Operative versus nonoperative care of displaced midshaft clavicular fractures: a meta-analysis of randomized clinical trials

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CRD summary
This review found that operative treatment of completely displaced midshaft clavicular fractures lowered the rate of non-union and symptomatic malunion and led to an earlier return to function when compared to non-operative treatment. The conclusions for non-union and malunion may be reliable, but as there was no statistical analysis, conclusions relating to function may not be.

Authors' objectives
To compare operative with non-operative care in the treatment of acute, displaced midshaft fractures of the clavicle.

Searching
MEDLINE was searched; search terms were presented, but search dates were not. Relevant experts were contacted to identify unpublished or ongoing trials. Proceedings of relevant annual meetings were also searched.

Study selection
Randomised trials of operative versus non-operative treatment of acute, completely displaced midshaft fractures of the clavicle were eligible. Quasi-randomised studies, studies in children, and studies that included delayed union or non-union, or pathological fractures, were excluded.

The non-operative approach in all studies was to use a standard sling. For the operative approach three studies used plate fixation and three intramedullary pin fixation. The average age was 34, 80% of patients were male. The fractures were generally a result of motor vehicle accidents (36% of injuries, where reported), falls (18%) or were sports related (44%).

Two reviewers performed the study selection.

Assessment of study quality
Trial quality was assessed using the Detsky score for quality of randomisation, outcome measures, eligibility criteria, interventions and statistical analysis. Two reviewers independently performed the quality assessment.

Data extraction
Several outcome scores were assessed, namely the Constant Shoulder Score; Disabilities of the Arm, Shoulder and Hand score (DASH); and the Single Assessment Numeric Evaluation (SANE). For each score (where reported) the mean value of the score in each study arm was extracted. Numbers of patients with complications and rates of non-union and symptomatic malunion were also extracted. Two reviewers performed the data extraction, which was checked by a third, with disagreements resolved by consensus.

Methods of synthesis
Weighted averages across studies of the various outcome scores were calculated for operative and non-operative groups separately. For complications, non-union and symptomatic malunion, relative risks with their 95% confidence intervals were calculated and pooled across trials in a random-effects meta-analysis. Numbers-needed-to-treat were calculated. Heterogeneity was assessed using $I^2$ and Cochran's Q test.

Results of the review
Six studies were included in the review, with a total of 412 patients (sample size range: 51 to 111). Detsky quality scores were 16 in four studies and 14 in two, out of a possible 20.

The mean Constant Shoulder Score (from three studies) was 94.3 in the operative group and 90.2 in the non-operative group. The mean DASH score (from two studies) was 4.9 in the operative group and 10.7 for conservative care. Data
from one study found that 80% of operative patients had returned to moderate activity within 60 days, compared to 55% of non-operative patients.

Complications were less common in the operative group, but the result was not statistically significant (RR 0.70, 95% CI 0.42 to 1.18; I²=69%; five studies). Non-union rates were lower in the operative group (RR 0.18, 95% CI 0.06 to 0.51; I² = 0; five studies), as were non-union and symptomatic malunion rates combined (RR 0.11, 95% CI 0.04 to 0.29; I²=0; five studies).

**Authors' conclusions**
Operative treatment significantly lowered the rate of non-union and symptomatic malunion and led to an earlier return to function than non-operative treatment. There was little evidence at present to suggest a long-term benefit of operational care.

**CRD commentary**
An appropriate review question was considered, with suitable inclusion criteria. A limited search of only one database was conducted, but effort was made to identify unpublished or ongoing trials. Appropriate action was taken to minimise reviewer error and bias at all stages of the review. Study quality was assessed and studies appeared to be of moderate quality, but risk of bias from attrition, and from outcome assessments was not evaluated. Dichotomous outcomes (including complications and non-union) were combined in a meta-analysis, but function scores were not formally analysed. It was not clear why no analysis was performed. Data was limited, with few patients or events, with limited reporting on function scores.

The authors’ conclusions about function are unlikely to be reliable. The large effect sizes observed for the dichotomous outcomes, however, suggest that conclusions for these outcomes may be reliable.

**Implications of the review for practice and research**

**Practice:** The authors reported that a subset of individuals with completely displaced midshaft fractures of the clavicle would benefit from fixation. This does not justify an indiscriminate approach to the surgical fixation of all such fractures.

**Research:** The authors made no recommendations for research.

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