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PATIENT SELECTION AND DEVICE DEVELOPMENT ARE CRUCIAL FOR THORACIC ENDOVASCULAR AORTIC REPAIR IN TYPE A AORTIC DISSECTION

Reply to the Editor:

Yang and colleagues highlight several important points regarding the complicated management of patients with acute type A aortic dissection (TAAD). Despite recent advancement in surgical techniques, the surgical mortality for TAAD remains between 15% to 25% in current series,¹ which reflects the significant morbidity and mortality associated with open repair of TAAD. Furthermore, many more patients are deemed to be at too high risk for surgical repair, and the mortality with medical management approaches 90%. An endovascular treatment option for TAAD (Figure 1) thus might provide a therapeutic option for this unmet need and be a welcome advance for this highly lethal condition.

We agree that at present the long-term effects of wire-containing endografts in the ascending aorta are unknown. Decreased aortic compliance may lead to deleterious left ventricular hemodynamics in the long term. In their letter, Yang and colleagues point out that patients included in the study of Nienaber and colleagues² had significant comorbidities and may have been more susceptible to the negative effects of decreased aortic elasticity. It must be emphasized, however, that patients with an extensive burden of comorbid conditions are also more likely to die after surgical repair of TAAD. This is thus the patient population most likely to derive a mortality benefit from a less-invasive endovascular option for TAAD. Younger patients without extensive comorbidity should still undergo traditional open surgical repair until further data regarding endovascular repair are available.

Until recently, most endograft implantation in the ascending aorta has been performed with devices not specifically designed for this anatomic location. The different

FIGURE 1. Transapical approach for acute type A aortic dissection treated with thoracic endovascular aortic repair.

hemodynamic forces seen by the left ventricle after an ascending aorta endograft need to be carefully studied and applied in the engineering and design of new location and disease-specific devices. Currently, there is a paucity of research on this subject.

Yang and colleagues raise an important point regarding the current design of endografts for the ascending aorta, particularly with respect to coronary involvement. Improved preoperative imaging modalities may be useful in identifying patients with TAAD whose anatomy is suitable for a thoracic endovascular aortic repair approach. Ultimately, patient selection will be essential, and endovascular and open repair platforms should be viewed as potentially complementary strategies in the treatment of TAAD.

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THORACIC ENDOVASCULAR AORTIC REPAIR IN TYPE A AORTIC DISSECTION: INCHING TOWARD AN ENDOVASCULAR SOLUTION

Reply to the Editor:

Yang and colleagues¹ are certainly right in corroborating our statements regarding some shortcomings of the current generation stent grafts. These shortcomings are particularly relevant for grafts used in the ascending aorta, the aortic segment typically not only moving in 3-dimensional space but also changing dimensions with every systole.

First, current stent-graft technology is certainly still far from mimicking those beat-to-beat changes, and stent grafts are rather rigid. Such noncompliant fabric is thus likely to transmit steep pulse waves in absence of the physiologic Windkessel effect, both to the arch region and to the descending aorta, thereby provoking increased afterload to left ventricular contraction^{2,3} and possibly promoting heart failure in already failing hearts. This mechanism is well recognized and underlines current technologic limitations. Nevertheless, in some patients of advanced age, potentially with a host of comorbidities (disqualifying them for open surgery), the individual risk-benefit assessment may only allow a nonsurgical endovascular approach, considering the cumulative risk of thoracotomy, cardiopulmonary bypass, and cardiac arrest (regardless of the subsequent loss of Windkessel function). Moreover, surgical interposition grafts may have similar impact, because they also lead

to loss of compliance and reduction of Windkessel and untempered pulse waves and thus probably to similar effects on left ventricular afterload and vascular-ventricular coupling, with some inherent risk of promoting heart failure.⁴

Secondly, we realize certainly that not all cases of ascending aortic dissection are anatomically suitable to be considered for an endovascular approach, but rather at best between 30% and 50%.^{5,6} This is because of various limitations, including the involvement of coronaries or valve structures as we had clearly outlined, on the basis of electrocardiographically gated multidetector computed tomographic angiography as the current imaging standard.

Finally, our extremely careful selection of patients, as described in our article,⁷ appears to be the most likely reason for the encouraging early survival of more than 90% of those patients with type A aortic dissection not considered candidates for classic open repair. A broader endovascular application clearly depends on technologic progress to produce better and more suitable materials in sync with the complex motion and characteristics of the ascending aorta, but there is little doubt that we are inching toward the aortic valve.

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