Case Reports

Endovascular Repair as a Bridge to Surgical Repair

of an Aortobronchial Fistula Complicating Chronic Residual Aortic Dissection

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Endovascular and open surgical repair have been used in patients with descending thoracic aortic dissection; however, the appropriate treatment is debated. We describe the case of a 60-year-old woman who had a symptomatic, chronic, residual, descending thoracic aortic dissection that was complicated by an aortobronchial fistula. She underwent emergent thoracic endovascular stent-grafting but remained symptomatic. Computed tomographic angiograms showed a contained rupture into the lower lobe of the left lung. The patient underwent definitive surgery to remove the stents, reconstruct the aorta, and resect the nonviable lung tissue. The remainder of her postoperative course was uneventful, and she was discharged from the hospital 13 days after the 2nd operation. Results of genetic testing confirmed an earlier presumptive diagnosis of Marfan syndrome.

In an emergency, the best initial option for patients with a complicated descending thoracic aortic dissection might be thoracic endovascular aortic repair, which could serve as a bridge to definitive open repair. ***(Tex Heart Inst J 2014;41(2):198-202)***

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Aortic dissection is characterized by an intimal tear followed by blood cleaving the medial layer of the aortic wall longitudinally.[1] Complications necessitating surgical intervention develop in approximately 30% of patients who have a descending thoracic aortic dissection.[1-4] Although the role of thoracic endovascular aortic repair (TEVAR) is expanding in the treatment of descending thoracic aortic dissection, debate continues as to whether complicated descending thoracic aortic dissections, either acute or chronic, are better treated by means of TEVAR or traditional open surgical repair.[2-5] Open repair is necessary when patients are unsuitable candidates for TEVAR or when TEVAR does not result in adequate repair. We report a case in which a patient with a chronic descending aortic dissection underwent open surgical repair of an aortobronchial fistula after initial TEVAR failed to stop the internal bleeding.

Case Report

In August 2012, a 60-year-old woman presented at a hospital with chest pain and hemoptysis. She had a history of hypertension and a DeBakey type I aortic dissection, for which she had undergone replacement of the aortic root and ascending aorta 6 months earlier. She was intubated for airway protection and was transferred to our institution for treatment of a symptomatic, chronic, residual, descending thoracic aortic dissection.

Of note, the patient's cardiologist had previously diagnosed her to have Marfan syndrome. This was on the basis of the patient's tall stature, presence of scoliosis, history of annuloaortic ectasia and DeBakey type I aortic dissection, and family history of features consistent with Marfan syndrome (one daughter had a possibly dislocated lens, and another had skeletal problems). The patient had no other morphologic features of Marfan syndrome, and no formal genetic counseling or testing had been performed.

Upon presentation, the patient was hemodynamically stable and showed no signs of malperfusion. Apart from the primary symptoms of chest pain and hemoptysis, results of her cardiovascular and pulmonary examination were not unusual. Electrocardiograms and cardiac enzyme test results revealed no evidence of acute ischemia or infarction. A computed tomographic angiogram (CTA) of the chest, obtained

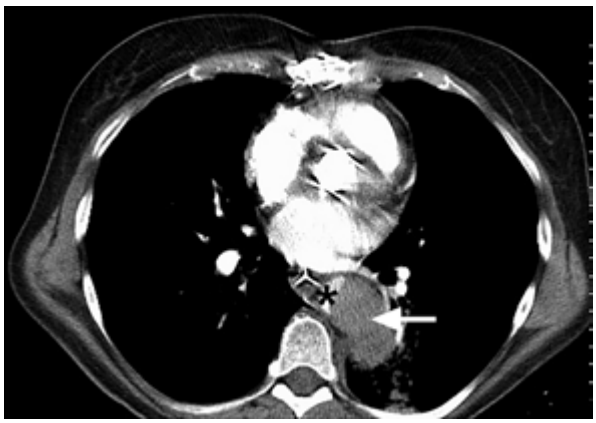

Fig. 1 *Contrast-enhanced computed tomographic angiogram of the chest shows the descending thoracic aortic dissection with a focal area of haziness in the adjacent segment of the lower lobe of the left lung. The asterisk indicates the true lumen of the distal descending thoracic aorta; the arrow indicates the false lumen.*

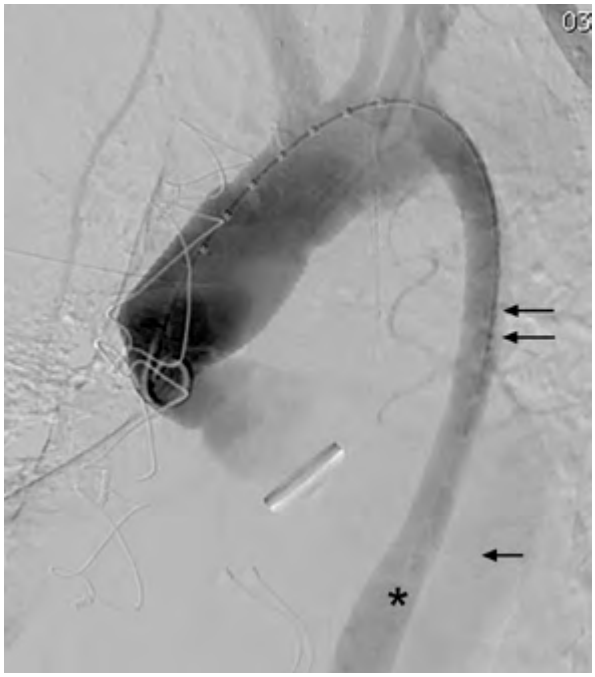

Fig. 2 *Diagnostic aortogram shows a dissection within the descending thoracic aorta; the contrast agent flows into the true lumen (asterisk) and false lumen (single arrow) without extravasation. The double arrow indicates the site of fenestration in the dissection flap.*

at the referring hospital, revealed a chronic descending thoracic aortic dissection with a focal area of haziness in the adjacent segment of the lower lobe of the left lung (Fig. 1). The hazy area suggested a contained rupture of the distal descending thoracic aorta into the lower lobe of the left lung.

Anti-impulse therapy was initiated (blood pressure control with β-blockers and calcium channel blockers, with the target of a systolic blood pressure <120 mmHg and a mean arterial pressure <80 mmHg), and her coagulopathy was reversed. The patient was taken to the hybrid operating suite for emergent TEVAR. A cerebrospinal fluid drain was placed for spinal cord protection. A diagnostic aortogram showed a dissection within the descending thoracic aorta, and the contrast agent flowed into the true and false lumina without active extravasation (Fig. 2). Systemic heparin was administered, and two 31-mm × 15-cm GORE® TAG® stents (W.L. Gore & Associates, Inc.; Flagstaff, Ariz) were placed in the true lumen of the descending thoracic aorta. The completion aortogram showed well-positioned endografts that provided aortic coverage from just distal to the left subclavian artery to just above the celiac axis; in addition, no endoleak was apparent (Fig. 3).

The patient reported persistent chest pain, so chest CTA was performed on the 2nd postoperative day. The

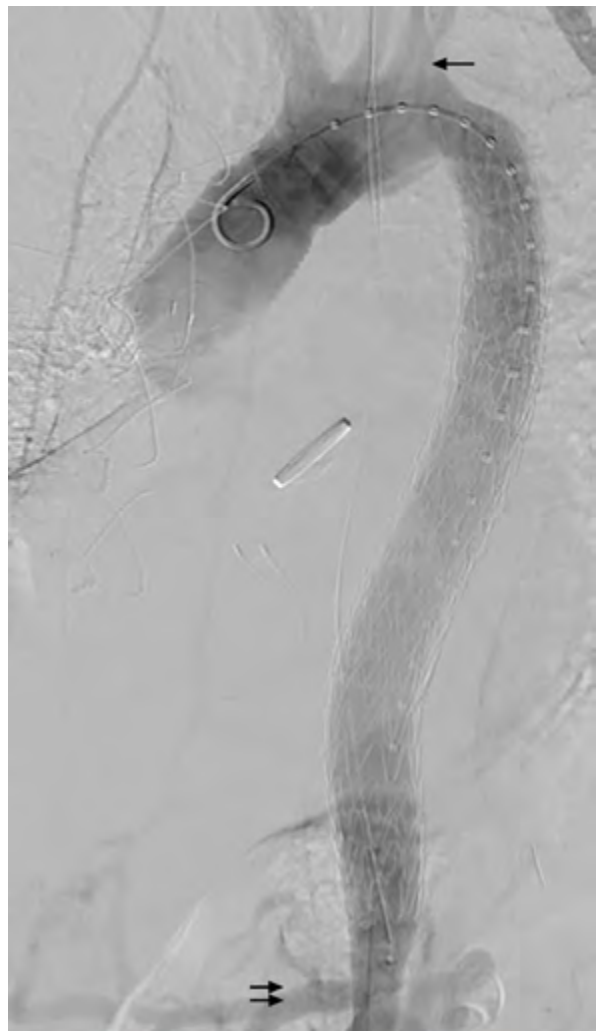

Fig. 3 *Completion aortogram shows well-positioned endografts. Coverage starts distal to the left subclavian artery (single arrow) and ends just above the celiac axis (double arrow).*

stents were well seated within the true lumen of the descending thoracic aorta. Residual dissection in the transverse aortic arch was seen proximal to the stents. The contrast agent revealed communication between the false lumen of the descending thoracic aorta and the true lumen through re-entry sites distal to the stents. The focal area of haziness in the adjacent segment of the left lung was larger than it had been on the initial scan. In addition, a focal outpouching was better defined in the distal descending thoracic aorta adjacent to the hazy area (Fig. 4). These findings were consistent with a contained rupture of the distal descending thoracic aorta into the adjacent lower lobe of the left lung (Fig. 5). The patient was returned to the operating room for definitive open repair.

After lung isolation with a double-lumen endobronchial tube, a generous left posterolateral thoracotomy incision was made, and systemic heparinization was achieved. Prompt proximal and distal control of the aortobronchial fistula's site was attained with the use of aortic clamps, which were placed distal to the left subclavian artery and the distal descending thoracic aorta, respectively. The aorta was opened longitudinally, and the previously placed stents were removed. A 24-mm × 30-cm gelatin-impregnated Dacron tube-graft (Vascutek®, a Terumo company; Renfrewshire, Scotland) was anastomosed end-to-end to the aorta. No intercostal artery was suitable for patch reimplantation or bypass. The fistula's entry site into the lower lobe of the left lung was noted (Fig. 6). A large portion of the left lower lobe was filled with a large hematoma and was considered not to be viable, so a lobectomy was performed before chest closure. The patient's postoperative course was uneventful, and she was discharged from the hospital on postoperative day 13. Results of genetic testing showed that she had a fibrillin-1 gene exon 15 mutation, consistent with the earlier diagnosis of Marfan syndrome. In October 2013, the patient reported by telephone that she was doing well.

Discussion

Debate continues in regard to the appropriate treatment of patients who have a descending thoracic aortic dissection. Aggressive medical management, the recommended treatment for uncomplicated descending thoracic aortic dissection, results in lower morbidity and mortality rates than does surgery.[2,4] However, approximately 30% of acute descending thoracic aortic dissections are complicated by malperfusion of visceral organs or extremities, a rapid increase in aortic diameter, refractory pain, hemodynamic instability, contained rupture, or hypertension, despite aggressive pharmacologic management.[4,5] Even in recent series, the mortality rate remains high (25%–50%) among patients who undergo emergent open surgical repair of a complicated

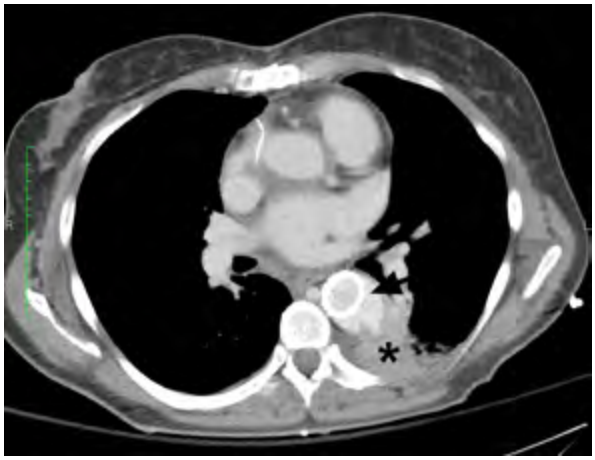

Fig. 4 *Postoperative computed tomographic angiogram of the chest. Flow of the contrast agent shows communication between the false lumen of the descending thoracic aorta and the true lumen distal to the stents (arrow). The focal area of haziness in the adjacent segment of the lower lobe of the left lung is larger than before, and a focal outpouching is seen in the distal descending thoracic aorta adjacent to the area of haziness (asterisk).*

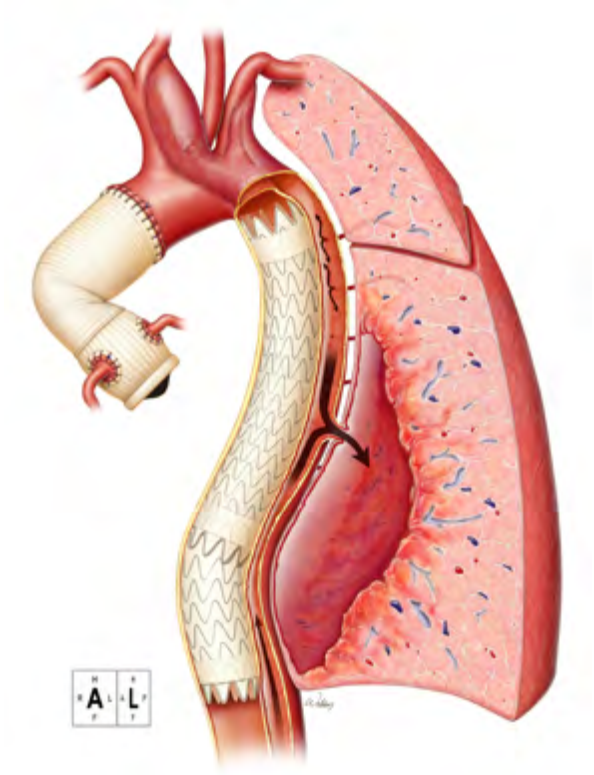

Fig. 5 *Diagram of the aorta and adjacent left lung shows the stent-grafts within the true lumen. The distal descending thoracic aorta ruptured into the lower lobe of the left lung (arrow) because the false lumen continued to receive blood flow from collateral vessels and from re-entry sites below the stents.*

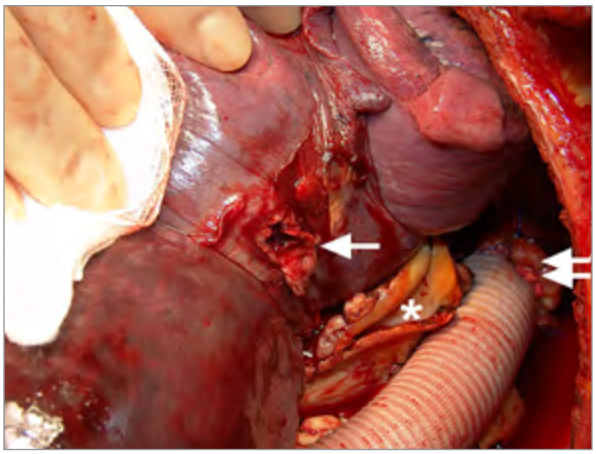

Fig. 6 *Intraoperative photograph after surgical repair of the aortopulmonary fistula into the lower lobe of the left lung (single arrow) shows the proximal aortic anastomosis (double arrow) and the transected descending aorta (asterisk).*

descending thoracic aortic dissection.[6] Endovascular treatment of complicated dissections might result in better short-term outcomes.[2-6] Inducing false-lumen thrombosis by sealing the aortic tear with an endograft might reduce the morbidity and mortality rates.[6] Investigators have shown that using endovascular techniques to manage complicated descending thoracic aortic dissection decreases morbidity and mortality rates in comparison with open repair.[2-9]

Acquired aortobronchial fistula is very rarely reported as a complication of aortic dissection.[10,11] In most reported cases, the patients presented with hemoptysis and anemia in association with a thoracic aortic aneurysm with or without prior surgical or endovascular intervention.[10-15] The possibility of aortobronchial fistula should be considered in a patient who presents with hemoptysis and has a history of thoracic aortic surgery. However, viewing the fistula is possible in only 17% of cases,[15] so a high degree of clinical suspicion is needed for diagnosis.

Our patient presented with a symptomatic chronic residual descending thoracic aortic dissection. In this emergent situation, TEVAR was considered to be the best initial option, because it is associated with lower morbidity and mortality rates than open surgical repair. Endovascular treatment is less physiologically demanding than open surgery when patients present with acute, life-threatening conditions such as hypovolemic shock from hemorrhage or septic shock from overwhelming infection. In our patient, TEVAR probably prevented catastrophic bleeding from a free rupture of the aorta into the left pleural cavity or prevented her death by asphyxiation due to massive hemoptysis from the fistula. The stents excluded the entry tear in the descending thoracic aorta; however, the contained-rupture site continued to expand because of the persistent pressurization of the false lumen from collateral vessels and fenestrations along the dissection flap distal to the stents. Close monitoring and prompt CTA enabled early identification of the rupture (which had been temporized by the endovascular stent-grafting) and definitive open management.

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