

Endograft Treatment of Type B: Dissections What We Know and What We Do Not Know

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All aortic dissections are acute at some point in time. Medical management is the mainstay of therapy, and those cases that are successfully medically managed become chronic dissections. The chronic dissections require serial imaging and may ultimately require intervention as a result of aortic degeneration, the development of ischemia, or rupture. In a best-case scenario, the continued medical management of chronic dissections maintains a stable aortic size indefinitely without evidence of ischemia or rupture. On the other hand, some patients degenerate and require either surgery or endovascular therapy, while a subset presenting with acute thoracic dissection have ischemia or rupture and ultimately also require an intervention.

In our experience, it is exceedingly rare to intervene for persistent hypertension or continued pain in patients without collagen vascular deficiency syndromes, and the primary indication for intervention is either ischemia or rupture. At the Cleveland Clinic, we have been following distal dissection quite closely for a number of years. A subset of these dissections, approximately 10 to 15%, have required intervention based on our guidelines—which, as I stated previously, are the development of ischemia as defined by intestinal ischemia, renal ischemia, or lower extremity ischemia—and our treatment paradigm relates to the pathophysiology at home. The initial assessment of an aortic dissection requires cross-sectional imaging techniques. These techniques are designed to evaluate the origin of the dissection, the relationship between the true and the false lumen, and also the end organ perfusion. We have learned that preoperative imaging is incredibly important, and once we have the appropriate preoperative imaging, we attempt to treat the mechanism of the problem rather than the simple anatomy at hand.

The mechanism of the problem in aortic dissections may be true lumen compression or dissection into the branches, and patients can have both problems at the same time but generally fall into one of the two categories. If the true lumen has adequate perfusion to the visceral and lower extremity segments but there is still evidence of ischemia and there is dissection into the branches, then the branch blood supply must be derived from the true lumen. Consequently, interventions are performed to bring true lumen flow to the distal aspect of the branch using conventional stents or stent grafts. On the other hand, if the true lumen is compressed and small, the intention is to allow passive expansion of the true lumen by blocking off fenestrations, therefore depriving the false lumen of blood. When the false lumen is deprived of inflow, it will contract allowing passive contraction of the true lumen; once again, we attempt to be gentle in such a delicate aortic situation.

At this point in time, there is only one commercially available endovascular graft for the thoracic aorta, Gore Tag Prosthesis. Two other devices are under development. None of these devices have been specifically evaluated for use with aortic dissections, and this is a

point of concern in terms of the long-term durability and appropriateness of treatment in such patients. We have also learned that these cases are complicated and can develop complications during the procedure. We have had patients develop massive amounts of hyperkalemia as a result of rapid reperfusion of the entire infrathoracic aorta, and we have had patients rupture solid organs such as the spleen and liver as a result of a reperfusion injury as well. Both of these concerns are real and must be addressed promptly. We find it most appropriate to do this in an operating room setting.

We have also learned that the patients have to be followed up quite carefully. In our early experiences, similar to those of the Stanford group, we placed short grafts over the fenestrations, and over a period of 3 to 5 years of follow-up, we noticed interposing aneurysms between the short grafts. Although this is acceptable in the short term for alleviating ischemia, it becomes necessary to treat these aneurysms, and we have had a number of patients return and now have total aortic replacements. These patients were treated with a minimally invasive technique for their acute presentation of mesenteric ischemia and then an elective thoracoabdominal repair or endovascular stent grafting with branches.

So, in conclusion, the treatment paradigms for acute dissections are really not well developed. In our experience, endovascular treatment for ischemia seems superior to open surgery; for rupture, there remains the question of excluded false lumen and the potential for continued bleeding in the setting of persistent false lumen flow. Caution is warranted in terms of complications. To best manage these patients, there is a need for extensive training to deal with dissections, an interventionalist to be facile with intravascular ultrasonography, angiography, branch stenting, and stent grafting, and a team of physicians. We find that cardiologists, surgeons, and a radiologist are important members for this team, and it is best to set this up ahead of time.

There are several aspects of aortic dissections that remain unexplored. There is a lot of discussion about the treatment of asymptomatic or noncritically symptomatic distal dissections with endovascular grafts. The protagonists state that these patients will, in the long run, go on to develop thoracoabdominal aneurysms and potentially have ischemia of the visceral organs; the antagonists state that the devices are early in their development, that none have been evaluated for a use in dissection, and that medical management appears to be relatively good. I think that one issue we must face is how many patients, if properly managed medically, will go on to develop thoracoabdominal aneurysms. A second is that we really have to look carefully at devices to ensure that we are not going to damage the fragile aorta of the arch or the descending thoracic aorta following an aortic dissection. A third relates to the potential for acute complications.

The last frontier of dissection management is how to assess appropriate medical management. Clearly high-dose β -blockers are useful. There is evidence that angiotensin-converting enzyme inhibitors may also be useful in terms of aortic protection. How these patients should be monitored in the outpatient setting, when their follow-up needs to occur, and what should be done in the setting of worsening or protracted hypertension are all issues that we will have to confront in the future.

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