



Golden Hills

Orthopedic and Sports Physical Therapy

j o u r n a l

march 2007



Our Mission...

To further the prevention, diagnosis and treatment of movement dysfunction in order to enhance the physical health and functional abilities of our patients.

To maximize the patient's potential for regaining full physical health by providing rehabilitation through the use of advancements in physical therapy techniques and state-of-the-art equipment.

To establish a self-management program for the patient through education and a personalized home exercise program for each individual to enable the patient to maintain their physical health at home and at work.

Part I: **Treating Foot and Ankle Injuries in the Athlete**

The human foot is a complex, beautifully designed mechanism composed of 26 bones, 33 joints and over 100 ligaments. The ankle is made up of three bones and numerous ligaments. Together, the ankle and the foot are the key to our mobility. They form an efficient unit that supports many tons of pressure each day and, over an average lifetime, will allow their owners to walk and run as many as 70,000 miles.

Because of their anatomical intricacy and frequent, weight-bearing use, the foot and ankle are highly susceptible to injury. Foot and ankle injuries are particularly common in athletes. Even minor injuries can have an adverse affect on an athlete's performance and may set up a pattern of compensatory movements that decrease his or her efficiency of movement, and may lead to related knee or hip injuries. Treatment of injuries in the athlete must be predicated on the fact that the foot-ankle unit is part of a larger complex mechanism; altering motion at any body segment may have consequences distant to that site.

Based on the extensive experience of Saad Shaban, PT, founder and owner of Golden Hills, this 2-issue series (March and April) will cover the following topics:

- Anatomy of the foot and ankle

- Common injury conditions
- Physical therapy treatments
- Preventive stretches for patients to do at home

At Golden Hills Orthopedic and Sports Physical Therapy, our talented team of physical therapists can make the difference in getting your patient athletes back in the game after an injury occurs. Our end goals are to help you respond to injuries with appropriate evaluation and treatment, and to encourage you to rely on Golden Hills as a partner in helping your patient athletes achieve their recovery goals.

The Foot

The foot is made up of a complex interaction of bones, ligaments and muscles. These structures help the foot alternate between being a mobile, flexible adaptor and a stable rigid lever. The foot is broken down into two functional parts, the forefoot and the rear foot. Overall, the foot functions in three primary ways:

- Provides a stable platform of support
- Attenuates impact upon loading
- Assists in efficient forward propulsion of the body

Anatomy of the Foot

The forefoot includes the five metatarsal bones and the phalanges (toes). The first

Treating Ankle and Foot Injuries in the Athlete (Continued)

metatarsal bone bears the most weight and plays the most important role in propulsion. It also provides attachment for several tendons. The second, third and fourth metatarsal bones are the most stable of the metatarsals. They are well protected and have only minor tendon attachments and are not subjected to strong pulling forces.

Near the head of the first metatarsal, on the plantar surface of the foot, are two sesamoid bones (a small, oval-shaped bone that develops inside a tendon where the tendon passes over a bony prominence). They are held in place by their tendons, and are also supported by ligaments.

The midfoot includes five of the seven tarsal bones (the navicular, cuboid and three cuneiform). The distal row contains the three cuneiforms and the cuboid. The midfoot meets the forefoot at the five tarsometatarsal (TMT) joints. There are multiple joints within the midfoot itself. Proximally, the three cuneiforms articulate with the navicular bone.

The talus and the calcaneus make up the hindfoot. The calcaneus is the largest tarsal bone, and forms the heel. The talus rests on top of it and forms the pivot of the ankle.

Biomechanics of the Foot

Toe movements take place at the joints. These joints are capable of motion in two directions: plantar flexion (toes pointing down) and dorsiflexion (toes pointing up). In addition, the joints permit abduction and adduction of the toes.

The foot as a whole (excluding the toes) has two movements: inversion and eversion. All the joints of the hindfoot and midfoot from the subtalar contribute to these movements, which are complex and consist of several components. In addition, foot movements ordinarily are combined with ankle movements.

The Ankle

Anatomy of the Ankle

The ankle, or talocrural joint, is a synovial hinge joint that connects the distal ends of the tibia and fibula in the lower limb with the proximal end of the talus bone in the foot. The articulation between the tibia and the talus bears more weight than between the smaller fibula and the talus.

The ankle joint is responsible for dorsiflexion and plantar flexion of the foot, and allows for the greatest movement of all the joints in the foot. The ankle does not allow rotation.

In plantar flexion, the anterior ligaments of the joint become longer while the posterior ligaments become shorter. The reverse is true for dorsiflexion.

The lateral malleolus of the fibula and the medial malleolus of the tibia along with the inferior surface of the distal tibia articulate with three facets of the talus. These surfaces are covered by cartilage.

The anterior talus is wider than the posterior talus. When the foot is dorsiflexed, the wider part of the superior talus moves into the articulating surfaces of the tibia and

fibula, creating a more stable joint than when the foot is plantar flexed.

The ankle is bound by the strong deltoid ligament and three lateral ligaments: the anterior talofibular ligament, the posterior talofibular ligament and the calcaneofibular ligament.

The joint is most stable in dorsiflexion and a sprained ankle is more likely to occur when the foot is plantar flexed. This type of injury more frequently occurs at the anterior talofibular ligament.

The Increased Risk of Ankle and Foot Injuries in Athletes

Every sport predisposes the athlete to a particular subset of foot and ankle injuries. Some are more high risk than others. Endurance athletes are prone to overuse injuries, whereas collision sports have a higher incidence of strains, sprains and fractures.

In next month's issue, we will explore the most common foot and ankle injury conditions and provide insights into Golden Hills' approach to helping injured athletes return to pre-injury levels of athletic performance.

Golden Hills Joins the Better Business Bureau!

We're excited to announce that we recently joined our local chapter of the Better Business Bureau, representing our commitment to providing superior care and service to our patients and referring physicians.

