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FRACTURES OF THE OLECRANON

Analysis of 37 Consecutive Cases

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This study is based on 37 consecutive cases of fracture of the olecranon, treated during the period 1973–1975. The average follow-up time was 2 years. The treatment was operative in all but two of the cases. Superficial post-operative infection occurred in three cases and in three cases the internal fixation failed due to porotic bone. The transverse fractures healed more satisfactorily than the comminuted ones. A short post-operative immobilization of 3 weeks or less gave the best results ($P < 0.05$). In the comparison of methods cerclage combined with two Kirschner wires gave better results than cerclage alone.

Key words: elbow injuries; fracture fixation

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As a rule, fractures of the olecranon are treated operatively (Weber & Vasey 1963, Luther & Schulitz 1968, Bakalim & Wilppula 1971a, Colton 1973, Labitzke 1975), with the only exceptions being undislocated fractures and fractures in children (Scheuba & Unger 1970, Newell 1975). Many operative methods of treatment have been developed: Wire loop fixation, intramedullary nailing (Küntscher 1967), percutaneous Kirschner wires, the Zuelzer nail (Zuelzer 1958), plating, screw-fixation (Müller et al. 1963), excision of the fragment with reinsertion of the triceps tendon (Bakalim & Wilppula 1971b) and tension wiring (Weber & Vasey 1963, Labitzke 1975).

The purpose of this paper was to find out which of the methods employed in this series gave the best results and what other factors influenced the results.

MATERIAL AND METHODS

The series is based on 37 consecutive fractures of the olecranon treated in the Surgical Hospital, University Central Hospital, Helsinki, during the period 1973–1975. The age and sex distribution of the patients is shown in Figure 1. Female patients were more numerous (23/14). All the male patients were under 60, whereas 13 of the female patients were over 60 years of age.

The fracture was often sustained in a fall. All the fractures were dislocated except for one in a 15-year-old boy. Fifteen of the fractures were transverse, five oblique and 18 comminuted. One patient had a fracture of both olecranons. All the fractures were intra-articular and they were complicated in three cases. One of the fractures was associated with luxation of the radial head. None of the patients showed any neurological or vascular deficit in the upper extremity.

To evaluate the size of the proximal fragment, the joint cavity was divided into degrees; the distribution of the fractures is shown in Figure 2. In almost all of the cases the fracture fell within the sector 40–100° (34/37).

All but two of the patients were treated operatively. The above-mentioned undislocated fracture in an adolescent was treated with a plaster of paris cast. The other patient suffered from severe rheumatoid arthritis. An olecranon fracture on the contralateral side had been treated operatively, but the osteosynthesis had failed due to severe osteoporosis.

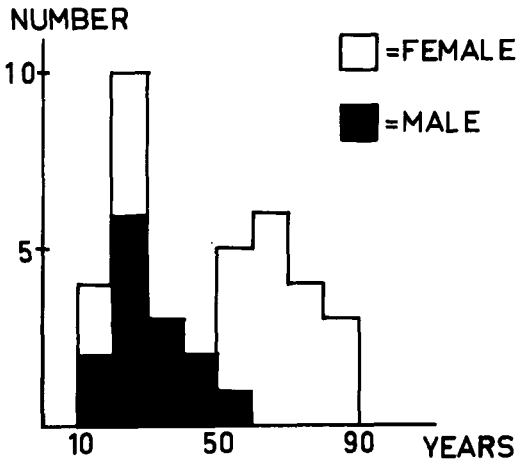

Figure 1. Age and sex distribution of patients with 37 olecranon fractures.

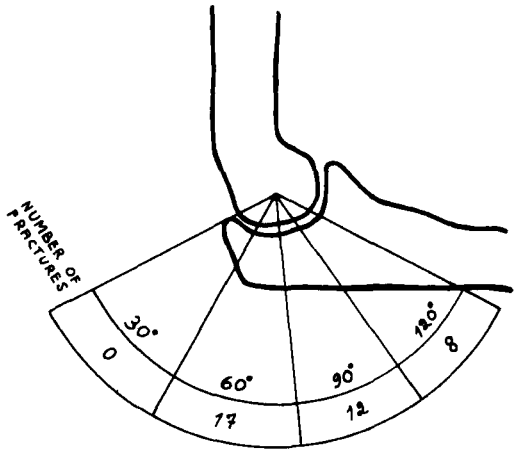

Figure 2. Distribution of the site of 37 olecranon fractures in the semilunar notch.

Most of the fractures (24) were treated operatively within nine hours of the patient's arrival at the casualty department. In 19 cases the primary treatment was internal fixation with two Kirschner wires and cerclage (Table 2). A tourniquet was used in almost all of the cases (30/35). The operation time ranged from 30 min to 2 hours (mean 1 hour).

The average duration of hospitalization was 5 days (range 1–11 days) and that of plaster immobilization was 22 days (range 0–44 days). In 22 cases the internal fixation material was later removed under local anaesthesia.

The patients were requested to attend a follow-up 2 years after the operation. For evaluation of the clinical results the subjective and objective results were combined and scored as follows.

Excellent = symptom-free, motion equal to the intact side.
Good = occasional pain or restriction of motion less than 10°.
Fair = occasional pain and restriction of motion less than 30°, or over 30° with no pain.
Poor = occasional pain with restriction of motion over 30°.

The statistical significance was studied with the chi-square and *t*-tests.

RESULTS

At follow-up 20 out of 35 operatively-treated patients were entirely symptom-free, 10 had occasional pain or pain after strenuous exercise, and two were not evaluated because of rheumatoid arthritis. Loss of rotation was found in two patients, 15° in one and 90° in the other. Loss of extension-flexion was seen in 20 patients: 1–10° in seven, 11–30° in six and over 30° in seven patients. In 28 cases the radiological result was good, whereas in the remaining seven there were clear post-traumatic arthrotic changes.

Patients under 50 did better than the older ones and the results of the men were better than those of the women, although these findings were not significant. Transverse fractures healed, as was expected, better than the comminuted fractures (Table 1). When the immobilization time was 3 weeks or less the result was significantly better than when plaster was used for more than 3 weeks (Table 3), regardless of the degree of comminution.

Three patients developed a superficial infection and failure of the osteosynthesis was observed in another three. In the first case of failure of the internal fixation, the primary result was good, but the wire loop behind the Kirschner wire loosened. The patient was treated with cortisone for rheumatoid arthritis and she had a superficial infection post-

Table 1. Effect of fracture type on results

Fracture type	Results				
	Excellent	Good	Fair	Poor	Total
Comminuted	6	3	7	2	18
Transverse	5	4	4	0	13
Oblique	2	0	2	0	4
Total	13	7	13	2	35

Table 2. Effect of methods on results

Method	Results				
	Excellent	Good	Fair	Poor	Total
2 Kirschner wires and cerclage	6	6	6	1	20*
Screw	4		3	1	8
Simple wire loop	1	1	4		6
Resection	1				1
Total	13	7	13	2	35

* The results of one patient were not evaluated because of severe rheumatoid arthritis.

Table 3. Effect of immobilization on results

Immobilization (days)	Results				
	Excellent	Good	Fair	Poor	Total
0–21	9	6	4	1	20*
22–44	4	1	9	1	15
Total	13	7	13	2	35

* $P < 0.05$

operatively. The second failure was an elderly woman with osteoporosis; the screw used for the osteosynthesis pierced the proximal fragment. In a second operation a new osteosynthesis was performed with two Kirschner wires and a wire loop, resulting in arthrosis. In the third failure, the osteosynthesis was performed with a simple wire loop which cut through the proximal fragment.

Patients without associated injuries were off work between 21 and 236 days (mean 77 days).

DISCUSSION

The age distribution is similar to that reported in previous papers (Luther & Schulitz 1968, Scheuba & Unger 1970). In this material, all the patients over 60 were women. When the fracture line passed through the coronoid process or distal to it, it was not considered a fracture of the olecranon (Rauber & Kopsch 1955). This is in contrast to the classification used by some other authors, for example, Luther & Schulitz and Scheuba & Unger.

The clinical results were similar to those presented by Bakalim & Wilppula (1971a, b); however, the number of poor results was smaller in the present series. The results were better for the male than for the female patients; the explanation is probably the greater incidence of osteoporosis and the more advanced age of the female patients. The restriction of mobility in the present series was smaller than in the materials presented by Luther & Schulitz (1968) and Scheuba & Unger (1970). They put greater emphasis on conservative treatment. The eight patients re-examined in the series of Weber & Vasey (1963) all had a restriction of under 10°. Bakalim & Wilppula suggest that their relatively high incidence of limitation of movement might be attributed to the relatively long average duration of immobilization (6 weeks in operatively treated cases). Immobilization for over 6 weeks seemed to have an unfavourable effect on the results. At present, there is a trend towards short immobilization, for example, Weber & Vasey recommend a plaster cast for only 4 days. In the present series the average duration of immobilization was 22 days.

In one case the head of the screw cut through the proximal fragment. A washer might have prevented this occurring in the porotic bone. Stable internal fixation can be achieved with a screw in transverse and oblique fractures of the olecranon. It may not always succeed in comminuted fractures; too thin or too short a screw will lead to a failure, and too thick a screw may split the fragment or dislocate the fracture.

In conclusion, we suggest that internal fixation with two Kirschner wires and cerclage according to Weber & Vasey (1963) should be the method of choice in treating fractures of the olecranon in most cases. A period of immobilization of 3 weeks or less is recommended.

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