“But it’s only an ankle sprain”

Ankle injuries are the most common injury to the lower limb as a result of sports. Fortunately, most of them are minor and require little specific treatment, however, some are serious and possibly career ending. The purpose of this article is to describe how ankle sprains occur, the various forms of treatment and the usual outcome, as well as covering the more specific severe ankle sprain injuries that can occur.

Ankle sprains usually occur from twisting injuries to the ankle where the foot and ankle roll inwards underneath the leg (inversion injury). This stretches and potentially tears the ligaments on the outer side of the ankle (lateral side), which can then lead to problems with instability of the ankle joint. Less commonly, the ankle can sprain going the other way, where the foot and ankle rotate outwards under the leg (eversion injury). This can potentially be a much more serious injury, especially if it is combined with rotation of the ankle.

A ligament is a fibrous band which connects adjacent bones together in a joint and provides passive stability of that joint. In other words, it does not require muscles to be working for the joint to be stabilised by a ligament. A “sprain” simply means stretching and micro-tearing of ligaments. The ligaments however are overall still in continuity so that there is no complete tear.

Anatomy

The ankle is a complex joint. It is actually composed of 2 separate joints. There is the true ankle joint (figure 1), which is composed of the tibia, fibula and the talus bone. The tibia and fibula form a horseshoe configuration around the talus which moves in an up and down motion within the ankle.

The second part of the ankle joint is what is called the subtalar joint which is under the talus and allows in and out motion of the ankle and rotation.

The important ligaments of the true ankle joint (figure 2) and are composed of the anterior and posterior talo-fibular ligaments and the calcaneo-fibular ligaments. These are ligaments on the outer (lateral) side of the ankle and stabilise the ankle against inversion injury. These are the most commonly injured ligaments around the ankle.

Ligaments act as passive stabilisers to the joint. The joint also has dynamic stabilisers which are the muscles and tendons, which act as secondary stabilisers. In other words, when the ligaments are torn, muscle activity can control the stability of the ankle joint.

Mechanism of Injury

The most frequent type of sprain occurs on weight applied to the foot on an uneven surface, causing the foot to roll in or turn inwards. This can also occur on a flat surface if

the foot lands in an awkward position from a jump or the person is knocked off balance, causing the weight to go abnormally onto the foot, resulting in the ankle inverting. Occasionally people will hear a “snap” or “pop” when the lateral ligaments tear.
As a result of an ankle sprain, usually the person will fall, but may only stumble. They will develop difficulty walking and will in a short period of time develop swelling with or without bruising. This is associated with pain on the outer side of the ankle.

Ankle sprains can be minor and the athlete may be able to continue playing, only to discover later in the day or the following day that there is some swelling on the outer aspect of the ankle. At the other extreme, the ankle injury may be severe and almost feel as though the ankle is broken with immediate onset of swelling, bruising and pain and difficulty weight bearing.

The majority of injuries are minor and more often than not are treated by the individual themselves by rest. Occasionally, the individual may seek medical attention and may even have an x-ray of the ankle performed showing that there are no fractures.

Most minor ankle sprains usually settle down within a couple of weeks and the athlete will return to playing. However, unless certain precautions are taken the ankle is more prone to re-injury which can progressively become worse, resulting in instability of the ankle. This can also be true of more severe ankle sprains which result in complete tearing of the ligaments which without any treatment can lead to giving way episodes or

instability. It can be difficult for the injured person to differentiate between a simple sprain and complete ligament tear.

Diagnosis

An accurate diagnosis can be made by a combination of listening to the exact mechanism of injury, examining the ankle and some special investigations. The athlete's description of the injury will usually provide the diagnosis. It then becomes incumbent upon the medical practitioner to assess the severity of the sprain by examining the ligaments to assess if they are intact or not.

Usually the ligaments are tender over the lateral side of the ankle and this is associated with swelling and bruising. There are some special tests that can be performed to assess the integrity of the ligament (these tests are called the anterior draw and talar tilt tests). These tests can be used to compare against a non-injured side to assess how "loose" the injured ankle is against the normal ankle.

Classification of Ankle Sprains

Ankle sprains can be classified by the severity, into grade 1, 2 or 3.

Grade 1 is usually a mild sprain with a little pain and swelling and maybe some minor joint stiffness. The ligaments have been stretched but are actually intact. Usually, one ligament is more affected than the others (usually the anterior talo-fibular ligament).

There is usually minimal loss of function and the athlete is usually able to return to play within a few days, with appropriate treatment.

Grade 2 are moderate to severe injuries, with more pain, swelling and stiffness. There usually is tearing of the lateral ligaments but the tearing is usually localised to one or two out of the three ligaments. There is some moderate loss of function with difficulty on walking or trying to raise onto tiptoes. These injuries take longer to heal and can take up to 2 to 3 months before the joint is fully stable, although the pain and stiffness can settle quicker than this. It is important that appropriate treatment is undertaken during the healing phase to allow the ligaments to heal without too much laxity so as to prevent further instability episodes.

Grade 3 is a severe injury which can paradoxically present with a severe pain initially followed by little or no pain later due to disruption of not only the ligaments but also the nerve fibres. Swelling is usually profuse and can come on very quickly. Usually all three of the lateral ligaments are ruptured and occasionally the secondary stabilising tendons can also be stretched and partially torn. These tears require rapid accurate diagnosis and treatment to prevent long term functional disability.

X-rays are occasionally needed, particularly if there is tenderness over the bones of the ankle, or the athlete is unable to weight bear. These usually do not show any bony injury but this does not exclude a significant soft tissue injury.

Management of Lateral Ligament Injuries

The vast majority of lateral ligament injuries to the ankle can fortunately be treated conservatively without any operation. This does not however mean that the injury can be ignored, in fact, quite the reverse is true. The treatment must be proactive and specific to allow rapid resolution of swelling, return of motion and strengthening of the ankle to include a gait programme of balance control prior to returning to play. There are many mnemonics that are used for treating soft tissue injuries but the most appropriate one is "PRICEMMM".

Protection with ankle bracing and/or taping to prevent re-injury while the ligament heals.

Rest for the injured ankle until normal heel/toe gait is restored.

Ice on the ankle to decrease swelling and relieve pain.

Compression as soon as possible to decrease swelling.

Elevation – the initial step for reducing swelling.

Medication – anti-inflammatories and/or Paracetamol for pain relief and reduction of swelling.

Mobilisation as early as possible when pain free to expedite return to play.

Modalities – ultrasound, megapulse etc.

The initial stages following injury should involve elevation, compression, ice and rest with some motion exercises. Cold and compression can be applied using ice or frozen peas and an elastic bandage, but icing should not be applied to the skin for more than 20

to 30 minutes as it can burn the skin. This is especially true if gel packs are being used. There are now however proprietary equipment available to provide cold compression such as the Cryocuff or Arctic Flow (figure 3), which is basically an elasticated sac applied around the ankle into which is infused ice cold water which provides cooling and compression. There is good literature to show that these are more effective at pain and swelling control than other forms of cold and compression. These are commercially available and are used by many professional teams and sportsmen. If available, I would strongly recommend the use of these devices.

During the acute phase following injury it is important to avoid hot showers, heat rods and hot packs, which will all increase swelling and therefore pain and will delay healing.

My recommendation is also to acutely, within a day or two of the injury, commence physiotherapy. The physiotherapist can use modalities such as ultrasounds and megapulse to reduce swelling. They can also tape the ankle using felt pads to provide localised compression to reduce swelling over the areas of maximal swelling.

Elevation is important and the ankle must be higher than the waist in order for the elevation to work appropriately.

As the swelling starts to decrease and the pain reduce, more active rehabilitation should commence. The aim at this stage is to increase motion and strength while at the same

time protecting the ligament in a position of normal length with taping or bracing to prevent it from healing in a stretched position, which will predispose the ankle to laxity.

The stretching that is done is to the heel cord (Achilles tendon), as this tendon starts to tighten up after injury. Other tendons that are stretched will include the tendons around the ankle as well as the toe tendons. The exercises will include calf stretching, toe curls (placing a towel on the floor and curling your toes to pick up the towel), marble pick ups (picking up marbles with your toes), resting the heel on the floor and writing the alphabet in the air with your big toe, and using a stationary bike.

Combined with the stretching is a strengthening programme, (initially without resistance) but as pain allows, resistance will be added, using elasticated bands (Therabands) to strengthen all of the muscles and tendons around the ankle at the front, back and on both sides. Pain is the main indicator as to how the strengthening can increase. Strengthening will progress to then include weight bearing resistance exercises as well as general leg conditioning and strengthening.

An important part of the rehabilitation phase is also what is known as proprioception training. This basically means to reconnect the brain and ankle so that the brain is aware of what the ankle is doing in space. These are commonly done as balance exercises, both on a flat surface as well as on a wobble board. The greater the ligament disruption, the more the loss of proprioceptive function to the ankle and the more important it is to retrain this. This is also done with the help of the physiotherapist.

The next phase of rehabilitation is to return to sports specific training and in combat sports it is also important to return to jumping, twisting, turning and cutting training exercises. Prior to returning to this level of activity, the injured ankle should have 80 to 90% of strength compared to the non-injured ankle. This can be approximated or it can be accurately measured using isokinetic (strength testing) machines. The initial functional activities will include running in a pool and swimming. It is prudent to use ankle strapping or braces when returning to weight bearing activity. Orthotics (insoles in shoes) can also be used with wedges under the heel to help stabilise the ankle. High top sports boots will also help stabilise the ankle.

There are numerous types of braces available on the market and the strap up shoe lace type braces are just as good as many of the other more bulky plastic braces. In combat and kicking sports the use of plastic type braces is not usually allowed and therefore ankle taping and simple neoprene braces, at the time of return to competition, is all that can be used.

Historically, many ankle injuries were treated by a period of prolonged immobilisation using below knee plaster of paris casts. Unfortunately there are still a number of doctors and surgeons who advocate the use of casts for ankle ligament injuries. There is a plethora of good scientific literature to show that there is a much quicker return to function and a much better outcome in a group of patients who are treated actively with physiotherapy modalities, mobilisation and treatment as outlined above compared to

those who are immobilised in a plaster cast. The days of using plaster casts for lateral ankle ligament injuries is hopefully passing.

Surgery for Lateral Ligament Injuries

There is very little place for acute surgery following lateral ligament injuries, as the vast majority of people with sprained ankles of whatever severity, can return to training and competition with a properly designed and executed rehabilitation programme as outlined above. Certainly in grade 1 and 2 lateral ligament injuries there is no place for acute surgery.

However, there is some literature to suggest that in high level elite athletes with grade 3 type injuries or certain grade 2 injuries, with their examination revealing laxity of their lateral ankle ligaments, that there is a place for acute surgery. Diagnosis should be confirmed with special radiographic tests which may include an MRI scan or stress x-rays of the joint.

If an acute surgical procedure is undertaken it usually involves simple repair of the torn ligament with some degree of reinforcement to the ligament. There is some literature that has shown that in elite athletes, comparing a rehabilitation programme versus acute repair in high grade injuries, they tend to do better short term from the acute repair. However, the mainstay of treatment amongst most Orthopaedic Surgeons would still be along the lines of conservative treatment.

The major down side to surgery is ankle stiffness and loss of motion, which can in itself be catastrophic in sports, which require full and normal joint motion. A stiff ankle can put paid to a sporting career at a high level, and therefore is not undertaken without consultation and discussion between the surgeon and athlete. All options should be considered prior to proceeding along the surgical route with acute injuries. There are other potential surgical risks including nerve damage.

Chronic Lateral Ligament Injury

If acute ligament injuries are not treated appropriately, it can lead to ligaments healing in an elongated position, which in itself can then lead to instability of the ankle. The player tends to complain of going over on their ankle with minimal provocation. The athlete can feel very unsure of their ankle and may not feel that they are competing at 100%. Neglected lateral ligament ruptures, especially grade 3, can commonly lead to recurrent giving way episodes of the ankle.

Recurrent giving way of the ankle is not always purely related to laxity of the ligaments. Occasionally there can be additional causes within the ankle joint, which if treated on their own may be enough to allow the athlete to stabilise their ankle with their secondary muscular restraining structures. These secondary problems within the joint can include loose pieces of cartilage, damage to the lining surface of the joint and scar tissue formation within the ankle joint (called a meniscoid lesion), which can accompany

chronic lateral ligament injuries and can occasionally also occur following ankle fractures.

Certainly, if an athlete gets to the stage where the ankle is continually giving way on them it is important to seek the opinion and advice of an appropriately trained Orthopaedic Surgeon as recurrent giving way episodes will lead to further damage to the joint lining surface (articular cartilage), which in itself can also lead to further problems including arthritis.

At that stage, the Orthopaedic Surgeon would examine the ankle and ligaments specifically. Further imaging including x-rays and MRI scans would be requested. The ankle may require an examination under anaesthetic at which point an ankle arthroscopy (keyhole surgery of the ankle) would also be performed to assess the joint surface, any loose bodies or any scar tissue within the ankle, which would be removed. If the ankle was found to be significantly unstable, then a surgical reconstruction (not a repair as outlined above) would be undertaken. A reconstruction procedure uses one of the tendons on the outer side of the ankle which is sacrificed and then re-routed around the ankle to provide the new lateral ligaments. These are not uncommon procedures and will allow an athlete to return to sport including full competition after an appropriate period of rehabilitation.

It is very important to understand the difference between the acute situation following the initial injury to the lateral ligaments of the ankle and the chronic situation which occurs

after the ankle lateral ligament injury has been neglected and the ligaments have either healed in an elongated position or have not healed. The treatment for these two situations is different. Even in the chronic situation, it would be important to try a structured and specific rehabilitation programme prior to surgical reconstruction.

Other Ligament Injuries around the Ankle

Syndesmosis injury (high ankle sprain)

The Syndesmosis is the thick ligaments that connect the tibia and the fibula above the ankle joint. These ligaments can be torn by uncommon ankle injuries which involve the ankle being usually hyper dorsi-flexed (foot forced upwards with the toes towards the head) combined with a rotational force of the ankle.

These are uncommon injuries and range from 1% to 11% of all ankle sprains, with the higher rate of injury occurring in contact sports. This injury is usually associated with little swelling. The athlete commonly is tender over the front of the ankle between the tibia and fibula. The syndesmosis sprains can vary in severity from minor to major due to various criteria. High grade syndesmotic sprains are a serious injury and result in delayed healing and delayed return to sport and a grade 3 syndesmotic sprain can put an athlete out of play for up to a season.

The treatment initially involves non weight bearing and may involve a period of immobilisation in a cast or boot. Occasionally, if there is instability of the ankle, syndesmosis surgery may be required to stabilise the syndesmosis. The diagnosis in

these injuries is usually delayed as they are commonly perceived to be simple ankle injuries but the athlete continues to complain of pain and has difficulty undertaking their sport and training and eventually seeks the opinion of an Orthopaedic Surgeon. Unless a high index of suspicion is maintained, it is commonly missed by doctors and Orthopaedic Surgeons as well. In the high grade sprains it can certainly be a career ending injury unless appropriately managed and carefully followed up. A diagnosis is usually made with special examination tests and further imaging modalities.

Medial (inner) Ankle Ligament Sprains

The inner ligament of the ankle is called the deltoid ligament. This ligament injury is commonly seen in wrestlers. Overall the injury is much less common than lateral ligament injuries, being seen in about 10% of people with ankle injuries compared to about 85% involving lateral ligament injuries. Medial ligament injuries can and frequently are associated with more severe ankle injuries involving fractures but simple deltoid ligament sprains can be treated conservatively like lateral ligament injuries.

Other Injuries

Lateral ligament injuries of the ankle are usually characteristic in their presentation and can be easily diagnosed.

However, there are occasionally other injuries which are mis-diagnosed as lateral ligament injuries. These include ruptures of the Achilles tendon as well as injuries to

the inner and outer tendons of the ankle. These all have different methods of treatment and need to be diagnosed early.

Summary

Ankle ligament injuries are common in sport, especially contact sports. More often than not, athletes will neglect them or they will be treated inappropriately. Because most of these injuries are relatively "minor", it does not inhibit the athletes from returning to their sport. However, my advice on ankle ligament injuries is to seek appropriate treatment from a sports trained physician or a physiotherapist. The outcome of lateral ligament injuries is much better with early aggressive rehabilitation, as outlined previously. Unusual combination of injuries to the ankle can be picked up by an appropriate trained examiner and treatment instituted to allow the athlete to return to their sport early and safely. Advice from a physiotherapist or a sports surgeon will also include returning to sport in a manner to prevent re-injury, which is certainly not uncommon with lateral ligament injuries around the ankle.

If the injury is picked up early and managed appropriately it should reduce the functional problems to the athlete and allow them to return safely and quickly back to their sport.

So, "I have only sprained my ankle" can have a wide meaning and although most ankle sprains are "simple", it is important that the complex ones are not missed so as not to prejudice the athlete's return to their activities.

In my series of articles I aim to cover various injuries, both common and uncommon and other issues relating to contact sports. I hope the articles are interesting and informative, and although I cannot give specific advice to individuals, I am happy to provide some general guidelines either from myself or my colleagues at the Manchester Sports Medicine Clinic, regarding any queries that any readers may have related to injury. These can be emailed to kneedoc@fastmail.fm. Alternatively, visit my website www.sportsmedclinic.com. If readers would like to make appointments for consultations these can be made through the kneedoc@fastmail.fm.

Mr Sanjiv Jari
Consultant Trauma, Lower Limb, Orthopaedic & Sports Medicine Surgeon
Honorary Clinical Lecturer, University of Manchester