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Management of Acute Ankle Sprain in Athletes

Abstract

Management of acute ankle sprain is an important socio-economic healthcare problem. This compact overview provides evidence from current literature on both treatment and prevention of acute ankle sprains.

Diagnosis is made by delayed physical examination 5 to 7 days post trauma.

Treatment: We recommend that for athletes as much as any other patient treatment decisions should be made on an individual basis. The best available option for most patients is functional treatment.

Prevention: Use of external ankle support devices, in the form of semi-rigid ankle orthosis or Aircast brace, prevents mainly lateral ankle ligament injuries, during high risk sporting activities.

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Introduction

Lateral ankle ligament injuries of the ankle (ankle sprains) are a common problem in acute care, with an estimated rate of one ankle injury per 10,000 people per day [Katcherian 1994]. Statistics for casualty departments reveal that patients with sprained ankles account for two to six percent of all those seeking treatment [Stephensen 1981], also for about 25% of all injuries to the musculo-skeletal system and therefore an acute ankle ligament injury is the most frequently observed injury in the emergency room [Boruta 1990]. Injuries to the lateral ankle ligament complex form 25% of all sports injuries [Keeman 1990]; some sports (e.g. basketball, football and volleyball) have a particularly high incidence of ankle injuries [Lindenfeld 1994]. A recent study of ankle injuries in basketball found that players with a history of ankle injury were nearly five times more likely to sustain an ankle injury [McKay 2001]. The total annual cost to society for ankle injuries has been estimated to be varying between 35 million US dollars per one million people [Makuloluwe 1977] and 40 million Euro per one million people [Zeegers 1995]. Treatment is performed by emergency and primary health care doctors as well as by orthopaedic and trauma surgeons [Kannus 1991].

Trauma mechanism is a combination of adduction and inversion of the plantar flexed foot. The most commonly injured part of the lateral ligament complex is the anterior talofibular ligament (ATFL). Broström [1966] found that combined ruptures of the ATFL and calcaneofibular ligament (CFL) occur in 20% of patients and isolated rupture of the CFL is very rare. The posterior talofibular ligament (PTFL) is usually uninjured unless there is an actual frank dislocation of the ankle. The nomenclature for lesions of the lateral ligament complex of the ankle is diverse. Most authors use the term «sprain» to describe a morphologic condition, representing a diversity of pathology ranging from a simple overstretching of the ligament to a complete rupture with instability of the joint [Watson-Jones 1976]. In a recent systematic review of available literature, treatment for acute lateral ankle ligament rupture that was too short in duration or did not include sufficient support of the ankle joint, tended to result in more residual complaints [Pijnenburg 2000]. Therefore, post trauma it is important to distinguish a simple distortion from an acute ligament rupture, as it

is proven that adequate treatment is associated with better prognosis. Treatment has remained somewhat controversial throughout the years, mainly because of the variety of modalities used. The three main modalities being: 1) operative treatment, 2) conservative treatment with immobilisation and 3) functional treatment. The latter is an early mobilisation programme and involves the use of an external support (combined with co-ordination training). Additionally, prevention of ankle injuries has the potential to play an important role in maintaining health for those people who engage in high-risk sports and those who have suffered from a previous injury to the ankle ligament complex.

In this article on the management of acute ankle sprain with emphasis on treatment of athletes, a compact overview is provided of current literature on both treatment and prevention of acute ankle sprains.

Diagnosis

Diagnosis is made by delayed physical examination 5 to 7 days post trauma [van Dijk 1996, Klenerman 1998]; stress radiography, arthrography, magnetic resonance imaging and sonography are often performed as well [Kannus 1991]. However, these methods are expensive and their reliability is debatable. The accuracy of physical examination has been determined in a series of 160 patients, comparing physical examination performed within 48 hours of the injury and 5 days post injury. The specificity and sensitivity of the delayed physical examination for the presence or absence of a lateral ankle ligament rupture were 84% and 96% respectively. Therefore it was concluded that a precise clinical diagnosis is possible [van Dijk 1996].

Treatment

The treatment practice variation identified for lateral ankle ligament complex injuries suggests a lack of evidence-based management strategies for this problem. Dehne [1933] was one of the first to describe immobilisation with a plaster cast below the knee. Many studies presenting results of this type of immobilisation

have since been published. Freeman [1965] introduced a new concept in the conservative treatment of ruptures of the lateral ankle ligaments by suggesting the use of proprioceptive training. Consequently, many patients were treated with non-specific elastic bandage combined with co-ordination training. Functional treatment forms became more popular the last two decades of the 20th century [Jacob 1986, Moller-Larsen 1988, Vaes 1985]. The use of other treatments such as ultrasound, cryotherapy, laser or homeopathy is either not effective in treatment of acute ankle sprains [van der Windt 1999, de Bie 1998, Ogilvie-Harris 1995] or data are too marginal to draw definitive conclusions [Zell 1988]. Despite all of these options, it is unclear which treatment is most appropriate. Those in favour of functional treatment cite advantages such as lower cost and decreased morbidity with the same probability of ankle stability when compared to operative treatment. However, underestimating the injury severity may lead to chronic instability of the lateral ankle ligament complex. Therefore, the treatment approach is important to clarify. In this overview an update of the evidence provided by a number of recent systematic reviews is provided. It is generally agreed that a «no treatment» strategy for acute ruptures of the lateral ankle ligament complex leads to more residual complaints [Pijnenburg 2000]. Following Kannus and Renström [Kannus 1991], who already compared operative treatment, plaster cast and early controlled mobilisation in a narrative review and few years later Ogilvie-Harris [1995], who performed a narrative review identifying 58 randomised controlled trials (RCT's) on several treatment forms for acute lateral ankle ligament ruptures, the first systematic review to be published [Pijnenburg 2000] analysed the results of 27 RCT's. Their results were based on 3 outcomes: time lost from work, residual pain and giving way. The assessment of trial quality was based on 3 criteria: randomisation method, assessor blinding and intention to treat analysis. Authors concluded that operative treatment leads to better results than functional treatment and functional treatment leads to better results than cast immobilisation for 6 weeks. Another recent review also stated that functional treatment with early mobilisation appears to provide better outcomes for patients compared to immobilisation with a cast [Kerkhoffs 2002b]. In contrast, there are reasons to question the selection of operative treatment as a treatment of choice. Operative treatment is associated with a higher risk of complications and is also associated with higher costs. Because of the high prevalence of ankle injuries, operative treatment may be performed by surgeons in training, which may affect the outcome. Finally, when conservative treatment fails, secondary operative reconstruction of the elongated ligaments can be performed with similar good results, even years after the initial injury [Krips 2000]. Authors state that therefore functional treatment still remains the treatment of choice. In order to provide further insight in this topic, another systematic review restricted the focus to the comparison operative treatment strategies versus conservative treatment strategies, the review included a greater number of clinically important outcomes and considered other aspects of trial methodology [Kerkhoffs 2002a]. The conclusions and implications originating from this review stated that there is actually insufficient evidence from available RCT's to determine relative effectiveness of surgical and conservative treatment for acute injuries of the lateral ankle ligament complex. Treatment decisions should be made on an individual basis, carefully weighing the relative benefits and risks of each option. However, this review also stated that given the risk of operative complications and higher cost (including hospital admission) associated with surgery, the best available option for most patients would be functional treatment for acute injuries [Kerkhoffs 2002a]. None of the above mentioned systematic reviews compared different functional treatment strategies. One recent systematic review was performed to analyse which is the best functional treatment [Kerkhoffs 2002c]. For analysis, functional treatment strategies were divided upon 4 categories and trials were included when comparing one treatment with another: 1) elastic bandage/stocking, 2) tape, 3) lace-up ankle support and 4) semi-rigid ankle support. Conclusions were that the use of an elastic

bandage seems preferable to the use of tape treatment. The use of a semi-rigid ankle support seems preferable to the use of an elastic bandage. However, insufficient data is present to be able to accurately compare all 4 different treatment strategies. Therefore no definite conclusions concerning the optimal functional treatment strategy can be drawn [Kerkhoffs 2002c]. As previously noted, athletes as much as any other patient want to return to pre-injury as quick as possible with as small a chance as possible for recurrent injury or other long term complaints; therefore, for athletes as well as other patients we recommend that treatment decisions should be made on an individual basis, carefully weighing the relative benefits and risks of each option. The best available option for most patients will be functional treatment [Pijnenburg 2000, Kerkhoffs 2002a].

Prevention

Prevention of ankle injuries is particularly important for those people who engage in high risk sports and those who have suffered a previous ankle sprain [deMaio 1992, Lindenfeld 1994]. Methods of prevention include use of customised footwear and supports, ankle taping, training regimens and injury awareness. Prevention of recurrent injury may also include other interventions such as wobble board exercises, aimed at co-ordination and proprioception. One recently updated state-of-the-art systematic review [Handoll 2002] provides good evidence from randomised clinical trials for the use of external ankle support devices, in the form of a semi-rigid ankle orthosis or Aircast brace, to prevent mainly lateral ankle ligament injuries, during high risk sporting activities (e.g. basketball, football, volleyball). Participants with a previous sprain should be advised that future sprains can be reduced with the use of these types of external supports when engaging in high risk activities [Handoll 2002]. Whether semi-rigid supports are warranted for individual athletes depends on the risk ratio of the individual activity, previous injury status, any possible or perceived loss of performance and the supply and cost of the support [Handoll 2002]. Further trials on other prophylactic interventions are warranted.

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References

- 1 Katcherian D.: Soft-tissue injuries of the ankle. In: Lutter L.D., Mizel M.S., Pfeffer G.B., eds. Orthopaedic knowledge update: foot and ankle. Rosemont, Illinois: American Academy of Orthopaedic surgeons, 1994: 241–253.
- 2 Stephensen N.: Ankle sprain. Copenhagen: Rene Vejlsgaard Medical Yearbook, 1981.
- 3 Boruta P.M., Bishop J.O., Braly W.G., Tullos H.S.: Acute ankle ligament injuries: a literature review. *Foot & Ankle* 1990; 11: 107–113.
- 4 Keeman J.N.: Commentaar enkelspecial. *Reuma en Trauma* 1990, 1: 34–35.
- 5 Lindenfeld T.N., Schmitt D.J., Hendy M.P., Mangine R.E., Noyes F.R.: Incidence of injury in indoor soccer. *Am. J. Sports Med.* 1994; 22: 364–367.
- 6 McKay G.D., Goldie P.A., Payne W.K., Oakes B.W.: Ankle injuries in basketball: injury rate and risk factors. *Br. J. Sports Med.* 2001; 35: 103–108.
- 7 Makululuwe R.T.: Ultrasound in the treatment of sprained ankles. *Practitioner* 1977; 218: 586–588.
- 8 Zeegers A.V.: Supination injury of the ankle joint. Thesis, University of Utrecht, The Netherlands, 1995.

- 9 *Kannus P., Renström P.*: Current concept review. Treatment for acute tears of the lateral ligaments of the ankle. *J. Bone Joint Surg. [Am.]* 1991; 73: 305–312.
- 10 *Broström L.*: Sprained ankles VI. Surgical treatment of chronic ligament ruptures. *Acta Chir. Scand.* 1966; 132: 551–565.
- 11 *Watson-Jones R.*: Fractures and joint injuries. 5th Edition. Edinburgh: Churchill Livingstone, 1976.
- 12 *Pijnenburg A.C., Van Dijk C.N., Bossuyt P.M., Marti R.K.*: Treatment of ruptures of the lateral ankle ligaments: a meta-analysis. *J. Bone Joint Surg. [Am.]* 2000; 82: 761–773.
- 13 *Van Dijk C.N., Mol B.W., Lim L.S., Marti R.K., Bossuyt P.M.*: Diagnosis of ligament rupture of the ankle joint. Physical examination, arthrography, stress radiography and sonography compared in 160 patients after inversion trauma. *Acta Orthop. Scand.* 67: 566–570.
- 14 *Klenerman L.*: The management of sprained ankle [Editorial].
- 15 *Van Dijk C.N., Bossuyt P.M., Marti R.K.*: Medial ankle pain after ligament rupture. *J. Bone Joint Surg. [Br.]* 1996; 78: 562–567.
- 16 *Dehne E.*: Die Klinik der frischen und habituellen adduktion-supinations Distorsion des Fusses. *Deutsche Zeitschrift für Chirurgie* 1933; 242: 40–61.
- 17 *Jacob R.P., Raemy H., Steffen R., Zeegers A.V.*: Functional treatment of fresh outer ligament ruptures using an Aircast splint. Article in German. *Der Orthopäde* 1986; 14: 434–440.
- 18 *Moller-Larsen F., Wethelund J.O., Jurik A.G., de Carvalho A., Lucht U.*: Comparison of three different treatments for ruptured lateral ankle ligaments. *Acta Orthop. Scand.* 1988; 59: 564–566.
- 19 *Vaes P., de Boeck H., Handelberg F., Oxman A.D.*: Comparative radiologic study of the influence of ankle joint bandages on ankle stability. *Am. J. Sports Med.* 1985; 13: 46–50.
- 20 *Van der Windt D.A., van der Heyden G.J., van den Berg S.G., ter Riet G., de Winter A.F., Bouter L.M.*: Ultrasound therapy for musculoskeletal disorders: a systematic review. *Pain* 1999; 81: 257–271.
- 21 *De Bie R.A., de Vet H.C., Lenssen T.F., van den Wildenberg F.A., Kootstra G., Knipschild P.G.*: Low-level laser therapy in ankle sprains: a randomised clinical trial. *Arch. Phys. Med. Rehab.* 1998; 79: 1415–1420.
- 22 *Ogilvie-Harris D.J., Gilbert M.*: Treatment modalities for soft tissue injuries of the ankle: A critical review. *Clin. J. Sports Med.* 1995; 5: 175–186.
- 23 *Zell R.*: Treatment of acute sprains of the ankle joint. Double-blind study assessing the effectiveness of a homeopathic ointment preparation. *Fortschr. Med.* 1988.
- 24 *Kerkhoffs(b) G.M., Rowe B.H., Assendelft W.J., Kelly K., Struijs P.A., van Dijk C.N.*: Immobilisation and functional treatment for acute lateral ankle ligament injuries in adults (Cochrane review). In: *The Cochrane Library*, Issue 3, 2002, Oxford: Update Software.
- 25 *Krips R., van Dijk C.N., Halasi T., Lehtonen H., Moyen B., Lanzetta A., Farkas T., Karlsson J.*: Anatomical reconstruction versus tenodesis for the treatment of chronic anterolateral instability of the ankle joint: a 2-10-year follow-up. *Knee Surg. Sports Traum. Athroscopy* 2000; 8: 173–179.
- 26 *Kerkhoffs(a) G.M., Handoll H.H., de Bie R., Rowe B.H., Struijs P.A.*: Surgical versus conservative treatment for acute injuries of the lateral ligament complex of the ankle in adults (Cochrane review). In: *The Cochrane Library*, Issue 3, 2002, Oxford: Update Software.
- 27 *Kerkhoffs(c) G.M., Struijs P.A., Marti R.K., Assendelft W.J., Blankevoort L., van Dijk C.N.*: Different functional treatment strategies for acute lateral ankle ligament injuries in adults (Cochrane review). In: *The Cochrane Library*, Issue 3, 2002, Oxford: Update Software.
- 28 *Handoll H.H., Rowe B.H., Quinn K.M., de Bie R.*: Interventions for preventing ankle ligament injuries (Cochrane review). In: *The Cochrane Library*, Issue 3, 2002, Oxford: Update Software.