Detailed screening of the aortic arch, the ascending aorta, and aortic root morphology is critical. In the presence of predisposing factors, combined ascending aorta replacement should be considered.

Conflict of Interest Statement

Authors have nothing to disclose with regard to commercial support.

References

1. Vallabhajosyula P, Szeto W, Desai N, Bavaria JE. Type I and type II hybrid aortic arch replacement: postoperative and mid-term outcome analysis. *Ann Cardiothorac Surg.* 2013;2:280-7.
2. Canaud L, Hireche K, Berthet JP, Branchereau P, Marty-Ané C, Alric P. Endovascular repair of aortic arch lesions in high-risk patients or after previous aortic surgery: midterm results. *J Thorac Cardiovasc Surg.* 2010;140:52-8.
3. Canaud L, Ozdemir BA, Patterson BO, Holt PJ, Loftus IM, Thompson MM. Retrograde aortic dissection after thoracic endovascular aortic repair. *Ann Surg.* 2014;260:3889-95.
4. Totaro M, Miraldi F, Fanelli F, Mazzei G. Emergency surgery for retrograde extension of type B dissection after endovascular stent graft repair. *Eur J Cardiothorac Surg.* 2001;20:1057-8.
5. Neuhauser B, Czermak BV, Fish J, Perkmann R, Jaschke W, Chemelli A, et al. Type A dissection following endovascular thoracic aortic stent-graft repair. *J Endovasc Ther.* 2005;12:74-81.
6. Ishimaru S. Endografting of the aortic arch. *J Endovasc Ther.* 2004;11(Suppl 2):II62-71.
7. Canaud L, Joyeux F, Ziza V, Branchereau P, Marty-Ané C, Alric P. Hemi-aortic arch debranching for hybrid aortic arch repair by sequential transposition of the left common carotid and subclavian arteries. *J Thorac Cardiovasc Surg.* 2013;145:764-7.
8. Patterson B, Holt P, Nienaber C, Cambria R, Fairman R, Thompson M. Aortic pathology determines midterm outcome after endovascular repair of the thoracic aorta: report from the Medtronic Thoracic Endovascular Registry (MOTHER) database. *Circulation.* 2013;127:24-32.
9. Van Prehn J, Vincken KL, Muhs BE, Barwegen GK, Bartels LW, Prokop M, et al. Toward endografting of the ascending aorta: insight into dynamics using dynamic cine-CTA. *J Endovasc Ther.* 2007;14:551-60.
10. Kpodonu J, Preventza O, Ramaiah VG, Shennib H, Wheatley GH III, Rodriguez-Lopez J, et al. Retrograde type A dissection after endovascular stenting of the descending thoracic aorta. Is the risk real? *Eur J Cardiothorac Surg.* 2008;33:1014-8.
11. Neuhauser B, Greiner A, Jaschke W, Chemelli A, Fraedrich G. Serious complications following endovascular thoracic aortic stent-graft repair for type B dissection. *Eur J Cardiothorac Surg.* 2008;33:58-63.
12. Eggebrecht H, Thompson M, Rousseau H, Czerny M, Lönn L, Mehta RH, et al. Retrograde ascending aortic dissection during or after thoracic aortic stent graft placement: insight from the European registry on endovascular aortic repair complications. *Circulation.* 2009;120(11 Suppl):S276-81.
13. Dong ZH, Fu WG, Wang YQ, Guo da Q, Xu X, Ji Y, et al. Retrograde type A aortic dissection after endovascular stent graft placement for treatment of type B dissection. *Circulation.* 2009;119:735-41.
14. Williams JB, Andersen ND, Bhattacharya SD, Scheer E, Piccini JP, McCann RL, et al. Retrograde ascending aortic dissection as an early complication of thoracic endovascular aortic repair. *J Vasc Surg.* 2012;55:1255-62.
15. Kent WD, Appoo JJ, Bavaria JE, Herget EJ, Moeller P, Pochettino A, et al. Results of type II hybrid arch repair with zone 0 stent graft deployment for complex aortic arch pathology. *J Thorac Cardiovasc Surg.* 2014;148:2951-5.
16. Kpodonu J, Ramaiah VG, Diethrich EB. Intravascular ultrasound imaging as applied to the aorta: a new tool for the cardiovascular surgeon. *Ann Thorac Surg.* 2008;86:1391-8.

Key Words: aneurysm, aorta, aortic arch, stent-graft, retrograde type A dissection

EDITORIAL COMMENTARY

Nothing comes for free

Anthony L. Estrera, MD

See related article on pages 136-42.

From the Department of Cardiothoracic and Vascular Surgery, The University of Texas Medical School at Houston, Memorial Hermann Heart & Vascular Institute, Houston, Tex.

Disclosures: Author has nothing to disclose with regard to commercial support.

Received for publication April 17, 2015; accepted for publication April 17, 2015.

Address for reprints: Anthony L. Estrera, MD, Department of Cardiothoracic and Vascular Surgery, The University of Texas Medical School at Houston, 6400 Fannin St, Suite 2850, Houston, TX 77030 (E-mail: Anthony.L.Estrera@uth.tmc.edu). *J Thorac Cardiovasc Surg* 2015;150:142-4

0022-5223/\$36.00

Copyright © 2015 by The American Association for Thoracic Surgery

<http://dx.doi.org/10.1016/j.jtcvs.2015.04.041>

In 2005, the US Food and Drug Administration (FDA) approved the first device for the endovascular treatment of aneurysms of the descending thoracic aorta.¹ Since that time, improvements in technique and advancements in device design have led to improved outcomes with thoracic endovascular aortic repair (TEVAR). During the past decade, TEVAR has been applied for nearly all types of aortic pathology, becoming the prevailing therapeutic intervention in conditions such as traumatic transection, symptomatic penetrating ulcers, and acute complicated type B aortic dissection. Controversy,

FIGURE 1. Number of retrograde type A aortic dissections reported per year from 2005 through 2014 to the Food and Drug Administration (FDA) by way of the Manufacturer and User Facility Device Experience (MAUDE) database. (Note that some reports were synopses of recent articles on the topic of retrograde acute type A aortic dissection and were excluded. Only reports that included details of the case submitted, allowing confirmation of retrograde acute type A aortic dissection, were included.) IFU, Indications for use; TEVAR, thoracic endovascular aortic repair.

however, remained regarding other conditions such as acute uncomplicated type B and chronic complicated aortic dissection. Despite little high-level evidence to support its use for these more controversial aortic pathologies, the FDA expanded the indications of TEVAR. In 2013, the GORE TAG graft (W.L. Gore & Associates, Inc, Flagstaff, Ariz) was given approval for the treatment of acute and chronic type B aortic dissections,² shortly followed by the Medtronic Valiant Captivia (Medtronic Inc, Santa Rosa, Calif) in early 2014.³ Thus, by January 2014, the FDA had approved use of TEVAR for almost all pathologies of the thoracic aorta.

Although it is too early to determine the overall impact of the expanded indications for TEVAR, any increase in procedures volume will ultimately be associated with an increase in associated complications, such as retrograde acute type A aortic dissection (RTAAD), as is reported by Gandet and colleagues⁴ in this issue of the *Journal*.

In this study, Gandet and colleagues⁴ examined their experience with hybrid arch repair to determine clinical and morphologic variables associated with retrograde type A aortic dissection. From a reasonable experience (293 total TEVAR procedures over 12 years), Gandet and colleagues⁴ identified 32 “hybrid” arch procedures (proximal landing zone 0 or 1). In this group, the incidence of RTAAD was alarmingly high at 18%; fortunately, with expeditious treatment Gandet and colleagues⁴ were able to salvage 5 of 6 cases with ascending aortic repair. Factors associated with RTAAD included graft oversizing by more than 10%, obliteration of the sinotubular junction, arch anomalies, severe

angulation between the arch and the ascending aorta greater than 120°, and an indexed aortic size of at least 20 mm/m². These factors were somewhat intuitive and consistent with previous studies analyzing RTAAD. The importance of avoiding oversizing cannot be overemphasized, in line with a previous report from the Medtronic Thoracic Endovascular Registry (MOTHER) registry in which increased risk of RTAAD was observed for every 1% over 9% of oversizing when TEVAR was applied for acute type B aortic dissection.⁵ Another similarity with the MOTHER registry was the fact that the highest incidence of RTAAD occurred with the proximal landing zone 0. Although Gandet and colleagues’ report⁴ was more specific in that they focused on RTAAD with hybrid arch repair, the significance of the MOTHER registry report⁵ is that it highlighted the fact that RTAAD remains a significant complication after TEVAR and should not be ignored.

The Manufacturer and User Facility Device Experience (MAUDE) database is the repository for reports of adverse events associated with medical devices approved by the FDA.⁶ The reports are submitted to the FDA by mandatory participants, such as manufacturers, and by voluntary individuals, such as surgeons. After surveying the MAUDE database and searching for the term “retrograde aortic dissection” from 2005 (the year of approval for TEVAR) to 2014, all reported RTAAD events were tallied and listed in Figure 1.

As noted by this cursory review, the number of reported RTAAD events dramatically increased in 2014, to 19 events from baseline of 8 events. Although I acknowledge the

limitations of this voluntary reporting mechanism and that the overall totals of cases performed were not included, it was still noteworthy. More intriguing, however, was the fact that the increase in RTAAD events reported in 2014 occurred after the FDA expanded approval of TEVAR for other aortic pathologies, such as acute aortic dissection. *This makes one take pause.*

In the end, it is very easy to become enamored by the ease of endovascular therapies and the potential for improved outcomes as a result of less stress on the patient. We must always remember, however, that “nothing comes for free.”

References

1. US Food and Drug Administration. GORE TAG Thoracic Endoprosthesis—P040043. Available at: <http://www.fda.gov/MedicalDevices/ProductsandMedicalProcedures/DeviceApprovalsandClearances/Recently-ApprovedDevices/ucm078658.htm>. Accessed April 1, 2015.
2. WL Gore & Associates. Instructions for use for: GORE TAG thoracic endoprosthesis—conformable. Available at: http://www.accessdata.fda.gov/cdrh_docs/pdf4/p040043s051c.pdf. Accessed April 16, 2015.
3. US Food and Drug Administration. January 2014 PMA Approvals (approval for Valiant thoracic stent graft with Captivia delivery system). Available at: <http://www.fda.gov/medicaldevices/productsandmedicalprocedures/deviceapprovalsandclearances/pmaapprovals/ucm392347.htm>. Accessed April 16, 2015.
4. Gandet T, Canaud L, Ozdemir BA, Ziza V, Demaria R, Albat B, et al. Factors favoring retrograde aortic dissection after endovascular aortic arch repair. *J Thorac Cardiovasc Surg*. 2015;150:136–42.
5. Canaud L, Ozdemir BA, Patterson BO, Holt PJ, Loftus IM, Thompson MM. Retrograde aortic dissection after thoracic endovascular aortic repair. *Ann Surg*. 2014;260:389–95.
6. US Food and Drug Administration. MAUDE adverse event report: W.L. Gore & Associates GORE® TAG® thoracic endoprosthesis system, endovascular graft, aortic aneurysm treatment. Available at: https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfMAUDE/Detail.CFM?MDRFOI_ID=4413964. Accessed April 4, 2015.