SCIENTIFIC ARTICLE

Interobserver Variability in the Treatment of Little Finger Metacarpal Neck Fractures

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Purpose To address the null hypothesis that surgeons shown radiographs of little finger metacarpal neck fractures with measured fracture angulation would recommend surgery as often as surgeons shown unmarked radiographs.

Methods Members of the Science of Variation Group, an international collaboration of fully trained orthopedic and trauma surgeons, were asked to review 20 little finger metacarpal neck fracture cases, which included a vignette and 3 high-quality radiographs. Members were then randomized to review radiographs with or without measured fracture angulation on the lateral view and select operative or nonoperative management.

Results Surgeons shown radiographs with measured angulation were more likely to recommend surgery, and there was less variability among these surgeons, particularly for fractures with less angular deformity.

Conclusions Measured fracture angulation has a small but significant influence on treatment recommendations for little finger metacarpal neck fractures. *(J Hand Surg Am. 2014;39(9):1722–1727. Copyright © 2014 by the American Society for Surgery of the Hand. All rights reserved.)*

Type of study/level of evidence Diagnostic III.

Key words Boxer fracture, interobserver agreement, metacarpal, little finger, variability.

Recommendations for the treatment of fractures of the little finger metacarpal neck vary substantially between surgeons.[1] A wide range of treatment recommendations with respect to patient historical information, clinical examination findings, biomechanical data, and radiographic parameters influence surgeons.[2–9] We were interested in studying factors that influence the decision to recommend surgery and sources of variation.

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Using a web-based collaborative of practicing orthopedic surgeons, we tested the null hypothesis that surgeons shown radiographs with measured fracture angulation would recommend surgery as often as surgeons shown unmarked radiographs. In secondary analyses, we analyzed whether (1) measurements improved the agreement between surgeon over radiographs alone, (2) the amount of angulation influenced the recommendation for surgery or the interobserver agreement of recommendation for operative treatment, (3) patient factors influenced the recommendation for surgery or the interobserver agreement of recommendation for operative treatment, and (4) surgeon factors influenced recommendation for surgery or interobserver agreement for operative treatment.

PATIENTS AND METHODS

We invited members of the Science of Variation Group, an international collaboration of fully trained orthopedic and trauma surgeons, to participate in an

online survey related to the treatment of little finger metacarpal neck fractures. The observers were only incentivized by their inclusion in the group authorship of the present manuscript. Full institutional review board approval was obtained prior to beginning the study.

We sent 673 invitations to members of the Science of Variation Group. A total of 250 surgeons participated in the study, most of whom were hand surgeons practicing in academic centers in the United States and Europe. The participants provided their age, sex, specialty, and number of years in practice (Table 1).

In an online survey, observers were shown posteroanterior, oblique, and lateral radiographs of 20 fractures of the little finger metacarpal neck in patients 18 to 80 years old. The fractures were selected to represent a spectrum of patient age and fracture severity. At the time of invitation, a computer-generated schedule randomly sorted the observers into 2 groups, 1 to review all 20 cases with a marked measurement of sagittal angulation on the lateral radiograph and the other to review all 20 cases with a set of radiographs without marked measurements. Posteroanterior or oblique views were not marked in either group. A short description of the patient's age, hand dominance, sex, occupation, and mechanism of injury accompanied each set of radiographs; the clinical vignette for each patient's radiograph was identical for both the marked and the unmarked sets. The observers were then asked to review each case and select nonoperative or operative reduction and fixation treatment.

At the completion of the study, we performed a secondary analysis for the influence of radiographic, patient, and surgeon factors on the recommendation for surgery and the interobserver agreement for operative treatment. Angulation on the lateral radiograph was categorized by 10° intervals measured on the marked set of radiographs: 10° to 20°, 21° to 30°, 31° to 40°, 41° to 50°, 51° to 60°, and 61° to 70°. Age was classified as younger than 65 years or 65 years and older. Occupation was classified as student, laborer, professional, or retired.

Statistical analysis

Interobserver agreement was determined with use of the multirater kappa measure described by Siegel and Castellan.[10] The generated kappa values were interpreted according to the guidelines of Landis and Koch.[11] A value of 0.01 to 0.20 indicates slight agreement; 0.21 to 0.40, fair agreement; 0.41 to 0.60, moderate agreement; 0.61 to 0.80, substantial agreement; and 0.81 to 0.99, almost perfect agreement. Zero indicates no agreement beyond that expected because of chance alone; −1.00, total disagreement; and +1.00, perfect agreement.[11] We used a 2-sample independent Z-test to compare differences in kappa and a Pearson chi-square test adjusted for multiple testing by Bonferroni correction to assess differences in proportions of operative recommendations.

RESULTS

On average, surgeons shown radiographs with measured fracture angulation recommended surgery slightly but significantly more often than surgeons shown unmarked radiographs (42% vs 39%; $P = .03$). The group shown radiographs with measured angulation were slightly but significantly more likely to agree on the treatment. Overall, the interobserver agreement was fair (Table 2).

With increasing fracture angulation, recommendations for surgery increased but the agreement between observers decreased (Table 3). Significantly less agreement was observed when fracture angulation was 51° to 60° and 61° to 70° when compared with all other intervals. Fracture angulation of 31° to 40° and 41° to 50° had significantly less agreement than angulation of 21° to 30°, but they were not significantly different than each other.

Recommendation of operative treatment was significantly higher for patients younger than 65 years of age, dominant hand, and certain occupations (Table 4). Interobserver agreement on operative treatment was significantly lower for dominant hand ($P = .005$), varied by occupation, but was not affected by age.

Recommendation for operative treatment was significantly different among surgeon specialties (Table 5). Orthopedic trauma surgeons and miscellaneous surgeons recommended surgery most often, and shoulder and elbow surgeons recommended surgery least often. Interobserver agreement also varied by subspecialty. Hand surgeons scored the highest agreement. Although surgeons from the United States and Europe had similar recommendations for treatment, overall, U.S. surgeons recommended surgery less frequently.

DISCUSSION

Fractures of the little finger metacarpal neck are common, yet treatment varies substantially between surgeons. Several mechanical studies on cadavers