot drop with rupture.
- Treatment is immobilization in walking cast/boot for 3 weeks →may benefit from steroid injection into tendon sheath.
- If ruptured, orthopedic referral.



(Simpson, 2009)

Posterior Tibialis Tendinopathy

- History
  - History of twisting the foot, stepping in a hole, or slipping off a curb. Acute
  - Flat foot (pes planus/hindfoot valgus) chronic
  - Women are more commonly affected than men, often age >40.
  - Deformity gradually increases from months to years and, with progression, causes pain along the lateral tarsal region (sinus tarsi) and eventually even rupture.



(Simpson, 2009)

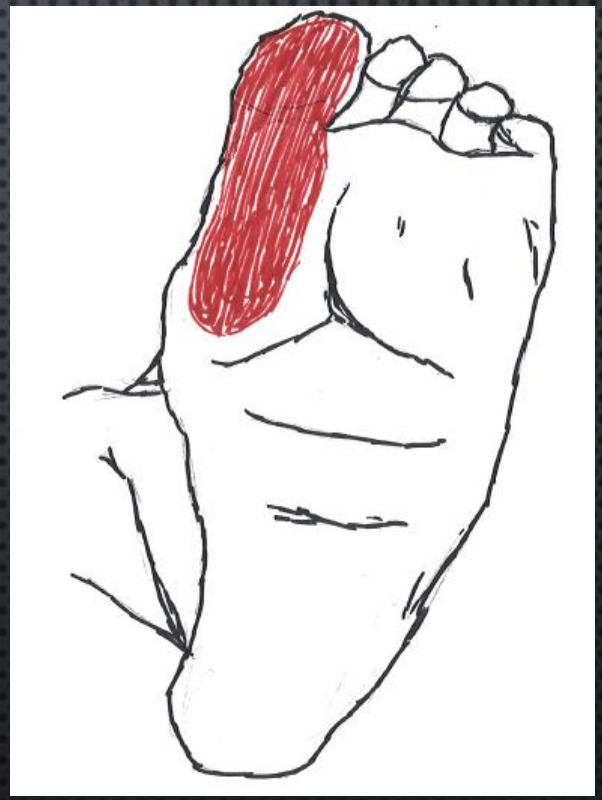
Posterior Tibialis Tendinopathy

- Physical
  - "Too many toes sign"
  - Single foot toe raise reproduces pain.
  - Unable to do 10 successive toe raises.
  - Tender medially and/or laterally at hindfoot/ankle
- Treatment
  - Immobilization in a short leg cast or boot for 2-3 weeks if pain is experienced with ambulation.
  - Steroid injection increase the risk of rupture and is not commonly used.
  - May need referral to ortho or foot/ankle surgeon if no improvement with conservative treatment.

(Simpson, 2009)

Flexor Hallucis Longus Tendinopathy

- Classical ballet dancers
  - "En pointe"
- Posteromedial ankle pain (behind the medial malleolus) and pain along the bottom of the great toe.
- For prolonged tendinosis, recommend immobilization in a cast or walking boot.



(Simpson, 2009)

THE END!!!