Endovascular Repair of Acute Descending Thoracic Aortic Dissection

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Aortic dissection is a frequently occurring pathology with a natural history including a significant number of severe complications such as stroke, aortic valve insufficiency, cardiac tamponade, and aortic rupture. Although surgical intervention remains the primary treatment for ascending (Stanford type A) aortic dissections, the treatment of both acute and chronic descending aortic dissections (DTDs; Stanford type B) is still controversial despite advances in surgical and medical therapies.

In the acute phase, most institutions treat DTDs with medical therapy and reserve surgical intervention for life-threatening complications such as uncontrolled hypertension, ongoing chest pain despite medical therapy, progression of dissection, aneurysmal enlargement, rupture, and/or extremity ischemia. This selected approach has resulted in mortality rates of 25% for medical therapy and approximately 35% for open surgical procedures but can exceed 50% when organ ischemia is present prior to surgery.

When acute DTDs are successfully treated with medical therapy, the dissections are considered chronic after 14 days. Nearly one-third of chronic dissections are at risk of further dissection and aortic rupture or require surgery for aneurysmal enlargement of the false lumen within 5 years. The survival rate has improved with operative intervention; however, thoracic aortic aneurysm repair is associated with high morbidity and mortality. Significant risk of postoperative paraplegia and other complications including renal failure and long recovery periods related to comorbid medical conditions is frequently encountered.

Endovascular treatment of acute and chronic DTDs has historically been limited to fenestration of the aortic septum, separating the true and false lumen to increase flow to ischemic visceral arteries and lower extremities. In the early 1990s, Dake and colleagues reported the application of endograft techniques for the treatment of DTDs by covering the proximal entry site in Stanford B dissections with endografts diverting flow from the false lumen to the true lumen. The initial application of this technology has been very promising from several perspectives, with the benefit in acute _dissections being alleviation of pain, relief of visceral and peripheral ischemia related to malperfusion, and decompression of _the false lumen to control of bleeding. Exclusion of the entry site promotes a significant rate of false lumen thrombosis and dissection regression in the first 6 to 12 months following exclusion. A major benefit of the endovascular treatment of acute and chronic dissections has been a reduction in the mortality rate and incidence of paraplegia compared with surgical repairs. Complications including renal failure and long-term recovery have been diminished, with stroke remaining a low-incident but significant complication. Exclusion of infrarenal aneurysmal components of the dissection has been more challenging, with delineation of the optimal treatment awaiting further advances.

Significant ongoing investigation is required to determine optimal indications for endovascular treatment of DTDs as the endovascular alternative has proven to be possible with low mortality and paraplegia rates compared with the medical and surgical alternatives. Although the indication for treatment of acute DTDs is reserved for complications following failure of medical management, some studies suggest a benefit for endovascular exclusion of most acute lesions even with symptoms if late complications of chronic dissections can be avoided by regression of the dissection. Concurrent cohort and/or randomized clinical studies are indicated to compare endograft treatment of descending thoracic aortic aneurysms to contemporary medical and surgical treatments, with initial observations being that this alternative new method offers significant advantages.