point out that this group of patients likely underwent endovascular repair because of a poor physiologic state and that this alone may account for the poor results. The fact that the onset of infection, 24.8 months in the open group and 24 months in the endovascular group, did not differ suggests a similar mechanism of infection. Reducing the risk of this difficult complication is an important area of ongoing study.¹¹

References

1. Nissen AP, Sandhu HK, Mushtaq H, Miller CC III, Safi HJ, Estrera AL, et al. Resection and replacement of thoracic aortic graft infections. *J Thorac Cardiovasc Surg*. 2021;162:1-8.
2. Okita Y, Yamanaka K, Okada K. Opinion: aortic graft infection—any guidelines or just surgeon's experience lines! *Semin Thorac Cardiovasc Surg*. 2019;31:674-8.
3. Kahlberg A, Grandi A, Loschi D, Vermassen F, Moreels N, Chakfé N, et al. A systematic review of infected descending thoracic aortic grafts and endografts. *J Vasc Surg*. 2019;69:1941-51.e1.
4. Hostalrich A, Ozdemir BA, Sfeir J, Solovei L, Alric P, Canaud L. Systematic review of native and graft-related aortic infection outcome managed with orthotopic xenopericardial grafts. *J Vasc Surg*. 2019;69:614-8.
5. Bianco V, Kilic A, Gleason TG, Arnaoutakis GJ, Sultan I. Management of thoracic aortic graft infections. *J Card Surg*. 2018;33:658-65.
6. Corvera JS, Blitzer D, Copeland H, Murphy D, Hess PJ Jr, Pillai ST, et al. Repair of thoracic and thoracoabdominal mycotic aneurysms and infected aortic grafts using allograft. *Ann Thorac Surg*. 2018;106:1129-35.
7. Li HL, Chan YC, Cheng SW. Current evidence on management of aortic stent-graft infection: a systematic review and meta-analysis. *Ann Vasc Surg*. 2018;51:306-13.
8. Kreibich M, Siepe M, Morlock J, Beyersdorf F, Kondov S, Scheumann J, et al. Surgical treatment of native and prosthetic aortic infection with xenopericardial tube grafts. *Ann Thorac Surg*. 2018;106:498-504.
9. Masabni K, Weaver MR, Kandagatla P, Shepard AD, Huang J, Al Adas Z, et al. Cryopreserved allograft in the management of native and prosthetic aortic infections. *Ann Vasc Surg*. 2019;56:1-10.
10. Weiss S, Tobler EL, von Tengg-Kobligh H, Makaloski V, Becker D, Carrel TP, et al. Self made xeno-pericardial aortic tubes to treat native and aortic graft infections. *Eur J Vasc Endovasc Surg*. 2017;54:646-52.
11. Wilson WR, Bower TC, Creager MA, Amin-Hanjani S, O'Gara PT, Lockhart PB, et al; American Heart Association Committee on Rheumatic Fever, Endocarditis, and Kawasaki Disease of the Council on Cardiovascular Disease in the Young; Council on Cardiovascular and Stroke Nursing; Council on Cardiovascular Radiology and Intervention; Council on Cardiovascular Surgery and Anesthesia; Council on Peripheral Vascular Disease; and Stroke Council. Vascular graft infections, mycotic aneurysms, and endovascular infections: a scientific statement from the American Heart Association. *Circulation*. 2016;134:e412-60.

See Article page 1.

Commentary: The next quarter century

Dawn S. Hui, MD, and Andrea J. Carpenter, MD, PhD

In this edition of the *Journal*, Nissen and colleagues¹ report on nearly a quarter century's experience with the management of thoracic aortic graft infections. Of interest is the year in which the study period ended; 2013 was the year in which the US Food and Drug Administration added acute and chronic type B aortic dissection as indications for use of the Conformable GORE TAG Thoracic Endoprosthesis (W.L. Gore and Associates, Inc, Flagstaff, Ariz). It was also the year that Nienaber and associates² published the 5-year results of the Investigation of Stent Grafts in Aortic Dissection with Extended Length of Follow-up (INSTEAD-

Dawn S. Hui, MD (left), and Andrea J. Carpenter, MD, PhD (right)

CENTRAL MESSAGE

The excellent surgical results obtained in the treatment of thoracic aortic graft infections is less fully realized with endografts. This is significant in the face of expanding TEVAR indications.

XL) trial, showing that elective thoracic endovascular aortic repair (TEVAR) of uncomplicated type B aortic dissections had superior outcomes compared to best medical therapy alone for all-cause mortality, aorta-specific mortality, and aortic disease progression. Just a few months later, Bavaria

From the Department of Cardiothoracic Surgery, University of Texas Health Science Center at San Antonio, San Antonio Tex.

Disclosures: Authors have nothing to disclose with regard to commercial support.

Received for publication Nov 16, 2019; accepted for publication Nov 18, 2019; available ahead of print Dec 9, 2019.

Address for reprints: Dawn S. Hui, MD, 7703 Floyd Curl Dr, Suite 211L, San Antonio, TX 78229 (E-mail: huid@uthscsa.edu).

J Thorac Cardiovasc Surg 2021;162:10-1

0022-5223/\$36.00

Copyright © 2019 by The American Association for Thoracic Surgery

<https://doi.org/10.1016/j.jtcvs.2019.11.087>

and colleagues³ presented the findings of the DISSECTION trial for acute complicated type B dissections, which was rapidly followed by US Food and Drug Administration approval of the Valiant Captivia System (Medtronic Inc, Minneapolis Minn) for the treatment of type B aortic dissections.

Although the study period of Nissen and colleagues¹ predates these landmark events, the study findings may be most significant for the imminent wave of patients who will undergo TEVAR for acute or chronic dissections, or for aneurysmal degeneration. In the entire cohort, 30-day mortality of thoracic aortic graft infection treatment was a very respectable 9.4%, despite more than one-third of the patients having aortic fistulization. Comparison with a cohort of patients without infection undergoing aortic reoperations showed similar 5-year overall and reinfection-free survivals. These excellent results are likely due to aggressive treatment, with a mean time of 4 to 5 days from admission to intervention and nearly 75% of patients having vascularized tissue coverage, a factor that was associated with a 30-day mortality of 0%. One group, however, did not benefit from such excellent results. Among patients with endograft infection, surgical treatment was universally fatal, with 0% survival at 2.5 months. Although Nissen and colleagues¹ cite advanced age and concomitant aortic fistulization as potential confounders, this group, albeit representing a small proportion of the study (12.5%), is one to which aortic surgeons should pay heed.

Examination of the existing TEVAR literature is helpful but limited. In the INSTEAD-XL trial, none of the early or late aorta-related events (death or additional open surgery) were related to infectious etiologies (C. Nienaber, personal communication, November 11, 2019). The population was highly selected, however, with only 23% of those screened enrolled into the study. In observational studies, Szeto and coworkers⁴ reported the rate of reintervention for thoracic endografts to be 11.7%, of which only 3.75% were for infectious complications. This institution also reported the overall incidence of aortic endograft infection (both abdominal and thoracic) at 0.6%, with a notable increase in

hospital transfers for this problem in the latter half of the study.⁵ Of the 6 patients with TEVAR infections, 4 were deemed to have inoperable disease and were managed conservatively; of the other 2, who underwent explantation, only 1 survived at 24.7 months' follow-up. Notably, these studies were also before the expansion of TEVAR indications and were from another highly experienced aortic center.

As TEVAR undergoes implementation beyond clinical trial conditions and by an expanding pool of operators, the small cohort of 4 endograft patients in the study of Nissen and colleagues¹ and the patients from the University of Pennsylvania group may serve as a cautionary tale. Of special consideration are patients undergoing TEVAR for blunt trauma. In addition to the lack of good quality registry data and loss of follow-up that characterize the trauma population, coexisting injuries (such as splenic injury requiring splenectomy or resulting in hyposplenism) and the emergency or urgent nature of intervention may increase the risk of infection. For all patients with aortic disease, the condition remains a lifelong risk, even after treatment. As we move into the new age of TEVAR for long-term benefit, we should keep in mind the small but significant signal raised by the article of Nissen and colleagues.¹

References

1. Nissen AP, Sandhu HK, Mashtaq H, Miller CC III, Safi HJ, Estrera AL, et al. Resection and replacement of thoracic aortic graft infections. *J Thorac Cardiovasc Surg*. 2021;162:1-8.
2. Nienaber CA, Kische S, Rousseau H, Eggebrecht H, Rehders TC, Kundt G, et al; INSTEAD-XL trial. Endovascular repair of type B aortic dissection: long-term results of the randomized Investigation of Stent Grafts in Aortic Dissection trial. *Circ Cardiovasc Interv*. 2013;6:407-16.
3. Bavaria JE, Brinkman WT, Hughes GC, Khojenezhad A, Szeto WY, Azizzadeh A, et al. Outcomes of thoracic endovascular aortic repair in acute type B aortic dissection: results from the Valiant United States Investigational Device Exemption Study. *Ann Thorac Surg*. 2015;100:802-8; discussion 808-9.
4. Szeto WY, Desai ND, Moeller P, Moser GW, Woo EY, Fairman RM, et al. Reintervention for endograft failures after thoracic endovascular aortic repair. *J Thorac Cardiovasc Surg*. 2013;145(3 Suppl):S165-70.
5. Murphy EH, Szeto WY, Herdrich BJ, Jackson BM, Wang GJ, Bavaria JE, et al. The management of endograft infections following endovascular thoracic and abdominal aortic aneurysm repair. *J Vasc Surg*. 2013;58:1179-85.