

Journal club: 30 May 2012

Attendees: Mr N.Wilson, Mr RD.Meek, Mr D.Russell, Mr F.Welsh, Mr A.Wilkinson, Mr AJ.Bennett
West of Scotland Journal Club

Theme: Paediatric Orthopaedic Surgery

1. Kunkel S, Cornwall R, Little K, Jain V, Mehlman C, Tamai J.

Limitations of the radiocapitellar line for assessment of paediatric elbow radiographs.
J Pediatr Orthop 2011;31:628-32.

2. Slobogean BL, Jackman H, Tennant S, Slobogean GP, Mulpuri K.

Latrogenic ulnar nerve injury after the surgical treatment of displaced supracondylar fractures of the humerus: number needed to harm, a systematic review.
J Pediatr Orthop 2010;30:430-36.

3. Kocher MS, Kasser JR, Waters PM, Bae D et al.

Lateral entry compared with medial and lateral entry pin fixation for completely displaced supracondylar humeral fractures in children.
J Bone Joint Surg [Am] 2007;89-A:706-12.

Limitations of the radiocapitellar line for assessment of paediatric elbow radiographs.

Reviewer: Findlay Welsh

Summary

1. Purpose

To systematically assess the validity of the Radiocapitellar line as a measure of normal radiocapitellar alignment, specifically assessing the impacts of the radiographic view, choice of anatomical landmarks, patient age, forearm position and observer bias.

2. Methods

20 patient films selected following power analysis with ethical approval. Normal radiographs identified from recent films taken as contralateral comparison films from children aged 1 to 8 years. Films assessed by 3 board certified paediatric orthopaedic surgeons (blinded to radiograph indication) for both radial shaft line and radial neck line. This was repeated on AP and Lateral films, and on films both with capitellum visible and with capitellum obscured giving 480 lines drawn ($20 \times 3 \times 2 \times 2 = 480$). Line drawings were noted to have been repeated again at a 2 week interval. Fisher exact test used to assess categorical placement (thirds) and ANOVA to assess continuous position.

3. Results

From 480 Radiocapitellar lines (RCL) drawn, 23 (5%) missed the capitellum and 224 (47%) missed the middle third. Significantly greater proportion of RCL's passed through the middle third using the neck rather than shaft drawn lines ($p < 0.001$ for Lateral xray). When the capitellar was visible, a significantly greater number of lines were drawn intersecting the capitellum than when obscured

($p=0.03$). Patient age was also shown to correlate inversely with continuous variable ($p<0.001$) with 11% of RCL's in children under 4 year missing the capitellum and none above 6 years missing.

4. Conclusions

Lines drawn on the radial neck are more likely to intersect the middle third of the capitellum than lines drawn from the proximal radial shaft (on both AP and Lateral films) and hence should be used as the primary landmark. Although a small trend to the lateral view was observed on the continuous data, no significant difference was observed on the categorical data and thus no view (AP or lateral) was superior for assessing the radiocapitellar line. Only approximately half of lines passed through the middle third with ninety five percent intersecting at any point. This suggests that using deviation from the middle third to assess malalignment is not a accurate enough discriminator.

5. Critique

Strengths

Clinically relevant study

Comparison with capitellum obscured to reduce bias

Observers experienced but also blinded to history/pathology

Pre study power analysis

Appropriate statistical analysis

Methodological Concerns

Only normal radiographs included therefore unclear if conclusions can be extrapolated to injured elbows

Radiograph alignment not validated with forearm rotation not assessed

No assessment of effect of patient age (due to limited size of cohort)

Unclear where the 2 week repeat drawing information was included

No comparison with emergency department observers who conventionally will make first assessment.

Iatrogenic ulnar nerve injury after the surgical treatment of displaced supracondylar fractures of the humerus: number needed to harm, a systematic review.

Reviewer: Mr A Wilkinson

Summary

1. Purpose

To determine, from the available literature, if the risk of iatrogenic ulnar nerve injury is different between all lateral pinning compare with medial and lateral pinning for supracondylar fractures of the humerus in children.

2. Methods

Literature search from: MEDLINE, Excerpta Medica Database, Cumulative Index to Nursing and Allied Health, the Cochrane Database of Systematic Reviews, and the Database of Abstracts and Reviews of Effects. The Journal of Paediatric Orthopaedics and proceedings of the Pediatric Orthopaedic Society of North America were searched by hand.

Inclusion criteria: (1) displaced supracondylar humeral fractures in children aged between 3 and 12 years; (2) K- wiring intervention using closed, open, or mini-open techniques; and (3) mention of the postoperative out-come, including ulnar nerve status.

Independent selection of papers by two reviewers.

Calculation of nerve injury risk for each trial, the risks were then pooled.

3. Results

32 trials (2639 patients) from 555 studies were included as they compared cross pins with lateral only pins, 30 trials with only cross pins (2968 patients) were excluded.

Of the 1468 patients in the cross pins group sustained 56 iatrogenic ulnar nerve injuries. 2 patients from the 1171 with lateral only pins sustained the same injury.

The pooled risk from these results shows a relative increase in risk of 0.035 for cross pins.

Calculation of the number needed to harm (1/0.35) equates to 28 children treated for one iatrogenic ulnar nerve palsy. (95% CI 17-71) using crossed pins.

4. Conclusions

This systematic review of the literature for K-wire fixation of supracondylar humeral fractures shows an increase in the risk of ulnar nerve injury for medial and lateral entry of pins when compared to lateral only entry. The rates of injury for crossed pins for the included studies (3.8%) are similar to those for the excluded studies with crossed pins only (3.5%). The individual sensitivity analysis demonstrates well very little influence of one particular study.

This study cannot refute the point that medial wires carefully placed may obviate the risk of ulnar nerve injury (from the wire).

5. Critique

Strengths

A thorough review of the literature.

Good assessment of the influence of each study to the overall pooled risk.

A concise message.

Methodological Concerns

Looked at individually many of the studies had the zero risk difference marker well within the 95% CI.

Lateral entry compared with medial and lateral entry pin fixation for completely displaced supracondylar humeral fractures in children.

Reviewer: Mr AJ Bennett

Summary

1. Purpose

This study aims to look for a significant difference in the rate of loss of reduction, and iatrogenic ulnar nerve injury between the two main techniques of wire fixation of Gartland III supracondylar fractures in children, lateral entry point wires, and crossed lateral-and-medial entry point wires.

2. Methods

A power calculation was performed and the study powered to look for a 10% difference in complication rates.

From 217 children with Garland III extension supracondylar fractures who presented over a 20 month period in a single unit with 10 operating specialist paediatric orthopaedic surgeons 52 were entered into the study after enrolment and exclusions.

Cases were randomised into the two fixation-type groups

Operative technique was described in detail. Lateral entry wires had to be parallel or divergent.

For crossed wires the lateral wire was placed first, then the elbow extended (to reduce risk to the nerve), and the wire placed through a small open medial incision to ensure the nerve was avoided.

The patients were followed up with radiographs and clinical examination.

3. Results

The lateral group (28 children) and the crossed wires group (24 children) were comparable in their important variables.

No patient had a significant loss of reduction.

6 lateral group patients and 1 crossed-wires patient had a mild loss of reduction but this was not a statistically significant difference between the groups.

There were no iatrogenic nerve injuries in either group.

4. Conclusions

Both fixation techniques appear to be effective but these results are dependent upon the prescribed surgical technique being followed.

5. Critique

Strengths

Prospective randomised clinical trial

10 surgeons involved

Blinded until after reduction

Operative technique prescriptively described

Methodological Concerns

Unblinded through radiographic and clinical assessment

Small numbers

Poor uptake in study enrolment

Only powered to detect a 10% difference

Significant caveats as to following exact surgical technique for both procedures.

Some concerns over exclusion of two cases that required additional wires to the prescribed technique. (This was however fully addressed, and statistics done to show that inclusion of these cases could not have affected the conclusions of the paper).