

Base fractures of the fifth proximal phalanx can be treated conservatively with buddy taping and immediate mobilisation

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ABSTRACT

INTRODUCTION: Treatment of base fractures in the proximal phalanx depends on the fracture type, the degree of displacement and whether fracture reduction is stable or not. Internal fixation often leads to decreased mobility of the injured finger despite exact reduction of the fracture. Our treatment is focused upon function and to a lesser extent on exact reposition of the fractured fifth digit. Buddy taping was used after initial, closed reduction of the fracture allowing for immediate mobilisation.

MATERIAL AND METHODS: This was a prospective follow-up study of 53 consecutive conservatively managed base fractures in 53 patients with a mean age of 39 years. All fractures were treated with buddy taping to the fourth digit and immediate mobilisation.

RESULTS: The subjective outcome showed high overall satisfaction, and only four patients reported mild pain at rest or work. Malrotation was noted in three cases, none of which needed corrective surgery. All but one patient regained full flexion of the affected finger. Satisfactory extension was seen as only two patients had a lack of extension in both the metacarpo-phalangeal and the proximal interphalangeal joint. No nonunion or delayed unions occurred.

CONCLUSION: In the literature there is no consensus on the treatment of fractures in the base of the proximal phalanx in the fifth digit. We propose conservative management with buddy taping which enables immediate mobilisation of this particular fracture.

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Finger fractures are very common and account for more than 20% of all below-elbow fractures in Europe and the US annually [1-3]. Treatment of base fractures at the proximal phalanx of the fifth digit is a trade-off between fixation and mobilisation in order to restore the finger's maximal range of motion (ROM) [3-7]. Surgical fixation tends to cause substantial loss of motion [8] when percutaneous K-wire fixation or open reduction and internal fixation is performed [9, 10]. Our standard treatment strategy for base fractures of the proximal phalanx focuses on function and to a lesser extent on exact repos-

itioning of the fractured digit. We used buddy taping and immediate mobilisation, as we were convinced that this would lead to the best possible ROM and function of the fractured finger.

MATERIAL AND METHODS

This prospective quality control study was conducted at the Department of Hand Surgery, Gentofte Hospital, Copenhagen, Denmark. All patients, regardless of age, with an open or closed metaphyseal fracture in the base of the proximal phalanx of the little finger were included. Excluded were patients with a concurrent fracture of the diaphysis (transverse, oblique or spiral) or distal metaphysis and patients who had received internal fixation elsewhere before referral to our clinic.

Plain radiographs (postero-anterior (PA) and lateral views) were used to identify the fracture (**Figure 1**). Fracture reduction was performed under local anaesthetics. The fifth digit was fixed to the fourth (**Figure 2**) using 1/2" Buddy-Loops (3-Point Products) or 1/2" surgical tape (3M Micropore) and mobilisation of all finger joints was initiated immediately. Patients were examined in our outpatient clinic one and two weeks after the trauma. Radiographs were repeated only in the event that the clinical examination showed malalignment. Patients who were reluctant to mobilise their finger were referred to a hand therapist.

All patients were invited to a long-term follow-up visit a minimum of 12 months after the injury. Patients who declined this visit were invited to answer a questionnaire.

At follow-up, clinical examination was performed by an independent senior registrar. Range of motion, grip-strength and malrotation were evaluated and compared with the uninjured hand. Subjective outcome, functional disorders and working status were noted. Union and malunion in terms of coronal or sagittal angulation were assessed on standard PA and lateral radiographs taken at follow-up or at any earlier occasion after fracture healing.

Statistical methods

Metric-scaled data are reported as the arithmetic mean

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 **FIGURE 1**

Standard postero-anterior radiograph showing a base fracture of the fifth finger's proximal phalanx.



 **FIGURE 2**

Buddy taping of the fourth and fifth finger allowing for full flexion of both fingers.



or median (when normally distributed/non-normally distributed, respectively) and standard deviation or range.

Trial registration: no trial registration of this quality study was performed.

RESULTS

A total of 53 consecutive patients diagnosed with a base fracture of the proximal phalanx of the fifth digit and treated with buddy taping were included: 30 women and 23 men with a mean age of 39 years (three to 86). Nine had an epiphyseolysis, four an intrarticular fracture and 40 an extraarticular fracture. No concurrent flexor or extensor tendon injuries were recorded. Two patients

had an open fracture and soft tissue injury. There was no need to modify the treatment or to perform corrective surgery at a later date in any of the patients.

Nine patients declined further follow-up examination, three could not be traced and one had died. Thus, 40 patients (13 patients aged 3-15 years and 27 patients over the age of 16 years) were reviewed: 29 completed a follow-up visit and 11 answered a questionnaire. The mean follow-up time was 33 months (12-60 months).

In all, 35 patients declared that they were satisfied or very satisfied with the final result, two were neutral and three were unsatisfied. All 40 patients were without pain at rest and 34 when using the hand. Two patients reported significant pain in the finger. Two patients reported functional disorders from the affected hand at work, but neither reported job change because of fracture-related problems. One indicated finger swelling at use. Four complained of stiffness of the metacarpophalangeal (MP) or proximal interphalangeal (PIP) joint, most notably in the morning.

Range of motion in the MP, PIP and distal interphalangeal (DIP) joints is listed in **Table 1**. All but one patient regained full flexion to the palm of the affected finger. The mean extension lag was ten degrees in the PIP joint and 5.5 degrees in the MP joint. Only two patients had an extension lag in both the MP and PIP joint. Rotational malunion was seen in three cases, 5-10 degrees of supination in two patients and ten degrees of pronation in one. None of these caused any functional problems. Grip strength of the affected hand at follow-up was restored to normal compared with the non-injured hand (Table 1).

Conventional radiographs showed a median coronal angulation of one degree in ulnar direction (range: ten degrees radially to ten degrees ulnarly). Lateral radiographs showed a median dorsal angulation of eight degrees (range: from five degrees palmar to 40 degrees dorsally). All fractures healed, and no delayed union occurred.

The residual angulatory deformity was statistically smaller in patients below 15 years, which is in accordance with the higher potential for remodelling in this age group (a mean of 2.5 degrees versus 18.6 degrees in older patients; $p = 0.0001$). Still, the deformity in the older patients had no major functional significance. On the PA views, there was no statistically significant difference between young and older patients (mean values 1.4 versus 1.3, respectively; $p = 0.93$).

DISCUSSION

To our knowledge, the particular fracture we describe in this series has never been described as an independent entity in the literature, and there is therefore no evidence-based consensus on its treatment. It is typically

caused by an abduction and hyperextension injury to the little finger, resulting in a coronal ulnar and dorsal angulation at the fracture site in the base of the proximal phalanx. This deformity tends to be maintained by the intrinsic muscle insertion on the base of the proximal phalanx and the extension force of the central slip across the PIP joint and, even more so, the distal portion of the proximal phalanx. Unlike diaphyseal fractures, these do not tend to cause appreciable rotational deformity. In the PIP joint, there is a tendency towards extension deficit. The hypothesis underlying our treatment strategy is that buddy taping and active exercises would counteract the development of this deformity or at least maintain a functional range of motion, and that a minor extension deficit of the PIP joint would be compensated for by the hyperextension deformity at the fracture site. As a consequence, we focused on monitoring the treatment by clinical judgment rather than by radiographic control. Moreover, the dynamic treatment prevents finger swelling and tendon adhesions.

Our results show that the strategy we chose may lead to functionally satisfactory results in the vast majority of the cases. The treatment is cost-effective and well tolerated by patients, and specialised hand therapist training is rarely needed: Only three patients were referred to an occupational therapist for training. It must be emphasised that close clinical control of the patients' compliance to early mobilisation is of paramount importance.

The main weakness of the study is that we had no control group for comparison and that we were unable to compare with series dealing with operative treatment of this particular fracture. Nevertheless, internal fixation of phalangeal fractures in general has been reported to carry a rather high risk of complications, such as reduced mobility, infection and sympathetic dystrophy and to require reoperation to remove hardware or perform tenolysis [8, 10]. Another weakness is that a large group of patients (n = 24) refrained from the follow-up examination and we are unable to establish whether this is due to good or poor function of the fractured digit. However, 11 of these patients responded to a questionnaire the contents of which were similar to the questionnaire used at the follow-up visit. These 11 patients reported a higher overall satisfaction level than the 29 patients who completed the follow-up examination.

CONCLUSION

Base fractures of the proximal phalanx in the fifth digit can be treated conservatively with buddy taping and immediate mobilisation and emphasise that this treatment is not feasible for all fracture types of the little finger. Clinical examination should be performed after one and two weeks where the angulatory deformity of the in-

TABLE 1

Clinical outcome.

	Fractured 5th finger, mean (\pm SD)	% of opposite uninjured 5th finger	Hand of fractured finger, mean (\pm SD)	% of opposite hand
MP extension	5.5 (\pm 16.76) degrees	98	-	-
MP flexion	83.8 (\pm 11.15) degrees	97	-	-
PIP extension	-10 (\pm 15.18) degrees	90	-	-
PIP flexion	91.0 (\pm 5.07) degrees	101	-	-
DIP extension	-2.1 (\pm 7.62) degrees	98	-	-
DIP flexion	76.9 (\pm 10.3) degrees	100	-	-
PTP	0 (\pm 0.09) cm	100	-	-
Grip strength	-	-	31.1 (\pm 14,62) kg	108

DIP = distal interphalangeal joint; MP = metacarpophalangeal joint; PIP = proximal interphalangeal joint; PTP = pulp to palm distance; SD = standard deviation.

jured finger should be assessed. Finger function and not the degree of fracture angulation should determine further treatment.

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