

# Ulnar wrist pain after Colles' fracture

## 109 fractures followed for 4 years

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109 patients with unilateral Colles' fracture, treated with closed reduction and cast immobilization, were re-examined after 4 (1-9) years. At follow-up, 40 patients had persistent ulnar wrist pain. The most important factor for predicting ulnar pain was final dorsal angulation of the radius. Initial and final radial

shortening, fracture of the distal radioulnar joint, ulnar styloid fracture, or instability of the distal ulna were not correlated to ulnar wrist pain. We suggest that ulnar wrist pain following Colles' fracture is caused by incongruity of the distal radioulnar joint.

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Persistent ulnar-side wrist pain is the most frequent complaint in patients with Colles' fracture (Altissimi et al. 1986, Roumen et al. 1991). Several possible causes of this pain have been suggested, including fracture involving the distal radioulnar joint (Frykman 1967), nonunion of the ulnar styloid (Reeves 1966, Burgess and Watson 1988), and distal ulnar instability (Lippman 1937, Buterbaugh and Palmer 1988).

We have re-examined our patients to determine the incidence of ulnar wrist pain and its possible causes.

### Patients and methods

From October 1983 through February 1991, 155 patients with Colles' fracture were treated by closed reduction and cast immobilization at our hospital. Of these, 14 were lost to follow-up, 13 died, 12 had bilateral fractures, 8 had severe psychiatric or neurological problems, 8 had moved out of the area, and 4 had associated upper extremity injuries. Those patients whose distal radial epiphysis remained open were not included in this study. The remaining 109 patients were available for follow-up study, 4 (1-9) years after the injury.

There were 93 women and 16 men, with a mean age of 58 (15-85) years at the time of injury; a 15-year-old girl was included as her epiphysis was closed. The etiology of injury was a fall on level ground for 58 fractures, a fall from a substantial height for 32, a bicycle accident for 8, a motor-vehicle accident for 8, and an industrial injury for 3 fractures. All fractures were

reduced under regional anesthesia and immobilized in a below-elbow cast for 5 weeks.

The follow-up examination included subjective, objective, and radiographic examinations. Detailed questionnaires were completed by the patients to evaluate their pain. Their degree of wrist pain was rated as severe (pain while resting), moderate (pain while moving), or mild (pain during heavy work or excessive motion). The stability of the distal ulna was evaluated by moving the ulnar head back and forth in a dorso-volar direction with the forearm in pronation.

The fractures were classified according to Frykman (1967) with 34 Type I, 42 Type II, 6 Type III, 14 Type IV, 1 Type V, 2 Type VI, 5 Type VII, and 5 Type VIII. Dorsal angulation and axial radial shortening (Abbaszadegan et al. 1989) were measured on standard anteroposterior and lateral radiographs (Friberg and Lundström 1976) taken before reduction and at the follow-up visit. Radiographs of the contralateral wrist were used for comparison. Radiographic evidence of fracture involving the distal radioulnar joint, ulnar styloid fracture, nonunion of the ulnar styloid, and arthrosis of the distal radioulnar or ulnocarpal joint was recorded. Sclerotic or cystic change of the ulnar head and/or lunate was regarded as arthrosis of the ulnocarpal joint.

The Student's *t*-test, one-way analysis of variance (ANOVA), and chi-square-test with Yates' correction were used. *P*-values less than 0.05 were considered significant.

Table 1. Dorsal angulation (degree) and axial radial shortening (mm) in 109 Colles' fractures with or without ulnar wrist pain. Mean SD

	Ulnar wrist pain				P-value
	+		-		
Number	40		69		
Initial displacement					
Dorsal angulation	30	11	24	16	.03
Axial radial shortening	1.0	1.9	0.34	1.9	.09
Final displacement					
Dorsal angulation	26	9.9	17	11	.0001
Axial radial shortening	2.0	2.3	1.2	2.3	.09

## Results

### Subjective symptoms

After immobilization was discontinued, 32 patients were free from pain after 3 months, another 23 after 6 months, 11 within 12 months, and the last 43 patients had some persisting pain at the follow-up examination. For all patients, pain was present from the beginning of the injury. 31 patients complained of pain on movement, especially during supination and pronation, 28 had pain with heavy lifting, 13 noted sensitivity to weather, and 4 patients had pain at night. Of these, 40 patients complained of pain primarily at the ulnar side of the wrist, 2 at the dorsal aspect, and 1 at the radial side. In the 40 cases with ulnar wrist pain, 25 rated their pain as mild, 13 as moderate, and 2 as severe.

### Objective findings

Grip strength was fully restored in most patients, except 5, whose strength was less than half that on the uninjured side. Extension, supination, and pronation were also restored, but flexion remained unsatisfactory in 21 patients whose loss of flexion was greater than 30 degrees. 4 patients who had inflammatory signs, such as swelling and warmth of the radioulnar joint, complained of constant pain. 36 patients had tenderness around the ulnar head; in 16 it was present in the radioulnar joint alone, 8 in the ulnocarpal joint alone, and 12 in both joints. 3 patients had a carpal-tunnel syndrome. 2 patients, who described their pain as severe, had associated severe reflex sympathetic dystrophy.

Both initial and final dorsal angulation of the radius were increased when comparing the ulnar pain patients with the group without such pain (Table 1). The degree of dorsal angulation, however, was not related to the degree of pain. There was no difference in initial and final axial radial shortening for patients with or

Table 2. Relationship of radiographic and physical findings to ulnar wrist pain in 109 Colles' fractures

	Ulnar wrist pain		P-value
	+	-	
Number	40	69	
Fracture involving			
distal radioulnar joint	4	9	.9
Ulnar styloid fractured	24	39	.9
Nonunion of ulnar styloid	15	21	.6
Instability of distal ulna	10	7	.07
Arthrosis of			
distal radioulnar joint	6	9	1.
ulnocarpal joint	14	16	.3

without pain. Fractures involving the distal radioulnar joint, ulnar styloid fracture, nonunion of ulnar styloid, and instability of distal ulna showed no correlation to ulnar wrist pain (Table 2). Radiographic arthrosis of the distal radioulnar joint and ulnocarpal joint had occurred in 15 and 30 patients, respectively, without a difference between the groups.

## Discussion

Our 37 percent rate of ulnar wrist pain in patients with Colles' fractures is similar to the reports of Lidström (1959) and Altissimi et al. (1986), but higher than other long-term studies (Cooney et al. 1980, Villar et al. 1987, McQueen and Caspers 1988), in which the incidences were reported to be 10-30 percent. This may reflect that the final anatomical result in our series was poorer.

Our study showed that ulnar-sided wrist pain was the most frequent complaint in patients with Colles' fracture. The most important factor for predicting ulnar wrist pain was final dorsal angulation. Dorsal angulation after Colles' fracture causes not only radio-carpal incongruity but, in particular, lack of congruity in the distal radioulnar joint. We believe this to be the main reason for ulnar wrist pain, because we found tenderness of the radioulnar joint in 28 of 40 patients with ulnar wrist pain. The fact that no relationship existed between the degree of pain and the degree of dorsal angulation may support the concept of Darrach (1927) that complete dislocation of the distal radioulnar joint causes fewer symptoms than if the joint surfaces partly remain in contact. We suggest from our findings that pain in the radioulnar joint is not always accompanied by inflammatory reactions, as indicated by the fact that only 4 patients had swelling and warmth of the wrist. Only Frykman (1967) previously

noted that ulnar wrist pain was related to residual dorsal angulation, although he emphasized fractures involving the radioulnar joint. In contrast, axial radial shortening which has been considered to be the most important displacement for functional outcome, was not related to ulnar wrist pain. This result indicates that even severe radial shortening does not always cause ulnocarpal impingement. We found no correlation between ulnar wrist pain and development of radiographic arthrosis of the radioulnar or ulnocarpal joint. This may be because our definition of radiographic arthrosis was too strict. Furthermore, it might be explained by the heterogeneous distribution in our patients' age or in the follow-up period. From our results, however, we agree with Mikkelsen and Lindblad (1990) that radiographic arthrosis is not always accompanied by a symptom. Median neuropathy and reflex sympathetic dystrophy were observed only in 3 and 2 patients, respectively, but were considered to be the important reasons for wrist pain in our series. Furthermore, as the tenderness of the ulnocarpal joint was present in 20 of 40 patients with ulnar wrist pain, other factors such as tearing of the triangular fibrocartilage complex and tenosynovitis of the extensor carpi ulnaris may also play an important role in causing pain.

In some reports the importance of open reduction and internal fixation of an avulsed ulnar styloid in patients with Colles' fractures has been emphasized (Buterbaugh and Palmer 1988, Palmer 1988). The base of the ulnar styloid is the main attachment for the triangular fibrocartilage complex, which acts as the stabilizer of the distal radioulnar joint. Colles' fracture is often associated with ulnar styloid fracture and rupture of this complex, leading to instability of the ulnar head. Lippman (1937) and Buterbaugh and Palmer (1988) attributed the pain to the instability of the ulnar head. In our series, 13 of 17 with ulnar head instability had nonunion of the ulnar styloid process. However, the presence of nonunion of the ulnar styloid or instability of the distal ulna did not influence the pain. Reeves (1966) and Burgess and Watson (1988) reported satisfactory results by excision of ulnar styloid fragments for relief of chronic ulnar pain. af Ekenstam et al. (1989) found, however, that repair of the ruptured triangular fibrocartilage or avulsed ulnar styloid did not affect the outcome of Colles' fracture. We believe that internal fixation of the avulsed ulnar styloid is not necessary, at least with respect to ulnar wrist pain.

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