

LETTERS TO THE EDITOR

Regarding “Derivation and validation of a practical risk score for prediction of mortality after open repair of ruptured abdominal aortic aneurysms in a U.S. regional cohort and comparison to existing scoring systems”

We read with interest the article by Robinson et al.¹ Several series have now questioned the validity of the Glasgow Aneurysm Score, Hardman Index, and Vancouver score in the prediction of outcome after ruptured abdominal aortic aneurysm (RAAA).^{2,3} The authors have now also demonstrated a lack of external validity for the Edinburgh Ruptured Aneurysm Score. These four risk-scoring instruments were all derived from clinically diverse Scottish, Australian, and Canadian specialist and nonspecialist vascular practices in an era of exclusively open surgical repair for RAAAs. Poor performance in a contemporary series of selected American patients undergoing open repair of RAAAs, that also offers emergency endovascular aneurysm repair is unsurprising.

Twenty years of clinical research has failed to clarify whether outcome in patients with RAAAs can be predicted accurately. The existing literature suggests there are patient-related preoperative variables associated with perioperative death after AAA rupture. However, it must be noted that population-related, institutional-related, health systems-related, and surgeon-related variables have a profound effect on outcome, too.^{4,5} When faced with such variability, the goal of a precise, reliable instrument with generalizable validity seems unattainable.

There are certain universal deficiencies common to the application of all scoring systems. Selection bias in the recruitment of patients to the original data set upon which a scoring instrument is derived can impair performance. The performance of a scoring system is said to work best when it is customized to the behavior of a local environment and population. As a result, our own risk modeling was unique and highly specific toward our data. When applied to data from other centers, it will fail to demonstrate the same good fit. Furthermore, with the introduction of endovascular repair of RAAAs, and the potential improvements in patient survival, risk-scoring data sets require further analysis, remodelling, or recalibration to ensure predictive power is maintained.

The quality and utility of the Vascular Study Group of New England (VSGNE) data is irrefutable. Although the number of patients turned down for surgical intervention and the proportion treated with endovascular aneurysm repair would enhance interpretation of the data, this series is a step in the right direction to develop accurate modern risk stratification tools for patients with RAAAs. The VSGNE has the opportunity to first apply the risk tool from this development data set on a separate VSGNE data set to confirm internal validity and permit fine-tuning before application to external data sets.

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Reply

We thank Tambyraja and colleagues for their thoughtful response to our recent manuscript. Tambyraja and colleagues in Edinburgh have extensive experience in this area of study, and they rightly point out that, even after 20 years of research, the prediction of outcome after repair of a ruptured abdominal aortic aneurysm (RAAA) has remained elusive.

These authors emphasize that the performance of any scoring system will always be best when applied to the local environment from which it is derived. We agree with this assessment, because there are many local factors related to the patient as well as to the institutions and surgeons that will affect outcome. Surgeons and institutions must therefore be ever mindful of the factors that impact outcome in their own environment so that clinical care and decision making can be optimized. Nevertheless, a scoring system with generalizable validity is a worthwhile goal because it allows for the risk adjustment that is necessary for fair and valid comparative audit. Given the strength of the Vascular Study Group of New England data set, we believe that this analysis represents progress toward that goal. We agree that validation of our scoring system in larger data sets, both internal and external, is necessary to show broad generalizability. We plan this in future work.

Tambyraja and colleagues also point out that the availability of endovascular aneurysm repair may affect the predictive ability of the scoring system in certain cohorts of patients. This is an excellent point that echoes the discussion in our article. We plan to validate this scoring system in patients undergoing endovascular repair of RAAA. We believe that a scoring system that accurately predicts outcome in patients undergoing open and endovascular repair of RAAA will have broad applicability and will allow for more accurate comparison of the outcomes of open and endovascular repair.