SCIENTIFIC ARTICLE

Reoperation After Combined Injury of the Index Finger: Repair Versus Immediate Amputation

Suzanne C. Wilkens, MD,* Femke M. A. P. Claessen, MD,* Paul T. Ogink, MD,* Ali Moradi, MD,* David Ring, MD, PhD*

Purpose To identify factors associated with unplanned reoperation of severely injured index fingers and to address the number of amputations after initial repair.

Methods In this retrospective study, we included all patients older than 18 years of age who had repair or immediate amputation for combined index finger injury at 2 level I trauma centers and 1 community hospital tied to a level I trauma center between January 2004 and February 2014. Twelve patients were excluded because of inadequate follow-up. Bivariate and multivariable analyses sought factors associated with unplanned reoperation after repair and immediate amputation.

Results Among 114 patients with combined injury, 75 were treated with repair and 39 with immediate amputation. A total of 41 patients had an unplanned reoperation, 33 after repair (44%) and 8 after immediate amputation (21%). In multivariable analysis, patients who had a reoperation for fingers other than the index finger were at risk for unplanned reoperation after repair. Women were more likely to have an unplanned reoperation than men, and patients who had a ray amputation were at risk for unplanned reoperation after immediate amputation. Six patients (18%) had amputation after initial repair.

Conclusions Surgeons may counsel patients that they are twice as likely to have an unplanned reoperation after a repair for combined injury of the index finger compared with an immediate amputation. Unplanned reoperations were more common among patients with injuries involving multiple fingers. Effective shared decision making is particularly important in this setting given that 1 in 5 repaired index fingers were eventually amputated. *(J Hand Surg Am. 2016;41(3):436–440. Copyright © 2016 by the American Society for Surgery of the Hand. All rights reserved.)*

Type of study/level of evidence Therapeutic IV.

Key words Amputation, combined injury, index finger, reoperation, repair.

Additional material is available online.

*From the *Department of Orthopaedic Surgery, Hand and Upper Extremity Service, Massachusetts General Hospital, Boston, MA.*

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Corresponding author: David Ring, MD, PhD, Department of Hand Surgery, Massachusetts General Hospital, Department of Orthopaedic Surgery, Harvard Medical School, Yawkey Center, Suite 2100, 55 Fruit St., Boston, MA 02114; e-mail: dring@mgh.harvard.edu.

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IN THE UNINJURED HAND, THE INDEX finger may be the second most important digit after the thumb because of its strength, ability to abduct, relative independence compared with the other digits, and its proximity to the thumb.[1,2] White published an article entitled "Why I Hate the Index Finger," noting that if the index finger is stiff and insensate, patients will quickly adapt and use their middle finger and the index finger will just be in the way.[3,4] As a consequence, many hand surgeons hold the opinion that a combined injury of the index finger (an open fracture

TABLE 1. Reasons for Unplanned Reoperation for Combined Injury of the Index Finger (Repair, n = 33; Immediate Amputation, n = 8)

Reason for Reoperation*	Repair, n (%)	Immediate Amputation, n (%)
Nonunion	9 (27)	0
Infection	4 (12)	1 (13)
Stiffness	10 (30)	1 (13)
Dysvascular	6 (18)	0
Wound	0 (0)	3 (38)
Other	4 (12)†	3 (38)‡

*Reasons for reoperation after ray amputation: 2 for problems with a skin graft, 1 for web space contracture, and 1 for pain thought to be from neuroma.
†Two unstable joints, and 2 extensor tendon issues.
‡One neuroma, 1 bone exposure, and 1 revision amputation because of unsatisfied outcome.

combined with a nerve, tendon, or arterial injury) might be better treated by immediate amputation than an attempt at reconstruction.[1,2,5,6] Conversely, repair of the index finger might be worthwhile for aesthetic reasons or for tasks like typing.[3]

We were interested in the incidence of unplanned reoperation after repair and immediate amputation for combined injury of the index finger. We studied the primary null hypothesis that there was no difference in unplanned reoperation incidence between repair and immediate amputation for combined injury of the index finger. We also sought factors associated with unplanned reoperation after initial repair, initial amputation, or either treatment.

MATERIALS AND METHODS

This retrospective study was approved by our institutional review board. We identified 126 adult patients that had repair or immediate amputation for combined index finger injury by reviewing patients identified by searching a multiinstitutional Research Patient Data Registry database covering all relevant orthopedic encounters at 3 area hospitals: 2 level I trauma centers and 1 community hospital tied to a level I trauma center between January 2004 and February 2014. We used *International Classification of Diseases*, ninth edition, codes 816.1, 816.11, 816.12, 816.13, 817, 883.0, 883.1, 883.2, 886.0, 886.1, and 903.5.

Twelve patients were last evaluated less than a month after surgery, which left a total of 114 adult patients with combined injury of the index finger for analysis: 75 treated with repair and 39 with immediate amputation.

Our primary outcome variable was unplanned reoperation. We also addressed amputation after initial repair of a combined injury. The final evaluation in the record occurred an average of 9 months after surgery (range, 1−62 months). The timing of unplanned reoperation was an average of 4 months (range, 2 days−20 months) after repair and an average of 5 months (range, 2 days−15 months) after immediate amputation. Thirty-three patients underwent unplanned reoperation after repair for combined injury and 8 patients after immediate amputation for combined injury. There was a total of 41 unplanned reoperations after all combined injuries (Table 1). Six patients (18%) had amputation—5 had a ray amputation and 1 had an amputation at the proximal interphalangeal joint level after initial repair of combined injury of the index finger, because of a dysvascular finger (n = 3), stiffness and pain causing poor hand function (n = 2), or infection (n = 1).

We studied the following explanatory variables identified by text search and record review: age at surgery, duration of surgery, surgeon experience in years (since graduation from residency), gender, smoking, diagnosed diabetes, workers' compensation status, hospital, nerve injury, arterial injury, fracture, tendon injury (flexor digitorum superficialis, flexor digitorum profundus, extensor digitorum indicis, extensor digitorum communis), level of amputation (distal interphalangeal joint, middle phalanx, proximal interphalangeal joint, proximal phalanx, metacarpophalangeal [MCP] joint, ray amputation), injury of other fingers on the affected hand, affected side, mechanism of injury, hand surgeon specialization, surgeon (plastic or orthopedic), and reoperation of fingers other than the index finger.

Statistical analysis

Bivariate analysis was performed using a 2-sided Fisher Exact test for dichotomous and categorical variables and an unpaired Student *t* test for continuous variables. Variables were presented with frequencies and percentages for categorical variables and as mean with SD for continuous variables.

Factors with a *P* value less than .05 in bivariate analysis (rather than < .10 because it would result in overfitting) were entered into a multivariable logistic regression analysis to assess if factors were independently associated with unplanned reoperation after repair, after immediate amputation, and after all combined injuries. A 2-sided *P* value of less than .05 was considered statistically significant.

RESULTS

The unplanned reoperation rate was significantly higher after repair than after immediate amputation (44% vs