Impact of Proximal Seal Zone in Managing Type B Aortic Dissection

A look at how zone 2 involvement and proximal seal affect TEVAR outcomes for TBAD.

BY JOSEPH V. LOMBARDI, MD

Zone 2 involvement (ie, disease extending to the aortic segment between the distal margin of left common carotid artery [LCCA] and distal margin of the left subclavian artery [LSA]) in type B aortic dissection (TBAD) can be a dilemma for surgeons who perform thoracic endovascular aortic repair (TEVAR). Although landing in healthy aorta is always the goal, many surgeons proceed with placing the stent graft in a suboptimal landing zone with disease involvement (frank dissection or, more commonly, intramural hematoma [IMH]) or inadequate sealing length.

In the STABLE studies, the protocols required that TBAD did not extend proximal to the LSA and a ≥ 20-mm proximal landing zone length between the LCCA and the most proximal extent of dissection. Although these criteria were met according to best site assessments, centralized core laboratory analysis of the three-dimensional reconstructed CT imaging indicated that many patients exhibited more extensive dissections. The reason for this inconsistency is multifactorial. When patients present in the acute setting and need emergent treatment, it can be difficult to obtain a full evaluation of the entire proximal landing zone as thoroughly as the core laboratory. Also, no current standards allow for consistent categorization of full disease involvement in the proximal seal zone, which may also have contributed to inconsistency in imaging assessment among surgeons and sites. Needless to say, this phenomenon likely occurs with a similar or greater frequency in the "real world," outside the confines of a clinical trial.

The effect on suboptimal proximal seal zone on outcomes after endovascular TBAD repair has not been well studied in the literature. The literature that does exist suggests that landing in an unhealthy aorta increases the risk of retrograde dissection. In a study by Kuo et al involving 71 patients who underwent TEVAR for complicated TBAD, a majority (63%) had a proximal seal zone entirely in IMH or dissected aorta.[1] During a mean follow-up of 14 months, two confirmed cases and one suspected case of retrograde dissection occurred exclusively in the patients with circumferential IMH in the landing zone. In the STABLE I and II studies, it was also found that most patients who experienced retrograde dissection or proximal type I entry flow had inadequate proximal landing zone by core laboratory analysis.[2,3]

Recently, the effects of the achieved proximal seal length on outcomes from the STABLE studies have been studied.[4] This analysis included 110 patients from the STABLE I and STABLE II studies who were treated for acute TBAD and who had available core laboratory measurements for the achieved seal length, calculated as the difference between available seal length (from the LCCA to the proximal extent of dissection) on preprocedure CT and uncovered length (from the LCCA to the first 360° visualization of the stent) on postoperative CT. Based on the achieved seal length, these 110 patients were divided into four groups: ≥ 20 mm (n = 19), 10 to < 20 mm (n = 25), 0 to < 10 mm (n = 36), and < 0 mm (n = 30). The low proportion of patients who achieved 20 mm of proximal seal was due to not only inadequate seal zone to begin with in some patients but also inadequate use of available sealing zone during device deployment in additional patients. For example, in patients who required stent graft delivery adjacent to the LCCA, the investigators tended to be more cautious for fear of covering the carotid orifice.

We examined a composite outcome of device events (proximal type I entry flow, device migration, transaortic growth > 5 mm, or retrograde dissection) and observed an inverse relationship between this outcome and achieved seal length. The cumulative rate of this outcome at a mean follow-up of 39.6 ± 20.4 months was lowest in patients with proximal seal length of ≥ 20 mm (15.8%), and this rate increased as the seal length decreased: 32.0% for seal length of ≥ 10 to < 20 mm, 52.8% for ≥ 0 to < 10 mm, and 60.0% for < 0 mm (P < .01, Cochran-Armitage trend test).

These results highlight the importance, albeit with many challenges, of landing an endograft in healthy and

stable aorta in patients requiring urgent management for complicated TBAD. Emergent TEVAR with inadequate seal length should lead to heightened surveillance algorithms for retrograde extension and early aneurysm formation. Utilization of intraoperative transesophageal echocardiography and predischarge CTA can be useful in establishing baseline anatomical characteristics and early diagnosis of aortic-related morbidity. ■

1. Kuo EC, Veranyan N, Johnson CE, et al. Impact of proximal seal zone length and intramural hematoma on clinical outcomes and aortic remodeling after thoracic endovascular aortic repair for aortic dissections. J Vasc Surg. 2019;69:987-995.
2. Lombardi JV, Cambria RP, Nienaber CA, et al. Prospective multicenter clinical trial (STABLE) on the endovascular treatment of complicated type B aortic dissection using a composite device design. J Vasc Surg. 2012;55:629-640.e2.
3. Lombardi JV, Gleason TG, Panneton JM, et al. STABLE II clinical trial on endovascular treatment of acute, complicated type B aortic dissection with a composite device design [published online August 30, 2019]. J Vasc Surg.
4. Lombardi JV, Famularo M, Seale MM, et al. RS08. Inadequate proximal seal length predicts complications after endovascular repair of acute type B aortic dissection. J Vasc Surg. 2018;67:e240.

Joseph V. Lombardi, MD
Head, Division of Vascular and Endovascular Surgery
Professor of Surgery
Cooper Medical School of Rowan University
Director, Cooper Aortic Center
Cooper University Health Care
Camden, New Jersey
lombardi-joseph@cooperhealth.edu
Disclosures: Speaker, consultant, and principal investigator for Cook Medical.