EDITORIAL

The utility of the modified frailty index for risk stratification in patients undergoing spine surgery

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THE ability to accurately and consistently predict how well a patient will tolerate elective spine surgery is one of the most challenging issues spine surgeons face. Risk stratification is not only essential in preoperative patient counseling, but is also a critical component of resource utilization and planning. Although we must rely on our clinical judgment, evidence-based assessment tools can be valuable, if they are simple and time-efficient. Previously, the American Society of Anesthesiologists (ASA) physical status classification grade was investigated for this purpose, using data from the Scoliosis Research Society Morbidity and Mortality database; it showed a significant correlation of higher preoperative ASA grades and increased morbidity in patients undergoing complex spine surgery.³ With the burgeoning geriatric patient population, another potentially important concept mitigating perioperative and postoperative complication risk stratification is frailty, especially in less complex spine procedures. As an adjunct to the ASA, the authors investigated whether the modified frailty index (mFI) correlates with higher risks of postoperative complications.

This study has a strong rationale and a clear purpose; to investigate whether the mFI is predictive of systemic and wound-related complications in patients undergoing mainly secondary-level spine surgeries.¹ The study design is a retrospective case series using a large patient cohort that was prospectively collected by the American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) during a 4-year period (2006–2010). The study design is appropriate for the research question asked, given the mFI's phase of development related to spine surgery. The study is well powered and the results generalizable, given the large multicenter national database and that the majority of the cases were “routine” spine surgeries. The ACS NSQIP has audit procedures in place to optimize data validity. The mFI has not un-

dergone formal intra- and interrater reliability testing, although the binary variables used to construct the mFI make it relatively simple to use.

The mFI was assessed using 30-day risk-adjusted surgical outcomes⁷ and variables making up the prevalidated Canadian Study of Health and Aging Frailty Index (CSHA-FI).⁸ This enabled the satisfactory assessment of 16 NSQIP and 11 CSHA-FI variables. The calculation and cutoff for significant frailty of the mFI had previously been published by other surgical specialties.^{2,6,8} The authors stated that this cutoff was chosen because spine procedures are generally not offered to moderately or severely frail patients. This rationale, however, may not be entirely accurate. With minimally invasive techniques and navigation rapidly evolving, patients with significant spinal pathology and poor health-related quality of life scores are likely to be offered surgery, despite a higher risk profile. Further studies will be required, including a subgroup analysis of this study's population to provide greater insight into these patient populations.

With regard to statistical analysis, the authors used standard and appropriate univariate and multivariate analyses to assess the association of the mFI to postoperative outcomes and 30-day mortality. The assessment and prediction of perioperative and postoperative complications in patients undergoing elective primary and secondary spine surgery is essential and often undervalued. This is particularly important in older and frail patients whose health-related quality of life and resource utilization seem more closely tied to surgical adverse events, whether early or late. Furthermore, patient symptoms, surgical indication, and surgical technique also vary.^{4,5}

The authors should be congratulated for introducing a risk index that objectively quantifies both surgical site and systemic related surgical risk. The study is statistically sound and provides valid results within the restraints of a

retrospective design. However, for the mFI to be considered for widespread adoption it must undergo prospective evaluation in this distinct patient population.

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Disclosures

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Response

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We appreciate the positive comments made by Drs. Fisher and Tee in their commentary. On the issue of an appropriate cutoff point for the mFI, we believe that a higher cutoff point would have included moderately to severely frail patients only. As a result, we would have reached a greater statistical significance, but the results might have been less clinically relevant and generalizable. However, we agree with Drs. Fisher and Tee that sensitivity analyses carried out at higher cutoff points would indeed provide useful information, especially now that minimally invasive procedures are being performed more frequently for frailer patients with significant spinal pathology. We hope that our study will pave the way for future studies to assess the utility of mFI in a prospective manner.