Case Report

Adult atrial septal defect device closure with floppy rims

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ABSTRACT

Floppy rims of atrial septal defect (ASD) preclude device closure as those rims do not hold the device with a high risk of device dislodgement and embolization. In spite of the floppiness if the margins have an adequate length (>5 mm), sometimes it may also hold the oversized device obviating the need for surgical closure. We report a successful closure of an adult 30 mm ostium secundum ASD with floppy posterosuperior and inferior vena cava rim with Amplatzer 34 mm device. "Oversize the device in floppy rims" is the only clue to get success in those cases. Sometimes, a fair trial against nature's negativity can also result in a successful outcome.

Key words: Defect, Device, Floppy rim

Adequate assessment of the margins of an atrial septal defect (ASD) plays a critical role in successful device closure and avoiding imminent complications. ASD device closure is a Class I recommendation in patients with feasible morphology (defect diameter ≤38 mm, sufficient rims of 5 mm except toward the aorta). Specific indications for surgical approach include ASD other than secundum, lack of sufficient rims (<5 mm) other than towards aorta, and the need for other cardiosurgical interventions. The deficient retro-aortic rim is most common and present in 36–57% of patients with secundum ASD but most leading centers treat these patients percutaneously [1,2]. Rim is defined as being floppy if it moves back and forth with blood flow and flutters. Although floppy rim is associated with a high risk of dislodgement, we report a rare case of successful device closure of an ASD with floppy posterosuperior and inferior vena cava (IVC) rim with the oversized device.

CASE REPORT

A 42-year-old slender female presented with effort dyspnea Class II for the past 1 year. On clinical examination, she had a pulse rate of 80 beats/min and blood pressure of 110/70 mmHg in the right arm supine position with the right ventricular type of cardiac apex, wide, and fixed splitting of second heart sound with loud pulmonary component (P2), and Grade III/VI ejection systolic murmur over the pulmonary area.

Transthoracic echocardiography revealed a large ostium secundum ASD of 30 mm size with mild pulmonary arterial hypertension and was subjected to transesophageal echocardiography (TEE) to look for suitability for device closure. TEE revealed the largest dimension of the defect to be 30 mm with a floppy posterosuperior rim of 8 mm (Fig. 1a) and floppy IVC rim of 8 mm (Fig. 1b) with good mitral, posteroinferior rim, and superior vena cava (SVC) rim.

In view of floppiness, we slightly oversized the device, parked the Amplatzer extra stiff wire in the left superior pulmonary vein, and started deploying the device just outside the ostium of the left superior pulmonary vein. Due to the large nature of the device, we deployed half of the left atrial disc in the left atrium, then deployed half of the right atrial disc in the right atrium, and finally deployed the device keeping a snare attached to the device to retrieve it in the event of device dislodgement and embolization. We successfully closed the defect with Amplatzer 34 mm device with the right atrial disc of 42 mm and the left atrial disc of 50 mm size (Fig. 2). The length of the interatrial septum was 55 mm for which we could avoid the risk of aortic and atrial roof erosion. Although floppiness of the two margins arose the likelihood of device dislodgement, by slightly oversizing the device by 4 mm, we were able to close the ellipsoidal defect percutaneously without any post-procedure dislodgement, residual flow, impingement on the mitral valve, aortic erosion, or pericardial effusion, and the patient was discharged next day with advice to follow-up after 1 month.

DISCUSSION

TEE is a routine to access size and rims of the ASD in three different views (four-chamber view mid esophageal [ME] 0°,

Access this article online	
Received - 17 February 2021 Initial Review - 03 March 2021 Accepted - 05 March 2021	Quick Response code
DOI: 10.32677/IJCR.2021.v07.i03.004	

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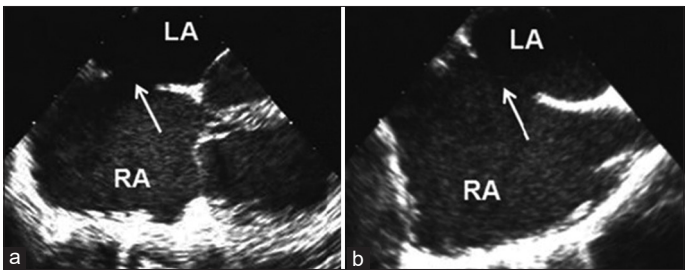

Figure 1: Atrial septal defect with (a) floppy posterosuperior rim and (b) floppy inferior vena cava rim

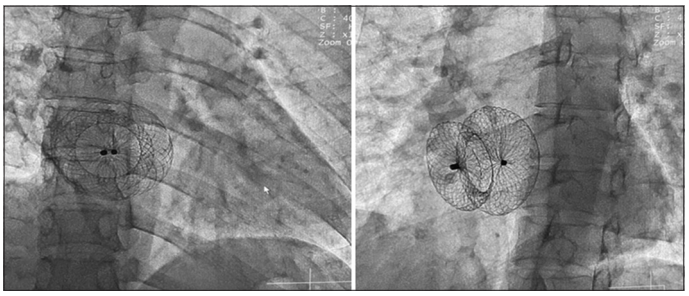

Figure 2: (a) The right anterior oblique 30° showing well-seated device; (b) the left anterior oblique 50° showing well-separated discs

short-axis view ME 45°, and bicaval view ME 90–110°). AV rim and posterior superior rim are assessed in four-chamber view, aortic and inferoposterior rim are assessed in short-axis view, and IVC and SVC rim are assessed in bicaval view. A rim <5 mm is termed as deficient or inadequate and absent if it is <1 mm. The sizes of the ASD are recorded in all three views (four chamber, short axis, and bicaval view) and the largest dimension is taken into account for device sizing. Deficient retro-aortic rim is the most common but not the contraindication for device closure. However, in patients with large defects, the absence of the retro-aortic rim can cause difficulties in percutaneous closure. In this situation, the left atrial disc of the implant tends to slip over the anterior wall of the atrium and prolapse into the right atrium and this poses a significant risk of atrial wall erosion. The deficient posterosuperior rim rarely accompanies ASD. Percutaneous closure of such defect is feasible, but one should be extremely careful because sometimes, it is associated with deficient retro-aortic rim and this poses a significant risk of atrial wall erosion.

The deficient posteroinferior rim occurs in 3.3% of patients with secundum ASD [1]. Percutaneous closure of this defect is feasible but even if the device is well implanted and initially stable, it can slip to the IVC, which usually takes place a few hours after the procedure or causes cyanosis because the implant's straddling over the IVC with a right-to-left shunt. Therefore, percutaneous closure of secundum ASD with posteroinferior rim deficiency should rather be avoided. In the case of a posterior rim deficiency, the feasibility of percutaneous closure of secundum ASD depends on the extent of the defect. If it reaches the border with the IVC, device closure should be avoided due to the significant risk of embolization. It is extremely important to distinguish the deficiency of the posteroinferior rim from the deficiency of the posterior rim.

Device closure of ASD is contraindicated with deficient IVC rim. Pillai *et al*. have described successful device closure in spite of the floppy or deficient posterior rim where, out of 23 cases with floppy or deficient rim, the device was unstable with the need of retrieval only in two cases [3]. Amedro *et al*. reported successful device closure in eight patients out of 18 cases with deficient inferoposterior rim [4]. Adhikari *et al*. reported that 27.7% of patients of all the ASDs had floppy rims [5].

Oversizing of the device was the clue to success with large defects, with relatively deficient rims and/or thin and floppy rims as described by Saritas *et al*. [6] Evola *et al*. also reported successful closure of a large ASD with deficient inferoposterior rim [7.] Ghaderian *et al*. reported successful ASD device closure in five patients with floppy rims [8]. Nassif *et al*. also reported successful device closure in a patient with floppy septum [9]. Nazer *et al*. also described successful ASD closure with the floppy rim in a patient with cryptogenic stroke [10]. Although the presence of floppy rim is associated with a high probability of device dislodgement [2], adequate and thorough global assessment of all other margins along with the length of the interatrial septum and oversizing the device can sometimes bring success.

CONCLUSION

Floppy rims although carry a high risk of device dislodgement, successful device deployment can be achieved with a proper global assessment of all the rims and interatrial septum in toto with slight oversizing of the device. Giving a fair try to this cohort of patients can avoid the need for surgical closure. It is always advisable to oversize the device in large defects, with deficient rims and floppy rims to get reasonable success and provide justice to the patient.

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Funding: None; Conflicts of Interest: None Stated.

How to cite this article: Das D, Acharya D, Singh J, Pramanik S. Adult atrial septal defect device closure with floppy rims – A case report. Indian J Case Reports. 2021;7(3):87-89.