Do we underestimate the predictive value of the ulnar styloid affection in Colles fractures?

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Abstract Various radiographic factors have been suggested as predictively important when dealing with an unstable distal radius fracture. Accordingly, many classification systems have been established in order to give an accurate description of a fracture and to grade the seriousness of the injury. In this paper, we use the classification of Colles fractures introduced by Frykman to investigate the predictive value of a concomitant fracture of the ulnar styloid. We found styloid affection to be a better predictor of a poor outcome than intra-articularity, but the combination carries the worst prognosis. We therefore suggest that a fracture of the distal radius associated with those two types of injuries should be considered for surgical treatment.

Introduction

Over the years, the treatment of fractures in the distal radius has become more selective. Thus, external fixation and percutaneous pins have become more widely used when dealing with unstable fractures, i.e. when a satisfactory position cannot be maintained by a conventional cast.

Various radiographic factors have been suggested as important (Abbaszadegan et al. 1989; Adolphson et al. 1993; Jenkins and Mintowt-Czyz 1988; Porter and Stockley 1987; Van Der Linden and Ericson 1981; Villar et al. 1987), and many classification systems have been launched (e.g. Frykman 1967; Garland and Werley 1951; Lidström 1959; Older et al. 1965), each one with its own criteria.

The aim of the present study was to evaluate the importance of the fractured ulnar styloid, when accompanying a distal radius fracture. We used the Frykman classification system, which we found quite comprehensive and well suited to our purpose.

Materials and methods

The study included 158 patients, 125 women and 33 men, aged 25–75 years, who were treated for Colles fracture at the Surgical Department, Barum Hospital, Norway, during 1989. Fracture reduction, when needed, was carried out under haematoma block with 2% lignocaine, 5–10 ml. Time in cast varied from 4 to 6 weeks.

Follow-up

Radiographic controls were carried out after 12 days and 10 weeks. For comparison a radiograph of the uninjured arm was obtained at 12 days. Reassessment was performed at cast removal and at 10 and 35 weeks.

The fractures were classified according to Frykman (1967), i.e. in 8 classes, and then rearranged into four groups (Table 1, Fig. 4), based upon articular affection and/or accompanying fracture of the ulnar styloid. Fractures in group 1 and not in need of primary reduction were evaluated separately. Radiographs (standard side and anteroposterior projections) were assessed for: (1) loss of volar angle (LVA) in degrees, (2) radial dislocation (RD) in mm, and (3) radial shortening (RS) in mm. An X-ray score arbitrarily combining the measured variables seemed useful. The units differed, however, so in order to even out these variations, we used the following formula: LVA/5 + 2(RD + RS), which for the average fracture gives us practically the same weight to all denominators. A fracture was for all practical purposes considered undislocated when the score was ≤8. Mean volar angle of the uninjured side (all groups) was 9.36° (range 4°–21°).

Table 1 Classification of fractures of the distal radius as used in the study

<table>
<thead>
<tr>
<th>Group</th>
<th>Fracture of ulnar styloid</th>
<th>Articular affection</th>
<th>Corresponds to Frykman's class (n)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>–</td>
<td>–</td>
<td>I (46)</td>
<td>46</td>
</tr>
<tr>
<td>2</td>
<td>–</td>
<td>+</td>
<td>III (11), V (2), VII (3)</td>
<td>16</td>
</tr>
<tr>
<td>3</td>
<td>+</td>
<td>–</td>
<td>II (40)</td>
<td>40</td>
</tr>
<tr>
<td>4</td>
<td>+</td>
<td>+</td>
<td>IV (15), VI (11), VIII (4)</td>
<td>30</td>
</tr>
</tbody>
</table>
Functional evaluation and measurements

At 10 and 35 weeks, pronation, supination, flexion and extension of the wrists was measured with a standard goniometer. Results are given as wrist movement score (WMS), arbitrarily calculated by adding the results of each measurement given as percent of the expected normal, i.e. compared with the uninjured arm. Grip strength was measured with a vigorimeter, and the highest of three consecutive measurements used. The results were registered as percent of expected normal. As for grip strength, we assumed that the dominant arm is 15% stronger (Kongsholm and Olerud 1987).

Visible deformity was evaluated as either absent or present at 35 week’s follow-up.

Exclusion

Fifteen patients were lost during follow-up for various reasons. Another 11 had fractures in need of revision reduction (10 of them with a fractured styloid). The remaining 132 patients came to both radiography check-ups and the 35-week follow-up.

Statistical analysis

For statistical analysis we used Student's t-test, the chi-square test with Yates correction and the Pearson correlation coefficient. P < 0.05 was regarded as significant.

Results

Fracture classification

We found the evaluation of articular damage from plain radiographs difficult, especially the determination of whether the distal radioulnar joint was affected. We thus chose to combine fracture types with visible articular damage into one category and those without into another. Likewise, those with a fracture of the ulnar styloid were placed in one category and those without in another (Table 1). Thus, we achieved a simple grouping, which turned out to be predictive and scalar.

Fracture stability

A tendency to redislocation was observed in all fracture classes, even after the 12-day period (Fig. 1). This was not affected by the immobilization period. Group 4 (intra-articular fractures with a concomitant fracture of the ulnar styloid), represented the most unstable fractures, followed by in descending order group 3 (extra-articular fractures with styloid involvement), 2 (intra-articular fractures without) and 1 (extra-articular fractures without ulnar styloid fracture) (Fig. 1 and 2). Undislocated fractures of group 1 showed a slight tendency to secondary dislocation. We found a strong correlation between primary and final radiographic score \( r = 0.67, P < 0.0001 \), and a good correspondence between the radiographic score and visible deformity (Figs. 1 and 3).

Wrist movement score (WMS) and loss of grip strength

A significantly greater loss of wrist mobility and grip strength was found in the fracture groups with a concomitant fracture of the ulnar styloid (groups 3 and 4) as compared with the others (Table 2). Loss of grip strength at 35 weeks correlated with all measured X-ray parameters (i.e. types of dislocation, Table 3).