ABSTRACT

A rare and lethal vascular condition is the communication of the thoracic aorta and tracheobronchial tree. Typically, the development occurs after open or endovascular aortic repair that has been complicated by infection and usually presents with hemoptysis as the heralding event, which can lead to massive hemorrhage. Computed tomography angiography remains the diagnostic imaging modality of choice. Medical management will be futile, with the need for expedited operative intervention via open, endovascular, or hybrid open and endovascular repair. (J Vasc Surg Cases Innov Tech 2022;8:732-5.)

Keywords: Aortic pseudoaneurysm; Aortobronchial fistula; Thoracic endovascular aortic repair; Traumatic aortic transection

The development of an aortobronchial fistula (ABF) is a rare, but potentially lethal, vascular condition. Aortic aneurysms, traumatic aortic disruptions, malignancies, and infectious and/or inflammatory processes have been associated with the development of ABFs. ABFs have also been associated with open aortic repair (OAR) and thoracic endovascular aortic repair (TEVAR) when complicated by either graft infection or an anastomosis pseudoaneurysm.1 The ABF is considered primary when it involves a native aorta with the aorta-to-bronchial tree or lung and secondary when it exists between the graft or anastomosis in a reconstructed aorta.2-4 Typically, hemoptysis will be the heralding bleeding event, which can result in acute respiratory distress, hypotension, and, even, death if no intervention is performed. Patients with ABFs will often present as vascular emergencies with open repair of the complication carrying a high mortality rate of 15% to 41%.4,5

We have presented a case of an ABF that had developed from an aortic pseudoaneurysm in an adult man with a history of OAR to treat traumatic thoracic transection ~30 years earlier. We were able to successfully treat the patient with TEVAR, with demonstrated graft patency and ABF resolution at 3 years of follow-up. The patient provided written informed consent for the report of his case details and imaging studies.

CASE REPORT

The patient was a 54-year-old man with a history of open descending thoracic aorta repair following traumatic transection after being involved in a motor vehicle accident in the 1990s. He had presented to our emergency department on January 6, 2018, with a single episode of hemoptysis estimated to be approximately two to three tablespoons of bright red blood. He had no additional symptoms or signs of distress. The patient underwent a computed tomography (CT) study with an emphasis on evaluating for possible pulmonary embolism. The CT scan demonstrated an irregular mass abutting the aortic arch (Fig 1). CT angiography (CTA) of the thorax demonstrated a saccular aneurysm measuring 14 × 12 mm, with a 12-mm neck that was ~2.0 cm from the left lateral margin of the left subclavian artery origin (Fig 2). An additional finding included a small enhancing vessel that was seen arising from the pseudoaneurysm and was identified as an ABF. The patient was admitted to the surgical intensive care unit with strict blood pressure control. The patient underwent additional testing, with findings of a normal ceretec white blood cell scan and normal white blood cell count, erythrocyte sedimentation rate, and C-reactive protein. These results supported the diagnosis of a noninfected thoracic pseudoaneurysm. The patient proceeded to the operating room to undergo elective TEVAR using a Valiant Captivia endograft (30 × 30 × 100 mm; Medtronic, Dublin, Ireland) via percutaneous access of the bilateral common femoral arteries (Fig 3). During the procedure, the ABF was left intact without any form of ligation. The patient tolerated the procedure well with no complications and returned to the surgical intensive care unit postoperatively. The patient had received a total of...
one preoperative and three postoperative doses of intravenous vancomycin and piperacillin-tazobactam. The patient had an uneventful remainder of his hospital course and was discharged home on postoperative day 1. At the patient’s 4-month postoperative clinic visit, he was asymptomatic, with thoracic CTA demonstrating a patent endograft with complete obliteration of the aortic arch pseudoaneurysm and the ABF (Fig 4). At the 3-year postoperative visit, the patient was completely asymptomatic, and the follow-up thoracic CTA displayed overall stability of the endograft with obliteration of the pseudoaneurysm and ABF, and no signs of an endoleak or endograft migration (Fig 5).

**DISCUSSION**

An ABF is an uncommon condition associated with infection (typically tuberculosis), pulmonary malignancy, lung transplantation, atherosclerotic and mycotic aneurysms, and anastomotic pseudoaneurysm after repair. The most frequent presenting symptom has been hemoptysis, which will be the herald bleeding event for these individuals. The diagnostic test of choice is CTA. Some might elect to perform bronchoscopy; however, an ABF located in the peripheral lung parenchyma might not be identified, with increased risk of protective thrombus dislodgement. One must be aware that active extravasation might not be seen in patients presenting early. If active extravasation is identified on the imaging study, the patient will have a significantly worse prognosis. If the ABF is not seen on CTA, other findings that can be suggestive include air presence in thrombus, bronchial wall thickening, periaortic blood and/or thrombus collection, consolidation of the lung adjacent to an aneurysm, and a small pseudoaneurysm adjacent to a site of previous OAR or TEVAR.

Emergency intervention could be necessary if the patient remains hemodynamically unstable. The overall mortality associated with open repair has been reported to range from 15% to 41%. Open repair has had an associated higher morbidity and mortality owing to the emergent nature of the procedure, complex nature of the procedure, associated risks of graft infection and sepsis, and the need for repeat procedures. TEVAR with or without repair of involved lung tissue has generally had better outcomes. Canaud et al11 performed a systemic review of 134 patients with ABF who had undergone TEVAR, with a reported 93% technical success rate. A 5.9% rate was reported for 30-day mortality, and the aortic-specific and all-cause mortality at 17 months was 14.3% and 21.4%, respectively. More than 50% of these patients had received >1 month of antibiotics.
Fig 3. A, Intraoperative angiogram showing aortic pseudoaneurysm before endograft deployment. B, Intraoperative angiogram showing aortic pseudoaneurysm after endograft deployment.

Fig 4. A, Follow-up axial computed tomography angiography (CTA) at 4 months postoperatively demonstrating complete obliteration of the pseudoaneurysm and aortobronchial fistula (ABF). Note the hyperdense thrombosed fistula tract (arrow). B, Follow-up coronal CTA at 4 months demonstrating complete obliteration of the pseudoaneurysm and ABF. Note the hyperdense thrombosed fistula tract (arrow).

Fig 5. A, Three-year follow-up axial computed tomography angiography (CTA) showing stable appearance of patent endograft with no evidence of recurrence of pseudoaneurysm or aortobronchial fistula (ABF). B, Three-year follow-up coronal CTA showing stable appearance of patent endograft with no evidence of recurrence of pseudoaneurysm or ABF.
after their procedure. However, no clear guidelines have been established in the literature for the overall length of antibiotic treatment for such patients. Our patient was provided with one preoperative and three postoperative doses, with no additional antibiotic therapy after discharge. Although TEVAR alone has had documented success and durability for treating ABFs, some studies have further suggested decreased ABF recurrence with adjunctive resection of involved pulmonary tissue and coverage of the TEVAR and ABF repair segment with an intercostal interposition muscle flap.9,12

An appropriate preoperative evaluation is critical to avoiding life-threatening complications. Expedited management requires operative repair via an open, an endovascular, or a hybrid approach. Nonoperative management has been universally fatal. As we have demonstrated in the present report, ABFs can occur decades after open thoracic aortic repair and can be successfully treated using an endovascular technique, ensuring that the appropriate measures and consideration is given to the length of antibiotic treatment and the need to treat the actual ABF.

CONCLUSIONS

An ABF is a rare vascular complication that has been reported after open and endovascular thoracic aortic repair. The most common presenting symptom has been hemoptysis, which can be the herald bleeding event before hemorrhagic catastrophe. CTA is the diagnostic test of choice for identifying an ABF. Endovascular aortic repair is the alternative to open repair with an overall lower mortality rate when it becomes necessary to operate.

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Submitted Mar 11, 2022; accepted Jul 11, 2022.