

CASE REPORT

Unusual Embolization of Atrial Septal Defect Device in Left Ventricle and its Successful Retrieval

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ABSTRACT

Atrial septal defect (ASD) transcatheter occlusion techniques are now established as the preferred method and have become an alternative to surgery under extracorporeal circulation. In this study, we aimed to present our emergency surgical approach to an unusual case of device embolization to left ventricle due to migration of the ASD occluder. The diagnosis was made via transthoracic echocardiography postprocedure. No early or late complication was seen. Transesophageal echocardiography (TEE) examinations showed no residual interatrial shunting. Transcatheter occlusion of secundum-type ASD has drawbacks, such as distal migration and residual shunts. Consequently, we think that unfavorable anatomy (deficient or floppy rim, septal malalignment) and device diameter are major issues in device migration. Careful follow-up and TEE monitoring perioperatively can lead to successful management of such cases.

Keywords: Amplatzer septal occluder, Embolization, Migration, Secundum-type atrial septal defect.

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INTRODUCTION

Atrial septal defect (ASD) is one of the most common acyanotic congenital heart diseases in children. The treatment option, which included only surgery using cardiopulmonary bypass few years back, is now changing, with many centers giving the option of percutaneous device closure. Reported series with percutaneous deployment of occluder devices emphasize that transcatheter closure technique avoids open-heart surgery and its associated complications. However,

these interventional procedures are accompanied with their own complications, such as device embolization.^{1,2} Device embolization, if it occurs, is common to the right-sided structure, especially the pulmonary artery or its branches.³⁻⁵ We report a case in which the ASD device got migrated to the left ventricle and was successfully retrieved surgically. This case report describes the less commonly seen left-sided migration of the Amplatzer occlusion device and emphasizes the importance and utility of two-dimensional (2D) echocardiography to view and assess the path traversed by the device, examining for trauma to local structures.

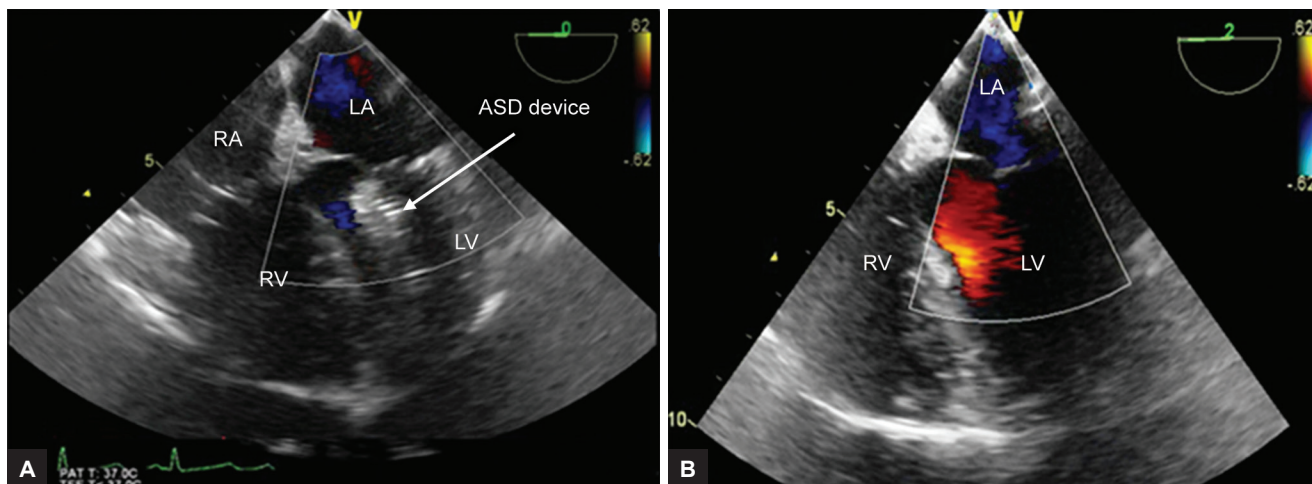
CASE REPORT

The patient was an 8-year-old girl child who presented with a history of dyspnea on exertion and occasional palpitation. Transthoracic echocardiography (TTE) showed 15 mm ostium secundum (OS) ASD with a well-defined rim and a left-to-right shunt. It also showed mild tricuspid regurgitation with mild pulmonary artery hypertension (right ventricular systolic pressure = 30 + right atrial pressure). With no other associated cardiac anomaly, the patient was scheduled for ASD closure using a 16 mm Amplatzer Septal Occluder (St. Jude Medical Inc., Cardiovascular and Ablation Technologies, Plymouth, MN, USA). The procedure was successfully performed without any complications under balanced general anesthesia in transesophageal echocardiography (TEE) monitoring and fluoroscopy guidance during the catheterization procedure. The TEE confirmed the findings of 15 mm OS ASD with a well-defined rim around the defect (inferior vena cava: 5 mm, superior vena cava: 8 mm, aortic: 4 mm, posterior: 7 mm, and mitral: 5 mm). The final TEE revealed good apposition of the device with minimal residual shunt flow. On routine post-procedure TTE before discharge from the hospital, the device was found to have migrated to the left ventricle cavity. Although the patient was hemodynamically stable, an urgent surgical intervention was recommended to retrieve the device and close the defect. The device was removed and the ASD defect was closed with a pericardial patch under cardiopulmonary bypass and TEE monitoring. No mitral regurgitation or injury to mitral valve was seen. The device was retrieved via ASD and mitral valve. It was covered with recent red thrombus and was found

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Figs 1A and B: (A) The TEE ME four-chamber view showing ASD (Amplatzer) occluder device migrated into the left ventricle; and (B) Postbypass ME four-chamber view showing normal valve and left ventricle. ME: Midesophageal

to be embolized entirely into the left ventricle, lying just below the mitral valve and moving freely (Figs 1 A and B, Video 1). The patient was successfully weaned off from ventilator and trachea extubated after 4 hours of mechanical ventilation. The patient was shifted to the ward on the second postoperative day and, after uneventful recovery, discharged from the hospital on the fourth postoperative day.

DISCUSSION

Transcatheter occlusion techniques have become an increasingly used alternative to surgical closure in selected cases of ASD, and various devices are available for this. Most OS ASD defect with ≤ 34 mm and adequate rim (5 mm) can be closed using Amplatzer devices. The hazards of such devices are thick profile of the device and a high amount of nitinol in the device, causing the potential for nickel toxicity. Transcatheter closure of ASD has comparable results to surgical closure. The absence of residual shunts and late thromboembolic events is in favor of surgical closure of ASD. Minimally invasive techniques address cosmetic angle without compromising results. The need for lifelong antiplatelet agents and subacute bacterial endocarditis prophylaxis has to be weighed against the disadvantage of a small incision. A promising early result by device closure does not guarantee a favorable late outcome. Chessa et al reported a total of 36 complications after ASD closure procedure was performed on 417 patients, and the authors classified the device malposition and device emboli as major complications.¹ Embolization commonly occurs in 0.1 to 3% of patients undergoing device closure,^{1,2} but if it develops, the reasons are insufficient or floppy rim around the defect, early release of device, operator inexperience, and mismatch between the size of the ASD and Amplatzer. Transesophageal

echocardiography has been used to assess ASD morphology and sizing (longest size in end systole). The size of the device should be 2 mm more than the size of the largest defect diameter measured on 2D echocardiography. In our case, the size of the device chosen was only 1 mm more than the ASD defect computed in TTE and TEE. We believe this was the major reason for embolization of the device. Although TEE performed during Amplatzer placement seems to be a potential contributor to prevent technical errors and occurrence of complications apart from guidance during placement and surgical retrieval, transcatheter devices can be associated with failures and, most importantly, with life-threatening complications. Other suggested mechanisms of acute failure are device-related failure and tearing of the interatrial septum as a result of catheter and device manipulations. A part of or the entire device might embolize to the right or left atrium, main pulmonary artery⁵ or right and left pulmonary artery, or even the aorta.⁶ The surgical or percutaneous interventional methods may be used in the retrieval of the embolized devices.⁷ Since the device was in the left ventricle, surgical treatment was implemented and successful results were achieved. The surgical approach makes possible to both retrieve the device and close the defect in case ASD is not suitable for percutaneous closure intervention. Also, there are those who argue that only the surgical method is to be preferred in the retrieval of embolized device as it enables to detect the damage in the device embolisms in pulmonary artery and other cardiac cavities, and the damage that may occur during the embolization in intracardiac structures.⁸

CONCLUSION

Device embolization is a rare but potentially fatal complication of transcatheter ASD closure and mostly occurs within the first 24 hours postprocedure. Although

percutaneous retrieval is feasible, surgical removal might be preferred when the endothelialization status of the device is unknown. This case underlines the importance of proper patient selection and the utility of routine TTE before discharge in addition to TEE in guiding the intraoperative management.

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