

## **CAUSES OF PERSISTENT PAIN FOLLOWING AN ANKLE SPRAIN**

An ankle sprain may result in damage to the surface of the ankle joint or to structures around the ankle joint. This could lead to the development of persistent pain and swelling in the ankle, which does not settle despite a course of physiotherapy or rest.

Damage to the ankle joint (intra-articular) includes injury to the joint surface of the ankle, anterior ankle impingement and posterior ankle impingement. Injuries to structures around the ankle (extra-articular) include peroneal tendon tears, peroneal tendon dislocation and occult fractures.

The patient can usually localize the pain to the front (anterior), back (posterior), inner side (medial) or outer side (lateral) of the ankle. The pain may be associated with ankle swelling.

### **ANTERIOR ANKLE PAIN**

If the pain is anterior then articular (joint) surface injury and anterior ankle impingement should be considered.

**Articular surface injury** may involve cartilage alone (**chondral**) or cartilage and bone (**osteochondral**). These patients will usually experience pain with walking, running and jumping activities. The pain is often worse with stairs or uneven ground. There may be start up pain where the patient has pain when he/she starts an activity such as running and the pain eases as the patient continues. With these lesions, the talar dome is more frequently injured than the tibia. Other symptoms with these lesions include ankle swelling, stiffness, weakness or giving way. If the damage is on the inner side of the ankle then the pain is usually on the inner side. However if the damage is on the outer side of the ankle then the pain is usually on the outer side.

With **anterior ankle impingement**, the pain is worse with walking or running up hill, inclines or stairs. Squatting (eg with weight lifting) and landing after a jump (eg gymnastics or acrobatics) may make this pain worse. Sometimes the patient may be able to localize this pain to the inner or outer side of the ankle. There is limited range of ankle motion, particularly in dorsiflexion. Anterior ankle spurs are the most common cause of anterior impingement. The cause of the anterior spurs is unknown and they most likely are the result of repetitive minor injuries. Anterior impingement secondary to spur formation is quite common in athletes especially in soccer, rugby and basketball.

### **LATERAL ANKLE PAIN**

Lateral ankle pain may be due to synovitis (inflammation of the ankle joint) from a recent sprain, peroneal tendon tear, peroneal tendon dislocation, or occult fractures (3 types are discussed below).

**Ankle synovitis** can cause anterolateral (front outer side of the ankle) ankle pain located just anterior to the lateral malleolus. The pain is usually worse with activities such as stair walking and running and relieved by rest. There may be associated ankle swelling or loss of joint motion.

A **peroneal tendon tear** is commonly associated with lateral ligament instability. The peroneus brevis is more commonly torn than the peroneus longus. The tear is usually located at the level of the tip of the fibula. The person with a peroneal tendon tear does not often present acutely but will present later with persistent lateral ankle pain and swelling along the tendon. The lateral pain is located behind the lateral malleolus. The pain is worse with activity especially on uneven ground.

Skiing is a common cause of **peroneal tendon dislocation**. It may also occur with ankle sprains. It is due to forceful contraction of the peroneal tendons as the skier edges the skis into the snow while making a turn. It may also occur with ankle sprains. The patient will often experience a popping sensation during the accident. The peroneal tendon may remain dislocated or it may reduce and cause repeated dislocation episodes with activities. There is posterolateral ankle pain and swelling behind the lateral malleolus. If there are repeated dislocation episodes then there will be a snapping or popping sensation. The symptoms are worse on uneven ground.

**Fracture of the anterior process of the calcaneus** can occur with a lateral ankle sprain. It is an avulsion fracture of the bifurcate ligament. The patient presents with persistent lateral ankle pain following an ankle sprain. The pain and tenderness is maximal in an area that is about 2 cm anterior and 1 cm inferior to the anterior surface of the lateral malleolus.

**Fracture of the lateral process of the talus** is also known as the **snow boarder's fracture**. The patient presents with localized pain, swelling and bruising anterior to the lateral malleolus. There is tenderness around the lateral malleolus. Thus this fracture clinically appears like a lateral ankle sprain. This and the fact that the plain radiographs often do not show the fracture or have only subtle changes are the reasons why this fracture is frequently diagnosed late in patients who have had a presumptive diagnosis of an ankle sprain. The symptoms do not resolve with physiotherapy and the patient presents with chronic lateral ankle pain.

**Fracture of the tuberosity of the fifth metatarsal** follows an inversion injury to the ankle. This can be associated with an ankle sprain. This injury represents an avulsion fracture of the base of the fifth metatarsal, which is where the peroneus brevis tendon inserts.

## **POSTERIOR ANKLE PAIN**

Posterior ankle pain may be due to posterior ankle impingement.

**Posterior Ankle Impingement** occurs more commonly in ballet dancers who do Pointe work. It may also occur in other athletes following an inversion injury to the ankle. Posterior ankle impingement may be due to several causes. The most common cause of painful posterior ankle impingement is due to the presence of an os trigonum. This is the un-united posterolateral tubercle of the talus. Its incidence is about 10% and occurs in both ankles in up to 50% of cases. The os trigonum usually does not cause any problems. An os trigonum may become painful following an ankle sprain due to disruption of the fibrocartilaginous connection between the os trigonum and the posterolateral process of the talus. Posterior ankle impingement most commonly occurs in female ballet dancers who place the ankle in extreme equinus to assume the en Pointe position. It occurs less frequently in other athletes following ankle sprains.

They will complain of pain in the area of the posterior heel or deep in the back of the ankle. The pain is aggravated by Pointe work, jumping or running activities or when they stand on the tip of their toes.

## **INVESTIGATIONS**

Weightbearing xrays of the ankle are useful as an initial test. It will identify the presence of anterior bone spurs in the ankle joint or the presence of an os trigonum. It may also show the presence of fractures around the ankle. It may not identify joint damage as xrays visualise bone but not cartilage.

Magnetic Resonance Imaging (MRI) is the most useful investigation looking for damage to the ankle joint surface, synovitis or peroneal tendon damage. Ultrasound and bone scans are less helpful in identifying these problems.

Bone scans can identify fractures of the anterior process of the calcaneus or lateral process of the talus if the xrays appear normal and these fractures are suspected.

## **TREATMENT**

The initial treatment of patients with anterior, lateral or posterior ankle pain after an ankle injury is physiotherapy and to avoid activities that aggravate the symptoms such as running and jumping sports. Injection of local anaesthetic (eg 0.5% marcaine) and steroid (eg celestone) may be helpful in patients with synovitis or posterior ankle impingement.

In general 80% of patients would make a full recovery within 2-3 months of physiotherapy treatment. If a patient has persistent pain despite a 2-3 months trial of physiotherapy or if their improvement stalls during the initial 2-3 months of physiotherapy or if they are unable to weight bear then they require an orthopaedic review and would most likely require a MRI assessment to identify the cause of their persistent pain. The above is true unless the patient has a fracture or if there is a peroneal tendon subluxation/dislocation, which are discussed below.

A high index of suspicion is required to diagnose a fracture of the anterior process of the calcaneus. With early diagnosis a short leg walking cast for 6 weeks will allow the fracture to heal. If the diagnosis is delayed then a trial of a walking cast or boot for 6 weeks is helpful. The patient will often complain of discomfort in the region of the fracture for up to 3 months following the injury. If symptoms persist then surgical excision of the fracture fragment for persistent pain may be necessary at a later stage.

In a patient with a fracture of the lateral process of the talus, displacement of the fracture (as seen on CT scan) will determine if surgery is required. If a displaced lateral process of talus fracture is left untreated, it may lead to the development of painful posttraumatic arthritis in the subtalar joint. This can develop within 12 months of the injury.

The tuberosity of the fifth metatarsal has an excellent blood supply and a fracture of the tuberosity of the fifth metatarsal will heal readily. These patients can be treated symptomatically. This can vary from wearing sneakers with a compressive tubigrip to a walking cast or boot. Only rarely will the fracture be sufficiently displaced to require open reduction and internal fixation. The patient will often complain of discomfort in the region of the fracture for up to 3 months following the injury.

In acute peroneal tendon dislocation/subluxation, nonoperative treatment with immobilization is ineffective. Surgical repair of the peroneal retinaculum is required to stabilize the tendons. Following the surgery the leg needs to be immobilized in a short leg walking cast or Cam walker boot for 6 weeks. This is followed by a course of physiotherapy.

Articular damage, synovitis and painful anterior bony impingement problems require ankle arthroscopic (key hole) surgery. Please refer to the section on **ankle arthroscopy**. If articular damage does not heal after an arthroscopy then cartilage transplantation may be required.

Posterior ankle impingement pain from an os trigonum requires surgery to excise the os trigonum. This is done as a day surgery procedure. This is followed by physiotherapy to prevent post surgical scar tissue formation. The patient may fully weight bear on the leg after the operation. Gentle swimming and cycling may commence 2 weeks post op and light jogging may commence 3-4 weeks post surgery.