

A Preoperative Risk Score for Predicting Surgical Site Complications Following Ankle and Pilon Fracture Fixation in Frail Patients

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INTRODUCTION: Open reduction internal fixation (ORIF) has been the main-stay treatment of trimalleolar ankle and pilon fractures. However, patients with decreased functionality and increased comorbidity status are prone to wound-related complications. These patients may require additional preoperative optimization or may benefit from less invasive operative techniques. The purpose of this study is to provide a risk-related score to anticipate development of surgical site infection and/or wound complications following ORIF of trimalleolar ankle and pilon fractures among frail patients in order to inform preoperative optimization and potential areas for risk mitigation.

METHODS: A national database was queried from 2015-2020 for patients undergoing ORIF for trimalleolar or pilon fractures. Exclusion criteria included associated lower extremity fractures, oncologic or infectious indications, or previous implants. Frailty scores were calculated as defined by the revised Risk Analysis Index (RAI-rev). Outcomes included 30-day superficial (SSSI) and deep (DSSI) surgical site infections, wound dehiscence, and readmission. Established weights were generated for predictive variables via backstep logistic regression to yield a Frail Ankle Infection Risk (FAIR) score for wound and infectious complications that accounted for BMI, frailty, preoperative lab values, and comorbidities. Discriminatory accuracy was quantified by Receiver Operating Characteristic (ROC) curve analysis and C-statistics.

RESULTS:

A total of 2,696 patients who underwent ankle fracture ORIF were identified (Pilon n=2,177; Trimalleolar n=525). 2.5% of patients developed SSSI, DSSI, or wound dehiscence. 6.2% of patients were readmitted. The backstep logistic regression model generated an excellent predictive FAIR score for wound and infectious complications (AUC = 0.83). When utilizing a threshold within the FAIR score, patients above the threshold were more likely to suffer a wound or infection-related complication (OR: 10.4, 95% CI: [3.4-31.5]), length of stay greater than 3 days (OR: 1.4, [1.1-1.9]), any complication (OR: 2.1, [1.4-3.2]), and readmission (OR: 1.8, [1.1-3.0]) than those below the threshold.

DISCUSSION AND CONCLUSION: ORIF for trimalleolar and pilon ankle fractures is particularly associated with increased rates of wound and infection-related perioperative complications among frail patients with predisposing factors. While fracture severity and other extenuating considerations play a role in surgical timing and management of these patients, a period of soft tissue rest before fixation has been a mainstay in minimizing the risk of wound dehiscence and surgical site infection. This score may provide additional understanding of the factors associated with complications following these surgical procedures and may expose additional areas for pre-operative optimization in this patient population.

Table 1. Variables within FAIR Score

BMI

Revised RAI frailty score

Functional Status (ambulatory/assistance/nonambulatory)

Preoperative albumin

Preoperative bilirubin

Preoperative GFR

Preoperative INR

History of CKD

History of COPD

History of CHF

History of T2DM