W.Y.S. is a consultant and serves on an advisory board for Micro Interventional Devices, Inc, and has research grants from Edwards Lifesciences Corporation, Medtronic, Inc, LivaNova, and Bolton Medical. G.J.A. has nothing to disclose with regard to commercial support.

Authors have nothing to disclose with regard to commercial support.

References

1. Berretta P, Patel HJ, Gleason TG, Sundt TM, Myrmet T, Desai N, et al. IRAD experience on surgical type A acute dissection patients: results and predictors of mortality. *Ann Cardiothorac Surg.* 2016;5:346-51.
2. Nienaber CA, Sakalihasan N, Clough RE, Aboukoura M, Mancuso E, Yeh JS, et al. Thoracic endovascular aortic repair (TEVAR) in proximal (type A) aortic dissection: ready for a broader application? *J Thorac Cardiovasc Surg.* 2017;153:S3-11.

<http://dx.doi.org/10.1016/j.jtcvs.2017.04.038>

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.

Christoph Nienaber, MD, PhD^a

Rachel E. Clough, MD, PhD^b

James S. M. Yeh, MD, PhD^a

Xun Yuan, MD^a

^aCardiology and Aortic Centre

The Royal Brompton and Harefield NHS Foundation Trust
London, United Kingdom

^bDivision of Imaging Sciences and Biomedical Engineering
King's College London
London, United Kingdom

References

1. Yang TT, Chang TW, Chen YF. TEVAR in type A aortic dissection: exciting results with unsolved problems. *J Thorac Cardiovasc Surg.* 2017;154:1220-1.
2. Moulakakis KG, Mylonas SN, Kakisis J, Kadioglou NP, Papadakis I, Sfyroeras GS, et al. Arterial stiffness alterations and inflammatory response following endovascular aortic repair: based on a presentation at the 2013 VEITH Symposium, November 19-23, 2013 (New York, NY, USA). *Aorta.* 2015;3:75-80.
3. Ohyama Y, Ambale-Venkatesh B, Noda C, Chugh AR, Teixido-Tura G, Kim JY, et al. Association with aortic stiffness with left ventricular remodeling and reduced left ventricular function measured by magnetic resonance imaging: the multi-ethnic study of atherosclerosis. *Circ Cardiovasc Imaging.* 2016;9:e004426.
4. Spadaccio C, Nappi F, Al-Attar N, Sutherland FW, Acar C, Nenna A, et al. Old myths, new concerns: the long-term effects of ascending aorta replacement with Dacron grafts. Not all that glitters is gold. *J Cardiovasc Transl Res.* 2016;9:334-42.

5. Moon MC, Greenberg RK, Morales JP, Martin Z, Lu Q, Dowdall JF, et al. Computed tomography–based anatomic characterization of proximal aortic dissection with consideration for endovascular candidacy. *J Vasc Surg*. 2011;53:942-9.
6. Sobocinski J, O'Brien N, Maurel B, Bartoli M, Goueffic Y, Sassard T, et al. Endovascular approaches to acute aortic type A dissection: a CT-based feasibility study. *Eur J Vasc Endovasc Surg*. 2011;42:442-7.
7. Nienaber CA, Sakalihasan N, Clough RE, Aboukoura M, Mancuso E, Yeh JS, et al. Thoracic endovascular aortic repair (TEVAR) in proximal (type A) aortic dissection: Ready for a broader application? *J Thorac Cardiovasc Surg*. 2017;153:S3-11.

<http://dx.doi.org/10.1016/j.jtcvs.2017.06.050>