Left aortic sinus to right atrial tunnel

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A 21-year-old asymptomatic lady detected to have heart disease at 12 years of age during a routine medical examination referred to us for further evaluation. The clinical examination was normal except for a grade 3/6 continuous murmur over the right sternal border. Echocardiogram showed minimal dilatation of the right-sided chambers and a fistulous tract originating from the left aortic sinus and draining into right atrium (Panel A). To define the anatomy precisely, a computed tomographic angiogram was done which showed a dilated and elongated left aortic sinus with a fistulous communication to the right atrium near the superior vena cava–right atrial junction (Panels B and C). The left main coronary artery originated just below the aortic origin of the fistula. Catheterization revealed a 12% step-up of blood oxygen saturation in the right atrium with a pulmonary to systemic flow ratio of 1.67:1. The pulmonary artery pressure was normal. An aortic root angiogram was done which demonstrated the fistulous communication to the right atrium. Patient underwent successful percutaneous closure of the fistula using an 8/6 mm Amplatzer Duct Occluder (AGA medical corporation, USA) in the same sitting (Panel D).

Aorta–right atrial tunnel is an abnormal tubular extra cardiac communication between the ascending aorta and the right atrium. Congenital deficiency of the elastic lamina in the aortic media is proposed as the probable cause for this anomaly. This abnormal communication can arise from any of the three sinuses of Valsalva and the left sinus origin is more common. The preference for rupture into the right atrium is unclear. Depending on the origin and course in relation to the ascending aorta, it is divided into anterior and posterior types. Tunnels from the right sinus usually run anteriorly and tunnels from the left sinus follow a posterior course. This differs from ruptured sinus of Valsalva by having an extra cardiac tunnel.

Aorta–right atrial communication behaves like a left to right shunt at the atrial level. Most of the patients are asymptomatic and continuous murmur at the right parasternal border is the common finding. Diagnosis can be established non-invasively by echocardiography and more definitively by computed tomographic angiogram and cardiac magnetic resonance imaging or invasively by aortogram.

Surgical or percutaneous closure is indicated once the diagnosis is established as communication can result in volume overload of both ventricles, bacterial endocarditis, aneurysm formation, or spontaneous rupture.

**Panel A** Echocardiogram in parasternal short-axis view at the aortic valve level demonstrating the left aortic sinus to right atrial fistula.

**Panels B and C** Computed tomographic images revealing the fistulous tract originating from the left coronary sinus following a posterior course behind aorta and draining into right atrium at its junction with superior vena cava.

**Panel D** Follow-up image showing device in situ. RA, right atrium; LA, left atrium; RV, right ventricle; LV, left ventricle; AO, aorta; PA, pulmonary artery; SVC, superior vena cava; LAS, left aortic sinus; TUN, tunnel.