ANKLE PAIN

The ankle joint is a hinge joint between the distal end of the tibia and the talus of the foot. It is protected from lateral displacement by the lateral malleolus that is formed out of the distal end of the fibula. It is also protected from medial displacement by the medial malleolus, formed out of the medial portion of the distal head of the tibia. The ankle is provided with a strong capsule and various ligaments that cross various aspects of the joint. These ligaments provide the ankle with its only real stability. The anterior and posterior tibiofibular ligaments hold the distal ends of the tibia and fibula together (the inferior tibiofibular joint) and thereby maintain the bony socket that the dome of the talus fits into. The deltoid ligament further stabilizes the talus in the mortise medially by joining the apex and both the anterior and posterior borders of the medial malleolus to the navicular bone and to the sustentaculum tali of the calcaneus, as well as to the inner side of the talus. Its deepest fibers attach the tip of the medial malleolus to the medial surface of the talus. Mortise stability is augmented laterally by the anterior talofibular, posterior talofibular, and calcaneofibular ligaments, which respectively attach the lateral malleolus to the talus or calcaneus. All these ligaments combine to prevent inversion and eversion in the ankle joint, while permitting flexion and extension. True inversion and eversion of the foot actually take place in the subtalar joint, located just distal to the ankle joint itself, and in the joints of the midfoot.

Several tendons cross the ankle joint to provide movement and additional stability. The Achilles tendon (from the gastrocnemius and soleus muscles) crosses the joint posteriorly, while the tendons from the anterior tibialis and the toe extensor muscles cross anteriorly. The posterior tibialis, flexor digitorum longus, and flexor hallucis longus tendons cross the ankle joint just behind the medial malleolus, and the peroneal tendons cross behind the lateral malleolus.

The most common source of *ankle pain* is forced ankle joint inversion. If the ankle joint is forced to invert, abnormal strain may be placed on the lateral ligaments. The degree of injury may vary from a mild over-stretching of the lateral ligaments (an ankle strain) to the more serious *sprain*. The seriousness of a sprain ranges from a simple avulsion of a ligament's bony insertion to a serious tear in the joint capsule with complete tearing of the lateral ligaments and dislocation of the ankle. As a rule, the more serious the inversion injury, the more ligamentous tearing will have occurred. Tearing generally follows a predictable pattern. The anterior talofibular ligament and the lateral capsule are torn first followed by tearing of the fibulocalcaneal ligament, and then the posterior talofibular ligament (the latter is rarely torn and only with the complete dislocation of the ankle). Regardless of the degree of injury, the tissue stress will cause inflammation with its attendant lateral swelling, palpation tenderness, and overt pain (the degree generally proportional to severity).

Complete tears of the lateral ankle ligaments should be considered very serious injuries. They occur most frequently in sports and other activities that employ jumping. This injury is especially prevalent among dancers, basketball players, track competitors, and volleyball players. The injury usually occurs when the athlete jumps, landing with full weight on an inverted foot. Typically, the victim will report having heard a single pop or tearing noise followed by “unbelievable pain” through the ankle. Swelling generally occurs immediately and the victim will be unable to bear any weight on the injured side.

Injury inflicted on any of the structures associated with the ankle may be a source of ankle pain. *Ankle pain* mainly comes from arthritis of the joints, capsulitis, effusion, soft tissue impingement, osteochondral fracture, tendon rupture, tendon subluxation, tendonitis, tenosynovitis, proximal nerve or nerve root impingement, vertebral ligament strain, or trigger points.

A DSR survey should be made to establish the presence of inflammation and chronic trigger points.

The high skin resistance pattern commonly associated with an ankle inversion injury (over the lateral submalleolus)

Treatment

If an ankle is suspected of being sprained or fractured, the focus should be on preventing any further injury. Restrain the patient from attempting to put any weight on the involved foot. This could mean virtually carrying the patient off the field on a stretcher or immediately supplying crutches and instruction in the three-point crutch gait. If the materials are available, immobilize the joint and apply positive pressure to prevent further swelling. A full cover-up tape job may serve, as will an inflatable splint ankle sleeve. Studies have shown that ice packs, cold immersion baths, contrast packs, or contrast immersion baths do nothing to prevent swelling. Ice packing or cold immersion baths may, however, help reduce some of the attendant pain.

Often after the classic symptoms of an ankle sprain or strain have disappeared, the patient will continue to complain of a low-grade diffuse aching pain in the ankle or foot that increases with walking. The patient may describe a sharp pain that cuts across the anterior aspect of the joint, or from malleolus to malleolus. A sharp pain may begin within the anterior aspect of the joint and spread to the instep. In almost all such cases, relatively high skin resistance will be found over the lateral submalleolus of the ankle joint and over the anterior tarsal tunnel.

Treatment of *ankle pain* is dependent on which treatable causes have been determined to be responsible.

Application:

- If the condition is **acute**, icepack the inflamed zone. If the condition is **chronic,** electrically stimulate the inflamed zone. Place a negative electrode over the inflamed zone and a positive electrode over a more proximal site. Preset an electrical stimulation unit to deliver a visible contraction, at 7 Hz. Stimulate for 10 minutes. Then set the unit to deliver a medium frequency current, with a duty cycle of 10-seconds on and 10-seconds off, sufficient to produce a near tetanic contraction of the involved muscles. Stimulate for 10 minutes.

- In either case (acute or chronic), manipulate the tissues in and around the inflamed zone to eliminate any adhesions that are present.

- Preset the ultrasound unit to deliver a 1 MHz pulsed waveform, at 1.5 W/cm^2. Ultrasound the inflamed zone, utilizing an effective non-steroidal anti-inflammatory as a coupling agent, for six minutes.

- If the condition is **acute,** electrically stimulate the inflamed zone. Place a negative electrode over the inflamed zone, and a positive electrode over an associated muscle. Preset the electrical stimulation unit to deliver a visible contraction at 7 Hz. Stimulate for 20 minutes. If trigger points are involved, and are the primary source of the pain syndrome, this technique should be considered optional, since it may irritate or re-trigger the trigger points. The effect, in most cases is only temporary, but in others it may slow recovery or shake the patient's confidence.

The following treatment form has also been effective.

Variation:

- Preset the ultrasound unit to deliver a 1 MHz pulsed waveform, at 1.8 W/cm^2. Ultrasound the inflamed zone, utilizing an effective non-steroidal anti-inflammatory as a coupling agent, for six minutes. This procedure is designed to soften the adhesions that may be present.

- Manipulate the tissues in and around the inflamed zone to eliminate any adhesions that may be present.

- Twenty minutes after the first ultrasound, preset the ultrasound unit to deliver a 1 MHz pulsed waveform, at 1.5 W/cm^2. Ultrasound the inflamed zone, utilizing an effective non-steroidal anti-inflammatory as a coupling agent, for six minutes. This is performed to "cool off" the manipulated zone by effectively halting the production of prostaglandins by the stressed tissues.

- Mechanically vibrate the plantar surface of the foot, for two minutes (preferably with a foot vibrator), to further increase capillary circulation and to desensitize the involved tissues.

If the inflammation has resulted from an arthritic condition, successful treatment may take up to six sessions to resolve. If the condition has resulted from a simple soft tissue irritation and inflammation, the problem may be resolved in only one or two sessions.

Trigger Points

The following is a list of trigger point formations which may, singly or in combination, refer pain into the ankle area: Gluteus minimus, Adductor longus, Gastrocnemius, Anterior tibialis, Long toe extensors, Soleus, Short toe extensors, and Abductor hallucis.