Case Report

Surgical Treatment of Amplatzer Embolus in a Secundum Atrial Septal Defect Patient

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Received 18 August 2011; Accepted 23 January 2012

Abstract

A secundum atrial septal defect is the most common congenital heart defect. Transcatheter treatment of secundum atrial septal defects is a popular and less invasive alternative to surgery. Procedural complications may occur in a wide spectrum, particularly device embolus as the most emergent one, but luckily they do not commonly occur in the clinical setting. Mortality from adverse events related to transcatheter treatment strategies is twentyfold higher than that of primary elective surgical closure. Here, we report an Amplatzer device embolus in a secundum atrial septal defect patient. The device was successfully removed with surgery, postoperative course was uneventful, and the patient was discharged from the hospital on the 5th postoperative day.

J Teh Univ Heart Ctr 2012;7(4):182-184

This paper should be cited as: Durukan AB, Gurbuz HA, Tavlasoglu M, Salman N, Ucar HI, Yorgancioglu C. Surgical Treatment of Amplatzer Embolus in a Secundum Atrial Septal Defect Patient. J Teh Univ Heart Ctr 2012;7(4):182-184.

Keywords: *Heart septal defects, atrial • Septal occluder device • Surgical procedures, operative*

Introduction

A secundum atrial septal defect (ASD) is the most common congenital heart defect, making up 10% of all congenital heart defects. Five to ten percent of children and 30% of adults with congenital heart disease have the ostium secundum ASD.[1] ASD closure is indicated to prevent right ventricular volume overload due to left-to-right shunting over four years of age and to prevent arrhythmias and right heart failure in later decades.[2]

Transcatheter treatment of the secundum ASD is a popular and less invasive alternative to surgery. By 2008, 30000 devices had been implanted.[2] Procedural complications do exist, luckily very rarely in the clinical setting. These complications increase morbidity and mortality rates compared to conventional surgical closure.[3]

Here, we report a case with the secundum ASD in which the atrial septal occluder device was embolized during the transcatheter procedure and was successfully treated with surgery.

Case Report

A 38-year-old, 160 cm tall, 65 kg woman was referred to our hospital with the diagnosis of the secundum ASD. She

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had initially referred to another hospital with the complaints of palpitation and shortness of breath. During cardiologic evaluation, echocardiography was performed and a secundum type ASD (pulmonary to systemic blood flow ratio [Qp/Qs]: 2.0), first to second degree mitral regurgitation, and first to second degree tricuspid regurgitation were noted. There was a mild increase in the right ventricular dimensions. Pulmonary artery pressure was measured as 45 mm Hg. In our hospital, echocardiography was performed again and the anatomy was found suitable for the implantation of an ASD occluder device. During catheter closure, the occluder device was embolized. The patient was heparinized for systemic anticoagulation. It was not possible to retrieve the embolized device via catheterization procedures, and the patient was referred for emergency surgical removal. Surgical intervention was performed within forty-five minutes of embolization. The electrocardiogram was normal sinus rhythm. On chest X-ray, the 'Amplatzer occluder Device' was seen in the right pulmonary artery localization (Figure 1).

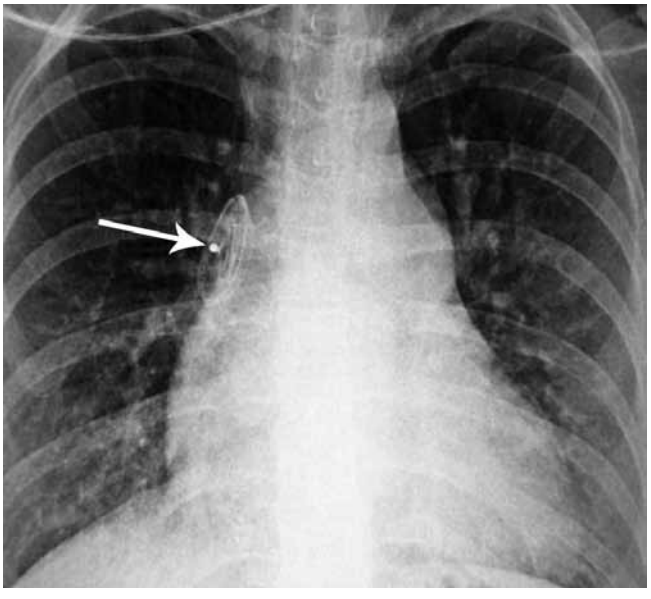

Figure 1. Preoperative chest X-ray of the patient, performed following device embolization. The arrow points very clearly to the septal occluder device in the right pulmonary artery

The patient underwent surgery under general anesthesia and with standard median sternotomy incision. There were pericardial adhesions. Once the pericardium had been opened, the 'Amplatzer Occluder Device' was easily palpated in the right pulmonary artery proximal to the superior vena cava. Cardiopulmonary bypass (CPB) under moderate hypothermia was established with aorto-bicaval cannulation (selective superior vena cava cannulation was performed). Myocardial management was provided by antegrade cold and terminal warm blood cardioplegia. Right atriotomy was performed. A 2.5 × 1.5 cm secundum type ASD was seen. It was closed with a Teflon patch. Right pulmonary arteriotomy was performed proximal to the superior vena cava and the device was removed (Figures 2 and 3). Arteriotomy was closed primarily. The postoperative course was uneventful, and the patient was discharged on the 5th postoperative day.

Figure 2. Intraoperative image. The right pulmonary artery is opened and the septal occluder device (arrow) is being removed through the arteriotomy

Figure 3. Removed "Amplatzer Occluder Device"

Discussion

The approach has shifted from surgical closure to transcatheter procedures in the treatment of the secundum ASD, which is definitely a less invasive approach. Hospital stay is shorter with transcatheter treatment and cosmetic results are better. Return to work for adults and return to school for children are earlier than those with cardiac surgery. Developmental outcome has been reported to be better in cases treated with transcatheter procedures. Adverse events related with CPB are avoided.[4] Right ventricular functions are preserved better.[5] And most importantly, the incidence of minor or major complications is lower with transcatheter closure.[6]

Procedural complications like device malposition or embolization, atrial wall erosion, mitral regurgitation,

cardiac arrhythmia requiring treatment, sciatic nerve compression due to retroperitoneal hematoma, prolonged time for femoral vein hemostasis, access site hematoma, arteriovenous fistula formation, pericardial/pleural effusions, and transient ischemic attacks have been previously reported.[1, 2] Butera et al.[1] reported 0.7% malposition/embolization. Wilson et al.[2] reported device embolization in 2 out of 227 patients and one was again treated via the transcatheter route. Sarris et al.[7] reviewed data from 19 well-known European institutes; and in a 10-year period, 56 cases undergoing emergency surgery after catheter intervention were reported. Among the 56 cases, there were 22 embolization cases and 7 cases were due to the pulmonary artery. Surgical removal of the device, closure of the defect, and repair/replacement of the damaged cardiac structure were performed. Operative mortality was 5.4%. Based on the EACTS reports, operative mortality for primary surgical ASD closure was 0.36% in the same time period.[7] Based on the FDA reports, in a 7-year period, mortality rates for transcatheter closure were similar to those of primary surgical closure (0.13%), but the mortality for the surgical management of a device adverse event (2.6%) was twentyfold higher than that for primary elective ASD closure.[3]

We managed to remove the device in a very short time, and the patient was discharged without any further complications.

Conclusion

Transcatheter device closure of the ASD can lead to serious complications despite its advantages over surgical closure. But it should be kept in mind that even if most cases are successful, not only early, but also late complications may occur regardless of the size or type of the current devices. Surgical treatment of the complications may be mandatory and should be performed immediately, especially in cases of embolization. Surgery is quite effective in treatment, but it is a fact that operative mortality rises when surgery is performed for the treatment of complications. Operative mortality is much lower for primary surgical repair.

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