warrants further investigation, with multicenter randomized clinical trials.

References

1. Bavaria JE, Appoo JJ, Makaroun MS, Verter J, Yu ZF, Mitchell RS, Gore TAG Investigators. Endovascular stent grafting versus open surgical repair of descending thoracic aortic aneurysms in low-risk patients: a multicenter comparative trial. *J Thorac Cardiovasc Surg*. 2007;133:369-77.
2. Makaroun MS, Dillavou ED, Kee ST, Sicard G, Chaikof E, Bavaria J, et al. Endovascular treatment of thoracic aortic aneurysms: results of the phase II multicenter trial of the GORE TAG thoracic endoprosthesis. *J Vasc Surg*. 2005;41:1-9.
3. Nienaber CA, Fattori R, Lund G, Dieckmann C, Wolf W, von Kodolitsch Y, et al. Nonsurgical reconstruction of thoracic aortic dissection by stent-graft placement. *N Engl J Med*. 1999;340:1539-45.
4. Moon MR, Dake MD, Pelc LR, Liddell R, Castro LJ, Mitchell RS, et al. Intravascular stenting of acute experimental type B dissections. *J Surg Res*. 1993;54:381-8.
5. Dake MD, Miller DC, Semba CP, Mitchell RS, Walker PJ, Liddell RP. Transluminal placement of endovascular stent-grafts for the treatment of descending thoracic aortic aneurysms. *N Engl J Med*. 1994;331:1729-34.
6. Szeto WY, McGarvey M, Pochettino A, Moser GW, Hoboken A, Cornelius K, et al. Results of a new surgical paradigm: endovascular repair for acute complicated type B aortic dissection. *Ann Thorac Surg*. 2008;86:87-93.
7. Zeeshan A, Woo EY, Bavaria JE, Fairman RM, Desai ND, Pochettino A, et al. Thoracic endovascular aortic repair for acute complicated type B aortic dissection: superiority relative to conventional open surgical and medical therapy. *J Thorac Cardiovasc Surg*. 2010;140(6 Suppl):S109-15.
8. Verhoye JP, Miller DC, Sze D, Dake MD, Mitchell RS. Complicated acute type B aortic dissection: midterm results of emergency endovascular stent-grafting. *J Thorac Cardiovasc Surg*. 2008;136:424-30.
9. Pearce BJ, Passman MA, Patterson MA, Taylor SM, Lecroy CJ, Combs BR, et al. Early outcomes of thoracic endovascular stent-graft repair for acute complicated type B dissection using the Gore TAG endoprosthesis. *Ann Vasc Surg*. 2008;22:742-9.
10. Nienaber CA, Rousseau H, Eggebrecht H, Kische S, Fattori R, Rehders TC, et al. Randomized comparison of strategies for type B aortic dissection: the INvestigation of STEnt Grafts in Aortic Dissection (INSTEAD) trial. *Circulation*. 2009;120:2519-28.
11. Nienaber CA, Kische S, Rousseau H, Eggebrecht H, Rehders TC, Kundt G, et al. 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.
12. 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.
13. Bavaria J, Brinkman W, Hughes GC, Khojenezad A, Szeto WY, Azizzadeh A, et al. Outcomes of TEVAR in acute type B aortic dissection: results from the Valiant US-IDE Study. *Ann Thorac Surg*. (in press).
14. W.L. Gore and Associates. Evaluation of the GORE Conformable TAG® Thoracic Endoprosthesis for treatment of acute complicated type B aortic dissection. Available at: <http://clinicaltrials.gov/ct2/show/study/NCT00908388?sect=X870156>. Accessed September 14, 2014.
15. Fattori R, Montgomery D, Lovato L, Kische S, Di Eusanio M, Ince H, et al. Survival after endovascular therapy in patients with type B aortic dissection: a report from the International Registry of Acute Aortic Dissection (IRAD). *JACC Cardiovasc Interv*. 2013;6:876-82.

EDITORIAL COMMENTARY

Timing in life is everything

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See related article on pages S151-6.

Complicated acute type B aortic dissection (cTBAD) is one of most challenging clinical scenarios encountered in clinical practice of cardiovascular surgeons. Technical aspects and outcomes associated with open repair have been challenging. Thoracic endovascular repair (TEVAR) has resulted in at least 50% reductions in mortality and neurologic complications relative to open repair.¹ The aortic surgical community has therefore recommended a change of paradigm to

TEVAR as the primary approach for these patients in the last 5 years.²

In this issue of the *Journal of Thoracic and Cardiovascular Surgery*, Desai and coworkers³ add to the growing literature evaluating the relationship between the timing of TEVAR and disease- and procedure-related complications in patients with cTBAD.³ In this cohort, the rates of major adverse events, including death, permanent neurologic deficit, renal failure, and retrograde type A dissection, were 39.4% for patients treated within the first 2 days of symptoms, 27.3% for patients treated within 2 to 14 days, and 5.5% for those treated between 14 and 45 days, with the difference statistically significant ($P = .04$) for all acute versus subacute cases. Now, the definition of the subacute phase in the literature is 14 days to 3 months. It is unclear to me why Desai and coworkers³ decided to exclude patients treated between 45 and 90 days. Inclusion of the entire subacute cohort out to 3 months might have changed or softened the statistical significance. Needless to say, it is highly recommended to use similar criteria for patient selection and outcome reporting as are used in the literature, so as to have apples-to-apples comparisons among studies.

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So, what is the ramification of the data presented by Desai and coworkers?³ It is not to support TEVAR for cTBAD! This has been proven by many other studies,^{1,2} and the US Food and Drug Administration has already approved stent-grafts from 2 different manufacturing companies for this indication. The article of Desai and coworkers³ does provide a very valuable insight into the optimal timing for TEVAR in this complex cohort of patients in a high-volume center, and affirms the notion that delayed endovascular intervention—preferably after 2 weeks—is associated with improved outcome. The results are consistent with the VIRTUE Registry, a prospective multicenter European registry of 100 patients with uncomplicated type B aortic dissection undergoing TEVAR in the acute, subacute (2-12 weeks), and chronic phases after the index presentation.⁴ The 3-year follow-up of VIRTUE Registry patients revealed that mortality among patients undergoing TEVAR in the subacute phase was one-quarter that among patients in the acute phase and one-sixth that among patients with chronic type B aortic dissection. Furthermore, the rates of retrograde type B aortic dissection and adverse neurologic events were significantly lower among patients treated in the subacute phase.

One might argue that in the case of patients with true cTBAD, the treating surgeon does not have the luxury to delay TEVAR until the subacute phase in the hope of improving outcomes. The capacity to delay the endovascular approach certainly exists for patients with high-risk uncomplicated type B dissection, however, and for patients in whom the dissection is deemed completely uncomplicated. Although solid data are missing to support TEVAR for the later group, the first multicenter European study demonstrated improved survival and reverse aortic remodeling with TEVAR relative to medical therapy for uncomplicated type B aortic dissection.⁵ Two prospective upcoming trials from the National Institutes of Health grant and the International Registry of Aortic Dissection should provide more evidence in this controversial area.

Last but not least, retrograde type A aortic dissection may become the Achilles heel of TEVAR for all type B dissection, and with a 6.8% to 8.5% incidence, the study of Desai and coworkers³ had a relatively high rate of retrograde type A aortic dissection. In more than 1000 patients entered into the Medtronic Outcomes of Thoracic Endovascular Repair (MOTHER) registry, the incidences of retrograde type A aortic dissection after TEVAR were 4.3% (5/114) for acute aortic dissection, 3% (6/195) for chronic dissection, and 0.7% (5/670) for patients treated for degenerative aneurysm.⁶ The etiology of retrograde type A aortic dissection is multifactorial and is associated with patient, procedural, and postprocedural factors.⁷ Any oversizing, or ballooning, along with any iatrogenic injury to the proximal unstented portion of the aorta, predisposes the patient toward retrograde type A aortic dissection, and the development of “dissection-specific” stent-grafts is expected to reduce the incidence of this horrible complication.

References

1. Khoynezhad A, Donayre CE, Omari BO, Kopchok GE, Walot I, White RA. Midterm results of endovascular treatment of complicated acute type B aortic dissection. *J Thorac Cardiovasc Surg*. 2009;138:625-31.
2. Khoynezhad A, Donayre CE, White RA. Endovascular management of acute complicated type B aortic dissection in North America. *Rev Cardiovasc Med*. 2012;13:e176-84.
3. Desai DN, Gottret JP, Szeto WY, McCarthy F, Moeller P, Menon R, et al. Impact of timing on major complications after TEVAR for acute type B aortic dissection. *J Thorac Cardiovasc Surg*. 2015;149:S151-6.
4. VIRTUE Registry Investigators. Mid-term outcomes and aortic remodelling after thoracic endovascular repair for acute, subacute, and chronic aortic dissection: the VIRTUE Registry. *Eur J Vasc Endovasc Surg*. 2014;48:363-71.
5. 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.
6. 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.
7. Khoynezhad A, White RA. Pathogenesis and management of retrograde type A aortic dissection after thoracic endovascular aortic repair. *Ann Vasc Surg*. 2013;27:1201-6.