

Ankle sprains in the paediatric athlete



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Physical activity and sports have many positive benefits for children. However, injuries do happen. Sport injuries comprise 8% of paediatric emergency department visits; 41% of emergency department visits for musculoskeletal complaints are sport-related. These injuries include sprains (34%), contusions (30%) and fractures (25%). Injuries to the ankle are the most common (20%) (1).

Although ankle sprains are common, management is inconsistent. With minor modifications to standardize care, many athletes can return to their sport faster, with less chance of reinjury.

ANATOMY OF THE ANKLE

The ankle is a simple hinge joint composed of the tibia and fibula, both of which articulate with the talus. The talus is wide anteriorly and narrow posteriorly. This provides stability when the joint is in a neutral position, as the wider part of the talus is locked securely in the joint. Three ligaments provide stability to the ankle laterally: the anterior talofibular ligament (ATFL), the calcaneofibular ligament (CFL) and the posterior talofibular (PTFL) ligament. The deltoid ligament is found medially, emanating from the distal tibia. Dynamic stability is achieved by the peroneus brevis muscle laterally (everts the foot) and the tibialis posterior muscle medially (inverts the foot) (Figure 1).

DIAGNOSIS

The mechanism of injury for the typical ankle sprain is an inversion of a plantar flexed foot. The ATFL is the most commonly injured ankle ligament. With increasing severity of injury, the CFL and the PTFL are injured.

Physical examination findings consistent with an ankle sprain include anterolateral swelling and/or bruising, tenderness over the ligaments and difficulty bearing weight. Other injuries must be excluded, including fractures (eg, proximal fibula, base of fifth metatarsal, Salter-Harris fractures) or interruption of the syndesmotic ligament (between the fibula and tibia), which is referred to as a 'high ankle sprain'. In younger children, Salter-Harris, or growth plate, fractures are more common than sprains; therefore, there should be a high degree of suspicion for fractures when children present with ankle inversion injuries. To distinguish sprains from these potentially more complicated diagnoses,

the Ottawa ankle rules (Table 1) can be used in children over the age of 10 years (2). This may reduce the need for ankle x-rays by 16% and foot x-rays by 29% (3).

MANAGEMENT

Initial management goals for a sprained ankle include protecting the ankle, decreasing pain and inflammation, and increasing stability and function. The general principles of PRICE – Protection, Rest, Ice, Compression, Elevation – should be followed.

Protection and relative rest

There is no evidence to support a positive effect of immobilization (4). In fact, a 20% decline in strength has been shown for each week of immobilization (5). Functional bracing, with early mobilization, provides support and stability, allowing for earlier improvements in range of motion, earlier return to sport, and higher patient satisfaction when compared with immobilization (4,6). Rigid lateral stirrups may be used acutely. When returning to sport, a functional brace such as a lace-up ankle brace should be worn for the first three to six months to protect the ankle from further injury while the ligaments are healing.

Ice

Ice is an effective anti-inflammatory and has been shown to decrease time to recovery by 30% to 60% when used within the first few days of injury (7). Application of an ice pack for 15 min at a time, one to three times a day, in the first 36 h after injury, decreases swelling and allows for earlier, complete recovery (8,9).

Compression and elevation

Compression and elevation are often applied in conjunction with ice therapy. There is little literature to support their independent use in ankle sprains; however, expert opinion continues to endorse both (9). The rigid splints described above also provide compression and facilitate access to the ankle for icing.

Nonsteroidal anti-inflammatories

Nonsteroidal anti-inflammatories such as ibuprofen decrease pain and inflammation, particularly in the first few days

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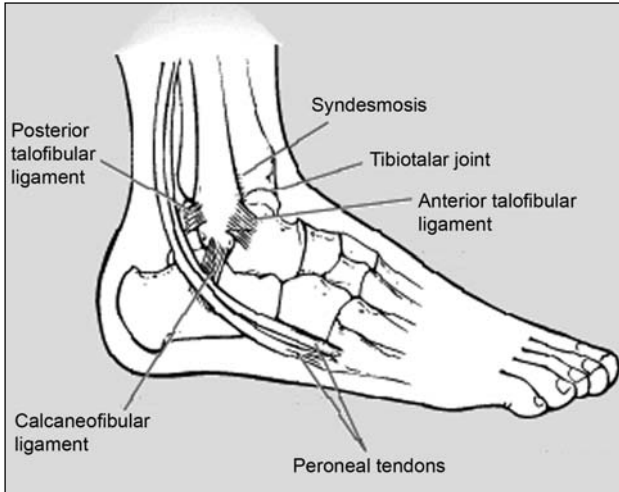


Figure 1) Anatomy of the ankle. Image reproduced with permission from reference 16

following an injury. When used over longer periods, they help to decrease pain and facilitate physiotherapy.

REHABILITATION

Rehabilitation is essential in the management of ankle sprains and in the prevention of reinjury once the athlete returns to sport (9,10). Rehabilitation programs may be implemented under the supervision of a physician, physiotherapist or athletic therapist. Essential elements of an ankle rehabilitation program include:

- returning to a normal range of motion. Decreased dorsiflexion has been shown to be related to increased incidence of ankle sprains in children (11).
- strengthening the peroneal musculotendinous unit to provide dynamic stability to the ankle. Strengthening can be achieved with resisted dorsiflexion, plantar flexion, eversion and inversion of the ankle using a rehabilitation elastic band (eg, Thera-Band, The Hygenic Corporation, USA).
- optimizing flexibility of the calf muscles and Achilles tendon to facilitate a neutral and more stable position of the ankle. Flexibility can be improved by stretching the gastrocnemius and soleus muscles, and the Achilles tendon.
- proprioceptive rehabilitation. Deficits in proprioception have been shown to correlate with an increased incidence of ankle sprains (12), while proprioceptive exercises may decrease the risk of injury by almost 50% (13). Balance can be improved with exercises on wobble boards or small trampolines.
- bracing to provide extra support while the athlete optimizes the strength, flexibility and proprioceptive skills necessary to prevent recurrent sprains (14). Although taping is commonly used, it is more expensive and less effective than bracing (15).

Table 1

The Ottawa ankle rules

An ankle x-ray series is only necessary if there is pain in the malleolar zone and any of the following:

1. Bone tenderness at the posterior edge or tip of the lateral malleolus, or
2. Bone tenderness at the posterior edge or tip of the medial malleolus, or
3. Inability to weight bear both immediately and in the emergency department

A foot x-ray series is only necessary if there is pain in the midfoot zone and any of the following:

1. Bone tenderness at base of fifth metatarsal, or
2. Bone tenderness at the navicular bone, or
3. Inability to bear weight both immediately and in the emergency department

Adapted from reference 2

RETURN TO PLAY

Return to play may begin in a step-wise fashion, when range of motion, strength and proprioception have returned to normal, and pain has resolved. Often, this takes between one and six weeks, depending on the severity of the ankle sprain. Formal physiotherapy continues until the athlete achieves full return to play. The athlete is then discharged with a home exercise program. A brace should be worn to protect the ankle from further injury during the first three to six months following return to sport.

TAKE HOME MESSAGE

Ankle injuries are very common and often debilitating for the young athlete. Return to competitive-level sport necessitates early mobilization and commitment to a physiotherapy program. Different types of bracing can be helpful in both early and late phases of recovery, but rehabilitation is essential to reduce the risk of recurrence.

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The recommendations in this article do not indicate an exclusive course of treatment or procedure to be followed. Variations, taking into account individual circumstances, may be appropriate.