**Clinical Integration of Osteopathic Manipulative Medicine**

**Family Medicine / Emergency Medicine / Orthopedic: Ankle sprain**

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**Introduction:**

Ankle sprain, a.k.a. sprained ankle, is an injury frequently seen by primary healthcare providers and emergency departments\(^1\). Ligaments are band-like elastic tissues that are capable of slight stretching. Their two main functions are to hold the joint together to prevent excessive motion of the joint and send proprioceptive information. An ankle sprain occurs when the ligaments that stabilize the ankle joint become stretched beyond their natural physiologic motion leading to ligament injury\(^2,3\). About 25,000 people in the U.S. daily suffer from ankle sprain\(^3\). Ankle sprain occurs when the foot is inverted or everted beyond the natural joint motion leading to excessive stretching and force applied to the ankle ligaments. Although everyone is at risk, athletes are particularly prone to ankle sprains because their activities generally involve frequent changing motions of the ankle joint\(^3\). Athletes place an abundance of stress on their body and are constantly pushing their limits. Therefore we, as clinicians, must tailor the treatment that maximizes healing and minimize their time spent on the sideline from an ankle sprain.

Ankle sprains are conventionally managed with R.I.C.E. (Rest, Ice, Compress, and Elevate). Protective devices, ie air splints, plastic or velcro braces and support have also been incorporated into the conventional treatment management. Pain control and swelling is treated with tolerated weight bearing activities and NSAIDs. Additionally, an exercise conditioning program is developed under the supervision of a doctor or physical therapist. The resolution of sprain generally resolves within 4-6 weeks in majority of the cases without any complications\(^4\). Surgery has been shown to be beneficial in a few selective cases (high grade injury with widening ankle mortise) however most injuries do not require surgery\(^5\). Although data is scarce, OMM has been shown to be beneficial with the management of ankle sprains with data showing faster recovery and maintaining function.

**Patient presentations:**\(^2,3,4\)

Acute phase – lasts 1-3 days post injury. The goal is to control pain, minimize swelling and maintain/regain ROM. Full recovery may take up to 4-6 weeks.

**Signs & Symptoms:**
- Throbbing Ankle Pain
- Soft tissue swelling
- Ecchymosis / erythema
- Warm to touch
- Decrease mobility
- Ankle deformity

**Differential diagnosis:**

- Ankle fracture
- Stress fracture
- Avulsion fracture
- Maisonneuve fracture
- Ankle instability
- Ligament injury
- Cellulitis
- Gout
- Club foot
- Compartment syndrome

**Clinical pearls and diagnostic tools:**

- Ankle sprain is a clinical diagnosis that generally does not require any imaging modalities unless there is suspicion for a fracture or other pathology.
- Understand the Ottawa* rule to imaging ankle injury helps decrease cost, radiation exposure and unnecessary testing for the adult and pediatric population.
- Always assess and document sensory, motor, reflex and vascular status prior and after any procedure and/or treatment.
- Clinicians should always assess above and below the injury site for all musculoskeletal injuries.

Because the ankle joint is made up of 3 bones (tibia, fibula and talus), tendons, soft tissues and ligaments therefore injury may not be limited to the ligaments. Careful consideration is required when assessing the extent of the injury making sure structures nearby are not violated.

Ankle sprains are diagnosed mainly through history and physical exam and occasionally the use of x-ray once the Ottawa rule is applied appropriately. Rarely, MRI is utilized unless there is high suspicion for higher level of injury.

*Ankle x-ray is only required if there is any pain in the malleolar zone and any one of the following:

- Bone tenderness along the distal 6 cm of the posterior edge of the tibia or tip of the medial malleolus, OR
- Bone tenderness along the distal 6 cm of the posterior edge of the fibula or tip of the lateral malleolus, OR
- An inability to bear weight both immediately and in the emergency department for four steps.
The mechanism of injury determines the location of the sprain which are generally divided into 1) Lateral ankle sprain, most common inversion injury 2) Medial ankle sprain, eversion injury that is rare secondary to the tensile strength of the deltoid ligament and 3) Syndesmotic sprain (high ankle sprain), occurs with dorsiflexion and/or eversion injury which involves all ligaments of the ankle including the interosseous membrane.

Once location has been determined grading the level of sprain is of importance, which is based upon clinical signs and loss of function. Universally, clinicians have used Grade I (mild stretching of ligaments and no visible joint instability), Grade II (partial or incomplete tear with mild to moderate join instability) to Grade III (complete ligament tear with severe mechanical instability).

**OMM Integration:** Recent data advises clinicians to avoid manipulating ankle fracture prior to obtaining x-ray. Prior to this study, clinicians were routinely manipulating fractured ankles before obtaining an x-ray. Since the study was published, clinicians now are imaging prior to manipulating the ankle. This shows conventional treatment could be changed with the appropriate study. OMM for ankle sprain should also be considered as an effective treatment modality even though guidelines have yet to be implemented.

A study conducted by Eisenhart et. al. showed OMM treated group had immediate improvement ($F = 5.92$, $P = 0.02$) with ankle edema and pain in patients with an acute grade I/II ankle sprains and significantly improves ROM one week after it is performed on patients in the ED with acute ankle sprains.

Wikstrom et. al. performed a systematic review of three studies and found that single session of manipulative therapy was ineffective, however, multiple sessions of manipulative therapy showed decrease in pain, increase in ROM and improved function in patient with acute lateral ankle sprains. The team did advise further studies are needed to identify which techniques should be deployed.

Loudon et. al. performed a systematic review and meta-analysis using eight articles about the efficacy of manual joint mobilization/manipulation in treatment of lateral ankle sprains and found that manipulation for acute, subacute or chronic sprains decreases pain, improves function and increases ROM.

A case report conducted by Whitman et. al. showed manual medicine using techniques such as proximal Tibio-Fibular joint HVLA, rearfoot distraction, lateral glides & eversion mobilization, talo-crural joint mobilization, ankle eversion mobilization and dorsiflexion self-mobilization were effective in treating a 27-year-old volleyball player who failed conventional ankle sprain treatment with persistent symptoms after sustaining an acute lateral ankle sprain 3 weeks prior. Whitman et. al. were able to show manual therapy improved function, resolution of pain, shorter recovery time and complete absence of impairment post injury.

Lastly, a randomized clinical trial was conducted by a group of physical therapists to compare the effects of thrust and non-thrust manipulation and exercises with and without myofascial therapy for acute inversion ankle sprains. The team enrolled 50 patients, mainly young middle
aged men with acute inversion ankle injury. The study showed patients who had myofascial therapy along with thrust and/or non-thrust manipulation had improved outcomes (decreased ankle pain and improved functional ability) using a 2-by-3 mixed-model analyses of variance (P < 0.001, functional score P = 0.002).

The treatment goals of any ankle sprain must address the pain, surrounding soft tissues, joints, ligaments, edema and musculoskeletal system. OMM and manual therapy has been shown to be effective in addressing all the issues that may arise in an ankle sprain. By incorporating OMM, the patient can potentially recover faster with maximal function and possibly decrease re-injury risk.

**Osteopathic Structural Examination:** Structural examination of the fibular head, ankle and foot should be performed, looking for dysfunctions in:

- Fibular head movement
- Interosseous ligaments
- Dorsiflexion and Plantar flexion
- Subtalar Abduction/Adduction
- Calcaneal inversion-eversion
- Cuboid dysfunction
- Fifth Metatarsal dysfunction
- Navicular dysfunction
- Cuneiform dysfunction
- First Metatarsal dysfunction
- Phalangeal dysfunction
- Tenderpoints associated medial/lateral malleoli, cuboid region, navicular and base of fifth metatarsal
- Soft tissues of the ankle/foot including the muscles and lymphatics with respect to T.A.R.T. changes.

Anterior drawer test, inversion/eversion stress testing, valgus/varus testing and squeeze test are also appropriate to perform to assess degree and injury type.

**Possible Treatments Options:**

Techniques that may be used during the acute and later stages as tolerated by the patient:

- Muscle energy for the fibular head, ankle, foot and phalanges
- Counterstrain tenderpoints of the knee, ankle and foot.
- FPR of the knee, ankle and foot.
- Still technique of the ankle.
- Thoracic inlet release followed by pedal pump manually
- Myofascial release of the gastrocnemius, anterior/posterior tibial, peroneus longus and brevis, and additional muscles and plantar fascia of the foot.
- Rear-foot distraction, Lateral slides & eversion mobilization, Talo-Crural joint mobilization, Ankle Eversion mobilization and Dorsiflexion self-mobilization.
- Acupuncture (limited efficacy due to lack of quality research data).vii.

Techniques that are utilized once the acute phase has been resolved:

- Articulatory and Thrusting technique of the knee, ankle and foot.
- Exercise therapy to strengthen the ankle/foot muscles.
- Stretch therapy of the ankle and foot.
- HVLA of the proximal Tibio-Fibular joint

**Related evidence based medicine articles:**


**Citations:**