Herlev og Gentofte Hospital
Afdeling for Led- og Knoglekirurgi

Scan Me

Reduction and K-wire fixation of pediatric supracondylar humerus fractures – Do we practice what we preach?

Abstract 240
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BACKGROUND

The supracondylar humerus fracture (SCHF) is the most common reason for fracture surgery in children and accounts for 60% of fractures around the elbow[1]. Surgical treatment most often consists of closed reduction and percutaneous pinning (CRPP) with K-wires.

Configuration of K-wires has been extensively investigated. There is support for two divergent lateral-entry K-wires for stable fracture patterns, and either three divergent lateral-entry or two crossed K-wires for unstable fracture patterns[2].

Despite general agreement on treatment, studies[3,4] show a high degree of inadequate management with faulty reduction or fixation, which can lead to loss of reduction (LOR), malunion and poor outcome.

Figure 1 – Gartland classification for supracondylar humerus fractures. Anterior humeral line (AHL) = dashed. A) Type I, AHL crosses through the capitellum. B) Type II, AHL anterior to the capitellum. C) Type III, no contact between fragments. D) Flexion type.

AIM

1. Describe fracture pattern according to Gartland.
2. Investigate if adequate surgical reduction was obtained.
3. Report K-wire pattern and fixation quality.
4. Report number reoperations and of loss of reduction (LOR).

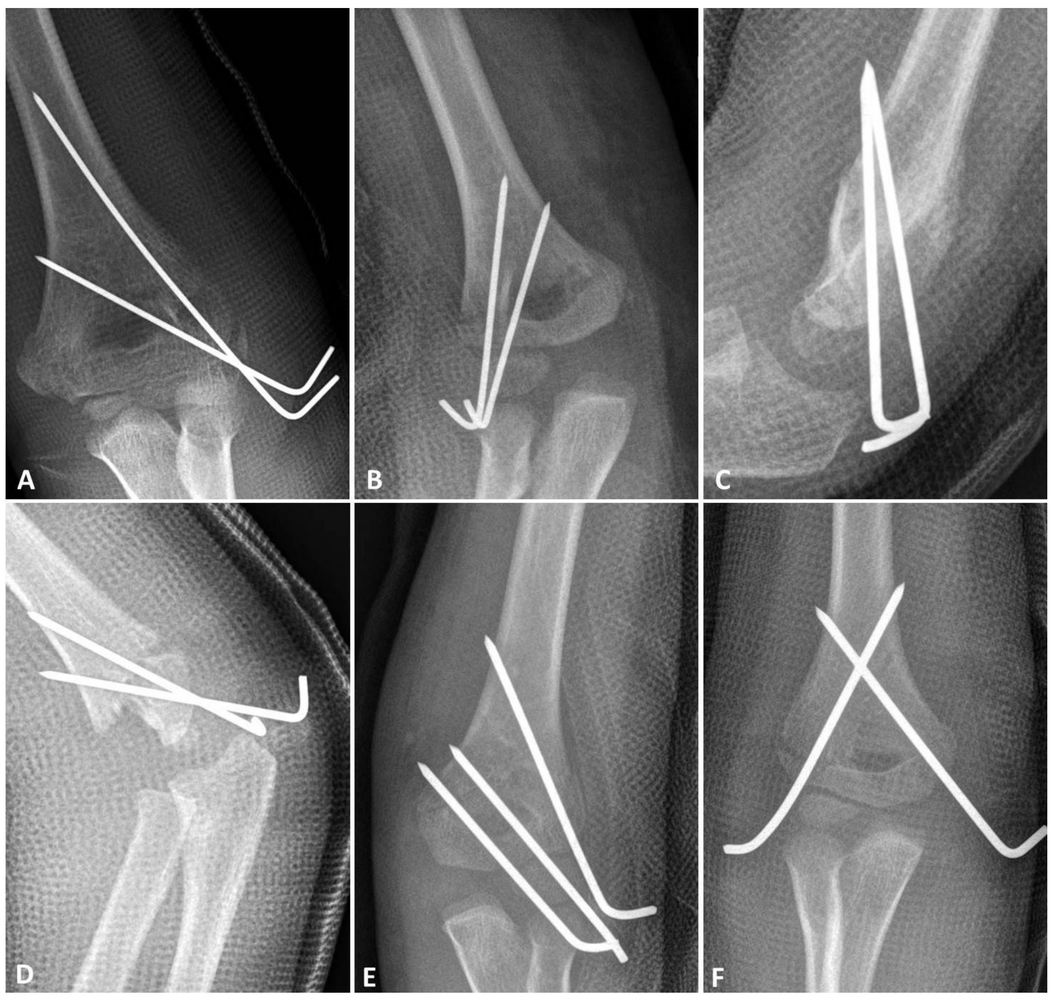

Figure 2 – Faulty (A-D) and adequate (E-F) K-wire configurations. A) Intramedullary pin placement. B) Small pin spread. C) Pins exit through fracture. D) Inadequate fixation, fracture has displaced. E) 3 lateral-entry pins. F) Crossed pins.

METHOD

We reviewed all surgical cases of SCHF in children at Herlev and Gentofte Hospital from 2017 to 2020. Age, gender, Gartland classification, reduction quality, K-wire configuration, and LOR was recorded.

Gartland (**Figure 1**) type IIA fractures were defined as stable and type IIB and III as unstable. Satisfactory reduction was defined as the anterior humeral line (AHL) passing through the capitellum, absence of rotation, varus, and valgus, and less than 5 mm of displacement of the distal fragment in any plane.

RESULTS

We reviewed 171 fractures; results are presented in **Table 1**.

Gartland type (n,%)	**IIA** (n=53, 31)	**IIB and III** (n=118, 69)	**All cases** (n=171, 100)
Age (mean years, range)	6, 1-12	6, 1-15	6, 1-15
Gender			
Male			86(50)
Female			85(50)
Side			
Right			71(42)
Left			100(58)
K-wire patterns			
2 lateral-entry K-wires	26(49)	23(19)	49(29)
3 lateral-entry K-wires	3(6)	10(8)	13(8)
Crossed K-wires	16(30)	40(34)	56(33)
Other patterns	8(15)	45(38)	53(31)
Inadequate reduction	8(15)	39(33)	47(27)
Technically faulty K-wires	22(42)	28(24)	50(29)
Small spread			22(44)
Exit through fracture			10(20)
Crossed at fracture			9(18)
Intramedullary			4(8)
Thin wires			4(8)
Long wires			1(2)
Loss of reduction			3(2)
Reoperations			4(2)

Table 1 – Results (n=171).

DISCUSSION

The requirement for adequate reduction and optimal configuration of K-wires have been thoroughly established in the literature[1,2]. However, this and other studies[3,4] still report a high number of technical faults.

20% of unstable fractures were only treated with two lateral-entry K-wires, and 31% of all cases were fixed with other K-wire patterns than those recommended. Similar to our results, Flynn et al[3] found 25% of unstable fractures were fixed only with two lateral-entry K-wires.

We found 4 (2.3%) reoperations; 1 due to inadequate reduction and 3 due to LOR. All 3 cases of LOR had improper primary fixation. Both Flynn et al[3] and Rajasekaran et al[4] found 2.9% LOR.

CONCLUSION

- 27% of fractures were not reduced to satisfaction.
- 29% of K-wire fixations were technically faulty.
- 2% of cases suffered post-operative loss of reduction.

Future studies are needed to investigate the reason for the high number of faulty osteosyntheses.

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