



Modified Frailty Index predicts 30 day morbidity and mortality from spine surgery

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Introduction

Limited tools exist to stratify perioperative risk in neurosurgical patients undergoing spinal procedures. We hypothesized that a modification of the Canadian Study of Health and Aging- Frailty Index (CSHA-FI) constructed from standard demographic variables, can be predictive of postoperative morbidity and mortality.

Methods

The 2006-2010 National Surgical Quality Improvement Project (NSQIP) file was accessed for the neurosurgical population undergoing spinal surgeries based on CPT codes and Surgeon specialty. The CSHA frailty index (FI) is calculated as the proportion (from a given set) of deficits present in a given individual, and indicating the likelihood that frailty is present. The variables are assigned a value of ‘1’ when the deficit is present and ‘0’ when absent.

FI = X/Y = Sum of deficits/total number of variables

11 preoperative clinical NSQIP variables were matched to the original 71 CSHA-FI variables (Table 1). Increase in the modified Frailty Index (mFI) implies increased frailty. The outcomes assessed were 30-day occurrence of adverse events. These were then summarized into groups: any infection, wound related complication, Clavien IV complications (life-threatening requiring ICU admission), and mortality. Chi-square analysis and nominal logistic regression were performed in SPSS 20 (IBM, NY).

Table 1

List of variables used by Canadian Study of Health and Aging to construct the Modified Frailty Index

- Non-independent functional status
- History of diabetes mellitus
- History of either chronic obstructive pulmonary disease or pneumonia
- History of congestive heart failure
- History of myocardial infarction
- History of percutaneous coronary intervention, cardiac surgery, or angina
- Hypertension requiring the use of medications
- Peripheral vascular disease or rest pain
- Impaired sensorium
- Transient ischemic attack or cerebrovascular accident without residual deficit
- Cerebrovascular accident with deficit

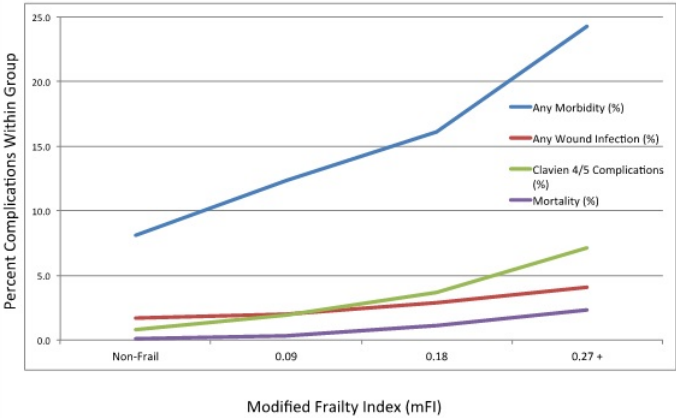
Results

We identified 18,294 patients undergoing spinal surgery. Postoperative morbidity and mortality displayed an increasing trend with increasing mFI. 8.1% of patients with mFI of zero had atleast one morbid complication compared to 24.3% patients with mFI of 0.27 or greater (p<0.001). mFI of zero was associated with a mortality rate of 0.1% compared to 2.3% for mFI of 0.27 or greater (p<0.001). Surgical site infections and Clavien 4 complications occurred in 1.7% and 0.8%, respectively, in patients with mFI of zero compared to 4.1% and 7.1% respectively in patients with mFI of 0.27 or greater (p<0.001 for both). Multivariate analysis showed that preoperative Modified Frailty Index and American Association of Anesthesiologists (ASA) classification of 4 and 5 had a significantly increased risk of leading to Clavien IV complications. However, mFI was more powerful at predicting Clavien IV complications and death than ASA.

Conclusions

Modified frailty index, based on preoperatively identifiable patient variables, accurately assesses the risk of postoperative morbidity and mortality, providing an easy method to improve perioperative risk stratification.

Figure 1



Postoperative morbidity and mortality displayed an increasing trend with increasing mFI

Learning Objectives

By the conclusion of the session the participants discuss the need and importance of national databases that can be used for peri-operative risk assessment of neurosurgical patients.

References

- Bergman H, Ferrucci L, Guralnik J, et al. Frailty: an emerging research and clinical paradigm—issues and controversies. J Gerontol Med Sci 2007;62:731-7
- Obeid et al. Predictors of critical care-related complications in colectomy patients using the National Surgical Quality Improvement Program: exploring frailty and aggressive laparoscopic approaches.J Trauma Acute Care Surg. 2012 Apr;72(4):878-83