Chronic Sequelae of Ankle Sprains & Ankle Instability

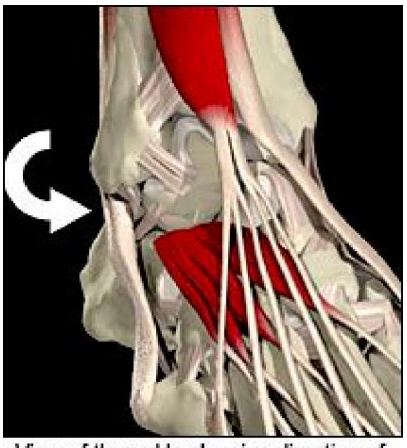
This article will discuss patterns of chronic dysfunction that occur secondary to ankle sprains. This is not about the acute ankle sprain; the working assumption here is that the injury occurred long ago and left the patient with some degree of damage. The patient may come in complaining of ankle pain, or you may find the ankle involvement secondary to your more global evaluation of a knee, hip, or lower back that is responding more slowly to your local treatment. The patient will often be surprised that the involved ligaments are still quite tender. An ankle sprain may heal in an abnormal position, or with abnormal function, and symptoms, either local or distant, may appear years later, with no obvious connection to the ankle sprain.

Inversion Ankle Sprain Patterns

In a typical inversion ankle sprain, the foot is suddenly inverted, straining the Antero-Talo-Fibular [ATF] ligaments and leading to an inferior motion of the fibula. This motion often leads to a fibula fixated anteriorly and inferiorly.[1] This can be accessed through palpation of the inferior portion of the lateral malleolus, which will be tender and resist the testing motion. This can be corrected this with recoil adjustments and orthotics to re-enforce proper foot/ankle mortise alignment.

It is also necessary to check the talus, as well as the cuboid and fifth metatarsal. Aberrant mechanics of the lateral ankle and foot are consistent with the motion that occurs in the inversion sprain, whereby the ankle supinates. The foot and ankle will often be stuck in this supinated position. Don't think dropped cuboid; think supinated cuboid. Don't think lateral talus; think supinated talus. This visualization gives a clearer picture of the usual three-dimensional mechanics.

Ligaments that need addressing here could include any of the lateral ATF ligaments. Check the anterior and/or posterior talo-fibular ligaments, as well as the calcaneo-fibular ligament. It is also necessary to check the anterior tibio-fibular ligament. Treatment of old ligament injuries is addressed below. The lateral muscles should be checked, especially the peroneal muscles, the biceps femoris, and the gluteus medius.



View of the ankle showing direction of inversion ankle sprain.
(Picture courtesy of Primal Pictures - Interactive Foot and Ankle.)

Functional Diastasis of the Ankle Mortise

A significant lesion at the ankle involves a functional diastasis between the fibula and tibia. This is often seen after a classic inversion sprain. This can also be a sequela of the high ankle sprain, usually caused by dorsi-flexion combined with external rotation of the foot. This is a less common sprain and involves the opposite motion, eversion. An excellent recent review of high ankle sprain diagnosis and treatment is referenced at the end of this article.[2] A diastasis, or grade three sprain, is usually defined as a pathological separation between two bones. Far more often, the separation is not obvious on X-ray and is not to the same degree as a pathological diastasis. The lesion described here is not a complete dislocation. It could be described as a functional diastasis.

This has commonly been described as occurring at the distal tibia-fibula junction, at the pubic symphysis, and at the sacroiliac joint.[3] At the distal tibia-fibula junction, this can involve a chronic sprain or tear of the extensor retinaculum, a thick band of deep fascia overlying the distal part of the anterior lower leg. One may also find possible stretching and laxity of the interosseous ligament and/or the anterior and posterior tibio-fibular ligaments (the syndesmotic ligament complex). The lateral ankle ligaments can also be involved. If the tibia and fibula are functionally separated here, the ankle and foot cannot function normally, leading to recurrent ankle sprains, foot or ankle pain, or problems further up the kinetic chain in the knee or lower back.

Assessment here could start by evaluating the overall mobility of the ankle. It will usually feel somewhat "sloppy" with excessive mobility as you move it into inversion and/or eversion. Orthopedic tests of these ligaments include: The side-to-side test is for the integrity of the inferior tibio-fibular ligaments and the interosseous membrane. The ankle is held in neutral position, without inverting or everting the calcaneus, while the foot is sheared transversely. A soft end-feel and excessive glide are positive findings. A positive test can frequently be associated with fracture. The external rotation stress test holds the ankle joint in neutral while externally rotating the foot. This tests the syndesmosis. The squeeze test is done by grasping the distal tibia and fibula and squeezing them together. The reduction of pain or excess excursion may indicate disruption of the syndesmosis.[4]

View of the ankle extensor retinaculum and anterior ligaments.
(Picture courtesy of Primal Pictures - Interactive Foot and Ankle.)

Palpation of these ligaments may reveal tenderness and possibly a slight bogginess, especially at their junctions with the bones. Damaged ligaments have a slight excessive "give" on palpation, although this is a subtle finding. Palpation should also be performed more proximally at the interosseous membrane, deep to the peroneal muscles, between the fibula and the tibia.

Assessment of the joints of the foot and ankle may illicit restriction, and should be addressed and adjusted accordingly. The pattern of dysfunction after the inversion sprain is described above. A high ankle sprain is a pronation event; thus, it will have different biomechanics, and need different adjusting corrections. The fibula and/or tibia may show intraosseous (within the bone) restrictions.[5]

Assessment of the muscles that surround the area, both by testing for strength and pain on contraction, and by looking for tenderness and/or tissue texture changes along the course of the muscles is necessary. The biceps femoris and gluteus medius are more proximal muscles that are often inhibited whenever the fibula is involved.[6] Muscle involvement can include inhibition (weakness) and/or tightness, trigger points, and tendon insertionopathies. Muscular rehabilitation for the ankle would involve a focus on improving gait, and on retraining for speed and strength of contraction. Balance and stability are key here, and can be enhanced by use of; Active Release Technique [ART], custom constructed orthotics, Physiotherapy modalities, Ultrasound-Phonophoresis including Ligaplex I, wobble board therapy followed by Interferential and cryotherapy.

It is more difficult to use palpation to assess directly for ligamentous laxity if the distal tibia is functionally separated from the fibula. Besides the orthopedic tests described previously, a trained provider can use applied kinesiology-style "challenge" AK muscle testing.[7] One can use one hand to push the distal tibia and fibula apart, and then test an indicator muscle. Induced weakness would be another indication of functional separation. Another AK-type test would be to take your fist and "hammer" on the calcaneus, with the thump in a superior direction. This mild trauma will often produce weakness in an indicator when the ankle joint is dysfunctional.

A trained provider can use palpation to assess for a manipulate-able lesion here, where the distal fibula and distal tibia are stuck apart. Surround the ankle mortise with both of hands, and push the hands toward each other. For the right ankle, stand or sit facing the patient and use the heel of your left hand to push the lateral malleolus toward the midline. Your right hand pushes the medial malleolus toward your left hand. You are feeling for restriction. This is a slightly different feel than your usual joint palpation; it will probably take you several repetitions on different patients to get a sense of this. Fine-tune the exact direction of push to find the maximum resistance point, and correct with recoil adjusting. The goal of the adjustment is to reset mechanoreceptors and address hypo-mobility.

Inherent in the concept of functional diastasis is instability with potential hypermobility or laxity - in this case, the deep ligaments and fascia of the ankle mortise. Adjusting the hypomobility, and "resetting" is not usually enough. How can you address the instability?

Simple taping afterward should help stabilize the ankle mortise. I prefer to take one piece of 1.5-inch or 2-inch non-elastic tape and apply it all the way around the lower leg just above the malleoli. I have the patient take a roll of tape home and re-tape the leg daily for six weeks or so. I recheck the patient periodically. If the patient cannot tolerate tape, instruct him or her to use a cloth band. Elastic tape or an elastic wrap is not as effective; you need to stop the ankle mortise from separating during gait. If the patient is a pronator, supinator or has asymmetry issues between the two feet, orthotic use will be necessary.

The ligaments and fascia of the region have usually been overstretched to the point of laxity from the original injuries. Soft-tissue therapy is necessary to attempt to restart the early stages of the healing process. Let's define "healing" for these tissues more rigorously. First-stage healing is defined here as the process that occurs after an injury, involving inflammation, laying down of fibroblasts, and remodeling. Healing of this type takes 6-8 weeks, and basically stops after a certain amount of time, whether the ligaments and fascia are completely healed or not. The patients you see with chronic functional instability at the ankle are probably far beyond this stage of healing.

How can one restart this process and retighten the ligaments? Here are three possible ways: One is Active Release Technique [ART]. Davidson, et al., found that controlled micro-trauma, induced through ART technique protocol, increased the amount of fibroblast production in the Achilles tendon of rats.[8] The theory is that the structure of the tissue is rearranged, and damaged tissue is replaced by new tissue. Warren Hammer reviewed the research and clinical rationale for use of this modality in this publication.[9] Another similar tool is cross-frictional massage. A third is proliferant injections, a medical procedure of injecting irritant solutions, including glucose, into the damaged ligaments. All of these treatment models should be accompanied by Ligaplex I using Ultrasound Phonophoresis as the delivery mechanism and custom orthotic to stabilize and balance symmetry of the foot/ankle mortise. The goal of these three therapies is to restart the inflammation/healing cycle.

This article attempted to share a comprehensive model of how to address chronic instability of the ankle mortise. Adjust the foot, the ankle, and the fibula and tibia. Adjust the separated tib-fib. McConnell Tape the ankle mortise for enhanced stability and correct instability and shock degradation through custom made orthotics. Address the surrounding ligaments and other soft tissues, ideally using methods such as Active Release Technique combined with specific Physiotherapy treatment plans to enhance fibroblastic activity and restart first-stage healing. And retrain ankle mortise stability via specific wobble board activities.

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