# Return to Sport and Performance Outcomes after Hand Fractures in Professional Baseball Players

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INTRODUCTION:
About 7% of total injuries in the Major League Baseball (MLB) from 2010-2016 involve the hand. Compared to other hand injuries, fractures of the hand more often require surgical intervention. Therefore, the purpose of the current study was to report the return to sport (RTS) rate, RTS time, and performance outcomes in professional baseball position players, with the secondary purpose of comparing these outcomes between positions and between operatively vs. non-operatively treated players. The authors hypothesized that there will be a high return to sport rate (>80%) after hand fractures, with no significant decline in performance after return to sport for both operatively and non-operatively treated players.
METHODS: The MLB Health and Injury Tracking System (HITS) database was queried for all major league and minor league position players who sustained a metacarpal fracture or phalangeal fracture of any digit. The primary outcomes of interest were RTS rate and time and the following performance outcomes: batting average (AVG), on-base percentage (OBP), slugging percentage (SLG), and on-base plus slugging percentage (OPS). Outcomes were reported across the full study cohort, and sub-analyses compared player position as well as operative vs. non-operative treatment were also included.
RESULTS: Overall, 801 professional baseball position players were included with 263 outfielders, 352 infielders, and 186 catchers. There were 156 players that were treated operatively and 645 treated non-operatively. Overall, 654 out of 801 (81.6%) players were able to RTS at a mean of 58 ± 47 days. Outfielders, infielders, and catchers were able to RTS at similar rates (84% vs. 81% vs. 80%, respectively, p=0.440) and in a similar amount of time (58 vs. 58 vs. 56 days, p=0.893). Players treated operatively vs. non-operatively were able to RTS at similar rates (83% vs. 82%, respectively, p=0.740), however players treated operatively required more time to return to sport (86 vs. 51 days, p=0.893). No significant differences in performance were observed when comparing pre-injury to 1-year post-injury.
DISCUSSION AND CONCLUSION: 82% of professional baseball position players are able to RTS at a mean of 58 days after hand fracture, with player position not affecting RTS rate or time. Players treated operatively did require more time to RTS (86 vs. 51 days), however RTS rate did not differ between operatively vs. non-operatively treated players. At 1-year post-injury, players perform similarly compared to pre-injury baseline regardless of player position or type of treatment.

Table 1. Demographics of professional position players with hand fractures, as well as those treated operatively vs. non-operatively.

| Demographic | Total Cohort (n=801) | Operative Only (n=156) | Non-Operative Only (n=645) | P Value |
|---|---|---|---|---|
| **Position:** | | | | 0.199 |
| Outfielder | 263 (32.8%) | 59 (37.8%) | 204 (31.6%) | |
| Infielder | 352 (43.9%) | 59 (37.8%) | 293 (45.4%) | |
| Catcher | 186 (23.2%) | 38 (24.4%) | 148 (22.9%) | |
| **BMI** | 26.3 (2.6) | 26.5 (2.6) | 26.3 (2.6) | 0.484 |
| **Injury Mechanism:** | | | | **0.021** |
| Fielding | 234 (29.2%) | 54 (34.6%) | 180 (27.9%) | |
| Batting | 395 (49.3%) | 59 (37.8%) | 336 (52.1%) | |
| Throwing | 9 (1.1%) | 2 (1.3%) | 7 (1.1%) | |
| Base Running | 108 (13.5%) | 28 (17.9%) | 80 (12.4%) | |
| Other | 55 (6.9%) | 13 (8.3%) | 42 (6.5%) | |
| **Injured Dominant Hand** | 373 (46.6%) | 80 (51.3%) | 293 (45.4%) | 0.220 |
| **Injured Thumb** | 130 (16.2%) | 33 (21.2%) | 97 (15.0%) | 0.082 |
| **Injury Location:** | | | | **<0.001** |
| Unknown Location | 7 (0.9%) | 4 (2.6%) | 3 (0.5%) | |
| Metacarpal | 400 (49.9%) | 78 (50.0%) | 322 (49.9%) | |
| Proximal Phalanx | 94 (11.7%) | 29 (18.6%) | 65 (10.1%) | |
| Middle Phalanx | 34 (4.2%) | 5 (3.2%) | 29 (4.5%) | |
| Distal Phalanx | 155 (19.4%) | 15 (9.6%) | 140 (21.7%) | |
| Unspecified Phalanx | 111 (13.9%) | 25 (16.0%) | 86 (13.3%) | |

BMI presented as mean (standard deviation), and all other demographics presented as n (%).
Statistically significant findings are in bold.

Table 2. Performance outcomes throughout 1-year post-fracture.

| Statistic | Pre-Injury | 1 Week | 2 Weeks | 1 Month | 3 Months | 1 Year | P-value |
|---|---|---|---|---|---|---|---|
| AVG | 0.253 (0.061) | 0.256 (0.153) | 0.237 (0.140) | 0.247 (0.114) | 0.240 (0.090) | 0.244 (0.073) | **0.023** |
| OBP | 0.332 (0.066) | 0.335 (0.159) | 0.315 (0.147) | 0.321 (0.117) | 0.316 (0.094) | 0.319 (0.076) | **0.006** |
| SLG | 0.382 (0.124) | 0.390 (0.299) | 0.358 (0.248) | 0.365 (0.196) | 0.361 (0.162) | 0.371 (0.135) | 0.064 |
| OPS | 0.714 (0.173) | 0.725 (0.433) | 0.671 (0.364) | 0.687 (0.290) | 0.677 (0.237) | 0.689 (0.194) | **0.013** |

AVG=batting average, OBP=on-base percentage, SLG=slugging percentage, OPS=on-base plus slugging percentage.
Data is presented at mean (standard deviation). Statistically significant findings are in bold.

Table 3. Return to sport rate and time between outfielders vs. infielders vs. catchers.

| | Outfielder | Infielder | Catcher | P-value |
|---|---|---|---|---|
| **Return to Sport Rate** | 221/263 (84.0%) | 285/352 (81.0%) | 148/186 (79.6%) | 0.440 |
| **Return to Sport Time (days)** | 57.8 (46.4) | 58.4 (47.7) | 56.4 (45.1) | 0.893 |

Return to sport time is presented as mean (standard deviation).

Table 4. Performance outcomes throughout 1-year post-fracture in players treated operatively vs. non-operatively.

| | Operative | | | | | | |
|---|---|---|---|---|---|---|---|
| Statistic | Pre-Injury | 1 Week | 2 Weeks | 1 Month | 3 Months | 1 Year | P-value |
| AVG | 0.252 (0.062) | 0.280 (0.155) | 0.244 (0.162) | 0.225 (0.135) | 0.238 (0.084) | 0.235 (0.065) | **0.034** |
| OBP | 0.326 (0.075) | 0.362 (0.133) | 0.323 (0.169) | 0.289 (0.135) | 0.324 (0.083) | 0.307 (0.067) | **0.003** |
| SLG | 0.377 (0.131) | 0.441 (0.369) | 0.371 (0.313) | 0.323 (0.215) | 0.351 (0.153) | 0.352 (0.123) | **0.031** |
| OPS | 0.703 (0.187) | 0.803 (0.484) | 0.694 (0.445) | 0.612 (0.336) | 0.675 (0.209) | 0.659 (0.177) | **0.007** |