Surgical interventions for treating acute fractures or non-union of the middle third of the clavicle (Protocol)

Lenza M, Bellori JC, Comes dos Santos JB, Matsumoto MH, Faloppa F
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Surgical interventions for treating acute fractures or non-union of the middle third of the clavicle (Protocol)
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Surgical interventions for treating acute fractures or non-union of the middle third of the clavicle

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Abstract

This is the protocol for a review and there is no abstract. The objectives are as follows:

The objective of this review is to evaluate the effectiveness of different methods of surgical treatment for fractures and non-unions of the middle third of the clavicle. Separate comparisons will be set up for these two conditions.
BACKGROUND

The clavicle or collarbone has several important functions. It acts as a bridge connecting the upper limb to the thoracic cage, helping to stabilize the shoulder girdle and allowing the arm to perform a full range of movement. In addition, it functions as an attachment for muscles, provides protection to vital neurovascular structures, supports respiratory function and has a significant aesthetic role in the physical appearance of the person. These functions can be damaged by the occurrence of fractures and non-union (Kozelnicki 2006; Lazarus 2001).

This review deals with two conditions: acute fractures and non-union resulting from failed fracture healing.

Description of the condition

The clavicle is one of the most commonly fractured bones, corresponding to 2.6% to 4% of all fractures (Nordqvist 1994; Postacchini 2002). The incidence of clavicle fractures in adults is 71 per 100,000 in men and 20 per 100,000 in women (Nee 1994). Court-Brown 2006 in an epidemiological study of fractures in people over 12 years of age observed a bimodal distribution curve of clavicle fracture incidence with age in males, with a high incidence in young males and, to a lesser extent, in older males; and a unimodal curve in females with a high incidence in older women.

There are two mechanisms of injury that most typically result in clavicle fractures. The most common occurs after a fall directly onto the outer side of the shoulder and corresponds to around 85% to 94% of the cases. Sporting activities that may result in direct trauma to the clavicle, such as bicycling and skiing, are common causes of clavicle fractures (Nowak 2000). The other mechanism of clavicle injury is indirect trauma, which happens after a fall onto an outstretched arm; the force of the fall is transmitted through the upper extremity to the clavicle, producing the fracture. Although previously believed to be the most frequent cause of injury, this represents only 2% to 5% of fractures (Jery 2007; Kozelnicki 2006).

Allman 1967 proposed a classification for clavicle fractures, dividing them into three groups according to their location along the bone. Group I are fractures in middle third of the bone; group II are fractures in the outer or lateral third of the bone; and group III are fractures in the inner or medial third. In a large epidemiological study, Nordqvist 1994 classified 76% of all fractures as group I fractures and a median age of 13 years old was found for patients in this group. Recently, due to the absence of a single system that has prognostic and therapeutic value, Robinson 1998 proposed his own classification, based on Allman’s categories, that includes prognostically important variables, such as degree of displacement and degree of comminution (fragmentation of the bone). A possible complication of middle third clavicle fractures is non-union. In 1986, the American Food and Drug Administration (FDA) defined non-union as being ‘established when a minimum of nine months has elapsed since injury and the fracture shows no visible progressive signs of healing for three months’. However, these criteria cannot be applied to every fracture (LaVelle 2003). Even though non-union of the clavicle has not been definitively specified in the literature so far, many investigators agree that a diagnosis can be made if consolidation does not happen until six months after the injury (Jery 2007; Manske 1985; Pyper 1978; Wilkinson 1983). The verification of the non-union is made when there is clinical or radiographic evidence showing that healing has ceased and that union is highly improbable.

Description of the intervention

Indications for operative treatment of middle third clavicle fractures include: open fracture, severe displacement caused by comminution, an imminent lesion of the skin by a sharp edge of the clavicle and neurovascular injuries. The relative (not absolute) indications for surgery are: multiple trauma; floating shoulder, painful malunion and painful non-union. Most recently the other relative indications have been adopted in a major number of cases, including high energy fractures such as clavicle shortening greater than 20 mm, complete displacement and severe comminution. When the surgical approach is chosen to treat these fractures, there are several techniques of fixation that can be implemented (Bradbury 1996; Ebraheim 1997; Jupiter 1987; Mulhall 1994). These include internal fixation with screws, pins, wire loops or plates; and external fixation with external fixators. Bone grafting may also be used. The primary indications for treatment of an established non-union are pain and functional impairment. Usually, there is no indication for treating an asymptomatic non-union. Surgical treatments of clavicle non-union include bone graft with or without fixation, clavicle excision and more rarely free fibula vascularized graft. The latter involves the use of a bone graft from the fibula (one of the two bones of the lower leg) which includes blood vessels that can be connected to the blood vessels in the locality of the clavicle. Each treatment has documented advantages and disadvantages (Lazarus 2001).

How the intervention might work

Whilst studies show incidences ranging from 0.03% to 5.9% of non-union (Nordqvist 1998; Robinson 2004; Złowodiński 2005) for undisplaced fractures, studies of displaced fractures reveal rates up to 15% of non-union (Canadian 2007; Hill 1997; McKee 2006). Etiological factors that predispose to the development of non-union include open fracture, associated poly-traumatic lesions, re-fracture, initial fracture displacement, comminution, shortening, older age and an inadequate period of immobilisation (Jupiter 1987; Marti 2003). Robinson 2004 observed that intrinsic factors, which are factors not related to any external conditions of the patient, such as advanced age and female gender are more likely to predispose the non-union development. These results have re-
Apêndice

cently prompted an increase in the preference for operative treatments by surgeons, through the usual techniques of open reduction and internal fixation (using plate and screw) or intramedullary fixation (either approaching the focus of the fracture or not) (Canadian 2007; Meier 2007). The comparison between surgical and conservative (non-operative) management is the subject of a separate Cochrane Review in preparation (Cheung 2008).

Complications of surgical treatments include wound infection or dehiscence, deep infection and problems with the hardware used for fixation. The rates of infections range from 0% to 18% (Böttner 1997; Polgenhau 1992; Verborgt 2005; Wu 1998) and the rates of hardware irritation requiring partial or total hardware removal range from 50% to 100% (Ali Khan 1976; Böttner 1997; Canadian 2007). Other potential drawbacks of surgical interventions include scarring, complex regional pain syndrome, transient brachial plexus symptoms, non-union and re-fracture after hardware removal, and hardware migration (Lasarius 2001).

Why it is important to do this review

Middle third fracture of the clavicle is one of the most common fractures of the body. It frequently results in short-term disability and pain and can result in longer-term deformity and disability. Although the majority of acute fractures can be treated conservatively, there are some types of fractures that need to be treated surgically. Surgical treatment for symptomatic non-union is also performed. Hence, it is important to systematically review the available evidence in the literature of surgical interventions in order to inform management decisions for these injuries.

OBJECTIVES

The objective of this review is to evaluate the effectiveness of different methods of surgical treatment for fractures and non-unions of the middle third of the clavicle. Separate comparisons will be set up for these two conditions.

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 surgical interventions for treating middle third clavicle fractures or non-union will be considered.

Types of participants

Trials with adolescents or adults who have been diagnosed with an acute middle third clavicle fracture or non-union will be included. Any trials exclusively including young children (age less than 10 years) will be excluded, but trials that also involve young children will be included provided the proportion of young children is clearly under 10% or separate data are available. People with other shoulder injuries or disorders will be excluded.

Types of interventions

All surgical interventions for treating middle third clavicle fractures or non-union. Examples include internal fixation using a plate, Kirschner wires, titanium nail, Knowles pin and external fixation with an external fixator. All possible comparisons between these surgical strategies (applied either singly or combined) together with the use of bone grafting will also be considered.

Types of outcome measures

Primary outcomes

- Pain, treatment failure (a systematic non-union; unresolved non-union; or re-operation) and health-related quality of life.

Examples of commonly used instruments for measuring the above outcomes are:

- The Constant Score (Constant 1987);
- Short Form-36 (SF-36) (Ware 1992);
- Disability of the Arm, Shoulder, and Hand questionnaire - DASH (Hudak 1996);
- VAS (visual analogue scale) (Revill 1976)

Secondary outcomes

Functional impairment and clinical outcomes

- Shoulder range of motion;
- Shoulder strength;
- Cosmetic appearance;
- Patient satisfaction with treatment;
- Time of rehabilitation;
- Time to return to previous activities (sport, manual labour etc.),

Radiographic outcomes

- Time to consolidation;
- Clavicular length shortening and shift;
- Step off and gap deformity of shaft of clavicular bone;
- Composite measures include malunion and total radiological deformity;
- Non-union.

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Adverse outcomes

- Early complications (wound infection and/or dehiscence, parasthesia in upper limbs, pain, etc);
- Short-term complications (skin problems, stiffness, hardware irritation requiring removal, wire migration, etc);
- Late complications (asymmetric shoulder, sensitive and/or painful fracture site, hardware irritation and/or prominence, etc).

Economic data

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

Search methods for identification of studies

Electronic searches

We will search the Cochrane Bone, Joint and Muscle Trauma Group Specialised Register (to present), the Cochrane Central Register of Controlled Trials (CENTRAL; in The Cochrane Library current issue), MEDLINE (1966 to present), EMBASE (1988 to present), and LILACS (1982 to present). We will also search Current Controlled Trials at www.controlled-trials.com, the UK National Research Register (records up to September 2007 can be accessed at https://portal.nihr.ac.uk/Pages/NRRArchive.aspx) and the WHO International Clinical Trial Registry at www.who.int/ictrp/search/en/ for ongoing and recently completed trials. There will be no restrictions based on language or publication status.

In MEDLINE (PubMed) the first two phases of the optimal trial search strategy (Higgins 2006) will be combined with the subject specific search (see Appendix 1). Search strategies are also shown for The Cochrane Library (Wiley InterScience; see Appendix 2), EMBASE (OVID WEB; see Appendix 3), and LILACS (http://bases.bireme.br; see Appendix 4).

Table 1. Methodological quality assessment scheme

<table>
<thead>
<tr>
<th>Items</th>
<th>Scores</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Was the assigned treatment adequately concealed prior to allocation?</td>
<td>Yes* method did not allow disclosure of assignment. Unclear = small but possible chance of disclosure of assignment or unclear. No = quasi-randomised, or open list or tables.</td>
<td>Cochrane code (see Handbook): Clearly yes = A; Not sure = B; Clearly no = C.</td>
</tr>
</tbody>
</table>

Searching other resources

We will check the reference lists of articles, reviews and textbooks for possible relevant studies. We will handsearch abstracts of the British Elbow and Shoulder Society annual meetings (2001 to present;www.besc.org.uk/meetings/archive.asp), the American Orthopaedic Association annual meetings (1996 to present;www.bhwf.org/ota/am/), American Academy of Orthopaedic Surgeons annual meetings (www.aaos.org/) and the British Trauma Society Annual Meeting (http://www.trauma.org/btsv).  

Data collection and analysis

Selection of studies

Two authors (JB and ML) will independently select and assess, using a pre-piloted form, potentially eligible studies for inclusion in the review. Any disagreements will be resolved by discussion and, if necessary, adjudication by a third author (JG).

Data extraction and management

Two review authors (JB and ML) will use a pre-piloted data extraction form to independently collect data including methods, participants, interventions and outcomes. Any disagreements will be resolved by a third review author (RA). Two review authors (RA and ML) will enter data into Review Manager. If necessary, requests will be sent to trial authors for additional information or data.

Assessment of risk of bias in included studies

Three authors (ML, JB and JG) will independently assess 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 (see Table 1). Data will also be collected for future inclusion in the Risk of Bias table.

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<th>Methodological quality assessment scheme (Continued)</th>
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<tr>
<td>(2) Were the outcomes of participants who withdrew described and included in the analysis (intention-to-treat)?</td>
<td></td>
</tr>
<tr>
<td>Yes = withdrawals well described and accounted for in analysis.</td>
<td></td>
</tr>
<tr>
<td>Unclear = withdrawals described and analysis not possible, or probably no withdrawals.</td>
<td></td>
</tr>
<tr>
<td>No = no mention, inadequate mention, or obvious differences and no adjustment.</td>
<td></td>
</tr>
<tr>
<td>(3) Were the outcome assessors blinded to treatment status?</td>
<td></td>
</tr>
<tr>
<td>Yes = effective action taken to blind assessors.</td>
<td></td>
</tr>
<tr>
<td>Unclear = small or moderate chance of unblinding of assessors, or some blinding of outcomes attempted.</td>
<td></td>
</tr>
<tr>
<td>No = not mentioned or not possible.</td>
<td></td>
</tr>
<tr>
<td>(4) Were important baseline characteristics reported and comparable?</td>
<td></td>
</tr>
<tr>
<td>Yes = good comparability of groups, or confounding adjusted for in analysis.</td>
<td></td>
</tr>
<tr>
<td>Unclear = confounding small, mentioned but not adjusted for, or comparability reported in text without confirmatory data.</td>
<td></td>
</tr>
<tr>
<td>No = large potential for confounding, or not discussed.</td>
<td></td>
</tr>
<tr>
<td>(5) Were the trial participants blind to assignment status after allocation?</td>
<td></td>
</tr>
<tr>
<td>Yes = effective action taken to blind participants.</td>
<td></td>
</tr>
<tr>
<td>Unclear = small or moderate chance of unblinding of participants.</td>
<td></td>
</tr>
<tr>
<td>No = not possible, or not mentioned (unless double-blind), or possible but not done.</td>
<td></td>
</tr>
<tr>
<td>(6) Were the treatment providers blind to assignment status?</td>
<td></td>
</tr>
<tr>
<td>Yes = effective action taken to blind treatment providers.</td>
<td></td>
</tr>
<tr>
<td>Unclear = small or moderate chance of unblinding of treatment providers.</td>
<td></td>
</tr>
<tr>
<td>No = not possible, or not mentioned (unless double-blind), or possible but not done.</td>
<td></td>
</tr>
<tr>
<td>(7) Were care programmes, other than the trial options, identical?</td>
<td></td>
</tr>
<tr>
<td>Yes = care programmes clearly identical.</td>
<td></td>
</tr>
<tr>
<td>Unclear = clear but trivial differences, or some evidence of comparability.</td>
<td></td>
</tr>
<tr>
<td>No = not mentioned or clear and important differences in care programmes.</td>
<td></td>
</tr>
<tr>
<td>(8) Were the inclusion and exclusion criteria for entry clearly defined?</td>
<td></td>
</tr>
<tr>
<td>Yes = clearly defined (including type of fracture).</td>
<td></td>
</tr>
<tr>
<td>Unclear = inadequately defined.</td>
<td></td>
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</table>

Although many characteristics including hand dominance are important, the principal confounders are considered to be age, gender, type of fracture or non-union.
Table 1. Methodological quality assessment scheme

(Continued)

<table>
<thead>
<tr>
<th>Question</th>
<th>Scale</th>
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<tbody>
<tr>
<td>(9) Were the outcome measures used clearly defined?</td>
<td>Yes = clearly defined. Unclear = inadequately defined. No = not defined.</td>
</tr>
<tr>
<td>(10) Were the accuracy and precision, with consideration of observer variation, of the outcome measures adequate and were these clinically useful and did they include active follow up?</td>
<td>Yes = optimal. Unclear = adequate. No = not defined, not adequate.</td>
</tr>
<tr>
<td>(11) Was the timing (e.g. duration of surveillance) clinically appropriate?</td>
<td>Yes = optimal (&gt; 1 year) Unclear = adequate (6 months - 1 year) No = not defined, not adequate (&lt; 6 months)</td>
</tr>
</tbody>
</table>

Disagreement will be resolved by consensus or a fourth review author adjudication (MM).

Measures of treatment effect

Quantitative data, both dichotomous and continuous, will be reported in the text and in the analyses. Dichotomous outcome data will be considered as risk ratios with 95% confidence intervals. When appropriate, we will express estimate effects as NNTs (numbers needed to treat). The NNT corresponds mathematically to the inverse of risk difference and clinically to the number of patients to be treated to avoid one undesired event and will be calculated using the pooled risk ratio. Continuous outcome data will be expressed as mean differences with 95% confidence intervals. When two or more studies present their data derived from the same validated instrument of evaluation (with the same units of measure), data will be pooled as a mean difference (MD). Conversely, when primary studies express the same variables through different instruments (and different units of measure) we will use the standard mean difference (SMD).

Unit of analysis issues

The unit of randomisation in the presented trials is usually the individual participants. Special issues in the analysis of studies with non-standard designs, such as cluster-randomized trials will be reported. Exceptionally, as in the case of trials including people with bilateral fractures, data for trials will be evaluated for fractures or limbs, instead of individual patients.

Dealing with missing data

With the purpose of including all patients randomised to any intervention we will perform an intention-to-treat analysis. In case there is insufficient information relative to estimate effects, such as number of patients, means, measures of uncertainty (standard deviation or error), or number of events and patients, we will try to contact the main authors of primary studies. When impossible to acquire missing data such as standard deviations, we will present data in the text and/or tables. The same strategy will be used for results of non normally distributed data.

Assessment of heterogeneity

The heterogeneity of estimate effects between the included studies will be assessed by visual inspection of the forest plot (analysis) along with consideration of the test for heterogeneity and the I² statistic.

Data synthesis

When appropriate, results of comparable groups of studies will be pooled. Initially we will stipulate the fixed-effect model and 95% confidence intervals. However, given that we expect a multiplicity of clinical and methodological characteristics in the included studies, it is likely that we will choose to use the random-effects model.

Subgroup analysis and investigation of heterogeneity

We will investigate two conditions: acute clavicle fractures and non-union of clavicle fractures. The subgroup analyses for these two conditions are: age (adolescent, adult and elderly), type of fracture (two fragments and more than two fragments), type of non-union (hypervascular and avascular), mechanism of injury...
and surgical experience (stated as experienced and not or no information). To test whether the subgroups are statistically significantly different from one another, we will test the interaction using the technique outlined in Altman 2003. The age subgroup analyses will be defined in accordance with the World Health Organization (WHO 2008) that defines age groups as follows:

- adolescence: the period of life between 10-19 years old;
- adults: the period of life between 20-59 years old;
- elderly: the period of life over 60 years old.

Sensitivity analysis
If necessary, we will perform sensitivity analyses exploring diverse aspects of trial and review methodology, including the effects of missing data, study quality (specifically allocation concealment and outcome assessor blinding). We will use the test of interaction to establish whether the subgroups are statistically significantly different from one another (Altman 2003).

ACKNOWLEDGEMENTS
We would like to thank Lindsey Brough and Joanne Elliott for their assistance in preparing the protocol. We thank the following for helpful feedback at editorial review: Peter Harbison, Helen Handoll and Janet Wale. We also thank Amar Rangan for his comments during the protocol review process.

REFERENCES

Ali Khan 1978

Allman 1967

Altman 2003

Beadlbury 1996

Bosman 1997


Cheung 2008

Constant 1987

Court-Brown 2006

Ebrahim 1997
Ebrahim NA, Meldhall AO, Darwin M. Open reduction and internal fixation with bone grafting of clavicular nonunion. Journal of


Hill 1997

Hudak 1996

Jester 2007

Jupiter 1987

Kortchik 2006

LaVelle 2003

Lazarus 2001

Maisonneuve 1985

Marti 2003

McKee 2006

Meister 2007

Mullaji 1994

Nee 1984

Nordqvist 1994

Nordqvist 1998

Nowak 2000

Poignet 1991

Postacchini 2002

Pyper 1978

Revell 1976

Robinson 1998

Robinson 2004

Vergeen 2005

Ware 1992

WHO 2008

Williams 1983
APPENDICES

Appendix I. MEDLINE search strategy

MEDLINE (PubMed)

Appendix 2. The Cochrane Library search strategy (Wiley Interscience)

CENTRAL (Wiley)

#1 MeSH descriptor Clavicle, this term only
#2 clavic* OR collarbone:ti,ab,kw
#3 (#1 OR #2)
#4 MeSH descriptor Fracture Healing, this term only
#5 MeSH descriptor Fracture Fixation explode all trees
#6 MeSH descriptor Fractures, Bone explode all trees
#7 (fracture* OR pseudoarthrosis* OR pseudoarthrosis*:ti,ab,kw)
#8 (#4 OR #5 OR #6 OR #7)
#9 (#3 AND #8)
Appendix 3. EMBASE search strategy

EMBASE (OVID WEB)

1. clavicle/
2. (clavic* or collarbone).tw.
3. or/1-2
4. exp Fracture Healing/ or exp Fracture Treatment/ or exp Fracture/ or exp Pseudarthrosis/
5. fracture* or pseudoarthros* or pseudarthros*).tw.
6. or/4-5
7. and/3,6
8. Clinical trial/
9. Randomized controlled trial/
10. Randomization/
11. Single blind procedure/
12. Double blind procedure/
13. Crossover procedure/
14. Placebo/
15. Randomized controlled trial*.tw.
17. Random allocation.tw.
18. Randomly allocated.tw.
19. Allocated randomly.tw.
20. (allocated adj2 random).tw.
22. Double blind*.tw.
23. ((treble or triple) adj blind*).tw.
25. Prospective study/
26. or/27-25
27. Case study/
29. Abstract report/ or letter/
30. or/27-29
31. 26 not 30
32. limit 31 to human
33. and/7,32
Appendix 4. LILACS search strategy

LILACS

Mh clavicle OR Tw clavicle OR Tw collarbone [Palavras] AND Mh fracture healing OR Mh fracture fixation OR Mh fractures OR Tw fractures OR Mh Pseudarthrosis OR Tw pseudarthrosis [Palavras] and ((Pt randomized controlled trial OR Pt controlled clinical trial OR Mh randomized controlled trials OR Mh random allocation OR Mh double-blind method OR Mh single-blind method) AND NOT (Ct animals AND NOT (Ct human and Ct animal)) OR (Pt clinical trial OR Ex E05.318.760.5355 OR (Tw clini$ AND (Tw trial$ OR Tw ensu$ OR Tw estud$ OR Tw experim$ OR Tw investig$)) OR ((Tw singl$ OR Tw simple$ OR Tw doubl$ OR Tw doble$ OR Tw duplo$ OR Tw tripl$) AND (Tw blind$ OR Tw ciego$ OR Tw ciego$ OR Tw mask$ OR Tw mascar$)) OR Mh placebo$ OR Tw placebo$ OR (Tw random$ OR Tw random$ OR Tw casual$ OR Tw casual$ OR Tw azar OR Tw aleator$) OR Mh research design AND NOT (Ct animals AND NOT (Ct human and Ct animal)) OR (Ct comparative study OR Ex E05.337$ OR Mh follow-up studies OR Mh prospective studies OR Tw control$ OR Tw prospectiv$ OR Tw volunt$ OR Tw voluntar$) AND NOT (Ct animals AND NOT (Ct human and Ct animal))

HISTORY


CONTRIBUTIONS OF AUTHORS

The first drafts of this protocol were prepared by Mário Lenza, João C Belloti and João B Gomes dos Santos. The search strategy was developed by Mário Lenza and João C Belloti. All authors commented on and approved the final version of the protocol.

DECLARATIONS OF INTEREST

None known.

SOURCES OF SUPPORT

Internal sources

- Universidade Federal de São Paulo, Brazil.

External sources

- No sources of support supplied
Apêndice 3. Revisão publicada – Conservative interventions for treating middle third clavicle fractures in adolescents and adults (Review)

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

Lenza M, Belloti JC, Andriolo RB, Gomes dos Santos JB, Faloppa F

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