

The Osteopathic Evaluation and Treatment of Ankle Injuries



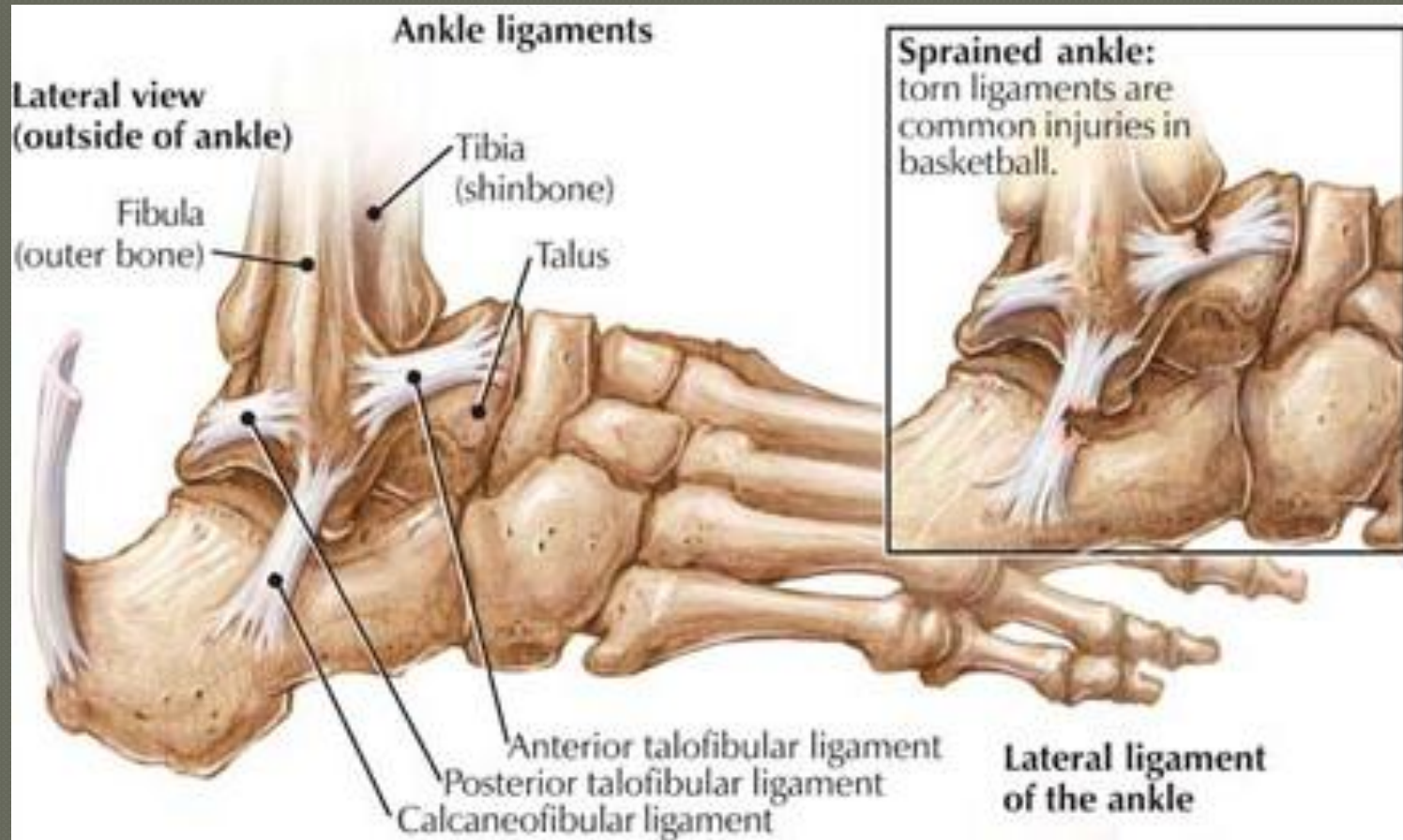
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Sports Injuries

- Common maneuvers in some sports that can increase risk for injury
 - Jumping
 - Pivoting while running
 - Sudden stopping while running
 - Maneuvering a ball with your hand
- The most common areas of injury during these activities are ankle, knee and fingers
- The ankle is the most commonly injured joint in basketball and volleyball, and often in soccer
 - Inversion ankle sprains
 - Avulsion fractures of 5th metatarsal
 - Achilles tendonitis and plantar fasciitis
 - Bursitis, tendonitis, periostitis

Anatomical Ankle Review



Ankle Anatomy

- Distal tibia and fibular = roof of ankle joint
- Talus fits into distal tibia and fibula
- The foot is supported laterally by 3 ligaments
 - Anterior talofibular ligament
 - Calcaneofibular ligament
 - Posterior talofibular ligament
- The medial side of ankle is supported by the deltoid ligament

Ankle Anatomy

○ Muscles of the foot and ankle

- Anterior compartment of leg
 - Tibialis anterior, extensor hallucis longus, extensor digitorum longus
- Lateral compartment of leg
 - Peroneus longus, peroneus brevis
- Posterior compartment of leg
 - Gastrocnemius and soleus complex, Achilles tendon
 - Tibialis posterior, flexor digitorum longus, flexor hallucis longus

Ankle Anatomy

- Sciatic nerve branches above knee into 2 major divisions
 - Tibial nerve
 - Common peroneal nerve
 - Splits into superficial and deep branches just distal to fibular head
 - Superficial=sensation lateral aspect dorsum of foot and innervates peroneal mm.
 - Deep=sensation 1st and 2nd interdigital spaces and dorsiflexes the ankle and toes

Ankle Injuries

- 15% of all sport-related injuries in primary care are sprained ankles
- Inversion injury (rolling inward of the ankle) is most common mechanism of ankle injury
- The anterior talofibular ligament (ATFL) is the weakest and most frequently injured ligament
- ATFL injuries tend to occur most often in skeletally mature athletes (over 14 yrs old)
- ATFL sprains are diagnosed by pain with palpation of ligament or a positive anterior drawer sign
- Anterior drawer sign also helps grade the severity of the injury
 - The more laxity that is present the higher the grade of injury

Anterior Drawer Test

- ⦿ Usually best done with patient dangling leg over edge of exam table
- ⦿ Physician cups one hand under the heel
- ⦿ Other hand is placed over front of the tibia to provide counter pressure
- ⦿ (+) test= significantly more anterior movement of the joint compared to the uninjured ankle

Anterior Drawer Sign



Classification of Ankle Sprains

- **Grade 1: small percent ligamentous fibers disrupted**
 - Pain on motion, local tenderness, mild swelling
- **Grade 2: moderate percentage ligamentous fibers torn**
 - Pain on motion, diffuse tenderness, moderate swelling, joint effusion, mild instability
- **Grade 3: ligament completely disrupted**
 - Severe pain, marked tenderness, marked swelling, joint instability

Ankle Sprains

- Need to differentiate ankle sprain from fracture
- Sprains usually present as pain over affected ligament while the ankle rests in normal anatomic position
- Ankle fractures have maximal tenderness on bony anatomy (distal fibula, 5th metatarsal)
- Eversion sprains are rare and generally involve both medial and lateral joint injury
- Need to rule out fractures with any eversion sprain

Evaluation of Ankle Injuries

- Plain X-rays can be obtained to help differentiate sprain vs. fracture
- X-rays should be attained according to the Ottawa ankle rules to rule out fractures
- Ottawa rules, however, were not developed specific to pediatric patients and do not take into account possible growth plate injury
- If any doubt about diagnosis, better option in pediatrics is to X-ray the ankle and/or foot

Ottawa Rules

- **Ankle X-rays: need if any of the following**
 - Boney tenderness at posterior edge of lateral malleolus
 - Boney tenderness at posterior edge of medial malleolus
 - Inability to bear weight both immediately after injury and when examined in office
- **Foot X-rays: need if any of the following**
 - Boney tenderness at base of 5th metatarsal
 - Boney tenderness at navicular
 - Inability to bear weight, same as for ankle

Ankle Fractures

- Occur more with inversion injuries in skeletally immature athletes
- Most common between 10-15 y/o
- Ankle fractures account for 5% of pediatric fractures
- Present with boney tenderness to palpation specifically over distal fibular physis
- Risk for potential growth arrest of area

Medical Treatment of Ankle Sprains

- Early treatment includes RICE: rest, ice, compression, elevation
- Early mobilization is important to maintain range of motion
 - Plantar flexion
 - Dorsiflexion
 - Foot circles
- Ankle splints/braces can allow for early weight bearing, not early return to play
- Crutches necessary when not able to bear weight
- Good ankle strengthening needed to prevent re-injury

Osteopathic Considerations of Ankle Sprains

- Somatic dysfunction can occur in addition to local ligamentous damage during an ankle sprain
- Since sprains are traumatically induced, somatic dysfunction may not follow expected biomechanical motions
- Failure to diagnose and treat beyond the ankle itself increases recurrence and can prolong healing

Osteopathic Considerations of Ankle Sprains

- Supination and plantar flexion occur with most inversion sprains, along with:
 - Eversion of the calcaneus
 - Posterolateral glide at talocalcaneal joint
 - Stretching and potential trigger point development in peroneus muscles
 - Distal fibula is drawn anteriorly with reciprocal posterior glide of fibular head
 - Tibia can externally rotate with anteromedial glide of tibial plateau
 - Femur internally rotates

Evidence-based Medicine: Ankle Sprains

- JAOA 2003 prospective, randomized controlled trial that evaluated the efficacy of OMT for patients in the ER with grade 1 and 2 acute ankle sprains
- Included 55 patients 18 yrs and older who presented within 24 hours of ankle injury
- Randomly assigned OMT group or control group
- Both groups evaluated for edema, range of motion (ROM) and pain (compared to uninjured ankle)
- Pain measured with a 1-10 visual analog scale
- No difference in measures between 2 groups at baseline

Evidence-based Medicine: Ankle Sprains

- Specific OMT used on each patient varied according to exam findings but included a combination of the following
 - Soft tissue and fascial techniques
 - Muscle energy
 - Strain counterstrain
 - Lymphatic drainage
- Duration of OMT session was 10-20 min

Evidence-based Medicine: Ankle Sprains

- Immediately after OMT the ankle was re-evaluated for edema, ROM and pain
- Both groups received standard medical care including RICE and NSAIDS
- Follow-up exam on all patients at 5-7 days to repeat all measures above

Evidence-based Medicine: Ankle Sprains

- Results showed that immediately after the 1 session in the ER, the OMT group had a statistically significant improvement in edema and pain
- A trend toward increased ROM after OMT (when compared to the control group) was not statistically significant at immediate re-assessment
- At 1 week follow-up: both groups had an improvement in edema and pain
- At 1 week follow-up: there was a statistically significant improvement in the ROM in the OMT group compared to the control group

Evidence-based Medicine: Ankle Sprains

- Authors concluded that there is both an immediate advantage and delayed benefit to the addition of OMT to standard medical care in the treatment of ankle sprains

OMT in Ankle Sprains

- Recommended OMT based on common patterns of injury and somatic dysfunction
 - Palpate fibula and tibia to identify and treat a torsion of the interosseous ligament with soft tissue technique
 - Treat posterior fibular head
 - Attention to the foot especially cuboid bone which may be dropped and need to be reduced
 - Muscle energy and or strain-counterstrain for dysfunction of fibularis muscles and associated tendons
 - Strain-counterstrain directly on ATFL, especially Grade 1 sprains
 - Lymphatic drainage to reduce pain from edema

Counterstrain Technique for Anterior Talofibular Ligament



How it is done:

- 1: Patient is on their side with the affected leg up
- 2: Physician is seated beside the table
- 3: The tender point is located, typically anterior to the lateral malleolus
- 4: The ankle is everted until the tissues soften and the patient reports maximal relief at the tender point
- 5: The position is held for 90 seconds and then the ankle is brought back to the neutral position and the tender point is reassessed

Soft Tissue/Myofascial Release of Peroneus Muscle Contractures



How it is done:

- The goal is to 3-dimensionally balance and relieve tension across the joint
- Evaluate and treat with the knee in full extension, then in various degrees of flexion as the tissues ease
- With a combination of traction, compression, twisting and bending, find the point of balance in the tissue, then hold until maximum ease is accomplished
- As the leg moves toward ease, the myofascial tension releases
- May be fast or slow release depending on individual tissue

Muscle Energy for Posterior Fibular Head



How it is done:

- Patient is in the supine position
- The physician stands on the side of the involved leg
- The physicians cephalad hand stabilizes the patient's knee and holds the posterior fibular head between his thumb and index finger.
- The physicians other hand inverts and plantar flexes the foot (into barrier)
- Direct patient to evert foot against the counterforce of the physician on the dorsum of foot
- The patient relaxes for 2-3 seconds and then the process is repeated until no new barriers are encountered and normal range of motion is restored

Return to Play After Ankle Sprain

- ⦿ When ankle is not tender to palpation
- ⦿ When strength is equal in both ankles
- ⦿ When athlete can stand with eyes closed and balance on injured side for 30 sec.
- ⦿ Expect at least 2 weeks from injury to return to play, but can be longer depending on degree of injury

Question 1

- Which of the following is the most common type of ankle sprain?
 - A. Aversion
 - B. Eversion
 - C. Inversion
 - D. Reversion
 - E. Rotation

Question 2

- Which of the following is the weakest ligament of the ankle and most likely to be damaged in a sprain?
 - A. Anterior talocalcaneal
 - B. Anterior talofibular
 - C. Calcaneofibular
 - D. Posterior talocalcaneal
 - E. Posterior talofibular

Question 3

- Which of the following OMT modalities is most helpful in the management of an acute ankle sprain?
 - A. Craniosacral
 - B. HVLA fibular head
 - C. Muscle energy thoracic
 - D. Rib raising
 - E. Strain-counterstrain ATFL

Question 4

- A 16 year old presents to ER with ankle pain after soccer practice and is diagnosed with a grade 2 sprain. OMT is performed in the ER for the ankle sprain. Which of the following is an expected outcome immediately after OMT?
 - A. Decreased ROM of ankle
 - B. Less ankle pain
 - C. Less need for NSAIDS
 - D. Improved ROM of ankle
 - E. Increased swelling of the ankle

Question 5

- An 11 year old boy presents to your office with right ankle pain after rolling his ankle during a basketball game in gym. His ankle is swollen and he has tenderness along the posterior edge of the distal fibula. Which of the following is the most appropriate?
 - A. ACE wrap ankle and crutches
 - B. Observation
 - C. OMT
 - D. Return to play
 - E. X-ray ankle

References

- Kliegman R, Jenson H, Behrman R, Stanton B. Nelson textbook of pediatrics, 18th ed. Philadelphia, PA. Saunders Elsevier; 2007.
- Metzl J, et al. Sports medicine in the pediatric office. Elk Grove, IL. American Academy of Pediatrics; 2008.
- Blood S. Treatment of the sprained ankle. JAOA. 1980; 79: 680-692.

References

- Eisenhart A, Gaeta T, Yens D. Osteopathic manipulative treatment in the emergency department for patients with acute ankle injuries. JAOA. 2003; 103 (9): 417-421.
- Zitelli B, Davis H. Atlas of pediatric physical diagnosis, 5th ed. Philadelphia, PA. Mosby Elsevier; 2007.
- Ward R. Foundations for osteopathic medicine. Baltimore, MD. Williams and Wilkins; 1997.