Malunited Fractures in the Hand

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Continuing Medical Education

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Ghazi M. Rayan, MD, has no relevant conflicts of interest to disclose.

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Learning Objectives

- List the classifications of the malunion of hand fractures.
- Describe the clinical presentations for malunited metacarpal fractures.
- Review the clinical presentations for malunited phalangeal fractures.
- Offer treatment strategies for malunited metacarpal and phalangeal fractures.
- Discuss the different surgical techniques for malunited metacarpal and phalangeal fractures.

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Posttraumatic deformity of a tubular bone in the hand after malunion can impact function due to alteration in mobility, strength, or associated pain. Surgical intervention is often indicated, with the surgical options based on both the type and location of the deformity, as well as any associated articular, tendon, or soft tissue constraints. This article provides a management approach based on the deformity classification, location, and any associated conditions. *(J Hand Surg Am. 2014;39(2):378–384. Copyright © 2014 by the American Society for Surgery of the Hand. All rights reserved.)*

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Deformity following a fracture of a tubular bone in the hand can result in substantial disability for a number of associated reasons. These may include distortion of the normal arc of digital motion, interference with adjacent digital mobility (Fig. 1), tendon imbalance or adhesions, articular stiffness, loss of strength or dexterity, esthetic concerns, and/or pain.[1]

One can appreciate the impact of skeletal deformity by understanding the unique structural relationships of the tubular bones. Following the universal mathematical relationship recognized as the Fibonacci series, the fingers move in a curve that does not change its shape as it grows, with the proximal interphalangeal joint in its center.[2]

CLASSIFICATION

A malunited phalanx or metacarpal may be classified by the following criteria: the bone involved; location of the deformity (ie, intra-articular or extra-articular (Fig. 2); the type of deformity (angulation, rotation, shortening, or a combination) (Fig. 3); pediatric or adult patient; and whether the deformity is an isolated skeletal lesion or is associated with soft tissue complications.[1,3–5]

CLINICAL CONDITIONS

Metacarpal neck deformity

In general, deformity following metacarpal fracture may have less functional impact than those involving the phalanges. Although angular flexion deformities of the neck of the fourth or fifth metacarpals rarely present with a functional deficit due to the mobility of their carpometacarpal joints,[6] this is not the case with an angular flexion deformity greater than 10° in the sagittal plane in the second or third metacarpal necks. The patient may experience a prominence of the metacarpal head in the palm when grasping objects, as well as limitation of full metacarpophalangeal motion.[7]

Diaphyseal metacarpal deformity

As a result of the combination of strong interconnections between the metacarpals at both the proximal and distal levels and the normal rotational mobility of the metacarpophalangeal joints, rotational deformities at the diaphyseal level become functionally problematic only when exceeding 10° as the involved digit may interfere with motion of adjacent digits.[8–12]

Apex dorsal angular deformities of the metacarpal diaphysis of more than 20° in the sagittal plane often require surgical correction due to loss of strength, intrinsic tightness, and a cosmetic problem for the patient.[12–15]

FIGURE 1: A rotational malunion with functional impairment due to scissoring when flexion is performed.

Phalangeal deformity

Phalangeal deformity primarily involving both proximal and middle phalanges can comprise rotation; lateral, volar, or apex dorsal angulation; shortening; and often a combination of these.

Apex volar angulation of 10° or more involving the proximal phalangeal diaphysis will affect the balance of the extensor mechanism, potentially producing a pseudoclaw deformity. Lateral angular deformities are associated with more complex injuries involving bone loss.

Although angular deformities will require correction at the site of deformity, in selected rotational phalangeal deformities, correction can be achieved at the metacarpal level.

Intra-articular deformity

A malunited intra-articular fracture may present with painful or limited motion, deformity, or likely a combination of deficits. Published experience has