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 venosus defect; not the expected isolated secundum ASD. All the margins and morphology of the inferior sinus venosus 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 ventricle 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 venosus 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 venosus defect masqueraded as a secundum type ASD. The differing morphologies of these varieties

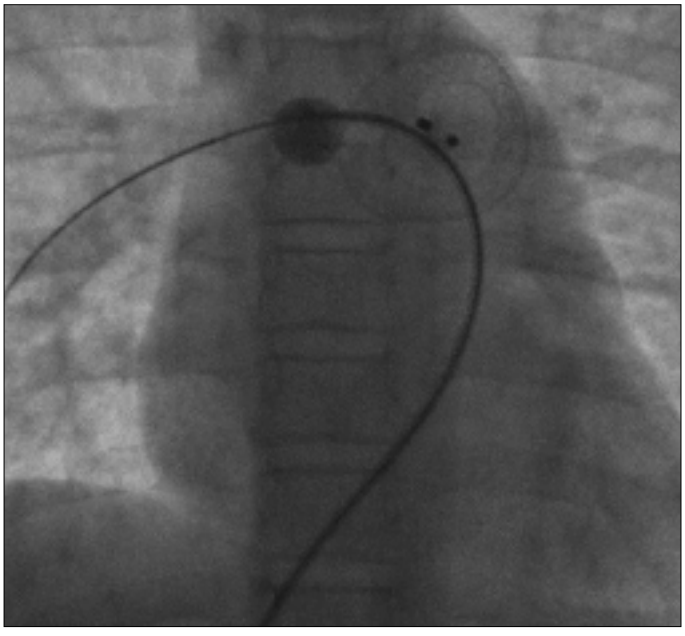

Figure 1. Amplatzer wedged in the subpulmonary infundibulum

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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.

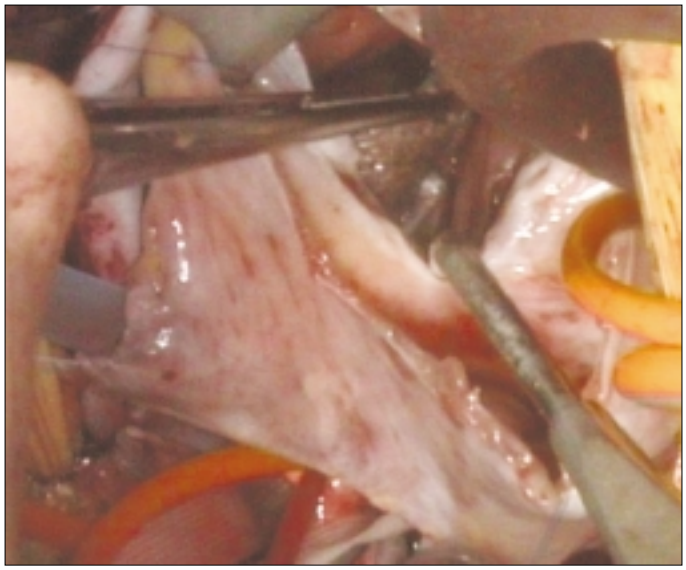

Figure 2. Amplatzer septal occluder device sitting in the right ventricular outflow tract -view through right atriotomy

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.

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