Stability assessment of distal radius fractures

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A total of 112 consecutive cases of fractures of the distal radius managed conservatively were graded according to radiological criteria using the first radiograph. These criteria, as well as age over 60 years, were considered as gravity factors.

A strong correlation was found between these criteria and the risk of secondary displacement, despite a correct initial reduction.

Introduction

The subject of instability in fractures of the distal radius has been the focus of considerable interest for many years. Various factors, such as severe dorsal comminution (Cooney et al., 1979), important dorsal angulation and radial shortening (Vaughan et al., 1985), and advanced age (Soren Solgaard, 1986), have been associated with the secondary displacement seen in this type of fracture. It is currently assumed that there is a correlation between the severity of the primary displacement and the loss of reduction (Dias et al., 1987). The aim of this study was to correlate further these different risk factors with the tendency towards a poor position.

Material and methods

From October 1985 to November 1987, 112 cases of fracture of the distal radius were treated consecutively in our department with a mean age of 54 years, (range 13–93 years). There were 86 women and 25 men. The fractures were classified according to Frykman (Frykmann, 1967) (Fr. I: 40 cases, Fr. II: 31, Fr. III: 8, Fr. IV: 9, Fr. V: 1, Fr. VI: 16, Fr. VII: 3, Fr. VIII: 4). The treatment consisted of local anaesthesia, reduction of the fracture and immobilization by a forearm plaster-of-Paris cast with moderate volar tilt and ulnar deviation.

All these cases were classified according to the following anatomical criteria based on the radiological study on admission (*Fig.* 1):

dorsal angulation more than 20° (*Fig.* 1*a*),
dorsal comminution (*Fig.* 1*a*),
intra-articular radiocarpal fracture (*Fig.* 1*b*),
associated ulnar fracture (*Fig.* 1*b*).

These criteria, as well as age over 60 years, were considered as factors of instability capable of inducing secondary displacement. An instability score of 0 to 5 was attributed to each case according to the presence of these five factors.

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Radiological assessment was repeated after reduction and at union using Stewart et al.'s scoring technique (Stewart et al., 1985).

All statistical analyses were made with the χ^2 and the Student's t tests, using the SPSS PC+ program (SPSS Inc., Chicago, Illinois).

Results

At union, the mean Stewart score was 0.15 ± 0.35 in the subgroup without any risk factor and rises in a linear relationship with an increasing number of these factors, reaching 6 ± 2.55 in the subgroup most at risk (*Fig.* 2).

Statistical analysis confirmed the individual influence of each risk factor on the quality of the radiological result ($P = 0.0134$ for dorsal displacement, $P = 0.0016$ for dorsal comminution, $P = 0.0171$ for intra-articular radiocarpal fracture, $P = 0.023$ for associated ulnar fracture, and $P = 0.0001$ for the patient's age).

Figure 3 shows the radiological evolution of each patient subgroup according to Stewart's radiological score at admission, reduction and fracture union. The quality of reduction becomes increasingly worse when the instability score rises. The Stewart score at reduction always remained below 2, signifying that the fractures were correctly reduced. As the number of risk factors increases, there is an obvious trend towards a loose position, going nearly as far as primary displacement.

Discussion

This study confirms the importance of meticulous radiological assessment of fractures of the distal radius. It emphasizes the importance of correctly identifying the signs of instability such as dorsal angulation or comminution, associated ulnar fracture and intra-articular involvement, particularly in the elderly, osteoporotic patient. Our data show that the existence of these risk factors is correlated with loss of position despite immobilization in a cast. This study confirms our opinion that only in slightly displaced fractures of the distal radius does conservative treatment lead to a satisfying anatomical end result. The study concluded that fractures presenting 3 or more gravity factors should be the object of more attentive radiological surveillance. This would permit an earlier orthopaedic remanipulation or surgical management in the cases of secondary displacement.

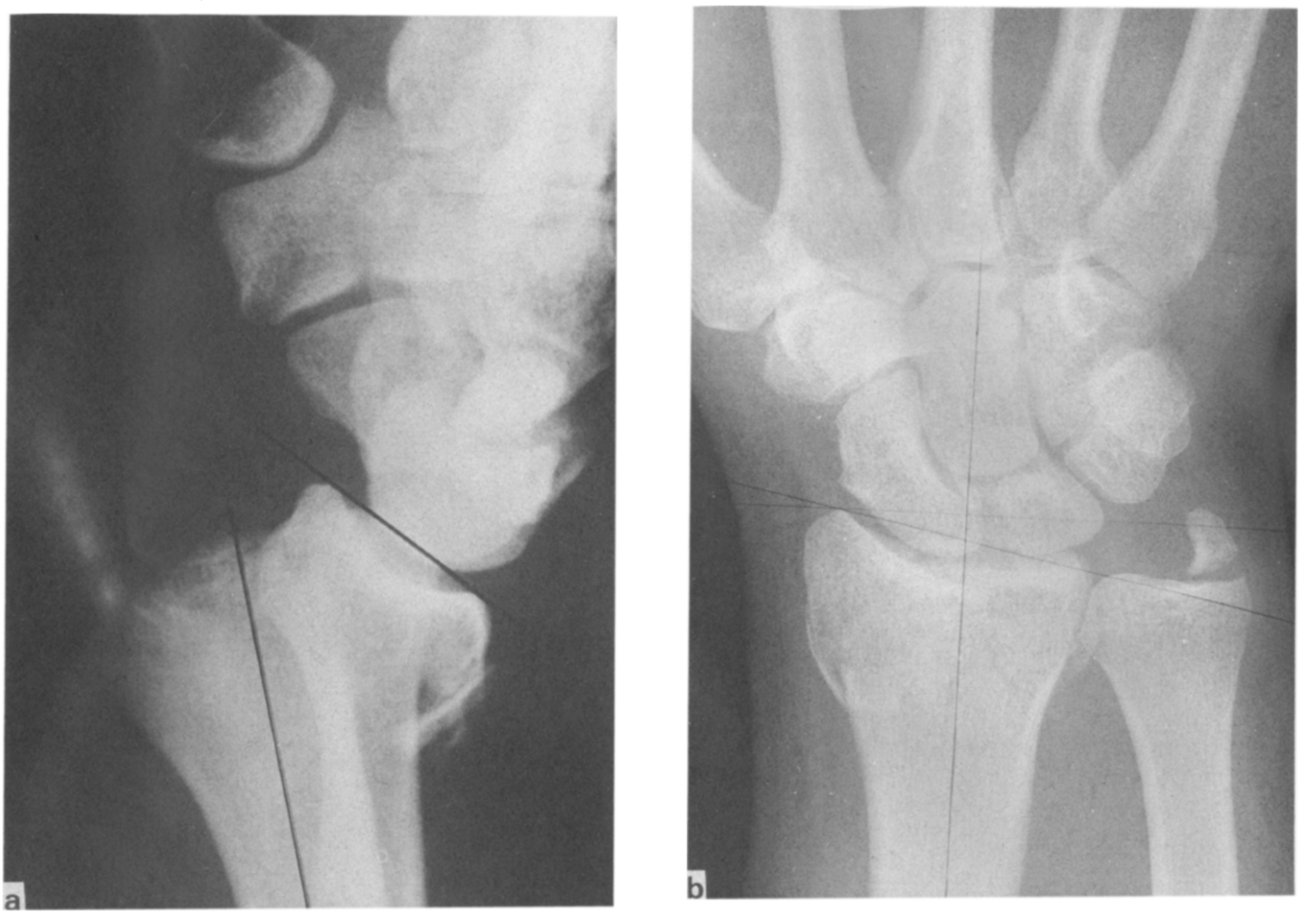

Figure 1. Anatomical criteria defined on the first radiograph *a*, Dorsal angulation superior to 20° and dorsal comminution. *b*, Intra-articular involvement and associated ulnar fracture.

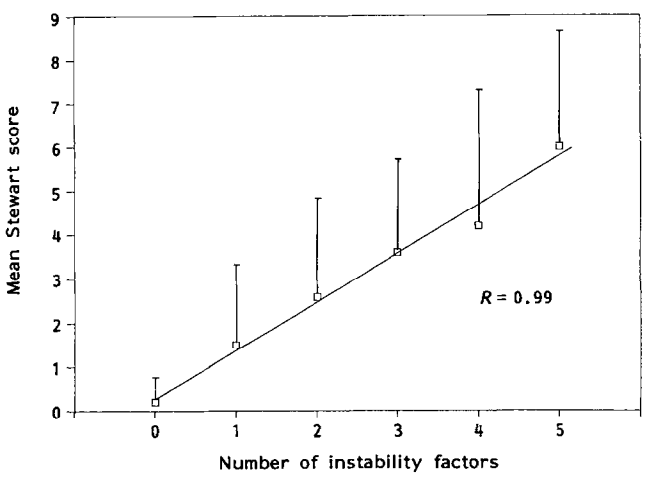

Figure 2. The 112 cases of conservatively treated fractures of the distal radius are divided into six subgroups according to the presence of instability factors. These subgroups are plotted according to their mean Stewart's score at union.

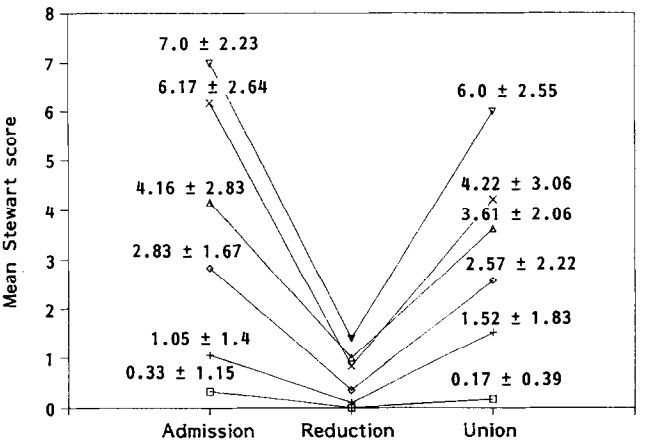

Figure 3. Evolution of the radiological score of the 112 cases of distal radius fractures on admission, after reduction and at union. This evolution is represented by the mean Stewart's score per subgroup, according to the existence of factors of instability (Cr). □: 0Cr; +:1Cr; ◇: 2Cr; △: 3Cr; X: 4Cr; ▽: 5Cr.

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