Developing a Risk Score for Predicting Multiple Reoperations in Patients With Fracture-Related Infections

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Purpose: Postoperative infections are a leading cause of morbidity following fracture repair. There is a paucity of literature predicting the number of reoperations for fracture patients with postoperative infections. The purpose of this study is to develop a risk score predicting which fracture-related infection (FRI) patients will require one versus multiple reoperations.

Methods: This was a retrospective cohort study of all patients undergoing reoperation for FRI from January 2013 to April 2021. Logistic regression was performed to select variables predictive of multiple reoperations. The following 4 pre-specified methods of covariate selection were used: (1) covariates selected a priori, (2) additional covariates with univariate P values ≤0.10, (3) additional covariates selected by effect sizes (odds ratio ≤0.5 or ≥2.0), and (4) additional covariates selected by effect sizes or P values ≤0.10. The model most predictive of multiple reoperations was selected via comparison of each model's receiver operating characteristic (ROC) curves. Variables that did not significantly impact the fit of the multivariable model were removed via backwards elimination. An integer-based risk score was then developed.

Results: 88 patients underwent 1 FRI reoperation while 208 patients underwent 2 or more reoperations. From multivariable logistic regression, age greater than 45 years (P<0.001), purulent drainage at infection presentation (P<0.001), and nonunion at infection presentation (P = 0.013) were all significantly associated with multiple reoperations. Model 2 (covariates selected a priori with addition of covariates with univariate P≤0.10) was most predictive of multiple reoperations (area under ROC curve = 0.789). Variables included in the final risk score were age ≥45 years, purulent drainage, nonunion, and wound dehiscence at infection presentation.

Conclusion: This study describes the first risk score for predicting multiple reoperations in patients with infection following fracture repair. Age greater than 45 years, purulent drainage, and nonunion at infection presentation were all significantly associated with multiple infection reoperations.