Acta Orthop Scand *57*, 229–231, 1986

Early displacement of distal radius fracture

In a retrospective series of 269 patients with distal radius fracture, initially undisplaced fractures (Older Type 1) had a good radiographical prognosis, whereas the more comminuted fractures showed increasing shortening until union, averaging 8 mm. Secondary displacement most often occurred during the first 2 weeks of immobilization, indicating that the radiographical control should be performed at that time. Reduction and fixation with plaster of the severely displaced Type 3 and 4 fractures never led to a satisfying radiographical end-result. Therefore, alternative methods of fixation should be considered in these fractures.

Søren Solgaard

Department of Orthopedics U, Rigshospitalet, University of Copenhagen, Denmark

Correspondence: Department of Orthopedics O, Frederiksborg County Hospital, DK-3400 Hillerød, Denmark.

Older and associates (1965) classified distal radius fractures into four types according to shortening and dorsal comminution (Figure 1). We have shown (Solgaard 1985) that this classification gives the best prognostic information about the possibility of retaining a good position of the fracture at union.

We have now studied the radiographical result in the four fracture types after reduction and plaster fixation.

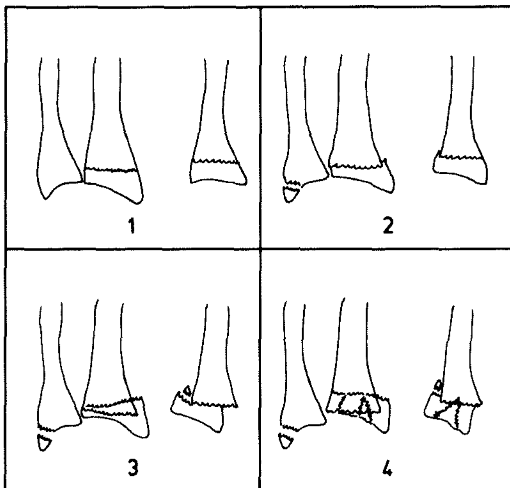

Figure 1. The fracture types of Older's classification (Older et al. 1965). Type 1: Minimal displacement, radial length distal to ulna at least 7 mm. Type 2: Radial length 1 to 7 mm. No comminution. Type 3: Radial length less than 4 mm. Slight comminution. Type 4: Radial length usually negative. Marked comminution.

Patients and methods

The material included 269 fractures in 41 men, median age 58 (20–85) years, and 228 women, median age 64 (26–101) years (Table 1).

Reduction in local anaesthesia and immobilization in dorsal and volar plaster slabs for 6 weeks was performed in 195 fractures, whereas 74 undisplaced fractures were treated by dorsal plaster for 5 weeks. The dorsal angulation of the articular surface in the lateral plane, and the length of the radial styloid distal to the ulna in the AP-plane were measured initially, after reduction, and at fracture union.

In 47 patients, intermediary radiographical controls were performed after 1 and 2 weeks of immobilization; 12 cases were Type 2, 28 cases Type 3,

Table 1.
Number of fractures according to Older's classification (Figure 1) and number of reduced fractures

Type	All fractures N *(%)*	Reduced fractures N
1	51 *(19)*	4
2	107 *(40)*	85
3	92 *(34)*	88
4	19 *(7)*	18
Total	*269 (100)*	195

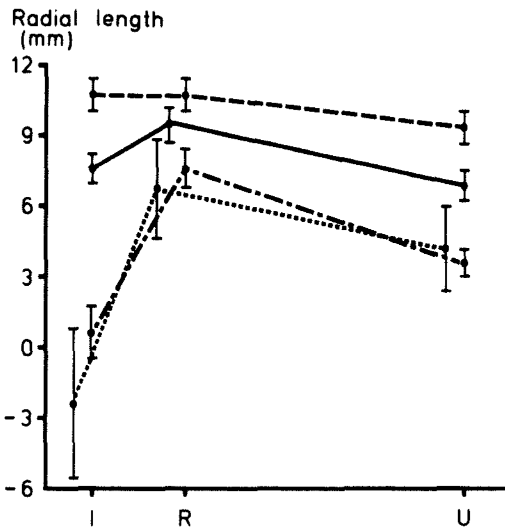

Figure 2. Radial length (mean ± 1.96 SD) initially (I), after reduction (R) and after union (U) in 269 patients with distal radius fractures, Older's Types 1 to 4.
Type 1: – – –; Type 2: ——; Type 3: –.–.–.–; Type 4: ....

and 7 cases Type 4, and they were used to analyse the time when secondary displacement occurred.

Results

The minimally displaced fractures of Type 1 united with only minor secondary displacement. Fractures of Types 3 and 4, which were nearly always reduced (Table 1), showed secondary dorsal angulation, averaging 6 and 8 degrees, respectively, and shortening showed the same pattern (Figure 2). In Type 2 fractures a final displacement of 6 degrees of dorsal angulation was recorded, although only 85/107 fractures were reduced initially. The final shortening of these fractures was less than for Type 3 and 4 fractures.

In the 47 patients with regular, radiographical controls the secondary displacement predominantly occurred within the first 2 weeks after fracture (Figure 3). In only four cases did the secondary displacement occur during the last 4 weeks of immobilization.

Discussion

Our undisplaced fractures had a good prognosis, as radial shortening and dorsal angulation seldom increased during immobilization, and the radiographical result was excellent, as has been reported previously (de Palma 1952, Older et al. 1965).

In fractures of Types 2 to 4 secondary displacement occurred in most cases although they were satisfactorily reduced. The residual dorsal angulation averaged 10 degrees. Radial shortening was also reduced in the majority of Type 2 fractures, but in about half of the cases the anatomical reduction was lost during immobilization. In fractures of Types 3 and 4 reduction was significantly worse, and secondary displacement occurred in almost all cases, leading to a shortening of about 8 mm; de Palma (1952) stated that a residual shortening of more than 4 mm precludes a satisfactory functional results.

Our study thus confirms that the four fracture types in Older's system are increasingly difficult to reduce and retain because of increasing compression and shortening. Fractures of Types 3 and 4 had an identical prognosis, and could probably be grouped as one fracture type. Alternative methods of immobilization must be sought to improve the anatomic end-results in these severe fractures.

Secondary displacement of a distal radius fracture occurs during the first 2 weeks of treatment (Fenyö & Johansson 1974, Hinding 1972). Only four of our fractures deteriorated

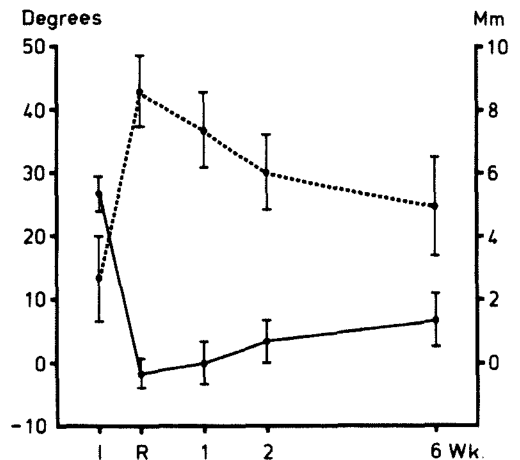

Figure 3. Dorsal angulation and radial length (mean ± 1.96 SD) in 47 patients with distal radius fractures. I initially, R after reduction. Dorsal angulation: —— Radial length: ....

during the second to sixth week. Consequently the first radiographical control should be performed 2 weeks after the primary reduction, as re-reduction is still possible and gives better results than re-reduction during the first week (Collert & Isacson 1978).

Acknowledgments

The statistical analysis was performed by Cand. Stat. Svend Kreiner, Department for Data Processing, Herlev Hospital, Denmark.

I am indebted to the Hafnia-Hånd-i-Hånd-Fondet for financial support.

References

Collert, S. & Isacson, J. (1978) Management of redislocated Colles' fractures. *Clin. Orthop.* **135**, 183–186.

de Palma, A. F. (1952) Comminuted fractures of the distal end of radius treated by ulnar pinning. *J. Bone Joint Surg.* **34-A,** 651–662.

Fenyö, G. & Johansson, O. (1974) Secondary displacement of reduced distal radius fractures. *Acta Orthop. Scand.* **45**, 76–81.

Hinding, E. (1972) Fractures of the distal end of the forearm. *Acta Orthop. Scand.* **43**, 357–365.

Older, T. L., Stabler, W. E. & Cassbaum, W. H. (1965) Colles fracture. Evaluation and selection of therapy. *J. Traum.* **5**, 469–476.

Solgaard, S. (1985) Classification of distal radius fractures. *Acta Orthop. Scand.* **56**, 249–252.