

Surgical Extraction of an Embolized Atrial Septal Defect Occluder Device into Pulmonary Artery after Percutaneous Closure

Mustafa Yolcu, M.D.¹, Mehmet Ali Kaygin, M.D.², Emrah Ipek, M.D.¹,
Fatih Rifat Ulusoy, M.D.¹, Bilgehan Erkut, M.D.²

An atrial septal defect is the most common type of congenital heart disease among adults. Surgical repair or percutaneous closure of the defect is the treatment options. Even though percutaneous closure seems to be less risky than surgical repair, it may result in fatal complications like device embolism, cardiac perforation and tamponade. Herein we report a case of the embolism of a device into the pulmonary artery after one hour of percutaneous closure in which the embolized device was surgically removed and the defect was closed with a pericardial patch.

Key words: 1. Heart septal defects, atrial
2. Device, septal occluder
3. Embolism

CASE REPORT

A 22 years old female patient was admitted to our outpatient clinic with a complaint of dyspnea for the previous three years. Her physical examination revealed a 1-2/6 pansystolic murmur in the mesocardiac area. A right bundle branch block was detected on her electrocardiogram. In the transthoracic echocardiography (TTE), a 22 mm secundum type atrial septal defect (ASD), right heart dilatation and pulmonary arterial hypertension (PAP 45 mmHg) were detected. Transesophageal echocardiography (TEE) showed that the defect was 25 mm, the superior rim was 16 mm and the aortic rim was 8 mm in size. The defect was closed through a right femoral route with a 30 mm ASD occluder after balloon sizing with TTE. In the cineangiography and TTE early after the procedure, the device was observed to be in the correct

position (Fig. 1). The patient had experienced dyspnea one hour after the procedure. The TTE revealed that the device was not in the defect and it had embolized to the pulmonary artery. The patient was referred to the cardiovascular surgery unit and underwent surgery promptly. Under general anaesthesia, a median sternotomy was done. The pericardium was opened with an aortobicaval cannulation under cardio-pulmonary bypass. The pulmonary artery was incised along its vertical axis and the occluder device was removed (Fig. 2). The right atrium was opened and the defect was then closed with a pericardial patch. The patch was patent by the first post-operative day as shown on control echocardiography.

DISCUSSION

ASD is the most common type of congenital heart disease

Departments of ¹Cardiology and ²Cardiovascular Surgery, Erzurum Region Training and Research Hospital

Received: August 16, 2012, Revised: October 18, 2012, Accepted: October 18, 2012

Corresponding author: Mustafa Yolcu, Department of Cardiology, Erzurum Bolge Egitim ve Arastirma Hastanesi, Kardiyoloji Klinigi, 25100, Palandoken, Erzurum, Turkey

(Tel) 90-442-319-18-00 (Fax) 90-442-232-64-05 (E-mail) yolcuductor@gmail.com

© The Korean Society for Thoracic and Cardiovascular Surgery. 2013. All right reserved.

© This is an open access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/3.0>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

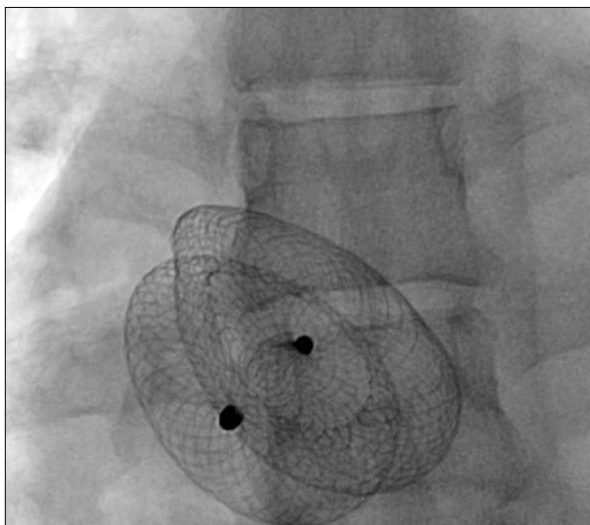


Fig. 1. Fluoroscopic view of the atrial septal defect occluder after percutaneous closure.

in adults [1,2]. There are three different types of ASD according to their shape and location [1,3]. Secundum ASD is the most common type, which accounts for 50% to 70% of all ASDs and located in the fossa ovalis [1,3]. Primum ASD together with complete endocardial cushion defects comprises 10% of all ASDs [1,3]. Sinus venosus type ASD is located at the upper portion of the interatrial septum where the vena cava superior opens [1,3].

A shunt between atria leads to chronic right ventricular volume overload, which in turn causes lower filling rates of left ventricle [4]. Surgical or percutaneous closure in asymptomatic patients is indicated in the case of right ventricular volume overload and if the pulmonary to systemic flow ratio increases beyond 1.5 [5]. In adult patients, the defect should be repaired as soon as possible after it is detected because patients who undergo repair after 25 years of age have a shorter life span than a control population [6].

The most important factor for success in percutaneous closure is the correct patient selection [5,6]. In patients with secundum ASD, percutaneous closure can be performed safely with careful evaluation of anatomical factors like defect size and sufficiency of the rims [5,6]. In a previous report, it was shown that atrial defects up to 43 mm in diameter can be closed percutaneously [7]. A sufficient anterior rim is not necessary to bring the device into a stable position [7].



Fig. 2. View of the embolized device in the pulmonary artery during surgery.

Conversely, deploying the device in patients with deficient cranial rims can be difficult and may lead to an unstable position of the device and increased risk of device embolization [7].

The most common type of complications in percutaneous closure is device embolization, with a rate of 0.5% to 1% [8]. In a study with 450 patients, seven cases of device embolization into pulmonary artery in the first 12 hours were reported [8]. In our case, one hour after intervention we detected device embolization into the pulmonary artery after performing echocardiography since the patient had dyspnea. After that, emergency surgery was performed within one hour with a median sternotomy and under cardiopulmonary bypass. The pulmonary artery was incised and the embolized device was taken out.

The most frequent reason for device embolization is floppy or insufficient rims [8,9]. Additionally, using a smaller ASD occluder device is another reason for device embolization [8,9]. Device embolization requires emergency treatment [8,9]. In appropriate cases, snares can be used to take out the device, but most of the time, surgical extraction of the device and ASD patch closure is needed [8,9].

Percutaneous ASD closure is a widely used and has been performed successfully throughout the world in recent years. However, it should be kept in mind that improper patient and

device selection may result in deadly complications like device embolization, cardiac perforation and tamponade.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

REFERENCES

1. Miyaji K, Furuse A, Tanaka O, Kubota H, Ono M, Kawauchi M. *Surgical repair for atrial septal defect in patients over 70 years of age.* Jpn Heart J 1997;38:677-84.
2. Guray U, Guray Y, Yilmaz MB, et al. *Evaluation of P wave duration and P wave dispersion in adult patients with secundum atrial septal defect during normal sinus rhythm.* Int J Cardiol 2003;91:75-9.
3. Park MK. *Specific congenital heart defects: left-to-right shunt lesions: atrial septal defect.* In: Park MK. *Pediatric cardiology for practitioners.* 5th ed. Philadelphia: Mosby/Elsevier; 2008. p. 161-5.
4. Dickinson DF, Arnold R, Wilkinson JL. *Congenital heart disease among 160 480 liveborn children in Liverpool 1960 to 1969. Implications for surgical treatment.* Br Heart J 1981;46:55-62.
5. Sahin M, Ozkutlu S, Yildirim I, Karagoz T, Celiker A. *Transcatheter closure of atrial septal defects with trans-thoracic echocardiography.* Cardiol Young 2011;21:204-8.
6. Uzun M, Ulusoy E, Baysan O, et al. *Our cases with atrial septal defect: properties of a series of 240 cases.* Gulhane Med J 2007;49:21-4.
7. Majunke N, Bialkowski J, Wilson N, et al. *Closure of atrial septal defect with the Amplatzer septal occluder in adults.* Am J Cardiol 2009;103:550-4.
8. Kapoor MC, Singh S, Sharma S, Chatterjee S, Cassorla L, Sommer RJ. *Case 6-2003: embolization of an atrial septal occluder device.* J Cardiothorac Vasc Anesth 2003;17:755-63.
9. Chessa M, Carminati M, Butera G, et al. *Early and late complications associated with transcatheter occlusion of secundum atrial septal defect.* J Am Coll Cardiol 2002;39:1061-5.