



Esophagectomy Surgical Apgar Score: One Size Fits All?

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Aoki et al present an interesting study assessing the ability of a simple tool to predict major morbidity after esophagectomy. This is an important topic as the ability to predict major morbidity in the early postoperative period could potentially identify high-risk patients, increase rescue rates, and improve outcomes. Additionally, such a score may allow clinicians to more accurately prognosticate in the immediate postoperative period.

The Surgical Apgar Score (SAS) was originally validated in General and Vascular Surgery patients.¹ In this cohort, each 2-point SAS category was associated with significantly worse mortality and major morbidity when compared with the next highest category.

Janowak et al modified the SAS based on estimated blood loss (EBL) at their institution in order to apply it to a cohort of esophagectomy patients and generate an esophagectomy SAS (eSAS).² They found that patients with an eSAS score of ≤ 6 were 2.55 times more likely to have major postoperative morbidity than those with eSAS > 6 . Conversely, Stroyer et al found no association between the original SAS, the eSAS as described by Janowak, or a modified SAS (mSAS) and postoperative major complications at their institution.³ mSAS is calculated using interquartile ranges of EBL in a study cohort. This study by Aoki et al attempts to clarify the relationship between eSAS, mSAS, and major morbidity. The authors suggest that while the eSAS (using Janowak et al cut points for EBL) is not associated with morbidity after esophagectomy, the mSAS (using cohort-specific EBL cut points) may be a useful tool.

There are a few issues that require careful consideration as the reader interprets the findings and associated inferences of this study. Unfortunately, the definition of major morbidity substantially limits the conclusions that can be drawn. Janowak et al define major morbidity using a combination of NSQIP⁴ and Clavien-Dindo⁵ classification systems and the authors of this paper have chosen to follow suit. In a supplementary analysis, the authors perform Fisher's exact test using the Clavien-Dindo definition alone. However, the logistic



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Central Message

Aoki et al examine the relationship between an esophagectomy Surgical Apgar Score and 30-day major morbidity after esophagectomy. The potential for a simple prediction tool for morbidity after esophagectomy is exciting. However, there are significant issues that affect the interpretation of these results the use of this score.

regression analysis and ROC analysis are performed using a nonvalidated definition of major comorbidity. The conclusions that can be drawn from this study are entirely dependent on this definition and this combined definition may be overestimating major morbidity at 68.7%. Although the authors present a rudimentary breakdown of major complications, these complications are not clearly described (eg, grade of complication) and this limits the ability of the reader to evaluate this information especially in the setting of a nonstandard definition of morbidity.

In addition to definitional issues relating to the outcome, there is a subtle issue that relates to the main exposure/predictor of interest. In this study, an mSAS score cutoff of <4 was determined using ROC analysis and Youden's index, which is an appropriate method of selecting a cutoff. However, presentation of the ROC curves and C-statistic for major morbidity and the eSAS/mSAS scores would allow the reader to better assess the performance of these scores as predictors. The mSAS and eSAS score cutoffs in this study differ from previous studies. Derivation of these cutoffs is based on the performance of the model in this study and is statistically appropriate. However, this implies that the mSAS cut points are specific to the

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Conflicts of Interest: None.

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institution and require hospital-level analysis prior to use. This may limit the clinical utility of this score in any other setting.

The issue of EBL cutoff and accuracy of EBL measurement are important limitations.

Visual estimation of blood loss has been shown to be both inaccurate and unreliable, regardless of discipline and experience.⁶ The authors correctly acknowledge that this is a limitation of the SAS in general; however, it remains a challenge in the use of these scores for both research and clinical purposes. Generation of cut points for EBL in eSAS and mSAS is a problem. In fact, each study examining eSAS or mSAS as a predictor of morbidity has used different, institution-specific cut points. Again, this would require hospital level analysis prior to use at an institution.

If this score is to be used as a clinical tool, the requirement of institution-level cut points for both EBL and what constitutes a high-risk mSAS score will limit its use. If it is to be used as a research or quality assurance tool, then the performance of this score needs to be compared to other models. In vascular and general surgery patients, the original SAS score was found to have a statistically significant ordinal association with both major complication and death and performed impressively in ROC analysis for both. However, it was shown to inferior to the more complex NSQIP morbidity

and mortality models. The value of the original score lies in its ease of use.

The potential for a simple risk stratification tool in esophagectomy patients is exciting. However, there are significant flaws in the evidence for both the eSAS and mSAS which will require further research with larger numbers and more rigorous definitions. That being said, the need to derive center-specific cutoffs may likely represent an irremediable death knell for the clinical utility of the eSAS or mSAS, regardless of any proliferation of larger studies that may follow.

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