Medical Practice for Sports Injuries and Disorders of the Lower Limb

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Abstract: Among sports injuries and disorders of the lower limb, ankle sprains are the most common, followed by ruptures of the Achilles tendon and muscle strains (especially the gastrocnemius muscle). The basic procedure primarily used in the acute phase of injury is well known as RICE: Rest, Icing, Compression, and Elevation. Adequate treatment should be given after precise evaluation of the degree of injury. Disorders such as stress fractures, shin splints (fatigue periostitis), plantar aponeurosis, and painful os tibiale externum, are generally due to overuse and malalignment of the lower limb. After precise diagnosis based on history taking, clinical symptoms, X-ray, bone scintigraphy, and magnetic resonance imaging (MRI), various ways of treatment—for example, rest, arch support, and taping—reduce the local load and contribute to recovery. Meanwhile, in order to engender a smooth return to sports activities and to prevent relapse, stretching, muscle training, taping, and malalignment correction using arch support are all important factors for recovery from injuries and disorders.

Key words: Ankle sprain; Rupture of Achilles tendon; Stress fracture; Shin splint

Introduction

According to the “Survey on Sports-related Injuries,”1) 88,531 athletic injuries and disorders occurred in 1996 — 16.8% (14,910) - ankle, 6.9% (6,144) - lower leg, 4.4% (3,911) - foot, and 3.3% (2,940) - Achilles tendon related. In the ankle joint, sprains accounted for the most incidences (67%), ligament damage 15.9%, and fractures 11.7%. Muscle strains and fractures in the lower leg occurred with similar incidence, as did sprains and fractures in the foot. As for the Achilles tendon, ruptures accounted for 95.4% of the injuries. This paper will illustrate typical pathological conditions of both sports-related injuries and sports-related disorders.

Sports Injuries of the Lower Limb

1. Ankle sprain

Ankle sprains are the most frequently experienced sports injuries, and the great majority
weight. Taping, bracing, plastering should be done to prevent future varus alignment. Figure 1 shows a brace used to prevent varus malalignment of the ankle joint (EVERSTEP®6, NIPPON SUGMAX Co., Ltd).

Surgical treatment is rarely necessary for fresh injury cases. For neglected cases in which instability and/or pain persist due to inappropriate initial treatment, taping for varus prevention, fibular and anterior tibial muscle training, and furthermore maintaining dorsiflexion and valgus mobility are all important to limit varus instability during sports activities.

2. Rupture of the Achilles tendon

The Achilles tendon is the largest tendon in the human body and ruptures due to sudden contraction of the gastrocnemius muscle. In younger patients, blood flow disturbance (causing a miniscule rupture) and Achilles tendinitis are common causes, while degeneration of the tendon and inadequate warming up may lead to ruptures in the middle-aged population. The condition is generally associated with volleyball, basketball, gymnastics, tennis, and badminton, in which jumping, landing, forceful stepping, and cutting movements are routine movements. Patients describe the sensation at the moment of rupture as being “kicked from behind,” and often times hear a rupturing “pop.” Pain is mild in most cases; patients can walk flat-footed, but cannot tiptoe. A recessus can be felt at the ruptured site, and the patient complains of tenderness. When the calf is grasped with the knee joint flexed at 90 degrees in a prone position, the ankle joint normally flexes, but this does not occur with a ruptured Achilles tendon (Thompson’s squeeze test).

Emergency treatment involves immobilizing the lower leg with the ankle flexed (so that the stump of the ruptured tendon is not dislocated), icing, and using crutches in order to reduce the weight on the injured leg.

Treatment is globally classified into two groups: conservative therapy (i.e. with a cast or
orthosis) and surgical therapy. The former has many advantages — no scar, no hospitalization, and no concern for any complications (especially infection) — and disadvantages — longer use of crutches for partial weight bearing, delayed recovery of muscle strength, and a longer period of recovery before being able to return to athletic activity. Thus, conservative treatment is generally chosen for patients with relatively stationary jobs, for earlier return to work, and for those who cannot stay in the hospital; on the other hand, surgical treatment is recommended for patients who want an earlier return to sports activities.

If one chooses conservative treatment, the lower leg should be placed in a cast for several weeks with the ankle joint flexed. Next, an ankle foot orthosis should be worn to control the dorsal flexion angle of the ankle. In surgical treatment, the Achilles tendon is sutured, and afterwards the lower leg is put in a cast. After removal of the sutures, an ankle orthosis is worn; full weight bearing is permitted four weeks postoperatively. Most patients return to their usual sports activities four to five months after surgery.

3. Muscle strain of the gastrocnemius muscle

Muscle strains are defined as the condition associated with the rupture of muscle fibers, a partial one in most cases. Often times called a “tennis leg,” this well-known condition occurs due to rapid extension of the gastrocnemius muscle (when the ankle is suddenly dorsiflexed from a plantarflexed position), and is induced by a sudden dash or quick turn (as in a tennis serve). The muscle strain is localized at the muscle-tendon interface of the medial head of the gastrocnemius. The patient describes the moment of injury as being “kicked from behind,” and hears a rupturing sound. Local tenderness and pain on extension contribute to a fairly easy diagnosis.

Conservative treatment is principally preferred. The basic treatment in the acute phase, RICE — minimization of swelling, local rest-
2. Shin splints

Shin splints are also known as fatigue periostitis. They are accompanied by pain while running at the attachment of the soleus muscle in the posteromedial distal third of the lower leg. Malalignment (i.e., pes planus) may be a common reason for this condition. Though an X-ray examination may reveal no abnormal finding, in other cases, it may show cortex thickening and bulging of the bone at the medial side of the tibia. Bone scintigraphy only shows mild accumulation, while clear accumulation is revealed in a stress fracture. Treatment includes local resting and arch support (especially to reduce weight bearing at the pain site in a patient with pes planus).

3. Plantar aponeurosis

The plantar aponeurosis covers the whole sole of the foot from the calcaneus to the proximal phalanges, and is involved in shock absorption and kicking off, much like a spring. Athletes who are involved in sports that require continuous running such as long-distance track, frequently develop this condition. Pain appears in the medial plantar surface around the heel while running, landing, and starting to walk first thing in the morning. Local rest, stretching, and arch support (in case there is malalignment) are common ways to treat this condition.

4. Painful os tibiale externum

Os tibiale externum is a sesamoid bone that exists medial to the navicular bone and is found in 10–20% of the population; if a patient complains of local bulging, tenderness, flaring, and swelling, the condition is called “painful os tibiale externum.” Diagnosis is not difficult since the accessory bone is seen in X-rays. Examples of treatment procedures include local rest, taping, and arch support (for a pronated foot).

Figure 2 shows the arch support used in our hospital.
Conclusion

In this paper, typical sports injuries and disorders of the lower leg and ankle have been described. The basic procedure in the acute phase is known as RICE. Adequate treatment should be given only after the gravity of the injury has been assessed. Since these disorders are commonly due to overuse and malalignment of the lower leg, after precise diagnosis — based on history taking, clinical symptoms, X-ray, bone scintigraphy, and magnetic resonance imaging (MRI) — various ways of treatment (rest, arch support, and taping) reduce the local load and contribute to recovery.

For a smooth return to athletic activities and in order to prevent relapse of injuries or disorders, stretching, enhancement of muscle strength, taping, and correction of malalignment with arch support are all indispensable measures.

REFERENCES


