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CORR Insights®: What Is the Effect of Advanced Age and Comorbidity on Postoperative Morbidity and Mortality After Musculoskeletal Tumor Surgery?

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Where Are We Now?

The typical soft tissue sarcoma initially presents as an enlarging, painless lump. Because soft tissue sarcomas usually

are painless, they often are discovered late. Therefore, treatment approaches often will include extensive surgery. This is an issue, since soft tissue sarcomas also are more common in patients older than 50 years of age, meaning that many patients will have important medical comorbidities, which may complicate treatment still further.

The current study by Ogura and colleagues added to our knowledge of how pretreatment comorbidities affect posttreatment complications. Japan was a good site for this study because the proportion of the elderly is “rapidly increasing as a result of demographic changes,” according to the authors. Japan also has a detailed national administrative database for all acute-care inpatients. Ogura and colleagues used this database to identify

5716 patients undergoing musculoskeletal tumor surgery during a 5-year period ending in 2012. The authors used the Charlson Comorbidity Index (CCI) to stratify medical comorbidities. The CCI is a validated tool that assigns scores to 19 chronic conditions. For example, congestive heart failure is given 1 point, diabetes with end organ damage or lymphoma are given 2 points, moderate/severe liver disease or metastatic solid tumor are given 3 points [1]. It was originally developed to predict 1-year mortality after hospital discharge, but has since been shown to predict mortality and complications of treatment for multiple malignancies, including breast, prostate, lung, and the colon [8].

The authors found that the highest odds ratios (OR) for increased complications were CCI scores ≥ 4 (OR, 2.85), anesthesia > 240 min (OR, 2.66), lower extremity location (OR, 1.96), and blood transfusion (OR, 1.79). Age older than 80 years had less pronounced effect (OR, 1.68). Risk factors for in-hospital mortality were

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similar, but also included high hospital volume (OR, 0.335). Morbidity and inpatient mortality were even more increased, 3 and 6 fold respectively, in patients older than 80 years of age and CCI ≥ 4 .

Their findings are analogous to those of Aggerholm-Pedersen et al. [1] who used a Danish population registry and the CCI to predict survival for 453 adult bone sarcoma patients. They found CCI scores of 2 and greater did indeed impair survival in patients with non-Ewing/nonosteosarcoma histology.

Where Do We Need To Go?

While this information is generally helpful for tumor surgeons, surgeons still need more relevant and more convenient risk stratification tools. Secondly, we need to improve our surgical care of elderly and frail patients with sarcomas. Finally, it is also reasonable to question whether careful computations of comorbidity risk really do offer pertinent guidance to the surgeon treating an elderly patient with a rapidly enlarging, non-metastatic sarcoma.

Our ability to stratify pretreatment risk still is evolving. As Ogura and colleagues show in their study, factors not recorded by CCI (high hospital volume, blood transfusion, length of

surgery, and others) also have important effects on posttreatment morbidity and mortality. Therefore, the CCI by itself is likely not adequate.

Although Ogura and colleagues were specifically interested in the effect of age, it is notable that their results showed comorbidities had a much larger impact than age on complications and mortality. This is likely because while absolute risk is higher in older subjects, the additional risk of comorbidities is more pronounced in younger patients who are otherwise less likely to die [12].

We must continue improving our surgical treatment of elderly and frail patients. Other studies of musculoskeletal surgery in elderly patients have shown mixed results [9, 11, 12]. Arthroplasty surgery in octogenarians has been claimed to be successful and adequately low risk [9]. However, surgical treatment for hip fractures in the elderly is associated with high (20% to 30%) mortality in the first year [11]. In fact, a detailed Danish population study of hip and vertebral fragility fractures [12] showed excess mortality of 1.8% per year that persisted for up to 19 years.

Outcomes after surgery for sarcomas in the elderly have been previously studied [4, 10]. Thus far, the data suggests that surgical treatment of extremity sarcomas in older patients is acceptably safe. Analyses of 128

patients older than 80 years of age at Royal Marsden Hospital in London, and 179 patients older than 65 years of age at MD Anderson Cancer institute revealed 30-day mortality rates of 4% and 0.9%, respectively. These are analogous to Ogura and colleagues who found mortality of 0.5% for patients older than 65 years of age, and 1.6% for patients older than 80 years of age.

While this is encouraging, Al-Refai et al. [2] found decreased sarcoma related survival with age and raised the question whether some elderly patients are being undertreated. They used US Surveillance Epidemiology and End Results (SEER) registry data to study 2586 persons 65 years of age or older with extremity soft tissue sarcoma and found a correlation between older age and decreased use of surgery and use of radiotherapy.

How Do We Get There?

We can benefit from improved tools to predict nononcologic morbidity and mortality in our patients. For example, Colinet et al. [5] described a disease specific comorbidity index specifically for nonsmall cell lung cancer, which they showed to be more accurate than CCI. Walters et al. [13] developed a simpler tool for predicting postinpatient mortality, whose measures included sex, number of independent activities of daily

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living at discharge, presence of congestive heart failure, cancer (solitary versus metastatic), creatinine and albumin levels. They reported improved risk prediction compared to CCI with receiver operator characteristic of 0.79 versus 0.68 for CCI [13]. A registry review of 5192 men with prostate cancer, more common in older men, the CCI was compared and to predict outcome better than other tested indices [3].

If predictors of morbidity and mortality, like the CCI, can be automatically computed in the background by electronic health records, they would be more likely to be utilized in clinical decision making. As a start, Hall et al. [8] have produced a simple spreadsheet macro to compute CCI. Increased convenience may lead to incorporation of quantified predictions of morbidity and mortality into the informed consent process. This was one of the recommendations by Guzzo et al. [7] who verified the predictive capacity of the CCI in more than 15,000 patients undergoing radical prostatectomy.

For now, I believe we should continue to operate on elderly patients with extremity soft tissue sarcoma when they are determined to be medically fit for surgery. As Ogura and colleagues have shown, perioperative mortality is a small fraction (0.9% to 4%) of predicted death due to cancer

(40% to 60%). A nihilistic approach to the elderly patient is inappropriate.

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