THE DISTAL RADIO-ULNAR JOINT IN COLLES’ FRACTURES

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The effect of involvement of the distal radio-ulnar joint on subsequent function was studied in 170 patients with Colles’ fractures, reviewed for one year after cast removal.

Patients with involvement of this joint had significantly weaker grips and a significantly greater incidence of pain and tenderness over the joint at all stages of follow-up. They also had a poorer range of supination at six months and at one year. The presence or absence of an ulnar styloid fracture was not related to the functional results.

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The importance of involvement of the distal radio-ulnar joint (DRUJ) in Colles’ fractures is only just emerging. In such cases, pain and tenderness around the ulnar styloid have been reported (Stewart, Innes and Burke 1985; Solgaard 1988), and their resistance to treatment is such that they have been described as the ‘chronic backache’ of wrist fractures (Palmer 1984). It is now recognised that the anatomy and the function of the DRUJ are more complex than previously thought (Fisk 1984). Apart from pain the effect of this type of injury on hand and wrist function has not been studied and there has been no controlled prospective study to assess the effect of DRUJ involvement in Colles’ fractures. This study was designed to address this issue.

PATIENTS AND METHODS

A total of 186 consecutive patients with displaced Colles’ fractures not involving the radiocarpal joint were studied. Their mean age was 62.7 ± 67 years (49 to 78). There were 87 fractures involving the DRUJ, and 99 in which the fracture line was proximal to this joint on both anteroposterior and lateral radiographs. Table I shows the grading of the severity of displacement and the quality of reduction (Lidström 1959). The presence of an ulnar styloid fracture was also noted.

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<th>Grade</th>
<th>Deformity</th>
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<tr>
<td>1</td>
<td>None or insignificant. Dorsal angulation &lt;0° or shortening of &lt;3 mm</td>
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<td>2</td>
<td>Slight. Dorsal angulation 1° to 10° and/or shortening of 3 to 6 mm</td>
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<td>3</td>
<td>Moderate. Dorsal angulation 11° to 14° and/or shortening of 7 to 11 mm</td>
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<td>4</td>
<td>Severe. Dorsal angulation &gt;15° or shortening of &gt;11 mm</td>
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All the fractures had been manipulated under regional anaesthesia, and initially held in a plaster slab. This was changed to a full cast within the first week, which was retained for an average period of 4.1 weeks (3.4 to 4.6). When the cast was removed, the patients were instructed to exercise the wrist, forearm and hand.

The functional result in each case was assessed at six weeks, six months and one year after the removal of the cast using the demerit system (Sarmiento et al 1975; Sarmiento, Zagorski and Sinclair 1980), as modified from Gartland and Werley (1951). In this system (Table II), points are given for each functional deficit; greater scores mean poorer function. Grip strength was measured using a vigorimeter, taking the higher grip strength of the dominant hand into account, and recording the average of three tests. A goniometer was used to measure forearm rotation.

RESULTS

Sixteen patients were lost to follow-up, leaving 81 with DRUJ involvement and 89 without. The two groups had similar age and sex distributions, and were well matched.
Weakness of grip after Colles' fracture related to the involvement of the distal radio-ulnar joint. Zero is normal strength; 4 is < 25% of other side.

for the amount of initial displacement, the quality of reduction and the final position.

Patients whose fractures involved the DRUJ had a significantly weaker grip than did the others at all stages of follow-up (Fig. 1: chi-squared test: six weeks p < 0.004, six months p < 0.004, 1 year p < 0.001). These patients also had a greater restriction of supination (Fig. 2). The difference was not statistically significant at six weeks (Student's t-test), but was very significant at six months (p < 0.001) and at one year (p < 0.001). There was no difference in range of pronation between the two groups.

At six weeks, 45 patients (55%) with DRUJ involvement and 22 (24%) without complained of some pain around the head of the ulna. There were similar results at six months and at one year. By the chi-squared test the difference was very significant (p < 0.001) at the three time intervals. No clinical instability of the distal ulna could be demonstrated in any patient. The presence or absence of a fracture of the ulnar styloid did not influence the functional results.

**DISCUSSION**

Involvement of the triangular radio-ulnar articular disc in Colles' fractures was recognised by Taylor and Parsons as early as 1938, but the importance of this joint was not taken into account until Frykman (1967) classified distal radial fractures with particular reference to involvement of the DRUJ. He regarded DRUJ injury as an important cause of unfavourable results.

The results of my study support the opinions of Coleman (1960) and of Villar et al (1987) that DRUJ involvement is associated with a weaker grip, but this has not been explained. Palmer and Werner (1981) estimated that with the forearm in neutral position, some 40% of the load across the wrist is transmitted through the triangular disc and the lower end of the ulna. The act of gripping thus exerts a considerable force across the DRUJ; any instability due to injury could therefore weaken the grip strength.

The association between DRUJ injury and restriction of supination has not previously been reported. The

**Table II. Demerit point system used to evaluate the end results of Colles' fractures (Sarmiento et al 1975)**

<table>
<thead>
<tr>
<th>Score</th>
<th>Residual deformity (0 to 3)</th>
<th>Prominent ulnar styloid</th>
<th>Residual dorsal tilt</th>
<th>Radial deviation of the hand</th>
<th>Subjective evaluation (0 to 6)</th>
<th>Excellent: no pain, disability or limitation of movement</th>
<th>Good: occasional pain, slight limitation of movement, no disability</th>
<th>Fair: occasional pain, some limitation of movement, some disability</th>
<th>Poor: pain, limitation of movement, marked disability</th>
<th>Objective evaluation (0 to 5)</th>
<th>Dorsiflexion &lt; 45°</th>
<th>Ulnar deviation &lt; 30°</th>
<th>Supination &lt; 50°</th>
<th>Pronation &lt; 50°</th>
<th>Palmar flexion &lt; 30°</th>
<th>Radial deviation &lt; 15°</th>
<th>Loss of circumduction</th>
<th>Pain in distal radio-ulnar joint</th>
<th>Grip strength &lt; 60% of uninjured side</th>
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**Total score**

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<th>Excellent</th>
<th>Good</th>
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<td>0 to 2</td>
<td>3 to 8</td>
<td>9 to 20</td>
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axis of forearm rotation is close to the DRUJ; any incongruence could explain the later restriction. The plaster casts for the Colles' fractures were all applied with the forearm in pronation, and this movement was therefore unaffected.

The findings of Stewart et al (1985) and Solgaard (1988) on pain and tenderness after DRUJ injury are supported by this study. Fisk (1984) believed that the pain after DRUJ injury was due to the instability of the medial column of the carpus, but none of my patients showed any evidence of such an instability. It seems possible that the pain could also be caused by incongruency of the DRUJ.

Weigl and Spira (1969) showed by arthrography that there were perforations of the triangular cartilage in 60% of patients with Colles' fractures, but also that such perforations were present in 41% of normal wrists at post-mortem. The exact nature of DRUJ injury in Colles' fracture is unclear. Although incongruency at the DRUJ has been studied by Ekenstam and Hagert (1985) and van der Linden (1986), there is no accepted method of correction. Ekenstam, Jakobsson and Wadin (1989) had disappointing results after surgical repair of the triangular cartilage.

Patients with Colles' fractures which extend into the DRUJ have a worse prognosis. It is likely that they will have reduced grip strength and a restricted range of supination, and they may suffer chronic pain around the head of the ulna.

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REFERENCES