Iatrogenic ulnar nerve injury after the surgical treatment of displaced supracondylar fractures of the humerus: number needed to harm, a systematic review
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CRD summary
This review concluded that there was a greater risk of iatrogenic ulnar nerve injury with crossed pinning compared with lateral pinning in children with supracondylar fractures of the humerus (elbow fractures). The review had some methodological problems, so caution is warranted when interpreting the authors' conclusions.

Authors' objectives
To determine if there is a difference in the risk of iatrogenic ulnar nerve injury associated with the crossed versus lateral pin configuration in children with supracondylar fractures of the humerus.

Searching
MEDLINE, EMBASE, CINAHL, the Cochrane Database of Systematic Reviews and DARE were searched to December 2008. Search terms were reported. The Journal of Paediatric Orthopaedics and the proceedings of the Paediatric Orthopaedic Society of North America were searched to 2003. Reference lists of selected papers were cross referenced. Experts in the field were contacted.

Study selection
Studies of k-wiring interventions using closed, open or mini-open techniques in children aged between 3 and 12 years with displaced supracondylar fractures of the humerus were eligible for inclusion. Studies had to report on postoperative outcomes, including ulnar nerve status. Studies were excluded if they did not report on the postoperative status of ulnar nerve, or if the authors did not report on the pin configuration used or only used lateral pinning.

The included studies either compared crossed and lateral pinning, or assessed lateral pinning only. The predominant study design was retrospective.

Two reviewers independently performed study selection and disagreements were resolved by consensus.

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

Data extraction
Data were extracted on ulnar nerve injury and used to calculate risk differences and 95% confidence intervals (CIs).

The authors did not state how many reviewers were involved in data extraction.

Methods of synthesis
For the comparative studies, a random-effects meta-analysis was undertaken to calculate pooled risk differences and 95% confidence intervals. The number needed to harm (NNH) was also estimated.

Sensitivity analysis was conducted to assess the robustness of the pooled estimate to the influence of each individual trial.

Results of the review
Sixty-two studies were included in the review (n=5,607 children). Thirty-two studies of crossed wires compared with lateral wires were included in the meta-analysis (n=2,639 children), with study sample sizes that ranged from seven to 331 children. Data on crossed wire only studies (30 studies) were also extracted, but were not included in the meta-
Compared with lateral pinning, crossed pinning had a statistically significantly higher risk of ulnar nerve injury (risk difference 0.035, 95% CI 0.014 to 0.056). Sensitivity analysis revealed that the results were stable with the risk differences that ranged from 0.024 to 0.039. The number needed to harm was estimated at 28 (95% CI 17 to 71), or one iatrogenic ulnar nerve injury for every 28 children treated with crossed pinning rather than lateral pinning.

**Authors' conclusions**
There was a greater risk of iatrogenic ulnar nerve injury with crossed pinning compared with lateral pinning in patients with supracondylar fractures of the humerus.

**CRD commentary**
Inclusion criteria for the review were clearly defined. Several relevant databases were searched. Publication bias was not assessed, so could not be ruled out. Attempts were made to reduce reviewer error and bias during study selection, but it was not clear if such attempts were made during data extraction.

The authors did not report if quality assessment was conducted, so the influence of included study quality on the results could not be ascertained. Clinical heterogeneity was not considered. Studies were pooled using meta-analysis, but statistical heterogeneity was not discussed. Study designs of varying levels of bias (RCTs and retrospective studies) were pooled, which may not have been appropriate.

Overall, the review had some methodological problems, so caution is warranted when interpreting the authors’ conclusions.

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

**Practice:** The authors did not state any implications for practice.

**Research:** The authors stated that a prospective study of at least 1,000 patients would be needed to show a difference in the complication rates, so the use of quantitative methods (such as decision analysis) may be useful to identify an optimal fixation strategy.

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Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.