

## Successful Ankle Sprain Management

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Sprain injuries to the ankle joint complex cause temporary disability (and sometimes long-term devastation) to competitive and recreational athletes. A return to all activities at pre-injury levels is the goal of treatment. The ankle must be able to perform complex movements while supporting high weights and forces during normal walking. It provides support for the leg and the entire body, it absorbs and adapts to loads, shocks, and uneven surfaces, and it also assists in propulsion during gait. Regaining full function, such as running, cutting, and jumping during sports requires a surprisingly significant amount of strength, coordination and stability.

### Acute Ankle Sprains

Ankle sprain is the most common injury among athletes, and an inversion injury of the anterior talofibular (ATF) ligament is the most prevalent type of ankle sprain.<sup>1</sup> Most sprain injuries to the ankle can be successfully treated with a conservative regimen, although some conditions have a worse prognosis and may need a specialist or surgical consultation. The ability to bear weight after an ankle injury is an important consideration in deciding whether x-rays are needed. If a patient is unable to bear weight, or if there is significant tenderness at the posterior aspect of the lateral or medial malleolus, then x-rays are needed to rule out a fracture, which should be immobilized in a cast or repaired surgically.<sup>2</sup> In addition to the standard AP and lateral radiographic views, a "mortise" view is very helpful. If there is no evidence of fracture, or one less than 3 mm. of displacement, then conservative care is generally appropriate.<sup>3</sup>

### Cryotherapy

Initial care definitely should include the frequent application of cold packs over the injured area, right from the beginning. Comparison studies have found that early implementation of cryotherapy results in an earlier return to sports activities.<sup>4</sup> The local cooling controls inflammation, limits the extent of bleeding and effusion, and inhibits pain. Hourly applications are ideal with the involved leg should be elevated above the heart level throughout each maximum of 10 minutes of cold treatment.

### Controlled Movement

Ankle strapping will help reduce movement in response to mild (non-weightbearing) stress. Initially, crutches can be used in a three-point, partial weightbearing gait to allow protected mobility.<sup>5</sup> A rigid, yet comfortable stirrup support that allows dorsal and plantar flexion, while limiting inversion/eversion (such as an Aircast brace), encourages early mobilization, and improves early functional results.<sup>6</sup> This controlled movement appears to stimulate better collagen repair while limiting adhesion formation.

### Return to Function

In addition to managing the pain and inflammation during the acute phase, we have to prepare our patients to return to all pre-injury activities. Exercises and orthotic supports are very helpful in this regard, and can prevent recurrences.

### Strength

During the initial acute stage, exercises for the damaged ankle are not appropriate. However, general full-body conditioning should be continued, using methods that do not place undue stress on the healing ankle such as arm-hip swimming without ankle motion. A stationary cycle with pedal straps provides some joint mobilization, and at the same time helps to avoid deconditioning. The injured ankle motion is entirely passive.<sup>7</sup> Once the joint can be actively moved through a limited range without significant pain, resistance exercising of the peroneal muscles using elastic tubing can generally be started.<sup>8</sup> Initially these exercises start with standing knee flexion/extension with limited pain-free ankle plantarflexion and dorsiflexion motion. Finally, peroneal strengthening should be performed from a seated position with the heel resting on the floor, which reduces the forces on the ankle joint while still maintaining the functional alignment.

As strength builds, the patient should progress to standing gait training during the exercises to retrain the ankle support muscles in a closed-chain position. Further sport-specific exercises should be introduced to ensure that an athlete has all the strength and mobility to participate in sports activities. Examples include rope jumping which progresses to side-to-side jumps, carioca steps, figure eight runs, and even backward running. Plyometric procedures should be introduced only when all other capabilities have returned to pre-injury capacity.

### Coordination

Early research demonstrated that altered proprioceptive input predisposes to recurring injuries in patients with a history of sprained ankles.<sup>9</sup> Freeman et al. called this phenomenon "articular de-differentiation" to recognize the importance of inappropriate afferent signals from injured ankle and foot proprioceptors. They pointed out that "since articular nerve fibers lie in ligaments and capsules, and since these fibers have a lower tensile strength than collagen fibers, it seems inevitable that a traction injury to a ligament or capsule will lead to the rupture of nerve fibers as well as collagen fibers."<sup>10</sup> Any patient who wants to regain the ability to handle uneven surfaces and be able to respond to quick balance changes will have to retrain the neurological coordination of the foot and ankle. This is best done spending time on unstable surfaces, such as a mini trampoline or a balance board.<sup>11</sup>

Initial exercises should be done sitting, focusing on range of motion in all directions. The patient progresses to standing on a balance board with both legs, and then rotating in both directions. Next, time is spent performing single leg "stork stands," learning to maintain balance on the board, first with eyes open: then with eyes closed.<sup>12</sup> Subotnick recommends that an athlete should be able to demonstrate a "stork stand" for a least one minute on the injured leg before being allowed to return to full competition.<sup>13</sup> Eventually, the difficulty can progress to rotations in both directions and single leg squats for the more advanced athletes.<sup>14</sup>

### Stability

Customized biomechanical support for the foot and ankle is an important long-term treatment that can be supplied after an ankle sprain. A custom-made orthotic will help to maintain the foot and

ankle in its proper alignment during stressful sports activities. Support for the arches provides the stability that is often lacking once the ATF and other ligaments have been damaged. Since either prolonged pronation or excessive supination can interfere with the biomechanics of the foot and ankle, a well-designed orthotic can be the most effective means for preventing chronic, recurring ankle pain.

## Conclusion

Sprain injury to the ankle results in a temporary limitation in normal mobility that can have long-lasting effects on gait and stability. Proper treatment during the acute phase immediately after injury results in a rapid return to daily activities. To regain full function, however, most competitive, and many recreational athletes will need to consider the three factors of strength, coordination, and stability. Specific exercises and custom-fitted orthotics should be considered and recommended for most patients who present with a history of ankle sprain injury.

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