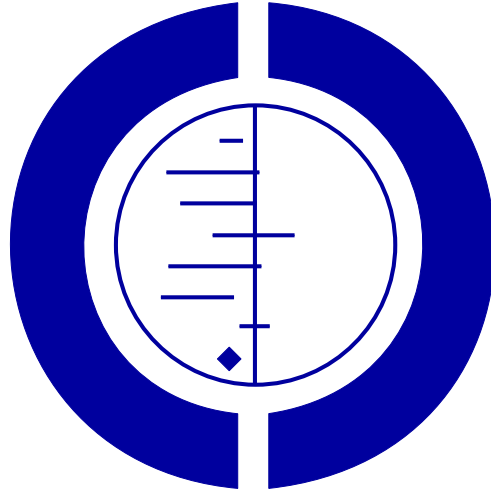


Interventions for treating mallet finger injuries (Review)

Handoll HHG, Vaghela MV



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TABLE OF CONTENTS

ABSTRACT	1
PLAIN LANGUAGE SUMMARY	2
BACKGROUND	2
OBJECTIVES	3
CRITERIA FOR CONSIDERING STUDIES FOR THIS REVIEW	3
SEARCH METHODS FOR IDENTIFICATION OF STUDIES	3
METHODS OF THE REVIEW	4
DESCRIPTION OF STUDIES	4
METHODOLOGICAL QUALITY	5
RESULTS	5
DISCUSSION	6
AUTHORS' CONCLUSIONS	8
POTENTIAL CONFLICT OF INTEREST	8
ACKNOWLEDGEMENTS	8
SOURCES OF SUPPORT	8
REFERENCES	9
TABLES	10
Characteristics of included studies	10
Characteristics of excluded studies	13
ADDITIONAL TABLES	13
Table 01. Search strategies for MEDLINE and The Cochrane Library	13
Table 02. Search strategies (OVID WEB) for EMBASE, CINAHL and AMED	14
Table 03. Methodological quality assessment scoring scheme	15
Table 04. Quality assessment scores for included studies	16
ANALYSES	17
Comparison 01. Custom-made or other finger splint versus Stack splint	17
Comparison 02. Kirschner wire fixation versus splint	17
INDEX TERMS	17
COVER SHEET	17
GRAPHS AND OTHER TABLES	18
Analysis 01.01. Comparison 01 Custom-made or other finger splint versus Stack splint, Outcome 01 Treatment failure	18
Analysis 01.02. Comparison 01 Custom-made or other finger splint versus Stack splint, Outcome 02 Patient dissatisfaction with splint	19
Analysis 01.03. Comparison 01 Custom-made or other finger splint versus Stack splint, Outcome 03 Complications	19
Analysis 02.01. Comparison 02 Kirschner wire fixation versus splint, Outcome 01 Treatment failure	20
Analysis 02.02. Comparison 02 Kirschner wire fixation versus splint, Outcome 02 Patient dissatisfaction with end result	20
Analysis 02.03. Comparison 02 Kirschner wire fixation versus splint, Outcome 03 Patient rating of restricted function	20
Analysis 02.04. Comparison 02 Kirschner wire fixation versus splint, Outcome 04 Complications	21

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ABSTRACT

Background

Mallet finger, also called drop or baseball finger, is where the end of a finger cannot be actively straightened out due to injury of the extensor tendon mechanism. Treatment commonly involves splintage of the finger for six or more weeks. Less frequently, surgical fixation is used to correct the deformity.

Objectives

To examine the evidence for the relative effectiveness of different methods of treating mallet finger injuries.

Search strategy

We searched the Cochrane Bone, Joint and Muscle Trauma Group Specialised Register (June 2005), the Cochrane Central Register of Controlled Trials (*The Cochrane Library* Issue 2, 2005), MEDLINE (1966 to June week 1 2005), EMBASE (1988 to 2005 week 24), other databases, reference lists of articles and various conference proceedings.

Selection criteria

Randomised or quasi-randomised clinical trials evaluating different interventions, including no intervention, for treating mallet finger injuries.

Data collection and analysis

Both authors independently performed study selection, quality assessment and data extraction. Study authors were contacted for additional information.

Main results

Four trials were included. These involved a total of 278, mainly adult, participants with 283 mallet finger injuries. All four trials were methodologically flawed, including inadequate outcome assessment.

Three trials compared different types of finger splints versus a standard Stack splint. One trial found a lower incidence of treatment failure in participants treated with a perforated custom-made splint. One trial found there were fewer complications in participants treated with a padded aluminium-alloy malleable finger splint; however, the incidence of treatment failure was similar in the two treatment groups. One trial evaluating the Abouna splint found a similar incidence of treatment failure in the two groups. However, the Abouna splint often needed replacing due to disintegration of its rubber cover and rusting of the exposed wires and was also less popular with participants.

The fourth trial found no statistically significant differences between participants whose mallet finger was treated with Kirschner wire fixation and those with a Pryor and Howard splint. Similar numbers had complications in the two groups.

Authors' conclusions

There was insufficient evidence from comparisons tested within randomised controlled trials to establish the relative effectiveness of different, either custom-made or off-the-shelf, finger splints used for treating mallet finger injury. There was a useful reminder that splints used for prolonged immobilisation should be robust enough for everyday use, and of the central importance of patient adherence to instructions for splint use. There was insufficient evidence to determine when surgery is indicated.

PLAIN LANGUAGE SUMMARY

Not enough evidence about the best way to treat mallet finger injury

Mallet finger, also called drop or baseball finger, is where the end of a finger cannot be actively straightened out due to injury. Typically the skin remains intact, and the impairment results from a tear of a finger tendon or a small fracture where the tendon attaches to the bone. Treatment commonly involves immobilising the finger-end in a splint for six or more weeks. Surgery may be used for more severe injuries. The review of randomised controlled trials did not find enough evidence to show which methods of treating mallet finger injury are the most effective.

BACKGROUND

The terminal bone of each finger, the distal phalanx, can be moved downwards (flexed) towards the palm via a flexor tendon or upwards (extended) via an extensor tendon. A sudden forced flexion of the extended finger, for instance when the fingertip is struck by a ball, can result in the disruption of this extensor tendon mechanism. In some cases, the extensor tendon ruptures or tears at or near its insertion on the distal phalanx ('soft-tissue mallet' injury). In other cases, an avulsion (pull-off) fracture occurs at the insertion of the extensor tendon on the distal phalanx ('bony mallet' injury). As a result of these injuries, the fingertip cannot be actively straightened out. Hyperextension of the middle joint (proximal interphalangeal or PIP joint) of the finger may also occur. The resulting deformity (extension lag) or droop occurring at the distal interphalangeal (DIP) joint is commonly called mallet finger. Other terms such as 'baseball finger' and 'drop finger' are also in use. Mallet finger injury is also referred to as a zone I injury in terms of the morphology (structure) of the extensor tendon mechanism.

Though the injury can be caused by a ball, including a baseball, the majority of mallet finger injuries result from other non-sports activities at work and at home. For example, stubbing a finger during bed-making in pre-duvet Scotland was highlighted as an important cause by Robb 1959. The underlying forces or mechanisms causing the trauma are also varied and may be quite mild or 'trivial', such as those incurred in pulling on socks, in older people (Stark 1962). The presentation of mallet finger is also variable. For instance, finger deformity occurring several days after crushing injuries was reported by Stark 1962.

The sex, age and affected finger distribution of mallet finger seems to vary with the population under study (Doyle 1999). Generally, however, it is more common in males. The injury tends to result from significant trauma in males, particularly in younger adults, and more minor trauma in older females (Stark 1962). Stark 1962 found the middle finger was most often involved, followed by the little finger. The little and ring fingers were most frequently involved in Robb 1959 and the little finger in Stern 1988. Involvement of the index finger is less common; that of the thumb is rarer

still. Around two thirds of the injuries occur in the dominant hand (Stark 1962; Stern 1988).

The majority of mallet finger injuries are 'closed' in that the overlying skin remains intact; injuries with superficial grazing also usually come into this category. Open injuries resulting in mallet deformity involve high energy trauma or more direct injury, such as laceration, over or near the DIP joint. Following the classification given by Doyle 1999, our main focus in this review is on the most common type (type I) of mallet finger injuries, which are those resulting from closed or blunt trauma where the tendon is damaged with either no fractures or with a small avulsion fracture. Types II, involving rupture of the tendon near or at the DIP joint, and III, involving deep abrasion of the tissues, are open injuries. Type IV injuries cover trans-epiphyseal (growth plate) fracture in children and fractures involving a large (20% and above) part of the joint surface in adults.

Treatment of mallet finger injury is generally non-surgical or conservative, and usually involves splinting of the DIP joint in hyper (excess) extension for around six to eight weeks. This positioning of the finger joints acts to relax the tendon and bring the torn ends or fracture fragments closer together thus promoting healing. This is usually followed by overnight splintage for around a month. The materials (plaster, plastic, aluminium) and design of the splints vary; developments often aiming to enhance convenience of application and use, comfort and tolerability, and to avoid complications. Surgical treatment is usually reserved for open or more severe injuries. It can involve the direct repair of the tendon and fracture reduction and fixation (after clean up of the wound for open injuries) or, after reducing the deformity, transfixing the DIP joint with a K-wire (Kirschner wires - smooth pins) to counteract the deforming force of the flexor tendon that bends the DIP joint, or a combination of both methods. Fracture fixation is usually via either mini screws, K-wire augmented by a suture or tension band wiring using stainless steel wire. Arthrodesis (surgical fusion) of the DIP joint in full extension may be done as a last measure.

The main factors potentially influencing the choice of treatment, and outcome, are:

- patient characteristics such as skeletal maturity, occupation and which digit is injured;

- type of injury: open versus closed; size of fracture fragment; partial or complete tear of tendon; epiphyseal injury;
- time since injury: acute (within 10 days); delayed presentation (one to two months); or chronic or recurrent, or both;
- degree of loss of extension;
- degree of functional disability, pain and inconvenience;
- previous treatment.

Complications of conservative treatment are mostly skin related, such as dorsal ulceration of skin over the DIP joint, and are generally transient (Stern 1988). Treatment failure, as well as an untreated mallet finger, can result in persistent extension lag (loss of voluntary full extension) and swan neck deformity (severe flexion deformity of DIP joint plus a secondary hyperextension deformity of the PIP joint resulting from an imbalance in the extensor mechanism). Complications of surgical treatment are common and more serious. These include infection, injury to the nail bed resulting in nail deformity, joint incongruity, skin necrosis and limitation of flexion of the DIP joint.

In 1998, Geyman et al published a systematic review on conservative versus surgical treatment of mallet finger (Geyman 1998). Our review, which is confined to treatment comparisons conducted within randomised trials, also evaluates both conservative and surgical interventions.

OBJECTIVES

This review aimed to determine the most appropriate treatment for mallet finger injuries. Our prime focus was the typical mallet finger injury: namely, acute closed soft-tissue or bony mallet finger injury in skeletally mature persons. Where possible, we planned to conduct separate analyses for closed soft-tissue bony mallet injuries, closed bony mallet injuries, open injuries, injuries (usually involving epiphyseal fractures) in children, fractures involving over 20% of the joint (articular) surface and injuries with delayed, including chronic, presentation.

We set out to test the following broad hypotheses both for the overall group and, where possible, for comparable injury groups.

There are no differences in outcome between different methods of conservative treatment, including no treatment.

There are no differences in outcome between surgical and conservative treatment.

There are no differences in outcome between different methods of surgical treatment.

CRITERIA FOR CONSIDERING STUDIES FOR THIS REVIEW

Types of studies

Any randomised or quasi-randomised (for example, allocation by date of birth or alternation) controlled trials which compare interventions, including no intervention, for the treatment of mallet finger injuries.

Types of participants

Patients of any age with mallet finger injury or deformity as described in the 'Background'. The potential for misdiagnosis, such as a missed bony mallet, was considered in trials in which the method of diagnosis was unspecified or based on physical examination alone (and thus not X-rayed). We planned to exclude trials focusing on the treatment of similar deformities resulting from disease, primarily rheumatoid arthritis.

Types of intervention

Conservative and surgical interventions, as presented in the 'Background', used in the treatment of mallet finger injuries. Though plaster casts have generally been replaced by various types of splints, some of which are commercially available such as the Stack splint (Stack 1986), trials evaluating plaster casting would have been included if these had been identified.

Types of outcome measures

We sought the following outcome measures:

- (1) recovery defined as return to pre-injury level of pain-free function of the finger, and time to recovery;
- (2) persistent extension lag, including subsequent remedial surgery;
- (3) persistent pain;
- (4) persistent finger stiffness;
- (5) inconvenience and complications of treatment;
- (6) long-term complications such as osteoarthritis and swan neck deformity;
- (7) range of finger motion;
- (8) patient adherence to treatment;
- (9) costs.

SEARCH METHODS FOR IDENTIFICATION OF STUDIES

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

We searched the Cochrane Bone, Joint and Muscle Trauma Group Specialised Register (June 2005), the Cochrane Central Register of Controlled Trials (*The Cochrane Library* Issue 2, 2005), MEDLINE (1966 to June week 1 2005), EMBASE (1988 to 2005 week 24), CINAHL (1982 to June week 2 2005), AMED (Allied and Complementary Medicine) (1985

to June 2005), PEDro - physiotherapy evidence database (<http://www.pedro.fhs.usyd.edu.au/index.html> accessed 14 June 2005), OTseeker - The Occupational Therapy Systematic Evaluation of Evidence Database (<http://www.otseeker.com> accessed 2 June 2005) and reference lists of articles. We also searched Current Controlled Trials at <http://www.controlled-trials.com> (accessed June 2005) and the UK National Research Register at <http://www.update-software.com/national/> (up to Issue 2, 2005) for ongoing and recently completed trials. We hand searched abstracts of the American Society for Surgery of the Hand annual meetings (2000 to 2004: <http://www.assh.org/>), the American Orthopaedic Trauma Association annual meetings (1996 to 2004: <http://www.ota.org/education/amabstracts.htm>) and American Academy of Orthopaedic Surgeons annual meeting abstracts 1989 to 2005 (<http://www.aaos.org/wordhtml/libscip.htm>: in June 2005, abstracts were only available for the 2004 & 2005 meetings). We also handsearched various supplements of the Journal of Hand Surgery (British Volume). No language restrictions were applied.

In MEDLINE (OVID WEB) the following subject specific search strategy were combined with all three stages of the optimum trial search strategy (Higgins 2005). The full search strategies for MEDLINE and *The Cochrane Library* are shown in Table 01; and strategies for EMBASE, CINAHL and AMED are included in Table 02.

1. ((mallet and (finger\$ or deformit\$)) or baseball\$ finger\$ or basketball\$ finger\$ or hammer finger\$ or drop finger\$).tw.
2. Finger Injuries/
3. Tendon Injuries/
4. or/2-3
5. (joint\$ adj (DIP or distal interphalangeal)).tw.
6. (avulsion fract\$ and finger\$).tw.
7. or/5-6
8. and/4,7
9. or/1,8

METHODS OF THE REVIEW

Both review authors assessed potentially eligible trials for inclusion. We sought further information from trialists of incompletely published or unpublished trials to ascertain their status. Titles of journals, names of authors or supporting institutions were not masked at any stage. Both authors independently assessed the methodological quality of included studies and extracted the data. All disagreements and discrepancies were resolved through discussion.

Attempts were made to contact trialists of the included trials for additional details of key items of trial methodology or data.

A modification of the Cochrane Bone, Joint and Muscle Trauma Group quality assessment tool was used in the evaluation of the

included studies. The scoring scheme for 12 aspects of trial validity, plus brief coding guidelines for selected items, is shown in Table 03. From the first update (Issue 4, 2005) of the review, the scores of the individual items were no longer summed.

Data analysis

Where available and appropriate, we presented quantitative data for outcomes listed in the inclusion criteria graphically. Relative risks and 95% confidence intervals were calculated for dichotomous outcomes. No data pooling was possible.

Typically, mallet finger injury occurs to one finger of a patient but, as anticipated in the review protocol, two or more mallet fingers did occur in the same person in some of the trials. We were thus mindful of the potential for unit of analysis problems where such trials presented analyses by fingers rather than by participants (Sauerland 2003).

Sensitivity and subgroup analyses

There were insufficient data to perform our planned sensitivity analyses investigating the effects of allocation concealment, assessor blinding and loss to follow up. Similarly, we were unable to carry out our planned separate outcome analyses of: (a) patients with closed soft-tissue versus bony mallet injuries; (b) patients with closed versus open injuries; (c) patients with acute versus delayed or chronic injury; (d) children; and (e) patients with large articular fractures.

DESCRIPTION OF STUDIES

No new studies were identified from the extension of the search from November 2003 to June 2005.

In all, we located six eligible studies, four of which are included and the other two are excluded for reasons given in the 'Characteristics of excluded studies' table.

All four included studies (Auchincloss 1982; Kinninmonth 1986; Maitra 1993; Warren 1988) were fully reported in medical journals. Further information was received from the trial investigators of two trials (Auchincloss 1982; Warren 1988). All four trial reports were identified from the specialised register of the Cochrane Bone, Joint and Muscle Trauma Group; three trials were originally found via MEDLINE and the other through bibliographic checking. All the trials were reported in English.

The publication dates of the trial reports span 12 years, from 1982 to 1993. Only Auchincloss 1982 gave details of the period of trial recruitment: August 1978 to October 1979. All trials took place in the UK; patients presented to accident and emergency departments in hospitals in four separate UK cities.

The four included studies involved a total of 278 participants with 283 mallet finger injuries. There were no mallet thumb injuries included. The percentage of males ranged from 62% to 71%. The mean ages were between 41 and 46 years in three trials; no age

information was provided for Kinninmonth 1986. The youngest recorded participant was nine years old (Maitra 1993) and the oldest was 82 (Auchincloss 1982); the majority of participants were skeletally mature.

All four trials included both soft-tissue and bony mallet injuries; two trials (Auchincloss 1982; Warren 1988) gave specific mention of using X-rays for diagnosis purposes. Both Maitra 1993 and Warren 1988 excluded open injuries and those with a large fracture fragment, although Warren 1988 made an exception of initially open injuries that had healed. Warren 1988 was the only trial to specifically exclude epiphyseal injuries in children. The majority of patients presented within one week of their injury; patients were excluded if they presented after two weeks in Auchincloss 1982 and after three days in Maitra 1993. Only Warren 1988 referred to patients with diseases that might have influenced treatment or outcome: two participants had rheumatoid disease and another was on steroid therapy for chronic obstructive airway disease.

No trial compared treatment with no treatment. Three trials (Kinninmonth 1986; Maitra 1993; Warren 1988) compared different types of finger splints versus a standard Stack splint. Kinninmonth 1986 tested a perforated custom-made splint; Maitra 1993, a padded aluminium-alloy malleable finger splint; and Warren 1988, the Abouna splint (Abouna 1965).

Surgical fixation with a Kirschner wire was compared with a Pryor and Howard splint (designed by Stack) in Auchincloss 1982.

Further details of the individual trials are presented in the 'Characteristics of included studies' table.

METHODOLOGICAL QUALITY

All four trials were methodologically flawed and generally failed to achieve top scores on most of the individual items of the methodological quality scoring scheme (see Table 03 for the description of items and Table 04 for the scores). In particular, there was insufficient information to judge whether allocation was concealed (item A) in Auchincloss 1982, though this trial used numbered sealed envelopes, or in Kinninmonth 1986 and Maitra 1993, where no details were given. Allocation was not concealed in Warren 1988, where allocation was based on odd and even hospital numbers. With the exception of Maitra 1993, where it is likely that no participants were lost to follow up, there was insufficient information in the journal reports to confirm that intention-to-treat analysis had been carried out (item B). In particular, the numbers of participants in the two intervention groups at randomisation were not provided in the journal reports of the other three trials. Further problems resulted from unit of analysis problems in Kinninmonth 1986 and Warren 1988, who presented analyses by fingers rather than by participants. However, intention-to-treat analysis was confirmed on the subsequent provision of baseline information for Warren 1988.

There was no blinding of outcome assessors (item C), participants or care providers (items E and F). Aside from Maitra 1993, baseline characteristics (item D), split by intervention group, of all randomised participants were not presented in the published reports of the other three trials. However, further information received for Warren 1988 led to an increased score for this item.

Additional information provided for Auchincloss 1982 indicated comparability of care programmes (item G). There was insufficient information to judge this in the other three trials. Only Warren 1988 gave an adequate description of the intended trial population (item H). None of the trials provided clear descriptions of their interventions (item I) in their trial reports; further information received for Auchincloss 1982 led to an increased score for this item.

Though the outcome measures used (item J) were well defined in two trials (Auchincloss 1982; Maitra 1993), the quality of outcome measurement in terms of the appropriateness of the measures used (item K) was unsatisfactory in all four trials. This was particularly so in Kinninmonth 1986, which, for example, did not mention how finger deformity was measured. Active surveillance (item L) clearly took place in Maitra 1993 and Warren 1988, but the duration of follow up was inadequate in both these trials (9 and 10 weeks respectively). Follow up was over one year for all participants in Auchincloss 1982 and the majority of participants in Kinninmonth 1986. However, since active surveillance could not be confirmed in either trial, both scored zero for this item.

RESULTS

The outcomes reported for the included trials are listed in the 'Characteristics of included studies' table. As indicated above the quality of outcome measurement was poor in all four trials. Additionally, the results were incomplete for many outcomes and we have been unable to obtain clarification on the results of Kinninmonth 1986, who presented their results according to affected fingers rather than individual participants. While quantitative data are presented graphically for some outcomes, this is for illustrative purposes only. No sensitivity or subgroup analysis was possible. In particular, best and worse scenario analyses to test the possible effects on the results of the inclusion of participants lost to follow up was prevented by the lack of baseline numbers in two (Auchincloss 1982; Kinninmonth 1986) of the three trials reporting losses to follow up. Although Auchincloss 1982 provided results split by time of presentation since injury, the numbers in each group (up to one week; over one week) were too few to explore this here.

The disparity in comparisons of the four included trials precluded pooling of data.

Different methods of conservative treatment

Although the standard Stack splint was the 'control' group in all three trials comparing different types of splint, there are distinct

differences in the characteristics of the 'intervention' splints under test. Thus, each trial is reviewed separately.

Perforated custom-made splint versus Stack splint (Kinninmonth 1986)

There were significantly fewer cases of treatment failure, defined as need to change splint type and/or excessive lag deformity, in the perforated splint group (2/27 versus 9/27). There was one change of splint type (from the perforated splint to Stack splint) in the perforated splint group due to skin irritation. In contrast, six participants in the Stack splint group changed to using the perforated splint. All six participants had had difficulty removing and reapplying their splint for hygiene purposes. Two of these participants had dorsal ulcers and two had skin maceration. Overall, there were more complications reported in the Stack splint group (1/27 versus 4/27). There was no mention of the use of a goniometer in the trial report, neither were the criteria for grading "lag" deformity made explicit nor when the measurements took place. If excessive lag deformity is taken as greater than or equal to 25 degrees, then there was one case reported in the perforated splint group and four in the Stack splint group. The ability of participants to change their splint was assessed and reported as percentages (84% versus 79%); Kinninmonth 1986 failed to provide the actual numbers of participants in the two groups and thus we could not determine the actual numbers who were unable to change their splint satisfactorily.

Padded aluminium-alloy malleable finger splint versus Stack splint (Maitra 1993)

At nine-weeks follow up, there was no difference between the two groups in terms of the treatment failure defined according to Abouna and Brown criteria (Abouna 1968): extension loss greater than 15 degrees; finger stiffness or impaired flexion, or both. Similar numbers of participants in the two groups were reported as having stiffness of either the distal or proximal phalangeal joints. There was no mention of how finger stiffness was assessed. Significantly fewer participants in the custom-made splint group had skin complications (2/30 versus 10/30). These comprised one case of dorsal ulcer and one of skin maceration in the test splint group and three cases of dorsal ulcer, six of skin maceration and one tape allergy in the Stack splint group. There was no indication of whether any of these led to the premature splint removal or other treatment. One quarter of each group was reported as having taken time off work but there was no information on how many worked.

Abouna splint versus Stack splint (Warren 1988)

Unlike the two custom-made splints tested above, the Abouna splint was supplied externally and its development predated the Stack splint. There was no difference between the two groups in terms of the treatment failure at 10 weeks, defined according to Abouna and Brown criteria (Abouna 1968). However, twice as many participants in the Abouna group expressed dissatisfaction with their splint (21/49 versus 10/57). This probably reflected the tendency for the rubber coating of the Abouna splint to perish

allowing the bare wire to rust and mark clothes. In three participants, the bare wire caused skin laceration and there was a need for at least one replacement of the original splint during treatment in 20 of the participants allocated the Abouna splint. No person allocated a Stack splint had skin laceration or required a new splint.

Surgical versus conservative treatment

Kirschner wire fixation versus Pryor and Howard splint (Auchincloss 1982)

Treatment failure, measured between 14 and 18 months follow up and defined according to the Stark (Stark 1962) criteria (based on pain and deformity), was less frequent in the surgical fixation group (1/19 versus 4/22). The same results were obtained for participants with "unchanged" range of active movement at the distal phalangeal joints. No participants had restriction of movement at the proximal phalangeal or metacarpo-phalangeal joints. In the splint group, one person was dissatisfied with the result of their treatment and two indicated they had restricted function of their finger. There were similar numbers of participants with complications in the two groups: two surgical group participants had infected fingers, in one case the wire was removed after two weeks; three splint group participants had severe local skin irritation, all recovered after removal of their splint. No participant had tenderness or deformity of the terminal nail or pulp. Auchincloss recalled that all participants were compliant. At late follow up, one surgical group participant and three splint group participants expressed dissatisfaction with their method of treatment.

DISCUSSION

Despite a comprehensive search for trials, we identified only five published trials and one registered trial. It is possible that we failed to identify other studies; such as unpublished studies, perhaps reported only in conference proceedings. We suggest that even if this is the case, it is unlikely that their quality and size would have been markedly different from the four included trials. These four trials were small, heterogeneous, inadequately described and reported by today's standards, and had methodological flaws. Ultimately, they provide very little reliable evidence on which to base clinical decisions. It is worth examining some of the underlying reasons for this conclusion, particularly as it could inform future trials.

- A key underlying problem is that these were all small trials and losses to follow up further reduced their capacity for producing definitive answers. In general, small numbers of trial participants result in a greater potential for random error or chance findings and, in particular, any apparent comparability of results of interventions tested within such trials should not be interpreted as evidence of no effect or no difference.
- As described in the 'Background', mallet finger injury covers a broad spectrum of injury and there are many factors that could potentially influence outcome. This was recognised in the tri-

als, but only to some extent. For example, in the exclusion of patients presenting with open injuries or three days from their injury in Maitra 1993. The variation in participant and injury characteristics of the trial populations points to the need for much larger sample sizes and for effective randomisation methods to balance potential and actual confounders (factors other than the trial interventions that could influence the trial results). Failure to describe the intended and actual trial populations is also unhelpful when interpreting trial findings.

- Lack of allocation concealment and assessor blinding, and failure to perform intention-to-treat analyses are all recognised as serious faults in RCTs that could seriously bias their findings. Unit of analysis problems in trials randomising by participants, some of whom had two or more mallet finger injuries, but presenting analyses by fingers can also distort trial findings. The conduct and quality of reporting of these trials in some regards reflects their vintage. The design of any future trial should include measures to avoid these sources of systematic bias. Similarly, reporting should conform to the CONSORT statement (Moher 2001). Doing this would have avoided the lack of information on the method of randomisation and the incomplete information on the participant flow (particularly, baseline numbers) in the included trials.
- Trials should provide a clear description of the interventions and care programmes. We suggest that any such description should include brief details on the advice and instruction provided on skin hygiene and splint removal. Such details aid interpretation of the validity and applicability of trial results. This applies likewise to outcome assessment through active surveillance, ideally of six months or longer, using validated outcome measures. Future trials can take advantage of the advances in outcome measurement for hand disorders (Bindra 2003; Heras-Palou 2003). We suggest that outcome assessment should also include patient adherence and use of resources (including clinician time).

Questions of validity aside, there remains the question of how applicable the trial comparisons and settings are to current practice. In particular, we are not sure if the Abouna splint is still produced, though we have located one “spring” mallet splint in a supplier list. The design of the basic Stack splint may differ slightly between different suppliers, different trials, and then and now. Lastly, all four trials were conducted in accident and emergency settings in the UK.

Different methods of conservative treatment

Perforated custom-made splint versus Stack splint

The rationale behind the development of the perforated splint in Kinninmonth 1986 was the avoidance of the need for splint removal for skin hygiene purposes. Kinninmonth 1986 found around one fifth of the participants were unable to remove and reapply their splints properly; this included the four participants in the Stack splint group with skin maceration or ulceration. The

inadequate description of trial methods and results for this trial prevent us drawing any conclusions on the relative effectiveness of the two splints in resolving mallet finger. Given the inherent problem of losing the benefit of splintage if one flexes the finger during cleaning, proper instruction and advice for the correct procedure is necessary for patients. We do not know how much of a problem is patients’ lack of comprehension and non-adherence to these instructions and to keeping on the splint for six or more weeks; this was not mentioned in the other trial reports, though Auchincloss (Auchincloss 2003) recalled no problems with compliance in his trial (Auchincloss 1982). Clearly, treatment would have to be adapted for patients unable to understand instructions or to perform their own hygiene.

Padded aluminium-alloy malleable finger splint versus Stack splint

Maitra 1993 attempted to get a better fit and avoid skin maceration with their padded aluminium-alloy malleable finger splint. Though the results for correcting the mallet finger deformity were reported as similar, there are insufficient data and an inadequate follow up of just nine weeks to conclude that the two splints were of equal effectiveness. Significantly fewer participants in the custom-made splint group had skin complications. However the proportion of skin complications in the Stack splint group of Maitra 1993 was higher than in the other two trials using the Stack splint (33% versus 15% versus 0%). There was also no mention of the skin hygiene regimen used.

Abouna splint versus Stack splint

In contrast, Warren 1988 tested another off-the-shelf splint, the Abouna splint. Nearly half the participants of each treatment group were assessed as treatment failures. Whether the similarity in these results is a true result cannot be answered here. However the greater unpopularity of the Abouna splint, probably reflecting its suboptimal performance during usage, is an important finding. The perishable rubber and rusting of the exposed wires and the frequent need for replacement splints reveal that the Abouna splint, in the form available to the trialists, is an inferior design to the Stack splint.

Surgical versus conservative treatment

There were no statistically significant differences between participants whose mallet finger was treated with Kirschner wire fixation and those using the Pryor and Howard splint in one small trial (Auchincloss 1982). In the absence of baseline data, we were unable to perform sensitivity analyses to examine the possible effects of the loss of nine participants (18%) from follow up. Subgroup analysis based on time from injury was also inappropriate, even though separate data were provided in Auchincloss 1982 for those presenting within and after one week of injury. Though, essentially, all the injuries were acute, there was a wide spectrum of injuries included in the trial. It is possible that surgical fixation is preferable for some types of mallet finger injury but, in the absence of information on when surgery is indicated and given the risk of

serious complications resulting from surgery, it seems prudent to opt for primary conservative treatment for a typical mallet finger injury.

AUTHORS' CONCLUSIONS

Implications for practice

There is insufficient evidence from comparisons tested within randomised trials to establish the relative effectiveness of different, either custom-made or off-the-shelf, finger splints used for treating mallet finger injury, or indeed, whether the end result of splintage is better than no treatment at all. Similarly, there was insufficient evidence to determine when surgery is indicated.

Until there is reliable evidence to the contrary, the continued use of the off-the-shelf but suitably fitted Stack mallet splint, or equivalent, for the majority of patients (i.e. those with acute closed soft-tissue or bony mallet finger injury) seems appropriate. Patients must be properly instructed on the safe removal and reapplication of the finger splint for skin hygiene purposes.

Implications for research

While there is considerable scope for good-quality sufficiently-sized and well-reported randomised trials in this area, we suggest such research would be informed by the following.

- A fuller description of the epidemiology, including type of injury and current treatment, of this 'common' condition.
- A clearer idea of outcome of typical treatment for typical (the majority) mallet finger injury. In particular, the extent and nature of treatment failure (assessed in terms of: serious complications resulting in the abandonment of splintage, of failure to sufficiently correct the impairment to enable pain-free return to previous activities and function, of persistent unchanged extension lag, serious longer-term deformity such as swan-neck deformity and functional deterioration of finger, and need for secondary treatment for a chronic mallet finger).
- A clearer idea of patient satisfaction, preferences and adherence to the treatment protocol.

These should help to show the extent of the problems of, and need for change to, current practice and help to identify the important issues that need addressing. New designs of splints, provided these are shown to be robust enough for everyday use, should always be compared within a randomised trial with the current standard splint. Some guide to the design, conduct and reporting of such trials is provided in the 'Discussion' of this review.

POTENTIAL CONFLICT OF INTEREST

None known.

ACKNOWLEDGEMENTS

We thank Lesley Gillespie for compiling the search strategy, setting up autosearches and copy editing the text and references in the protocol. We thank Lesley Gillespie, Janet Wale and Vicki Whittaker for editorial checks and comments; and Kate Rowntree for her help during editorial processing of the protocol. We thank Lesley Gillespie, Peter Herbison, Geoffrey Hooper, Tracey Howe, Kate Rowntree, Janet Wale and Vicki Whittaker for editorial checks and comments on the review. We thank Kirsty Loudon for copy editing of the first version.

We thank Mr Auchincloss and Mr Warren for providing further details of their trials.

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*Indicates the major publication for the study

TABLES

Characteristics of included studies

Study	Auchincloss 1982
Methods	<p>Randomisation method: shuffled sealed envelopes</p> <p>Assessor blinding: no</p> <p>Loss to follow up: 9 participants (18%)</p> <p>Intention-to-treat analysis: no in that baseline data not provided; otherwise probably yes.</p>
Participants	<p>A&E department, hospital in Bristol, UK.</p> <p>50 participants.</p> <p>Inclusion criteria: open or closed mallet finger injury within 2 weeks of injury.</p> <p>Exclusion criteria: presentation after 2 weeks</p> <p>Diagnosis: use of X-rays & finger goniometer</p> <p>Presentation: 0 to 2 weeks; mean 4.8 days.</p> <p>Sex (of 41): 29 male (71%)</p> <p>Age (of 41): mean 41 years; range 17-82 years</p> <p>Thumb injury: none (of 41)</p>
Interventions	<p>Period of study: August 1978 - October 1979.</p> <p>(1) Internal percutaneous (through the skin) fixation: a smooth Kirschner (K) wire was inserted by hand under ring-block anaesthesia to fix the DIP joint in extension. No external splintage applied. Finger dressing applied for 2 weeks and then participant asked to keep finger tip dry and covered. K-wire extracted at 6 weeks.</p> <p>(2) Pryor and Howard splint (originally designed by Stack) for 6 weeks. Participants advised not to remove splint except for hygiene purposes. While washing, participant told not to flex finger tip. (Control group.)</p> <p>Open wounds treated before randomisation - no repair of extensor tendons. No restriction on activity other than those imposed by interventions.</p> <p>Assigned: 50 (50 in all)</p> <p>Analysed: 19/22 at follow up</p>
Outcomes	<p>Length of follow up: mean 15.8 months, 14-18 months.</p> <p>(1) Objective results: Stark 1962 criteria based on pain and deformity - extension loss and impairment of flexion</p> <p>(2) Participant rating of results and function</p> <p>(3) Range of active motion at DIP joint; restriction at other finger joints.</p> <p>(4) Complications: local irritation leading to splint removal; infection</p> <p>(5) Participant satisfaction: opinion of treatment</p> <p>(6) Compliance</p>
Notes	<p>Further information on method of randomisation, skin hygiene and finger protection, and compliance received from Dr Auchincloss, who no longer had access to the original paperwork for the article, in letter dated 17/12/2003.</p>
Allocation concealment	B
Study	Kinninmonth 1986
Methods	<p>Randomisation method: not stated</p> <p>Assessor blinding: no</p> <p>Loss to follow up: 3 participants (6%)</p>

Characteristics of included studies (Continued)

	Intention-to-treat analysis: no, baseline data not provided. Also unit of analysis problems (fingers and participants).
Participants	A&E department, hospital in Edinburgh, UK. 54 participants with 57 mallet fingers (distribution of multi-injury cases not reported). Inclusion criteria: mallet fingers (soft-tissue and bony). Exclusion criteria: not specified. Diagnosis: not stated Presentation: 17 participants presented 1-6 weeks post injury. Sex ratio: 2 males/1 female (thus approx. 66% male). Age: no information Thumb injury: none
Interventions	Period of study: no dates given. (1) Perforated custom made finger splint which was secured by adhesive tape or Velcro strip. No removal required for hygiene purposes - instructions given for correct removal if needed; otherwise to keep the splint on without activity restriction. (2) Stack splint (control group). Instructions on daily removal for hygiene purposes. Both splints worn continuously for 6 weeks minimum (range 6-12 weeks). Participants reviewed at 2-6 weeks and thereafter as necessary: skin status and ability to change splint reviewed at each interview. Assigned: ?? (54 participants in all) Analysed: 27/27 fingers (37 participants interviewed at 11-15 months; status of 14 assessed via follow-up notes 6 weeks-5 months)
Outcomes	Length of follow up: 1 year (11-15 months: 37 participants); 6 weeks to 5 months (14 participants). (1) Treatment failure: change of type of splint because participant unable to change splint or splint was impractical; or excessive lag deformity (25+ degrees) (2) Lag deformity (3) Complications: skin irritation, laceration and ulceration; requirement for splint change (4) Participant ability to remove and reapply their splint
Notes	Request for further information sent to Mr Kinninmonth on 5/1/2004.
Allocation concealment	B

Study

Maitra 1993

Methods	Randomisation method: not stated Assessor blinding: no Loss to follow up: probably 0 participants (0%) Intention-to-treat analysis: yes, very likely
Participants	A&E department, hospital in Newcastle upon Tyne, UK. 60 participants. Inclusion criteria: mallet finger deformity (soft-tissue and bony); presenting within 3 days of injury. Exclusion criteria: open injury, large fracture fragment. Diagnosis: not stated (but goniometer mentioned in outcome measurement) Presentation: all within 3 days of injury Sex: 37 male (62%) Age: mean 44.5 years; range 9-73 years Thumb injury: none
Interventions	Period of study: no dates given. (1) Padded aluminium-alloy malleable finger splint (3/4 and 1/2 inch wide) with felt padding that was custom made for individual participants. DIP joint fully extended (PIP joint free). Elastoplast used to fix splint. (2) Stack splint (control group) - all available sizes.

Characteristics of included studies (Continued)

	Both splints worn continuously for 6 weeks, then 3 weeks splintage at night. Assigned: 30/30 Analysed: 30/30 at 9 weeks
Outcomes	Length of follow up: 9 weeks. (1) Recovery in terms of treatment success or failure: Abouna & Brown 1968 criteria based on extension loss, impairment of flexion and finger stiffness (2) Time off work (3) DIP and PIP joint stiffness (4) Complications: skin maceration, skin ulcer and tape allergy
Notes	Request for further information sent to Dr Dorani on 5/1/2004.
Allocation concealment	B

Study **Warren 1988**

Methods	Randomisation method: quasi-randomised based on odd and even hospital numbers Assessor blinding: no Loss to follow up: 8 participants (7%) Intention-to-treat analysis: likely (on receipt of further information)
Participants	A&E departments, two hospitals in Sheffield, UK. 114 participants with 116 mallet fingers (2 participants had 2 mallet fingers). Inclusion criteria: closed bony or soft-tissue mallet fingers or cases of open injury presenting after the skin wound had healed. Exclusion criteria: large bony fragment, epiphyseal injuries in children, fresh open injuries. Diagnosis: use of X-rays & standard hand goniometer Presentation: 0 to 8 weeks; 82 (71%) within 1 week. Sex: 73 male (64%) Age: mean 46 years; range 10-77 years Thumb injury: none
Interventions	Period of study: over 1 year, no dates given. (1) Abouna splint. (2) Stack splint (control group). Both splints worn continuously for 6 weeks. Then worn at night for another 2 weeks. Participants were "reviewed regularly". No specific advice given on skin hygiene. Assigned: 53/61 (53/63 fingers) Analysed: 49/57 (49/58 fingers) at 10 weeks
Outcomes	Length of follow up: 10 weeks. (1) Recovery in terms of treatment success or failure: Abouna & Brown 1968 criteria based on extension loss, impairment of flexion and finger stiffness (2) Complications: skin laceration; requirement for splint replacement (3) Participant satisfaction
Notes	Further information, including baseline data, numbers with skin laceration and numbers requiring splint replacement obtained from Mr Warren on 4/2/04. An earlier e-mail from Mr Warren (16/01/04) revealed trial was part of his MD thesis. A copy of this was not obtained for this review.
Allocation concealment	C
A&E: accident & emergency DIP: distal interphalangeal PIP: proximal interphalangeal	

Interventions for treating mallet finger injuries (Review)

Characteristics of included studies (Continued)

Characteristics of excluded studies

Garberman 1994	Trial report failed to provide results for comparison of dorsally placed aluminium-foam splint versus the Stack splint and instead focused on a non-randomised comparison of early and delayed presentation. No response received to requests for information and data, sent 2/12/2003 and 6/1/2004, for the randomised comparison. Trial provisionally excluded until further information obtained.
Hayton 2003	The contact person for this trial listed as completed in the UK National Research Register is no longer based at the listed hospital. No response received to requests for information (sent 19/12/2003 and 5/1/2004 to the contact author) on the status of this trial. Potential trial comparing two splints provisionally excluded until further information obtained.

ADDITIONAL TABLES

Table 01. Search strategies for MEDLINE and The Cochrane Library

MEDLINE (OVID WEB)

1. ((mallet adj (finger\$ or deformit\$)) or baseball\$ finger\$ or basketball\$ finger\$ or hammer finger\$ or drop finger\$).tw.
2. Finger Injuries/
3. Tendon Injuries/
4. or/2-3
5. (joint\$ adj (DIP or distal interphalangeal)).tw.
6. (avulsion fract\$ and finger\$).tw.
7. or/5-6
8. and/4,7
9. or/1,8
10. randomized controlled trial.pt.
11. controlled clinical trial.pt.
12. Randomized Controlled Trials/
13. Random Allocation/
14. Double-Blind Method/
15. Single-Blind Method/
16. or/10-15
17. Animal/ not Human/
18. 16 not 17
19. clinical trial.pt.
20. exp Clinical Trials/
21. (clinic\$ adj25 trial\$).tw.
22. ((singl\$ or doubl\$ or trebl\$ or tripl\$) adj (mask\$ or blind\$)).tw.
23. Placebos/
24. placebo\$.tw.
25. random\$.tw.
26. Research Design/
27. (latin adj square).tw.
28. or/19-27
29. 28 not 17
30. 29 not 18

The Cochrane Library

- #1. ((mallet next finger*) or (mallet next deformit*) or (baseball* next finger*) or (basketball* next finger*) or (hammer next finger*) or (drop next finger*))
- #2. ((dip near joint*) or (distal near phalan*))
- #3. FINGER INJURIES single term (MeSH)
- #4. TENDON INJURIES single term (MeSH)
- #5. (#3 or #4)
- #6. (#2 and #5)
- #7. (#1 or #6)

Table 01. Search strategies for MEDLINE and The Cochrane Library (Continued)

MEDLINE (OVID WEB)

31. Comparative Study/
32. exp Evaluation Studies/
33. Follow-Up Studies/
34. Prospective Studies/
35. (control\$ or prospectiv\$ or volunteer\$).tw.
36. Cross-Over Studies/
37. or/31-36
38. 37 not 17
39. 38 not (18 or 30)
40. or/18,30,39
41. and/9,40

The Cochrane Library

Table 02. Search strategies (OVID WEB) for EMBASE, CINAHL and AMED

EMBASE

1. Mallet Finger/
2. Closed Mallet Finger Injury/
3. or/1-2
4. ((mallet and (finger\$ or deformit\$)) or baseball\$ finger\$ or basketball\$ finger\$ or hammer finger\$ or drop finger\$).tw.
5. (joint adj (DIP or distal interphalangeal)).tw.
6. Finger Injury/ or Finger Fracture/ or Finger Malformation/
7. and/5-6
8. or/3-4,7
9. exp Randomized Controlled trial/
10. exp Double Blind Procedure/
11. exp Single Blind Procedure/
12. exp Crossover Procedure/
13. Controlled Study/
14. or/9-13
15. ((clinical or controlled or comparative or placebo or prospective\$ or randomi#ed) adj3 (trial or study)).tw.
16. (random\$ adj7 (allocat\$ or allot\$ or assign\$ or basis\$ or divid\$ or order\$)).tw.
17. ((singl\$ or doubl\$ or trebl\$ or tripl\$) adj7 (blind\$ or mask\$)).tw.
18. (cross?over\$ or (cross adj1 over\$)).tw.
19. ((allocat\$ or allot\$ or assign\$ or divid\$) adj3 (condition\$ or experiment\$ or intervention\$ or treatment\$ or therap\$ or control\$ or group\$)).tw.
20. or/15-19
21. or/14,20
22. limit 21 to human
23. and/8,22

CINAHL and AMED

1. ((mallet adj (finger\$ or deformit\$)) or baseball\$ finger\$ or basketball\$ finger\$ or hammer finger\$ or drop finger\$).tw.
2. Finger Injuries/
3. Tendon Injuries/
4. or/2-3
5. (joint\$ adj (DIP or distal interphalangeal)).tw.
6. (avulsion fract\$ and finger\$).tw.
7. or/5-6
8. and/4,7
9. or/1,8

Table 03. Methodological quality assessment scoring scheme

Items	Scores	Notes
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 or table.	Cochrane code (see Handbook): Clearly yes = A; not sure = B; clearly no = C.
B. Were the outcomes of participants who withdrew described and included in the analysis (intention to treat)?	2 = withdrawals well described and accounted for in analysis. 1 = withdrawals described and analysis not possible. 0 = no mention, inadequate mention, or obvious differences and no adjustment.	
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, or some blinding of outcomes attempted. 0 = not mentioned or not possible.	
D. Were important baseline characteristics reported and comparable?	2 = good comparability of groups, or confounding adjusted for in analysis. 1 = confounding small, mentioned but not adjusted for, or comparability reported in text without confirmatory data. 0 = large potential for confounding, or not discussed.	The principal confounders considered will be type of injury (closed: bony versus soft-tissue; open; trans-epiphyseal; DIP joint fractures), age (child, adult), gender, time since injury, presence of other ipsilateral hand injuries, mallet thumb, hand dominance and occupation or hobbies.
E. Were the participants blind to assignment status after allocation?	2 = effective action taken to blind participants. 1 = small or moderate chance of unblinding of participants. 0 = not possible, or not mentioned (unless double-blind), or possible but not done.	
F. Were the treatment providers blind to assignment status?	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, or some evidence of comparability. 0 = not mentioned or clear and important differences in care programmes.	Examples of clinically important differences in other interventions are: duration of splintage, differences in care and aftercare such as advice on activity and finger hygiene.
H. Were the inclusion and exclusion criteria for entry clearly defined?	2 = clearly defined. 1 = inadequately defined. 0 = not defined.	
I. Were the interventions clearly defined?	2 = clearly defined interventions are applied with a standardised protocol. 1 = clearly defined interventions are	

Table 03. Methodological quality assessment scoring scheme (Continued)

Items	Scores	Notes
		applied but the application protocol is not standardised. 0 = intervention or application protocol, or both are poorly or not defined.
J. Were the outcome measures used clearly defined?	2 = clearly defined. 1 = inadequately defined. 0 = not defined.	
K. Were the outcome measures or diagnostic tests used in outcome assessment appropriate?	2 = optimal. 1 = adequate. 0 = not defined or adequate.	
L. Was the surveillance active and of clinically appropriate duration?	2 = active surveillance and appropriate duration (6 months or more). 1 = active surveillance, but inadequate duration. 0 = surveillance not active or not defined.	

Table 04. Quality assessment scores for included studies

Items	Auchincloss 1982	Kinninmonth 1986	Maitra 1993	Warren 1988
A	1	1	1	0
B	0	0	1	2
C	0	0	0	0
D	0	0	1	1
E	0	0	0	0
F	0	0	0	0
G	2	1	0	1
H	1	0	1	2
I	2	1	1	1
J	2	1	2	1
K	1	0	1	1
L	0	0	1	1

ANALYSES

Comparison 01. Custom-made or other finger splint versus Stack splint

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Treatment failure			Relative Risk (Fixed) 95% CI	Totals not selected
02 Patient dissatisfaction with splint			Relative Risk (Fixed) 95% CI	Totals not selected
03 Complications			Relative Risk (Fixed) 95% CI	Totals not selected

Comparison 02. Kirschner wire fixation versus splint

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Treatment failure			Relative Risk (Fixed) 95% CI	Totals not selected
02 Patient dissatisfaction with end result			Relative Risk (Fixed) 95% CI	Totals not selected
03 Patient rating of restricted function			Relative Risk (Fixed) 95% CI	Totals not selected
04 Complications			Relative Risk (Fixed) 95% CI	Totals not selected

INDEX TERMS

Medical Subject Headings (MeSH)

Finger Injuries [etiology; *therapy]; Hand Deformities, Acquired [etiology; therapy]; Randomized Controlled Trials; *Splints; Tendon Injuries [etiology; *therapy]; Wounds, Nonpenetrating [complications; *therapy]

MeSH check words

Adult; Humans

COVER SHEET

Title	Interventions for treating mallet finger injuries
Authors	Handoll HHG, Vaghela MV
Contribution of author(s)	The review was initiated by Manesh Vaghela (MV) who provided the clinical input. Helen Handoll (HH) provided the methodological input, including conducting the search for trials and compilation of the protocol and review into RevMan. Both authors prepared the protocol and subsequently selected and processed the trials for the review, and agreed on contents of letters to trialists. HH produced the first drafts of the various sections of the review; these were checked and critically reviewed by MV. HH continued the search for trials for the first update and produced the revised document. This was checked by MV. Both review authors are guarantors of the review.
Issue protocol first published	2004/1
Review first published	2004/3
Date of most recent amendment	11 August 2005
Date of most recent SUBSTANTIVE amendment	04 March 2004

What's New	In this, the first, minor update of this review (published in Issue 4, 2005) the search for trials was extended to June 2005. No new trials were found.
Date new studies sought but none found	14 June 2005
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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DOI	10.1002/14651858.CD004574.pub2
Cochrane Library number	CD004574
Editorial group	Cochrane Bone, Joint and Muscle Trauma Group (formerly the Musculoskeletal Injuries Group)
Editorial group code	HM-MUSKINJ

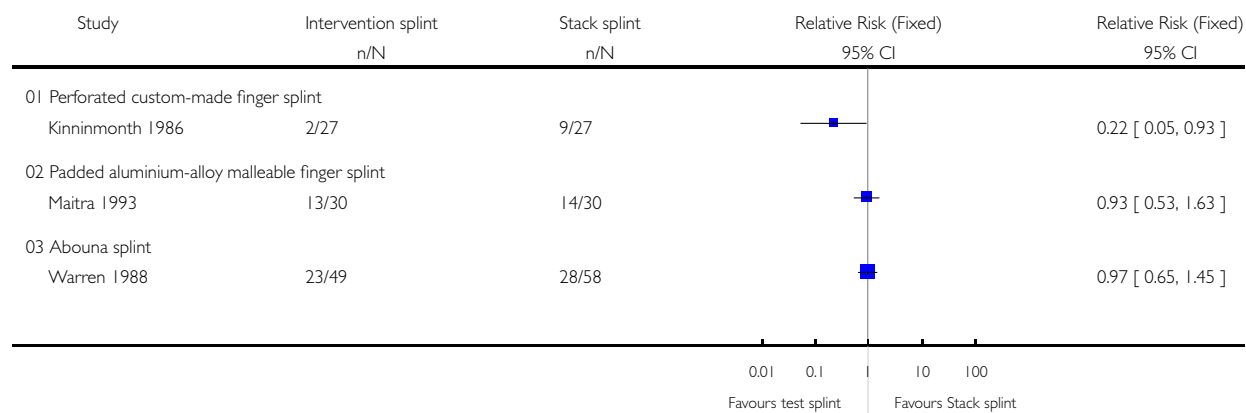
GRAPHS AND OTHER TABLES

Analysis 01.01. Comparison 01 Custom-made or other finger splint versus Stack splint, Outcome 01 Treatment failure

Review: Interventions for treating mallet finger injuries

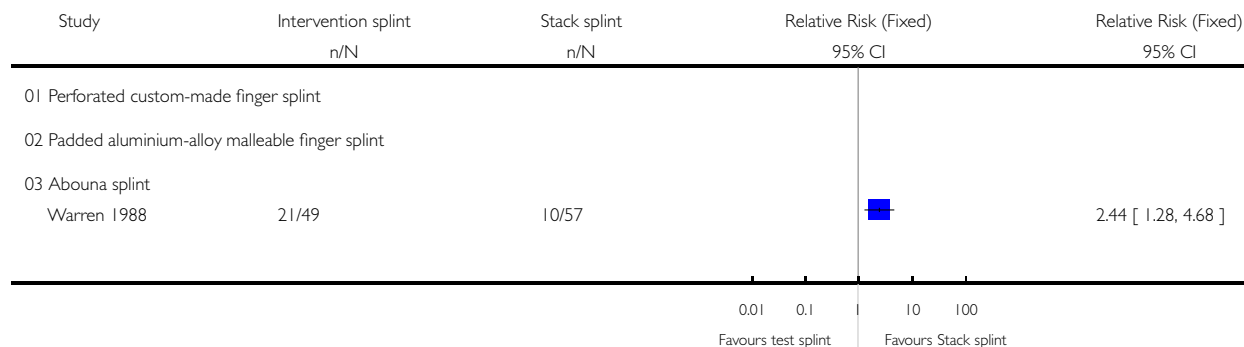
Comparison: 01 Custom-made or other finger splint versus Stack splint

Outcome: 01 Treatment failure



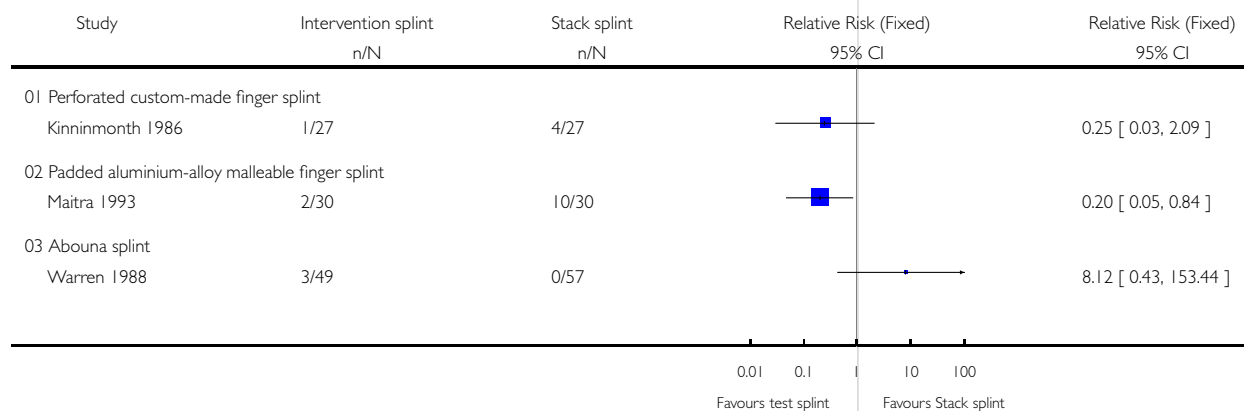
Analysis 01.02. Comparison 01 Custom-made or other finger splint versus Stack splint, Outcome 02 Patient dissatisfaction with splint

Review: Interventions for treating mallet finger injuries
 Comparison: 01 Custom-made or other finger splint versus Stack splint
 Outcome: 02 Patient dissatisfaction with splint



Analysis 01.03. Comparison 01 Custom-made or other finger splint versus Stack splint, Outcome 03 Complications

Review: Interventions for treating mallet finger injuries
 Comparison: 01 Custom-made or other finger splint versus Stack splint
 Outcome: 03 Complications

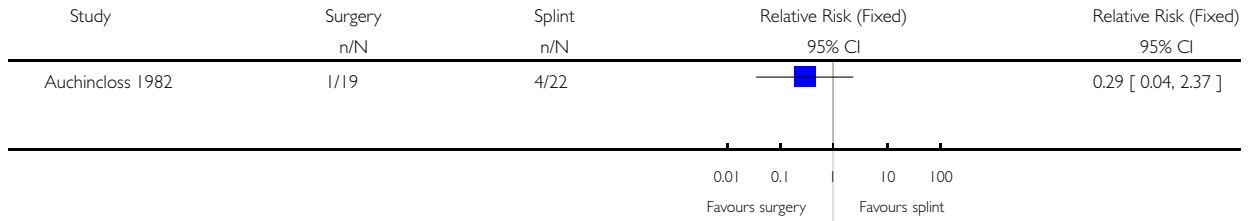


Analysis 02.01. Comparison 02 Kirschner wire fixation versus splint, Outcome 01 Treatment failure

Review: Interventions for treating mallet finger injuries

Comparison: 02 Kirschner wire fixation versus splint

Outcome: 01 Treatment failure

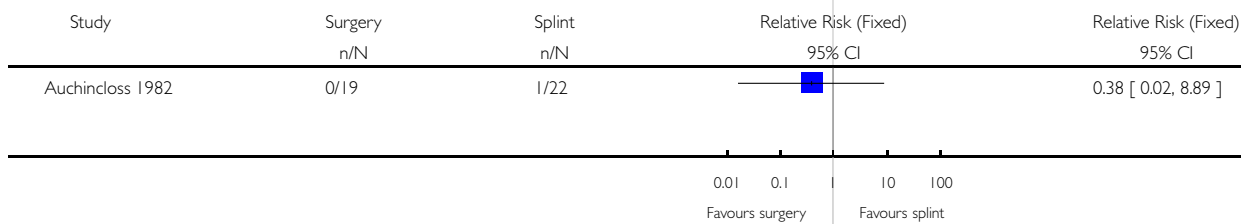


Analysis 02.02. Comparison 02 Kirschner wire fixation versus splint, Outcome 02 Patient dissatisfaction with end result

Review: Interventions for treating mallet finger injuries

Comparison: 02 Kirschner wire fixation versus splint

Outcome: 02 Patient dissatisfaction with end result

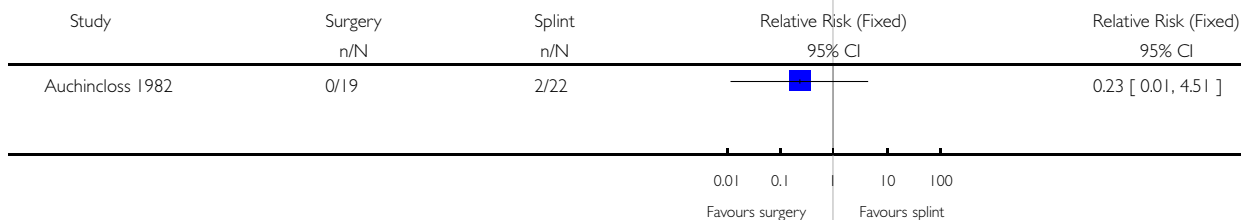


Analysis 02.03. Comparison 02 Kirschner wire fixation versus splint, Outcome 03 Patient rating of restricted function

Review: Interventions for treating mallet finger injuries

Comparison: 02 Kirschner wire fixation versus splint

Outcome: 03 Patient rating of restricted function



Analysis 02.04. Comparison 02 Kirschner wire fixation versus splint, Outcome 04 Complications

Review: Interventions for treating mallet finger injuries

Comparison: 02 Kirschner wire fixation versus splint

Outcome: 04 Complications

