Editorial

Clinical usefulness of the surgical Apgar score for estimating short-term and prognostic outcomes after esophagectomy

Naoya Yoshida[1,2], **Hideo Baba**[2]

[1]Division of translational research and advanced treatment against gastrointestinal cancer, Kumamoto University, Chuoku, Kumamoto 860-8556, Japan; [2]Department of Gastroenterological Surgery, Graduate School of Medical Sciences, Kumamoto University, Chuoku, Kumamoto 860-8556, Japan

Correspondence to: Hideo Baba, MD, PhD, FACS. Department of Gastroenterological Surgery, Graduate School of Medical Sciences, Kumamoto University, 1-1-1 Honjo, Chuoku, Kumamoto 860-8556, Japan. Email: hdobaba@ kumamoto-u.ac.jp.

Provenance: This is an invited Editorial commissioned by the Section Editor Shuang-Jiang Li, MD (Department of Thoracic Surgery and West China Medical Center, West China Hospital, Sichuan University, Chengdu, China).

Comment on: Nakagawa A, Nakamura T, Oshikiri T, *et al.* The Surgical Apgar Score Predicts Not Only Short-Term Complications But Also Long-Term Prognosis After Esophagectomy. Ann Surg Oncol 2017;24:3934-46.

Submitted May 28, 2018. Accepted for publication Jun 07, 2018.
doi: 10.21037/jtd.2018.06.40
View this article at: http://dx.doi.org/10.21037/jtd.2018.06.40

Esophagectomy for esophageal cancer is highly invasive and associated with frequent postoperative morbidity and mortality. Thus, it is considerably important to preoperatively evaluate the surgical risks and to develop a perioperative treatment strategy. To date, various predictors regarding immunity, inflammation, nutritional status, and physical status have been suggested to estimate short-term outcomes after esophagectomy. The neutrophil-to-lymphocyte ratio (1), controlling nutritional status (2), Glasgow prognostic score (3), Estimation of Physiologic Ability and Surgical Stress (4), and surgical Apgar score (SAS) (5) are the representative risk assessment tools for postoperative morbidity after esophagectomy. Postoperative morbidity may also correlate with a worsened survival outcome after esophagectomy (6,7). Thus, several risk predictors for short-term outcomes are concurrently suggested as useful to estimate long-term outcomes after esophagectomy (3,8,9).

Of these predictors, SAS uniquely consists of only intraoperative parameters such as the lowest mean arterial pressure, lowest heart rate, and estimated blood loss during surgery. In the current study, the authors retrospectively investigated 400 esophagectomies to assess the relationship between SAS and short-term/prognostic outcomes after esophagectomy. Finally, they elucidated that low SAS (≤5) could become an independent risk factor for postoperative morbidity classified as Clavien-Dindo grade≥3 and worse overall survival after esophagectomy. Subsequent analysis showed that SAS (≤5) was also associated with both respiratory and gastrointestinal morbidities. This study is clinically important because it is the first to indicate that SAS may be associated with long-term outcomes after esophagectomy.

Despite the clinical significance of SAS as a predictor of the worsened short-term and survival outcomes after esophagectomy, several queries why SAS and three parameters in it can reflect these outcomes exist. As authors mentioned, SAS takes only an instantaneous event in surgery. Duration of the lowest values are not considered. Notably, the lowest mean arterial pressure and heart rate can reflect various factors other than a patient's physical backgrounds such as depth of anesthesia, use of epidural anesthesia, use of circulating agent, use of hydroxyethyl starch, and fluid infusion balance. If the duration of the lowest values is long, the author's claim indicating a low SAS may reflect decreased organ perfusion and correlate with subsequent frequent morbidities are reasonable. However, if the duration is short, this reasoning should be reconsidered. Based on this perspective, further research, including both SAS and the duration of the lowest value of parameters, is necessary to establish the usefulness of SAS to estimate short-term outcomes after esophagectomy.

In clinical practice, we sometimes experience that intraoperative fluctuation of blood pressure and heart rate occur frequently in patients with severe arterial sclerosis, anemia, and hypoxia due to pulmonary disease and old age. Patients with low SAS may relate to unfavorable physical backgrounds, which can be causes of frequent postoperative morbidities. In this study, an SAS of ≤5 was associated with frequent smoking habits, hypoalbuminemia, an advanced cancer stage, and frequent neoadjuvant treatment. Those factors can become significant causes of postoperative morbidity (10-13). Thorough investigation of the correlation between SAS and a patient's background possibly explains the mechanism regarding why SAS correlates with worse short-term outcome.

Regarding the relationship between SAS and long-term outcomes, it does not make sense that a low SAS directly affects a worse prognosis after esophagectomy. However, frequent morbidities can become a potent cause of worsened survival outcomes in patients with a low SAS. Previous studies suggested that postoperative morbidity can correlate with a poor prognosis in various cancers (6,7,14,15). In these studies, continuing inflammation with hypercytokinemia, subsequent immune deficiency, and a lack of adjuvant treatment due to postoperative morbidities are discussed as a reason for a worsened survival outcome. Thus, authors had documented the information of adjuvant treatment in this study. From these viewpoints, SAS is not considered as a direct predictor, but as a potent surrogate marker of long-term outcomes after esophagectomy.

In this study, it is unclear how surgeons manage patients with low SAS. When we intraoperatively see a more significant blood loss, the lowest arterial pressure and high lowest heart rate, we may alter the postoperative treatment and outpatient follow-up strategy. However, a surgeon should not determine these strategies using only SAS. Notably, the intraoperative lowest arterial pressure and heart rate are affected by numerous factors unrelated to a patient's clinical background. Thus, patients who underwent esophagectomy should comprehensively be managed using both SAS and other clinicopathological factors associated with short-term and long-term outcomes after surgery.

In addition to the limitation that the authors mentioned, several additional limitations are considered. This study recruited patients for 10 years. This long period can be associated with historical biases regarding treatment strategies that may affect long-term outcomes after surgery. Moreover, because open esophagectomy is generally related to higher blood loss than that of minimally invasive esophagectomy, patients who undergo thoracotomy may tend to be included in the low SAS group, which can be a selection bias.

In conclusion, this study retrospectively elucidated that SAS is clinically useful for estimating both short-term and long-term outcomes after esophagectomy. However, SAS only reflects the instantaneous event during surgery; the mechanism regarding why SAS reflects these outcomes should be discreetly discussed. Further investigation with a larger cohort considering the duration of the lowest mean arterial pressure and heart rate is necessary to strengthen the importance of SAS during esophagectomy.

Acknowledgements

None.

Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

References

1. Vulliamy P, McCluney S, Mukherjee S, et al. Postoperative Elevation of the Neutrophil: Lymphocyte Ratio Predicts Complications Following Esophageal Resection. World J Surg 2016;40:1397-403.
2. Yoshida N, Baba Y, Shigaki H, et al. Preoperative Nutritional Assessment by Controlling Nutritional Status (CONUT) is Useful to estimate Postoperative Morbidity After Esophagectomy for Esophageal Cancer. World J Surg 2016;40:1910-7.
3. Vashist YK, Loos J, Dedow J, et al. Glasgow Prognostic Score is a predictor of perioperative and long-term outcome in patients with only surgically treated esophageal cancer. Ann Surg Oncol 2011;18:1130-8.
4. Yoshida N, Watanabe M, Baba Y, et al. Estimation of physiologic ability and surgical stress (E-PASS) can assess short-term outcome after esophagectomy for esophageal cancer. Esophagus 2013;10:86-94.
5. Eto K, Yoshida N, Iwatsuki M, et al. Surgical Apgar Score Predicted Postoperative Morbidity After Esophagectomy for Esophageal Cancer. World J Surg 2016;40:1145-51.
6. Baba Y, Yoshida N, Shigaki H, et al. Prognostic impact of postoperative complications in 502 patients with surgically resected esophageal squamous cell carcinoma: A retrospective single institution study. Ann Surg

2016;264:305-11.
7. Saeki H, Tsutsumi S, Tajiri H, et al. Prognostic significance of postoperative complications after curative resection for patients with esophageal squamous cell carcinoma. Ann Surg 2017;265:527-33.
8. Kosumi K, Baba Y, Ishimoto T, et al. Neutrophil/lymphocyte ratio predicts the prognosis in esophageal squamous cell carcinoma patients. Surg Today 2016;46:405-13.
9. Yoshida N, Harada K, Baba Y, et al. Preoperative controlling nutritional status (CONUT) is useful to estimate the prognosis after esophagectomy for esophageal cancer. Langenbecks Arch Surg 2017;402:333-41.
10. Yoshida N, Watanabe M, Baba Y, et al. Risk factors for pulmonary complications after esophagectomy for esophageal cancer. Surg Today 2014;44:526-32.
11. Goh SL, De Silva RP, Dhital K, et al. Is low serum albumin associated with postoperative complications in patients undergoing oesophagectomy for oesophageal malignancies? Interact Cardiovasc Thorac Surg 2015;20:107-13.
12. Sathornviriyapong S, Matsuda A, Miyashita M, et al. Impact of Neoadjuvant Chemoradiation on Short-Term Outcomes for Esophageal Squamous Cell Carcinoma Patients: A Meta-analysis. Ann Surg Oncol 2016;23:3632-40.
13. Kranzfelder M, Gertler R, Hapfelmeier A, et al. Chylothorax after esophagectomy for cancer: impact of the surgical approach and neoadjuvant treatment: systematic review and institutional analysis. Surg Endosc 2013;27:3530-8.
14. McSorley ST, Horgan PG, McMillan DC. The impact of the type and severity of postoperative complications on long-term outcomes following surgery for colorectal cancer: A systematic review and meta-analysis. Crit Rev Oncol Hematol 2016;97:168-77.
15. Watanabe Y, Nishihara K, Matsumoto S, et al. Effect of postoperative major complications on prognosis after pancreatectomy for pancreatic cancer: a retrospective review. Surg Today 2017;47:555-67.

Cite this article as: Yoshida N, Baba H. Clinical usefulness of the surgical Apgar score for estimating short-term and prognostic outcomes after esophagectomy. J Thorac Dis 2018;10(Suppl 18):S2103-S2105. doi: 10.21037/jtd.2018.06.40