

## **Anatomy of an Inversion Sprain**

By Neal Cross, PhD, NCTMB

Ankle inversion sprains make up the greatest majority of ankle sprains (Snider, 1997). The anatomical damage subsequent to this biomechanical event goes beyond the ankle and its adnexa.

The principle structures stressed during forced hyperinversion of the ankle are the three components of the lateral collateral ligament (LCL) of the ankle: the anterior and posterior talofibular ligaments and the calcaneofibular ligament.

The anterior talofibular (ATF) ligament attaches to the anterior margin of the lateral malleolus and runs distally to attach to the anterior aspect of the talus. It is readily palpable, especially at its proximal end, and is the first structure stretched or torn following an inversion sprain. The calcaneofibular (CF) ligament attaches to the distal tip of the lateral malleolus and runs inferiorly to attach to the lateral aspect of the calcaneus. You can easily palpate this ligament at its proximal portion. In the sequence of events following an inversion sprain, this is the second ligament to be compromised. The posterior talofibular (PTF) ligament is not readily palpable, as it runs from the posterior margin of the lateral malleolus to the posterior aspect of the talus. Damage to the PTF usually occurs only following severe sprains. In fact, the severity of inversion ankle sprains is often defined by the damage to these three ligaments making up the ankle LCL. For example, Anderson and Hall, 1995 note that 1st, 2nd and 3rd degree sprains are associated with the ATF; ATF+CF; and ATF, ATF+CF, ATF+CF+PTF, respectively.

The LCL is not the only structure on or near the lateral aspect of the ankle that is liable to injury following an inversion sprain. The peroneus (fibularis) longus and brevis muscles run from the lateral aspect of the leg and have their distal tendons running in a groove (peroneal groove) on the posterior aspect of the lateral malleolus, on their way to the distal attachments on the foot. These tendons are held in place by two (superior and inferior) retinacula. Following an extreme acute sprain or a series of milder inversion sprains, these two structures may be stretched or torn. Subsequently, when everting the foot (against resistance), the

tendons of the peroneal muscles "pop out" from behind the lateral malleolus. Injuries to any of the above ligaments and retinacula may result in swelling, ecchymosis and tenderness over the lateral aspect of the ankle and foot. Pain may often be more severe over tissues experiencing the most damage. Bone injuries also can occur with severe inversion sprains and need to be ruled out by a physician.

The lateral malleolus comprises the distal end of the fibula. Since inversion sprains of the ankle negatively impact this end of the bone, it makes sense that it would have to impact the proximal end as well. In fact, a loss of fibular motion usually occurs following such a sprain. If you check yourself or a client, you can gently rock the fibula forward and backward ever so slightly. The fibula may become "stuck" following an inversion sprain -- this motion would cease. The sprain also would cause increased tension on the interosseus membrane between the fibula and tibia. The proximal part of the fibula (fibular head) is closely associated with the knee joint complex via the lateral collateral ligament of the knee. As a result, there may be significant forces running through the lateral aspect of the knee.

The entire lower limb wrapped in a thick fascial layer. In fact, in the thigh this layer is so dense it has a special name; the fascia lata. On the lateral aspect of the thigh, and continuing down to the proximal leg, this fascia lata is thickened further by the apposed tendon of the tensor fascia lata, which together form the IT band (iliotibial tract). The IT band runs from the anterolateral surface of the pelvis to a tubercle (Gerdy's tubercle) on the anterolateral aspect of the tibial condyle. Therefore, sometimes following an inversion ankle sprain the IT band is forced inferiorly, and this forces the pelvis to be pulled down forcibly on the affected side. The end result will be an "uneven" pelvic base to support the torso and rest of the body.

As massage therapists, we need to be aware of relationships among body parts that may impact the work we do on our clients following specific injuries. In many instances, soft tissues well-removed from the site of original insult are affected.

### *Bibliography*

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