

Different functional treatment strategies for acute lateral ankle ligament injuries in adults (Review)

Kerkhoffs GMMJ, Struijs PAA, Marti RK, Assendelft WJJ, Blankevoort L, Dijk van CN



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ABSTRACT

Background

Acute lateral ankle ligament ruptures are common problems in present health care. Early mobilisation and functional treatment are advocated as a preferable treatment strategy. However, functional treatment comprises a broad spectrum of treatment strategies and as of yet no optimal strategy has been identified.

Objectives

The objective of this review is to assess different functional treatment strategies for acute lateral ankle ligament ruptures in adults.

Search strategy

We searched the Cochrane Musculoskeletal Injuries Group specialised register (December 2001), the Cochrane Controlled Trials Register (The Cochrane Library, Issue 4, 2001), MEDLINE (1966 to May 2000), EMBASE (1980 to May 2000), CURRENT CONTENTS (1993 to 1999), BIOSIS (to 1999), reference lists of articles, and contacted organisations and researchers in the field.

Selection criteria

Randomised clinical trials describing skeletally mature individuals with an acute lateral ankle ligament rupture and comparing different functional treatment strategies were evaluated for inclusion.

Data collection and analysis

Two reviewers independently assessed the quality of included trials and extracted relevant data on treatment outcome. Where appropriate, results of comparable studies were pooled. Individual and pooled statistics are reported as relative risks (RR) for dichotomous outcome and (weighted) mean differences (WMD) for continuous outcome measures with 95 per cent confidence intervals (95%CI). Heterogeneity between trials was tested using a standard chi-squared test.

Main results

Nine trials involving 892 participants were included. Lace-up ankle support had significantly better results for persistent swelling at short-term follow up when compared with semi-rigid ankle support (RR 4.19, 95% CI 1.26 to 13.98); elastic bandage (RR 5.48; 95% CI 1.69 to 17.76); and to tape (RR 4.07, 95% CI 1.21 to 13.68). Use of a semi-rigid ankle support resulted in a significantly shorter time to return to work when compared with an elastic bandage (WMD (days) 4.24; 95% CI 2.42 to 6.06); one trial found the use of a semi-rigid ankle support saw a significantly quicker return to sport compared with elastic bandage (RR 9.60; 95% CI 6.34 to 12.86) and another trial found fewer patients reported instability at short-term follow-up when treated with a semi-rigid support than with an elastic bandage (RR 8.00; 95% CI 1.03 to 62.07). Tape treatment resulted in significantly more complications, the majority being skin irritations, when compared with treatment with an elastic bandage (RR 0.11; 95% CI 0.01 to 0.86). No other results showed statistically significant differences.

Authors' conclusions

The use of an elastic bandage has fewer complications than taping but appears to be associated with a slower return to work and sport, and more reported instability than a semi-rigid ankle support. Lace-up ankle support appears to be effective in reducing swelling in

the short-term compared with semi-rigid ankle support, elastic bandage and tape. However, definitive conclusions are hampered by the variety of treatments used, and the inconsistency of reported follow-up times. The most effective treatment, both clinically and in costs, is unclear from currently available randomised trials.

PLAIN LANGUAGE SUMMARY

For ankle sprains treated functionally with the aid of supports, a semi-rigid or lace-up support seems a good option

When people sprain their ankles, they often injure the ligaments connecting the bones on the side of the ankle (lateral ankle ligaments). The damage might be a mild over-stretching or a complete rupture (break). The three main treatments are plaster casts or splints, surgery or keeping the ankle in use with external support from strapping or other supports (functional treatment). This review of trials looking at functional treatment found that elastic bandages lead to few complications than taping, but recovery might be faster with a semi-rigid ankle or lace-up support. More research is needed.

BACKGROUND

Lateral 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 per cent of all those seeking treatment (Stephensen 1981) and therefore an acute ankle ligament injury is the most frequently observed injury in the emergency room (Boruta 1990). The total annual cost to society for ankle injuries has been estimated to be approximately 35 million US dollars per one million people (Makuloluwe 1977). The treatment of inversion injuries is performed by emergency and primary health care doctors as well as by orthopaedic and trauma surgeons (Kannus 1991).

It is known that the anterior talofibular ligament is almost always the first or only ligament to sustain injury. Brostrom 1966 found that combined ruptures of the anterior talofibular ligament and the calcaneofibular ligament occurred in 20 per cent of cases and that isolated rupture of the calcaneofibular ligament was very rare. The posterior talofibular ligament is usually uninjured unless there is a frank dislocation of the ankle. Together, these three ligaments (anterior talofibular, calcaneofibular, posterior talofibular) form the lateral ligament complex of the ankle (Wiersma 1998).

The nomenclature for lesions of the lateral ligament complex of the ankle is diverse. Many terms are applied to the injured ligament, such as ankle sprain or ankle distortion. Most authors use the term 'sprain' to describe a morphologic condition, representing a diversity of pathology ranging from overstretching of the ligament to complete rupture with instability of the joint (Watson-Jones 1976).

The most common mechanism of injury is supination, a combination of adduction and inversion of the plantar-flexed foot. Traditionally, the diagnosis of this problem is made following a delayed physical examination four to seven days post trauma (Klenerman

1998; van Dijk 1994) and by a radiograph failing to demonstrate a bone fracture. A variety of treatments are used, with the three main modalities being:

- immobilisation with plaster cast or splint;
- functional treatment -an early mobilisation programme with the use of an external support;
- operative treatment.

Dehne 1933 was one of the first to describe immobilisation with a plaster cast below the knee. Freeman (Freeman 1965; Freeman 1965a; Freeman 1965b) introduced a new concept in the conservative treatment of ruptures of the lateral ligaments of the ankle by suggesting that the use of proprioceptive training using co-ordination exercises could reduce the proprioceptive deficit and symptoms of the ankle "giving way". Consequently, patients were treated with non-specific elastic bandage combined with coordination training. Functional treatment with tape bandage or orthotic support has become more popular in the last two decades (Jacob 1986; Lim 1995; Moller-Larsen 1988; Stover 1980; 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 definite conclusions (Zell 1988).

In a number of reviews on treatment of acute ankle sprains, early mobilisation and functional treatment are advocated, although some recent publications have shown slightly superior results after operative treatment (Ogilvie-Harris 1995; Kannus 1991; Tiling 1994; Pijnenburg 2000; Shrier 1995). In these reviews, however, a full analysis of the comparison between different functional treatment strategies was not conducted. As of yet, no optimal functional treatment strategy has been identified.

In this study, a systematic review of the available randomised controlled trials was conducted in order to perform a meta-analysis of data for different functional treatment strategies for acute ankle

sprains. In addition to two other Cochrane reviews on this subject, which investigated immobilisation versus functional treatment (Kerkhoffs 2002a) and surgery versus conservative treatment for ankle sprains (Kerkhoffs 2002b), this meta-analysis will be valuable in the further development of evidence-based recommendations for treatment of acute ankle sprains.

OBJECTIVES

The objective of this review was to compare different types and durations of functional treatment for the management of acute ankle injuries in adults. The main focus was on young to middle aged adults. Trials dealing solely with surgical or pharmacological interventions were excluded.

The specific null hypothesis is:

No difference exists in outcome between different types of functional treatment for acute injuries of the lateral ankle ligament complex.

CRITERIA FOR CONSIDERING STUDIES FOR THIS REVIEW

Types of studies

All randomised and quasi-randomised (methods of allocating participants to a treatment which are not strictly random e.g. date of birth, hospital record number or alteration) controlled trials comparing different types of functional treatment of injuries to the lateral ligament complex of the ankle. Unpublished reports retrieved from the authors were used and no restrictions were made concerning the language of publication.

Types of participants

Skeletally mature individuals, who have an acute injury to the lateral ligament complex of the ankle. Diagnosis can be based on either physical examination (positive anterior drawer test, pain and haematoma), a stress radiograph or an arthrogram of the injured ankle (diagnosis may be based on MRI, but this is not a necessity). Trials dealing exclusively with children (where growth plate injuries predominate) or patients with congenital deformities or degenerative conditions were excluded. A mixed population of adults and children was included if the adult population could be analysed separately.

Trials which were aimed at the treatment of chronic instability or post-surgical treatment were excluded. Patients with chronic instability have symptoms of pain, swelling, recurrent sprains and instability for longer than six months (Karlsson 1997).

Types of intervention

We categorised four general types of functional treatment and included trials comparing one treatment with another:

- elastic bandage/stocking, including all types that provide support using an elastic sock-like material (i.e. Malleotrain);
- tape, including all types that provide support using adhesive and elastic athletic tape;
- lace-up ankle support, including all types that provide support using a soft canvas-like or nylon material (i.e. Push-brace);
- semi-rigid ankle support, including all types that provide support through a firm thermoplastic material comprising a stirrup or posterior rigid support (i.e. Aircast Sport-Stirrup).

Trials which compared different types of the same category of functional treatment were excluded i.e. bandage versus bandage, as were trials comparing functional treatment with no treatment. Trials dealing solely with surgical or pharmacological interventions were also excluded.

Types of outcome measures

Data was sought for the following:

1. Return to sports (yes/no; time to achieve). Return to sports is defined as a return to the previous performed sport at the same level.
2. Return to work (yes/no; time to achieve)
3. Pain (yes/no) (continuous data)
4. Swelling (yes/no)
5. Subjective instability (e.g. 'giving way'; yes/no)
6. Objective instability (e.g. anterior drawer measures, talar tilt; yes/no)
7. Recurrent injury (yes/no)
8. Ankle mobility / range of motion (continuous data)
9. Complications (e.g. sensory deficit, infection, arthrosis, osteoarthritis, allergic reaction, stiffness, muscle atrophy; yes/no)
10. Patient satisfaction (interval, continuous or dichotomous data)

According to individual study follow-up times, treatment outcomes were assessed where possible:

- a. within six weeks of treatment (to identify early significant complications, short term results)
- b. six weeks to one year follow-up (to identify intermediate term results)
- c. one to two years after treatment (this is the standard minimum follow-up for publication of long term results in peer-reviewed journals such as the Journal of Bone and Joint Surgery. British Volume).

SEARCH METHODS FOR IDENTIFICATION OF STUDIES

See: Cochrane Bone, Joint and Muscle Trauma Group methods used in reviews.

We searched the Cochrane Musculoskeletal Injuries Group specialised register (December 2001), the Cochrane Controlled

Trials Register (The Cochrane Library, Issue 4, 2001), MEDLINE (1966 to May 2000), EMBASE (1980 to May 2000), CURRENT CONTENTS (1993 to 1999), BIOSIS (to 1999), reference lists of articles. We also contacted researchers in the field, the Medical Departments of the Dutch Defence Forces and the Royal Dutch Football Association.

Papers outside the English language were considered if translation was possible.

In MEDLINE (OVID Web), the following subject specific search was combined with the first two levels of the optimum search strategy (Clarke 2001):

1. Ankle Injuries/
2. Ligaments, Articular/
3. "Sprains and Strains"/
4. or/1-3
5. ankle\$.tw.
6. ligament\$.tw.
7. and/5-6
8. (sprain\$ or strain\$ or injur\$ or rupture\$ or tear or torn).tw.
9. and/7-8
10. and/4,9
11. Lateral Ligament, Ankle/
12. or/10-11

METHODS OF THE REVIEW

Selection of studies for inclusion:

From the title, abstract, or descriptors, two reviewers (GK, PS) independently reviewed literature searches to identify potentially relevant trials for full review. From the full text, using the above criteria, two reviewers (RM, CVD) independently selected trials for inclusion in this review (Dickersin 1992). Disagreement was resolved by consensus or third party adjudication (GK).

Quality assessment:

Methodological quality for each study was assessed independently, without masking (Jadad 1996; Schulz 1994; Verhagen 1998), by two reviewers (GK, PS) from the group using a piloted, subject-specific modification of the generic evaluation tool used by the Cochrane Musculoskeletal Injuries Group. Any disagreement was resolved by consensus or third party adjudication (WJJ). The scoring scheme for the 11 items of internal and external validity covered by this tool is given below.

A. Was the assigned treatment adequately concealed prior to allocation?

- 2=method did not allow disclosure of assignment
- 1=small but possible chance of disclosure of assignment or unclear
- 0=quasi-randomised or open list/tables

Cochrane code: clearly yes = A, not sure = B, clearly no = C.

B. Were the outcomes of patients who withdrew described and included in the analysis (intention to treat)?

- 2=intention to treat analysis based on all cases randomised possible or carried out

1=states number and reasons for withdrawal but intention to treat analysis not possible

0=not mentioned, or states number of withdrawals only

C. Were the outcome assessors blinded to treatment status?

- 2=effective action taken to blind assessors

1=small or moderate chance of unblinding of assessors

0=not mentioned or not possible

D. Were the treatment and control group comparable at entry?

- 2=good comparability of groups, or confounding adjusted for in analysis

1=confounding small; mentioned but not adjusted for

0=large potential for confounding, or not discussed

E. Were the subjects blind to assignment status after allocation?

- 2=effective action taken to blind subjects

1=small or moderate chance of unblinding subjects

0=not possible, or not mentioned (unless double-blind), or possible but not done

F. Were the treatment providers blind to assignment status after allocation?

- 2=effective action taken to blind treatment providers

1=small or moderate chance of unblinding of treatment providers

0=not possible, or not mentioned (unless double-blind), or possible but not done

G. Were care programmes, other than the trial options, identical?

- 2=care programmes clearly identical

1=clear but trivial differences

0=not mentioned or clear and important differences in care programmes

H. Were the inclusion and exclusion criteria clearly defined?

- 2=clearly defined

1=inadequately defined

0=not defined

I. Were the outcome measures used clearly defined?

- 2=clearly defined

1=inadequately defined

0=not defined

J. Was follow-up active and appropriate?

- 2=optimal

1=adequate

0=not defined, not adequate

K. Was the duration of surveillance clinically appropriate?

- 2=optimal

1=adequate

0=not defined, not adequate

Data extraction:

Data was independently extracted by two review authors (GK and PS) using a pre-piloted data extraction tool. Disagreements were resolved in a consensus meeting or, if necessary, by third party adjudication.

Where appropriate, results of comparable studies were pooled using fixed and random effects models. Individual and pooled statistics were reported as relative risks with 95 per cent confidence intervals for dichotomous outcomes and weighted or, where different scales have been used, standardised mean differences and 95 per cent confidence intervals for continuous outcome measures. Heterogeneity between trials was tested using a standard chi-squared test.

DESCRIPTION OF STUDIES

After deduction of the overlaps between the different databases, evaluation of the abstracts, and contact with some authors, a final total of 64 potentially eligible trials remained. The full texts of these articles were retrieved and thoroughly assessed as described above. This resulted in the inclusion of nine trials, involving 892 patients. The main reason for exclusion was that the trials contained no comparison of two different types of functional treatment. Details can be seen in the Characteristics of Excluded Studies Table.

Of the nine included trials, none looked at the same intervention comparisons. The variety of functional treatments included in the trials can be seen in detail in the Characteristics of Included Studies Table.

METHODOLOGICAL QUALITY

The methodological quality scores are listed in the Characteristics of Included Studies Table, under 'Methods'. The validity assessment comprised 13 items, each with a maximum of two points. However, it was not possible to ascribe points to items E and F in any of the trials, because blinding of patients and care providers proved to be impossible for the treatment strategies assessed. Therefore, a total of 22 points was the maximum score attainable. The initial agreement of the two reviewers on the quality assessment of the included trials was 91 per cent (118 out of 130 items). The median Kappa value (K) for measurement of agreement beyond chance of the separate validity items between these two reviewers was 0.81 (range 0-1). After our initial assessment, mean validity of included trials ranged from five to 15 points (maximum possible score 22), with a mean score of 10.8 points (SD 2.9). After retrieving additional information from the authors, the mean validity score increased to 10.9 (SD 2.9).

RESULTS

Data were extracted on all relevant outcome measures as previously described. Six comparisons were available in the retrieved studies:

- I) Elastic bandage versus tape
- II) Elastic bandage versus semi-rigid ankle support
- III) Elastic bandage versus Lace-up ankle support
- IV) Tape versus semi-rigid ankle support
- V) Tape versus lace-up ankle support
- VI) Semi-rigid ankle support versus lace-up ankle support

I) ELASTIC BANDAGE VERSUS TAPE

Four trials compared the effectiveness of elastic bandage and tape as treatment strategies (Pasila 1975; Allen 1985; Zeegers 1995; Jongen 1992). Outcomes on pain and occurrence of complications were both presented in two trials and these results were pooled. Tape treatment resulted in significantly more complications compared with treatment with an elastic bandage (RR 0.11; 95% CI 0.01 to 0.86). The majority of these complications were skin problems. Other outcomes (return to sports, return to work, pain, swelling, objective instability, subjective instability, range of motion and satisfaction) were reported in single trials only and no statistically significant differences were identified.

II) ELASTIC BANDAGE VERSUS SEMI-RIGID ANKLE SUPPORT

Four studies compared elastic bandage and a semi-rigid ankle support (Karlsson 1996; Leanderson 1995; Zeegers 1995; Dettori 1994). Time to return to work was the only outcome described in multiple trials (Leanderson 1995; Karlsson 1996) and these results were pooled. The use of a semi-rigid ankle support resulted in a statistically significant shorter period to return to work compared to the use of an elastic bandage (WMD (days) 4.24; 95% CI 2.42 to 6.06).

Karlsson 1996 found those treated with a semi-rigid ankle support had a significantly faster return to sports than those treated with an elastic bandage (WMD (days) 9.60; 95% CI 6.34 to 12.86), while in Zeegers 1995, fewer patients reported instances of 'giving way' at short term follow-up in the group treated with a semi-rigid support (RR 8.00, 95% CI 1.03 to 62.07). No differences were found for return to work, pain, swelling, objective instability, recurrent injury or decreased range of motion.

III) ELASTIC BANDAGE VERSUS LACE-UP ANKLE SUPPORT

This comparison was described in one study. Zeegers 1995 found significantly superior results for lace-up ankle support compared with elastic bandage in regard to the persistence of swelling at short-term follow-up (RR 5.48; 95% CI 1.69 to 17.76). The significant difference did not persist for the longer term follow-up periods. For return to work, pain, subjective and objective instability

and range of motion, analysis of the results did not demonstrate statistically significant differences.

IV) TAPE VERSUS SEMI-RIGID ANKLE SUPPORT

Two included trials compared the effectiveness of tape with that of a semi-rigid ankle support (Zeegers 1995; Sommer 1993). Diversity of outcome measures prohibited pooling of results. On return to work, pain, swelling, subjective instability, objective instability, recurrent injury and range of motion, no statistically significant differences were found in individual trials.

V) TAPE VERSUS LACE-UP ANKLE SUPPORT

In two trials (Zeegers 1995; Twellaar 1993), the use of tape was compared with treatment using a lace-up ankle support. For persistence of swelling at short-term follow-up, lace-up ankle support showed significantly superior results in one trial (Zeegers 1995; RR 4.07; 95% CI 1.21 to 13.68).

We pooled long-term results for pain, swelling and subjective instability. No statistically significant differences were found. Results on return to work, pain, subjective instability, objective instability and range of motion were described in individual trials only and no significant differences were found.

VI) SEMI-RIGID ANKLE SUPPORT VERSUS LACE-UP ANKLE SUPPORT

This comparison was described in one trial (Zeegers 1995). A statistically significant result was reported with regard to the persistence of swelling at short-term follow-up favouring lace-up ankle support when compared with semi-rigid ankle support (RR 4.19; 95%CI 1.26 to 13.98). No significant differences were shown for return to work, pain, subjective instability, objective instability and range of motion.

DISCUSSION

Current evidence on the treatment of acute ankle sprain in adults supports the view that functional treatment is preferable to treatment in a cast (Ogilvie-Harris 1995; Kannus 1991; Pijnenburg 2000; Tiling 1994; Shrier 1995). Advantages are claimed for operative treatment (Pijnenburg 2000), but disadvantages as well (Ogilvie-Harris 1995).

In the literature, functional treatment has usually been used as one category for different forms of treatment. As a result, differences in effectiveness within this category of functional treatment strategies cannot be excluded. This meta-analysis examined the best available evidence on the effectiveness of several different functional treatment strategies for the management of uncomplicated acute ankle sprains in adults, in order to compare the above-mentioned possible differences. On the basis of the results, the use of an elastic bandage seems preferable to the use of tape as treatment for an

acute ankle sprain in adults. 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 four different treatment strategies. Therefore, no definite conclusions concerning the optimal functional treatment strategy can be drawn.

Nine randomised controlled trials were included in our systematic review. Quality of included trials was moderate but partially acceptable with validity scores between five and 15 out of maximum 22 points. After evaluation of the results, few statistically significant differences between interventions were identified. Compared to the use of an elastic bandage, the use of tape shows significantly more complications, especially skin problems due to adhesion of tape to the skin, and has no statistically significant benefits with regard to other outcome measures. The skin problems seem evident and tape treatment should be used only with the utmost care for the patients' skin. While elastic bandage is generally well tolerated, a semi-rigid ankle support shows statistically significant better results with regard to the period to return to work or sports. Thence, the use of a semi-rigid ankle support seems to have socio-economic advantages above the use of an elastic bandage. None of the other results showed statistically significant differences.

Caution is required in interpreting the data presented in this meta-analysis. The small number of randomised controlled trials available, the limitations in their study design and the diversity of comparison studied makes it impossible to draw definitive conclusions concerning the optimal functional treatment strategy for an acute ankle sprain in adults. For example, only one study described adequately blinded outcome measurements (Dettori 1994) and most studies describe only short-term, only intermediate-term or only long-term results (Karlsson 1996; Leanderson 1995; Pasila 1975; Allen 1985; Twellaar 1993). Therefore, high-quality, sufficiently powered randomised trials are warranted to compare the effectiveness of different functional strategies for treatment of acute ankle sprain. Also, cost-effectiveness of different functional therapies should be incorporated since costs vary greatly between the various strategies. Both direct and indirect costs should be evaluated.

We also accept the possibility of both publication bias (Dickersin 1994) and study selection bias (Oxman 1994; Mulrow 1987). To reduce the risk of publication bias, a comprehensive and systematic search of the published and unpublished literature for potentially relevant studies was conducted (Clarke 2001). This was followed by attempts to contact corresponding authors. No additional published trial was identified. We addressed study selection bias by having two independent reviewers perform the selection; therefore we feel confident that the studies excluded were done so for consistent and appropriate reasons. We plan to update this review if additional eligible trials are found.

The validity of results generated from meta-analysis of small trials has been questioned. LeLorier and colleagues argued that there was low agreement between large clinical trials and meta-analyses

(LeLorier 1997). However, examination of their results showed considerable similarity between the results of meta-trials and meta-analyses. Ankle injuries are common; large trials should not be difficult to design and conduct.

AUTHORS' CONCLUSIONS

Implications for practice

The use of an elastic bandage seems preferable to the use of tape as treatment for an acute ankle sprain in adults. 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 four different treatment strategies. Therefore, no definite conclusions concerning the optimal functional treatment strategy can be drawn.

Implications for research

High-quality, sufficiently powered randomised trials are warranted to compare the effectiveness of different functional strategies for treatment of acute ankle sprain. An analysis of both direct and indirect costs of different functional therapies should be incorporated as costs may vary between strategies.

POTENTIAL CONFLICT OF INTEREST

None known.

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* Indicates the major publication for the study

TABLES

Characteristics of included studies

Study	Allen 1985
Methods	Randomisation method: not described. Blinding: no blinding. Loss to FU: 13/38 at 10 days. A: 1 E: 0 J: 2 B: 1 F: 0 K: 1 C: 0 G: 2 L:0 D: 2 H:2 T:11
Participants	Leicester Royal Infirmary. Leicester, United Kingdom. Skeletally mature patients. Exclusion criteria: fractures; presenting with an acute ankle inversion injury.
Interventions	Period of study: not mentioned. a) Elastic strapping for 10 days b) Tensoplast for 10 days Assigned: 20/18 Analysed: 13/12
Outcomes	Pain as measured by a subjective score. ROM
Notes	Diagnosis, Physical examination, stress X-ray, Arthrography

Characteristics of included studies (Continued)

Allocation concealment B – Unclear

Study	Dettori 1994
Methods	Randomisation method: not described. Blinding: adequate blinding of outcome measures. Loss to FU: 8/46 at 1 year. A: 1 E: 0 J: 2 B: 0 F: 0 K: 1 C: 0 G: 2 L: 0 D: 1 H: 2 T: 9
Participants	Madigan Army Medical Center, Tacoma, United States of America. Skeletally mature patients presenting with moderate/severe acute ankle sprains. Exclusion criteria: fractures.
Interventions	Period of study: 1987 a) Elastic bandage for 14 days b) Semi-rigid (Air-stirrup) brace Assigned: 24/22 Analysed: 20/18
Outcomes	Return to work Pain as measured by a subjective questionnaire. Swelling ROM
Notes	Diagnosis, Physical examination, Arthrography
Allocation concealment	B – Unclear

Study	Jongen 1992
Methods	Randomisation method: not described. Blinding: no blinding. Loss to FU: 12/100 at 15 weeks A: 1 E: 0 J: 2 B: 1 F: 0 K: 1 C: 0 G: 2 L: 1 D: 1 H: 2 T: 11(10)
Participants	Medical Center Alkmaar, Alkmaar, The Netherlands. Skeletally mature patients presenting with acute ankle sprains. Exclusion criteria: fractures; chronic instability; history of recurrent sprains.
Interventions	Period of study: 1991 a) 1 week cast, then elastic bandage (Malleotrain) for 6 weeks b) 1 week cast, then tape for 3x2 weeks Assigned: 50/50 Analysed: 44/44
Outcomes	Return to sports Complications Satisfaction Return to work
Notes	Diagnosis, Physical examination, Arthrography
Allocation concealment	B – Unclear

Study	Karlsson 1996
Methods	Randomisation: concealed envelope drawing. Blinding: no blinding. Loss to FU: 2/86 at 18 months. A: 1 E: 0 J: 2 B: 1 F: 0 K: 2 C: 0 G: 2 L: 1

Characteristics of included studies (Continued)

	D: 2 H:2 T:13
Participants	Ostra University Hospital, Goteborg, Sweden. Skeletally mature sports participants presenting with acute grade II/III lateral ankle sprains. Exclusion criteria: neurologic disease; history of recurrent injury; fractures.
Interventions	Period of study: not mentioned. a) Elastic bandage, p.w.b. and crutches until pain subsided b) Compression pads, e.w.b., ROM training Assigned: 40/46 Analysed: 39/45 Both groups receiving identical PT-treatment after 1 week
Outcomes	Return to sports Return to work Pain (subjective questionnaire) Swelling (subjective questionnaire) Subjective instability Return to sports Return to work
Notes	Diagnosis, Physical examination, Arthrography
Allocation concealment	A – Adequate

Study **Leanderson 1995**

Methods	Randomisation method: concealed envelope drawing. Blinding: no blinding. Loss to FU: 0% at 10 weeks. A: 2 E: 0 J: 2 B: 0 F: 0 K: 1 C: 0 G: 2 L:1 D: 2 H:2 T:12
Participants	Huddinge University Hospital, Huddinge, Sweden. Skeletally mature patients presenting with acute grade II/III lateral ankle sprains. Exclusion criteria: fractures; neurologic disease; history of recurrent sprains.
Interventions	Period of study: 1992-1993 a) Elastic bandage for 3 weeks b) Ankle brace (Air Stirrup) for 3 weeks Assigned: 34/39 Analysed: 34/39
Outcomes	Return to work Pain (Borg pain scale) Objective instability
Notes	Diagnosis, Physical examination, stress X-ray
Allocation concealment	A – Adequate

Study **Pasila 1975**

Methods	Randomisation method: 'drawing of envelopes'. Blinding: no blinding. Loss to follow-up: 0% at 2 years. A: 2 E: 0 J: 2 B: 1 F: 0 K: 2 C: 0 G: 2 L:2 D: 2 H:2 T:15
Participants	University Hospital Helsinki, Helsinki, Finland. Skeletally mature patients presenting with an acute ankle ligament injury. Exclusion criteria: chronic instability; fractures.
Interventions	Period of study: 1973.

Characteristics of included studies (Continued)

	a) Tensoplast for 8 days b) Elastic bandage for 8 days Assigned: 60/60 Analysed: 60/60
Outcomes	Swelling (mean decrease) Complications
Notes	Diagnosis, Physical examination follow-up
Allocation concealment	A – Adequate

Study Sommer 1993

Methods	Randomisation method: not stated. Blinding: no blinding. Loss to FU: 10/80 at 6 months. A: 1 E:0 J:1 B: 0 F: 0 K:1 C: 0 G: 0 L:0 D:0 H: 2 T: 5
Participants	University Hospital Heidelberg, Heidelberg, Germany. Patients between 18 and 45 years presenting with an acute lateral ligament rupture. Exclusion criteria: chronic instability; fractures.
Interventions	Period of study: 1989 a) Aircast brace for 6 weeks b) Tape for 6 weeks Assigned: 40/40 analysed: 37/33
Outcomes	Return to sports Objective instability (Talar tilt measurement on X-ray) Recurrent sprain
Notes	Diagnosis, Arthrography Stress X-ray Physical examination Short and intermediate term follow-up
Allocation concealment	B – Unclear

Study Twellaar 1993

Methods	Randomisation method: not mentioned. Blinding: no blinding. Loss to FU: 53/165 at 2.5 years. A: 1 E:0 J:1 B: 1 F: 0 K:1 C: 0 G: 2 L:1 D:0 H: 0 T: 7
Participants	University Hospital Maastricht, Maastricht, The Netherlands. Skeletally mature patients presenting with an acute lateral ligament rupture. Exclusion criteria: chronic ankle complaints; fractures.
Interventions	Period of study: not mentioned. a) Tape for 7 weeks b) Push brace for 7 weeks Assigned: 88/77 Analysed: 63/53 by interview and 46/47 by physical examination at FU.
Outcomes	
Notes	Diagnosis, Stress X-ray Physical examination
Allocation concealment	B – Unclear

Study	Zeegers 1995
Methods	Randomisation method: concealed envelopes. Blinding: no blinding. Loss to FU: 0% A: 1 E: J: 2 B: 2 F: K: 1 C: 0 G: 2 L: 2 D: 2 H: 2 T: 14
Participants	Skeletally mature patients presenting with an acute lateral ligament rupture.
Interventions	Period of study: not mentioned a) Tape for 3 weeks, tubigrip for 2 weeks (N=59) b) Adimed Stabil Shoe for 5 weeks (N=60) c) Aircast for 5 weeks Aircast (N=62) d) Support stockings for 5 weeks (N=62)
Outcomes	Return to work Pain Swelling Subjective instability Objective instability Range of Motion
Notes	Diagnosis, Physical examination, Arthrography
Allocation concealment	B – Unclear
p.w.b.= partial weight bearing	
f.w.b. = full weight bearing	

Characteristics of excluded studies

Study	Reason for exclusion
Airaksinen 1990	RCT. Elastic bandage versus elastic bandage and Intermittent Pneumatic Compression (IPC). The intervention studied is the effect of IPC.
Alt 1999	CCT. Functional properties of adhesive ankle taping. Not the intervention of interest.
Amoroso 1998	CCT. Effect of braces as a preventive method for ankle sprains. No comparative treatment trial.
Andersson 1983	RCT. Ibuprofen and two qualities of compression bandage. Comparison of two types of elastic bandaging.
Avcı 1998	RCT. Comparison of the results of short-term rigid and semi-rigid cast immobilisation. No comparison of functional treatment strategies.
Blandfort 1991	CCT. The clinical efficacy of the malleotrain bandage was evaluated in a clinical field trial on a very large mixed patient group. No comparisons made.
Brakenbury 1983	RCT. Trial on Enzyme therapy versus placebo and plaster versus tubigrip in four treatment groups. No comparison of different functional treatment strategies.
Brooks 1981	RCT. Four treatment groups: No treatment, physiotherapy, double tubigrip and cast immobilisation. No comparison of different functional treatment strategies.
Brostrom 1966	RCT. Three treatment groups: surgery followed by cast immobilisation, cast, wrap. No comparison of different functional treatment strategies.
Caro 1964	RCT. Three treatment groups: hydrocortisone injection and bandage, wrap, cast. The group with the elastic bandage had an injection as well, thus there was no pure comparison between two functional treatment strategies.
Cetti 1984	RCT. Plaster cast immobilisation versus Pliton-brace. No comparison of different functional treatment strategies

Duwairi 1998	RCT. Elastic bandage versus splint immobilisation for one week followed by two weeks of plaster of Paris. No comparison of different functional treatment strategies
Eiff 1994	RCT. Early mobilisation versus immobilisation treatment. No comparison of functional treatment strategies.
Freeman 1965	RCT. Three treatment groups: wrap, cast immobilisation and surgery. No comparison of functional treatment strategies.
Grasmueck 1997	RCT. Comparison of surgery versus conservative treatment with Adimed shoe or Aircast. Two functional treatment strategies can be selected but are from the same category, so analysis is not warranted.
Green 2001	RCT. Evaluation of the effect of passive accessory joint mobilisation on acute ankle inversion sprains. No comparison of functional treatment strategies
Gronmark 1980	CCT. Three treatment groups: surgery followed by cast, cast and wrapping. No comparison of different functional treatment strategies.
Gross 1991	CCT. Comparison of Swede-O-Universal Ankle Support and Aircast Sport-Stirrup orthoses and ankle tape in restricting eversion- inversion before and after exercise. No comparison of treatment strategies.
Hazanas-Ruiz 1999	RCT. Comparison of immobilisation with cast (3 weeks) and functional treatment with tape. No comparison of functional treatment strategies.
Hedges 1980	RCT. Immobilisation in a cast versus elastic bandage. No comparison of functional treatment strategies.
Holmer 1991	RCT. Two functional treatment strategies are compared - TED stockings versus ACE bandage. Both treatment strategies are categorised as being in the 'bandage' group as a functional treatment, therefore no comparison of different functional treatment strategies.
Hoogenband 1984	RCT. Cast and physiotherapy versus wrap and mobilisation. No comparison of functional treatment strategies.
Jerosch 1997	Not a comparative study. The influence of braces on the stability of the ankle joint is evaluated.
Johannes 1993	RCT. Comparison of the clinical efficacy of a semi-rigid bandage (Scotchrap) with the standard tape treatment. A comparison of two functional treatment strategies that are categorised as being in the same group, therefore no comparison of different functional treatment strategies.
Jorgensen 1986	RCT. Comparison of Naprosyne and mobilisation and placebo and immobilisation as treatment strategy. No comparison of functional treatment strategies.
Klein 1991	RCT. Comparison of immobilisation with cast and functional treatment with tape. No comparison of functional treatment strategies.
Konradsen 1991	RCT. Comparison of immobilisation with cast and functional treatment with tape. No comparison of functional treatment strategies.
Korkala 1987	RCT. Three treatment groups: immobilisation in a cast, elastic bandage and surgery. No comparison of functional treatment strategies.
Lind 1984	RCT. Immobilisation in a cast versus elastic bandage. No comparison of functional treatment strategies.
Makuloluwe 1977	CCT. The authors studied the effectiveness of ultrasound as treatment strategy for ankle sprains. Not the comparison of interest.
Manfroy 1997	CCT. The effect of exercise, prewrap, and athletic tape on the maximal active and passive ankle resistance of ankle inversion. No comparison of functional treatments for ankle sprain.
McCulloch 1985	RCT. The effect of two types of analgesia and immobilisation versus tape were evaluated in a four treatment group model. No comparison of functional treatments.
Milford 1990	RCT. Different functional treatment strategies used in one category.
Moller-Larsen 1988	RCT. Three treatment strategies: surgery and cast, cast and tape. No comparison of functional treatment strategies.
Munk 1995	RCT. Three treatment strategies were evaluated: surgery, cast and elastic bandage. No comparison of functional treatment strategies.

Characteristics of excluded studies (Continued)

Muwanga 1986	RCT. Nottingham ankle support, tubigrip and elastic bandage are evaluated. These are all categorised in the same functional treatment group for this review, so no comparison of different functional treatment strategies.
Nilsson 1983	RCT. Three treatment groups: elastic wrapping, cold pack icing and elastic wrapping, cold pack plus elastic wrapping plus local injection with lidocaine. No comparison of different functional treatments.
Nordkild 1986	RCT. Two types of immobilisation are examined: Hexcelite versus plaster of Paris. No comparison of functional treatment strategies.
O'Hara 1992	RCT. Two types of elastic bandage are compared. No comparison of different treatment strategies.
Oostendorp 1987	RCT. Comparison of elastic bandage versus elastic bandage and physiotherapy. The authors studied the effectiveness of physiotherapy as additive treatment for ankle sprains.
Otto 1997	RCT. Surgery versus early mobilisation with Aerocast pneumatic splints. No comparison of functional treatment strategies.
Prins 1978	RCT. Comparison of surgery, cast and tape. No comparison of different functional treatment strategies.
Regis 1995	RCT. Immobilisation in a cast versus 10 days of immobilisation in a cast followed by brace treatment. No comparison of functional treatment strategies.
Rocinski 1991	RCT. The effect of intermittent compression on edema in postacute ankle sprains. No comparison of different functional treatment strategies. Author described a 30 minutes follow-up and did not respond to a request for additional information.
Roycroft 1983	RCT. Initial immobilisation versus immediate active treatment. Different treatments within one group of patients.
Scotece 1992	RCT. Athletic tape versus three days of gecast versus daily tape for 3 days. No comparison of different treatment strategies.
Soosai Nathan 1997	RCT. Comparison of the aircast ankle brace with cast. No data available. No different functional treatment strategies compared.
Tufft 1994	RCT. Comparison of wool and crepe, and elastic tubular bandages. Two types of elastic bandage are compared, therefore no comparison of different functional treatment strategies.
Verbrugge 1996	CCT. The effects of a semi-rigid Air-Stirrup bracing vs. adhesive ankle taping on motor performance. Not the injury of interest.
Viljakka 1983	RCT. Treatment comparison of elastic bandage and antiphlogistic drugs. Comparison of two types of bandage treatment.
Vitellas 1995	RCT. The role of stress radiographs for the severe ankle sprain: a 7 year prospective study. No comparison of functional treatment strategies.
Watts 2001	RCT. Double tubigrip versus no treatment. No different functional treatment strategies.
Wiley 1996	Not a comparative study. The effect of the Malleoloc ankle joint orthosis on range of motion and performance.
Wilkerson 1993	RCT. Three treatment strategies are tested and compared, however every patient is treated with the Air-Stirrup brace. No different functional treatment strategies are compared.
Zwipp 1986	RCT. Four treatment strategies: surgery and cast, surgery and tape, cast, tape. No comparison of different functional treatment strategies.

ANALYSES

Comparison 01. Elastic bandage versus Tape

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Numbers not returning to sports			Relative Risk (Fixed) 95% CI	Totals not selected
02 Numbers not returning to work			Relative Risk (Fixed) 95% CI	Totals not selected
03 Pain			Relative Risk (Fixed) 95% CI	Subtotals only
04 Swelling			Relative Risk (Fixed) 95% CI	Totals not selected
05 Subjective instability (giving way)			Relative Risk (Fixed) 95% CI	Totals not selected
06 Objective instability (talar tilt and/or ADS)			Relative Risk (Fixed) 95% CI	Totals not selected
07 Decreased ROM			Relative Risk (Fixed) 95% CI	Totals not selected
08 Complications	2	208	Relative Risk (Fixed) 95% CI	0.11 [0.01, 0.86]
09 Patient satisfaction			Relative Risk (Fixed) 95% CI	Totals not selected

Comparison 02. Elastic bandage versus Semi-rigid ankle support

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Numbers not returning to work			Relative Risk (Fixed) 95% CI	Totals not selected
02 Pain			Relative Risk (Fixed) 95% CI	Totals not selected
03 Swelling			Relative Risk (Fixed) 95% CI	Totals not selected
04 Subjective instability (giving way)			Relative Risk (Fixed) 95% CI	Totals not selected
05 Objective instability (talar tilt and/or ADS)			Relative Risk (Fixed) 95% CI	Totals not selected
06 Recurrent injury			Relative Risk (Fixed) 95% CI	Totals not selected
07 Decreased ROM			Relative Risk (Fixed) 95% CI	Totals not selected
08 Return to sports (days)			Weighted Mean Difference (Fixed) 95% CI	Totals not selected
09 Return to work (days)	2	157	Weighted Mean Difference (Fixed) 95% CI	4.24 [2.42, 6.06]
10 Pain			Weighted Mean Difference (Fixed) 95% CI	Totals not selected
11 Swelling			Weighted Mean Difference (Fixed) 95% CI	Totals not selected
12 Subjective instability			Weighted Mean Difference (Fixed) 95% CI	Totals not selected

Comparison 03. Elastic bandage versus Lace-up ankle support

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Numbers not returning to work			Relative Risk (Fixed) 95% CI	Totals not selected
02 Pain			Relative Risk (Fixed) 95% CI	Totals not selected
03 Swelling			Relative Risk (Fixed) 95% CI	Totals not selected
04 Subjective instability (giving way)			Relative Risk (Fixed) 95% CI	Totals not selected
05 Objective instability (talar tilt and/or ADS)			Relative Risk (Fixed) 95% CI	Totals not selected
06 Decreased ROM			Relative Risk (Fixed) 95% CI	Totals not selected

Comparison 04. Tape versus Semi-rigid ankle support

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Numbers not returning to work			Relative Risk (Fixed) 95% CI	Totals not selected
02 Pain			Relative Risk (Fixed) 95% CI	Totals not selected
03 Swelling			Relative Risk (Fixed) 95% CI	Totals not selected
04 Subjective instability (giving way)			Relative Risk (Fixed) 95% CI	Totals not selected
05 Objective instability (talar tilt and/or ADS)			Relative Risk (Fixed) 95% CI	Totals not selected
06 Recurrent sprains			Relative Risk (Fixed) 95% CI	Totals not selected
07 Decreased ROM			Relative Risk (Fixed) 95% CI	Totals not selected
08 Return to work (days)			Weighted Mean Difference (Fixed) 95% CI	Totals not selected
09 Objective instability (talar tilt and/or ADS)			Weighted Mean Difference (Fixed) 95% CI	Totals not selected

Comparison 05. Tape versus Lace-up ankle support

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Numbers not returning to work			Relative Risk (Fixed) 95% CI	Totals not selected
02 Pain			Relative Risk (Fixed) 95% CI	Subtotals only
03 Swelling			Relative Risk (Fixed) 95% CI	Subtotals only
04 Subjective instability (giving way)			Relative Risk (Fixed) 95% CI	Subtotals only
05 Objective instability (talar tilt and/or ADS)			Relative Risk (Fixed) 95% CI	Subtotals only
06 Decreased ROM			Relative Risk (Fixed) 95% CI	Totals not selected

Comparison 06. Semi-rigid ankle support versus Lace-up ankle support

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Numbers not returning to work			Relative Risk (Fixed) 95% CI	Totals not selected
02 Pain			Relative Risk (Fixed) 95% CI	Totals not selected
03 Swelling			Relative Risk (Fixed) 95% CI	Totals not selected
04 Subjective instability (giving way)			Relative Risk (Fixed) 95% CI	Totals not selected
05 Objective instability (talar tilt and/or ADS)			Relative Risk (Fixed) 95% CI	Totals not selected
06 Decreased ROM			Relative Risk (Fixed) 95% CI	Totals not selected

INDEX TERMS

Medical Subject Headings (MeSH)

Ankle Injuries [*therapy]; Bandages; Immobilization; Lateral Ligament, Ankle [*injuries]; Sprains and Strains [*therapy]

MeSH check words

Adult; Humans

COVER SHEET

Title	Different functional treatment strategies for acute lateral ankle ligament injuries in adults
Authors	Kerkhoffs GMMJ, Struijs PAA, Marti RK, Assendelft WJJ, Blankevoort L, Dijk van CN
Contribution of author(s)	This review was initiated by Gino Kerkhoffs (GK) and others, including two review group authors (Peter Struijs and Niek van Dijk) and some preliminary work done. The lead was taken by GK and the scope of the review was refined. Initial trial location was performed by GK and Peter Struijs (PS) and subsequently by GK, PS and Niek van Dijk (CVD). Study selection was done by at least two review authors, and always GK and PS. All reviewers participated in quality assessment and data extraction of the included trials. Compilation of the comparisons, structuring of the review, data entry into RevMan and composition of the first drafts and rewrites of the text were shared by GK and PS. Rene Marti, Pim Assendelft, Leendert Blankevoort and Niek van Dijk advised on the analysis and content and provided critical feedback on the work. Gino Kerkhoffs is the guarantor of the review.
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Date new studies sought but none found	Information not supplied by author
Date new studies found but not yet included/excluded	Information not supplied by author
Date new studies found and included/excluded	Information not supplied by author
Date authors' conclusions section amended	Information not supplied by author
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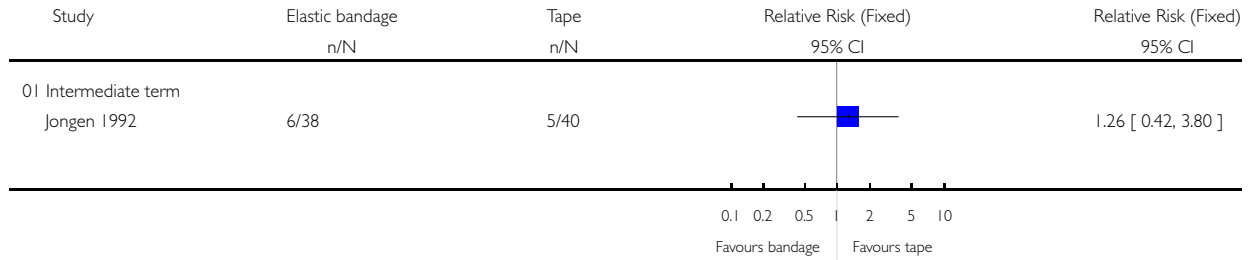
GRAPHS AND OTHER TABLES

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Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 01 Elastic bandage versus Tape

Outcome: 01 Numbers not returning to sports

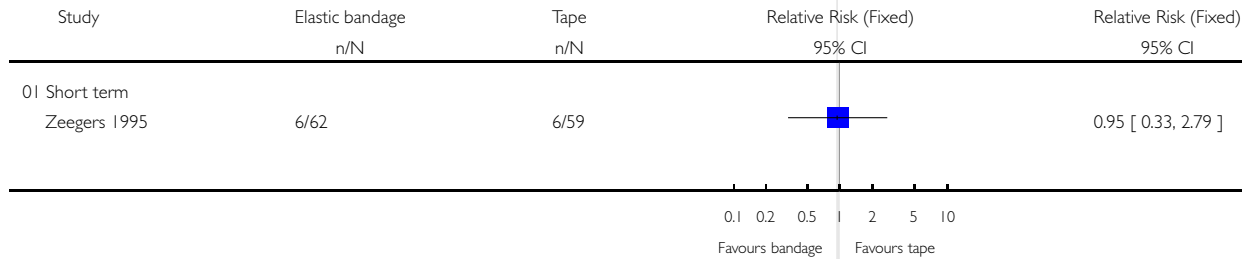


Analysis 01.02. Comparison 01 Elastic bandage versus Tape, Outcome 02 Numbers not returning to work

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 01 Elastic bandage versus Tape

Outcome: 02 Numbers not returning to work

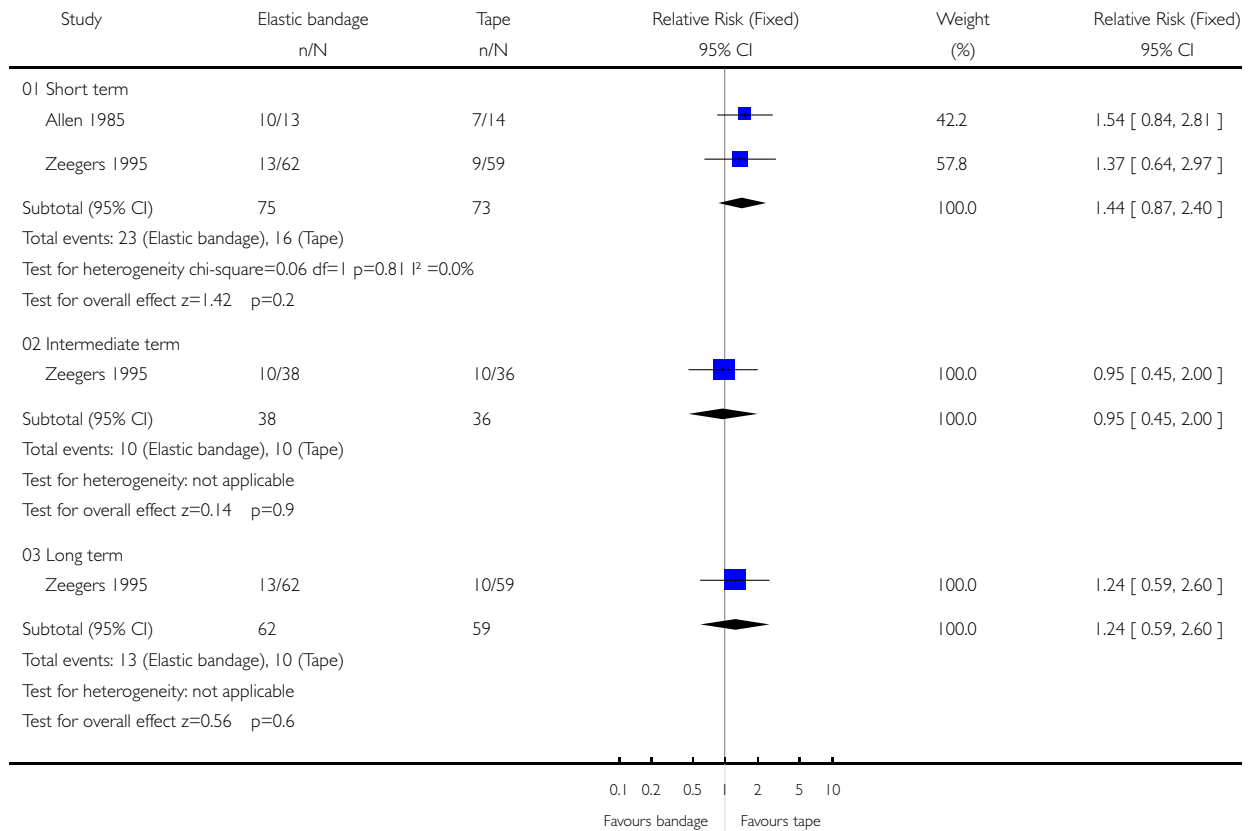


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Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 01 Elastic bandage versus Tape

Outcome: 03 Pain

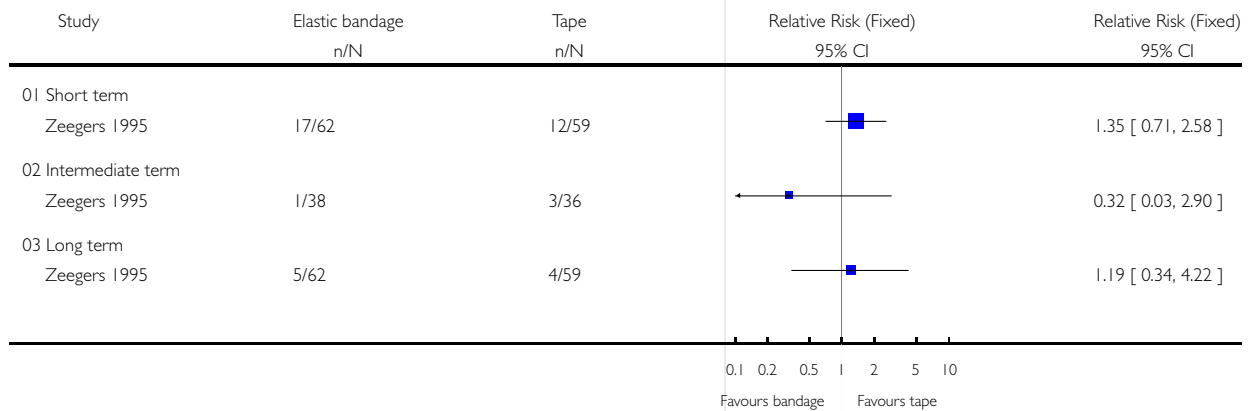


Analysis 01.04. Comparison 01 Elastic bandage versus Tape, Outcome 04 Swelling

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 01 Elastic bandage versus Tape

Outcome: 04 Swelling

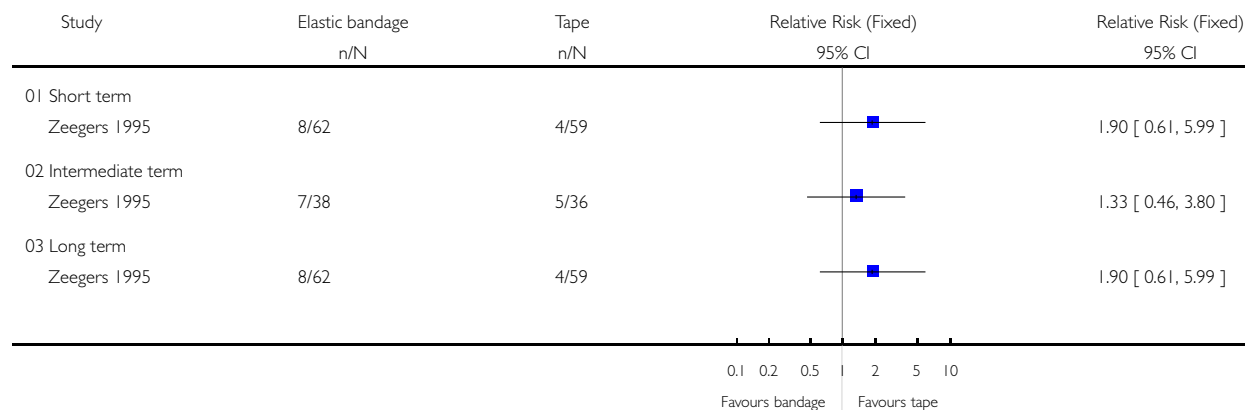


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Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 01 Elastic bandage versus Tape

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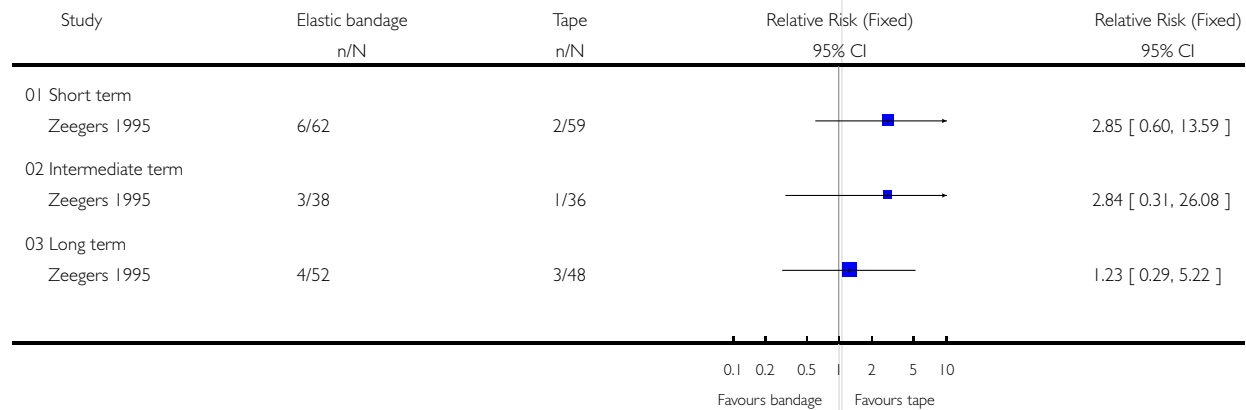


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Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 01 Elastic bandage versus Tape

Outcome: 06 Objective instability (talar tilt and/or ADS)

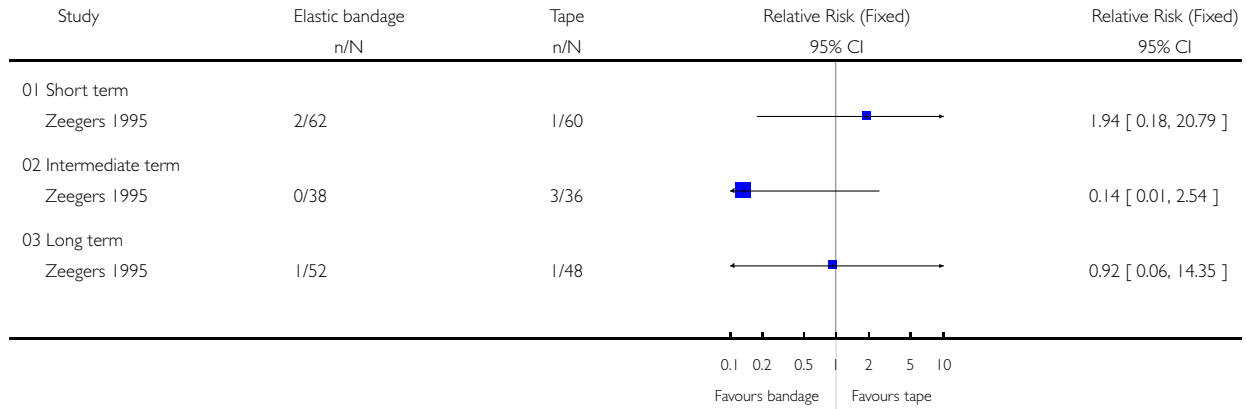


Analysis 01.07. Comparison 01 Elastic bandage versus Tape, Outcome 07 Decreased ROM

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 01 Elastic bandage versus Tape

Outcome: 07 Decreased ROM

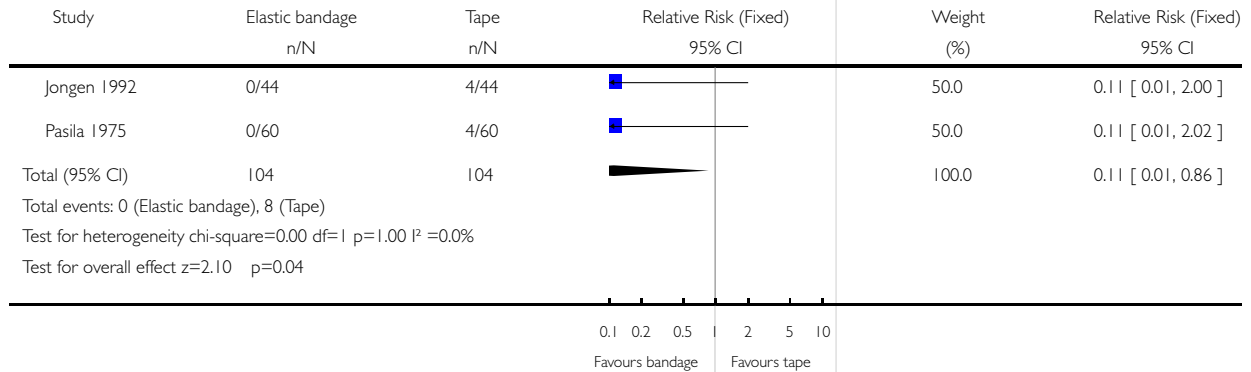


Analysis 01.08. Comparison 01 Elastic bandage versus Tape, Outcome 08 Complications

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 01 Elastic bandage versus Tape

Outcome: 08 Complications

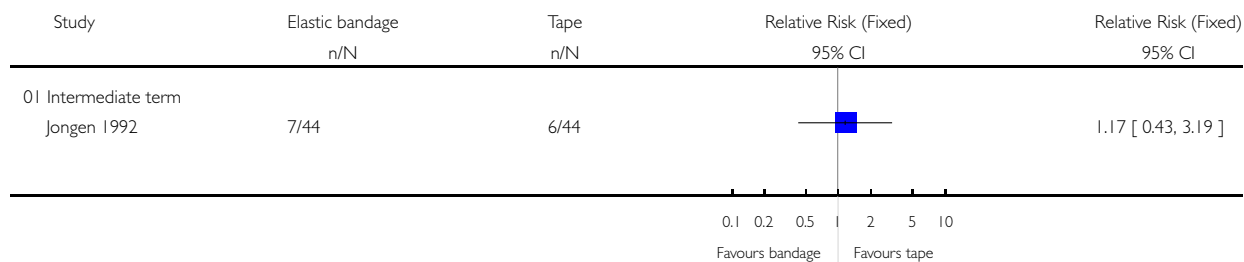


Analysis 01.09. Comparison 01 Elastic bandage versus Tape, Outcome 09 Patient satisfaction

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 01 Elastic bandage versus Tape

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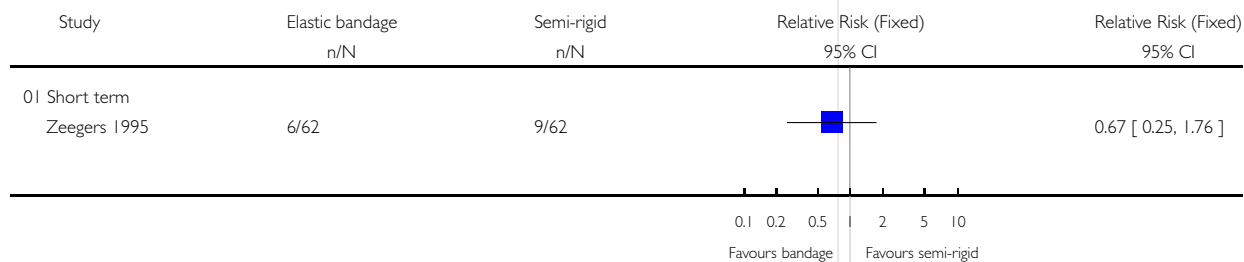


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Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

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Outcome: 01 Numbers not returning to work

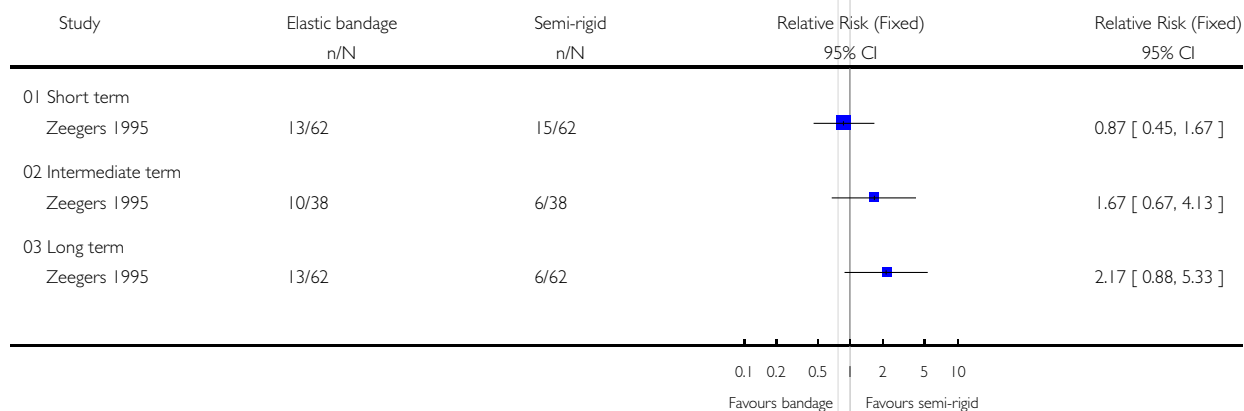


Analysis 02.02. Comparison 02 Elastic bandage versus Semi-rigid ankle support, Outcome 02 Pain

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 02 Elastic bandage versus Semi-rigid ankle support

Outcome: 02 Pain

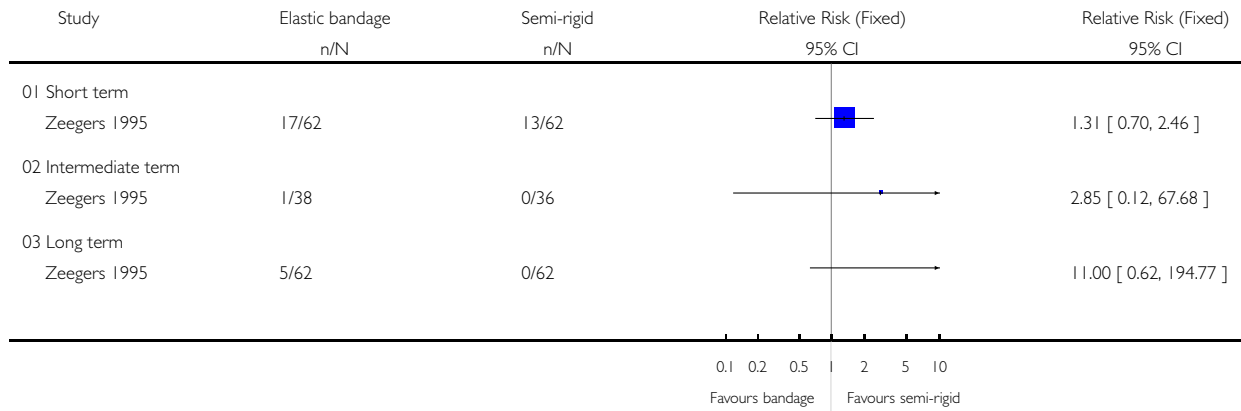


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Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 02 Elastic bandage versus Semi-rigid ankle support

Outcome: 03 Swelling

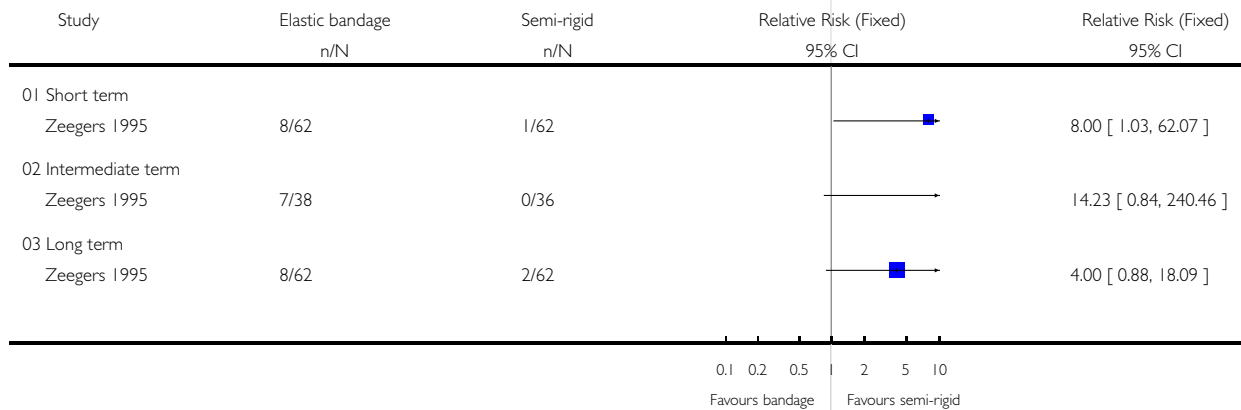


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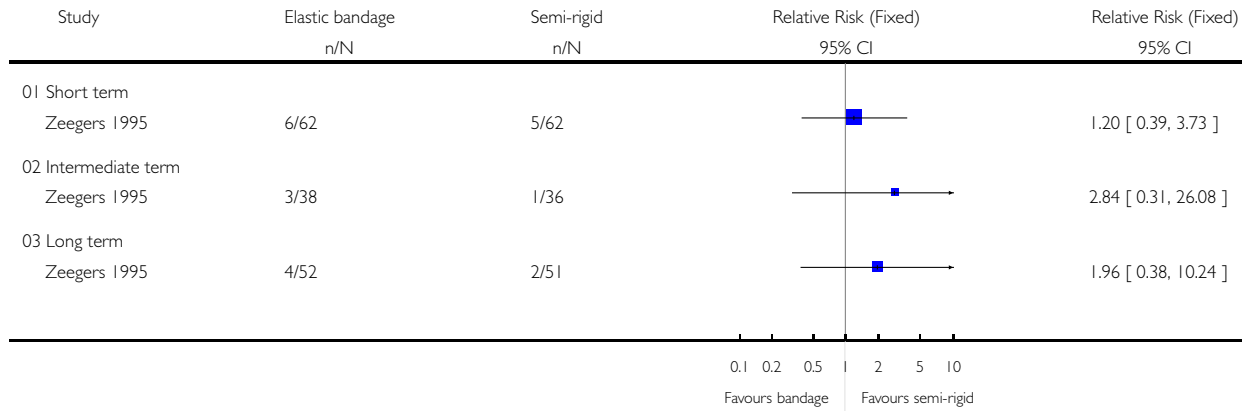


Analysis 02.05. Comparison 02 Elastic bandage versus Semi-rigid ankle support, Outcome 05 Objective instability (talar tilt and/or ADS)

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 02 Elastic bandage versus Semi-rigid ankle support

Outcome: 05 Objective instability (talar tilt and/or ADS)

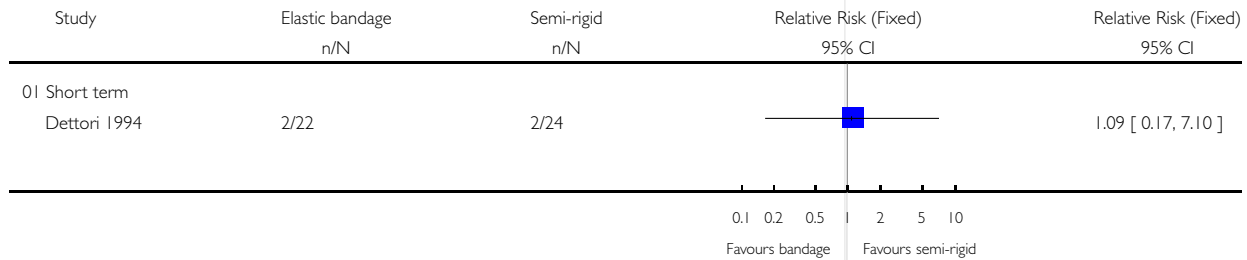


Analysis 02.06. Comparison 02 Elastic bandage versus Semi-rigid ankle support, Outcome 06 Recurrent injury

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 02 Elastic bandage versus Semi-rigid ankle support

Outcome: 06 Recurrent injury

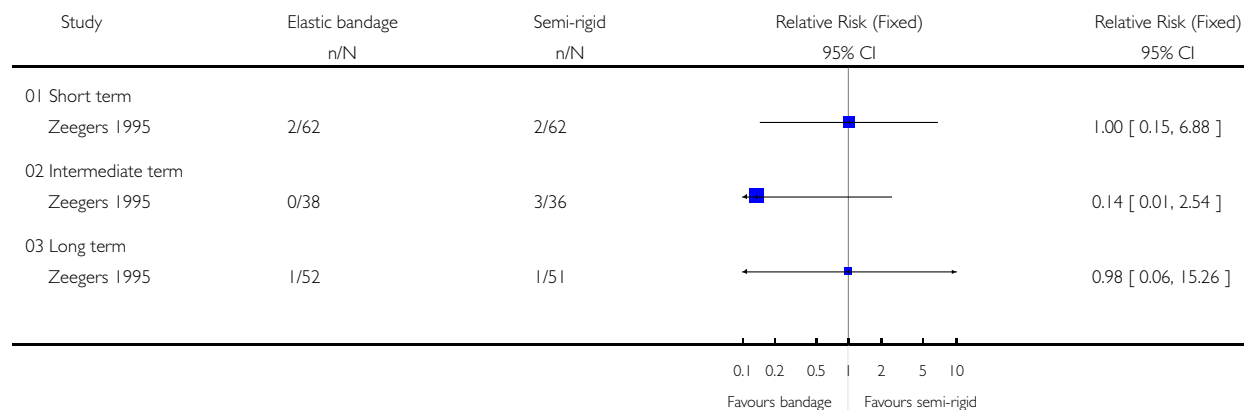


Analysis 02.07. Comparison 02 Elastic bandage versus Semi-rigid ankle support, Outcome 07 Decreased ROM

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 02 Elastic bandage versus Semi-rigid ankle support

Outcome: 07 Decreased ROM

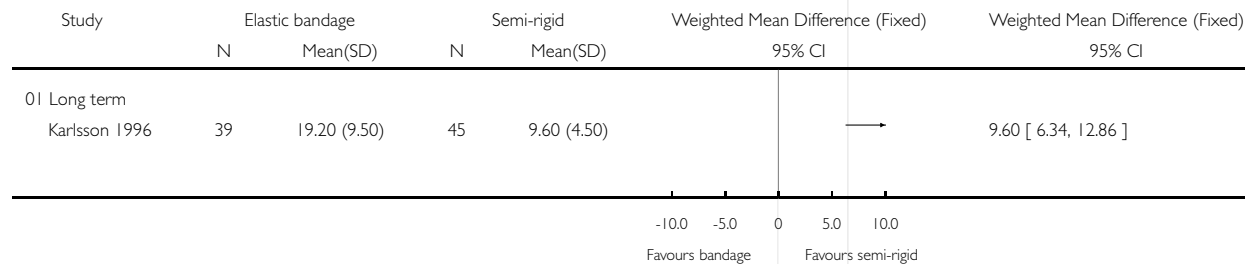


Analysis 02.08. Comparison 02 Elastic bandage versus Semi-rigid ankle support, Outcome 08 Return to sports (days)

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 02 Elastic bandage versus Semi-rigid ankle support

Outcome: 08 Return to sports (days)

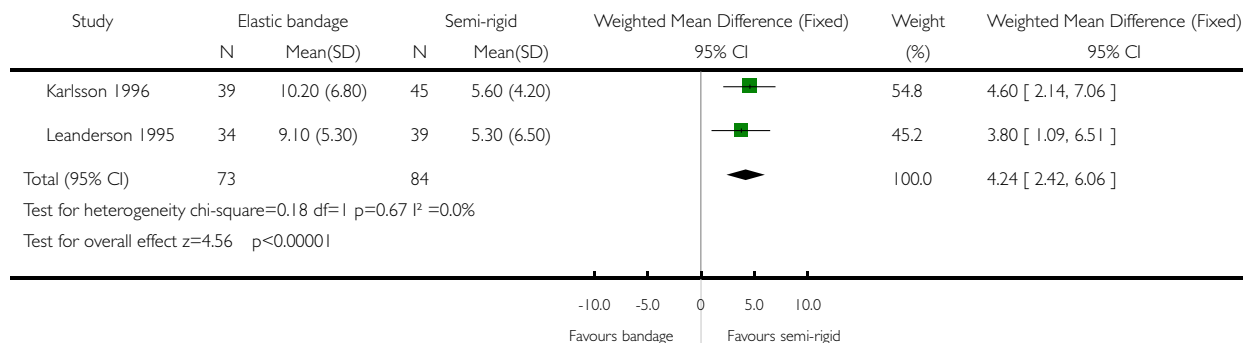


Analysis 02.09. Comparison 02 Elastic bandage versus Semi-rigid ankle support, Outcome 09 Return to work (days)

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 02 Elastic bandage versus Semi-rigid ankle support

Outcome: 09 Return to work (days)

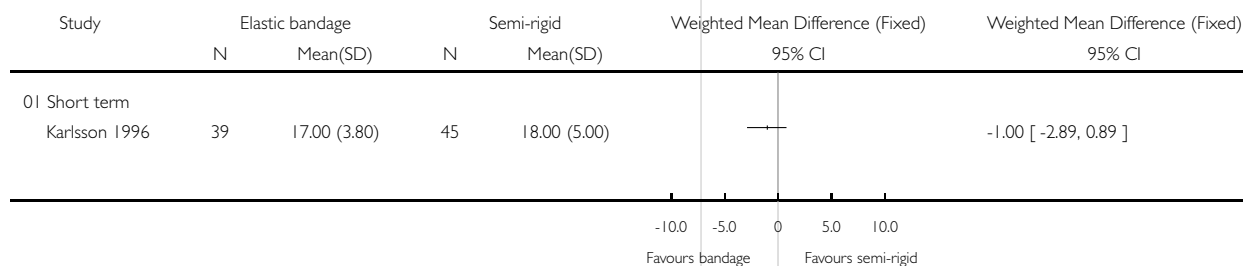


Analysis 02.10. Comparison 02 Elastic bandage versus Semi-rigid ankle support, Outcome 10 Pain

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 02 Elastic bandage versus Semi-rigid ankle support

Outcome: 10 Pain

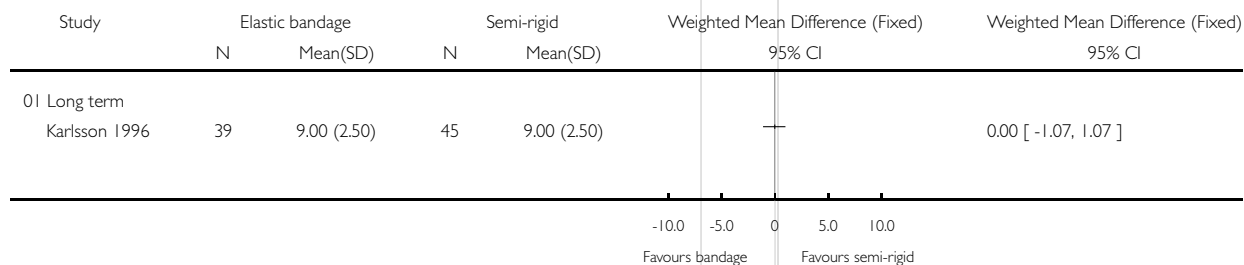


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Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 02 Elastic bandage versus Semi-rigid ankle support

Outcome: 11 Swelling

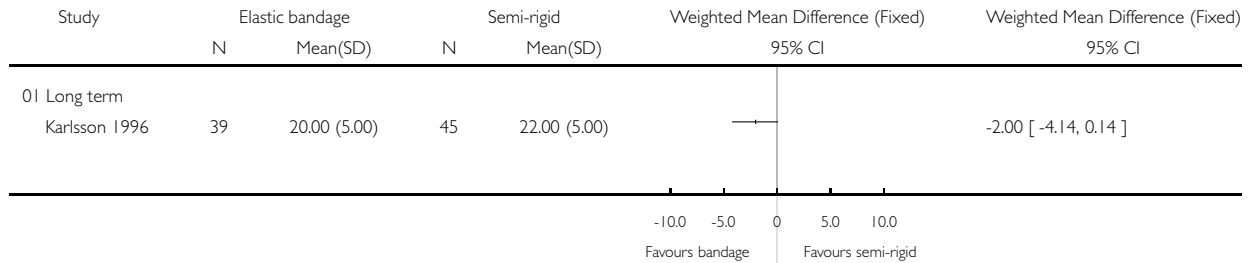


Analysis 02.12. Comparison 02 Elastic bandage versus Semi-rigid ankle support, Outcome 12 Subjective instability

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

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Outcome: 12 Subjective instability

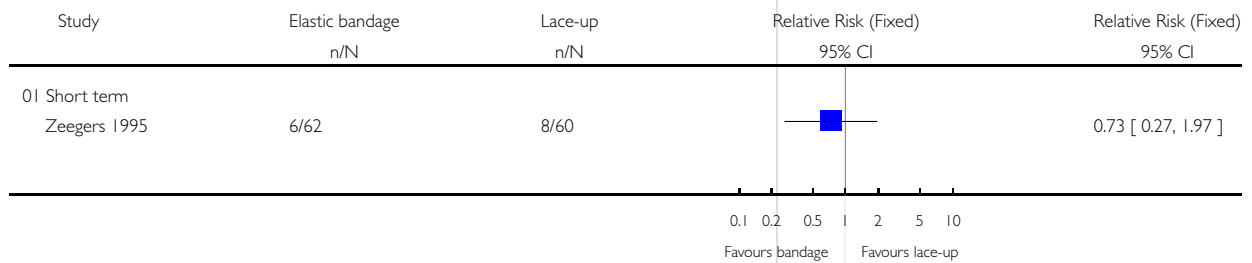


Analysis 03.01. Comparison 03 Elastic bandage versus Lace-up ankle support, Outcome 01 Numbers not returning to work

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 03 Elastic bandage versus Lace-up ankle support

Outcome: 01 Numbers not returning to work

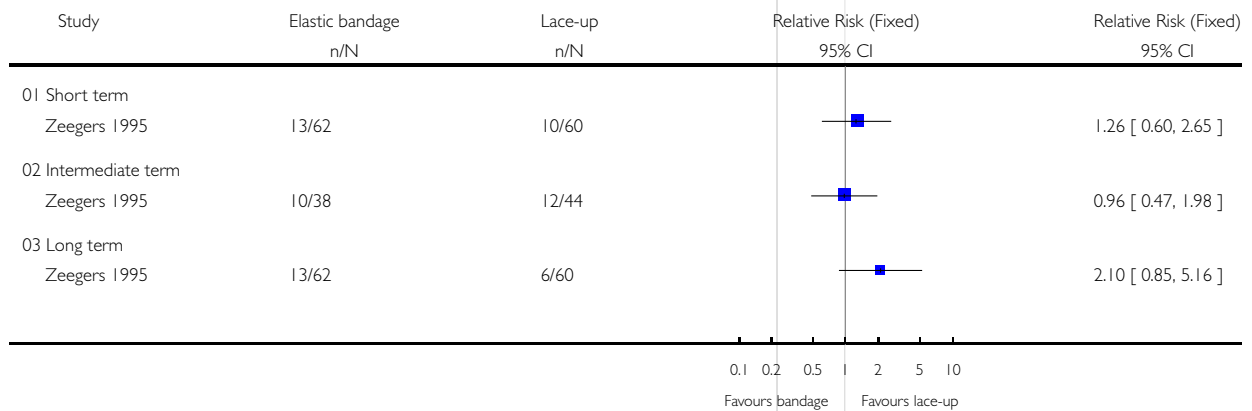


Analysis 03.02. Comparison 03 Elastic bandage versus Lace-up ankle support, Outcome 02 Pain

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 03 Elastic bandage versus Lace-up ankle support

Outcome: 02 Pain

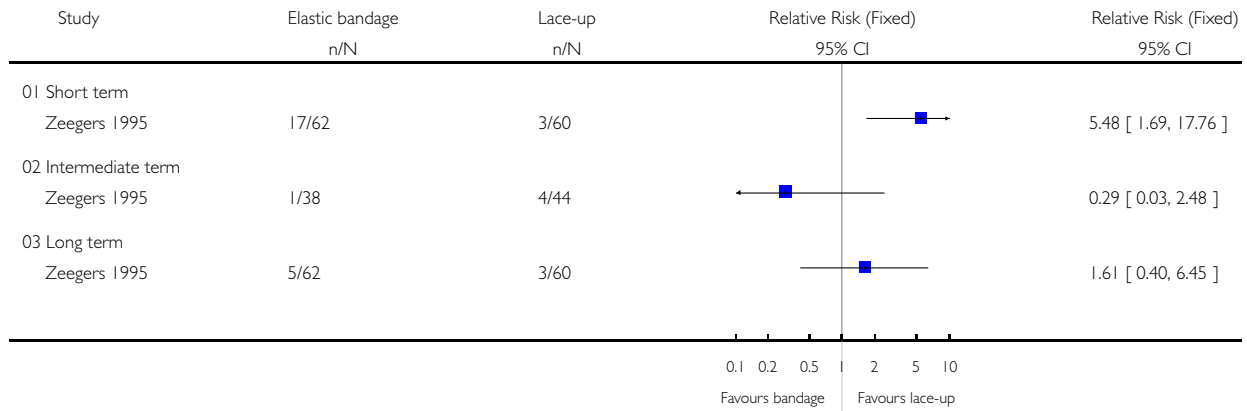


Analysis 03.03. Comparison 03 Elastic bandage versus Lace-up ankle support, Outcome 03 Swelling

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 03 Elastic bandage versus Lace-up ankle support

Outcome: 03 Swelling

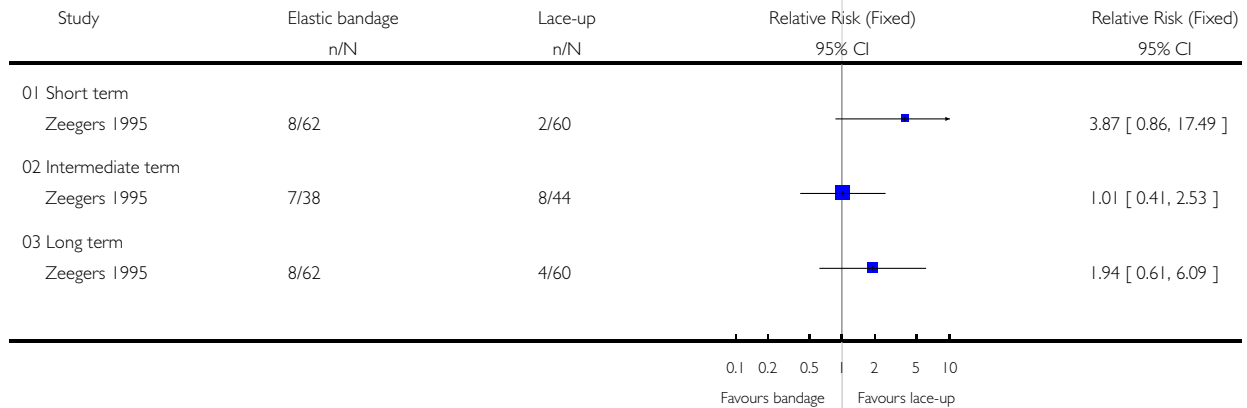


Analysis 03.04. Comparison 03 Elastic bandage versus Lace-up ankle support, Outcome 04 Subjective instability (giving way)

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 03 Elastic bandage versus Lace-up ankle support

Outcome: 04 Subjective instability (giving way)

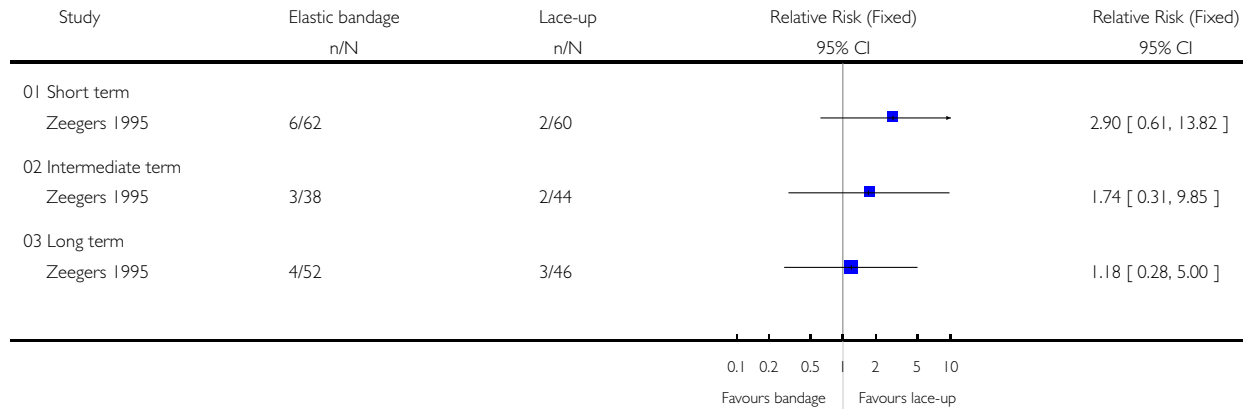


Analysis 03.05. Comparison 03 Elastic bandage versus Lace-up ankle support, Outcome 05 Objective instability (talar tilt and/or ADS)

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 03 Elastic bandage versus Lace-up ankle support

Outcome: 05 Objective instability (talar tilt and/or ADS)

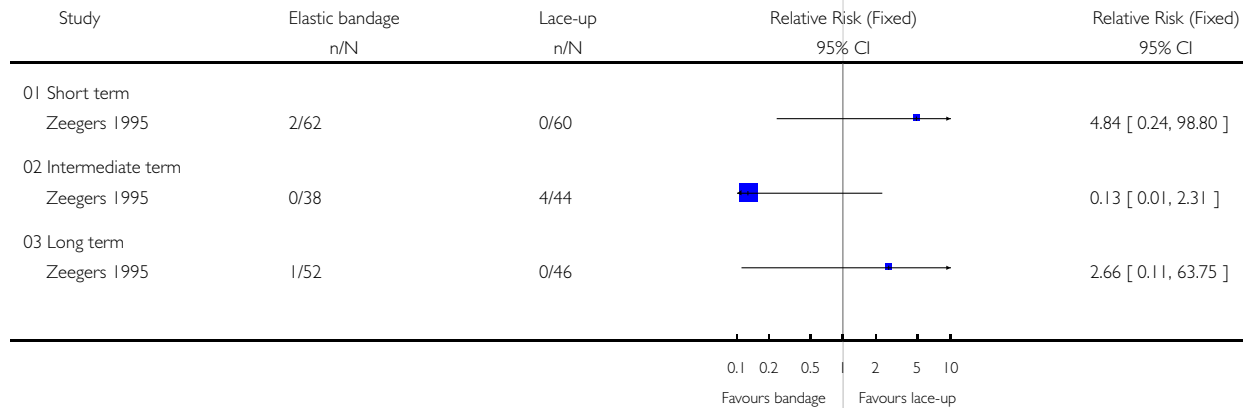


Analysis 03.06. Comparison 03 Elastic bandage versus Lace-up ankle support, Outcome 06 Decreased ROM

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 03 Elastic bandage versus Lace-up ankle support

Outcome: 06 Decreased ROM

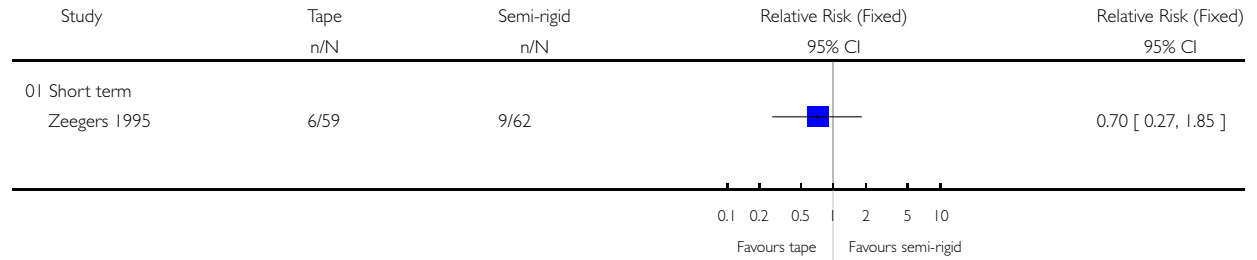


Analysis 04.01. Comparison 04 Tape versus Semi-rigid ankle support, Outcome 01 Numbers not returning to work

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 04 Tape versus Semi-rigid ankle support

Outcome: 01 Numbers not returning to work

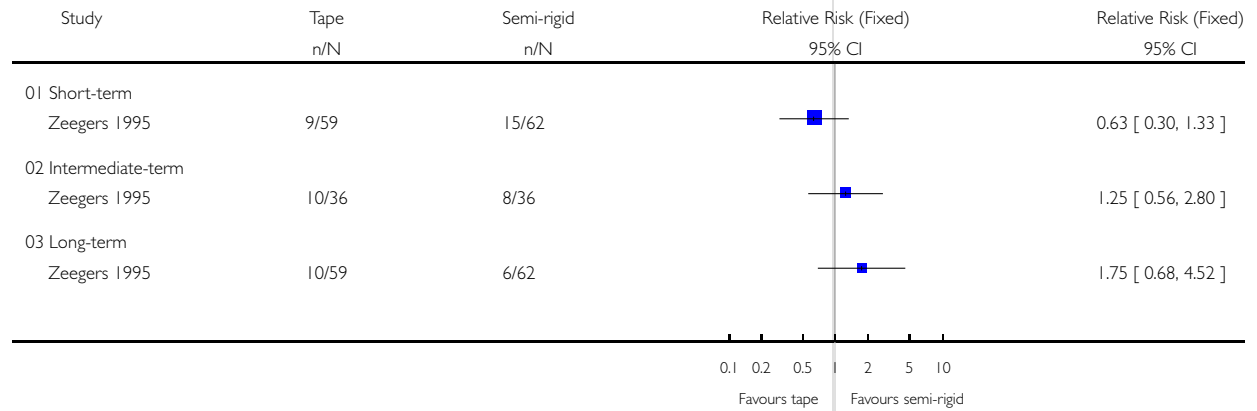


Analysis 04.02. Comparison 04 Tape versus Semi-rigid ankle support, Outcome 02 Pain

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 04 Tape versus Semi-rigid ankle support

Outcome: 02 Pain

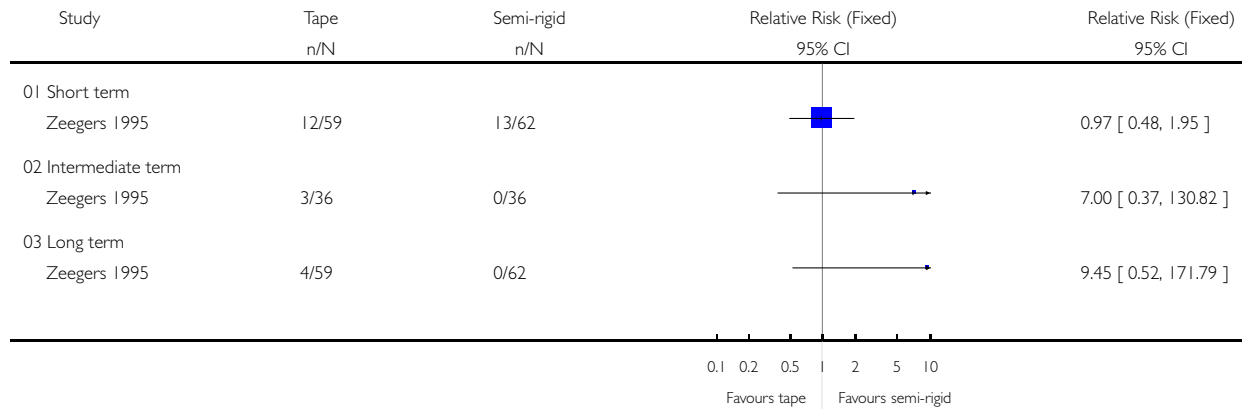


Analysis 04.03. Comparison 04 Tape versus Semi-rigid ankle support, Outcome 03 Swelling

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 04 Tape versus Semi-rigid ankle support

Outcome: 03 Swelling

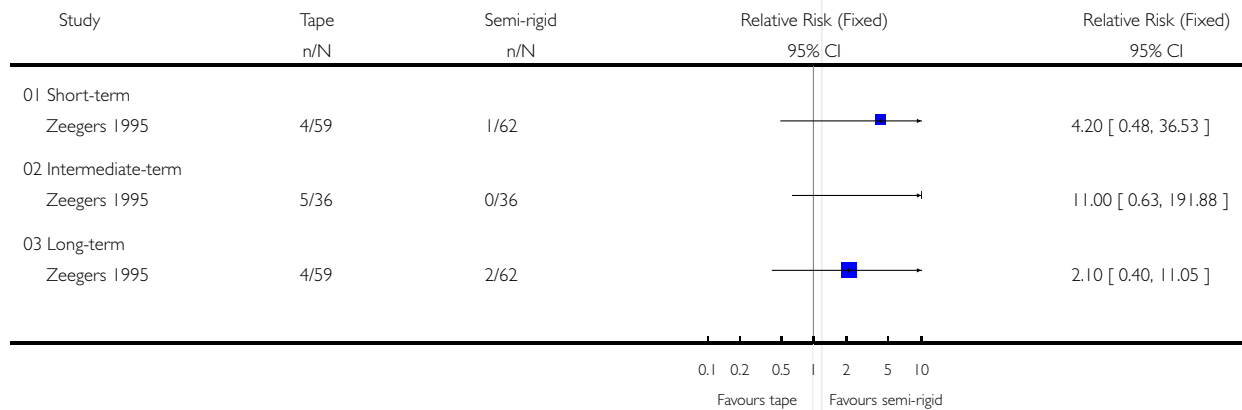


Analysis 04.04. Comparison 04 Tape versus Semi-rigid ankle support, Outcome 04 Subjective instability (giving way)

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 04 Tape versus Semi-rigid ankle support

Outcome: 04 Subjective instability (giving way)

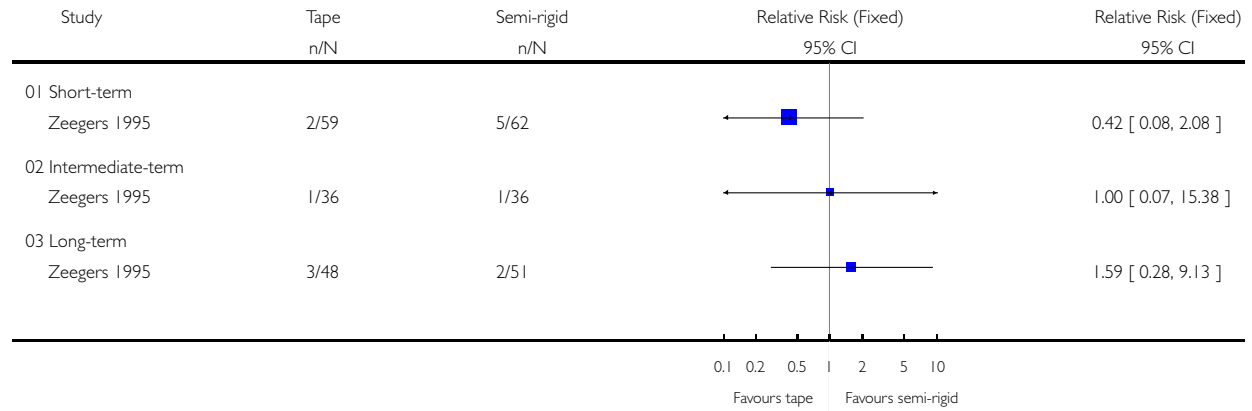


Analysis 04.05. Comparison 04 Tape versus Semi-rigid ankle support, Outcome 05 Objective instability (talar tilt and/or ADS)

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 04 Tape versus Semi-rigid ankle support

Outcome: 05 Objective instability (talar tilt and/or ADS)

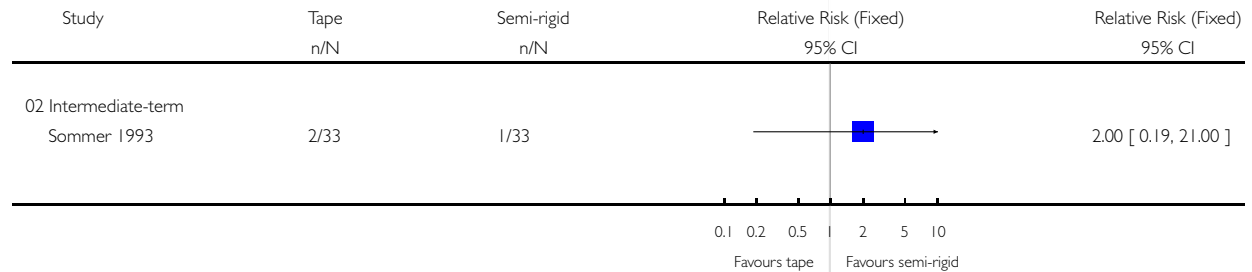


Analysis 04.06. Comparison 04 Tape versus Semi-rigid ankle support, Outcome 06 Recurrent sprains

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 04 Tape versus Semi-rigid ankle support

Outcome: 06 Recurrent sprains

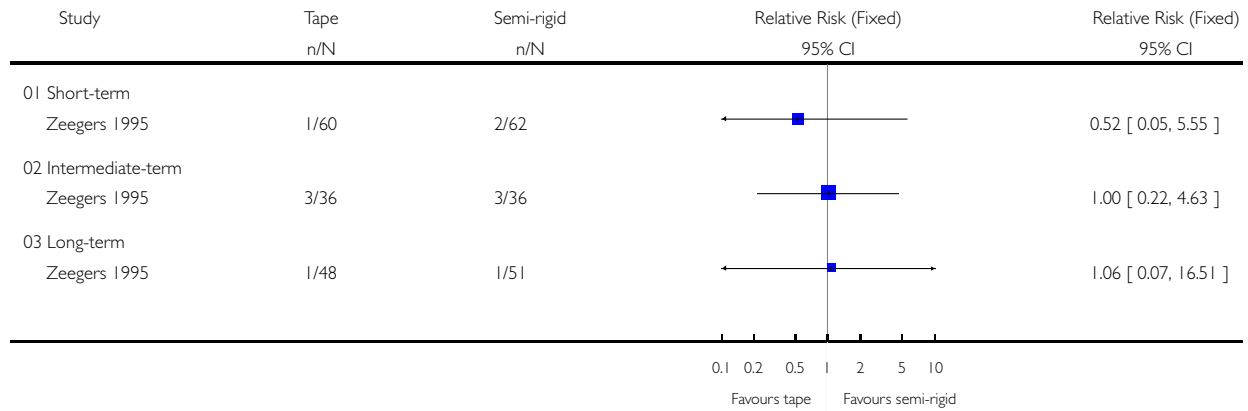


Analysis 04.07. Comparison 04 Tape versus Semi-rigid ankle support, Outcome 07 Decreased ROM

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 04 Tape versus Semi-rigid ankle support

Outcome: 07 Decreased ROM

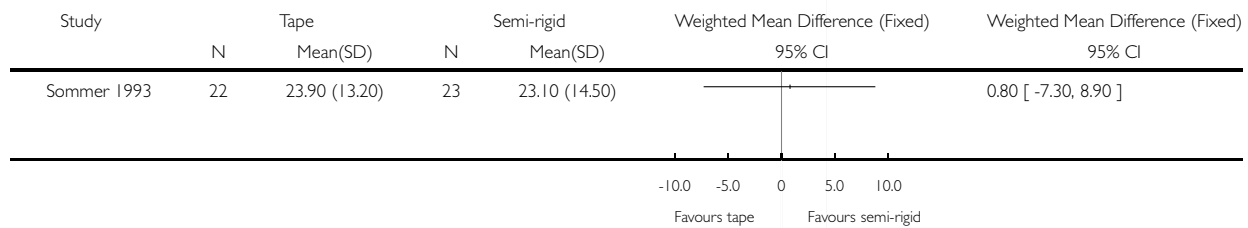


Analysis 04.08. Comparison 04 Tape versus Semi-rigid ankle support, Outcome 08 Return to work (days)

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 04 Tape versus Semi-rigid ankle support

Outcome: 08 Return to work (days)

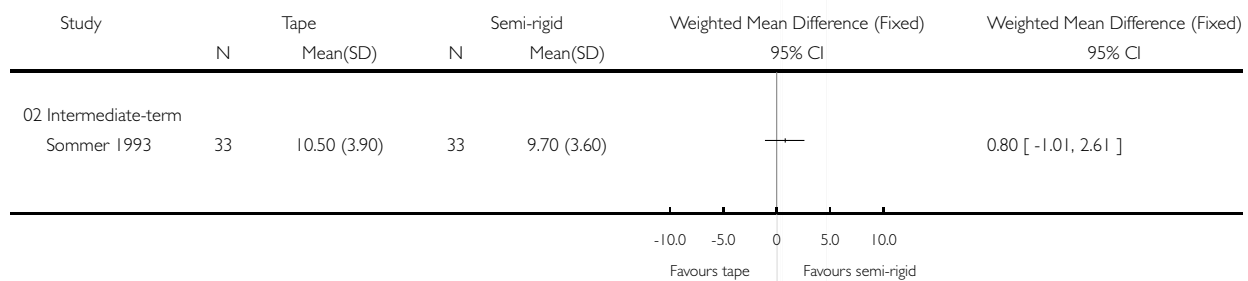


Analysis 04.09. Comparison 04 Tape versus Semi-rigid ankle support, Outcome 09 Objective instability (talar tilt and/or ADS)

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 04 Tape versus Semi-rigid ankle support

Outcome: 09 Objective instability (talar tilt and/or ADS)

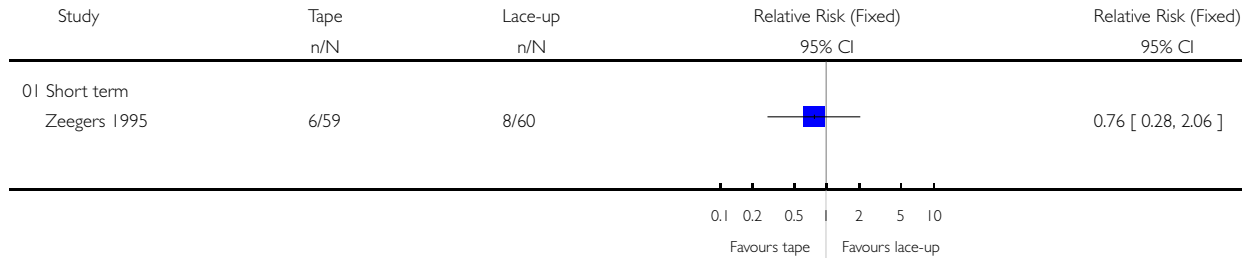


Analysis 05.01. Comparison 05 Tape versus Lace-up ankle support, Outcome 01 Numbers not returning to work

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 05 Tape versus Lace-up ankle support

Outcome: 01 Numbers not returning to work

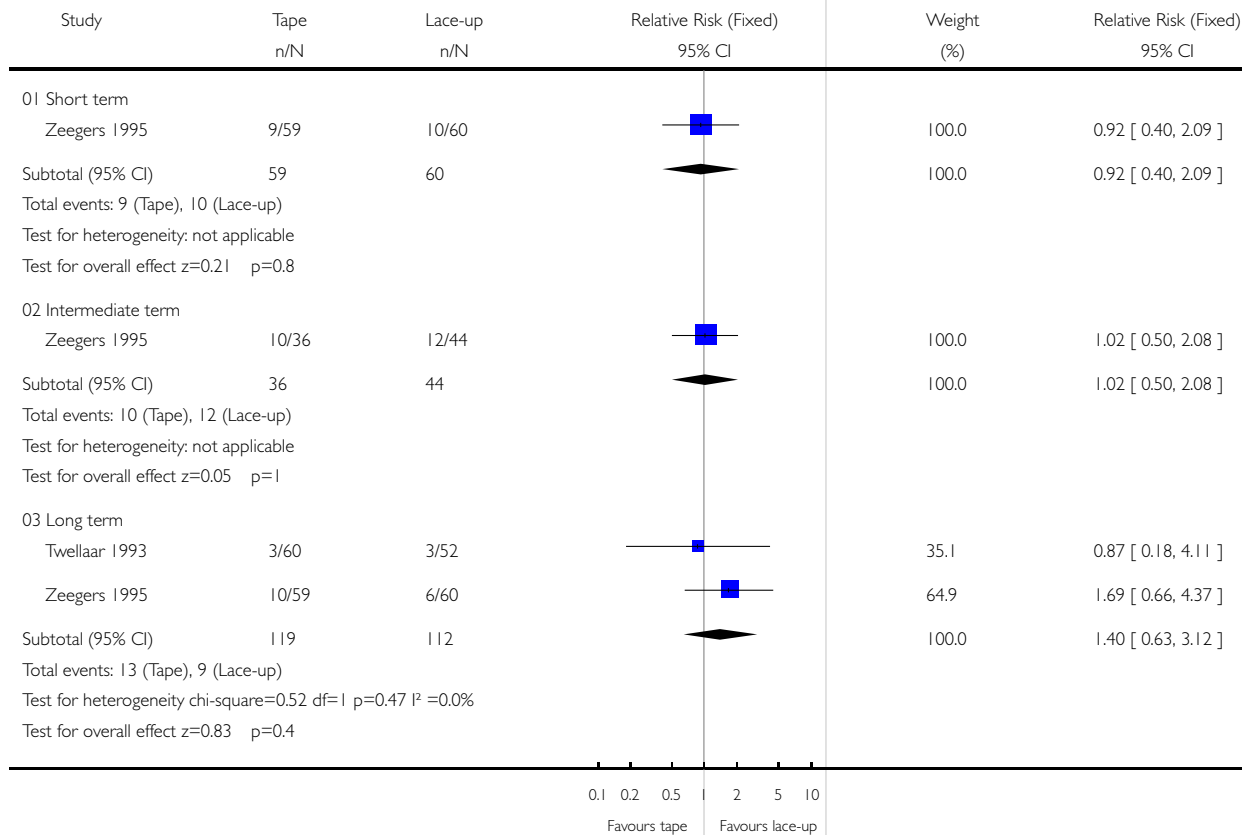


Analysis 05.02. Comparison 05 Tape versus Lace-up ankle support, Outcome 02 Pain

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 05 Tape versus Lace-up ankle support

Outcome: 02 Pain

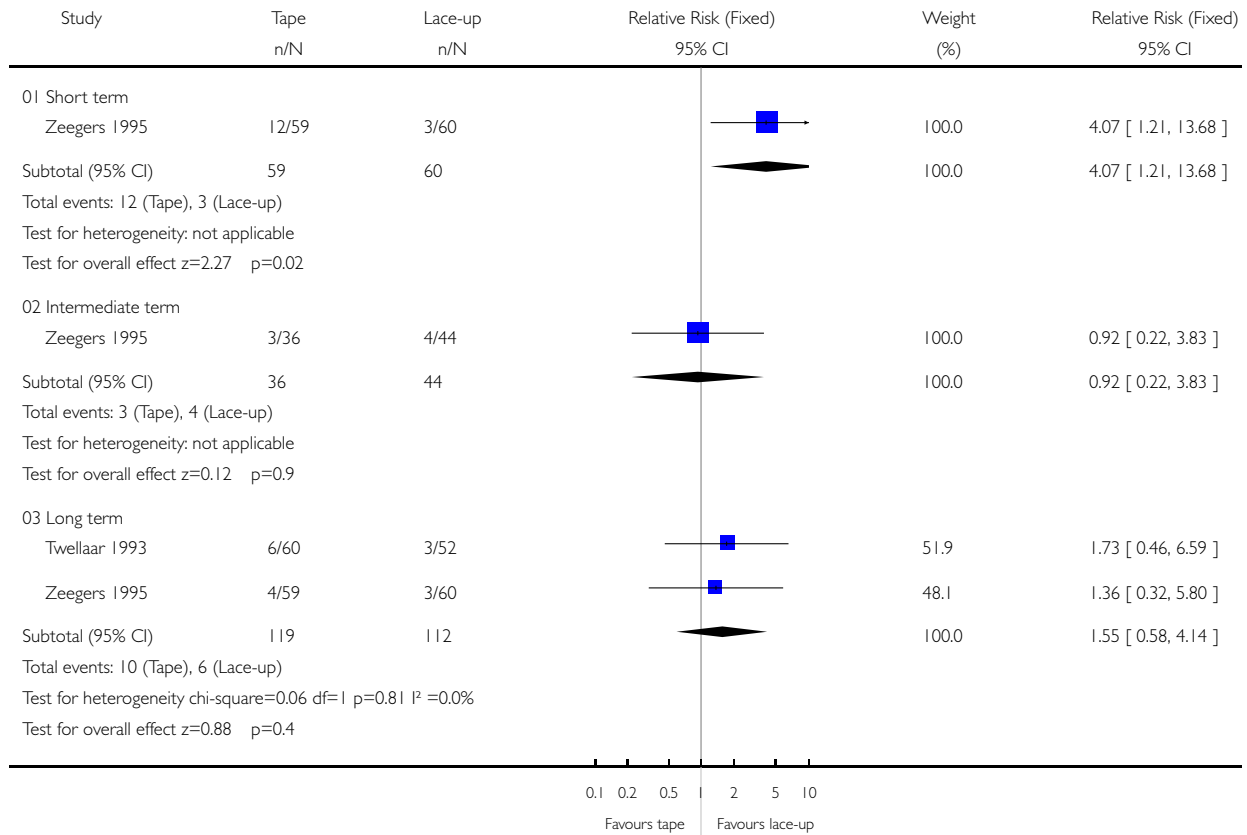


Analysis 05.03. Comparison 05 Tape versus Lace-up ankle support, Outcome 03 Swelling

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 05 Tape versus Lace-up ankle support

Outcome: 03 Swelling

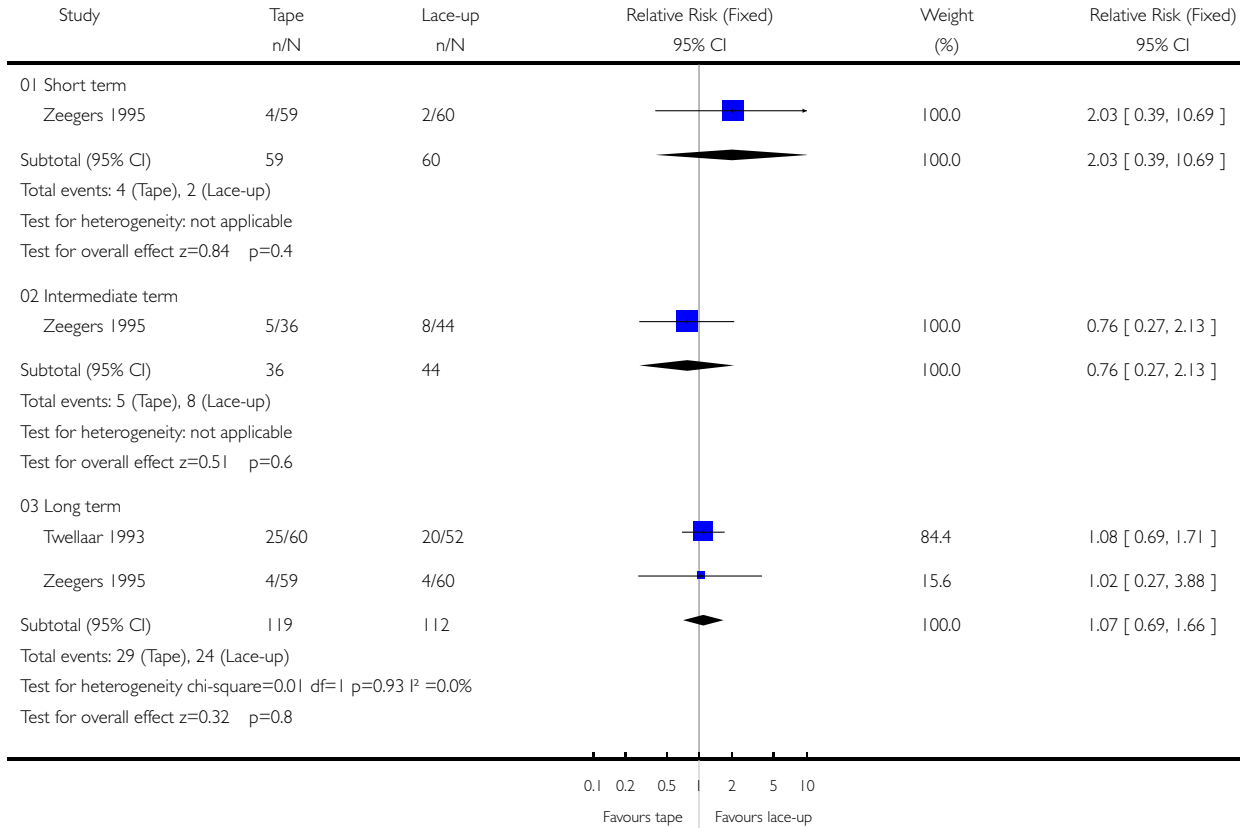


Analysis 05.04. Comparison 05 Tape versus Lace-up ankle support, Outcome 04 Subjective instability (giving way)

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 05 Tape versus Lace-up ankle support

Outcome: 04 Subjective instability (giving way)

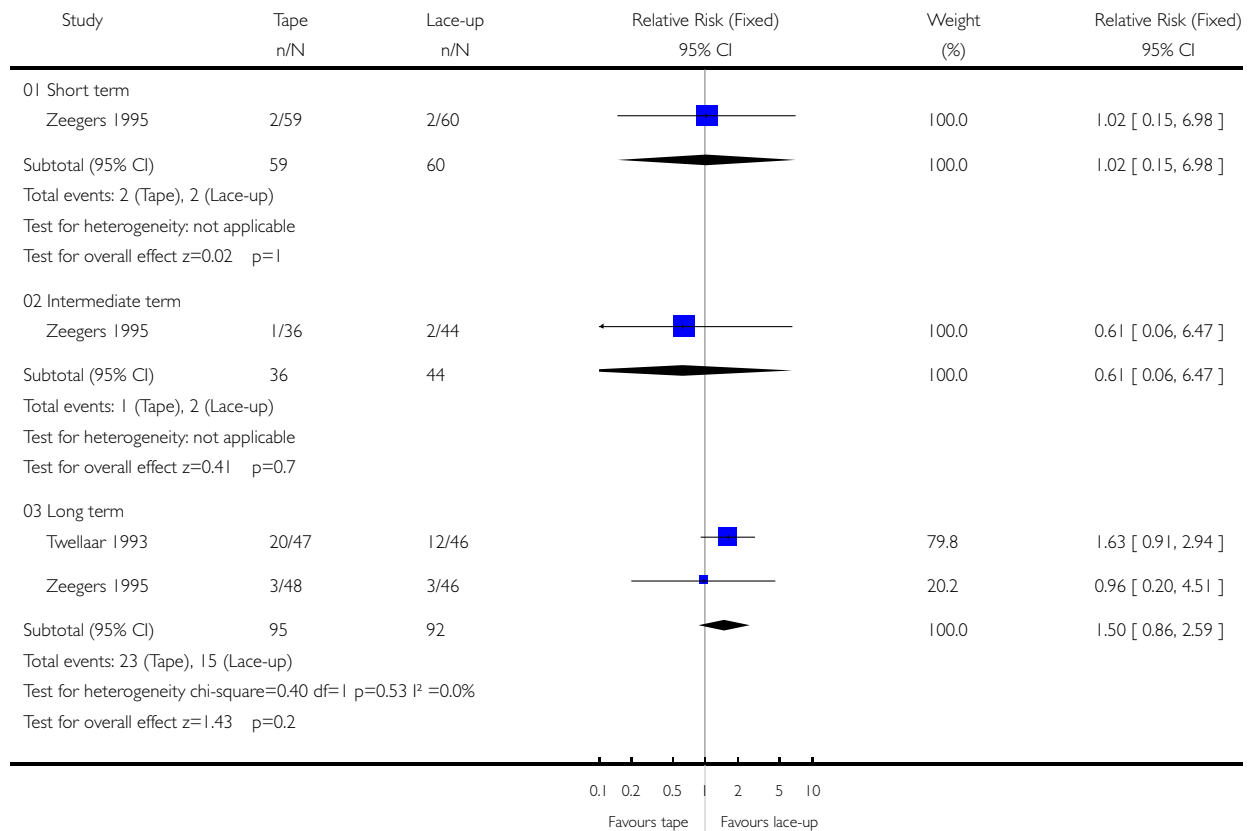


Analysis 05.05. Comparison 05 Tape versus Lace-up ankle support, Outcome 05 Objective instability (talar tilt and/or ADS)

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 05 Tape versus Lace-up ankle support

Outcome: 05 Objective instability (talar tilt and/or ADS)

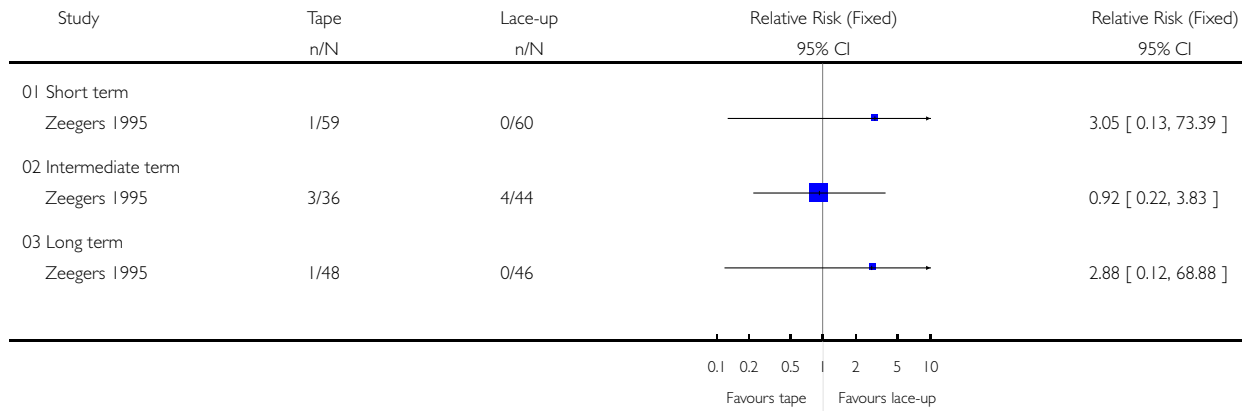


Analysis 05.06. Comparison 05 Tape versus Lace-up ankle support, Outcome 06 Decreased ROM

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 05 Tape versus Lace-up ankle support

Outcome: 06 Decreased ROM

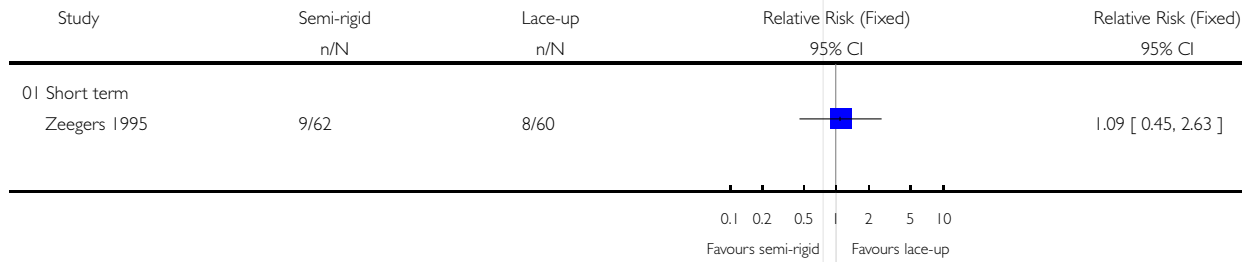


Analysis 06.01. Comparison 06 Semi-rigid ankle support versus Lace-up ankle support, Outcome 01 Numbers not returning to work

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 06 Semi-rigid ankle support versus Lace-up ankle support

Outcome: 01 Numbers not returning to work

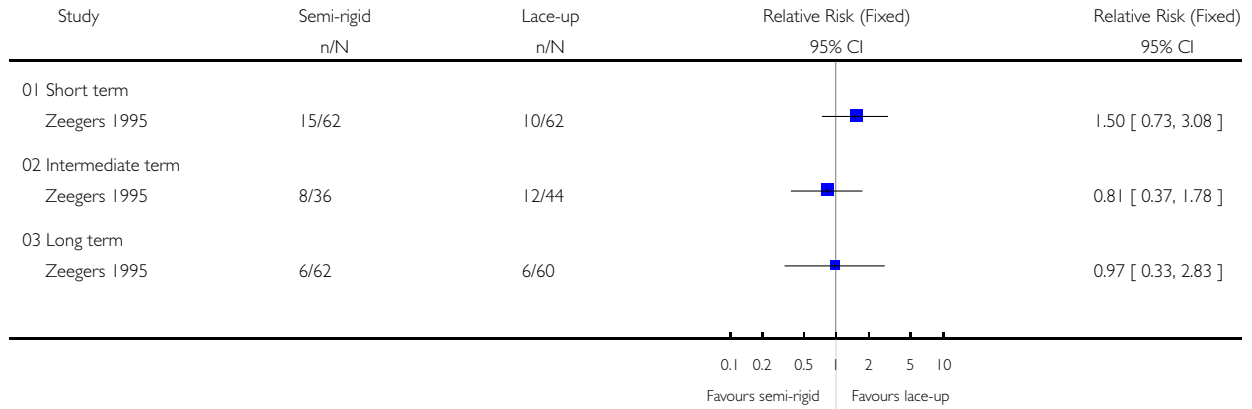


Analysis 06.02. Comparison 06 Semi-rigid ankle support versus Lace-up ankle support, Outcome 02 Pain

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 06 Semi-rigid ankle support versus Lace-up ankle support

Outcome: 02 Pain

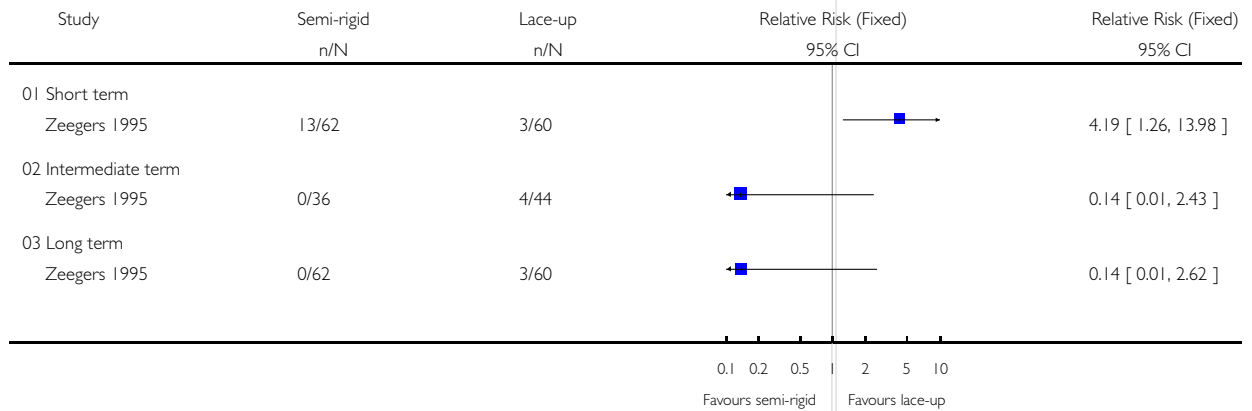


Analysis 06.03. Comparison 06 Semi-rigid ankle support versus Lace-up ankle support, Outcome 03 Swelling

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 06 Semi-rigid ankle support versus Lace-up ankle support

Outcome: 03 Swelling

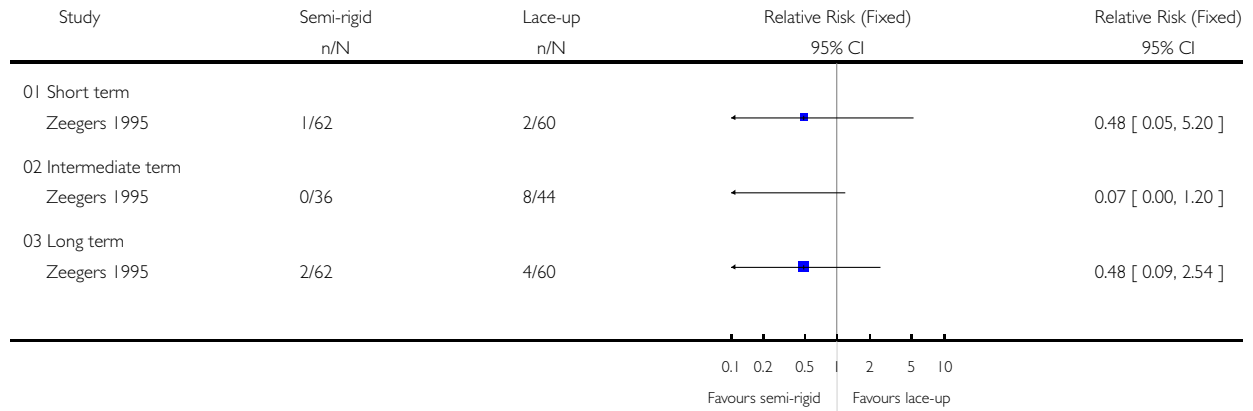


Analysis 06.04. Comparison 06 Semi-rigid ankle support versus Lace-up ankle support, Outcome 04 Subjective instability (giving way)

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 06 Semi-rigid ankle support versus Lace-up ankle support

Outcome: 04 Subjective instability (giving way)

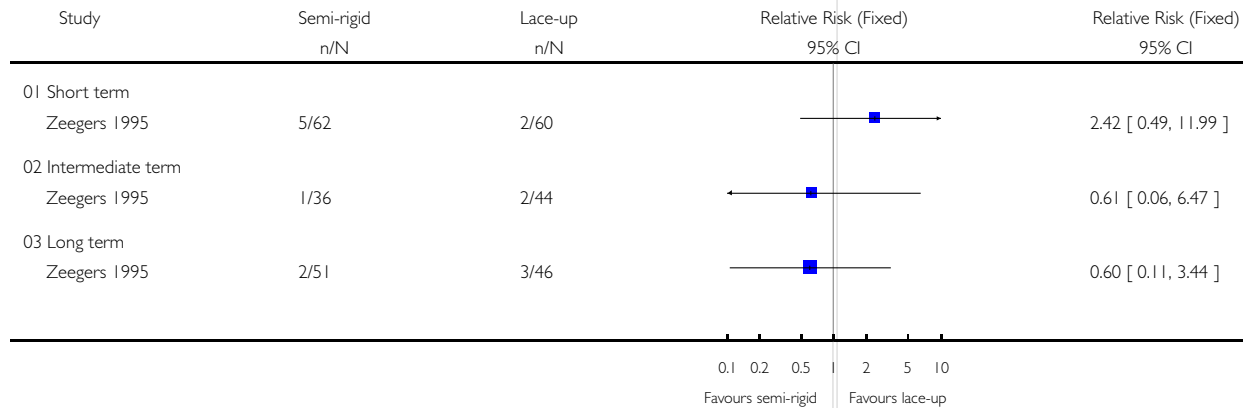


Analysis 06.05. Comparison 06 Semi-rigid ankle support versus Lace-up ankle support, Outcome 05 Objective instability (talar tilt and/or ADS)

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 06 Semi-rigid ankle support versus Lace-up ankle support

Outcome: 05 Objective instability (talar tilt and/or ADS)



Analysis 06.06. Comparison 06 Semi-rigid ankle support versus Lace-up ankle support, Outcome 06 Decreased ROM

Review: Different functional treatment strategies for acute lateral ankle ligament injuries in adults

Comparison: 06 Semi-rigid ankle support versus Lace-up ankle support

Outcome: 06 Decreased ROM

