Ankle injuries – a sport and exercise physician's perspective

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Patients presenting with ankle pain typically have a history of either an acute onset of pain after a specific event such as inverting the ankle when landing from a jump, or the symptoms have come on more insidiously over a number of days or weeks and often involves one of the many tendons in the region.

Therefore taking the time to take an accurate history and constructing a thorough examination is vital in establishing which structure or structures are likely to be implicated as the source of pain. Without an accurate tissue diagnosis, specific advice regarding the optimal management and treatment cannot be given.

Acute injuries

Acute injury to the lateral ligament complex – anterior talofibular (ATFL), calcaneofibular (CFL) and posterior talofibular (PFL), ligaments – is the most common sporting injury. The position of the ankle is often helpful in establishing whether the ATFL or CFL have taken the major strain and therefore more likely to be injured. For example, if the ankle was in neutral, the CFL should be suspected of being significantly damaged. If the ankle was in a more plantar flexed position, then the ATFL should be closely assessed.

In the acute phase, swelling and pain can make accurate clinical assessment of the ATFL and CFL difficult. Typically, the clinician uses the anterior drawer test to assess the integrity of the ATFL and the talar tilt test to assess the CFL. Comparison with the non-injured side (provided there has been no significant past history of injury to its lateral ligament complex) is useful.

Therefore in this acute situation, ultrasound can often be extremely useful in assessing the integrity of the ATFL and CFL to determine further management which may involve immobilisation in a Cam Walker or sometimes at the elite level, acute surgical reconstruction of the ligaments. However, it is important to remember that evidence of clinical deficiency of these two ligaments does not necessarily translate into functional instability. There are large numbers of elite athletes with deficient lateral ligament complexes who are able to play sports that involve regular changing of direction without any compromise in their performance or problems with recurrent ankle sprains.

Associated injuries

1 Peroneal tendon subluxation/dislocation

If the peroneal retinaculum is torn at the time of the ankle sprain, then the peroneal tendons can sublux or dislocate around the lateral malleolus. Usually the patient is aware of clicking and the movement of these tendons but it is not always the case. Ultrasound is able to dynamically assess whether or not the peroneal tendons sublux or dislocate due

to the absence of the retinaculum. If confirmed, surgical repair of the retinaculum is usually recommended.

2 Injuries to the bifurcate ligament

The bifurcate ligament (Y-shaped ligament running between the anterior process of the calcaneum to the cuboid and navicular bones) can often be confused with an injury to the lateral ligament complex. There is often diffuse swelling in the region and ultrasound can often be helpful if the lateral ligament complex is visualised and deemed to be uninjured. Injuries to the bifurcate ligament often heal more slowly and plain x-rays can sometimes reveal an associated fracture of the anterior process of the calcaneum.

Achilles tendon

Acute complete or partial ruptures of the Achilles tendon are a relatively common sports injury. The patient will describe a feeling of being struck on the back of the ankle. Running or walking can then become very painful. Clinically, Thomson's test is a relatively sensitive and specific indicator of a complete rupture of the Achilles tendon. The patient is asked to lie prone with his foot over the edge of the examining couch. Squeezing the calf muscles normally produces passive plantar flexion of the foot if the Achilles tendon is intact. If there is no movement of the foot during this manoeuvre, it can be reliably assumed that the Achilles tendon has been completely ruptured. In situations where the result of this clinical test is equivocal, ultrasound can then assist in determining whether or not a partial or complete rupture of the tendon has occurred which allows an appropriate decision regarding further management to be made. Acute ruptures can either be managed surgically or conservatively by placing the patient in a cast in which the ankle is in the plantar flexed position for the first four to six weeks. Partial ruptures can be managed in a Cam Walker for six weeks followed by a graduated calf-strengthening program.

It should be noted that over 90% of Achilles tendon ruptures occur in the absence of any preceding symptoms.

Plantar fascia

Partial or complete rupture of the plantar fascia occurs relatively infrequently. Typically, the patient will be pushing off and feel acute pain in the heel, often medially. Swelling and bruising usually become apparent within a few hours. Again, many patients can rupture the plantar fascia without any previous symptoms in the area. However, unlike the Achilles tendon, there is no reliable clinical test to differentiate between a partial or complete rupture of the plantar fascia. Therefore clinicians rely on ultrasound to allow them to differentiate between the two. Surgical repair of complete plantar fascia rupture is rarely, if ever, undertaken and usually

the patient can resume most physical activities within six to eight weeks of the rupture. Interestingly, partial ruptures can be more difficult to manage and often it is better for the patient to start running as soon as pain allows and if possible to complete the tear sooner rather than later.

Deltoid ligament

Eversion injuries of the ankle are much less common than inversion injuries. However when there is little or no swelling laterally and tenderness and swelling medially through the deltoid ligament, ultrasound can be useful in determining the extent of the injury to this structure.

Chronic injuries

Chronic conditions around the ankle often involve one of the large numbers of tendons that cross it. These include the Achilles (both mid-substance and insertional enthesopathy), peroneals, tibialis anterior and posterior, flexor hallucis longus and the plantar fascia which behaves like a tendon.

In recent years it has been appreciated that the pathology in these tendons is not an inflammatory but degenerative process and as a result the term “tendonitis” has been phased out and “tendinopathy” or “tendinosis” used.

Most of these tendons, including the Achilles to an extent, have synovial sheaths around them and acute inflammation of the tendon sheaths (tenosynovitis) can often mimic tendinopathy. Clinical examination may elicit crepitus but ultimately ultrasound is extremely useful in confirming that the tendon itself is structurally normal with evidence of inflammation of the tendon sheath.

The aetiology of chronic tendinopathy is multi-factorial. Increasingly genetic factors are being implicated. There is also an association between increased abdominal girth and tendinopathy. In athletes, sudden changes in training load can often precipitate the changes commonly seen on ultrasound of tendinopathy. Finally, biomechanical factors such as flat feet may over time increase the load on tendons such as tibialis posterior to produce symptoms.

It should be appreciated that many of the pathological changes occurring in the tendon do so prior to the onset of symptoms. As a result it can take many weeks or months to reverse these changes and render the patient asymptomatic.

1 Achilles

The most common overuse injury to the Achilles is tendinopathy involving the mid section, usually 2–4 cm proximal to its insertion onto the posterior calcaneum. Typically, the patient will have a fusiform swelling in this area. They will generally describe early morning stiffness and discomfort after any period of inactivity, which usually warms up. Increased loading on the tendons, such as running, will produce pain either during or after. Tendons characteristically take 24 to 48 hours to respond to a loading session and therefore the patient will often notice that their symptoms are worse the day after an activity which has (over)loaded the Achilles tendon.

Clinically, tendon palpation of both the Achilles and of other tendons is not always a useful clinical sign as many tendons are tender if you squeeze them hard enough. The best clinical tests are to ask the patient to undertake activities in which progressive loading of the tendon occurs. For example, in some patients merely asking them to perform a

calf raise (i.e. stand on tip toes) either on one or both legs may produce their symptoms. Characteristic of tendon pain is that it is usually well localised and the patient can point to where their pain source is. If a single leg calf raise fails to produce the patient's typical symptoms, then hopping, either on the spot or by jumping forward can be undertaken.

A large number of treatments now exist to manage patients with tendinopathy. As in other areas of medicine, this implies that no one specific treatment is universally successful. Often it involves pulling together two or three different treatments to assist in managing the tendinopathy. Nevertheless the majority of treatment programs will involve some form of concentric and then eccentric strengthening program, which has been shown in well-designed scientific papers to reverse the typical tendinopathy changes seen on ultrasound. Various “lotions and potions” are also used and in recent years autologous blood injections into or around the tendon have become popular. In some cases the blood is separated to produce a “platelet rich plasma” as it is believed that growth factors derived from the platelets are responsible for assisting the healing of the tendon pathology.

Two other pathologies around the Achilles tendon insertion are commonly encountered. Insertional Achilles tendinopathy or enthesopathy usually involves swelling and tenderness in the posterior calcaneal region. The patients' symptoms may often be very similar to those with mid substance Achilles tendinopathy. However, they will point to the posterior heel as the source of these symptoms. Some individuals have a prominent posterolateral calcaneum known as a Haglan's deformity and this can cause rubbing and irritation of the Achilles tendon in this area often associated with bursitis of the retrocalcaneal bursa. Ultrasound can assist in determining the extent of any tendon pathology as well as confirm the bursitis. Plain x-rays may show calcification or ossification of the Achilles tendon insertion as an alternative cause of prominence of the posterior calcaneum. Generally, insertional Achilles tendinopathy is harder to manage than in the mid section. Placing a heel raise into the patients' footwear can take the load off the Achilles tendon but some of the eccentric strengthening exercises can often exacerbate the condition.

2 Peroneus brevis/longus

Swelling and pain posterior and inferior to the lateral malleolus is usually derived from tenosynovitis with or without tendinopathy of the peroneus brevis or longus. Partial or complete ruptures of either of these tendons can occur. Often the tendon tears are seen to run longitudinally rather than transversely. Cortisone injections, often under ultrasound, can be very useful in the management of these patients. Insertional tendinopathy of peroneus brevis however can be hard to manage.

3 Tibialis anterior

Acute tenosynovitis of the tibialis anterior tendon sheath or the adjacent extensor digitorum longus tendons can occur in individuals who suddenly undertake significant amounts of walking, sometimes with the laces of the shoes too tight. Swelling and crepitus is often present and the condition is usually self limiting but may require a cortisone injection to completely settle.

Insertional tendinopathy of the tibialis anterior tendon will cause swelling and pain proportional to the activity levels of the individual. Treatment can be difficult and the patient can expect symptoms to persist for several weeks or months. Cortisone injections are undertaken but the patient must be warned of the risks of tendon rupture before doing so.

4 Tibialis posterior

The tibialis posterior tendon has an important role in supporting the roof of the medial longitudinal arch. If the patient has flat feet, the tendon can progressively lengthen which causes further flattening of the arch. When looking from behind the patient an increased number of toes (too many toes sign) will be seen laterally, indicative of significant lengthening of the tibialis posterior tendon. Often these individuals are unable to perform a single leg calf raise due to the tibialis posterior tendon deficiency. With significant defunctioning of the tendon, the patient will often undergo significant midfoot joint degenerative change and fusion of a number of joints becomes necessary. However, in early stages of the disease, a tendon transfer to assist the poorly functioning tendon can often delay arthritis in the mid foot.

5 Plantar fascia

Heel pain secondary to plantar fasciitis is a very common condition. There is usually no difficulty in making the diagnosis but in cases where standard treatment is not helping the patient's symptoms, then ultrasound can be useful in staging the severity of the disease process, often combined with an injection of cortisone with or without autologous blood.

Miscellaneous

Deltoid ligament

Pain and swelling around the anterior aspect of the medial malleolus can often be difficult to localise to a particular anatomical structure. Ultrasound is often useful in determining whether pathological changes can be seen in the anterior fibres of the deltoid ligament attaching to the medial malleolus.

Tarsal tunnel syndrome

Patients complaining of periodic pain, often associated with numbness or tingling on the sole of the foot, may be due to compression of the posterior tibial nerve in the tarsal tunnel, similar to carpal tunnel syndrome in the wrist. Ultrasound can

be extremely useful in determining whether some extrinsic pressure on the nerve, such as a ganglion, is responsible for these symptoms. An ultrasound guided cortisone injection of the tarsal tunnel can often alleviate these symptoms prior to consideration of surgical decompression of the nerve.

Ganglions/synovitis

The ankle and subtalar joints are often prone to ganglion formation. Any discreet tender soft tissue swelling, particularly over the anterior aspect of the ankle, is usually due to a ganglion. Alternatively, proliferative synovitis from degenerative joint disease such as the talo-navicular joint can occur and ultrasound is useful to confirm the diagnosis. Ultrasound guided aspiration and injection of cortisone of ganglions is usually the preferred first line treatment in those cases which are causing significant symptoms.

Sinus tarsi syndrome

Sinus tarsi syndrome involves pain arising from the sinus tarsi, which can sometimes be in association with significant osteoarthritis of the subtalar joint. Clinically, local anaesthetic injected into the sinus tarsi which abolishes the patient's symptoms is often useful in making the diagnosis. Plain x-rays with or without the use of MRI or bone scan and CT can assist in this diagnosis.

Summary

A large number of pathological conditions occur around the ankle. A thorough history and examination will usually identify the source of the patient's symptoms. However ultrasound can be extremely useful in staging the severity of the injury (e.g. lateral ligament complex) or condition (Achilles tendinopathy). Ultrasound is also useful where typical treatment does not appear to be working or the patient is presenting with somewhat atypical features and the diagnosis is uncertain. It is often combined with plain x-rays of the region where clinically indicated.

Finally, ultrasound guided cortisone injections of a number of different structures around the ankle is often utilised to ensure the cortisone reaches its target structure.

Bibliography

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