Irreducible Fracture Dislocation of a Finger Metacarpophalangeal Joint: A Case Report

Yoshitaka Hamada · Koichi Sairyo · Ichiro Tonogai ·
Tokio Kasai

Received: 20 May 2007 / Accepted: 20 June 2007 / Published online: 26 July 2007
© American Association for Hand Surgery 2007

Abstract A case of unusual displacement in a finger, with an avulsion fragment from the dorsal metacarpal head of the finger displaced in the palmar direction under the volar plate is described. An 18-year-old woman presented with complaint of difficulty flexing the metacarpophalangeal (MP) joint of the right little finger after a fall onto the outstretched hand. Three-dimensional computed tomography (CT) was useful for diagnosing this condition. Use of both palmar and dorsal approaches was needed to reduce the displacement and to fix the bones with a single screw. Bone union was achieved, and the patient has been asymptomatic for more than 10 months.

Keywords Avulsion fracture · Finger ·
Metacarpophalangeal joint

Introduction

Avulsion fractures near the metacarpophalangeal (MP) joints can occur when either the proximal phalangeal base or the metacarpal head is strongly pulled by the collateral ligament. There have been numerous reports in the literature on the treatment of avulsion fractures at the base of the proximal phalanges [5, 7]. The palmar approach has

been reported to be useful for treating this type of fracture. On the other hand, avulsion fractures from the metacarpal heads are not necessarily rare but are rarely reported, and a dorsal approach has been used for surgical treatment of it [1, 4, 6, 8]. Irreducible fracture dislocation in a condition of that avulsion fracture from the metacarpal head, in which a bone fragment from the dorsal metacarpal head has been displaced to the volar side and blocked flexion of the MP joint, is likely rare. We report in this paper, a case of this rarely reported type of displacement. The patient gave consent in writing for submission of her findings for publication.

Case Report

An 18-year-old woman failed a landing after a running high jump in a track and field competition, and injured her right little finger. Beginning right after the injury, she has been unable to flex her right little finger and visited our institution. On examination, there was tenderness on the radial side of her right little finger at the MP joint level. A bone fragment adjacent to the metacarpal head on the volar side and a deficit in the metacarpal head on the dorsal and radial side were found on plain radiography performed in four views (lateral, posteroanterior [PA], supination, pronation; PA and lateral views were shown in Fig. 1). However, the precise relationships among the avulsed fragment, deficit in the metacarpal head, and flexion disturbance could not be clearly determined on the radiographs. Three-dimensional (3D) computed tomography (CT) of the right little finger on the radial side of the MP joint clearly revealed that an avulsion fragment caused by the displacement of the collateral ligament to the palmar side and blocked flexion of the MP joint (Fig. 2). The patient underwent surgery to release the locking, with

Y. Hamada (✉) · K. Sairyo · I. Tonogai · T. Kasai
Department of Orthopedics, School of Medicine,
The University of Tokushima,
3-18-15, Kuramoto, Tokushima,
Tokushima, Japan 770-8503
e-mail: hamada-yoshitaka@umin.ac.jp

Y. Hamada · T. Kasai
L'Institut de la Main,
Paris, France

Figure 1 Radiographs showing a small bone fragment (arrows) adjacent to the metacarpal head on the radial and volar side. A defect of the metacarpal head (arrowheads) on the dorsal and radial side was also recognized. Plain radiographs from two views (a: PA; b: lateral).

open reduction and internal fixation. With the patient under axillary anesthesia, blocking of flexion and ulnar instability of the MP joint were confirmed manually. As a first step, the site was explored through a dorsal incision under a loupe magnification. Although the deficit in the metacarpal head was observed, the bone fragment on the volar side could not

Figure 2 3D CT images clearly show an avulsion fragment (arrows) caused by the collateral ligament that has been displaced to the palmar side and has blocked flexion of the MP joint. A deficit in the metacarpal head (arrowheads) on the dorsal and radial side is also recognized.

Figure 3 Intra-operative findings. With the patient under axillary anesthesia, ulnar instability of the MP joint was confirmed manually. The bone fragment (white arrow in a) captured by the volar approach was transferred to the dorsal incision by pull-out thread and fixed using a single miniscrew (white dotted arrow in b) at the dorsal site.

be found. A volar approach was then added (Fig. 3-a). The bone fragment captured with the volar approach (white arrow in Fig. 3-a) was transferred to the dorsal incision by pull-out thread and fixed using a single miniscrew (white dotted arrow in Fig. 3-b). After the operation, splinting to keep the MP joint in flexion was performed for 3 weeks after surgery. Bone union was confirmed at 10 weeks after surgery (Fig. 4). The range of movement of the MP joint of her right little finger reached 100 degrees (extension 10 degrees/flexion 90 degrees) and grip strength testing (20 kg on both sides) at 4 months after surgery recovered closed to the nonaffected side (Fig. 5).

Figure 4 Radiographs showing bone union 10 weeks after surgery.

Figure 5 Range of movement of MP joint of her right little finger reached 100 degrees (extension 10 degrees/flexion 90 degrees) at the final follow-up.

Discussion

In previous reports, surgical treatment using a dorsal approach was recommended for avulsion fracture from the metacarpal head and fracture dislocation of an MP joint [1, 4, 6, 8]. In the literature, conservative treatment is recommended if the fragment is round as the articular surface of the joint is not involved in this type of fracture [6]. Although the displaced fragment was round in our case, the widely displaced fragment prevented flexion of the MP joint. Therefore, surgical intervention was necessary. The avulsed fragment exhibited displacement blocking the movement of MP joint is rarely reported.

This patient has a very flexible body, with a very high joint laxity score measured according to the method of

Carter and Wilkinson [2]. The pathomechanism of this displacement that occurred appeared to have been caused by accelerated hyper-abduction of her MP joint caused by her joint laxity, similar to dislocation of the MP joint [3, 9]. In this case, 3D CT was a useful for diagnosis, and surgical intervention was necessary. In surgical treatment for this type of displacement, a palmar approach is needed as well as a dorsal approach.

References

1. Bischoff R, Buechler U, De Roche R, Jupiter J. Clinical results of tension band fixation of avulsion fractures of the hand. *J Hand Surg* 1994;19A:1019–26.
2. Carter C, Wilkinson J. Persistent joint laxity and congenital dislocation of the hip. *J Bone Jt Surg* 1964;46B:40–5.
3. Fultz CW, Buchanan JR. Complex fracture-dislocation of the metacarpophalangeal joint. Case report. *Clin Orthop Relat Res* 1988;227:255–60.
4. Gee TC, Pho RW. Avulsion-fracture at the proximal attachment of the radial collateral ligament of the fifth metacarpophalangeal joint—a case report. *J Hand Surg* 1982;7A:526–7.
5. Kuhn KM, Dao KD, Shin AY. Volar A1 pulley approach for fixation of avulsion fractures of the base of the proximal phalanx. *J Hand Surg* 2001;26A:762–71.
6. Sakuma M, Nakamura R, Inoue G, Horii E. Avulsion fracture of the metacarpophalangeal joint of the finger. *J Hand Surg* 1997;22B:667–71.
7. Sawant N, Kulikov Y, Giddins GE. Outcome following conservative treatment of metacarpophalangeal collateral ligament avulsion fractures of the finger. *J Hand Surg* 2007;32B:102–4.
8. Shewring DJ, Thomas RH. Collateral ligament avulsion fractures from the heads of the metacarpals of the fingers. *J Hand Surg* 2006;31B:537–41.
9. Viegas SF, Heare TC, Calhoun JH. Complex fracture-dislocation of a fifth metacarpophalangeal joint: case report and literature review. *J Trauma* 1989;29:521–4.