SCIENTIFIC ARTICLE

Ring and Little Finger Metacarpal Fractures: Mechanisms, Locations, and Radiographic Parameters

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Purpose To describe a series of ring and little finger metacarpal fractures with regard to mechanism, location, midshaft diameter, and isthmus diameter, to better define injury patterns and assist the surgeon in selection of appropriately sized implants.

Methods We reviewed all metacarpal fractures in skeletally mature patients who presented to a single surgeon over a 2-year period. Fractures of the ring and little finger metacarpals were analyzed with regard to mechanism and fracture location. Metacarpal midshaft and minimum isthmus diameters were measured on posteroanterior radiographs.

Results A total of 101 fractures involved the ring and little finger metacarpals. Punching-type injuries accounted for most fractures in the little finger metacarpal (49 of 67) and ring finger metacarpal (26 of 34). Among these punching-related ring and little finger metacarpal fractures, the most common fracture location was the little finger metacarpal neck (34 of 75), followed by the ring finger metacarpal shaft (21 of 75). Among men in this series, the metacarpal midshaft and minimum isthmus diameters were significantly narrower in the ring finger metacarpal than in the little finger (7.4 vs 8.7 mm, $p < .001$; and 2.2 vs 3.8 mm, $p < .001$).

Conclusions Whereas punching injuries tended to cause neck fractures in little finger metacarpals in this series, they caused shaft fractures in ring finger metacarpals, which may thus be considered a variant boxer's fracture. Furthermore, in men with fractures, the ring finger metacarpal is significantly narrower than the little finger, both in midshaft diameter and isthmus diameter, which surgeons should consider when planning internal fixation. *(J Hand Surg 2010;35A:1256–1259. © 2010 Published by Elsevier Inc. on behalf of the American Society for Surgery of the Hand.)*

Type of study/level of evidence Prognostic IV.

Key words Diameter, fracture, metacarpal, neck, shaft.

Metacarpal fractures are common and account for 18% of all fractures of the hand and forearm.[1] Up to 85% occur in men, and most involve the ring and little finger metacarpals.[2] Fracture of the little finger metacarpal neck is most frequent and results from a punching mechanism, and is thus known as boxer's fracture, although skilled professional boxers rarely experience this injury.[3] Fractures of the ring finger metacarpal have been less well characterized. Furthermore, a small study of 6 Asian male cadavers by Pereira et al.[4] found that the ring finger metacarpal was the narrowest of the metacarpals and suggested that commonly used plates may be too large for use in some populations. Intramedullary implants were not addressed.

This study aimed to describe a series of ring and little finger metacarpal fractures with regard to mechanism, location, midshaft diameter, and isthmus diameter, to

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FIGURE 1: Measurement of the midshaft diameter (red lines).

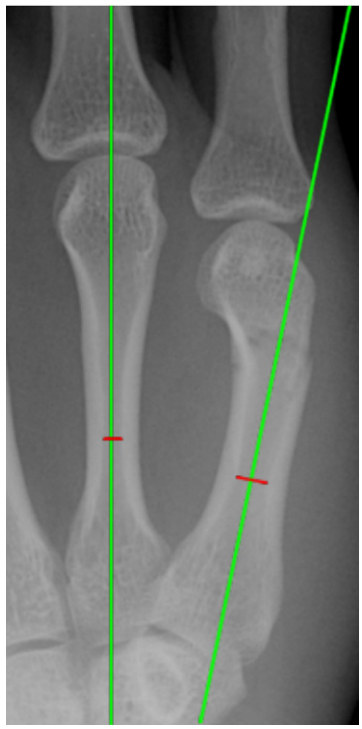

FIGURE 2: Measurement of the minimum isthmus diameter (red lines).

better define injury patterns and assist the surgeon in selection of appropriately sized implants.

MATERIALS AND METHODS

We reviewed records of all fractures treated by a single surgeon over a 2-year period. Cases were drawn from an urban level 1 trauma center (first year) and a suburban level 2 facility (subsequent year). We identified 132 metacarpal fractures in 108 skeletally mature patients. Of these, 101 fractures in 89 patients involved the ring and little finger metacarpals. The average patient age was 41 years (range, 16–98 years). There were 71 men. The ethnic composition included 63 white, 20 Hispanic, 5 African-American, and 1 Asian patient. There were no prior fractures apparent in any of the radiographs.

Fractures of the ring and little finger metacarpals were further analyzed with regard to mechanism and fracture location (base, shaft, neck, or head). The midshaft diameter of each metacarpal was then measured on posteroanterior (PA) digital radiographs, perpendicular to the long axis of the bone, using the standard digital measuring tool within the Picture Archiving and Communication System application. The following steps defined the midshaft: (1) the long axis of the bone was drawn; (2) lines were drawn through the most proximal and distal aspects of the bone, intersecting the long axis perpendicularly; and (3) the midpoint of the long axis between the 2 intersection points defined the midshaft (Fig. 1). The minimum isthmus diameter was also measured on PA digital radiographs and was defined as the narrowest distance between the inner cortices along the diaphysis of the bone, perpendicular to the long axis (Fig. 2). We compared mean diameters using *t*-test. Statistical calculations were performed with GraphPad InStat software (San Diego, CA). We obtained institutional review board approval for this study.

RESULTS

Table 1 lists mechanisms for all 101 ring and little finger metacarpal fractures. Punching-type injuries accounted for most fractures in both the ring finger metacarpal (26 of 34) and little finger metacarpal (49 of 67). Among the 75 ring and little finger metacarpal fractures resulting from punching-type injuries, the most common fracture location was the little finger metacarpal neck (34), followed by the ring finger metacarpal shaft (21), as listed in Table 2.

The midshaft diameter was significantly narrower in the ring finger metacarpal than in the little finger (average, 7.4 vs 8.7 mm; $p < .001$) among men. A similar trend was seen in women (6.5 vs 7.0 mm, $p = .28$). In both the ring and little finger metacarpals, women had significantly narrower midshaft diameters (ring finger: 6.5 vs 7.4 mm, $p < .01$; little finger: 7.0 vs 8.7 mm, $p < .001$).