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PERCUTANEOUS PINNING OF SUPRACONDYLAR FRACTURES OF THE HUMERUS

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Six cases of supracondylar fracture of the humerus in children were treated by closed reduction and percutaneous pinning with two Kirschner wires inserted laterally through the capitellum of the humerus. This treatment has the same advantages as the commonly used percutaneous pinning with crossed Kirschner wires inserted through the epicondyles of the humerus, and it further eliminates the risk of damaging the ulnar nerve by the insertion of the medial Kirschner wire.

Key words: percutaneous lateral pinning; supracondylar fractures of the humerus; ulnar nerve lesion

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Supracondylar fracture of the humerus in children, usually produced by a fall on the outstretched arm, is a common fracture between the ages of 4 and 10 years. In nearly 80 per cent it is an extension fracture with one posteriorly displaced distal fragment (Blount 1954, Holmberg 1945, Høyer 1952, Watson-Jones 1976).

Several different methods of treatment have been recommended:

(a) closed reduction and plaster fixation
(b) closed reduction and traction
(c) closed reduction and percutaneous pinning
(d) open reduction and osteosynthesis.

Several modifications of these methods have been described (Blount 1954, Dunlop 1939, El-Sharkawi & Fattah 1965, Hagen 1964, Høyer 1952, Sandegård 1943, Swenson 1948).

This report concerns six cases of supracondylar fracture of the humerus in childhood fixed with two percutaneous Kirschner wires, inserted laterally through the capitellum of the humerus after closed reduction, as described by Fowles & Kassab (1974).

PATIENTS AND METHODS

During the period 1974–1977, 33 children between the ages of 4 and 15 years with displaced supracondylar fractures of the humerus were treated in Holstebro Central Hospital, Orthopaedic Surgical Department.

Fifteen were treated with closed reduction and plaster, and one with skeletal traction. Seventeen were osteosynthesized, nine after open and eight after closed reduction. The closed reduction was in two cases followed by percutaneous fixation with two crossed Kirschner wires through the epicondyles, and in six cases with percutaneous pinning with two Kirschner wires inserted laterally through the capitellum of the humerus. These six fractures were all, according to the classification of Holmberg (1945), type 4 fractures. Five were treated as emergencies and one after 48 hours due to insufficient conservative treatment.

Figure 1a, b. AP and lateral radiographs showing a displaced supracondylar fracture of the humerus in a boy 8 years old.

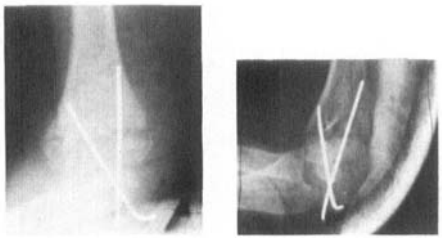

Figure 2a, b. AP and lateral radiographs of the same elbow as shown in Figure 1, after reduction, pinning and application of a plaster splint.

The surgical interventions are performed under general anaesthesia and with the aid of an X-ray with TV-amplifier. The fracture is reduced as described by Watson-Jones (1976).

The surgeon then with one hand holds the reduced fracture. Having palpated the capitellum of the humerus just laterally to the olecranon, a Kirschner wire (size 1.25 mm in diameter) is inserted percutaneously using an automatic drill between the capitellum and the trochlea of the humerus, through the fracture about 5 cm up into the medullary canal. The second wire is inserted at an angle of 30 degrees, close to the first, and drilled into the medial corticalis.

After the fixation the fracture reduction and stability are checked with the image intensifier. Finally the wires are bent and cut off outside the skin and a high dorsal plaster splint is applied with the elbow flexed to 90 degrees and the forearm in neutral position.

After the operation the patient is confined to bed with the arm elevated for 24 hours. All the patients were out of bed on the second day and were discharged 2 to 5 days postoperatively.

X-ray examination was performed 1 and 3 weeks after the operation. All fractures had healed after 3 weeks, when plaster and Kirschner wires were removed in the out-patient clinic without the use of local anaesthesia. Rehabilitation of the mobility of the elbow was started either by self-training (3 patients) or with the help of a physiotherapist (3 patients).

The children were re-examined 5 to 10 weeks postoperatively (mean 7 weeks), and finally followed up after 6 months to 3 years (mean 2 years). The results were classified according to Fowles & Kassab (1974).

Excellent: a normal hand and arm.

Good: either a deficit of less than 20 degrees in the range of movement of the elbow or a change in the carrying angle of less than 10 degrees (if both abnormalities were present the patient was placed in the next category).

Fair: a deficit in the range of movement of less than 20 degrees.

Poor: the range of movement decreased by more than 50 degrees, or a change in the carrying angle of more than 20 degrees.

RESULTS

At the final examination in the open ward the result in two patients could be classified as excellent, three as good and one as fair.

Six months to 3 years later the result was excellent in four cases and good in one case. The child classified as good had a varus deformity of 5 degrees.

During the observation period neither neurovascular disturbances nor infections were observed. No subjective discomfort was recorded.

One patient, who 10 weeks postoperatively was classified as excellent, could not be followed up.

DISCUSSION

The treatment of supracondylar fractures of the humerus in children as described by Swenson (1948) and later by Jones (1967), with closed reduction followed by fracture fixation with crossed percutaneous Kirschner wires through the epicondyles of the humerus, in several reports has proved

superior to conservative treatment (Flynn et al. 1974, Haddad et al. 1970).

However, the insertion of the medial Kirschner wire involves the risk of injuring the ulnar nerve due to difficulties in locating it because of fracture oedema. This fact may lead to open reduction of the fracture, enlarging the intervention considerably (Gruber & Hudson 1964, Sandegård 1943). Furthermore, the rarely occurring congenital anteposition of the ulnar nerve heightens the risk of injuring the nerve.

Percutaneous lateral pinning seems to offer the same advantages as the usually performed method with crossed Kirschner wires, i.e., stable fixation of the fracture, short hospitalization, short immobilization, few operative complications and good end results. Finally both methods are quick and simple surgical interventions. However, in addition percutaneous lateral pinning has the advantage of eliminating the risk of lesion to the ulnar nerve when inserting the medial Kirschner wire (Flynn et al. 1974, Haddad et al. 1970, Jones 1967, Swenson 1943).

Postoperative affection of the ulnar nerve was found in both cases treated with crossed percutaneous pinning in this report. In one of the cases the ulnar nerve was partially transected when the medial Kirschner wire was removed. After primary suture the nerve function was almost fully restored. In the other case paresis of the ulnar nerve was observed for 3 months after the operation. These ulnar nerve complications could have been avoided by using percutaneous lateral pinning.

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