

Frailty Predicts Mortality and Complications in Young Patients with Traumatic Orthopaedic Injuries

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Purpose: Frailty is a marker of decline across multiple systems. A modified frailty index (MFI) that incorporates comorbidities and functional status has been validated as a predictor of complications and mortality in elderly orthopaedic patients; studies in young patients are limited. The purpose of this study is to evaluate frailty as a predictor of mortality and postoperative complications in young patients with pelvis and lower extremity trauma.

Methods: The National Surgical Quality Improvement Program (NSQIP) database from 2008-2014 was queried for all patients with pelvis, and lower extremity trauma. To calculate the MFI, 11 variables are summated, including diabetes, congestive heart failure, hypertension, myocardial infarction, cerebrovascular accident, vascular disease, functional status, chronic obstructive pulmonary disease, prior percutaneous coronary intervention, cardiac surgery, and impaired sensorium. The MFI is calculated by dividing the number of variables present by the total number of variables. From prior studies, the threshold between "fit" and "frail" was determined to be an MFI of 0.25 with 0.4 as the threshold for dependence on activities of daily living. Patients were classified into non-frail (MFI = 0-0.2), moderately frail (MFI = 0.2-0.36), and severely frail (MFI >0.36). Patients were divided into elderly (age ≥60 years) and young (age <60). Multivariate logistic regression determined 30-day mortality. Secondary outcomes include Clavien-Dindo grade 4 complications.

Results: This study included 15,787 young patients, and 40,634 elderly patients. Young patients were: non-frail (90.5%), moderately frail (9%), and severely frail (0.52%). Elderly patients were: non-frail (60.6%), moderately frail (36.2%), and severely frail (3.3%). Across all ages, there is a stronger association between MFI and 30-day mortality (odds ratio [OR] 11.02, 95% confidence interval [CI] 6.25-19.39) than age and 30-day mortality (OR 1.07, 95% CI 1.06-1.07) (P <0.001). Regression showed no interaction between MFI and age in predicting mortality (P = 0.384). Rate of Clavien-Dindo complications increased from 1.18% at MFI 0 to 11.06% at MFI 0.36+. An increase in MFI is associated with a 28.8 times increased odds of Clavien-Dindo complications (95% CI: 16.05-51.77, P <0.001).

Conclusion: The utility of frailty indices in young patients has been debated, with studies demonstrating validity for predicting complications and mortality. In this series of orthopaedic trauma patients, the MFI predicts mortality and complications better than age alone. This indicates that MFI is valid in all age groups, and can be utilized to direct interdisciplinary management in all orthopaedic trauma patients.