

Osteosynthesis of medial humeral epicondyle fractures in children

8-year follow-up of 33 cases

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33 children with a mean age of 12 (7–15) years had open reduction and osteosynthesis for a displaced fracture of the medial humeral epicondyle. 8 (2–15) years after the operation a clinical and radiographic examination was performed. 22/33 had a prominent scar. No patients had symptoms from the ulnar

nerve. Function and range of motion of the elbow were good in all cases, albeit with 20–25 degrees of extension in 3. There were 3 cases of asymptomatic nonunion. Surgery was found to reduce the frequency of nonunion, compared to previous reports of non-operative treatment.

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Treatment of fracture of the medial humeral epicondyle in children is disputed in cases where the fragment is displaced, but not entrapped in the elbow joint. Non-operative treatment has been associated with a high frequency of pseudoarthrosis, few cases of symptoms from the ulnar nerve and good function and range of elbow motion (Josefsson and Daniels-son 1986). In this study we have re-examined children with fracture of the medial humeral epicondyle treated with open reduction and fixation.

Fracture diastasis was graded into 4 groups. The fracture was fixed with Kirschner wires in 23 patients, Palmer pins in 6, suture of the periosteum in 3 and with a screw in 1 patient. 8 patients had a diastasis of 1–3 mm after reduction. In all other patients, the fracture was reduced to anatomical position.

Postoperatively, 32 children were treated with a plaster cast for 3 (3–5) weeks, and 1 had a sling for 3 weeks. There were no postoperative infections or neurological complications.

Patients and methods

Our study included all children up to 15 years of age with fracture/epiphyseolysis of the medial humeral epicondyle, with or without elbow dislocation, who were treated with open reduction and fixation during the period 1976–89 at our hospital.

The patients had no history of intercurrent diseases or any further elbow fracture or dislocation. 39 cases were operated on in the period. 3 patients refused re-examination, 2 patients had emigrated and no address was available for 1 patient. 33 patients (17 girls and 16 boys) with a mean age at surgery of 12 (7–15) years were re-examined clinically and radiographically 8 (2–15) years after the injury (Table 1).

By studying medical records, each case was evaluated concerning trauma mechanism, elbow dislocation, method of osteosynthesis, after-treatment and complications. Of all 33 patients, 11 had both fracture and elbow dislocation (Table 1). The preopera-

Results

At re-examination, 10 patients had mild pain, mostly described as tenderness in the medial epicondylar region, and 4 patients complained of restricted extension. All patients had normal sensibility but one who had slight hyperesthesia in the area of the ulnar nerve.

22 patients had a disfiguring cicatrice, 11 had a projecting medial epicondyle and 9 patients had tenderness at the epicondyle. 1 patient had a valgus deviation of 5 degrees. 7 patients had restricted extension of 10 (5–25) degrees. 1 patient had restricted supination of 10 degrees and 2 patients had restricted flexion of 5 degrees. All had normal pronation and normal strength.

Out of the 33 re-examined patients, 30 had bony-healed epicondyles. The remaining 3 had nonunion, but no symptoms. 1 patient with nonunion had a restricted extension of 5 degrees. All patients had

Table 1. Observations in 33 cases of medial humeral epicondyle fractures in children after osteosynthesis

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	F	10	15	1	2	1	1 (3)	—	1	1	2	1	1	1	1	1	1
2	M	9	14	1	3	1	1 (4)	—	1	1	2	1	1	1	1	2	1
3	M	12	14	1	2	1	1 (3)	1, 2	1	2	2	1	1	1	2 (25)	2	1
4	F	14	14	1	3	1	1 (4)	—	1	1	1	1	1	1	1	2	2
5	M	10	14	1	3	1	1 (3)	—	1	1	1	1	1	1	1	1	1
6	F	14	13	2	2	1	1 (4)	—	1	1	1	1	1	1	1	2	2
7	F	11	12	1	2	1	1 (4)	1	1	1	1	1	1	1	1	2	2
8	M	11	12	2	2	4	1 (3)	—	1	1	1	1	1	1	2 (5)	1	1
9	F	8	12	1	3	4	1 (3)	—	1	1	1	1	1	1	1	2	2
10	F	13	12	2	4	4	1 (3)	1	1	2	2	1	1	1	2 (5)	2	2
11	F	15	11	2	3	1	1 (4)	—	1	2	2	2	1	1	1	2	2
12	F	13	11	1	4	1	1 (3)	—	1	2	1	1	1	1	1	2	2
13	M	13	10	2	3	2	1 (3)	—	2	1	2	1	1	2	1	2	2
14	M	13	10	1	1	2	2 (3)	—	1	1	2	1	1	1	1	2	1
15	F	11	9	2	1	2	1 (4)	—	1	1	2	1	1	1	1	2	2
16	M	7	9	1	1	2	1 (4)	—	1	1	2	1	1	1	1	2	2
17	M	8	8	1	3	1	1 (3)	3	2	1	1	1	1	1	1	2	1
18	F	12	8	2	3	3	1 (5)	2	2	2	2	1	1	1	2 (20)	2	1
19	F	14	8	1	2	2	1 (5)	—	1	1	2	1	1	1	1	2	1
20	M	13	7	1	1	2	1 (3)	1, 2	1	2	1	1	1	1	2 (25)	2	1
21	M	8	6	1	3	1	1 (3)	1	1	2	2	1	1	1	1	2	2
22	M	12	6	1	2	1	1 (4)	1	2	1	2	1	1	1	1	2	1
23	M	8	5	2	3	1	1 (3)	1	1	2	2	1	1	1	1	2	1
24	F	15	4	2	1	1	1 (3)	1	2	1	2	1	1	1	1	2	2
25	M	13	4	1	3	1	1 (4)	—	2	2	2	1	2	1	2 (10)	2	1
26	M	12	4	1	3	1	1 (3)	—	1	1	2	1	1	1	1	2	2
27	F	13	4	2	3	1	1 (3)	—	1	1	1	1	1	1	1	2	1
28	F	14	2	1	2	1	1 (3)	—	1	2	2	1	1	1	1	2	1
29	F	12	2	1	2	1	1 (4)	—	2	1	2	1	1	1	1	2	2
30	F	11	2	2	2	1	1 (3)	2	1	1	2	1	1	1	1	2	2
31	M	9	2	1	2	1	1 (4)	—	2	1	2	1	1	1	2 (5)	2	1
32	F	12	2	1	2	1	1 (5)	1	2	1	1	1	1	2	1	2	1
33	M	14	2	1	3	1	1 (4)	1	1	2	2	1	1	1	1	2	1

A Case

B Sex

C Age at injury

D Re-examination (years after injury)

E Elbow dislocation

1 no

2 yes

F Fracture diastasis

1 1–3 mm

2 3–6 mm

3 more than 6 mm

4 fragment entrapped in elbow joint

G Osteosynthesis

1 Kirschner wire

2 Palmer pins

3 screw

4 suture

H Postoperative immobilization

1 n, plaster (weeks)

2 n, mitella (weeks)

I Symptoms at re-examination

1 epicondylar pain

2 restricted range of motion

3 hyperesthesia in the area of the ulnar nerve

J Tenderness at the medial condyle

1 no

2 yes

K Projecting medial epicondyle

1 no

2 yes

L Disfiguring cicatrice

1 no

2 yes

M Valgus deviation 5 degrees

1 no

2 yes

N Restricted supination 10 degrees

1 no

2 yes

O Restricted flexion 5 degrees

1 no

2 yes

P Restricted extension, degrees

1 no

2 yes

Q Bony healing

1 no

2 yes

R Radiographic deformity of the epicondyle

1 no

2 yes

radiographic deformity of the medial epicondyle; in 15 the deformation was pronounced. No patients had growth abnormalities of the elbow.

There was no connection between residual symptoms and signs, and primary degree of diasta-

sis, method of osteosynthesis and reduction. The restricted extension correlated with the duration of plaster casting, there was no difference between 3 and 4 weeks, but a tendency that 5 weeks might have influenced the range of motion.

Discussion

Fractures of the medial humeral epicondyle show the highest incidence in 12-year-old children, and they constitute about 8 percent of all elbow fractures in children (Blount 1955, Landin and Danielsson 1986). The fracture is caused by a valgus trauma, often an indirect trauma on the extended elbow, and is commonly complicated by dislocation (Blount 1955, Rang 1974, Silberstein et al. 1981, Ogden 1982). It is generally agreed that undisplaced fractures should be treated with an angled plaster cast for 3 weeks. Some authors recommend casting of the elbow in only 60 degrees of flexion to prevent restricted extension (Wilson 1960, Ogden 1982).

In cases of either an intraarticular entrapped epicondyle or affected ulnar nerve, there is general agreement on open reduction and fixation of the medial epicondyle (Blount 1955, Rang 1974, Salter 1980, Canale 1987). However, the treatment of displaced fractures without an entrapped fragment is disputed.

Surgery has been recommended in all cases with instability and displacement of the elbow (Rang 1974, Salter 1980, Schwab et al. 1980, Papavasiliou 1982), in cases with a displacement of more than 2 mm (Hines 1986), in cases with a displacement of more than 3 mm (Weber 1964), in cases with a displacement of more than 5 mm (Blount 1955), in cases with a displacement of more than one half of the base of the fragment (Wadsworth 1982), and in cases with rotation, of more than 1 cm displacement and valgus instability (Canale 1987).

On the contrary, non-operative treatment has been recommended by authors who found good function and range of motion of the elbow, in spite of a high frequency of pseudoarthrosis, and surgery was consequently only recommended in cases where the fragment was intraarticularly entrapped (Wilson 1960, Fowles et al. 1990, Wilson et al. 1988).

In a follow-up study of 56 conservatively-treated children with a displaced unreduced fracture of the medial epicondyle, 31 had nonunion; there was no correlation with the primary degree of displacement. Slight symptoms and restricted extension were present in 12 patients. All had good function and range of motion (Josefsson and Danielsson 1986).

In our study, pseudarthrosis was found in 3 out of 33 patients and 7 had a restricted extension of 5–25 degrees. Residual symptoms and signs were com-

mon, but all had good function and stability of the elbow.

We conclude that surgery of displaced medial humeral epicondyle fractures, even without an entrapment, is superior to non-operative treatment concerning bony healing. Function and range of motion of the elbow are equal. However, the operation often leaves an unsightly scar.

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