Amplatzer device embolization: hazards of multiple attempts at catheter retrieval

Amplatzer cihaz embolisi: Kateter yardımıyla geri alma esnasında tekrarlayan denemelerin tehlikeleri

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Introduction

Atrial septal defect (ASD) transcatheter occlusion techniques have become a successful alternative to surgical procedures (1). The Amplatzer septal occluder is one of the commonly used devices. Many reports have demonstrated that this device is safe, efficient and easy to use with a rate of high success (2, 3). However, despite these advantages this technique has some complications. Recent studies have shown that the device embolization occurs in up to 0.55% of cases performed (4). We describe a case of Amplatzer septal occlusion embolization to the main pulmonary artery, and outline our principles of emergency surgical management of this rare complication.

Case report

An 11-year-old male child with known asymptomatic ASD was admitted to Great Ormond Street Hospital for interventional catheter device closure of the defect. The original diagnosis was made following the discovery of an incidental murmur on physical examination at one year of age and subsequent trans-thoracic (TTE) and transesophageal echocardiography (TEE) revealed what was thought to be a large secundum atrial septal defect with adequate margins for deployment of a percutaneous closure device.

The patient was taken to the cardiac catheterization laboratory, where a 24 mm Amplatzer device was deployed. Unfortunately, there was immediate embolization into the right ventricle where upon it became lodged against the pulmonary valve (Fig. 1). Several attempts at retrieval were unsuccessful, necessitating emergency surgical retrieval with closure of the septal defect on cardiopulmonary bypass.

The operative findings were quite different from those expected preoperatively. There was a small defect in the oval fossa together with an inferior sinus venous defect; not the expected isolated secundum ASD. All the margins and morphology of the inferior sinus venous defect were defined and documented prior to the inspection of the right ventricular inlet and outlet components.

It was clear that the medial papillary muscle had been severely damaged and partially avulsed following the multiple percutaneous attempts at retrieval, the consequence of which was acute tricuspid insufficiency. The Amplatzer device was seen to be wedged in the subpulmonary infundibulum, lying against the leaflets of the pulmonary valve (Fig. 2. Video 1. See corresponding video/movie images at www.anakarder.com). It was removed without difficulty, and direct inspection of this region through a right ventricular outflow tract incision did not reveal any injury to the valve, nor its free-standing infundibulum. The papillary muscle was reattached to the septal surface of the valve using pericardial-pledgetted sutures, and subsequent testing of the tricuspid valve showed it to be fully competent. This was confirmed with an on-table transesophageal echocardiogram.

The sinus venousus defect was closed with a Gore-Tex patch, taking care to leave the hepatic veins to the right side of the septum, and the defect in the oval fossa was closed directly.

Discussion

Transcatheter closure of ASDs has become the standard approach in most centers (5). The TTE and TEE are employed routinely to define the size, margins and overall suitability of the defect to percutaneous closure. In our report, a rare inferior sinus venous defect masqueraded as a secundum type ASD. The differing morphologies of these varieties

Figure 1. Amplatzer wedged in the subpulmonary infundibulum

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of atrial septal defect almost certainly accounts for the failure of the
device to engage the margins of the defect, with resulting embolization
further downstream. Device embolism is a rare complication and the first
port of call for retrieval of an ectopic device is at cardiac catheter.
However, it should be borne in mind that multiple attempts may cause
inadvertent injury, especially to the delicate subvalvular apparatus,
formed by the tendinous cords and papillary muscles.

Some authors accept that embolization of Amplatzer device is
always an indication for emergency surgical retrieval (1), which also
permits direct inspection of intra-cardiac structures that may have
become injured. In our report, several attempts led to the avulsion
of the medial papillary muscle.

This case emphasizes that despite a careful echocardiographic
assessment, sinus venosus defects may be diagnosed as simple
secundum defects, with the potential for complications for
percutaneous device closure. It also highlights the ease with which the
subvalvular apparatus may become injured following multiple attempts
at retrieval. We therefore advocate early surgical intervention in these
instances; a course of action that allows not only direct and safe
removal of the device, but also permits easy inspection of vital
structures which can easily become disrupted, as illustrated by this
case.

References

1. Kim JJ, Hijazi ZM. Clinical outcomes and costs of Amplatzer transcatheter
closure as compared with surgical closure of ostium secundum atrial
and late complications associated with transcatheter occlusion of
with transcatheter closure of secundum atria septal defects using the
Amplatzer septal occluder: a single center study in 236 consecutive
patients. Heart 2003; 89: 199-204.
4. Levi DS, Moore JW. Embolization and retrieval of the Amplatzer septal
5. Berger F, Vogel M, Alexi-Meskishvili V, Lange PE. Comparison of results
and complications of surgical and Amplatzer device closure of atrial