

FOOT AND ANKLE

The management of acute lateral ankle sprains: a survey of South African surgeons and best evidence available

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Abstract

Introduction: Ankle sprains remain the single most frequent injury in modern sports with increasing evidence that it is not as innocuous as previously thought. Conservative treatment options include various forms of immobilisation such as casts, moonboots and stirrup braces, followed by a rehabilitation period involving different modalities. Despite clinical evidence there seems to be a divergence between research and practice with an increase in acute surgical repair especially with regard to professional athletes. The aim of the study was to assess the approach on management of acute ankle sprains by orthopaedic surgeons in South Africa, by means of a descriptive cross-sectional survey analysis.

Methods: This was a two-part study. First, a questionnaire was emailed to participating orthopaedic surgeons, consisting of eight treatment options for a grade three lateral ankle sprain in a non-professional athlete. Secondly, a literature review was undertaken to establish the current best practice concerning ankle sprain management.

Results: A total of 129 responses was received out of the 719 that were sent out. Surgical repair was offered in 24 (19%). Conservative treatment including either cast or moonboot for a period of six weeks was chosen by 49 (38%) and two to four weeks by 55 (43%) as their preferred treatment. Only 39 (30%) of responding South African Orthopaedic Association members chose a short period of immobilisation followed by functional rehabilitation in accordance with the current best evidence available, based on the literature review done.

Conclusion: Despite good clinical evidence, there seems to be a lack of consensus in the management of grade three lateral ankle sprains.

Level of evidence: Level 5

Key words: ankle sprain, treatment, acute, ligament injury, management

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Introduction

Musculoskeletal problems are a significant health problem and burden. Ankle injuries are extremely common during sports and activities. Eighty-five per cent of ankle injuries are sprains and of these, 95% involve mainly the lateral ankle ligament complex.¹ Grade one and two lateral ankle sprains (LAS) remain the most prevalent injury. However, recent evidence shows that there is no such thing as a simple sprain.² Verhagen *et al.* reported a calculated total cost of 360 Euro per injured person in 2005,³ while Feger *et al.* reported a financial burden of 152 million USD per year of which 88% was spent on diagnosis and not actual treatment.⁴ Acute LAS significantly affect daily activity and cause a high incidence of absenteeism in both work and physical activities adding to the burden.⁵ Impact measured in disability-adjusted life-years (DALY), which is a measure of overall disease burden expressed as the number of years lost due to a certain disability, has increased by 50% from 2000 to 2010.⁶ Although reported that over 90% return to activity after ten days, 72% will have persistent symptoms at six months and 45% would not have fully recovered by three years.⁷ Strong evidence suggests that athletes in the first year of competition have twice the risk of suffering a recurrent LAS and of these, 50% will develop chronic symptoms.⁸ Despite compelling evidence of the importance of managing acute LAS as well as clear guidelines from numerous systematic reviews and meta-analyses, 90% of patients seeking medical care are managed incorrectly.^{2,4,7,9-11}

Simpson *et al.* did a descriptive cross-sectional survey looking at whether physiotherapists follow evidence-based guidelines when treating LAS. They found that between 49 and 91% used interventions for which there was no evidence.¹² Our question: Do all orthopaedic surgeons in South Africa treat acute LAS according to best current evidence? Thus, the null hypothesis is that there is no difference between current evidence-based guidelines and the management that orthopaedic surgeons will choose to treat an acute LAS.

Methods

A descriptive cross-sectional survey analysis was performed to assess the approach to management of acute LAS by orthopaedic surgeons in South Africa. An anonymous questionnaire emailed to members of the South African Orthopaedic Association (SAOA) on the current management of acute LAS consisted of eight treatment options for a grade three lateral ankle sprain in a non-professional athlete (Figure 1). The questions focused on the surgeon's treatment in the first six weeks after the sprain. Published research concerning lower back pain has utilised case studies of typical clinical presentations to

elicit information about the selection of management approaches.¹³ This method was also selected for the case used in this study, as it reflects the difference in orthopaedic surgeons' choices of interventions, rather than the differences in presentation of the patient.

A similar survey of physiotherapists was done and validated by a panel of experts in the field to ensure that the answers were objective and non-biased.¹² Ethics clearance was obtained from the Faculty of Health Sciences Human Research Ethics Committee (081/2017). The author also did an in-depth search of electronic databases including EBSCOhost, Scopus, Google Scholar, Science Direct, Springer and Web of Science regarding the management of acute lateral ankle sprains. Search words included the following: 'ankle sprain', 'ligament injury', 'acute', 'lateral ankle injury', 'treatment', 'management', with the focus on current research, to review the current best practice regarding the management approach of LAS.

Results

A total of 719 SAOA members were invited to participate, with 129 of the distributed questionnaires returned. Five hundred and three questionnaires were not returned, 77 questionnaires were not delivered to the recipients and ten surgeons declined filling in the questionnaire. Twenty-four (19%) surgeons chose acute surgical repair compared to 105 that chose a conservative approach

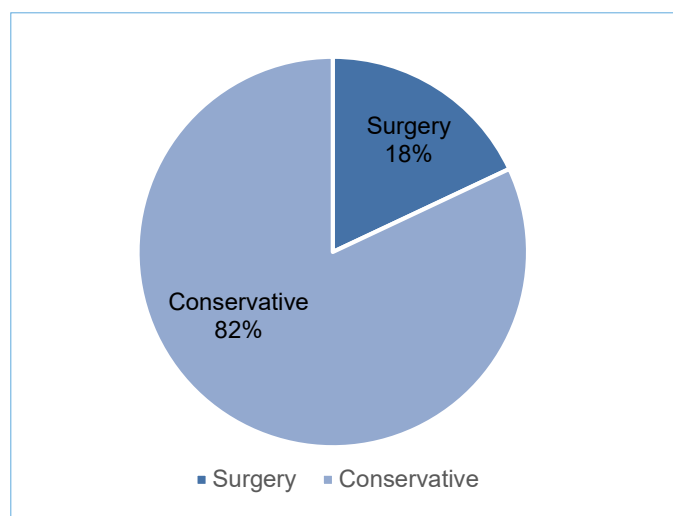


Figure 2. Surgery vs conservative treatment

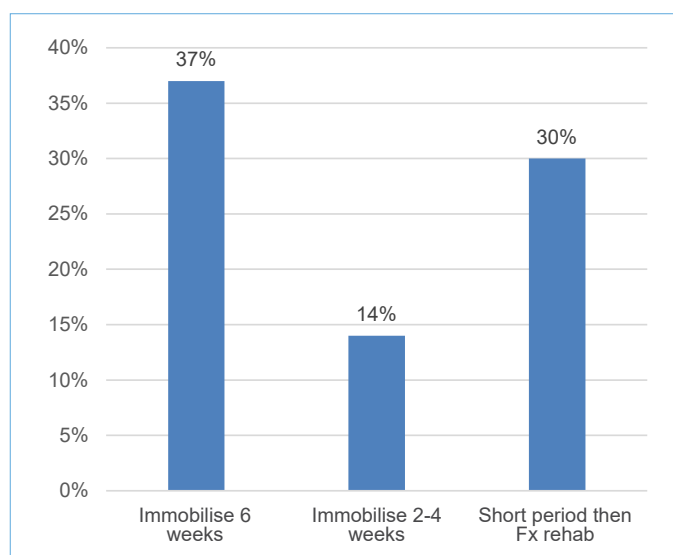


Figure 3. Period of immobilisation

Management of ankle sprain

Clinical scenario

A 28-year-old active male presents to your practice after an ankle sprain sustained while playing soccer. You diagnose him with a grade 3 isolated acute lateral ankle sprain. Please choose from the list below the most appropriate answer as to your initial management plan for him.

- Surgery with acute repair of the ATFL and CFL
- Plaster cast for 6 weeks
- Plaster cast for 2-4 weeks
- Moonboot for 6 weeks
- Moonboot for 2 weeks
- Short period of immobilisation followed by functional rehabilitation
- Ankle brace (e.g. stirrup brace) only
- Compression bandage

Please mark your answer with a tick.

Figure 1. Questionnaire

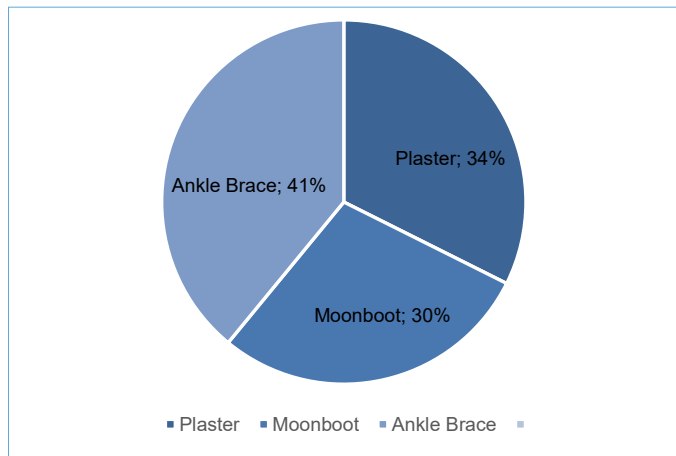


Figure 4. Period of immobilisation

(Figure 2). Forty-nine (38%) recommended a six-week period of immobilisation in either a cast or moonboot compared to 56 (53%) recommending a shorter period. Only 39 (30%) of surgeons chose a short period of immobilisation followed by functional rehabilitation in accordance with the current best evidence available (Figure 3). Regarding the type of immobilisation, the majority chose an ankle brace (39%) followed by below-knee plaster of Paris cast (32%) and moonboot (29%) (Figure 4). None of the orthopaedic surgeons chose to use compressive bandage alone.

Discussion

Simpson *et al.* noted in a survey done under physiotherapists that many treatment modalities are still used despite evidence showing minimal to no benefit.¹²

Ligaments fail usually under tensions greater than their yield point and this causes either partial or complete tears. The body's response to this is through a complex inflammatory response that involves three distinct phases overlapping each other.

The acute inflammatory phase begins within minutes of injury and continues over the next 48 to 72 hours. During this phase, a haematoma forms at the site of injury and platelet cells interact with matrix components. Growth factors are released which are necessary for healing and provide a platform on which many cellular events occur.

The proliferative/repair phase begins when immune cells release various growth factors and cytokines, which initiate fibroblast proliferation to rebuild the ligament tissue matrix. Initially tissue appears as disorganised scar tissue with more blood vessels, fat cells, fibroblastic and inflammatory cells than normal ligament tissue.

Subsequently a complex healing process occurs over several weeks, as follows: Fibroblast cells deposit various types of collagen, proteoglycans, other proteins and glycoproteins to the matrix. The collagen becomes aligned with the long axis of the ligament during this time; however, the newly formed type of collagen fibrils are abnormal and smaller in diameter than normal ligament tissue. After a few weeks, the remodelling phase starts in which collagen maturation occurs. This can last for months to years after the initial injury. With time, the tissue matrix starts to resemble normal ligament tissue. Evidence does show that the new tissue is grossly, histologically, biochemically, and biomechanically inferior to the normal tissue.¹⁴ A grade three LAS (Table 1) typically means that the anterior talofibular ligament (ATFL) and calcaneofibular ligament (CFL) is completely torn and that the posterior talofibular ligament (PTFL) is partially torn.¹⁵

It has been shown that immobilisation for prolonged periods leads to muscle wasting and joint stiffness. There is a decrease in the tensile strength of ligaments as well as collagen fibril numbers and thickness. Fibroblasts mainly produce type three collagen after

Table 1: LAS classification

	Ligament disruption	Ecchymosis and swelling	Pain with weight bearing
Grade 1	None/Stretch	Minimal	Normal
Grade 2	Partial	Moderate	Mild
Grade 3	Complete	Severe	Severe

an injury compared to type one collagen which makes up 85% of the collagen in normal ligaments.¹⁶ Nash *et al.* point out that early mobilisation increases blood flow, and reduces muscle atrophy, adhesions and joint stiffness, which in turn leads to decreased pain.¹⁷ This effect is called causal histogenesis, where functional stress is needed for remodelling of connective tissue.² Kerkhoffs *et al.* showed in a meta-analysis that exercise is associated with less instability and earlier return to function.¹⁸ Current evidence recommend early functional rehabilitation is better than immobilisation for grade one and two LAS and a short period of immobilisation (seven to ten days) followed by functional rehabilitation for grade three LAS.^{2,5,9,19-22} In our survey we found that nearly 40% of orthopaedic surgeons chose six weeks immobilisation as their initial management. With regard to different external supports, the Cochrane review by Kerkhoffs *et al.* showed that lace-up ankle braces are superior to semi-rigid braces, elastic bandage and tape in the short term. Tape also tends to have more skin problems associated with it.²³ Lardenoye *et al.* found increased patient satisfaction regarding braces compared to tape, but no difference in functional outcome and pain.²⁴ Beynnon *et al.* found that the Air-Stirrup® brace with elastic wrap led to return to function in half the time as compared to wrap or bracing alone.²⁵ They also found no difference in casting or Air-Stirrup bracing for the first ten days in grade three LAS. A prospective randomised study including 186 patients by Prado *et al.* compared functional braces with a walking boot and found that the brace resulted in earlier return to activity.¹⁰ Doherty *et al.*'s meta-analysis of 46 systematic reviews containing 309 studies reported a lower incidence of re-injury with the use of braces or tape compared to no support. They recommend wearing a brace during sporting activities for a minimum of six months with benefit up to one year with lace-up braces better than semi-rigid braces.¹¹ In our survey only 39% of SAOA members used ankle braces in managing acute LAS.

The National Athletic Trainers Association (NATA) recommendations advised caution in the use of non-steroidal anti-inflammatory drugs (NSAIDs) because of possible decrease in the tensile strength of the healing ligaments. They found that military recruits returned to training earlier, but noted greater instability and swelling after 14 days, most likely due to the analgesic effects that allowed return before the ligaments were healed.²⁰ Hauser *et al.* did a review of treatment options in ligament injuries in general and found that, although effective in decreasing pain and swelling for the first six to eight weeks, non-steroidal anti-inflammatory drugs (NSAIDs) did inhibit the histological, biochemical and biomechanical properties of ligament healing.¹⁶ Van den Bekerom *et al.*²⁶ reported in a meta-analysis of 22 trials that oral and topical NSAIDs are superior to placebo regarding pain and swelling in the short term. They did conclude that there was a low number of studies with a lack of methodological quality and small sample sizes but still recommended the use thereof. Regarding platelet-rich therapies it is thought that they could enhance the healing process due to the production of growth factors; however, numerous randomised controlled trials as well as a Cochrane review have shown no benefit regarding pain and function in both the short and long term.^{27,28} Petrella *et al.* and Jakobs *et al.* both showed in prospective randomised controlled trials that hyaluronic acid per articular injections results in earlier return to activity, decreased pain and increased patient satisfaction. However the literature on viscoelastic injections for acute LAS is limited.^{29,30} Cryotherapy is part of the so-called RICE (rest, ice, compression,

elevation) treatment. NATA recommendations noted that there is limited strong evidence for using cryotherapy but no evidence not to apply it. It is thought to decrease pain through reduced nerve conduction and muscle spasm and swelling through vasoconstriction of vessels leading to decreased permeability, but is only effective 15 to 30 minutes after treatment. Bleakley *et al.* compared two different cryotherapy regimens based on the duration of application and found no difference in functional status, swelling or pain at rest.³¹ Regarding manual therapy Ojha *et al.* did a systematic review and concluded that early manual therapy decreases total episode cost.³² Although the mechanism by which manual therapy works is unknown, Cleland *et al.* reported it to be superior to home-based exercises with respect to pain and function.³³ Hubbard reported, in only anecdotal evidence in the form of case studies, improved motion but only after multiple sessions.^{19,34} Evidence to support manual therapy is only moderate regarding effects on swelling and improved motion.^{6,31} Seventy-eight per cent of physiotherapists in a survey by Guillodo *et al.*³⁵ indicated that they would use it; however, Kerkhoffs *et al.* showed in a systematic review that evidence is limited regarding the benefits and that most positive effects disappeared two weeks after the injury, and thus recommended against using manual therapy.³⁶ Evidence also shows that ultrasound and laser therapy has no benefit and only adds extra cost.^{11,22,37-39} Neuromuscular training is defined as training to enhance unconscious motor responses by stimulating both afferent signals and central mechanisms responsible for dynamic joint control.⁴⁰ Freeman's concept was that it serves as an adjunct to functional treatment since joint injury results in proprioceptive deficit that prevents functional recovery and risks long term instability.⁴¹ It has been shown that neuromuscular and proprioceptive training decreases re injury rates and functional instability.⁹ Petersen *et al.* concluded in their systematic review that proprioceptive and neuromuscular training can be used in an effort to decrease future risk of re-sprain using mainly the 2Fit trial that included 522 participants, which was more powered than the studies by van Rijn *et al.* and Bleakley with a mere 102 participants.^{2,42,43}

In our survey, we found that one in five orthopaedic surgeons (20%) would do an acute surgical repair, which is in contrast to current best practice. Kerkhoffs *et al.* in their Cochrane review, comparing surgery versus conservative treatment for acute lateral ankle ligament injuries, failed to demonstrate a clear superior treatment approach.²³ There was evidence for longer recovery times, higher incidence of ankle stiffness, impaired ankle mobility and more complications in the surgical treatment group. Doherty *et al.* did a meta-analysis including 46 systematic reviews consisting of 309 studies.¹¹ Most randomised controlled trials used function, determined as time taken to return to work/activity, as their outcome. None of the reviews reported on the primary outcome of recurrence. The consensus regarding surgery is that it is not indicated prior to a conservative treatment trial, persistent symptoms and on an individual basis. Several reviewers further reported the propensity for a surgical intervention to have a higher risk of complications, including issues with wound healing, infection, dystrophy, and iatrogenic nerve injury leading to sensory deficit and paraesthesia compared to conservative treatment.^{11,18,22} Van den Bekerom *et al.* however did note that early surgical repair in professional athletes can be beneficial. In the narrative review article, they noted that objective instability measured as talar tilt or the anterior draw test was a predictor of recurrent instability and that surgery decreases this. This outcome is dependent on multiple factors including patient factors and access to an expert orthopaedic surgeon.²² White *et al.* more recently reported on a series of 42 professional athletes, median age of 22 years, that underwent a modified Broström repair for grade three LAS. They found that surgical management 'led to a more predictable return to sport' which is essential in professional athletes. Of note is also a 25% incidence of associated injuries such as osteochondral lesions that were identified and successfully treated during surgery.⁴⁴ The survey

was limited in the sense that no demographical data was collected to comment on experience or background and the fact that the response rate to the survey was so low.

Conclusion

Regarding the management of acute LAS, evidence seem to support lace-up braces in grade one and two ankle sprains. In grade three acute LAS, one can consider a short period of immobilisation followed by a lace-up brace. A phase-adapted functional rehabilitation programme is recommended, incorporating neuromuscular training which has specific benefits on the re-sprain rates. With respect to surgery there is a need for sufficiently powered, high quality randomised trials, and currently there is limited evidence for the young professional athlete. In the South African setting, taking cost and resources into consideration, the treatment algorithm for grade three LAS could be as follows: Wear a lace-up brace for the first week, which is much cheaper than the moonboot that is often given, but if not available place in a below-knee cast and prescribe NSAIDs as part of the pain regimen. From week two start with functional rehabilitation, referring to the physiotherapist. Specific instruction should include proprioceptive and neuromuscular training with early weightbearing as able, protecting the ankle from excessive inversion. Advise the patient to continue the neuromuscular training and wearing of the lace-up brace to prevent recurring injuries.

In our survey we found that less than half of orthopaedic surgeons follow the current best evidence in managing acute LAS regarding type and duration of immobilisation. This study shows a difference in the management of acute ankle sprains regarding current evidence and clinical practice.

Ethics statement

Ethics clearance was obtained from our institution's Faculty of Health Sciences Human Research Ethics Committee (081/2017).

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