

The assessment and management of lateral ankle ligament injuries

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Abstract

The assessment and management, as well as the clinical examination, special investigations and treatment of sports-related lateral ankle ligament injuries, are summarised for the general practitioner. Practical advice is discussed, when identifying and diagnosing chronic ankle injuries, and subsequent referral for specialist involvement.

Introduction

Sports-related ankle sprains and fractures are common injuries that affect athletes of all ages in various sporting activities.^{1,2} The highest incidence rate of ankle injuries is seen in court games and in team sports. However, all sport activities are included.² The majority of ankle injuries involve jumping, turning, changing direction or exerting force in a specific direction.³ A report on intrinsic and extrinsic risk factors for ankle injuries in athletes concluded that recurring previous ankle injuries are a consistent attribute of exposure.^{2,4} Thus, a thorough account of the mechanism of injury and history of previous injuries should guide the physician in his or her examination and when planning appropriate investigations.⁵

The mechanism of injury is typical of a stepping and twisting movement, with inversion and plantar flexion.¹ An injury to the lateral ankle ligament complex may involve the anterior talofibular ligament (ATFL), the calcaneofibular ligament (CFL), and/or the posterior talofibular ligament (PTFL).^{6,7} As a result of twisting, injuries to the medial ankle ligament complex that involve the deltoid ligaments may also occur, and relate to accompanying syndesmosis injuries, as well as ankle fractures and osteochondral lesions. Potentially, these ankle sprains may also injure the fibularis tendons, the joint capsule, the retinaculum and other structures that surround the ankle.⁶

A study that evaluated the presence of residual symptoms secondary to sport reported on a considerable number of patients who still had symptoms 1.5-4 years after the initial ankle inversion injury.⁸ Therefore, it is imperative that the correct diagnosis is made and adequate therapy of the acute ankle injury implemented.

The aim of this article was to summarise the assessment and management, as well as clinical examination, special investigations and treatment, of sports-related lateral ankle ligament injuries for the general practitioner. The identification of chronic ankle injuries and mandatory specialist referral is also covered.

Clinical consultation

History

History of current injury

The mechanism of injury needs to be explored in detail to assist in understanding the possible injured anatomical structures.³ However, the severity of the injury can be difficult to determine based on history alone. A clear understanding of the athlete's sport demands is important,⁵ as well as an enquiry into what was experienced by the patient and any audible sounds that may have been heard at the time of injury; for example a click, pop, crunch or cracking noise.⁵ Running on an uneven terrain, stepping in a hole or landing from a jump in an unbalanced position are common mechanisms that lead to ankle injury.² For example, a jump and landing on another person's foot with inversion and plantar flexion is likely to cause a more severe injury than merely walking and rolling over one's ankle.^{1,3}

History of a previous injury

A history of previous injuries is important in determining any pre-existing defects or possible chronic ankle injury.^{1,3} Previous sustained injuries must be noted, as well as the treatment and rehabilitation plan that were followed at the time. Any history of bone density or related ligament integrity abnormalities assists in determining pre-existing pathology that may have predisposed the patient to injury.³ This information impacts on the treatment plan and rehabilitation protocol that is prescribed and eventually followed.

Clinical examination

Clinicians must be vigilant when assessing any associated anatomical structures, both local and distant, to the ankle joint. The focal examination should be the most comprehensive.⁵ A thorough ankle examination includes a general inspection of the ankle in a neutral position, as well as weight bearing, if possible, while observing any swelling, discoloration or visible deformity.^{1,3}

Table I: Special clinical assessment tests^{3,6,9,12}

Test	Anatomical structure tested	How to perform the test	Positive result
Anterior drawer test	Anterior talofibular ligament	The patient's knee must be at 90° flexion. The ankle should be in a neutral position to 10° plantar flexion. The examiner must hold the calcaneus in one hand, while stabilising the distal tibia with the other. The calcaneus is then translated or pulled forward.	Increased translation or movement, compared to the contralateral side
Talar tilt	Anterior talofibular ligament and calcaneofibular ligament	The patient sits with the knee at 90° flexion with the ankle in a neutral position. The examiner fixes the tibia with one hand and holds the calcaneus with the other. An inversion force is applied at the calcaneus with a fixed tibia.	10° of absolute talar tilt or 5° difference, compared to the contralateral side
Squeeze test	Syndesmosis	With both hands, hold the medial and lateral aspects of the lower leg at the calf mid point. Compress the fibula and tibia.	Pain over the area of the syndesmosis
External rotation stress test	Syndesmosis	The patient must either be seated or lying prone. Stabilise the tibia with one hand, and hold the ankle at the calcaneus with the other. The ankle is passively dorsiflexed to maximal external rotation.	Pain over the area of the syndesmosis
Interosseous membrane assessment	Syndesmosis	The patient sits or lies supine, with the affected leg extended on the examination table. Palpate between the tibia and fibula from the ankle joint proximally (upwards)	Determine and document the length of tenderness from the distal tip of the fibula

Palpation of the soft tissue structures should include the ankle ligaments, medially (deltoid) and laterally (the ATFL, CFL and PTFL). The retinaculum and bony elements, such as the medial and lateral malleoli, the base of the fifth metatarsal, the proximal fibula and the tibia should be palpated.^{3,6} Assessment of active and passive, and where possible, resisted, range of motion of the ankle, can provide insight into possible injury to the ligaments, muscles, tendons and nerves.⁶

In combination with a complete clinical examination, an array of physical assessment tests may also be performed in order to formulate a more sound diagnosis. These include the anterior drawer test, talar tilt test and tests to assess syndesmosis injury (Table I).⁹ The results may not be as accurate in acute stages with severe pain and swelling, and the patient should be re-examined within a few days post injury. Should radiological investigations not render a specific diagnosis, these physical assessment tests will further assist in making a diagnosis.^{10,11}

Ankle ligament sprains are graded according to severity (Table II). A combination of tenderness at the level of the ATFL, lateral haematoma and discoloration, as well as a positive anterior drawer test, indicates a ligament lesion in 95% of cases.¹¹

Special investigations

Following clinical examination, the clinician must decide if a radiological examination would assist in making a definitive diagnosis. The Ottawa ankle rules are a valid clinical tool with

Table II: Grading of ankle ligament injuries^{6,13}

Grade 1: Mild lateral ankle ligament injury: The ligament is stretched with no macroscopic tear. There is little to no swelling or tenderness, as well as minimal to no functional loss, nor mechanical joint instability.

Grade 2: Moderate lateral ankle ligament injury: There is a partial macroscopic ligament tear, with moderate pain, swelling and tenderness of the involved structures. Special clinical tests are normal.

Grade 3: Severe lateral ankle ligament injury: There is complete ligament rupture with marked swelling, haemorrhage and tenderness. Loss of function and marked abnormal joint motion are noted, with instability of the ankle ligament complex as per special clinical tests.

which to determine the need for radiography of an acute injury of the ankle and mid foot in patients aged five years and older.^{14,15}

Based on the Ottawa ankle rules, a plain X-ray radiology series is necessary if the following is present:^{16,17}

- Pain or bony tenderness at the base of the 5th metatarsal.
- Inability to bear weight for four steps, both immediately after the injury and in the emergency department or doctor's room, or
- Bone tenderness at the posterior edge or tip of either the medial and/or lateral malleolus.

The value of a stress X-ray, ultrasound and magnetic resonance imaging in the diagnosis of ATFL injuries was found satisfactory when compared with arthroscopic findings.^{18,19} An ultrasound examination is also a reliable and accurate method with which to evaluate chronic ATFL injuries.²⁰ However, compared to MRI, ultrasound is useful, but less accurate and sensitive in detecting ligamentous injury, especially after acute trauma.¹⁹

Recommended management

Acute phase management

Acute phase management should be started as soon as possible. Once the diagnosis has been made and a fracture or syndesmotomic injury, or any other injury which is deemed to require immediate referral for specialist intervention (Table III) has been excluded, a functional rehabilitation treatment plan can be constituted.

The goal in the acute stage of management includes, but is not limited to, the prevention of further injury, adequate analgesia, swelling limitation, and the reduction of any secondary injury.²¹

Table III: Indications for specialist referral

- If the clinician is unsure of the clinical diagnosis, or the specific treatment plan.
- An ankle fracture has been diagnosed.
- There is a dislocation or unstable syndesmosis injury.
- There is a grade III ankle ligament injury, where the integrity of ankle ligament complex is unsure.
- In the event of chronic ankle ligament injuries, failing appropriate treatment plans.
- Osteochondral lesions or nerve injuries.

Treatment

The POLICE principle (protection, optimal loading, ice, compression and elevation) has been suggested in the acute phase management of soft tissue injuries,²² although the RICE principle (rest, ice, compression and elevation) is still generally accepted.²³

Additions to the POLICE protocol support the beneficial effect of accelerated rehabilitation.²⁴ Protection (bracing, strapping and wearing a moonboot) with optimal loading, instead of rest, promotes faster recovery.²²⁻²⁶

Simple analgesia that is age appropriate, such as paracetamol, may be prescribed. Use of nonsteroidal anti-inflammatory drugs (NSAIDs) in sports injuries remains controversial. NSAID use must be individualised. They must be used with caution in fractures and muscle strains. However, their use is beneficial in arthropathies and impingement syndromes.²⁷ The advantage of the use of NSAIDs in ligament injuries is unclear, but oral and topical application has been shown to reduce pain and swelling, and improve short-term function after ankle sprains.²⁸⁻³⁰

Functional rehabilitation

It is important to individualise each rehabilitation programme depending on the athlete or patient's needs and activities. Advanced rehabilitation should focus on sport-specific activities to prepare the athlete to return to competition safely.³¹ A multidisciplinary team with experience in the rehabilitation process is required for ankle ligament injuries in order to ensure satisfactory results and prevent subsequent re-injury.³²

Rehabilitation should include ankle stabilisation with an elastic bandage, bracing, taping or other external support, with progressive weight bearing, as well as comprehensive range of motion, flexibility and strengthening of the injured anatomical area and the surrounding musculature.^{24,33,34} To increase ankle dorsiflexion and improve general ankle function, passive and active joint mobilisation must be implemented.³⁵ Balance training should be enforced throughout the rehabilitation phase, and continued as follow-up management to reduce re-injury rates of ankle sprains.^{13,32} Stability and proprioception sensorimotor exercises have become an integral part of ankle rehabilitation. Positive results have made this intervention nearly mandatory for athletes, especially those participating in high-risk activities, such as basketball, soccer, volleyball and football.^{32,36} Exercises that restore sensorimotor control similar to wobble board training and weight bearing mobilisation, like walking, are always included.^{24,36} The use of proprioceptive training is effective in preventing recurrent injury.³⁷

The aims of the guided or supervised rehabilitation programme are:^{31,32}

- Returning the athlete to the same or a higher level of competition than before.
- Improving or retaining proprioception.
- Improving the strength and mobility of the ankle joint and ligaments.
- Decreasing ongoing or chronic pain.
- Preventing recurrent or re-injury.



Figure 1: ???



Figure 2: ???



Figure 4: ???

Grade 1 and 2 ankle ligament injuries: Accelerated or early functional treatment

Grade 1 and 2 ankle ligament injuries may commence with such a programme very soon after injury. Functional rehabilitation exercises during the first seven days post injury are more effective than immobilisation in managing Grade 1 and 2 ankle sprains,^{33,34} and have demonstrated increased overall functional ability and decreased time off work or activities.⁷

Grade 3 ankle ligament injuries

A longer period of immobilisation of approximately 10 days post injury using a rigid stirrup brace, a below-knee cast or moonboot is recommended with controlled therapeutic exercises that are instituted.^{33,38} After the initial immobilisation period, the ankle must be protected against inversion by semi-rigid ankle bracing, such as a lace-up brace,^{7,33,34,38} and a functional treatment and rehabilitation programme must be followed.³¹

Return to sport

Guidance regarding return to sport must be given by a healthcare practitioner who has assessed the recovery and integrity of the ankle ligaments and joint, since ankle sprains have a variable clinical course.³⁹ The patient's perception of function should be included when making any return-to-sport decision. Numerous instruments, including the Lower-Limbs Task Questionnaire and the Cumberland Ankle Instability Tool^{40,41} have been studied, and were found useful in helping to identify patient understanding.

Functional performance testing should be used as a component in a return-to-sport evaluation. These assessments include the single-legged-hop for distance, the figure of "8",^{42,43} and the star excursion balance or Y-balance test.⁴⁴ The evaluation in progress, and the pain or resistance encountered during full range of motion of the ankle, is also important. Before the patient returns to sport-specific exercise, the injured limb's functional performance should be at least 80% compared to the uninjured side.^{43,44} None of these measures should be tested independently since each of them provides specific information on the athlete's rehabilitation of the injured area and his or her readiness to return to sport.

Athletes with moderate to severe (Grade 2 and 3) lateral ankle ligament complex injuries should wear a brace for at least six months post injury during training or competition. Both lace-up and semi-rigid ankle braces, as well as traditional ankle taping, are effective in reducing the rate of re-injury.^{4,45}

Chronic ankle instability

Chronic ankle instability is characterised by reported symptoms that may include "feelings of giving way". This is accompanied by a history of repeated ankle sprains, persistent weakness and pain during activity, and self-reported disability and loss of function. Chronic ankle instability is believed to occur secondary to an initial ankle sprain.⁴⁶

Functional rehabilitation exercises have shown potential in reducing symptoms¹ and risks for the development of chronic ankle instability. However, it is essential to realise that residual symptoms following ankle injury may still be prevalent, and further interventions, including surgery, may be necessary to restore stability.¹³

Conclusion

The clinical management of athletes presenting with ankle injuries must include a comprehensive assessment and individualised treatment plan. Ankle sprains are not similar, and may present with a variable clinical course.⁴⁶ A re-evaluation of the diagnosis is essential should the patient not respond as expected.

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