A systematic review of early versus delayed treatment for type III supracondylar humeral fractures in children
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CRD summary
The review found, among children with type III supracondylar humeral fractures (broken arms), failure of closed reduction and conversion to open reduction treatment was more common with delayed than with early surgery following injury. Given the lack of prospective evidence, poor reporting of review methods and failure to assess study validity, some caution is advised in interpreting the authors' conclusions.

Authors' objectives
To determine whether delay in operating affects the rate of conversion from closed to open reduction treatment of type III supracondylar humeral fractures in children.

Searching
MEDLINE and the Cochrane Library were searched to February 2008, with no language restrictions. The PubMed “related articles” function was also used. Search terms were reported.

Study selection
Studies comparing early and late treatment of type III Gartland supracondylar humeral fractures in children were eligible for inclusion. Studies were required to report rates of failure of closed reduction and conversion to open reduction (sole review outcome). Studies including types II and III fractures were required to provide separate data for type III fractures.

The mean age of participants in the included studies was 5.3 to 6.8 years. In all cases, the planned operation was closed reduction and percutaneous pin fixation. In the included studies, early surgery was defined as occurring up to eight or 12 hours after the injury or on arrival in the emergency department; delayed surgery was defined as surgery received later eight or 12 hours after injury. Most children had early surgery (61%) rather than late surgery (39%). Reasons for delay varied across studies (where reported) and included time of fracture, transfer between facilities and theatre availability. Preoperative care (e.g. splinting and/or elevation) were not always described in detail. Surgery was usually conducted or supervised by consultants or by surgeons with special skills (where reported).

The authors did not state how the papers were selected for the review.

Assessment of study quality
The authors did not state that they assessed validity.

Data extraction
Odds ratios (ORs) and 95% confidence intervals (CIs) were calculated from event rates in the two groups of each study. Yate's correction was used for studies with no events in one group.

The authors did not state how many reviewers performed the data extraction.

Methods of synthesis
Studies were combined to calculate pooled odds ratios and 95% confidence intervals, using both fixed-effect and random-effects models. The χ² statistic was used to assess statistical heterogeneity. Publication bias was assessed by means of a funnel plot.

Results of the review
Five retrospective observational studies were included (n=396 children with type III fractures, range 21 to 171 children).

The risk of failure of closed reduction and conversion to open reduction was significantly lower in the early surgery group (fixed-effect OR 0.37, 95% CI 0.21 to 0.66).

There was no significant statistical heterogeneity; results were similar when a random-effects model was used.

The authors noted that the funnel plot showed no evidence of publication bias.

**Authors' conclusions**
Among children with type III supracondylar humeral fractures, failure of closed reduction and conversion to open reduction was more common with delayed surgical treatment than with early treatment.

**CRD commentary**
The objectives and inclusion criteria of the review were clear. Relevant sources were searched for studies, without restriction by language. It was unclear whether there was any restriction by publication status, but the authors found no evidence of publication bias when this was assessed. It was unclear whether steps were taken to minimise the risk of bias by having more than one reviewer independently select studies and extract the data.

It did not appear that study validity was assessed. Study methods were not described (e.g. selection procedures and rates of follow-up). These factors made it difficult to determine the reliability of the evidence presented. Appropriate statistical techniques were used to combine the data and assess statistical heterogeneity.

In view of the lack of prospective evidence, poor reporting of review methods and failure to assess study validity, some caution in interpreting the authors' conclusions may be advisable.

**Implications of the review for practice and research**
**Practice:** The authors stated that type III supracondylar humeral fractures in children should be treated within 12 hours of injury.

**Research:** The authors stated that future studies of early versus delayed surgery in children should report details of preoperative management (e.g. splinting position, arm elevation), the grade and experience of the operating surgeon, and complications (e.g. neurological, functional, vascular, infective, intraoperative and postoperative).

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