Conservative interventions for treating middle third clavicle fractures in adolescents and adults (Review)

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Conservative interventions for treating middle third clavicle fractures in adolescents and adults

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ABSTRACT

Background
Clavicle fractures account for around 4% of all fractures. Treatment of these fractures is usually non-operative.

Objectives
To evaluate the effects of different methods for conservative (non-operative) treatment for acute (treated soon after diagnosis) middle third clavicle fractures in adolescents and adults.

Search strategy
We searched the Cochrane Bone, Joint and Muscle Trauma Group Specialised Register, the Cochrane Central Register of Controlled Trials (The Cochrane Library 2008, Issue 4), MEDLINE (from 1966), EMBASE (from 1980), LILACS (from 1982), trial registers and reference lists of articles. No language or publication restrictions were applied. The date of last search was in December 2008.

Selection criteria
Randomised and quasi-randomised controlled trials testing conservative interventions for treating adolescents and adults with acute middle third clavicle fractures were considered. The primary outcomes were pain, shoulder function, health-related quality of life and time to return to previous activities.

Data collection and analysis
Two authors independently selected eligible trials, assessed methodological quality and cross-checked data extraction. Risk ratios and 95% confidence intervals were calculated for dichotomous variables, and mean differences and 95% confidence intervals were calculated for continuous variables. There was no pooling of data.

Main results
Three trials were included in this review. Two trials compared the figure-of-eight bandage with an arm sling in a total of 234 participants. Both trials were underpowered and compromised by poor methodology. One trial found slightly higher pain levels in the bandage group.
at 15 days (mean difference 0.80, 95% confidence interval 0.34 to 1.26; visual analogue scale: 0 (no pain) to 10 (worst pain)), and the other trial reported greater discomfort during bandage wear. There were no significant differences in functional or other outcomes reported for either trial. The third trial, which evaluated therapeutic ultrasound in 120 participants, was also underpowered but had a low risk of bias. The trial found no statistically significant difference between low-intensity pulsed ultrasound and placebo in the time to clinical fracture healing (mean difference -0.32 days, 95% CI -5.85 to 5.21 days) nor in any of the other reported outcomes.

Authors' conclusions

There is insufficient evidence from randomised controlled trials to determine which methods of conservative treatment are the most appropriate for acute middle third clavicle fractures in adolescents and adults. Further research is warranted.

**PLAIN LANGUAGE SUMMARY**

Conservative interventions for treating collarbone fractures in adolescents and adults

Collarbone (clavicle) fractures are a common injury, particularly in adolescents, and account for up to 4% of all fractures. They are frequently treated with conservative treatments that do not involve any kind of surgery. The most common treatments are the use of an arm sling, wrapping, figure-of-eight bandages and splints.

This review aims to evaluate the effects, primarily on pain and long-term function, of different methods, including duration of immobilisation, for conservatively treating collarbone fractures in adolescents and adults.

Three studies with a total of 354 participants were included in the review. Two trials, both of which had poor methodology, compared the figure-of-eight bandage versus an arm sling. One trial found slightly higher pain scores at 15 days in the bandage group and the other trial reported more discomfort during bandage use. However, while neither trial detected differences in other and longer-term outcomes, there was not enough reliable evidence to draw conclusions. The third trial was well conducted but not big enough to be conclusive. It compared therapeutic ultrasound with placebo (sham) in 120 people with clavicle fractures. It found no difference in outcome, including the time for fracture healing, between the two groups.

The review concludes that there is not enough evidence to draw conclusions about the best methods of conservative treatment for these fractures.

**BACKGROUND**

The clavicle (or collarbone) has important functions which can be compromised by the occurrence of fractures and their complications. It acts as a prop to keep the shoulder and arm away from the sternum and thoracic cage. This helps to stabilize the shoulder girdle and to allow the arm a full range of movement. In addition to its role as a bony framework for muscle origins and insertions, the clavicle provides protection to vital neurovascular structures, supports the respiratory function and has a significant aesthetic role in the physical appearance of the person (Kotecki 2006; Lazarus 2001).

**Description of the condition**

Clavicle fractures are common, accounting for 2.6% to 4% of all fractures (Nordqvist 1994; Ptaszczyn 2002). Epidemiological studies have reported an overall incidence of 64 per 100,000 population per year in Malmo, Sweden (Nordqvist 1994), 29 per 100,000 population per year in Edinburgh, Scotland (Robinson 1998) and 50 per 100,000 population per year in Uppsala, Sweden (Nowak 2000). The structure of the clavicle comprises medial and lateral flat expanses, linked by a thin, tubular middle. The medial and lateral segments are supported by muscular attachments and ligament structures, but the middle third is not fixed - this area represents a weak link in the clavicular structure. Up to 80% of all clavicle fractures occur in the middle third (Neer 1984).

Clavicle fractures often occur after a fall onto an outstretched hand or after direct trauma to the shoulder. Deformity of the shoulder, as well as bruising, is generally obvious after a clavicle fracture, making diagnosis straightforward (Lazarus 2001; Stanley 1988). In his study on clavicle fractures, Allman 1967 proposed the classification of clavicle fractures into three groups: group I (middle third fractures); group II (lateral third fractures); and group III (me-
dial third fractures). In a large epidemiological study, Nordquist 1994 classified 76% of all fractures as group I fractures, and found a median age of 13 years old for participants of this group. Just over half (53%) of middle third fractures were undisplaced. Recently, due to the absence of a single system that has prognostic and therapeutic value, Robinson proposed a new classification, which includes prognostically important variables, such as degree of displacement, and degree of comminution (Robinson 1998).

**Methods**

**Criteria for considering studies for this review**

**Types of studies**

Any randomised or quasi-randomised (method of allocating participants to a treatment which is not strictly random e.g. by date of birth, hospital record number, alternation) controlled trials comparing conservative interventions for treating clavicle fractures were considered.

**Types of participants**

Trials with adolescent or adult participants diagnosed with an acute middle third clavicle fracture were included. Trials exclusively including young children (age less than 10 years) were excluded but any trials that recruited young children as well as older people were included provided the proportion of young children was clearly under 10% or separate data were available. People with diagnosis of any other disorders in the shoulder were not included.

**Types of interventions**

We included trials evaluating the use of, or the optimal duration of use of, any conservative treatment (slings, strapping, figure-of-eight bandages and splints, and adjunct therapies such as therapeutic ultrasound).

**Types of outcome measures**

**Primary outcomes**

- Patient-assessed pain, shoulder function, health-related quality of life; and recovery rate of recovery of former function such as time to return to previous activities (sport, manual labour etc).

Examples of validated patient-assessed instruments for measuring the first three outcomes are:

- VAS (visual analogue scale) (Revill 1976) for pain;
- Disability of the Arm, Shoulder, and Hand questionnaire - DASH (Hudak 1996) for upper-limb function;
• Short Form-36 (SF-36) (Ware 1992) for health related quality of life.

A commonly used instrument for assessing shoulder function is the Constant score (Constant 1987), which is composite score for shoulder function which includes subjectively pain and activities of daily living, and objectively rated range of movement and strength.

Secondary outcomes

Functional impairment and clinical outcomes
• Shoulder range of motion;
• Shoulder strength;
• Cosmetic appearance;
• Patient satisfaction with treatment.

Resource use
• Hospital admission, number of outpatient attendances and other costs with treatment;
• Time off work or education.

Radiographic outcomes
• Clavicular length/shortening and shift;
• Non-union and symptomatic non-union;
• Time to consolidation.

Harms (failure of treatment and adverse events)
• Early complications (discomfort, paraesthesia in superior limbs, pain, etc);
• Short-term complications (skin problems, stiffness, etc);
• Late complications (asymmetric shoulder, sensitive and/or painful fracture site, etc);
• Need of operative procedure or additional medical treatment.

Search methods for identification of studies

Electronic searches
We searched the Cochrane Bone, Joint and Muscle Trauma Group Specialised Register (to December 2008), the Cochrane Central Register of Controlled Trials (CENTRAL; in The Cochrane Library 2008, Issue 4), MEDLINE (1966 to December 2008), EMBASE (1980 to December 2008), LILACS (1982 to December 2008). We also searched Current Controlled Trials, the UK National Research Register (for records up to September 2007) and WHO International Clinical Trial Registry for ongoing and recently completed trials. There were no restrictions based on language or publication status.

In MEDLINE (PubMed) the first two phases of the optimal trial search strategy (Higgins 2006) were combined with the subject specific search (see Appendix 1). Search strategies are also shown for The Cochrane Library (Wiley InterScience), EMBASE (OVID WEB) and LILACS.

Searching other resources
We contacted experts in the field and searched reference lists of relevant articles.

Data collection and analysis

Selection of studies
Two authors (JB and ML) independently selected and assessed, using a piloted form, potentially eligible studies for inclusion in the review. Any disagreements were resolved by discussion and when necessary, adjudication by a third author (RA).

Data extraction and management
Two review authors (JB and ML) used a piloted data extraction form to independently collect the data. Any disagreements were resolved by a third review author (RA). Two review authors (RA and ML) entered data into RevMan. When necessary, we sent requests to trial authors for additional information or data.

Assessment of risk of bias in included studies
Two review authors (ML and RA) independently assessed, without masking of the source or authorship of trial reports, various aspects of methodological quality of the included studies, using a modified version of the Cochrane Bone, Joint and Muscle Trauma Group’s former quality assessment tool (Table 1). An impression of the overall risk of bias, based on allocation concealment, blinding and the potential effect of incomplete outcome data, of the individual studies was also made. Disagreements were resolved by a third review author (JG).