POSTERIOR CAPSULITIS OF THE ANKLE JOINT: A COMMON COMPLICATION OF SPRAIN OF THE ANKLE

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ABSTRACT

This paper describes the diagnosis, possible pathology, mechanism of injury, and treatment of a group of conditions complicating the common sprained ankle. A new test is detailed which is pathognomonic for this group of conditions which is lumped under the general concept of 'posterior capsulitis of the ankle'. Once the condition is recognised, it may, in the majority of instances, be successfully treated by physical therapy.

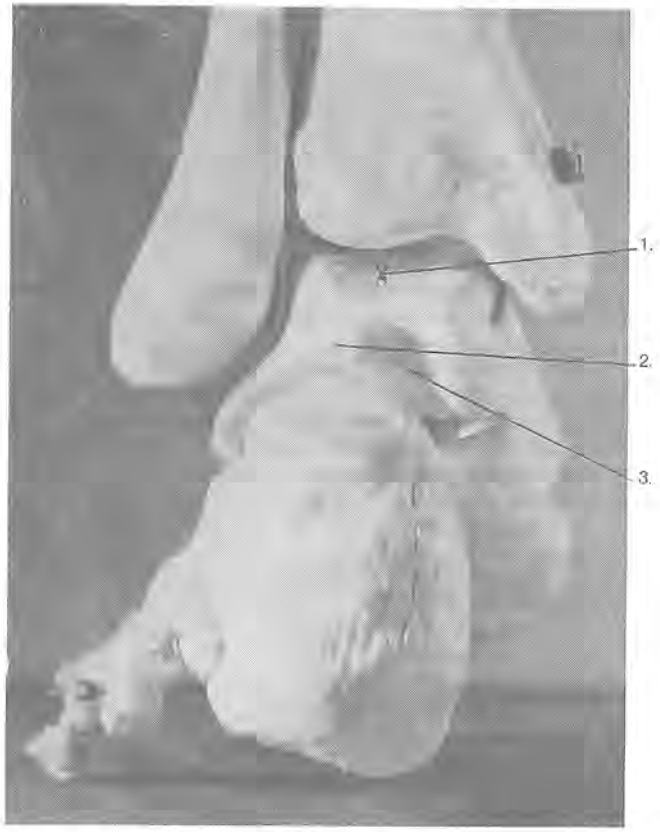
One of the most common injuries of the lower limb is an injury to the lateral ligament of the ankle. Most will recover within two or three weeks, but some will go on to be persistent and chronic. Some minor ankle strains become persistently disabling, while many severe sprains recover more quickly than the lucky patient can reasonably expect. In my experience, the most common complication of the simple sprain or strain of the lateral ligament of the ankle, is what I have chosen to call posterior capsulitis of the ankle. Once this condition is understood, it is possible in the majority of cases to treat it effectively. If it is ignored or missed, many patients can go on suffering needlessly for months or years.

Relevant anatomy of the ankle joint (Fig. 1)

The ankle joint is a ginglymus formed by the convex surface of the talus and the concave surface provided by the mortise made by the lower ends of the tibia and fibula. The capsule of the ankle joint attaches to the edge of the articular surfaces of the talus, tibia and fibula. It is relatively lax anteriorly and posteriorly to permit some 70 degrees of movement in the sagittal plane[1]. Laterally and medially the capsule is strengthened by the lateral and medial collateral ligaments. The medial (deltoid) collateral ligament is fan shaped and is able to resist eversion stresses throughout the range of movement within the sagittal plane. Eversion is also resisted by the action of tibialis posterior which acts as a strap to the medial aspect of the ankle as it passes under the medial malleolus. The lateral collateral ligament consists of three parts each of which has one common attachment to the lateral malleolus. The anterior fasciculus (or the anterior talo-fibular ligament), has its distal attachment to the talus anteriorly, just below the attachment of the capsular ligament. The middle fasciculus (or calcaneo-fibular ligament), has its distal attachment to the calcaneus below the level of the talo-calcaneal joint. The posterior fasciculus (or posterior talofibular ligament), runs almost horizontally to its distal attachment to the posterior tubercle of the talus, and is divided into short anterior fibres, and longer posterior fibres. The peroneus brevis and longus tendons and extensor digitorum longus tendons strap the lateral aspect of the ankle and act to resist inversion stresses.

Figure 1

POSTERIOR VIEW OF ANKLE



1. Position of posterior capsule of ankle joint.
2. Posterior tubercle of Talus.
3. Groove for tendon of Flexor hallucis longus.

The posterior aspect of the ankle is bound superiorly by the posterior aspects of the tibia and fibula and the interosseus ligament that binds them together. It is bound inferiorly by the posterior aspect of the talus which has a large groove for the flexor hallucis longus tendon. The groove runs downwards and medially and is bound laterally by a large tubercle. Sometimes this tubercle is separated from the talus and is then called the os trigonum.

THE MECHANISM OF INJURY

It would appear that the majority of lateral ankle sprains are inversion injuries, usually with some degree of internal rotation. The position of the foot, and the direction of the injury force will determine which part of the lateral ligament complex will be affected. Several experimental studies have shown which ligaments resist the various movements, and which ligaments will rupture if the movements are forced. Dias[3] states that the calcaneofibular ligament is tight in dorsiflexion and more relaxed in plantarflexion. There is agreement between Rasmussen et al[4] and Dias that the anterior fasciculus tends to rupture first if an inversion or internal rotation injury is applied to the plantarflexed foot. Also, the calcaneofibular ligament tends to rupture first if the foot is in dorsiflexion when the inversion or internal rotation force is applied. The posterior fasciculus can rupture, usually as a secondary consequence, whether the inversion/internal rotation injury is applied in dorsiflexion or plantarflexion. In either situation it appeared that the short, deeper fibres of the posterior fasciculus were most vulnerable.[4]

SUGGESTED PATHOLOGY OF POSTERIOR CAPSULITIS

Adhesive capsulitis or "Frozen ankle syndrome" is mentioned in a number of articles,[5,6] but with the exception of Cyriax[2] little attention has been drawn to pathological conditions of the tissues closely relating to the posterior aspect of the ankle. Cyriax describes two conditions which would behave in a similar fashion as the condition described here. A periostitis of the lower posterior part of the tibia is said to occur in ballet dancers from too much work "sur les pointes". This "dancer's heel" apparently arises from impingement of the calcaneus on the tibia, which is made possible from the hypermobility towards plantarflexion common amongst dancers. Cyriax also

describes a similar condition in soccer players which is caused by sudden forceful plantarflexion while kicking a ball.

I have not encountered in the literature, an account of a chronic inflammatory state of the posterior ankle capsule, nor damage to the flexor hallucis longus tendon as it passes behind the ankle joint and talus. I believe that there are five structures at the posterior aspect of the ankle, which could give rise to the syndrome which I have called the "posterior capsulitis".

1. Inflamation of the posterior capsule of the ankle joint.
2. Tendonitis of the flexor hallucis longus tendon at the point where it traverses the posterior part of the ankle joint.
3. Periostitis of the lower posterior part of the tibia. (Dancers' heel.)
4. Strain or sprain of the posterior fasciculus of the lateral collateral ligament. Most likely the anterior and deeper fibres are affected.
5. Fracture of the tubercle of the talus, or of the cartilaginous attachment of an os trigonum. (If one exists.)

Flexor hallucis tendonitis can be isolated by resisted testing, and fracture of the tubercle could be identified as a separate entity with radiography, but the other conditions can not be separated easily through any clinical means of which I am aware.

THE SIGNS AND SYMPTOMS OF POSTERIOR CAPSULITIS OF THE ANKLE

The signs and symptoms of this condition are usually evident from the day of injury, but are frequently confused and compounded by the presence of acute effusion, and haematoma which results from a sprain of the lateral ligament. This does not matter too much since the acute symptoms will rapidly settle using the usual physiotherapeutic approaches. (Rest, Ice, Compression, Elevation in the first 48 hours, progressive active stretching with frictional massage and joint mobilisation as necessary, proprioceptive training, plus or minus ultrasound, etc, after the first two days). It is when the acute symptoms are subsiding and the patient starts to complain of pain felt posteriorly rather than in the more usual position antero-laterally, that one starts to suspect a disturbance at the posterior part of the ankle. The classical posterior capsulitis has these essential characteristics:

1. Pain felt posteriorly, deeply to the Achilles tendon at the level of the ankle joint.
2. A positive 'Heel Thrust Test'. This is described below.
3. A loss of some degree of plantarflexion. Sometimes this may only be an aberration of 'end feel'.

Other features which are often present are:

1. Pain on strong resistance to plantarflexion, especially of the big toe. Hopping on the injured foot may be the only way to apply sufficient resistance to plantarflexion to elicit the pain but can be so painful as to make hopping impossible. It is tempting to accuse the Achilles tendon, but the "Heel Thrust Test" is negative and there is no loss of plantar-flexion in Achilles tendon strain.
2. Walking down steep slopes reproduces the posterior ankle pain. If the patient catches the heel of the shoe on a step, the pain produced is often sharp and momentarily immobilising.

Depending on the severity and length of time since the injury, other signs such as swelling, bruising, pain on inversion or eversion etc, will accompany these signs and symptoms.

THE HEEL THRUST TEST

This test is simple, sensitive and reliable in reproducing the pian caused by posterior capsulitis of the ankle. It consists of applying a sharp plantarflexion movement to the end of range by pushing against the plantar surface of the heel. (Fig. 2.) The talus is forced to rotate about a horizontal axis and the posterior tubercle (or os trigonum if present), is bumped against the posterior aspect of the lower end of the tibia, pinching the posterior capsule in the process. The test is positive ONLY if the pain is felt posteriorly. If anterior pain is felt, it is caused by stretching of the anterior capsule and/or the anterior fasciculus and is not referred from posterior structures. When performing the test, try one or two very gentle exploratory thrusts to begin with! It is a test of sensitive structure, and posterior capsulitis can be very painful.

Figure 2

THE HEEL THRUST TEST

The arrow indicates the direction of thrust.

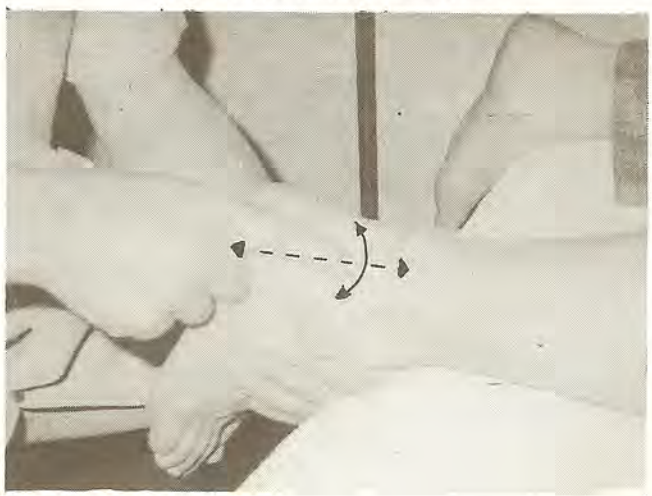
TREATMENT OF POSTERIOR CAPSULITIS OF THE ANKLE

It is not possible to prevent this complication even if the best of care is initiated from the time of injury. However, I am convinced that early physiotherapy as mentioned above will minimise the possibility of all complications to lateral ligament injury. The posterior capsule of the ankle is hard to reach with physiotherapeutic modalities such as ultrasound, frictional massage, etc, because of the presence of the overlying Achilles tendon, and the depth of the structures affected. A high failure rate is inevitable unless other methods are used. In addition to the usual approach to rehabilitation of lateral ligament sprains, the techniques employed for posterior capsulitis are:

1. Transverse frictional massage to the posterior fasciculus of the lateral ligament, and/or to the flexor hallucis longus tendon. (Fig. 3). The movement must be transverse to the direction of the collagen fibres, and there must be no movement between the skin and the therapist's finger. Cyriax[2] and Chamberlain[7] describe the rationale and method of transverse frictional massage.

Figure 3

TRANSVERSE FRICTION MASSAGE



(a) For posterior fasciculus of lateral ligament, in direction of interrupted arrow.
(b) For flexor hallucis longus tendon, in direction of solid arrow.

Figure 4

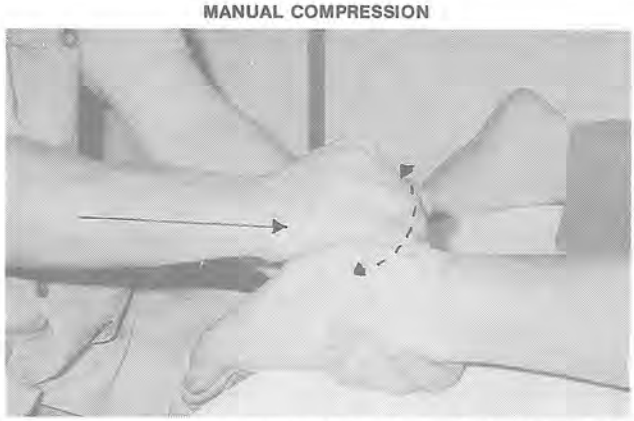
MANUAL TRACTION

Manual traction is applied in the direction indicated by the arrow. To achieve adequate separation of the talus from the tibiofibular mortice, place the foot and ankle in a moderate degree of plantarflexion and inversion. Maintain the traction for 5-10 seconds then release for 2-3 seconds. This cycle to be repeated 10 times as a set, and two or three sets in a treatment session. It is possible to produce a similar effect with the appropriate intermittent traction machine.

2. Traction. To stretch the ankle joint capsule. (Fig. 4.)
3. Compression in plantarflexion. The patient is prone and the ankle is close to full plantarflexion. (Fig. 5.) Small pressures into the painful range are applied for up to five minutes. With a very irritable joint, 30 seconds of such treatment may be all that it can tolerate. It is important to inflict some pain, but too much pressure will only aggravate for longer periods.
4. Self compression by the patient, to remodel the thickened and scarred posterior capsule. (Fig. 6.) It is useless to tell a patient to exercise once a day. The patient has to perform 5-10 compressions five or six times each day to stimulate improvement. Again, attention to irritability is important, as for compression in plantarflexion.

Figure 5

MANUAL COMPRESSION



Pressure is applied in the direction of the solid arrow and sustained, while movement is imparted at right angles as indicated by the interrupted arrow. It is important to reproduce the posterior pain, carefully but firmly.

Figure 6

PLANTARFLEXION STRETCH AND SELF COMPRESSION EXERCISE

The patient kneels on the floor and sits down on his heels so as to gently force planterflexion and compression of the posterior capsule of the ankle joint. This is done cautiously at first, since it may be very painful initially. The exercise consists of applying pressure in the direction indicated by the arrow, five or six times per session, at least five times a day. It is important that the pressure is released completely with each movement.

5. When conservative measures fail, the area should be infiltrated with a steroid suspension. One or two injections usually suffice even in chronic cases.

CONCLUSIONS

Further work on the pathologies that affect the tissues at the posterior part of the ankle needs to be carried out to determine if the clinical syndrome of posterior capsulitis is a reality. The pathologies suggested here can only be hypothetical at best, but the clinician must have in mind some view as to the probable cause of pain. In any event, the "Heel Thrust Test" is a reliable indicator to the presence of the condition possessing the mentioned characteristics, and the treatment method described is effective in the large majority of cases. Medical practitioners and physiotherapists should test for this syndrome as a normal part of their assessment of ankle injuries.

References

1. Hoppenfeld S. Physical examination of the spine and extremities. New York: Appleton-Century-Crofts, 1975.
2. Cyriax J. Textbook of Orthopaedic Medicine. Vol 1, 6th ed. London: Balliere Tindall, 1975.
3. Dias LS. The lateral ankle sprain. An experimental study. *J Trauma* 1979; 19: 266-269.
4. Rasmussen O, Kromann-Andersen C. Experimental ankle injuries. Analysis of the traumatology of the ankle ligaments. *Acta orthop Scand (Danmark)* June 1983; 54 (3): 356-62.
5. van Moppes FI, van den Hoogenband CR and Greep JM. Adhesive capsulitis of the ankle (frozen ankle). *Arch Orthop Trauma Surg* Sept 1979; 94 (4): 313-5.
6. Goldman AB, Katz MC and Freidberger RH. Posttraumatic adhesive capsulitis of the ankle; arthrographic diagnosis. *Am J Roentgenol* Oct 1976; 127 (4): 585-8.
7. Chamberlain Gail. J. Cyriax's friction massage: a review. *JOSPT* Summer 1982; vol 4; no 1.