

# The conservative treatment of mallet finger with a simple splint: a case report

A. MAITRA & B. DORANI

Accident and Emergency Department, Royal Victoria Infirmary, Newcastle upon Tyne

## SUMMARY

Sixty patients with mallet finger deformity were randomly treated with either a Stack or a custom-made padded aluminium alloy malleable finger splint. Both splints were equally effective in correcting the deformity but the aluminium alloy splint was able to be fitted to a wider variety of finger shapes and sizes and caused significantly fewer skin complications.

## INTRODUCTION

Mallet finger refers to the deformity where there is loss of active extension of the distal interphalangeal joint (dipj) due to rupture of the digital extensor tendon near its insertion to the distal phalanx or fracture of the base of the distal phalanx following trauma. It is generally agreed that conservative treatment of mallet deformity with external splintage gives as good a result as possible, reserving operative treatment for cases where a conservative regime has failed or the condition is complicated by large fracture fragment or dipj subluxation (Abouna & Brown, 1968; Crawford, 1984; Stern & Kastrup, 1988). The Stack splint (Stack, 1969) has been used most commonly for external splintage and found to be effective and inexpensive with good patient acceptance (Warren *et al.*, 1988).

There are two main difficulties associated with the use of Stack splint which is made of moulded plastic – one is splint fitting and the other is skin maceration. In spite of the availability of different sizes of the splint, a perfect fit is not achieved in a number of patients especially those with long, short, thin or fat fingers, including children, which would result in imperfect immobilization and treatment failure. The problem of skin maceration arises because the plastic material and a circum-

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Correspondence: Asit Maitra, Consultant, Accident and Emergency Department, Royal Victoria Infirmary, Queen Victoria Road, Newcastle upon Tyne NE1 4LP.

ferential fit favour increased sweating inside the splint complicated by added moisture from accidental water seepage during daily activities.

An antero-posterior splintage with felt padding, fashioned from the readily available finger splint, has been used to overcome these problems.

This study compares the effectiveness of this simple splint with that of the standard Stack splint in the management of mallet finger.

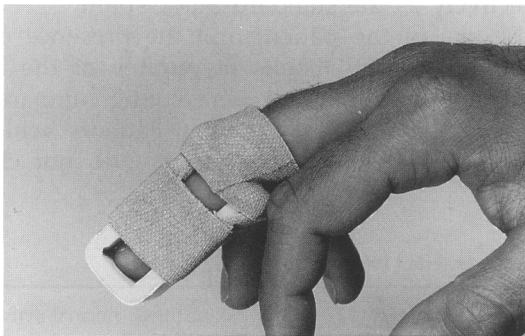
## MATERIALS AND METHODS

*Materials.* Padded aluminium alloy malleable finger splints ( $3/4$  &  $1/2$  inch wide) were cut and fashioned for individual patients. (Described hereafter as Trial splint.) The splint was fixed to the finger with strapping with dipj fully extended leaving proximal interphalangeal joint (pipj) free (Figs 1 & 2). Standard Stack splint of available sizes.

*Patients.* Sixty patients with mallet deformity were allocated randomly to either Trial or Stack splint. All patients were seen within 3 days of injury. Patients suffering



**Fig. 1.** Custom-made Trial splint from malleable finger splint.



**Fig. 2.** Trial splint fixed to the finger.

open injuries and large fracture fragment were excluded from the study. The angle of deformity was measured by a small hand goniometer. The period of immobilization was 6 weeks and then 3 weeks of nightly splintage.

*Follow-up.* All patients were reviewed at 3, 6 and finally at 9 weeks. Time off work, opinion about the splint and complications were noted. The criteria of Abouna & Brown (1968) were used to measure outcome of treatment (Table 1).

## RESULTS

The mean age of the patient population was  $44.5 \pm 16.6$  years, male:female ratio 3:2 and dominant and non-dominant hands were more or less equally injured. The commonest cause of injury was axial loading, 83.3% were tendon ruptures and 16.7% small avulsion fractures. The incidence was slightly higher (43.3%) in young adults than older age group (38.3%). The results of treatment were deemed to be successful in 21 (35%), improved in 12 (20%) and failure in 27 (45%). Twenty-three out of 27 (85.2%) failures were over 41 years of age.

Table 2 compares the demographic and clinical data of patients treated with (a) Trial splint and (b) stack splint. Two groups were broadly similar although the Trial splint treated group were comparatively younger and had more fractures. Table 3 shows the outcome of treatment in both groups. There was no significant difference. A quarter of the patients were off work during the period of continuous splintage (6 weeks) in each group and a similar number complained of minor stiffness at dipj and pipj. The skin complications were more frequent in the Stack splint treated group (Table 4).

## DISCUSSION

The results of treatment of mallet deformity in this study were comparable to other trials (Abouna & Brown, 1968; Crawford, 1984; Stack, 1969; Stern & Kastrup, 1988; Warren *et al.*, 1988). This would confirm that the Trial splint had maintained immobilization as effectively as the standard Stack splint.

Two factors, i.e. the age of the patient and the presence of fracture may be considered to have influenced the results favourably of the Trial splint-treated group. The patients treated by Trial splint were young compared to those treated by Stack splint, and it is known that younger patients achieve better results. However, the age difference between the groups was not clinically significant.

**Table 1.** Abouna and Brown criteria (1968)

Success:	Extension loss: 0–5°	No stiffness; normal active flexion and extension
Improved:	Extension loss: 6–15°	No stiffness; normal flexion
Failure:	Extension loss: >15°	Stiffness or impaired flexion

**Table 2.** Demographic and clinical data of patients studied

Variables	Trial splint (n = 30)	Stack splint (n = 30)
<b>Age</b>		
Mean	40.1	48.9
SD	±18.3	±16.4
SEM	3.3	2.9
Range	9–70 years	12–73 years
<b>Sex</b>		
Male	19 (63.3%)	18 (60%)
Female	11 (36.6%)	12 (40%)
<b>Side</b>		
Right	19 (63.3%)	15 (50%)
Left	11 (36.6)	15 (50%)
<b>Location (Digit)</b>		
Index	4 (13.3%)	4 (13.3%)
Middle	8 (26.6%)	10 (33.3%)
Ring	9 (30%)	10 (33.3%)
Little	9 (30%)	6 (20%)
<b>Type of injury</b>		
Tendon rupture	24 (80%)	26 (86.6%)
Associated fracture	6 (20%)	4 (13.3%)
<b>Degree of initial deformity</b>		
	29° ±SD 9.5	28.6° ±SD 11.55

**Table 3.** Results in relation to splint type

	Trial splint (n = 30)	Stack splint (n = 30)
Success	11 (37%)	10 (33%)
Improved	6 (20%)	6 (20%)
Failure	13 (43%)	14 (47%)

because in general, patients over the age of 40 tend to do less well (Abouna & Brown, 1968). The slightly increased number of avulsed fractures treated by Trial splint were unlikely to have made much difference as the numbers were small (Table 2). The two patient groups were therefore broadly similar.

The increased incidence of skin complications due to plastic splint compared to Trial splint was a significant finding which had been recognized in other publications (Stern & Kastrop, 1988). Since it not only caused pain and discomfort

**Table 4.** Skin complications vs. splint type

Splint type	Number of fingers treated	Number of fingers with skin complications	Type of skin complication		
			Dorsal ulcer	skin maceration	Tape allergy
Trial splint	30	2 (6.6%)*	1 (3%)	1 (3%)	0
Stack splint	30	10 (33%)	3 (10%)	6 (20%)	1 (3%)

\*  $P < 0.01$ 

which could lead to non-compliance of strict splint routine, but the additional problem of treating the skin lesion adequately while trying to maintain dipj extension during this prolonged period. It has led to trials of other splints (Warren *et al.*, 1988), but it is recognized that the Stack splint continues to be effective in the majority of patients without significant complications. However, where there is difficulty in fitting a particular finger and skin problem anticipated, this easily made antero-posterior DIY splint can be used effectively with reduction of skin complication as a bonus. We recommend this splint as an alternative means of treating mallet finger.

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