Aortic Valve Leaflet Entrapment by a Percutaneous Closure Device

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Iatrogenic aortic valve leaflet perforation and aorto–right atrial fistula are rare adverse events of transcatheter interventions and transseptal radiofrequency ablations, respectively. We present the case of a 62-year-old man who experienced acute, severe aortic insufficiency as a result of leaflet entrapment by a septal occluder device during attempted percutaneous closure of an iatrogenic aorto–right atrial fistula. This rare adverse event emphasizes the need for a thorough understanding of cardiac anatomy to minimize transcatheter adverse events and to recognize and treat them appropriately when they occur. (Ann Thorac Surg 2014;98:e23–5) © 2014 by The Society of Thoracic Surgeons

Iatrogenic aortic valve leaflet perforation is a rare but recognized adverse event of transcatheter interventions [1]. Likewise, aorto–right atrial fistula is a rare adverse event of transseptal radiofrequency ablation [2]. We describe a unique case of acute, severe aortic insufficiency (AI) that developed as a result of leaflet entrapment by the Amplatzer septal occluder device (AGA Medical Corporation, Plymouth, MN) during attempted percutaneous closure of an iatrogenic aorto–right atrial fistula. A 62-year-old man presented with a history of symptomatic, persistent refractory atrial fibrillation that was poorly controlled with medical therapy. He was offered radiofrequency pulmonary vein isolation, which he underwent. It was recognized during the transseptal puncture that the 8F SL1 sheath (St. Jude Medical, AF Division, Minnetonka, MN) had perforated the aorta at the level of the aortic root.

Further evaluation with transesophageal echocardiography (TEE) and fluoroscopy confirmed that the transseptal catheter had perforated the noncoronary sinus and was causing mild AI. Because the patient had multiple comorbidities—including morbid obesity (body mass index, 50 kg/m²), pulmonary hypertension, and obstructive sleep apnea—percutaneous closure with a 4-mm Amplatzer septal occluder device was deemed less morbid than open surgical intervention [3].

The original 8F SL1 sheath was left in place, and a 0.03 F J-wire was introduced through it. Next, a 4-mm Amplatzer device was threaded over the guidewire. The inner disc was deployed and seated on the aortic side in the noncoronary sinus. However, when the device was pulled back against the aortic wall and before the deployment was completed by releasing the outer disc of the device, severe aortic regurgitation was noticed on the TEE (Fig 1). At this point, further deployment of the Amplatzer was aborted, and the patient was expeditiously transferred to the operating suite.

On aortotomy, it was apparent that the transseptal 8F SL1 catheter had penetrated the right atrium into the noncoronary sinus, approximately 5 mm above the aortic valve annulus, and had perforated the noncoronary aortic leaflet near its free margin (Fig 2). It appeared that during device deployment, the noncoronary leaflet had been trapped and tethered to the aortic wall as the partially deployed Amplatzer device was being pulled. The Amplatzer device was carefully resheathed and retracted into the right atrium to minimize any further tearing of the leaflet. A 2.5-mm linear tear was identified in a slightly thickened but otherwise normal noncoronary aortic leaflet. This tear was amenable to primary repair with fine monofilament interrupted suture because of the quality of the leaflet tissue and some redundancy, especially near its free margin. Furthermore, the patient had a very small aortic annulus (19 mm) despite his weight; an

Fig 1. Tethering of the noncoronary aortic leaflet by the partially deployed Amplatzer device, resulting in severe aortic insufficiency.
Aortic valve replacement would have placed the patient at high risk of patient–prosthesis mismatch.

The valve was tested with saline solution and was found to be competent, with good coaptation of all three leaflets. The tears in the aortic sinus and right atrium were also repaired primarily, each with a single pledgeted monofilament suture. The aortotomy was then closed.

The patient was then weaned from cardiopulmonary bypass, and TEE revealed mild aortic regurgitation (Fig 3). The patient was discharged home after an unremarkable hospital course. He was at his baseline state of health at follow-up, 6 months after the operation.

Comment

To our knowledge, this is the first reported case of right atrio–aortic puncture with an associated aortic leaflet perforation complicating a catheter-based ablation procedure for atrial fibrillation. Despite real-time imaging with TEE and with fluoroscopy, the path of the catheter was difficult to define precisely, and the aortic leaflet involvement was initially missed. An attempt to close the atrio-aortic fistula percutaneously with an Amplatzer device caused acute AI because of aortic leaflet entrapment. The lesson learned from this rare adverse event is that a thorough understanding of cardiac anatomy is critical to avoiding or to rapidly diagnosing and treating transcatheter procedure adverse events.

References
