APPROACH TO AND MANAGEMENT OF ACUTE ANKLE LIGAMENTOUS INJURIES

Ankle ligament injuries are one of the most common injuries encountered in any general practice.

CHRISTA JANSE VAN RENSBURG

MB ChB, MSc (Sports Medicine), MMed Physical Medicine (Rheumatology)

Head

Section of Sports Medicine

University of Pretoria

Christa Janse van Rensburg is based at the Section of Sports Medicine, University of Pretoria. Her rheumatology practice is at Eugene Marais Hospital, Pretoria. She is an active member of the South African Sports Medicine Association, the South African Osteoporosis Society, and the South African Rheumatology and Arthritis Association. She accompanied the South African team to the Commonwealth and All Africa Games as a Medical Officer in 2002 and 2003 respectively.

Ankle ligament injuries are one of the most common injuries encountered in any general practice.[1-3] According to one estimation there is one inversion injury per 10 000 people per day.[4] The ligament injuries are mostly caused by an inversion stress.[1,5] The anterior talofibular ligament (ATFL), being the first to get injured, progresses posteriorly through the lateral capsule and the calcaneofibular ligament (CFL).[1,3,5] If not managed correctly, long-term sequelae, such as chronic instability and premature arthritis of the ankle joint, can result.[4,6] Treatment protocols range from cast immobilisation to functional rehabilitation to acute surgical repair.

ANATOMICAL CONSIDERATIONS

Ankle joint

This joint consists of the articular surfaces of the tibia, fibula and talus.[7] There are three articulations, i.e. tibiotalar, fibulotalar and tibiofibular.[8] The joint acts as a hinge, with movement primarily in the sagittal plane (dorsiflexion and plantarflexion), although limited frontal plane motion (inversion and eversion) is possible.

Ligaments

There are 3 groups of ligaments surrounding the ankle joint, the more commonly affected lateral complex consisting of the ATFL, CFL and posterior talofibular ligament (PTFL) (Fig.1). The medial (deltoid) ligament is divided into a superficial and deep part and is less likely to be injured[6,7] (Fig. 2). The syndesmotic ligaments connect the tibia and fibula and prevent rotational and axial forces from separating these bones.[7]

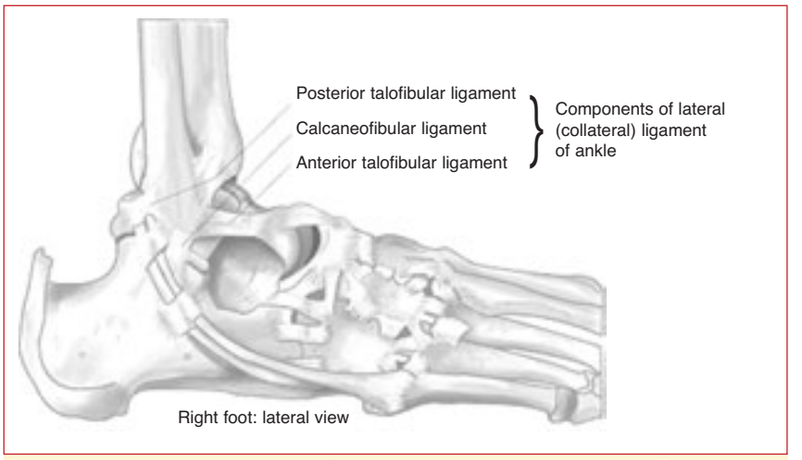

Fig.1.Lateral ligment complex. (Adapted from Netter FH. Atlas of Human Anatomy. *2nd ed. East Hanover, NJ: Hoechstetter, 1999: 491.)*

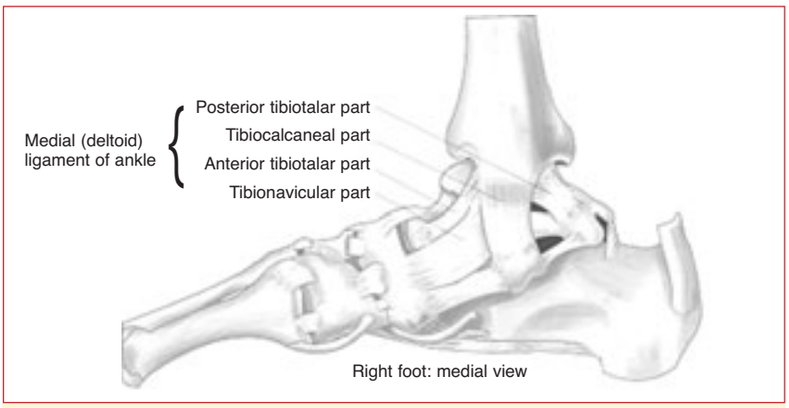

Fig.2. Medial ligament complex. (Adapted from Netter FH. Atlas of Human Anatomy. *2nd ed. East Hanover, NJ: Hoechstetter, 1999: 491.)*

Soft tissue structures

Approximately 5 nerves, 5 veins, 2 major arteries and 13 tendons cross the ankle joint. Injuries to or chronic problems with regard to any of these structures (e.g. tendon dislocation, nerve entrapment) can create pain around the ankle.[6,7]

MECHANISM OF INJURY

The classic mechanism of ligament injury to the ankle is forced adduction, supination and internal rotation of the foot. The ATFL, being the weakest, is the first to rupture. The CFL is ruptured in approximately 60% of cases and the PTFL in less than 5% of cases.[1,2] In a series of ankle arthroscopies in 30 patients, fresh injury to the cartilage was seen in two-thirds of cases.[2]

EVALUATION OF THE INJURED ANKLE

Only after performing a thorough history and physical examination can the clinician make a differential diagnosis (Table I).[1] One can then proceed with imaging in order to make a final diagnosis and start a treatment plan.

History

Determine the following:

- mechanism of injury
- position of the ankle during injury
- weight-bearing status after injury
- prior injury to the ankle.

Patients mostly recall the injury as a 'twisting' of the ankle with an audible 'snap' or 'pop'.[2,6]

Table I. **Differential diagnosis of acute ankle injury**

ATFL sprain
CFL sprain
Syndesmosis sprain
Anterior process calcaneus fracture
Lateral process talus fracture
Fifth metatarsal base fracture
Subtalar injury
Peroneal tendon injury
Osteochondral injury of the talus
Peroneal nerve injury
Sural nerve injury
Calcaneocuboid injury

Inspection

If possible, observe the patient while s/he is standing and walking. One must inspect for swelling, ecchymosis, cyanosis, pallor, or breaks in the skin (Fig. 3). Remember the role of gravity — one can be misled into thinking that uninjured soft tissues are injured.[1,2,4,5]

Fig. 3. Swelling and ecchymosis after ankle ligament injury.

Palpation

Note temperature and tautness of skin, and pain with direct palpation, active movement and passive stretching. Also check for palpable defects in tendons and ligaments, as well as tenderness of bones proximal and distal to the ankle joint (i.e. proximal fibula, base fifth metatarsal). Muscle strength and neurovascular status should also be evaluated.[1,2,4-6]

Specific tests

Squeeze test (Fig. 4)

Use the squeeze test to assess the syndesmotic ligaments. The examiner places one hand 15 - 20 cm below the knee on the midshaft of the lower leg. The tibia and fibula are then squeezed together. The test is positive if pain is localised in the antero-lateral region of the ankle or the distal fibula.[6]

Fig. 4. Squeeze test.

Anterior drawer test (Fig. 5)

This test assesses the ATFL after an inversion-type injury. With the knee in flexion and the foot in a neutral position the one hand stabilises the lower leg and pushes it posteriorly, while the other hand grasps the heel and displaces it anteriorly. Opinion varies on how much displacement is abnormal, but anterior subluxation of the talus in the mortise is clinically indicative of an ATFL sprain.[1,4-6]

Talar tilt test (Fig. 6)

This test is used to assess the integrity of the CFL. The lower leg is stabilised with one hand while the other hand

Fig. 5. Anterior drawer test.

grabs the heel, places it in neutral position and then inverts and everts the foot. The test is positive if comparison of the medial and lateral aspects demonstrates a difference of greater than 25%.[4,6]

Van Dijk *et al.*[9] found better specificity (84%) and sensitivity (96%) of the drawer test and talar tilt test if examination was delayed for 4 - 7 days, compared with examination within 48 hours (specificity 33%, sensitivity 71%).[9]

SPECIAL INVESTIGATIONS

Modes of imaging that can be used include X-rays, ultrasound and magnetic resonance imaging (MRI).

Fig. 6. Talar tilt test.

The Ottawa Ankle Rules (OAR)[4] have been developed and verified as a predictor of patients with a sprained ankle who should have an X-ray examination:

- tenderness at the posterior edge or tip of the medial or lateral malleolus
- inability to bear weight (4 steps) either immediately after the injury or in the emergency room, or
- pain at the base of the fifth metatarsal.

If radiographs are necessary, these should include anteroposterior (AP), lateral and mortise views.[4,10] Stress radiographs are generally not indicated for acute ankle sprains because findings will not change the treatment protocol.[1,4] However, they are of value in the assessment of chronic instability. The most commonly used criteria for abnormal laxity are those described by Karlsson:[11] anterior displacement of ≥ 10 mm, or a side-to-side difference of > 3 mm, and for the tilt test 10° greater than the uninjured ankle (Fig. 7).

Fig. 7. Positive talar tilt on stress radiograph.

Ultrasound can easily show the main ankle ligaments and can also assist in the assessment of most tendon disorders. The one disadvantage of this otherwise very helpful investigation is that the interpretation is operator dependent.[12]

MRI is very expensive, but can be of great value in evaluating osteochondral lesions and tendon disorders.[1,13] It has limited value in evaluation of ligamentous disorders as it cannot determine ligamentous laxity.

GRADING OF LATERAL LIGAMENT SPRAINS[4,5]

The degree of instability is graded in order to design a treatment protocol. Grading, however, remains a largely subjective interpretation.

Grade I injuries involve no macroscopic tearing, with little swelling or tenderness and minimal functional loss. No mechanical joint instability is noted.

A grade II injury is a partial macroscopic tear with moderate pain and swelling and tenderness over the involved structures. There is mild to moderate joint instability.

A grade III injury is a complete tear with marked swelling and tenderness. There is loss of function and marked joint instability.

MANAGEMENT

The aims of treatment for all three grades are to restore range of motion (ROM), to strengthen muscles and to regain proprioception.[5] The functional treatment protocol is based on the biological healing process. Initial treatment is directed towards avoiding excess swelling and injury. From weeks 1 - 3 there is vascular ingrowth, new collagen formation and fibroblast proliferation. In this phase there needs to be protection from inversion to prevent excess formation of the weaker type III collagen.

Approximately 3 weeks after injury collagen starts to mature. One now needs to put controlled stress on the ligament to promote proper collagen formation. With healing, the collagen matrix matures and full return to activities will be possible between 4 and 8 weeks after injury.[4,14]

Initial management[3,5]

Grades I and II

Initial management for grades I and II comprises:

- rest, ice, compression and elevation (RICE)
- short period of immobilisation and protection
- early range of movement exercises followed by neuromuscular ankle

training (including plantarflexion, dorsiflexion, inversion and eversion)
- proprioceptive training — usually commenced after 3 - 4 weeks (e.g. balancing on one leg, tilt board).

Return to sport is only permitted when functional exercises (jumping, twisting) can be performed without pain.

Protective taping or bracing should be used for 6 - 12 months after injury.[4,14]

Grade III

A number of prospective, randomised trials since the mid-1980s have not shown any significant differences in outcome after operative v. non-operative treatment for acute rupture of the lateral ligament complex.[1-5,15]

Some authors, like Clanton and Porter[3] and Zwipp *et al.*,[2] have some preferences on indications for surgery:
- rupture of the medial and lateral ligaments
- talar tilt of more than 30°
- osteochondral fracture of the talus
- massive haematoma requiring immediate decompression
- widening of the ankle mortise.

Altogether these indications characterise 1 - 5% of cases.

In professional athletes there is a trend towards surgical repair (Fig. 8), although there is no clear evidence of better outcome. However, there is consensus that any form of treatment should be supplemented with early mobilisation in an ankle orthosis.

THE DIFFICULT ANKLE

Sequelae after ankle ligament injuries are very common. In 10 - 30% of patients chronic symptoms may develop. These symptoms include pain, persistent synovitis, ankle stiffness, swelling, muscle weakness and giving way.

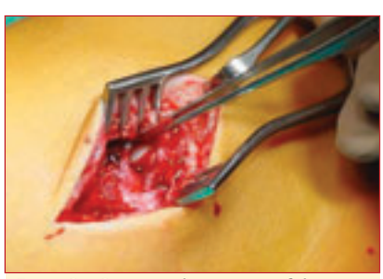

Fig. 8. Surgical repair of ligament tear.

Table II. **Differential diagnosis for the difficult ankle**

Fractures	Calcaneus anterior process
	Talus
	Lateral process
	Posterior process
	Osteochondral lesions
	Tibial plafond lesions
	Base fifth metatarsal
Impingements	Anterior
	Posterior
	Anterior lateral
Tendon injuries	Peroneal tendon
	Dislocation
	Subluxation
	Weakness
	Tibialis posterior
	Dislocation
	Rupture
Sprains	Medial ligament
	Syndesmosis
	Subtalar
Other	Sinus tarsi syndrome
	Complex regional pain syndrome

The key to successful management is accurate diagnosis. Therefore other problems that can mimic lateral ankle ligament injuries must be considered[1,3,16] (Table II).

If all of the above are excluded and only chronic instability remains as the diagnosis, a well-controlled physiotherapy programme with peroneal strengthening and proprioceptive training (with or without bracing and/or taping) can be helpful.[1,5] In patients refractory to this treatment surgery is offered. The subtalar ligaments must also be taken into consideration.

Return to sport activity is allowed 3 months postoperatively. An ankle brace may be needed for a further 6 - 8 months after surgery. The results of delayed surgery are very good.[1,5,14]

I would like to thank Brenda Weder for typing the manuscript and Maureen Brassel for her help with the literature survey.

Rerences available on request.

IN A NUTSHELL

Acute sprains of the lateral ligament complex of the ankle are common injuries.

Functional treatment has been shown to be the treatment of choice.

The results of functional treatment are favourable.

Acute surgical repair has no benefits over functional treatment, either in terms of repeat injury or on return to activity.

Athletes who develop chronic problems can be managed with strengthening and proprioceptive training in conjunction with taping or bracing.

Athletes who fail to respond to functional treatment can undergo delayed anatomical repair, with good results.