Thoracic and Cardiovascular Surgery

Chronic Descending Aortic Dissections

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Aortic dissection involving the descending aorta has a predictable and often debilitating course of progressive dilatation that occurs once patients survive the acute phase of the disease. Important factors that impact the rate and degree of dilatation include the persistence of a false lumen channel (and the amount of thrombus), the control of hypertension, and the presence of an underlying connective tissue disorder. The mainstay of management of chronic descending aortic dissections is antihypertensive therapy including β-blockade until the dissected aorta becomes significantly aneurysmal. Surgical management is recommended at that point. Multiple advances have been made that have improved the results of operative repair of aneurysmal descending aortic dissections including circulation management methodologies, CSF drainage, neurocerebral monitoring, and more recently, endovascular therapies. The presentation, diagnosis and management of chronic descending aortic dissections are discussed.

KEYWORDS chronic type B aortic dissection, β-blockade, cardiopulmonary bypass, spinal cord protection, aortic replacement

Descending thoracic aortic dissections have a reasonably predictable natural history that demand careful consideration and monitoring by cardiothoracic surgeons. Acute ascending aortic dissections, despite proximal repair, often lead to residual chronic distal arch and descending aortic dissections—the chronic phase of this process. Acute aortic dissections and their management are discussed in detail elsewhere in this issue of the *Seminars*. Acute descending aortic dissections are typically managed medically unless a malperfusion or bleeding complication occurs during the acute phase. All medically treated and many of the few surgically treated acute descending aortic dissections progress to a chronic phase that is characterized by a variable degree of aneurysmal dilatation, false lumen thrombosis, and dissection flap (septal) fenestrations. These complex aortic processes are ideally managed by a multidisciplinary team comprised of cardiothoracic surgeons, vascular surgeons, cardiologists, neurologists, and radiologists with an interest and expertise in the management of thoracic aortic pathology. The presentation, management, and surveillance of chronic descending aortic dissections are outlined below.

Aortic dissection affects 5 to 20 people per million population a year.[1] One third of aortic dissections are limited to the descending aorta and are classified as Stanford type B (or Debakey type IIIa or IIIb).[2] When compared with patients with Stanford type A dissections, individuals with type B dissections tend to be older and have more pronounced hypertension.[2,3] The descending thoracic aorta can be affected by dissection when the primary intimal tear arises in the descending aorta or when the false lumen, arising from a tear more proximally, propagates to the descending thoracic aorta. A chronic dissection is arbitrarily defined as one that has been present for greater than 14 days.[2] Historically, when type A dissections were managed by ascending aortic replacement alone with a distal anastomosis to a clamped distal ascending aorta, patients were predisposed to a higher rate of persistent false lumen patency and aneurysmal dilatation of the descending aorta yielding a higher rate of reoperation.[4] Once the safety of an open arch repair and anastomosis was realized, the ability to obliterate the false lumen improved, and the rate of distal aortic complications decreased. The many advances in the management of acute type A dissection are discussed elsewhere in this issue, but despite these advances chronic type B (or residual type A) dissections become aneurysmal to the point of requiring operative intervention in 30% to 40% of cases.[5-8]

Presentation

Acute dissection classically presents with tearing of the aorta, which is accompanied by excruciating chest pain that radi-

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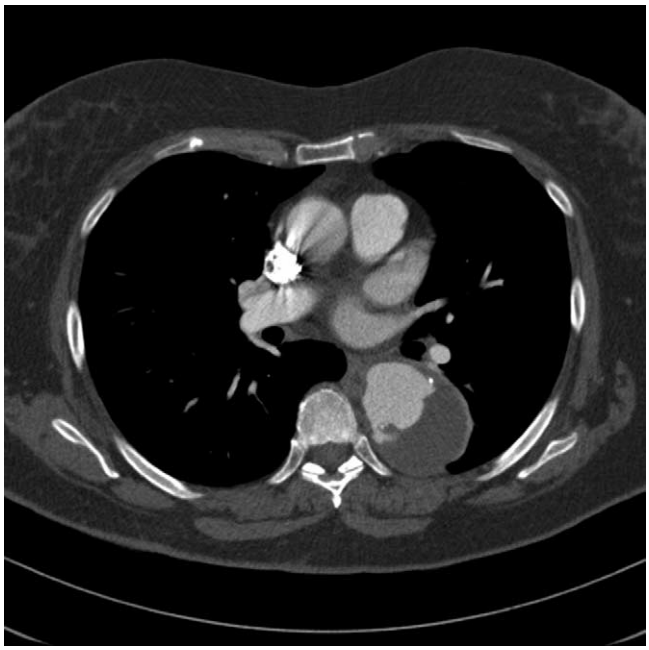

Figure 1 Helical computed tomographic angiogram if a chronic type B aortic dissection. The false lumen is thrombosed, and the aorta is aneurysmal.

ates to the back. Occasionally symptoms are less dramatic, or are even absent, so that some patients go undiagnosed. Symptoms of chronic dissection are often vague and nonspecific and are related to the mass effect of the aneurysm. Patients with rapidly enlarging aneurysms may present with progressive chest pain or hoarseness as a result of compression of the recurrent laryngeal nerve. A persistent non-productive cough can arise from bronchial irritation. Hemoptysis can occur with contained rupture into the lung. Occasionally patients never have symptoms, and the diagnosis is made from imaging studies obtained during the workup of unrelated problems. Less commonly, patients may present with frank rupture and shock.

Diagnosis

Cross-sectional imaging is the most relevant data required for diagnosis and planning the management of patients with aortic dissection. Confusion about the precise diagnosis and extent of dissection are commonly related to the inadequacy of an imaging study. A patient with preexisting residual false lumen from a previously treated or untreated dissection may be mistakenly thought to have an acute dissection at the current presentation when they in fact have a chronic dissection. Helical computed tomographic angiography (CTA) of the entire aorta has become the diagnostic mode of choice for most acute and chronic dissections (Fig. 1). MR angiography (MRA) is equally accurate and has an advantage in patients with renal insufficiency, but it can be more time consuming and difficult to obtain in claustrophobic patients (Fig. 2). Transesophageal echocardiography is accurate for diagnosis but is unable to provide enough anatomic detail of the aortic arch and thoracoabdominal aorta to have much role in the management and surveillance of chronic type B aortic dissections. A detailed description of all imaging modalities used in the diagnosis and management of aortic dissection and their specific utility is presented by Kapustin and Litt elsewhere in this issue.

Chronic type B aortic dissections that dilate are classified by the extent of involvement of the thoracic and abdominal aorta. Aneurysmal type B dissections are classified as descending thoracic aortic aneurysms if their extent is limited to the thorax. Those that span the thoracoabdominal aorta are classified according to the extent of thoracic and abdominal aortic involvement as originally described by Crawford and later modified by Safi (Fig. 3).[9-11] The designation of the extent of thoracoabdominal involvement helps both define the operative risks of aortic replacement and to plan the conduct, most specifically the circulation management, of aortic replacement.

Medical Management

The primary mode of management of descending aortic dissections is medical stabilization unless there is an acute malperfusion syndrome, aortic rupture, or the dissection becomes chronically aneurysmal. Acute malperfusion syndromes and management are discussed at length by Landridge and Kern in this issue. Open repair of acute type B dissection has an operative mortality rate of 35% to 50% compared with a 1-month mortality rate of 10% with medical management.[2,12] Thus stabilization with antihypertensive and "anti-impulse" therapies has become the standard of care for acute uncomplicated type B dissection.[4,6,12] The goal of medical therapy is to eliminate hypertension and diminish aortic wall stress (dp/dt). Once patients are stabilized with intravenous agents, oral antihypertensive therapy including

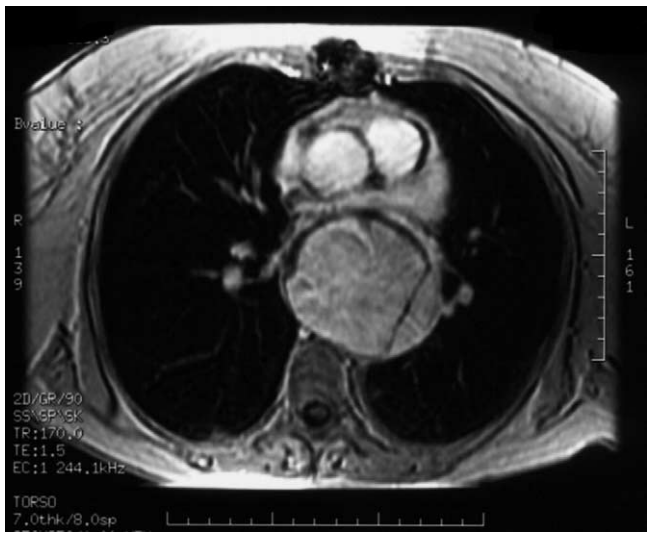

Figure 2 Magnetic resonance angiogram demonstrates a chronic type B aortic dissection. Note blood in the true (medial) lumen and in the false (lateral) lumen have equivalent density and character implying persistent flow in the false lumen.