

Surgical Intervention for Embolization of Atrial Septal Defect Closure Devices: Case Report

Hakan Vural,¹ Tahsin Bozat,² Derih Ay,¹ M.Çağdaş Çayır,¹ Arif Gücü,¹ Tuğrul Göncü¹

Departments of ¹Cardiovascular Surgery and ²Cardiology, Bursa Yüksek İhtisas Education and Research Hospital, Bursa, Turkey

INTRODUCTION

Atrial septal defect (ASD) closure using a percutaneous transcatheter device is used as an alternative to surgery. Various devices are increasingly used in clinical practice, and various types and models of septal occluder devices are available. The Amplatzer device (Amplatzer Medical, Golden Valley, MN, USA) is one with increasing popularity.

We report a case of attempted percutaneous transcatheter closure of a large ASD in a 14-year-old girl, complicated by total device embolization to the right ventricle necessitating emergency surgery.

CASE REPORT

A 14-year-old girl was admitted to our hospital with fatigue and palpitations. A large secundum ASD was found with transthoracic echocardiography and confirmed with transesophageal echocardiography (Table). Open heart surgery and device implantation were the 2 choices the patient and her parents were offered. They opted for the transcatheter procedure and signed the appropriate informed parental consent.

Transvenous closure was attempted. A long 14F sheath shaped to enter the left atrium was placed in the right femoral vein and a 5F sheath was placed in the femoral artery for pressure measurements. Under fluoroscopic control, a balloon was used to measure the stretched diameter of the ASD. A 28-mm Amplatzer device was implanted to occlude the ASD. During the predischARGE routine transthoracic echocardiographic examination performed on the next day, the occluder was revealed in the right ventricle (Figure 1).

Promptly, within a couple of hours, the patient was transferred to the operation room for surgical intervention. Following median sternotomy and standard aortic and bicaval venous cannulation, the right atrium was opened. The device was found to be placed partly in the right ventricle

and partly over the septal leaflet of the tricuspid valve. Following removal of the device, the septal defect was repaired primarily. Cross-clamp time was 13 minutes, and total perfusion time was 21 minutes. The patient was transferred to the intensive care unit and was extubated at the fourth postoperative hour. She was transferred to a regular hospital bed the next day, and was discharged at the fourth postoperative day without any complications.

DISCUSSION

ASD is the fourth most common congenital heart defect, with an incidence of 3.78 per 10,000 live births [Emmanouilides 1995], and constitutes 7% to 10% of all congenital heart abnormalities [King 1976]. Patients with large ASDs present with symptoms such as fatigue, arrhythmias, and congestive heart failure. Treatment modalities include surgical or transcatheter occlusion [King 1976].

Transcatheter occlusion techniques have become increasingly used alternatives to surgical closure of the ASD. Although various devices are reported to be useful, complications may occur [Rome 1990; Sideris 1990; Das 1993; Hausdorf 1996]. Embolization and/or malposition is the most common complication (3.5%). The other most common complications include arrhythmias, thrombus formation, right iliac vein dissection, groin hematoma, and retropharyngeal hemorrhage [Chessa 2002].

The most important reason for the acute failure of these devices is poor patient and/or device selection [Agarwal 1996; Berger 1999]. Other reasons include: device-related failure, inadequate experience [Thamson 2002; Contrafouris 2006], poor defect rim to hold the device [Agarwal 1996; Berger 1999; Thomson 2002; Contrafouris 2006], and tearing of the interatrial septum as a result of catheter and device manipulations [Thomson 2002; Contrafouris 2006]. A part of or the entire device may embolize to the right or left atrium, the main pulmonary artery, or even to other parts of the vascular tree on both the right and left sides of the circulation.

Following partial device embolization, there are 2 possible treatments: retrieve the device by a gooseneck snare or a basket catheter or refer the patient to the surgeon [Chessa 2002]. In patients experiencing unsatisfactory device position and a significant residual defect, device retrieval is usually

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Correspondence: Assoc. Prof. Dr. A. Hakan Vural, Department of Cardiovascular Surgery, Bursa Yüksek İhtisas Education and Research Hospital, 16330 Yıldırım, Bursa, Turkey; 0532-6116405; fax: 0-224-3605055 (e-mail: abrvural@gmail.com)

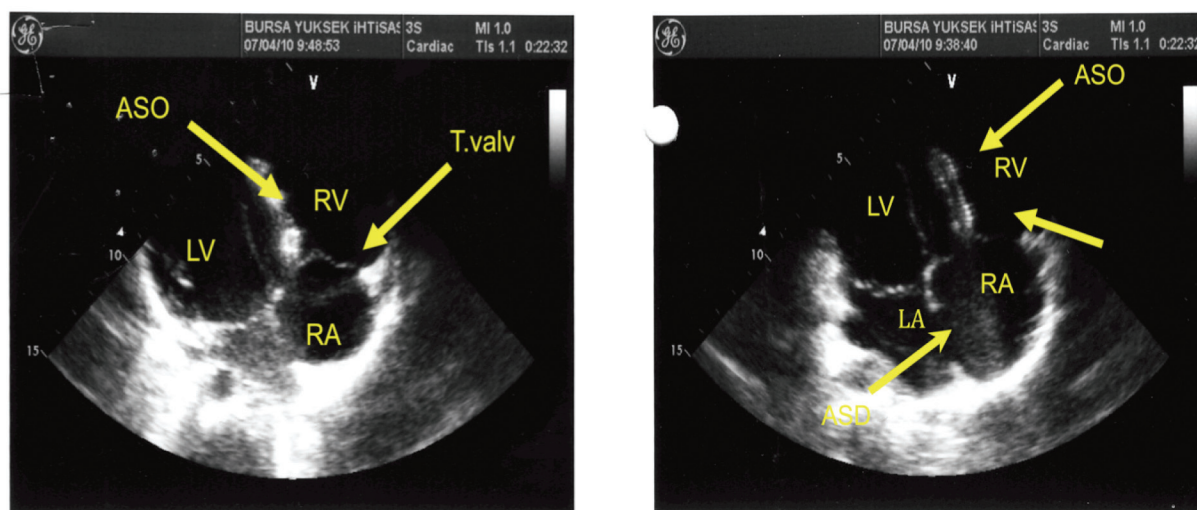


Figure 1. Apical 4-chamber view showing the Amplatzer Septal Occluder (ASO) device in the right ventricle. RV indicates right ventricle; RA, right atrium; LA, left atrium; LV, left ventricle.

feasible at the time of implantation, leading to elective surgical closure. In patients with total embolization, however, urgent surgical therapy is necessary [Berger 1999; Thomson 2002; Contrafouris 2006]. Our patient suffered from total device embolization leading to surgical intervention.

Echocardiographic findings of case.

Left ventricle size	2.0-3.2 cm
Left atrium size	3.0 cm
TEE* ASD size	2.6 cm
Pulmonary artery pressure	52
Qp/Qs	5/6
Aorta	2.3 cm
Ejection fraction	60%
Anterior inferior rim	1.37 cm (flail)
Anterior superior rim	1.1 cm
Posterior superior rim	2.4 cm
Posterior inferior rim	1.4 cm (flail)
Total septum	4 cm

*TEE indicates transesophageal echocardiography; Qp, pulmonary flow volume; Qs, systemic flow volume.

CONCLUSIONS

Although occlusion devices are reported to be useful alternatives to surgical closure in selected ASD cases, they may end up with failure, and potentially fatal complications. We believe that proper selection of patient and device is mandatory. Close monitoring and emergency surgery should be available for all patients [Contrafouris 2006].

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