Complications and Reoperations After Calcaneus Fractures: Comparing a Single Center with a Large Claims Database

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Purpose: Calcaneus fractures are complex injuries associated with challenging morbidity to the patient. Considerable existing research has been devoted to comprehension of wound and infectious complications. There is a paucity of literature evaluating other outcomes including nonunion. The influence of patient-specific and surgical factors may influence risk of nonunion. Improved knowledge can help identify patients at greatest risk of hardware failure and nonunion.

Methods: We undertook a retrospective review of operatively treated calcaneus fractures at a Level I trauma center from 2013 through 2022 as identified by CPT codes. Additionally, a structured query of a national insurance claims database (PearlDiver Technologies) was performed for operatively treated calcaneus fractures from 2015 through 2020 as identified by ICD-10 codes. Likelihoods of nonunion and infection within 1 year of index surgery and reoperation within 2 years of index surgery were analyzed using Kaplan-Meier estimations. Reoperation and nonunion risk factors were determined with multivariable logistic regression analyses created using a backwards stepwise process.

Results: At our Level I trauma center, there were 170 operatively treated calcaneus fractures for 147 patients. Using Kaplan-Meier estimation, nonunion occurred in 10.0% of fractures (95% confidence interval [CI], 4.9-14.9) within 1 year, infection occurred in 3.3% of fractures (95% CI, 0.4-6.2) within 1 year, and 25.1% of fractures (95% CI, 16.5-32.7) required reoperation within 2 years of index surgery. On multivariable analysis, increased odds of nonunion was associated with a greater change in preoperative to intraoperative Bohler's angle (odds ratio [OR] 1.17 [95% CI, 1.07-1.32]; P = 0.002) and a bilateral calcaneus injury (OR 4.00 [95% CI, 1.04-17.56]; P = 0.049). Alternatively, decreased odds of nonunion were associated with an increased preoperative Bohler's angle (OR 0.82 [95% CI, 0.70-0.93]; P = 0.006) and an increased final postoperative Bohler's angle (OR 0.89 [95% CI, 0.82-0.95]; P = 0.002). Additionally, decreased odds of reoperation were independently associated with an increased postoperative Bohler's angle (OR 0.97 [95% CI, 0.94-0.99]; P = 0.013) and increased body mass index (OR 0.91 [95% CI, 0.83-0.99]; P = 0.048). Our query of PearlDiver yielded 1923 operatively treated calcaneus fractures; nonunion occurred in 49 fractures (2.5%). On multivariable analysis of PearlDiver, an open injury was associated with increased odds of nonunion (OR 2.63 [95% CI, 1.11-5.52]; P = 0.017).

Conclusion: Our experience shows that nonunion is a considerable risk for patients undergoing surgical fixation of calcaneal fracture. This observation is not well described by existing literature, or by a query of the PearlDiver database (2.5% vs 10.0% in the present study). Additionally, 25% of operatively treated calcaneus fractures risked reoperation within 2 years. A larger postoperative Bohler's angle and any changes to Bohler's angle over treatment course can considerably impact odds of nonunion and reoperation.