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ACQUIRED AORTOPULMONARY FISTULA IN ACUTE DISSECTION

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Rupture of an acute ascending aortic dissection into the pulmonary artery is a rare and often fatal event. This complication results in the development of an acute left-to-right shunt, new murmur, and rapid right heart deterioration. We report the first successful repair of an acquired aortopulmonary fistula with aortic dissection after previous aortic valve replacement and multivessel bypass grafting.

Clinical summary. A 69-year-old man with hypertension was admitted to a local hospital after the sudden severe onset of upper back and chest pain. Eleven months earlier, he had undergone aortic valve replacement for calcific aortic stenosis with a St Jude Medical prosthesis (St Jude Medical, Inc, St Paul, Minn) and coronary bypass grafting with the left internal thoracic artery to the left anterior descending artery and a vein graft to the ramus intermedius artery. An admission chest radiogram revealed mild pulmonary edema, and electrocardiography demonstrated sinus tachycardia at 105 beats/min with no ST changes. After control of his blood pressure with esmolol, the patient underwent a chest and abdominal computed tomographic scan that showed an aortic dissection extending from the proximal ascending aorta to the iliac bifurcation. The patient was then transferred to our institution with a normal neurologic status, warm lower extremities, and poor urine output.

Aortography and transesophageal echocardiography confirmed the presence of an aortic dissection, beginning above the left sinus of Valsalva. There was compromise of the left renal artery flow by compression from the false lumen in the abdominal aorta and minimal angiographic blush of the left kidney.

After initial stabilization, the patient became hypotensive, requiring inotropic support, and dyspneic, necessitating intubation. He also had a new pansystolic murmur audible throughout the upper chest. Bedside right heart catheterization revealed a severe right-sided pressure elevation: right atrium, 22 mm Hg; right ventricle, 65/27 mm Hg; pulmonary artery, 75/37 mm Hg; pulmonary capillary wedge pressure, 39 mm Hg; and shunt ratio, 2:1. Repeat echocardiography show-

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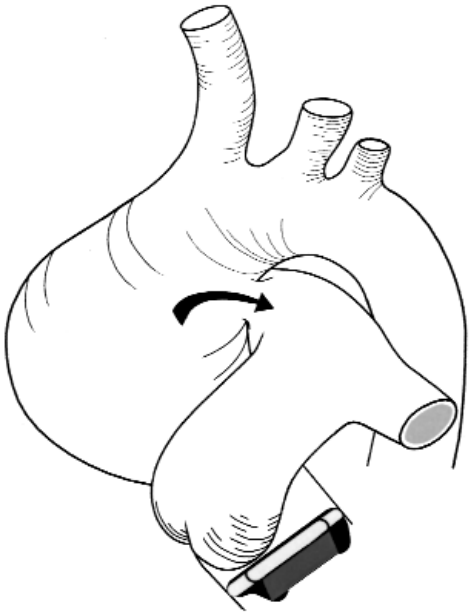

Fig 1. Operative finding of acute dissection with rupture of false lumen into the right pulmonary artery.

ed severe biventricular dysfunction, clot compressing the right atrium, and normal prosthetic valve excursion.

Because of sudden hemodynamic and respiratory compromise, the patient was taken urgently to the operating room. The femoral artery and vein were cannulated for cardiopulmonary bypass. After median sternotomy and dissection, a second venous drainage catheter was placed in the right atrium. A large clot was adherent to the right atrium and right lateral aortic wall. After bypass was begun, a pulmonary artery vent catheter drained arterial blood at a rate of 4.0 L/min.

After systemic cooling, aortic crossclamping, and ostial administration of cold crystalloid cardioplegic solution, we evaluated the aorta and found the dissection originated from a 1-cm entry point above the left sinus of Valsalva. The tear did not originate from the aortic suture line or the vein graft anastomosis site. The false lumen spiraled from the posterior aorta (left intact during the previous operation) to below the aortotomy suture line into the right coronary ostium. The dissection became circumferential above the sinuses of Valsalva and continued into the crossclamp placed just below the innominate artery. The false lumen had ruptured into the right pulmonary artery above the left sinus of Valsalva (Fig 1). The pulmonary artery component of the fistula was separated from the aorta and repaired with a continuous 4-0 polypropylene running suture.

The internal thoracic artery graft to the left anterior descending artery was patent. The right coronary ostium and proximal vein graft anastomosis were resected as buttons and a No. 31 Dacron tube graft was inserted into the aortic root just above the left main coronary ostium. The proximal and distal aortic anastomoses were performed with the crossclamp on with no period of circulatory arrest. The right coronary ostium and saphenous vein graft were reimplanted directly on the conduit with 6-0 running polypropylene sutures. The patient was weaned off cardiopulmonary bypass on a dopamine dose of 5 $\mu g \cdot kg^{-1} \cdot min^{-1}$ with a cardiac index of 2.8 L/m^2.

His postoperative course was uneventful, with extubation after diuresis on the sixth postoperative day. His serum creatinine level normalized to 0.9 mg/dL at the time of discharge. On office follow-up at 1 month, his physical activity was robust, and transthoracic echocardiography demonstrated an ejection fraction of 60%.

Discussion. Dissections of the ascending thoracic aorta may result in death from tamponade, aortic insufficiency, coronary compromise, rupture, or distal propagation. In rare instances, fistulous formation between the aorta and pulmonary artery may complicate dissection. Cases of acquired aortopulmonary fistulas have been described in chronic disease states of the aortic wall, such as aneursym, giant cell aortitis, syphilitic or mycotic disease, or endocarditis. In 1924, Boyd[1] reviewed 4000 autopsy reports of thoracic aortic aneursyms, finding 1197 cases of rupture with a 4% occurrence of aortopulmonary fistula.

There are few surviving cases of ascending aortic dissection with fistulization to the pulmonary artery reported in the literature[2-4] and none after valve replacement and coronary bypass grafting. In the past, these fistulas were most frequently diagnosed by means of aortography if discovered before the patient's death. We suspected and made the diagnosis of fistula on the basis of a rapid change in physical examination (new murmur and pulmonary edema) and measurement of a stepup in oxygen saturation between the right atrium and pulmonary artery. Transesophageal echocardiography performed in the operating room was not helpful in confirming the diagnosis of pulmonary artery fistula. Our surgical strategy was based on the following: (1) restoring single lumen continuity to the ascending aorta and excluding the aortic tear; (2) separating the pulmonary circulation from systemic blood flow; and (3) restoring adequate coronary circulation through native coronary ostia and surgical bypass grafts.

When a patient with aortic dissection presents with congestive heart failure, pulmonary edema, and left-to-right shunt, the possibility of acquired aortopulmonary fistula should be considered. Prompt diagnosis and intervention are crucial. Long-term surgical success is mandated by adequate closure of the pulmonary defect, with physical separation of the systemic and pulmonary circulation.

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