Surgical management of embolized Amplatzer septal occluder into the left ventricle tangled with the mitral valve

Jose Manuel Martínez-Comendador[1], Elio Martín[1], Javier Gualis[2], and Mario Castaño[1]

[1]Affiliation not available
[2]Hospital Universitario de León

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Abstract

Device embolization is a rare major complication of atrial septal defect percutaneous closures that requires surgical management if non-invasive retrieval fails. We report a symptomatic delayed embolization of an Amplatzer septal occluder device into the left ventricle outflow tract tangled with the mitral valve, complicated with ventricular arrhythmias and cardiac tamponade during percutaneous retrieval attempt. Emergent surgical treatment was performed, requiring combined approach through the right atrium and the aorta for surgical removal.

KEYWORDS

Atrial septal defect, Device embolization, Cardiac surgery

1 INTRODUCTION

Surgical repair has been traditionally considered the treatment of choice for atrial septal defect (ASD) repair during decades. However, nowadays the percutaneous deployment of Amplatzer septal occluder (ASO) devices has become the standard technique for favourable ASD closure[1,2]. These procedures are considered safe and effective, with low rates of mortality and morbidity, and avoid open-heart surgery[2]. However, device embolization to different sites of the circulatory system or cardiac chambers is a serious potential complication. In these cases, when the percutaneous retrieval of the device fails, surgical removal is needed[3]. We report a rare case of symptomatic embolization of an ASO into the left ventricular outflow tract (LVOT) after 24 hours of device deployment. During percutaneous retrieval the device tangled with the mitral valve and the left ventricle was injured, requiring emergent surgical removal with combined right atrial and aortic approaches, and patch repair of the left ventricle.

2 CASE PRESENTATION

An asymtomatic 66-year-old woman with history of paroxysmal atrial fibrillation was diagnosed by transesophageal echocardiography (TEE) of a 18-mm round shaped secundum ASD with adequate rims. She was referred for invasive treatment because of a significantly increased pulmonary/systemic flow ratio (Qp/Qs=2.2).

A 20-mm ASO and a 20-mm left atrial appendage occluder (Amplatzer® and Amplatzer Amulet® respectively, St. Jude Medical, Inc., St. Paul, Minn) were successfully delivered without intraprocedural complications. After 20 hours the patient complained of chest pain and palpitations. Transthoracic echocardiography showed recurrent left-to-right interatrial shunt and dislodgment of the ASO device, located in the LVOT and tangled with the subvalvular mitral valve apparatus (Figure 1 A). Percutaneous retrieval of the device was attempted despite the difficult access between the chordae tendinae of the mitral valve (Figure 1 B). The procedure was complicated with a severe pericardial effusion and ventricular tachyarrhythmias with

hemodynamic instability. The patient was transferred to the operating room for emergent surgical device removal. After full median sternotomy and pericardiotomy a haemorrhagic pericardial effusion was found. Under cardiopulmonary bypass, the aorta was cross-clamped and antegrade blood cardioplegia was infused. An intramyocardial dissecting hematoma of the left ventricular inferior wall was observed (Figure 2 A). A longitudinal right atriotomy was performed. The waist of the device was tangled with the mitral valve chordae, that prevented its detachment even after trying to fold it with two forceps. So, we decided to cut the waist of the device and separate the right and left ASO components. This maneuver untangled both parts and allowed to retrieve them separately from the right atrium the right part (through the mitral valve and the ASD) and from the aorta the left one (through the aortic valve) (Figure 2 B,C,D). The mitral valve was carefully assesed and no abnormal findings were found. The ASD was repaired with an autologous pericardial patch using a running 4/0 polipropilene suture. A bovine heterologous pericardial patch attached with biological glue was used for cardiac rupture repair. The postoperative course was uneventful and the patient was discharged on the 7^{th} postoperative day.

3 DISCUSSION

Management of ASO embolizations has been previously described in the literature as single case reports and very few multicenter experiences have been reported[1-5]. Embolization sites can be the right atrium, right ventricle, pulmonary valve, tricuspid valve, and much less frequently, the LVOT[2]. The surgical technique performed in these cases is usually gentle direct retrieval of the deployed device through the mitral valve[3]. To our knowledge, this is the first reported case of a symptomatic ASO embolization to the LVOT requiring emergent surgical retrieval through a combined approach (right atrium and ascending aorta) because of device tangling with the mitral subvalvular apparatus.

Cardiac tamponade is a rare complication, ranging from 0.1% to 0.3%[2]. In our case, the perforation of the left ventricular free wall during percutaneous retrieval attempts induced the pericardial bleeding.

Although percutaneous retrieval of the device is effective in approximately 70% of the cases[3], when the occluder is located at the LVOT and involves the chordae tendineae of the mitral valve, percutaneous retrieval must not be attempted to avoid damage of the leaflets, the subvalvular apparatus or the LV[2-4].

AUTHORS CONTRIBUTIONS

JMC drafted the manuscript. EM, JG and MC edited and revised the manuscript for important intellectual content. All authors read and approved the final manuscript.

Conflict of interest: none declared.

Figure Legends

Figure 1. Transthoracic echocardiogaphy showing Amplatzer atrial septal occluder tangled with mitral anterior leaflet chordal apparatus (A). Cath-lab fluoroscopy of percutaneous retrieval attempt procedure, with the left atrial appendage occluder implanted and the dislodged atrial septal occluder snared through its waist by means of a loop (B).

Figure 2. Left ventricular inferior dissecting hematoma (A). Right atrial disk viewed through the atrial septal defect with its waist tangled with the mitral valve (B). Transaortic retrieval of the left atrial disk after dividing the device through its waist (C). Two halves of the atrial septal occluder retrieved (D).

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