Acute fractures of the scaphoid were randomly allocated for conservative treatment in a Colles'-type plaster cast with the wrist immobilised in either 20° flexion or 20° extension. The position of the wrist did not influence the rate of union of the fracture (89%) but when reviewed after six months the wrists which had been immobilised in flexion had a greater restriction of extension. We recommend that acute fractures of the scaphoid should be treated in a Colles'-type cast with the wrist in slight extension.

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Although it is usual to immobilise acute fractures of the scaphoid with the wrist in slight extension,^{1,2} some authors recommend immobilisation in slight flexion.^{3,4} Wrist flexion may produce better apposition of the fragments,^{5,6} but cadaver studies have suggested that it is better to immobilise the wrist in extension.⁷ The arguments for flexion are mainly theoretical and there are no published reports of its use in clinical practice. Our aim in this randomised, prospective study was to compare the treatment of acute fractures of the scaphoid by immobilisation in a cast with the wrist in either slight flexion or extension.

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Patients and Methods

All patients with fractures of the scaphoid who presented and were diagnosed within two weeks of injury were considered for the study. The initial series of radiographs of the scaphoid were independently reviewed by two of the authors (TRCD and NJB), and only fractures which were detected by both were entered into the study. We excluded fractures which were confirmed only by special investigations such as bone scanning and CT or were first detected on follow-up radiographs. None of the fractures which were excluded progressed to nonunion. Fractures of the proximal pole which may have a higher incidence of nonunion, were also excluded, as were those which were lost to follow-up before the assessment at six months.

Of the fractures which had complete follow-up, 151 were considered for inclusion in the study. Of the 30 fractures excluded, 11 involved the proximal pole and 19 were not detected by one or both assessors on the original radiographs. Thus 121 acute fractures of the waist and distal pole were studied (Table I). The mean age of the patients was 30 years (range 16 to 76); 95 (78%) of the fractures occurred in men. The two treatment groups were well matched for age, gender and side of injury. Some patients (29%) reported that their casts prevented them from writing normally or eating or washing without help, but this was not influenced by the position of immobilisation.

All the fractures were treated by immobilisation in a Colles'-type below-elbow plaster. This is as effective as the conventional 'scaphoid' plaster which immobilises the base of the thumb.⁸ The patients were randomly allocated according to hospital number for immobilisation in the Colles' plaster with the wrist either flexed or extended 20°; the position was standardised by using a wooden block angled at 20° during application of the cast. All casts were

Table I. The fractures in the two groups treated with a Colles'-type plaster cast with the wrist immobilised in either 20° flexion or 20° extension

	Fractures	
	Flexion	Extension
Waist	54	57
Distal pole	4	6
Total	58	63

checked at two and four weeks and reinforced or replaced when necessary. At eight weeks the casts were removed, the wrists were examined and radiographs were taken. If there was tenderness in the anatomical snuff-box or the fracture was clearly visible on the radiographs, the wrist was immobilised for a further four weeks, again in either 20° flexion or extension. After 12 weeks all casts were removed, irrespective of the clinical findings but no radiographs were obtained. All the patients were seen four weeks after removal of the cast and six months after injury, when a further series of radiographs of the scaphoid were obtained and pain in the wrist, mobility, grip strength and union were assessed.

Results

After six months, 108 of the 121 (89%) fractures had united. The incidence of nonunion was not influenced by the position of immobilisation (chi-squared test, $p = 0.46$). Five of the 58 fractures immobilised in flexion and eight of the 63 immobilised in extension failed to unite. Wrist extension was significantly less (Mann-Whitney U-test, $p < 0.01$) in those wrists which had been immobilised in flexion, and all 11 wrists which regained less than 45° of extension were from this group. Wrist flexion, grip strength (Table II) and levels of pain (Table III) were not influenced by the position of immobilisation.

Discussion

It is usual to immobilise fractures of the scaphoid with the wrist slightly extended, but some authors have advocated a flexed position. Our results suggest that the position in which the wrist is immobilised does not influence the rate of nonunion of fractures of the waist and distal pole. Wrists which were immobilised in 20° flexion, however, had less extension at the six-month follow-up. The reason for this difference is unknown and it is possible that extension would have improved with time, but by the six-month assessment all of the wrists had been out of plaster for three months, and most for four. Another possible explanation is that immobilisation in flexion may produce increased flexion of the fracture, thus causing mild malunion. Union of fractures of the scaphoid with severe flexion (humpback deformity) is known to restrict wrist extension and may cause persistent pain.^{9,10} Alternatively, the loss of wrist extension after immobilisation in flexion may have been due to associated soft-tissue injuries and joint adhesions or contracture of the palmar capsule at the wrist.

Our results support the opinion that immobilisation of the wrist, rather than the position of immobilisation, is important for union of the fractured scaphoid.¹¹ To regain

Table II. Objective outcome of the fractures treated by immobilisation in either 20° flexion or 20° extension at the six-month assessment

Outcome	Flexion	Extension
Union rate (%)	53/58 (91)	55/63 (87)
Wrist extension (degrees, SD)*†	61 (13)	73 (10)
Wrist flexion (degrees, SD)†	66 (12)	67 (12)
Grip strength (kg, SD)†	29 (15)	34 (15)

* significant difference between the two treatment groups

† only fractures which united included in this analysis

Table III. The pain intensity reported by the patients treated in either 20° flexion or 20° extension at the six-month assessment

Pain intensity	Number of patients (%)	
	Flexion	Extension
None	26 (68)	37 (80)
Mild	9 (24)	8 (17)
Moderate	2 (5)	1 (2)
Severe	1 (3)	0 (0)
Total number	38	46

Only fractures which united are included in this analysis. This information was not recorded in 24 of these 108 patients

full extension of the wrist, however, it appears that the conventional position of slight extension is best. We therefore recommend that these fractures are immobilised in a Colles' cast with the wrist in about 20° extension.

Mr M. Laurence, FRCS, who had been one author of a paper advocating flexion, kindly helped to set up the London arm of this study.

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