

Preliminary Results: Factors Associated With Phalangeal Fractures

Ritsaart F. Westenberg, MD; Kamil Oflazoglu, MD; D. Arnold, BSc; Sezai Özkan, MD; Neal C. Chen, MD; Kyle R. Eberlin, MD
 Massachusetts General Hospital, Harvard Medical School, Boston, MA Hand and Upper Extremity Service, Department of Orthopaedic Surgery, Harvard Medical School and Massachusetts General Hospital, Boston, MA

1. Introduction

- There is variation of the reported incidence of nonunion in phalangeal fractures after surgical and non-surgical treatment. The factors related to non-union after finger fractures are unknown.
- This study tested the primary null hypothesis that there are no factors associated with nonunion of phalangeal fractures and no difference between proximal, mid and distal phalangeal fractures.

2. Methods

- 1888 patients with phalangeal finger fractures assessed between January 2010 and January 2015
- Fractures were assessed for location (finger, phalanx and anatomic location of the phalanx) and presence of nonunion
- Nonunion defined as lack of callus formation or bony bridging after 4 months, fractures which had additional treatment after 4 months because of nonunion, and failed digital arthrodesis. Patients with less than 4 months follow-up were excluded
- Nonunions were assessed for patient characteristics (age, sex, smoking, BMI, diabetes, osteoporosis), fracture location, joint-involvement, hand dominance, mechanism of injury, time to treatment, length of follow-up, comminution, open fracture, bone loss, and infection
- Nonunion cases were matched with united fractures based on their fracture location to assess associations between our explanatory variables and nonunion



Table 1. Patient characteristics

Variable	(n=15)
Age, mean (SD), years	47 (14)
Male sex, n (%)	14 (93)
BMI, mean (SD)	25 (3)
Smoking, n (%)	3 (20)
Diabetes, n (%)	0 (0)
Osteoporosis, n (%)	5 (33)

Table 2. Fracture, Injury and Treatment Characteristics

Variable	(n=20)
Fracture location, n (%)	
Thumb	4 (20)
Index	6 (30)
Middle	2 (10)
Ring	6 (30)
Small	2 (10)
Distal phalanx	10 (50)
Middle phalanx	3 (15)
Proximal phalanx	7 (35)
Location on phalanx	
Base	5 (25)
Shaft	7 (35)
Neck	1 (5)
Head	7 (35)
Joint involvement	
No	11 (55)
MCP	1 (5)
PIP	6 (30)
DIP	2 (10)
Injury characteristics	
Right hand dominance, n (%)	13 (65)
Dominant hand affected, n (%)	6 (30)
MOI, n (%)	
Impact	3 (15)
Sharp	13 (65)
Crush	4 (20)
Explosion	0 (0)
Other	0 (0)
Treatment characteristics	
Follow-up time, mean (SD), months	13 (9)
Time to treatment, mean (SD), days	7 (12)
Type of Treatment, n (%)	
Non-surgical	2 (10)
ORIF	2 (10)
Percutaneous Pinning	13 (65)
Other	3 (15)
Clinical variables, n (%)	
Comminution	16 (80)
Open fracture	18 (90)
Bone loss	18 (90)
Infection	1 (5)

Table 3. Location phalangeal fracture

Finger	Phalanx			Total
	Proximal	Middle	Distal	
Thumb	144	n/a	205	349
Index	115	94	149	358
Middle	97	125	202	424
Ring	167	171	223	561
Small	299	132	135	566
All fractures	822	522	914	2258

3. Results

- Fifteen of 1888 patients developed a phalangeal nonunion. Within these 15 patients, 20 non-united fractures were found.
- The mean follow-up time was 13±9 months. Table 1 shows patient characteristics and table 2 the distribution of our explanatory variables within these nonunion cases. Table 3 shows the fracture distribution of all phalangeal fractures between 2010 and 2015.



4. Conclusion

- Most of the nonunion cases were open fractures (90%), comminuted (80%) or had bone loss (80%).
- Further analysis of the data in this study may lead to the understanding of factors associated with nonunion and present a rate of nonunion in proximal, mid and distal phalanges.