

Epicondylar elbow fracture in children

35-year follow-up of 56 unreduced cases

Fifty-six conservatively treated children (7-17 years) with a displaced (1-15 mm) fracture of the medial humeral epicondyle were examined 35 (21-48) years after the injury. In 31 cases a pseudarthrosis had developed of which 3 had mild ulnar nerve symptoms. The function and range of motion of the elbow was good in all cases.

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Open reduction and pin fixation is generally accepted when a medial epicondyle is entrapped in the elbow joint. However, the indications for open reduction in cases without entrapment vary widely. Thus, surgery is recommended in all displaced cases (Rang 1974, Heppenstall 1980); in cases with a displacement of more than 3 mm (Weber 1964, Vecsei et al. 1975); in cases with a displacement of more than 5 mm (Blount 1955); and in cases with a displacement of more than one half of the base of the fragment (Wadsworth 1982). However, these recommendations are empirical, and long-term follow-ups of non-operated patients with different degrees of displacement are virtually nonexistent.

We have followed up a series of unreduced fractures of the medial epicondyle.

Patients and methods

Prior to the early 1960s, the majority of children in Malmö with fractured medial epicondyles were simply treated in a plaster cast for 3-5 weeks. Our subjects were selected from the years 1930-1962 using the following criteria:

1. Primary radiographs sufficiently distinct for measuring the degree of displacement of the medial epicondyle.
2. The whole, or nearly the whole, epicondyle avulsed.
3. No further elbow fracture visible.
4. No history before or after of any further elbow fracture or elbow dislocation.
5. Present address of the subject available.

The material consisted of 56 persons (39 males, 12 females). All of them answered a questionnaire, but 5 refused reexamination. Thus, 51 persons were reexamined clinically and radiographically (both elbows) 35 (21-48) years after their injury. The mean age at the time of injury was 11 (7-17) years of age. In 13 of the 56 subjects, the fracture of the medial epicondyle was combined with a dislocation of the elbow.

Results

The 5 persons who refused reexamination reported no residual symptoms and entirely normal elbow function. The initial displacement of the medial epicondyle in this group (6 ± 2 mm) did not differ from the clinically and radiographically reexamined group.

Table 1. Medial epicondyle fractures in children

	Number of subjects	Initial displacement (mm)	Age at injury (years)	Residual symptoms	Valgus deformity	Loss of extension (°)
Bony healed	20	5 ± 3 (1-15)	11 (7-16)	4	1 (10°)	2 ± 6 * (0-20)
Pseudarthrosis	31	6 ± 3 (1-14)	11 (8-17)	8	0	2 ± 5 (0-25)
Total	51	6 ± 3 (1-15)	11 (7-17)	12	1	2 ± 6 (0-25)

* A skewed distribution - no negative values.

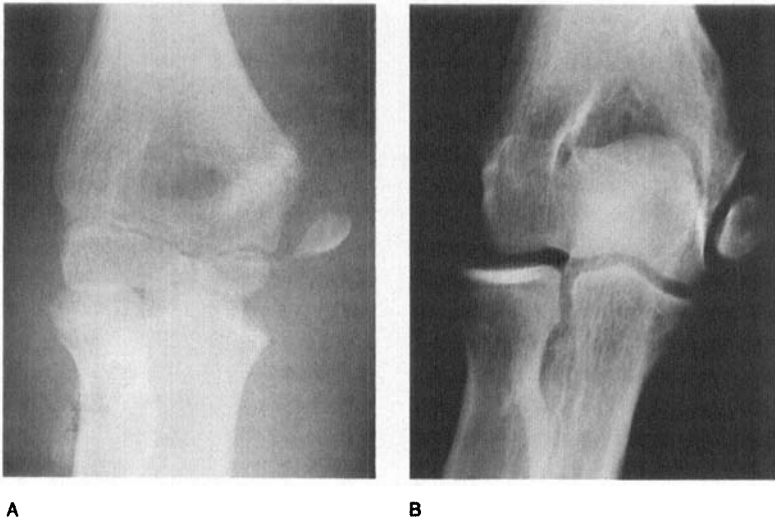


Figure 1. Fractured medial epicondyle with a displacement of 3 mm.
A. The fresh injury.
B. Pseudarthrosis of the medial epicondyle 32 years after injury.

A pseudarthrosis (Figure 1) had developed in 31 of the 51 cases, quite independently of the initial degree of displacement of the medial epicondyle (Table 1).

All bony-healed epicondyles were more or less deformed and displaced distally compared with the normal side. A semicircular bony groove located at the lateral part of the distal edge of the epicondyle (Figure 2) was found in 15 out of 20 bony healed cases. None of these had any symptoms from the ulnar nerve.

In 5 out of 20 bony healed cases, a small separate bone fragment was located medial to the epicondyle. Residual symptoms from the in-

jured elbow were present in 12 out of 56 cases. The number of subjects with symptoms did not differ between the bony healed group and the pseudarthrotic group. The symptoms (Table 2) were mild to moderate and did not restrict any work or athletic activities. All 3 subjects with numbness were in the pseudarthrotic group, and one of them had had neurolysis of the ulnar nerve. At the time of the reexamination, the Tinel sign was positive in 5 subjects, all in the pseudarthrotic group; their sensibility and strength were quite normal, and there was no atrophy of the hand muscles. The range of elbow motion did not differ between the bony



Figure 2. Fractured medial epicondyle with a displacement of 4 mm.
A. The fresh injury.
B. Healed medial epicondyle with a typical groove formation 33 years after injury.

Table 2. Residual symptoms in 12 out of 56 subjects

Unspecific discomfort from the elbow on effort	7
Weakness in the elbow	6
Tenderness over the ulnar part of the elbow	5
Numbness in the ulnar part of the hand	3
Feeling of instability in the elbow	2

healed group and the pseudarthrotic group. Restricted extension was recorded in 11 persons, restricted pronation (10°) in 2, and restricted flexion (5°) in 1. Supination was normal in all our subjects. One case with pseudarthrosis was moderately unstable at valgus provocation, however without symptoms of instability.

Discussion

Reexamination of the 51 (56) conservatively treated subjects revealed that there is no coincidence between the degree of displacement of the medial epicondyle and the frequency of bony healing. Pseudarthrosis developed in subjects with a displacement of 6 ± 3 mm. If the purpose of treatment is bony union, neither a displacement of 3 mm (Weber 1964, Vecsei et al. 1975) nor 5 mm (Blount 1955) or of less than half of the base of the fragment (Wadsworth 1982) is acceptable. A pseudarthrotic medial epicondyle, however, does not cause significant symptoms. Surprisingly, the frequency of subjects with elbow symptoms did not differ between the bony healed group and the pseudarthrotic group, and the range of elbow motion was the same. The only difference between the groups was the presence of mild

ulnar nerve symptoms in a few subjects in the pseudarthrotic group.

No long-term follow-ups of displaced, untrapped medial epicondylar fractures treated with open reduction and pin fixation are available for comparison. The question of operation or not is, therefore, still open.

However, even though conservative treatment is associated with a high frequency of pseudarthrosis and with mild symptoms from the ulnar nerve in a few cases, very good function and range of elbow motion can safely be expected.

The radiographically found semicircular bony groove in 15 out of 20 bony healed epicondyles is probably due to pressure caused by the ulnar nerve. Surprisingly no symptoms from the nerve were recorded. Similar grooves have previously been described in connection with dislocations of the median nerve (Matev 1976).

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