Impact of Discordant Views in the Management of Descending Thoracic Aortic Aneurysm

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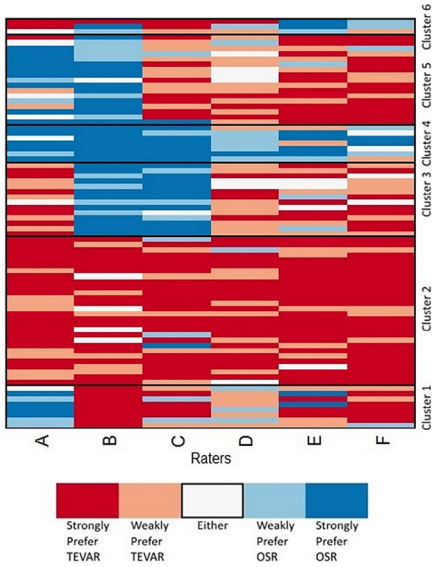
Thoracic endovascular aortic repair has a lower perceived risk than open surgical repair and has become an increasingly popular alternative. Whether general consensus exists regarding candidacy for either operation among open and endovascular specialists is unknown. A retrospective review of isolated descending thoracic aortic aneurysm at our institution between January 2005 and October 2015 was performed, excluding trauma and dissection. Two cardiac surgeons, 2 cardiovascular surgeons, 1 vascular surgeon, and 1 interventional radiologist gave their preference for open vs endovascular repair. Interobserver agreement was assessed with the kappa coefficient. *k*-means clustering agnostically grouped various patterns of agreement. The mean rating was predicted using least absolute shrinkage and selection operator regression. Negative binomial regression predicted the discrepancy between our panel of raters and the historical operation. Generalized estimating equation modeling was then used to evaluate the association between the extent of discrepancy and the adverse perioperative outcome. There were 77 patients with preoperative imaging studies. Pairwise interobserver agreement was only fair (median weighted kappa 0.270 [interquartile range 0.211-0.404]). Increasing age and proximal neck length predicted an increasing preference for thoracic endovascular aortic repair in our panel; larger proximal neck diameter predicted a general preference for open surgical repair. Increasing proximal neck diameter predicted a larger discrepancy between our panel and the historical operation. Greater discrepancy was associated with adverse outcome. Substantial disagreement existed among our panel,



Six evaluators disagreed on the optimal management of descending thoracic aortic aneurysm.

Central Message

Disagreements exist regarding the best management of isolated descending thoracic aortic aneurysm. Discussion among peers may help to identify high-complexity cases and to guide management decisions.

Perspective Statement

At a tertiary thoracic aortic referral center, 6 raters frequently disagreed on the optimal treatment of descending thoracic aortic aneurysm. An exploratory analysis suggested that an increasing discrepancy in recommendation may be associated with worse outcome. Regionalizing the care and use of a thoracic aortic surgery team composed of open and endovascular specialists may improve outcomes.

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and an exploratory analysis of the effect of increasing discrepancy demonstrated an association with adverse perioperative outcome. An investigation of the effect of a thoracic aortic team with open and endovascular specialists is warranted.

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INTRODUCTION

Thoracic endovascular aortic repair (TEVAR)—first introduced by Dake et al in 1992[1]—has become a popular alternative to open surgical repair (OSR) of descending thoracic aortic aneurysms as TEVAR has lower perceived morbidity and mortality risks.[2-4] However, despite improved periprocedural outcomes in TEVAR, the early advantage of endovascular repair appears to be negated at midterm follow-up.[4-7] The difference between modalities could be even smaller at selected thoracic aortic referral centers where outcomes with OSR are excellent.[8,9] The convergence of the survival curves has been attributed to a greater risk of late events among endovascular patients with actuarial freedom from reintervention ranging from 77% to 86% between 5 and 8 years.[5,10-12]

Recommendations on the appropriate use of TEVAR have been published,[11,13,14] but candidacy for either procedure remains a subjective decision. Whether consensus exists regarding the optimal treatment of patients with descending thoracic aortic aneurysm is unknown. We undertook the current study to evaluate whether open and endovascular specialists agreed on the management of descending thoracic aortic aneurysms and also to determine whether differences of opinion predicted periprocedural outcome.

METHODS

Patient Population

After the approval from the institutional review board at our institution, a retrospective analysis of patients who underwent operation for an isolated descending thoracic aortic aneurysm between January 2005 and October 2015 was performed using departmental databases. Additionally, the Stanford Translational Research Integrated Database Environment was queried using Current Procedural Terminology codes for arch and descending thoracic aortic repair (33870 and 33875) and endovascular stent graft placement (33880, 33881, 33883, and 33884). Patients with traumatic aortic injury or dissection spectrum processes (aortic dissection, intramural hematoma, and penetrating aortic ulcer) were excluded. Patients with thoracoabdominal (requiring visceral revascularization) or significant arch pathology (requiring innominate or left common carotid revascularization) were also excluded. Preoperative clinical characteristics and incidence of perioperative events were determined by a review of the medical record (Supplementary Appendix S1—Definitions). Presentation with ruptured descending thoracic aortic aneurysm was specified as a potential confounder a priori.[15-17]

Evaluation of Operative Preference

Treatment preference for TEVAR vs OSR was evaluated by asking 2 cardiac surgeons, 2 cardiovascular surgeons, 1 vascular surgeon, and 1 interventional radiologist to review representative preoperative images from either computerized tomographic angiography or magnetic resonance angiography, complete with the lengths of the proximal and distal landing zones and major axis measurements. Also included in the information provided was a brief clinical history—age, comorbidities, urgency, rupture status, previous operations, and presence of connective tissue disease—on a custom-designed Research Electronic Data Capture data form. Raters were blinded to the patient identity and the historical operation performed. Each surgeon's preference for open or endovascular repair was recorded on the following scale: strongly prefer TEVAR, weakly prefer TEVAR, either procedure, weakly prefer OSR, and strongly prefer OSR.

Outcomes

The primary adverse outcome was a composite of in-hospital death, stroke, paraplegia, myocardial infarction, or limb ischemia. The composite secondary outcome included pulmonary or renal complications. Pulmonary complication was defined as intubation of >48 hours, tracheostomy, treatment for pneumonia, or reintubation during hospitalization. Renal complication was defined as a rise in the creatinine level to >1.5 mg/dL and >1.5× baseline within 30 days of the operation or initiation of hemodialysis.

Statistical Analysis

We had 4 goals. First, we sought to delineate differences in the rating pattern among the 6 evaluators using nonparametric methods. Second, we assessed whether the discrepancy between our panel and the historical operation predicted adverse perioperative outcomes using generalized estimating equations. Third, we evaluated predictors of discrepancy between our panel's preference and the operation performed using negative binomial regression. Finally, we sought to identify clinical and anatomical characteristics that predicted our panel's preference with least absolute shrinkage and selection operator performed on linear regression (for more details, see Supplementary Appendix S2—Statistical Supplement). The latter 2 analyses would potentially identify a subset of patients who would benefit from further discussion. Because of the strictly exploratory nature of the analysis, no correction was made for multiple comparisons, and therefore the *P* values and the confidence intervals did not carry the same meaning as in a prospective randomized controlled trial.[18] Continuous variables were reported as either means with standard deviations or medians with interquartile ranges. Categorical variables are reported as counts with percentages. All *P* values were 2-sided, and a *P* value of <0.05 was considered statistically significant.