HHS Public Access

Author manuscript

J Hand Surg Am. Author manuscript; available in PMC 2018 October 01.

Published in final edited form as:

J Hand Surg Am. 2017 October ; 42(10): 803–809. doi:10.1016/j.jhsa.2017.06.108.

Return to Play and Complications after Hook of the Hamate Fracture Surgery

Anchal Bansal, BS[#], **Douglas Carlan, MD**[*], **John Moley**[#], **Heather Goodson**[*], and **Charles A. Goldfarb, MD**[#]

[#]Washington University School of Medicine at Barnes Jewish Hospital, Department of Orthopaedic Surgery, St Louis, MO

[*]Eaton Orthopedics, St Petersburg, FL

Abstract

Purpose—The purpose of this study was to evaluate the efficacy of hook of the hamate excision for fracture in a large cohort of patients to better understand recovery time and complications.

Methods—We retrospectively reviewed the medical records of patients treated with surgical excision for hook of the hamate fractures at 2 different centers. We collected information on demographics, clinical presentation, and postoperative complications. Continuous outcome variables included time-to-surgery, return-to-play and return to activity.

Results—Our cohort of 81 patients had a median age of 22 years and was composed of 74 athletes including 57 baseball players, and 8 golfers. The median time to return to play was 6 weeks (range 1 – 36 weeks) after surgery; 11 patients (14%) had a return at 12 weeks or longer. Seventy-eight patients returned to pre-injury activity levels. Twelve patients with a full-recovery continued to experience some level of intermittent, non-specific pain in the affected hand, although this was not severe enough to require additional treatment. We observed a 25% incidence of postoperative complications with the majority consisting of transient ulnar nerve dysfunction. Complications were more common among non-athletes, those presenting with nonunions, and those experiencing longer intervals between injury and surgery.

Conclusion—In most cases, surgical excision as treatment for hook of the hamate fractures is safe and allows a relatively rapid return to play. However, we found a higher incidence of complications, including transient ulnar nerve dysfunction, than has been previously reported. Additionally, there is a group of patients with delayed return to play and continued discomfort after surgery. These findings should inform the discussion with surgical candidates.

Corresponding Author: Charles A. Goldfarb, MD, Washington University Orthopedics, 660 S. Euclid Avenue, Campus Box 8233, Saint Louis, MO 63110, 314-747-4705, goldfarbc@wudosis.wustl.edu.

Level of Evidence: IV, Therapeutic

Keywords

Hook of hamate; fractures, complications; recovery time

Introduction

Fractures of the hook of the hamate constitute 2–4% of carpal bone fractures but disproportionately effects athletes of certain sports, particularly baseball, golf, hockey, and tennis players.[1–4] The volar and radially projecting hook of the hamate is at risk in athletes participating in sports requiring gripping[2] or those sustaining a direct impact to the proximal palm.[1] While some patients may present with acute symptoms consistent with a hook of the hamate fracture, others present with chronic, worsening discomfort without an identifiable trauma. A displaced hook fracture is anatomically important as it may impinge on the ulnar nerve and ring and small finger flexor tendons. Consequently, the injury can also present with any combination of pain, weakened grip, and ulnar nerve paresthesias.[1,5,6] Given this constellation of symptoms, it may be misdiagnosed,[1] especially in chronic cases for which a traumatic mechanism is not immediately identifiable.[6]

Recent studies have demonstrated that non-operative treatment (typically casting) for patients with an acute onset of symptoms may be appropriate but has a high risk of nonunion[3,7] due to limited vascular supply to the watershed area of the hook-body intersection together with in vivo tendinous forces.[6] Surgical options include excision of the hook fragment or open reduction and internal fixation. Previous studies[2,3,8] concluded that simple excision of the fracture was superior to open reduction and internal fixation, given shorter associated recovery times and minimal to no difference in functional outcome. Consequently, excision is the approach favored by most surgeons.[2,3,8]

The rarity of this injury is a limiting factor in attaining sufficiently large samples to allow statistically meaningful analysis. As a result, there are limited data regarding the clinical course of this injury or risk factors for a poor prognosis, including postoperative complications and adverse events. The purpose of this investigation was to describe the clinical outcomes associated with surgical excision of hook of the hamate fracture in an athletic population and to identify relevant risk factors affecting outcome.

Methods

Following institutional review board approval, we identified patients treated with an excision of the hook of hamate between 2007 and 2015 for an acute fracture or nonunion. We included patients treated by a hand surgeon at Washington University School of Medicine, Barnes Jewish Hospital in St. Louis (three hand surgeons), Missouri and Eaton Orthopedics in St. Petersburg, Florida (one hand surgeon).

Our initial cohort included all patients with a CPT code of 25210 (carpectomy: one bone) and diagnosis code of 814.08 (fracture of hamate bone). We manually reviewed the charts to confirm accurate diagnosis and procedure. Patients were excluded if the surgical notes

indicated a procedure other than excision of the hamate or if they had multiple injuries treated concurrently at the time of hamate excision.

Initial data collection was performed through chart review. In the case of missing data, we attempted to contact patients by telephone. In some cases, such as with professional athletes, return to play (RTP) information was available as a part of the public record and, when no other information was available, this was used. If outcomes and RTP could not be determined by any of these means, patients were excluded from the analysis.

Initial data points were age at injury, sex, dominant and injured hand, mechanism of injury, sport, level of play, hitting side (baseball players), imaging modalities, time from injury or symptom onset to diagnosis, treatment, time from injury (or symptom onset) to surgery, time from surgery to RTP, the development of postoperative complications and time from surgery to full recovery, defined as the absence of pain related to surgery. If nonoperative care was undertaken (whether immobilization or other modalities), it was deemed a failure if the patient had continued clinical symptoms after 6 weeks. The median time at diagnosis of nonunion for patients with chronic symptoms was 87 days. Patients were deemed to be fully recovered when there was documentation of no further complaints, no or minimal pain, without any additional follow-up appointments. Sensory nerve deficits were confirmed with elevated 2-point discrimination and motor deficits were confirmed with decreased strength on manual muscle testing. RTP was based upon a full return to pre-injury activity levels. Patients were coded as being an “athlete” if they played a sport on an organized team. Athletes who played recreationally, on a club team, or at the high school or collegiate levels were designated as amateurs, while those playing in the minor leagues or at the professional level were designated as being professional athletes.

Surgical Technique

The two senior authors, both hand fellowship trained surgeons, utilized the same surgical technique. A longitudinal incision was made over the ulnar palm, beginning at the wrist crease and extending distally approximately 4cm. The palmaris brevis was retracted or divided as necessary for exposure of the ulnar tunnel. The ulnar nerve proper, the motor branch of the ulnar nerve, the sensory branch of the ulnar nerve and the ulnar artery were identified and gently mobilized to expose the hook of the hamate. The hook was sharply exposed while protecting the adjacent ulnar neurovascular bundle and the contents of the carpal tunnel. The hook of the hamate was mobilized with an osteotome and/ or a rongeur after which the sharp edges from the body were smoothed with a rongeur. After skin closure, the patient was placed in a resting splint for two weeks for comfort before a gradual increase in activities.

Statistical Methods

Descriptive analysis included means, medians, frequencies, standard deviations, and ranges. Comparative analysis was performed using tests for non-parametric distributions. Mann-Whitney-U for continuous and ordinal variables between 2 independent groups was used to compare demographics between patients with and without complications, athletes and non-athletes, and amateur and professional athletes. Kruskal-Wallis testing for continuous and

ordinal variables between multiple independent groups was used to assess differences between baseball players at different levels of play (high-school, college, and minor leagues). Chi-square and Fischer's Exact tests for ordinal data were employed to determine relationships between the frequencies of complications among athletes and non-athletes, professional and amateur athletes, and men and women. Finally, Spearman's correlation coefficient was calculated to examine associations between continuous variables including age, time from injury to surgery, time from surgery to RTP, and time from surgery to until the patient was pain free. Significance was determined at a level of P=0.05.

Results

Patients and Demographics

There were 81 patients, including 70 fractures with acute onset and 11 patients with a chronic presentation of nonunion or partial union. As shown in table 1, our population was predominantly young male athletes. Median age was 22 years (range: 15–66). Seventy-four (91%) were male and 71 (88%) were athletes, including 57 baseball players and 8 golfers, among others. Level of play was known for 70/71 athletes and the amateur and professional categories consisted of 35 players each. Athletes were significantly younger than non-athletes with median ages of 21 (range: 27–54) and 46 (range: 15–51) years old, respectively ($p<0.05$). Men were significantly younger than women with median ages of 21 (range: 15–66) and 51 (range: 46–54) years old, ($p<.05$) respectively. Advanced imaging was utilized in most cases to confirm the diagnosis; in a minority of patients (14%), the diagnosis was made based on plain radiographs alone (Table 1).

Presenting Symptoms

Fifty-eight of 81 patients (73%) presented with an acute injury, 8 (10%) described chronic symptoms (present for greater than 6 weeks), and 14 (18%) noted the presence of a previous injury or prodrome of non-specific wrist pain prior to an acute exacerbating event. The most common presenting symptom was pain, reported by 77 (95%) patients. This encompassed both rest pain, and pain elicited with pressure, motion, or gripping. Twenty-four patients (30%) had signs of or a history of a transient ulnar nerve dysfunction. Eighteen had isolated sensory disturbances including 6 with paresthesias only at the time of the acute injury and 12 with paresthesias at office presentation. In addition, there were 3 with isolated motor weakness, and 3 with both motor and sensory deficits.

The mechanism of injury was documented specifically in 72/81 (89%) of cases. The majority were swing-related events (55), followed by a fall on an outstretched hand (10), and blunt trauma (7). Twenty-one patients failed a trial of non-operative treatment including immobilization. Although no significant age differences were observed between individuals initially treated with immobilization versus immediate surgery in either the overall or athlete populations, baseball players who were immobilized initially (median age: 17, range: 15–22) were significantly younger than those who underwent primary surgical excision (median age: 21, range: 15–27) ($P<.05$).

Baseball—Among the 57 baseball players in our population, 45 had a clear, acute swing-related injury. Dominant hitting side information was unavailable for 4 players and 4 were switch hitters. Of the remaining 37 baseball players, 36 (97%) sustained the fracture to the non-dominant wrist. Similarly, all 8 golfers had non-dominant side injuries. The single tennis player with a swing-related injury was to the dominant-hand.

Time from Injury to Diagnosis and Surgery

Non-athletes had a greater time interval from symptom onset to diagnosis (P<.05). Amateur athletes were more likely to have attempted non-operative care compared to professionals (P<.05). In the athlete cohort, those with a chronic presentation more likely to be amateur athletes (8/35) compared to professionals (0/35), (P<.05).

Professional baseball players had a shorter interval from symptom onset to diagnosis (P<.05) and symptom onset to surgery (P<.05) when compared to amateurs. High-school players had a longer interval between symptom onset and diagnosis (38 days vs. 12 days, P<.05) and between symptom onset and surgery (54 days vs. 15 days, P<.05) when compared to minor league players. Eleven of the 55 baseball players failed a course of non-operative treatment including immobilization. Players attempting non-operative care were younger (P<.05), and more likely to be amateurs (P<.05) than those who were primarily managed operatively.

Return to Play and Full Recovery

The median return to play time after surgery was 6 weeks (range 1 – 36 weeks). Return to play was similar between professional and amateur athletes including the subset of college compared to high school athletes. Eleven of the 81 patients (14%) returned to play or full activities at 12 weeks or greater after surgery. Seventy-eight patients could return to their pre-injury level of activity. Three patients did not return to full activities due to continued pain despite receiving multiple subsequent therapeutic interventions, including therapy. prolonged immobilization, and steroid injection. Even after full recovery, 12 of 73 patients (16%) reported intermittent pain at last follow-up.

Complications (Table 2)

There was sufficient postoperative medical record documentation to determine the presence or absence of complications related to surgery in 79 of the 81 patients. Twenty patients (25%) experienced a surgical complication. Most commonly, there was a transient sensory disturbance in the ulnar nerve distribution (11), a transient motor weakness in ulnar nerve innervated muscles (5), scar related pain (5), abnormal sensation in another cutaneous nerve (1), superficial infection (1), and wound dehiscence (1). The majority of complications resolved spontaneously (Table 2). Patients with a complication returned to play at a similar time point after surgery (49 days) compared to those without a complication (42 days). Patients with a complication had a longer interval between symptom onset and diagnosis (median time: 34 vs 19 days, P=0.05) as well as between symptom onset and surgery (median time: 51 vs. 23 days, P<.05) compared to those who did not incur complications. Complications were significantly more common among non-athletes (6/10) than athletes (14/69) (P<.05), and among patients initially presenting with a chronic injury compared to acute fractures (P<.05). A failed trial of immobilization (21 patients) was unrelated to

complications (P=0.367) despite its significant association with chronic presentation (P<0.05).

Discussion

Surgical excision is the generally accepted treatment for hook of the hamate fractures, especially in the athlete population. The previous literature supports excision given the typically rapid return to play as well as the risk of nonunion with treatment by immobilization. This investigation did not compare operative and nonoperative care but there were several findings which are important for those caring for patients with a hook of the hamate fracture. First, complications, albeit minor and rapidly resolving in the majority, are more common than previously reported. Twenty-five percent of our patients had a complication, most commonly a transient ulnar nerve dysfunction. Second, those patients with a complication had a longer interval between symptom onset and intervention, including those patients treated for a nonunion. Third, amateur athletes had a longer duration between symptom onset and intervention when compared to professionals. Finally, our results confirm that most patients recover quickly and completely for a rapid RTP. However, there is a subgroup (14%) with delayed return to play and continued discomfort after this surgery.

Athletes were most commonly injured while performing a swing related activity. This is expected, as the close approximation of the hook of the hamate against the bat, golf club, or club during gripping allows the full magnitude of impact force to be transmitted directly to the hook. Furthermore, we found that 97% of baseball players and 100% of golfers with swing related injuries were diagnosed with fractures of the non-dominant hand. This injury pattern is consistent with prior observations expressed in the literature as well as with our own expectations based on the knowledge that forces become concentrated in the follow-through, or non-dominant, hand.[1,2,7,9]

Our findings expand upon the existing outcomes in the literature. The majority of these studies have included small sample sizes with few outcomes data.[2,3,7,8,10,11] Stark et al[12] published the largest cohort to date, reporting on 59 patients. They found that 97% (57/59) experienced full recovery, and recovered normal grip strength within 6 months of excision. Furthermore, all athletes returned to their previous levels of play by an average of 8 weeks post-operatively. The remaining 2 patients experienced crush injuries and they continued to have some degree of pain and decreased grip strength, although these were not severe enough to inhibit their return to activity.[7] Other smaller studies have reported similarly favorable results, with average RTP ranging from 4–8 weeks[2,8,10] and complication rates between 0 and 8%.[1,2,5,7,11,13,14]

Our study demonstrated a higher rate of adverse events after surgical excision, approximately 25% (20/79), when compared with the existing literature. The higher complication rate in our study may be explained by several factors. First, the definition of postoperative complications varies in the literature. For example, Tolat et al did not report complications that resolved within 3 months of surgery.[14] We included complications of any duration and of any severity because we feel this is important for providing patients with

information on recovery. Second, previous studies were performed almost exclusively in young athletes. In contrast, we included non-athletes and older patients as these patients are part of the spectrum of this injury. Finally, we specifically observed patients for ulnar nerve complications which were present in a larger than expected number of patients but were transient in all. Like previous reports, most complications in our cohort were transient motor or sensory nerve palsy. Given that no sharp injuries to the nerve were reported, all these complications were considered neurapraxia, presumably related to ulnar nerve retraction. Eleven patients experienced a sensory disturbance, including diminished sensation, complete anesthesia, or paresthesias, and 5 presented with motor difficulties including weakness in the ulnar interossei, adductor digiti minimi, and loss of grip strength. Ulnar nerve motor deficits are rarely reported in the literature,[11,15] but, when present, some authors have asserted that its presence portends poor prognosis.[11] Our findings challenge these reports as transient ulnar nerve dysfunction was relatively common but 14/15 patients (93%) fully recovered by 5 months (one required 15 months for full recovery). The surgeon must be aware of relationship of the ulnar nerve and the hook of the hamate and understand the propensity for ulnar nerve dysfunction; gentle retraction may minimize this risk.

Chronic presentation and a longer interval to surgery (whether due to delayed diagnosis or failed non-operative care) were each associated with complications. More than half of all patients presenting with a chronic presentation and nonunion experienced a complication. This is consistent with results reported by Bishop et al describing complications in 67% of patients (10/15) who underwent excision for treatment of hook fracture nonunions.[15] Surgical treatment is commonly the first line of management for high level athletes because the goal is to minimize RTP time and casting trials can take up to 12 weeks.[6] In our sample, we noted that amateur athletes were more commonly treated with a primary non-operative approach and were more likely to present with nonunions compared to professionals. This is congruent with previous findings from the literature indicating rates of nonunion and partial union following casting to be as high as 83%.[10]

Despite waiting significantly longer for surgery and presenting more frequently with nonunions, amateur athletes as a group were not more likely to develop complications, or have significantly longer RTP than professionals, indicating a favorable recovery profile among these young individuals. However, the prolonged time between injury and diagnosis suggests that the index of suspicion for this injury may be lower for amateur athletes. Previous studies have found these delays to range as high as 22–24 weeks.[2,3,7,9,14] In addition, professional athletes may have a more rapid and extensive workup for their wrist pain when compared to the amateur athlete, presumably leading to the earlier diagnosis and treatment.

Our study had several limitations. First, as with any, retrospective assessment, there were missing data points. Medical records from follow-up appointments were the main data source, and some patients did not return to clinic after cessation of symptoms and RTP. In particular, minor league players had limited clinic appointments after initial surgical recovery and RTP information was gathered from online records or correspondence with team managers. Similarly, patients with incomplete follow-up who were contacted by phone may have provided less accurate descriptions of their post-operative course than medical

records. Second, full recovery and RTP are not standardized metrics but instead depend on each patient's individual expectations, threshold for pain, definition of recovery, and time of year of injury related to the playing season. The latter is especially influenced by profession and lifestyle. Finally, our complication rate is likely an underestimation given that retrospective reviews such as this typically only identify major complications that are documented in the medical record or documented by the trainer. Other, typically minor complications may have been unreported or may have been managed by a primary care physician or in a location away from our referral centers.

References

1. Bachoura A, Wroblewski A, Jacoby SM, Osterman AL, Culp RW. Hook of hamate fractures in competitive baseball players. Hand (N Y). 2013; 8(3):302–307. [PubMed: 24426938]
2. Bishop AT, Beckenbaugh RD. Fracture of the hamate hook. J Hand Surg Am. 1988; 13(1):135–139. [PubMed: 3351218]
3. David TS, Zemel NP, Mathews PV. Symptomatic, partial union of the hook of the hamate fracture in athletes. Am J Sports Med. 2003; 31(1):106–111. [PubMed: 12531766]
4. Devers BN, Douglas KC, Naik RD, et al. Outcomes of hook of hamate fracture excision in high-level amateur athletes. J Hand Surg Am. 2013; 38(1):72–76. [PubMed: 23200952]
5. Fredericson M, Kim BJ, Date ES, McAdams TR. Injury to the deep motor branch of the ulnar nerve during hook of hamate excision. Orthopedics. 2006; 29(5):456–458. [PubMed: 16729750]
6. Hirano K, Inoue G. Classification and treatment of hamate fractures. Hand Surg. 2005; 10(2–3): 151–157. [PubMed: 16568508]
7. Klausmeyer MA, Mudgal CS. Hook of hamate fractures. J Hand Surg Am. 2013; 38(12):2457–2460. quiz 2460. [PubMed: 23891177]
8. Manske PR. Fracture of the hook of the hamate presenting as carpal tunnel syndrome. Hand. 1978; 10(2):181–183. [PubMed: 711000]
9. Stark HH, Chao EK, Zemel NP, Rickard TA, Ashworth CR. Fracture of the hook of the hamate. J Bone Joint Surg Am. 1989; 71(8):1202–1207. [PubMed: 2777848]
10. Marchessault J, Conti M, Baratz ME. Carpal fractures in athletes excluding the scaphoid. Hand Clin. 2009; 25(3):371–388. [PubMed: 19643337]
11. O'Shea K, Weiland AJ. Fractures of the hamate and pisiform bones. Hand Clin. 2012; 28(3):287–300. [PubMed: 22883867]
12. Stark HH, Jobe FW, Boyes JH, Ashworth CR. Fracture of the hook of the hamate in athletes. J Bone Joint Surg Am. 1977; 59(5):575–582. [PubMed: 873952]
13. Parker RD, Berkowitz MS, Brahms MA, Bohl WR. Hook of the hamate fractures in athletes. Am J Sports Med. 1986; 14(6):517–523. [PubMed: 3799882]
14. Scheufler O, Radmer S, Erdmann D, et al. Therapeutic alternatives in nonunion of hamate hook fractures: personal experience in 8 patients and review of literature. Ann Plast Surg. 2005; 55(2): 149–154. [PubMed: 16034244]
15. Smith P 3rd, Wright TW, Wallace PF, Dell PC. Excision of the hook of the hamate: a retrospective survey and review of the literature. J Hand Surg Am. 1988; 13(4):612–615. [PubMed: 3047210]

Table 1

Demographics

Characteristic		n (%)
Age in years	Median (range)	22 (15 – 66)
Gender	Male	74 (91)
	Female	7 (9)
Dominant Hand	Right	74 (91)
	Left	4 (5)
	Data Missing	3 (4)
Side of Injury	Right	32 (40)
	Left	49 (60)
Mode of Injury	Swing	55 (68)
	Fall on outstretched hand	10 (12)
	Blunt trauma	4 (5)
	Crush	1 (1)
	Motorcycle accident	1 (1)
	Wrench	1 (1)
	Data Missing	9 (11)
Level of Play	High school	14 (17)
	College	9 (11)
	Minor leagues	33 (41)
	Professional (excluding minor league)	2 (3)
	Club	1 (1)
	Recreational	11 (14)
	Non-athlete	10 (12)
	Data Missing	1 (1)
Sport	Baseball	57 (70)
	Golf	8 (10)
	Tennis	2 (2)
	Softball	3 (4)
	Weightlifter	1 (1)
	Non-athlete	10 (12)
Diagnosis	Fracture	70 (86)
	Nonunion	11 (14)
Diagnostic Imaging	X-ray and CT	21 (26)
	X-ray and MRI	15 (18)
	X-ray, CT, and MRI	12 (15)
	CT alone	11 (14)
	X-ray alone	11 (14)
	CT and MRI	7 (9)

Characteristic	n (%)
MRI alone	2 (2)
MRI and bone-scan	1 (1)
X-ray and MRI	1 (1)

Table 2

Complications

Age	Sex	Diagnosis	Side	Dominant Hand	Sport	Level	RTP	Complications
15	Male	Fracture	L	R	Baseball	HS	42	Altered small finger sensation. Resolved by 2 weeks
17	Male	Nonunion	L		Baseball	HS	14	Ulnar base of palm numbness; resolved at 1 year
18	Male	Fracture	R	R but hits L	Baseball	Min	49	Ulnar nerve motor and sensory palsy; resolved by 1 month
19	Male	Fracture	R	R but hits L	Baseball	Min	56	Mild ring finger paresthesias; resolved by 2 months
20	Male	Nonunion	L	R	Baseball	C	42	Scar pain→ resolved by 12 months
21	Male	Fracture	L	R	Baseball	C	RTP confirmed but time unknown	Small and ring finger paresthesias, improving at 3 months.
22	Male	Fracture	L	R	Baseball	C	210	Wound dehiscence which healed by 1 month
26	Male	Fracture	L	R	Baseball	Min	49	Mild ring finger paresthesias; resolved by 1 month
27	Male	Fracture	L	R	Golf	Pro	56	-Scar pain and flexor carpi ulnaris tendonitis which resolved by 6 months. -Ring and small finger paresthesias; resolved by 3 months.
28	Male	Fracture	R	R	None	NA	133	Ulnar nerve motor and sensory palsy; resolved by 6 months
35	Male	Nonunion	R	R	Navy	NA	28	Ulnar nerve palsy with 3rd volar interosseous weakness; resolved by 5 months (functional recovery at 1 month)
46	Female	Fracture	L	R	None	NA	84	Ulnar nerve palsy with abductor digiti minimi weakness; resolved at 1 month. -Painful keloid scar tissue
46	Male	Fracture	R	R	None	NA	28	Ulnar nerve palsy, mild, resolved spontaneously
46	Female	Nonunion	L	R	None	NA	140	-Superficial infection which resolved with oral antibiotics -Ulnar motor weakness with decreased grip strength; resolved by 5 months
47	Female	Fracture	L	R	Tennis	Rec	56	Paresthesias, small finger. Resolved by 3 months.
52	Male	Nonunion	L	R	Golf	Rec	28	Altered small and ring finger sensation. Resolved by 1 month.
53	Male	Fracture	L	R	Golf	Rec	42	Altered small and ring finger sensation. Resolved by 1 month.
54	Female	Fracture	R	R	None	NA	42	Mild scar pain with heavy pressure
56	Male	Nonunion	L	R	Golf	Rec	84	Hypertrophic scar; resolved by 6 months.
65	Male	Fracture	L	R	Golf	Rec	56	Altered small and ring finger sensation. Resolved by 2 months.

HS: high school (amateur athlete); **Min**: minor league (professional athlete); **C**: collegiate (amateur athlete); **Pro**: professional (professional athlete); **NA**: not applicable **Rec**: Recreational league (amateur athlete)