COMPRESSION SCREWING OF DISPLACED FRACTURES OF THE HEAD OF THE RADIUS

G. SHMUELI, H. Z. HEROLD

From the Department of Orthopaedic Surgery, Barzilai Medical Centre, Israel

In selected cases with displaced fractures of the head of the radius, open reduction and compression screwing allow a perfect restitution of the articular surface. Seven patients treated in this way were followed up for a year or more when all but one had full mobility, no pain and normal strength, and there were no arthritic changes. The one exception, who had only a 10-degree loss of mobility, had been treated late.

Fractures of the head of the radius are usually treated conservatively when the displacement is insignificant, or by resection of the fractured head when the displacement is more pronounced. Radin and Riseborough (1966) reported that closed or open reduction of displaced fractures in adults had not proved worthwhile. Fischer *et al.* (1976) reported the possibility of screwing certain simple fractures and in five cases so treated and immobilised in plaster they obtained four good results. Firica and Troianescu (1979) reported eight cases of open reduction and fixation with Kirschner wires followed by immobilisation in plaster. They obtained four very good results, two satisfactory and two bad results. Odenheimer and Harvey (1979) reported two cases fixed with threaded wire and plaster, with good results.

For the last three years we have been treating suitable cases of displaced fractures of the head of the radius by open reduction and compression screwing. The uniformly good results in the operated cases convinced us of the advantages of this method of treatment which we now report.

MATERIAL AND METHOD

In the years 1978 to 1980, 42 patients with fractures of the radial head were treated as inpatients at the Barzilai Medical Centre. Twenty-eight patients with undisplaced fractures or with minimal displacement were treated conservatively by sedation and immediate mobilisation. At no time did we immobilise these fractures in plaster. Fourteen patients were operated upon: in seven, the comminution was severe and the radial head was excised; in seven others, we performed open reduction and internal fixation with compression screws. Thus, one third of the patients with a fractured radial head

required an operation, but only half of them lost the radial head, while in the other half a normal elbow joint was reconstructed.

Operative technique. Displaced fractures with fragments large enough for screwing, that is those comprising at least one third of the articular surface of the radial head, were reduced openly and fixed with screws. The operation was performed as an emergency immediately on admission. The radial head was approached posterolaterally through an incision starting at the lateral epicondyle of the humerus and extending about four centimetres below the joint. The subcutaneous tissue and the torn periosteum over the radial head were opened in the same line and retracted anteromedially, protecting the radial nerve which could not be seen. The fragment of the radial head was reduced and fixed with a small compression screw. In one instance, two compression screws were necessary in order to re-establish the articular surface. The annular ligament, when torn at the time of fracture or when cut during the surgical exposure, was sutured with fine catgut before closure of the wound. The incision was closed with a 000 nylon suture and the elbow covered with a compressive dressing for 24 hours.

After-care. The dressing was removed on the day after operation and active exercises started, consisting of pronation and supination. The stitches were removed and the patient discharged at 10 days. As the possible range of movement was still limited, further physiotherapy was required. No passive mobilisation was ever used and the role of the physiotherapist was restricted to instruction and encouragement of the patient in his exercises. No complications were encountered except one superficial infection which subsided after a few days' treatment with antibiotics.

G. Shmueli, MD
H. Z. Herold, MD, Head of Department } Department of Orthopaedic Surgery,
Barzilai Medical Centre, Ashkelon, Israel
Requests for reprints should be sent to Dr H. Z. Herold.

© 1981 British Editorial Society of Bone and Joint Surgery 0301-620X/81/4119-0535 \$2.00

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Case 1. Figures 1 and 2—Anteroposterior and lateral radiographs of the displaced fracture through the middle of the right radial head. Figures 3 and 4—One year after open reduction and compression screwing, the articular surface is smooth and appears perfectly normal.

RESULTS

Results were evaluated by three criteria: radiographically, by the range of movement and, subjectively, by the patient. No arthritic changes were observed within the short follow-up period of a year to three years. The articular surface of the radial head appeared smooth and practically normal on the radiographs. Pronation and supination were always full, and so were extension and flexion of the elbow in six cases out of seven. In one case, extension remained 10 degrees short of full. The patients questioned reported that the arm returned to normal, with no weakness or functional impairment.

ILLUSTRATIVE CASE REPORTS

Case 1. This 27-year-old man was a basket-ball player whose right radial head was split longitudinally down the middle. The anterolateral fragment was tilted laterally (Figs 1 and 2), the elbow was swollen and movement impossible. After open reduction and screwing, perfect realignment of the articular surface was obtained (Figs 3 and 4). This patient refused physiotherapy and decided to mobilise his elbow on his own. The follow-up notes at the outpatient clinic one month after operation reported a range of pronation and supination limited to 10 degrees and a suspicion of radial paresis. Two months after operation the range of movement was improved and there were no longer any signs of radial paresis. At three months, there was full mobility of the elbow, including pronation and supination. The patient returned to full physical activity six weeks after the fracture.

Case 2. The 21-year-old man was admitted with fracture of the right radial head with marked depression of its anterolateral half (Figs 5 and 6). A third fragment was revealed at operation and two screws were inserted for fixation (Figs 7 and 8). The motivation for rapid recovery in this case was quite remarkable and eight days after operation the patient obtained full mobility of the elbow. At this point, after removal of the stitches, he was discharged; he returned for follow-up

examination 10 days later, when pronation and supination were full, but extension of the elbow slightly limited. At follow-up one year later he had full mobility of the operated elbow with normal strength of the affected hand. Radiographs revealed a joint that appeared normal except for the screws inserted on reduction.

Case 3. A 37-year-old male manual worker was referred to our department one week after a fracture of the right radial head which was diagnosed in an emergency service (Figs 9 and 10). This was the only case where operation was delayed more than a few hours after the fracture was sustained. Although the radiographs revealed a perfect reduction of the articular surface (Figs 11 and 12), a mild restriction of movement persisted. At follow-up two years after operation the extension of the elbow was limited by 10 degrees; flexion, pronation and supination were full.

DISCUSSION

Resection of the radial head is accepted as the treatment of choice for comminuted fractures of the radial head. In undisplaced fractures, where stability seems sufficient, early mobilisation is usually recommended. Treatment is somewhat empirical in displaced and unstable fractures. Radin and Riseborough (1966) advised early mobilisation when the displaced fragment involved less than two thirds of the radial head but total excision when more than two thirds was involved. Most surgeons would perform a total excision of the radial head even for displaced fractures involving less than half of the radial head, if mobility of the elbow did not progress well with physiotherapy. Morrey, Chao and Hui (1979) have shown that at an average of 20 years after resection of the radial head there was very little limitation of movement, but strength was moderately decreased. Their patients often had degenerative arthritis at the

Fig. 5

Fig. 6

Fig. 7

Fig. 8

Case 2. Figures 5 and 6—Anteroposterior and lateral radiograph of the displaced fracture of the right radial head. Figures 7 and 8—Two years after open reduction and internal fixation with two compression screws.

Fig. 9

Fig. 10

Fig. 11

Fig. 12

Case 3. Figures 9 and 10—Anteroposterior and lateral radiographs of a displacement of about a third of the articular surface of the right radial head as seen on admission. Figures 11 and 12—A year after open reduction and screwing the articular surface is perfectly smooth.

elbow that was not severe but correlated with the amount of pain. Odenheimer and Harvey (1979), who reported cases of open reduction and internal fixation, contend that restitution of the radial head prevents the symptoms at the distal radio-ulnar joint which can follow resection.

Fischer *et al.* (1976), Firica and Troianescu (1979) and Odenheimer and Harvey (1979) all reported small series of fractures of the radial head treated by open reduction and internal fixation and advised immobilisation in plaster for three to four weeks. A total of 15 cases were reported and only 10 results were good.

The advantage of our technique is the rigid fixation allowing immediate mobilisation. We believe that any immobilisation of an intra-articular fracture allows the development of adhesions and threatens the function of

the joint. Immediate mobilisation is the only way to prevent future degenerative arthritis and obtain full mobility. Internal fixation that requires further immobilisation in plaster has lost its greatest advantage. Our experience with the present series has strengthened this belief. A fracture of the head of the radius should be treated, as any other intra-articular fracture, by the earliest possible mobilisation. Immediate rigid internal fixation, as described, is the only means to this end.

The patient referred to us late, a few days after the accident, never regained full mobility, although the surgical treatment allowed an almost perfect result; but even in this case normal power was obtained, with minimal invalidity. In all the other cases absolutely no invalidity remained and this is the main merit of this treatment.

REFERENCES

- Firica A, Troianescu O.** Fractures comminutives de la tête radiale: technique de reconstruction chirurgicale. *Rev. Chir Orthop* 1979;**65** Suppl II:66-7.
- Fischer LP, Gonon GP, Carret JP, Dimnet J, de Mourgues G.** Possibilités de vissage dans certaines fractures simples de la tête radiale. *Rev Chir Orthop* 1976;**62** Suppl II:89-96.
- Morrey BF, Chao EY, Hui FC.** Biomechanical study of the elbow following excision of the radial head. *J Bone Joint Surg [Am]* 1979;**61**-A:63-8.
- Odenheimer K, Harvey JP Jr.** Internal fixation of fracture of the head of the radius. *J Bone Joint Surg [Am]* 1979;**61**-A:785-7.
- Radin EL, Riseborough EJ.** Fractures of the radial head. *J Bone Joint Surg [Am]* 1966;**48**-A:1055-64.