Longer is better, discussing length of coverage and timing of intervention in type B aortic dissection

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Aortic dissection remains one of the most fascinating and challenging aortic pathologies. Despite thoracic endovascular aneurysm repair (TEVAR) becoming the treatment of choice for most aortic pathologies, there is a paucity of level I evidence to guide its use. When deciding how best to treat patients with type B aortic dissection (TBAD), several factors must be taken into consideration and two main questions must be addressed. First, what are we treating (ie, acute, chronic, complicated, uncomplicated), and, second, why are we treating it (eg, organ ischemia, remodeling, improving long-term survival)? Regardless of the type of therapy chosen, optimal medical therapy is always necessary to ensure positive outcomes before, during, and after a procedure.

TIMING OF PROCEDURE

Although type A aortic dissection and acute complicated TBAD are treated emergently, the appropriate timing to treat in uncomplicated patients is still debated. Desai et al[1] divided the timing of treatment into acute-early (0-48 hours), acute-delayed (48-hours to 2-weeks), and subacute (2-6 weeks) phases. They concluded that treatment in the acute phases was associated with a higher risk of severe complications, including a higher risk of retrograde type A dissection (RTAD) in the acute-early phase.[1] Conversely, Beck et al[2] have shown in a recent review of Vascular Quality Initiative data of TEVAR for uncomplicated TBAD that early intervention (1-14 days) was not associated with increased complications. In fact, they showed a slight survival benefit (not statistically significant) in the early treatment (1-14 days) group. However, interventions within 24 hours were associated with a higher risk of serious complications.[2] In our study of RTAD after TEVAR for TBAD, we did not find any statistically significant correlation between the timing of TEVAR and RTAD.[3]

LENGTH OF COVERAGE IN ACUTE COMPLICATED AND HIGH-RISK TBAD

In acute complicated TBAD, treatment is usually emergent due to organ ischemia or rupture. Although renal ischemia can be treated urgently at times, mesenteric ischemia and lower extremity ischemia are absolute emergencies. Thus, prioritization should be given to managing ischemic tissue beds and restoring blood flow to these regions. The length of coverage is thus determined by achieving these goals. Occasionally, coverage of the proximal entry tear is sufficient, although longer coverage is sometimes needed to reexpand the true lumen and improve flow to ischemic organs and the lower limbs. Intravascular ultrasound (IVUS) is an essential tool that can show true lumen expansion status and rule out the presence of dynamic flap obstruction. There are several methods to restore and improve flow to the true lumen using a variety of covered and uncovered grafts such as the PETTICOAT (provisional extension to induce complete attachment) and STABILISE (stent assisted balloon induced intimal disruption and relamination in aortic dissection repair) techniques. However, our preferred approach is increasing coverage with stent grafts until the true lumen is no longer compromised. We start by covering the proximal tear and then evaluate visceral segment perfusion with IVUS. If the true lumen is still compromised, we then extend coverage with stent grafts to approximately 2 cm above the level of the celiac artery. We reevaluate again with a combination of IVUS and angiography to determine if adjunctive stenting to visceral, renal, or iliac arteries is necessary. Other adjuncts such as suction thrombectomy are also needed at times.

To achieve adequate coverage of the proximal tear, venturing into the aortic arch is often necessary. We have found in our own practice that deploying the stent graft proximal to zone 3 was performed in 60% to 70% of our cases. Our practice has been supported by data from Mesar et al,[4] which show that erring on the side of more proximal deployment (zones 2 and 3) is associated with a reduced risk of morbidity and mortality.

TBADs with high-risk features have been associated with increased risks of morbidity and mortality. It is our practice to treat these patients during the index hospitalization. We typically start with anti-impulse therapy in the intensive care unit. Patients with continued pain or hypertension despite maximum medical therapy are treated with TEVAR. We tend to wait ≥48 hours from

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presentation before surgical intervention. Similarly, patients with a large total aortic diameter, a large proximal fenestration, or other high-risk features are usually treated within the same admission. Treatment is also usually delayed ≥48 hours from admission, which results in surgical intervention approximately 4- to 7-days from presentation. Another cohort under the high-risk category in our practice are patients readmitted after medical management of TBAD during their initial admission.

LENGTH OF COVERAGE IN ACUTE UNCOMPLICATED PATIENTS

Although most experts agree on the treatment algorithm for complicated dissection, treatment for uncomplicated dissection is still somewhat controversial. The INSTEAD-XL (endovascular repair of type B aortic dissection) trial has shown improved long-term outcomes associated with endovascular management of uncomplicated TBAD. However, these findings are based on a relatively small sample and are quickly becoming dated.[5,6] IMPROVE-AD (improving outcomes in vascular disease—aortic dissection) is a new study that will begin enrollment soon and aims to answer some of these questions. However, the findings of this study will not be available for some time.

Patients with uncomplicated dissection but with features associated with a higher risk of future intervention, as described by Schwartz et al,[7] are treated medically, then discharged home after optimization. They are typically seen in the office 3- to 4-weeks after their discharge with a repeat computed tomography (CT) scan. The CT scan is used to plan a TEVAR, which is usually performed no later than 6 weeks from the initial admission. This approach's main goal is to maximize remodeling and improve long-term survival. During the observation period, the patients are referred to a dedicated hypertension clinic and monitored closely. As discussed above, any patients who are readmitted are treated within that same admission. Although the same preference for a proximal landing zone that was discussed earlier applies to uncomplicated but high-risk patients, we favor a more aggressive approach regarding the distal extent of stent graft involvement. We believe that the primary goal in treating these patients is to achieve complete aortic remodeling. Thoracic aortic remodeling is, in our opinion, the driver for improved survival with TEVAR in this patient population. To achieve this, longer coverage is typically needed. Naturally, this raises concerns about spinal cord ischemia (SCI) and has led to several approaches such as the PETTICOAT technique, which uses a combination of proximal stent grafts and distal uncovered stents to maintain perfusion of lower branch vessels. It is our practice to extend coverage to about 2 to 4 cm above the level of the celiac artery with stent grafts. We are not aware of any randomized controlled trials comparing the use of covered and uncovered distal stents. However, in our experience, we observed higher remodeling rates with the use of distal stent grafts as opposed to extending with uncovered stents. In the few cases in which we used uncovered stents distally, we saw complete remodeling along the stent graft area and persistent flow to the false lumen in the uncovered stent area in the thoracic aorta. This could be due to the lower radial force in the uncovered stents and the presence of micro-fenestrations that are sometimes not seen on CT. Additionally, we have not seen an increased risk of SCI associated with the use of distal stent grafts. Although SCI is always a concern, we have noticed significantly lower rates of SCI in patients with dissection compared with those with aneurysms or other aortic pathologies. This could be attributed to persistent flow to the intercostal vessels, which continues until the false lumen is fully thrombosed and remodeled. In other words, the flow cessation to the intercostals happens in a more gradual fashion in dissection compared with aneurysms or other pathologies, where the cessation of flow is more abrupt. In addition, TBAD is not typically associated with severe atherosclerotic disease, and other vessels that perfuse the spine such as the internal iliac arteries are patent. In addition, it is our practice to almost always revascularize the left subclavian artery, when covered, to further decrease the risk of SCI. Several other methods are used to decrease the risk of SCI such as permissive hypertension after the procedure for approximately 2 weeks. Additionally, we keep the oxygen saturation high during the hospital stay and avoid excessive blood loss. We are finalizing a report looking specifically at remodeling in patients with acute dissection treated with stent grafts throughout the length of the thoracic aorta. It is our hope this will provide more insight into the issue of aortic graft coverage in the endovascular management of aortic dissection and an alternative perspective on this matter.

The opinions or views expressed in this commentary are those of the authors and do not necessarily reflect the opinions or recommendations of the Journal of Vascular Surgery Cases, Innovations and Techniques.

DISCLOSURES

None.

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