Petersen W, Rembitzki IV, et al. Treatment of acute ankle ligament injuries: a systematic review. Arch Orthop Trauma Surg. 2013;133(8):1129-41.

Design: Systematic review of randomized clinical trials and previous meta-analyses

Purpose of study: to answer research questions about the management of acute ankle ligament injuries, such as evidence for or against surgical/nonsurgical options, most effective type of external stabilization (different types and degrees of immobilization), effects of neuromuscular training , and whether there is a role for prophylactic bracing

PICOS:

- Patient population: adults 16 years or older with acute ankle ligament injuries
    - Articles which considered management of ankle fractures, syndesmosis lesions, and dislocations were excluded
    - If a randomized trial had been included in a previously published systematic review, it was also excluded from separate consideration
- Interventions and Comparisons:
    - Surgical versus nonsurgical treatment
    - Degrees of immobilization with external ankle supports
        - Aircast ankle braces versus elastic bandages
        - Semirigid orthosis versus tubular compression bandages or tape
    - Neuromuscular training versus conventional care
    - Brace use for prevention of sprains in football and basketball players
- Outcomes: pain scores, rates of ankle reinjury, subjective instability, return to full activity, patient satisfaction with treatment outcome, and clinical ankle scores on commonly used rating tools
- Study types: randomized clinical trials (RCTs) and previously published systematic reviews

Study selection:

- Databases were MEDLINE and Google Scholar between January 2002 and December 2012
- Search was restricted to English language articles which reached Level I evidence according to the Agency for Healthcare Research and Quality (AHRQ)
    - Cohort studies, retrospective studies, expert opinion, and case series were not considered

Results:

- 158 articles were identified through the literature search, and 3 meta-analyses and 17 RCTs were included in the analysis

- The three meta-analyses compared surgical vs nonoperative treatment, functional treatment versus immobilization, and the effect of different types of external support for nonoperative management of ankle sprains
    - The surgical vs nonoperative meta-analysis, using 20 studies with 2562 mostly young active adults, showed differences in favor of surgical management for pain and functional stability, but these results were not robust to removal to one low quality study with more extreme results in favor of surgery, and concluded that there was insufficient evidence to compare the effectiveness of one treatment over another
    - The comparison of functional treatment versus immobilization, using 21 trials with 2184 patients, reported differences in favor of functional treatment for return to work and sports activity, but these results were interpreted with caution, as the differences were not significant after exclusion of the low quality trials
    - The comparison of different types of external support, using 9 trials with 892 patients, showed that lace-up ankle support appeared to be more effective in reducing swelling in the short term compared with semi-rigid ankle support, elastic bandages, or tape, but cautioned that definite conclusions were hampered by the variety of treatments used and the inconsistency of followup times; the most effective treatment was unclear from the available studies
- Two newer randomized trials were found which were published after the meta-analysis comparing surgical vs nonoperative treatment, but made different comparisons
    - One study of Finnish military recruits with a Grade 3 injury compared suture repair followed by six weeks of cast treatment versus functional treatment versus an Aircast ankle brace for three weeks, and had approximately 14 years of followup
        - In the surgical group with 15 patients, there was 1 reinjury
        - In the Aircast brace group with 18 patients, there were 7 re-injuries
        - However, MRI showed grade II osteoarthritis (abnormal cartilage extending to less than 50% of the cartilage depth) in 4 of the 15 surgical patients and in none of the 18 in the functional group
    - The other RCT compared functional treatment alone and functional treatment after primary surgical repair, and showed similar overall results after acute lateral ankle sprain, but slower return to full athletic activity with functional treatment alone; the authors recommended that treatment be tailored to suit each individual athlete
- 5 randomized trials were found on the effect of different types of external support, but there was no attempt to pool data from different studies

    - However, there was a consistent pattern of findings from three studies which compared a semi-rigid device with a tubular compression bandage in Grade 2 and 3 ligamentous injuries
        - A plaster cast for 10 days was superior to a tubular bandage for foot-ankle scores at 3 months (Lamb 2009)
        - An Aircast brace was also superior to a tubular bandage for foot-ankle scores at 3 months (Lamb 2009)
        - An Aircast brace was superior at 10 days and one month, using the Karlsson score, to an elastic support bandage (Boyce 2005)
        - An AirLoc semirigid brace for four weeks, also using the Karlsson scoring scale, was superior to taping for four weeks, and the taping group had skin irritation more frequently than the semirigid brace group (Lardenoye 2012)
- The effects of training were explored in three RCTs, one of which found that neuromuscular training reduced the number of recurrent sprains in athletes, and two of which did not find a difference in recurrent sprains when supervised exercise was added to conventional care
- The preventive efficiency of braces was explored in four studies of athletes in high-risk sports such as basketball, football, and volleyball; three of the studies found that braces reduced the incidence of ankle sprains in these athletes

Authors' conclusions:

- Most Grade 1, 2, and 3 ankle sprains can be managed without surgery, but surgery should not be totally abandoned, and the indication for surgical repair should be made on an individual basis in people such as athletes who are at risk for future sprains; an extensive Grade 3 lesion with a significant hematoma could also be an indication for surgery
- For Grade 3 injuries, a short period (10 days) of immobilization with a below-knee cast or removable boot could be advantageous compared to an elastic bandage, and a period of 5 to 7 days is preferable
- A semirigid form of external stabilization is preferable to a less rigid support such as taping; protection from inversion is important during the healing phase, but it is important to allow motion, stretching, and strengthening of the ankle and therefore to avoid prolonged immobilization
- All studies about nonoperative treatment of ankle sprains have one major flaw, namely that they report only short-term followup data and no re-sprain rates
- Neuromuscular training such as with a balance board may be beneficial, but there have been high rates of non-adherence to the treatment plan in the published studies, and success rates are much higher in patients who use the balance boards as intended compared to those who do not use them as intended

- A brace may prevent re-injury in athletes during sporting activities such as cocker and basketball

Comments:

- There are several weaknesses with this systematic review, but some of those weaknesses are due to underlying weaknesses in the available literature
    - Two databases were used, which is the minimum number for a systematic review of the literature
    - Presumably, two authors worked independently to select articles for inclusion; this is not explicitly stated but can be inferred from the statement that two authors contributed equally to the analysis
    - At least one study identified as an RCT of surgical vs nonsurgical treatment (Takao 2012) was actually quasi-randomized (alternate allotment of treatment by even numbered days vs odd numbered days); this may not be represent a major threat to the overall conclusions, since the study itself was not very conclusive
- In addition to the lack of adequate long-term followup in the studies of nonoperative treatment, there was a lack of detail in the descriptions of the interventions in some of the included studies
    - Lamb 2009, which compared 10 days of cast immobilization to a tubular compression bandage, also used an Aircast brace, but did not say how long it was used or how patients were instructed in its use
    - Lardenoye 2012 did not furnish information about the use of the semirigid ankle brace, which was held in place with a hook and loop fasteners, but the authors did not say how many hours per day it was to be used or how long it was applied
    - Boyce 2005 also neglected to supply many details about the instructions for the Aircast brace which was compared with the elastic support bandage; presumably, it was applied for at least the 10 days between baseline and the 10 day followup examination, but may or may not have been used between the 10 day and the one month followup
- In spite of the numerous weaknesses in the review and in the literature on which it was based, there is sufficient information to support good evidence that in the setting of Grade 2 and Grade 3 ankle sprains, an external support with either a short-leg cast for 10 days or with a semirigid brace during the initial healing phase is more likely to promote a return to satisfactory ankle function than external support with a bandage device
- A recommendation in the guideline can also be made that most Grade 2 and 3 sprains can be managed nonoperatively, but that the presence of a large hematoma may be an

indication for surgery, as is the presence of a Grade 3 sprain in a physically active individual such as an athlete

Assessment: a weak but adequate systematic review which supports good evidence that in Grade 2 or Grade 3 ankle ligamentous injuries, external support with a semirigid brace or with a short-term use of a cast promotes injury healing more effectively than support with taping or with a tubular bandage, which may not furnish adequate protection against inversion of the ankle joint. Adequate for a general information statement that the majority of Grade 2 and 3 ankle sprains may be managed nonoperatively, but that the decision should be tailored to individual circumstances such as a large hematoma or a patient's level of physical activity using the lower extremity

References:

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Lardenoye S, Theunissen E, et al. The effect of taping versus semi-rigid bracing on patient outcome and satisfaction in ankle sprains: a prospective, randomized controlled trial. BMC Musculoskelet Disord 2012;28(13):81

Takao M, Miyamoto W, et al. Functional treatment after surgical repair for acute lateral ligament disruption of the ankle in athletes. Am J Sports Med 2012;40(2):447–451.