IMAGES in PAEDIATRIC CARDIOLOGY

Images Paediatr Cardiol. 2004 Apr-Jun; 6(2): 12–17.

PMCID: PMC3232523

Amplatzer device closure of an inferior venosus atrial septal defect after surgical closure of a secundum atrial septal defect

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Abstract

We present a patient who had transcatheter closure of a low atrial septal defect which was overlooked during surgical closure of a secundum atrial septal defect. The residual defect was detected during ablation for atrial flutter, and was closed successfully during the same procedure with an Amplatzer atrial septal occluder (ASO) device.

MeSH: Heart Septal Defects, Atrial, Child, Thoracic Surgery, Amplatzer ASO device, Heart Catheterization, Prostheses and Implants

Introduction

Atrial septal defects (ASD) are congenital deficiencies of the atrial septum, most commonly occurring in the fossa ovalis and referred to as secundum defects as they result from failure of development of the septum secundum.[1] Failure of the development of the septum primum results in partial atrio-ventricular septal defects and these are the second commonest. The venosus defects are the least common and arise at the junction of the sinus venosus and the primitive atrium; when situated close to the superior vena cava they are often associated with anomalous drainage of the right pulmonary veins and when the occur close to the inferior cava there is often override of the cava in relation to the atrial septum. Large defects allow substantial left to right shunting, resulting in volume overload of the right heart and pulmonary vascular tree.[2] Untreated ASDs may cause a variety of complications. These include the eventual development of pulmonary hypertension that is initially reversible, but may later become irreversible, atrial arrhythmias and paradoxical embolisation with organ infarction.

ASDs may close spontaneously in childhood.[2] Persistent defects with pulmonary to systemic flow ratios (Qp/Qs) of >1.5 are operated before school age or whenever a

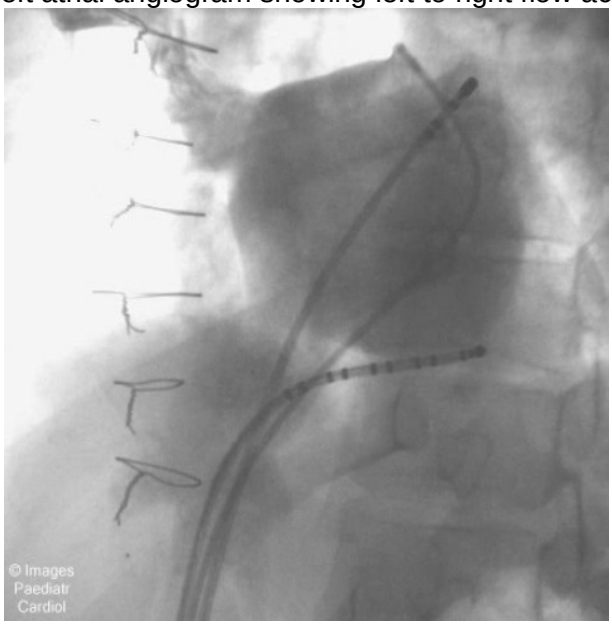
diagnosis is made if this occurs later.3 Significant residual ASDs after surgical closure have been documented in up to 17% of patients at catheterisation,[4] and currently, this Figure is down to 2%.[3] A variety of devices for transcatheter closure of ASDs have been developed and offer an alternative to surgical treatment.[5]

We present a patient who had surgical closure of ASD, with a second defect that was overlooked. She presented with atrial flutter; electrophysiological studies showed that she had a slow-slow atrioventricular nodal re-entry tachycardia which degenerated into atrial flutter. Slow pathway ablation was carried out at the base of the triangle of Koch. During the procedure, an inferior atrial defect was diagnosed and successfully closed with an Amplatzer ASO (atrial septal occluder) device.

Patient

The patient (female) had had surgery for ASD at 34 years of age at a tertiary referral centre where a two by three cm defect was closed by direct suture. The defect had been picked up when a murmur was noted on routine examination. She represented four years later with palpitations due to atrial flutter and ablation was undertaken. Atrioventricular nodal re-entry tachycardia was found and slow pathway ablation was carried out. During the procedure, the ablation catheters persistently passed from right to left atrium indicating the presence of an atrial communication. A left upper pulmonary angiogram showed a significant defect low in the interatrial septum very close to the junction of inferior vena cava and right atrium with no inferior margin (figure 1).

Figure 1 Left atrial angiogram showing left to right flow across ASD.



Transoesophageal echocardiography confirmed the diagnosis. Balloon sizing using the AGA Medical sizing balloon measured the stretched diameter at 19mm (figure 2). A 19mm Amplatzer ASO device was successfully deployed across the defect under transoesophageal echocardiography and fluoroscopic guidance (figures 3,4).

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Figure 2 Balloon sizing of ASD.

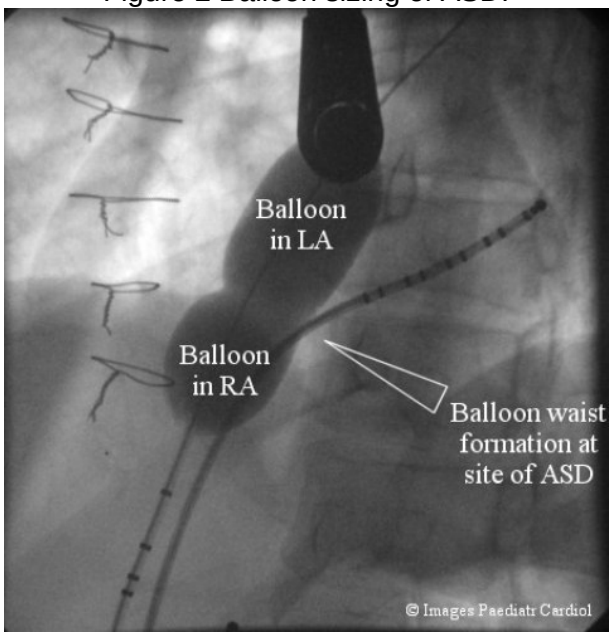

Figure 3 Deployment of Amplatzer ASO device.

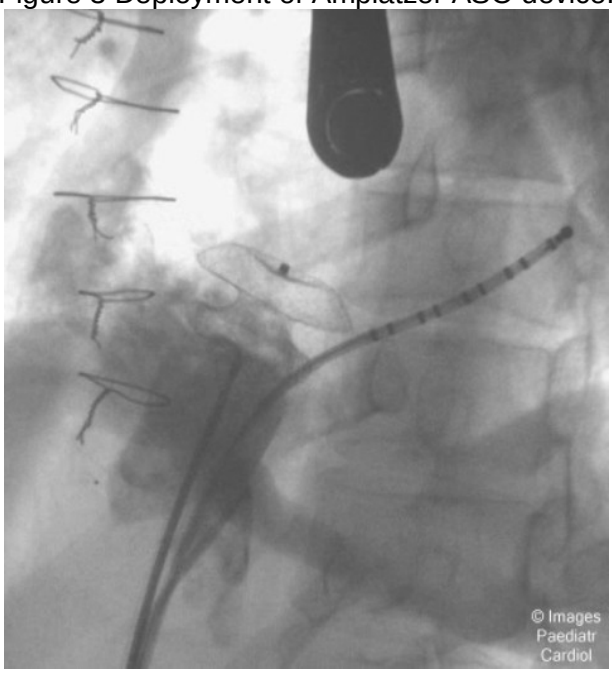

Figure 4 Release of Amplatzer ASO device.

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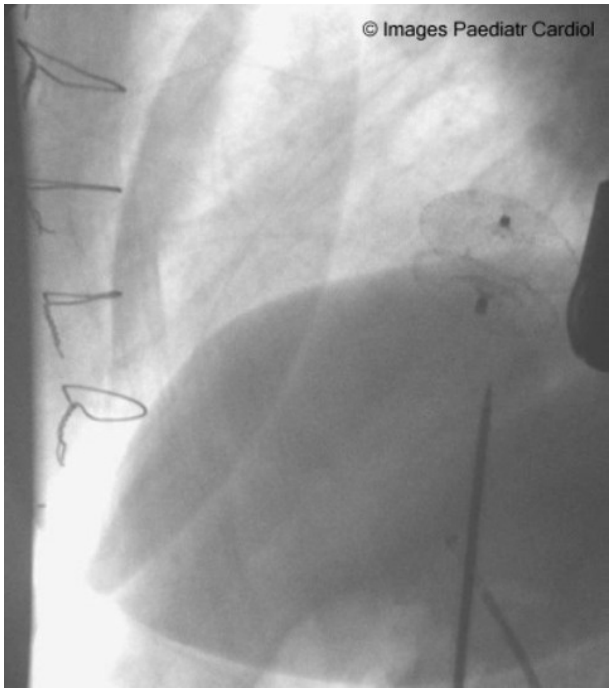
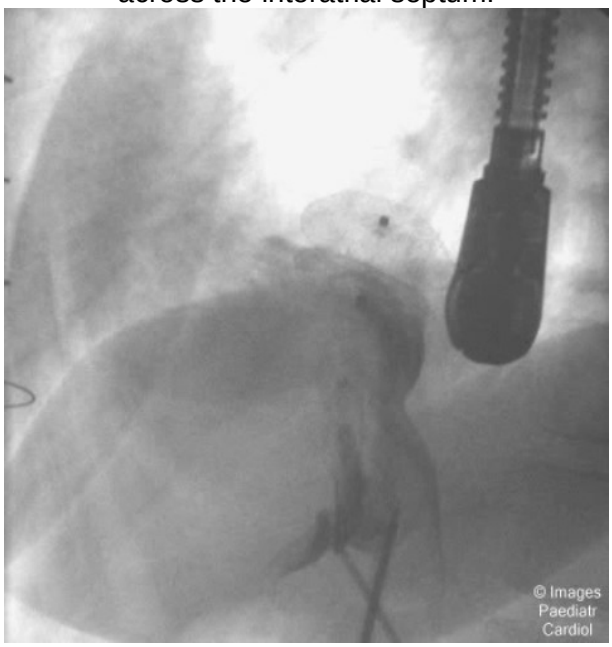


Right atrial angiography (figure 5) and transoesophageal echocardiography confirmed complete occlusion of the defect and with no impairment of flow through the inferior cava. Transthoracic echocardiography and CXR on the following day confirmed good device placement and ECG was also normal. One month later, she represented with tachycardia responding to medical therapy. Repeat ablation was successful.

Figure 5 Right atrial angiogram after Amplatzer device deployment showing no flow across the interatrial septum.



Discussion

The Amplatzer device has been used to close a wide variety of ASDs, ranging from defects in children, to persistently patent foramen ovale with presumed paradoxical embolism in older individuals.[6] The device has also been used for palliation in complex congenital heart disease.[7] Around 70% of ASDs are amenable to trans-catheter closure and the Amplatzer device is the most commonly used because of ease to deliver and deploy, retrievability, and a wide range of size from 4 to 40mm. Those ASDs not suitable for transcatheter closure include venosus ones with anomalous pulmonary venous drainage, very large defects, insufficient septal length to accommodate the device and poor margins, especially posteriorly and inferiorly. Although this case had no inferior margin, it was possible to secure the device straddling the top end of the inferior cava and the atrial wall. As the septum secundum had been surgically closed, this part of the septum was firm and the device could, therefore, be secured superiorly so that inferiorly the device could be stabilised where the septal margin was deficient. This report highlights the need to fully assess the atrial septum both before and during surgery or intervention as multiple ASDs can be missed particularly if situated in unusual positions. Some cases generally considered unsuitable for catheter closure can still be dealt with by intervention under certain circumstances. Although, atrial flutter or incisional atrial tachycardia occur after atrial surgery, it is important to remember that other arrhythmia substrates may be responsible.

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