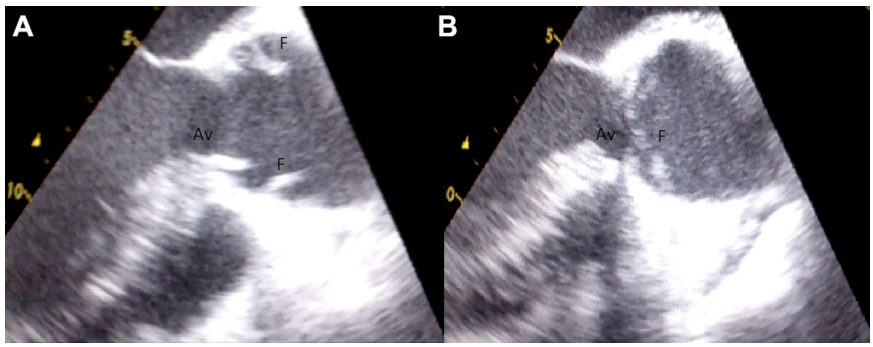

Fig 3. Transesophageal echocardiogram during (A) systole and (B) diastole showing ascending aorta, aortic valve and proximal intimal flap. (Av = aortic valve; F = proximal intimal flap.)

in the diagnosis of aortic dissection, but it was not accurate enough to differentiate it from a penetrating atherosclerotic ulcer, which would have different clinical implications as one of the variants of aortic dissection [5]. As has been reported previously [2], our findings in CT were not conclusive for aortic dissection because the scan lacked the demonstration of true and false lumens separated by an intimal flap. Logically, this was related to the short aortic segment involved in the dissection process. We found it to be in the best interest of the patient to define the aortic pathologic condition before going into the operating room, and therefore performed the TEE preoperatively.

Inasmuch as the aortic valve was anatomically normal, one can intuitively argue whether a supracoronary ascending aortic replacement or a valve-sparing ascending aortic replacement could have, or should have, been performed. We believe that because the aortic circle around the coronary ostia was extensively involved in the dissection process, a supracoronary ascending aortic replacement would have been a less than satisfactory procedure in that regard. Instead, we preferred to separate both coronary buttons from their Valsalva sinuses surgically, then fix the surrounding dissected layers using 4-0 Prolene and a strip of Teflon while sewing them back to a firm tissue such as a Dacron graft. Obviously, that decision does not prevent one from performing a valve-sparing procedure, which any team highly experienced in these procedures might have considered in such an emergency situation.

Comment

Ascending aortic dissection with aortic regurgitation caused by intussusception of the proximal intimal flap and accompanying coronary artery disease can be treated with excellent surgical outcome, given the emergency presentation and life-threatening complexity inherent in this pathologic condition. Our experience confirms that in patients with ascending aortic dissection, TEE stands as an invaluable diagnostic utility in defining proximal intimal flap intussusception beyond a continuum of diagnostic facilities including aortography, CT, and transthoracic echocardiography.

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FEATURE ARTICLES

Endovascular Repair of Acute Ascending Aortic Disruption via the Right Axillary Artery

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Endovascular repair of emergent syndromes involving the ascending aorta is uncommon. We describe an acute disruption of the ascending aorta during stenting of the pulmonary artery, resulting in an acute aortopulmonary

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artery defect and severe pulmonary edema. The disruption was treated successfully using an endovascular approach, with rapid resolution of the patient's pulmonary edema.

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Endovascular repair of aortic disease is an established treatment for select types of descending aortic and aortic arch disease. Endovascular repair has been applied occasionally to the ascending aorta using endovascular devices designed for the abdominal aorta [1–3]. We describe a technique of endovascular repair, via a right axillary artery approach, of an ascending aortic disruption that was noted immediately following bilateral proximal pulmonary artery stent placement in a patient with surgically corrected congenital heart disease.

The patient is a 26-year-old woman with symptomatic bilateral branch pulmonary artery stenoses. D-transposition of the great arteries was diagnosed shortly after birth, and she had initially undergone an arterial switch procedure (LeCompte repair) as a neonate, with a subsequent reoperation for bilateral branch pulmonary artery stenoses at 2 years of age. Preoperative cardiac magnetic resonance imaging demonstrated severe stenoses of the proximal pulmonary arteries bilaterally. The patient was referred for elective percutaneous intervention.

In the cardiac catheterization laboratory, using general anesthesia, the pulmonary artery anatomy was confirmed by angiography. Bilateral pulmonary artery angioplasty was performed with subsequent stent placement using a 26-mm Max LD stent dilated to an 18-mm diameter in the proximal left pulmonary artery and a 16-mm Max LD stent dilated to a 16-mm diameter in the proximal right pulmonary artery (ev3 Endovascular, Plymouth, MN). Immediately following placement of the stent in the right pulmonary artery, the distal right pulmonary artery pressure elevated to near systemic levels. Ascending aortic angiography confirmed a disruption of the ascending aorta, with a significant left-to-right shunt (Fig 1A). In addition, the branch pulmonary artery stents appeared to protrude into the ascending aorta (Fig 1B), less than 1 cm superior to the origin of the coronary arteries. The patient immediately developed rapidly progressive pulmonary edema and severe hypoxemia, despite high levels of positive pressure mechanical ventilation with 100% oxygen.

Surgical consultation was obtained emergently. Conventional surgery would have required emergent replacement of the ascending aorta as well as the main and proximal branch pulmonary arteries. Given her multiple previous sternotomies and her rapidly progressive pulmonary edema, open surgical repair was determined to carry a high risk for morbidity and mortality. Immediate endovascular repair was therefore determined to be the safer and more expedient option.

Based on angiographic measurements, the ascending aorta just above the right pulmonary artery was 20 mm. The area of coverage measured approximately 3 cm. Proximal seal would involve placing the proximal margin of the endovascular prosthesis near the ostia of the coronary arteries.

Cutdown exposure to the right axillary artery was obtained via a transverse incision in the axilla. A purse-string suture of 5-0 Prolene was placed, and arterial access was obtained using a 6-French sheath. Heparin was administered to maintain an activated clotting time greater than 250 s. A Bentsen guidewire was advanced into the ascending aorta. An AL-1 guide catheter was used to advance the guidewire into the left ventricle. An exchange-length Amplatz guidewire with a floppy J-tip was positioned in the apex of the left ventricle. The 6-French sheath was then exchanged for a 16-French sheath. A 5-French transvenous pacing catheter was placed in the right ventricle via a femoral venous approach.

Endovascular repair was performed using two Gore Excluder aortic cuffs (23 mm × 3.3 cm). The Gore Excluder device is designed for placement into the abdominal aorta via a femoral artery approach (61-cm delivery catheter). The device was placed via the sheath in the axillary artery. After positioning, the device was deployed during a brief period of rapid ventricular pacing to 180 beats/min and was expanded with a Coda balloon during an additional period of rapid ventricular pacing.

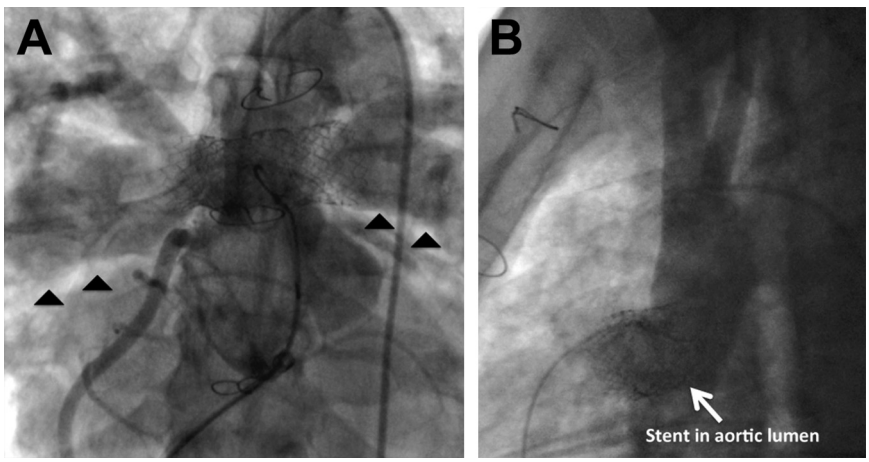

Fig 1. (A) Anteroposterior and (B) lateral angiographic images of ascending aortic disruption demonstrating an acute aorto-pulmonary window with pulmonary artery filling during aortic angiogram (arrowheads) and a pulmonary artery stent protruding into the ascending aortic lumen.