THE USE OF A MOULDED METACARPAL BRACE VERSUS NEIGHBOUR STRAPPING FOR FRACTURES OF THE LITTLE FINGER METACARPAL NECK

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Seventy-three patients with fractures of the neck of the little finger metacarpal were randomized to treatment with a moulded metacarpal brace or neighbour strapping. Sixty-five of these attended for follow-up at 3 weeks. Both treatment modalities permitted a functional range of movement, but patients treated with the metacarpal brace had significantly less pain than those treated with neighbour strapping, and this facilitated an early return to work.

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Fracture of the neck of the little finger metacarpal is one of the most common fractures in the hand and several authors have shown that the majority of these fractures can be treated non-operatively. It has been stated that up to 70° of palmar angulation can be accepted without the risk of significant disability (Hunter and Cowen, 1970; Ford et al., 1989). In recent years the use of a metacarpal brace has become popular (Konradsen et al., 1990; Viegas et al., 1987) and one randomized prospective study has demonstrated its benefit over a plaster of Paris cast or a simple elastic bandage (Hansen and Hansen, 1998). A further widely used method of treatment is neighbour strapping. We present the results of a prospective randomized single-blind study which compares the use of neighbour strapping with the metacarpal brace.

PATIENTS AND METHODS

Patients with minimally angulated ($<40°$), closed fractures of the little finger metacarpal neck with no rotational deformity or associated injury were included in the trial after assessment in the fracture clinic by an orthopaedic surgeon. Having obtained informed consent, patients were randomized by the hand therapist to treatment with a metacarpal brace (Fig 1a & b) or neighbour strapping, using the sealed envelope method. The brace was heat moulded to the contours of the patient's hand while the metacarpal head was supported and was then held in place by a bandage. In both groups identical advice was given on elevation, analgesic use and early active mobilization of the metacarpophalangeal and interphalangeal joints. All patients were also advised to return to these normal activities of daily living, including employment, as soon as possible.

Each patient was assessed at 3 weeks, after the brace or neighbour strapping had been removed so that the surgeon was unaware of the treatment method. Pain during the 3 weeks was assessed using a categorical verbal rating scale (0-none, 1-mild, 2-moderate, 3-severe). Tenderness at the fracture site was also recorded on a 0-3 scale, with "3" representing maximal tenderness. Both active and passive flexion and extension at the metacarpophalangeal joint were measured and the total range of finger movement (ROM) calculated. Each patient was asked to describe their overall satisfaction during the 3 weeks and whether they had returned to work following the injury.

Full ethical approval was obtained and statistical analysis was by the non-paired Student's *t*-test, the Mann–Whitney *U*-test and Fisher's exact test.

RESULTS

Seventy-three patients were included in the study but eight did not attend follow-up (five from the brace group and three from the strapping group), leaving 65 for analysis. Thirty-seven patients were treated with a brace and 28 with neighbour strapping. Table 1 shows the demographic data for both groups and Table 2 show the results of the study. Patients treated with a brace complained of less pain ($P = 0.01$) and had a slightly better ranger of finger movement ($P = 0.03$): furthermore, more of them had returned to work by 3 weeks ($P = 0.007$).

None of the patients developed rotational or significant angular deformity, although one patient from each group expressed concern at the lump at the fracture site. One patient complained that the brace rubbed on the ulnar border of his hand though this did not cause any significant damage. No patients complained of a short metacarpal compared to the other side.

DISCUSSION

The results of our study are comparable to those of previous studies which have evaluated the metacarpal brace (Hansen and Hansen, 1998; Konradsen et al., 1990), and showed a clear benefit over neighbour

strapping for three of the six outcome measures investigated. The age, sex and employment characteristics are similar to those described previously for this injury (Ford et al., 1989).

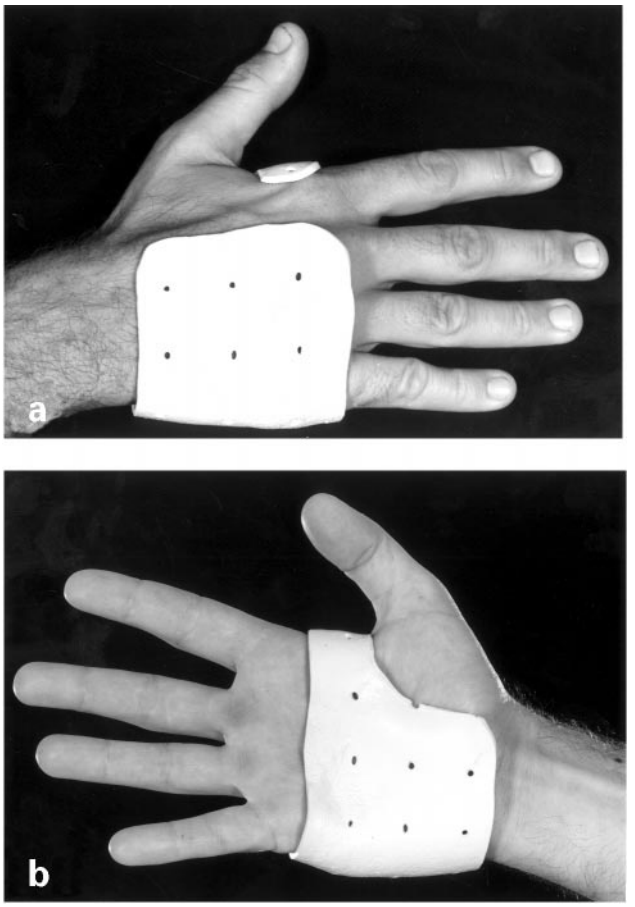

Fig 1 (a) Dorsal and (b) palmar views of the metacarpal brace.

The treatment of fractures of the neck of the little metacarpal has been the subject of much controversy. In recent years it has been shown that at least 40°, and maybe even 70°, of palmar angulation can be tolerated (Hunter and Cowen, 1970; Ford et al., 1989); in these cases operative treatment probably has no role. Most authors now favour nonoperative treatment although there is no general agreement as to what this treatment should entail. Plaster of Paris immobilization, functional bracing or no treatment at all have all been advocated (Ford et al., 1989). The selected treatment should reduce patient discomfort, allow an early return of movement and permit an early return to work: this is especially important as this fracture commonly occurs in manual workers and the self-employed. However, the treatment must prevent complications, such as significant angular displacement or fracture rotation.

In our study the brace group experienced significantly less pain and had a higher rate of return to work than the strapping group. We believe this is a real difference given the randomisation, the 'blind' assessment of the patients and the fact that identical advice was given to both groups. In addition, there was a significant difference in the active range of movement at the metacarpophalangeal joint, though the mean active range in both groups exceeded 61°, which is required at this joint for daily activities (Hume et al., 1990). The brace serves to protect the fracture site and allows movement at the metacarpophalangeal joint with minimal discomfort. In contrast neighbour strapping gives no direct protection, and results in increased discomfort and less confidence to undertake the tasks of daily living, including employment. None of the patients in our study, in which the brace was carefully moulded and bandaged to the patient's hand, experienced skin necrosis (Sørensen et al., 1993).

It has been suggested that little more than reassurance and an elastic bandage or strapping is required for these

Table 1—Patient demographics for the two groups in the study

	Mean age (range)	*Male: female*	*Clerical*	*Student*	*Manual (self-employed)*	*Unemployed*
Metacarpal brace	28 (12–57)	35:2	7	10	16 (9)	4
Neighbour strapping	25 (13–52)	27:1	3	9	13 (8)	3

Table 2—Results of treatment in the two groups

	Metacarpal brace	*Neighbour strapping*	P *value (test applied)*
Mean (range) active ROM of metacarpophalangeal joint	78° (40°–130°)	65° (20°–90°)	$P = 0.03$ (non-paired *t*-test)
Mean (range) passive ROM of metacarpophalangeal joint	107° (70°–150°)	97° (40°–130°)	NS (non-paired *t*-test)
Mean (range) pain score (0–3)	0.6 (0–2)	1.6 (0–3)	$P = 0.01$ (Mann–Whitney)
Mean (range) tenderness (0–3)	0.5 (0–1)	0.8 (0–2)	NS (Mann–Whitney)
Back to work by 3 weeks	34/37	8/28	$P = 0.007$ (Fisher's exact)
Overall satisfaction:			
dissatisfied	9	8	
satisfied	22	15	NS (Mann–Whitney)
fully satisfied	6	5	

fractures (Ford et al., 1989; Eichenholtz et al., 1961) as they rarely, if ever, cause problems in the long term. We agree with the latter in terms of early range of movement and long term outcome, but would emphasize the need for minimal pain, early restoration of a functional range of movement and an early return to daily activities. We suggest that the metacarpal brace facilitates these aims. It is easy to apply and a relatively inexpensive mode of treatment. Such is our confidence in this treatment that we now allow our patients to remove the metacarpal fracture brace themselves after 14 days, thus making further follow-up appointments unnecessary.

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