

Atrial Septal Defect secundum with inferior floppy rim in the elderly: surgical closure or transcatheter closure? A case report

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Abstract

Atrial Septal Defect closure in childhood and early adulthood has a good prognosis, but in older individuals the risk-benefit ratio is not as straightforward. We report a 57-year-old man who was easily fatigued when exercising. The cardiac examination revealed a wide and fixed splitting of S2, a pulmonary ejection systolic murmur grade III/VI, and increased jugular venous pressure. The transesophageal echocardiography showed Atrial Septal Defect secundum with a diameter of 20 mm, L-to-R shunt, and 5 mm, a thin and floppy inferior rim. The patient underwent surgical Atrial Septal Defect closure. The deficient posteroinferior rim occurs only in 3.3% of patients with secundum Atrial Septal Defect. This condition will enhance the likelihood of occluder dislodgement in the transcatheter closure approach. We learn from this case that surgical Atrial Septal Defect closure may be an option for elderly patients if there is an inadequate, thin, and floppy inferior rim or no comorbidities.

Keywords: Systolic Murmurs, Thoracic Surgical, Vital Signs, Heart Murmurs, Prognosis

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Introduction

An atrial septal defect (ASD) directly connects the atrial chamber's cavities, diverting blood. With an isolated ASD, symptoms may not appear until adolescence or adulthood. There were only 3.3% of secundum ASD patients who had a defective posteroinferior rim.¹ Percutaneous devices are an alternative to surgical closure due to their ease, lack of a scar, minimal morbidity, rapid anaesthesia times, and shorter hospitalisations. Technically, catheter closures of ASD are difficult due to morphological or haemodynamic abnormalities in adults. Surgical closure has negligible mortality and 100% surgical success rates and can treat complex anatomy.^{2,3}

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In patients with insufficient rims, a surgical closure is an initial choice. Nevertheless, patients who reject foreign implants and are not candidates for device occlusion, prefer surgery. Individualised therapy options are also crucial. ASD is a superficial lesion, although older people may have problems performing it. It must consider anatomic and haemodynamic alterations, including PAH and comorbidities.⁴ Herein, we present a case of atrial septal defect secundum in an elderly patient presenting with a thin and floppy inferior rim and mild pulmonary hypertension.

Case Report

For the last five months, a 57-year-old man was easily fatigued when exercising but improved when resting without chest pain, shortness of breath, or palpitations. There was no history of blue lips, angina, orthopnoea, or paroxysmal nocturnal dyspnoea in the patient. There was no sudden death history in the family. The patient had been treated for ASD at the Cardiology Department, Dr. Soetomo General Hospital, Surabaya, for five years. In March 2021, the patient's vital parameters were preserved during the physical examination, and the temperature was within normal limits. The cardiac examination revealed a wide and fixed splitting of S2, a pulmonary ejection systolic murmur grade III/VI, and increased jugular venous pressure. There was no oedema or clubbing of fingers in the patient's extremities.

A 12-lead electrocardiogram (ECG) showed normal sinus rhythm with right-axis deviation (RAD). The chest X-ray showed prominent central pulmonary arteries and right pulmonary vascular markings. Transthoracic echocardiography (TTE) indicated a 12.5-mm ASD secundum, a left-to-right shunt, and mild tricuspid regurgitation. The right atrium, right ventricle, and pulmonary arteries were dilated, and IVS motions were paradoxical. There was LV diastolic dysfunction and a normal LV systolic function (Biplane EF of 57.91%). Furthermore, transesophageal echocardiography (TEE) was performed to establish the morphology and suitability for device closure. It showed an ASD secundum with a diameter of 20 mm, an L-to-R shunt, and rim sizes as follows: posterior rim 5 mm; aortic rim 4 mm; superior

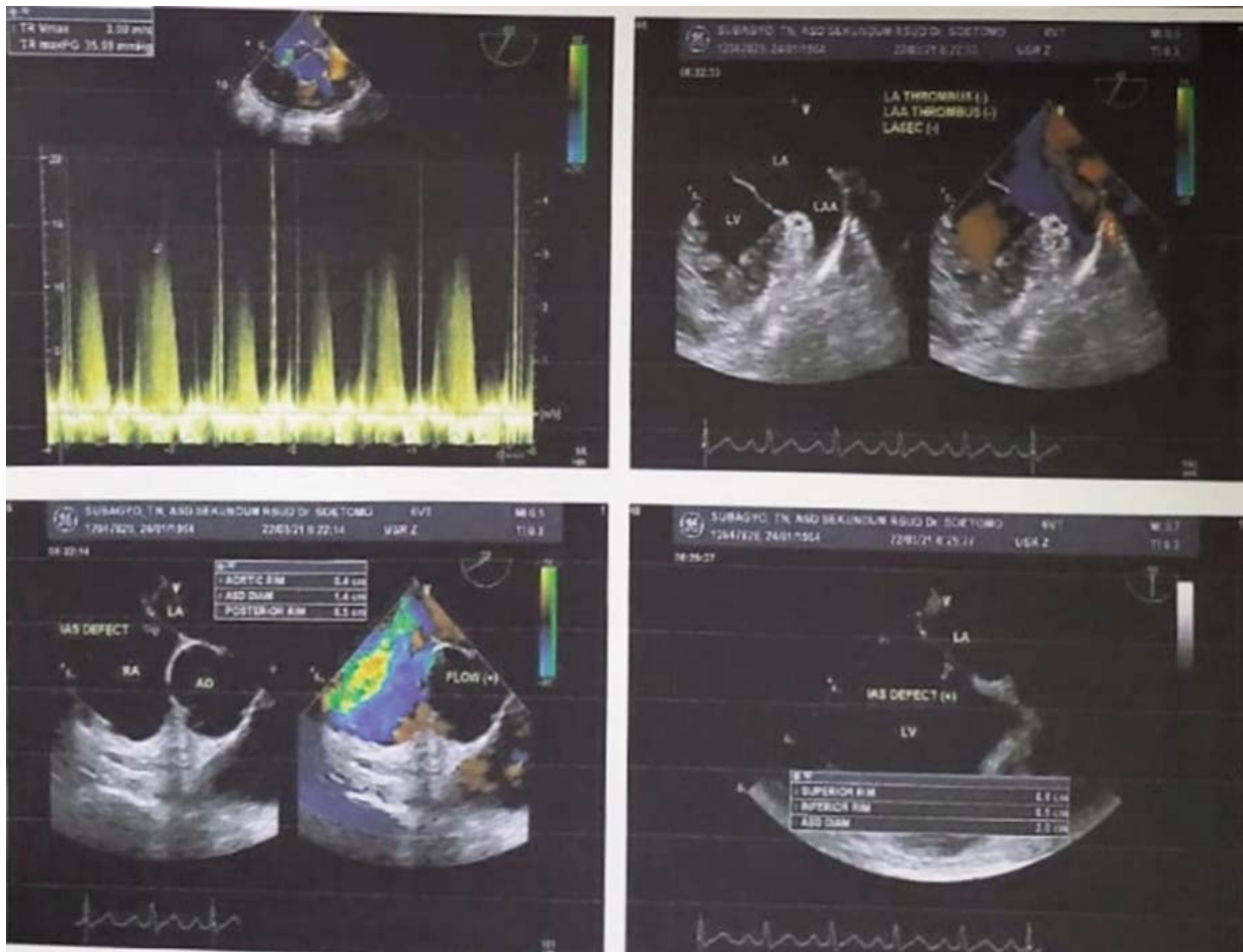


Figure-1: Transesophageal echocardiography (TEE) showed ASD secundum with a L-to-R shunt and inferior thin and floppy rim.

rim 9 mm; inferior rim 5 mm with a thin and floppy rim. Trivial mitral regurgitation and tricuspid regurgitation with a TR maxPG of 35.98 mmHg. Thrombus in LA and LAA and left atrial spontaneous echo contrast (LASEC) were not found. The balloon-sizing technique was not performed on the patient. (Figure 1) The coronary angiogram showed normal LMCA, LAD, LCx, and RCA. Other laboratory results were within normal limits, such as a complete blood count, a basic metabolic panel, a liver panel, a kidney panel, a lipid panel, and a COVID-19 RT-PCR diagnostic panel.

The examination results concluded that the patient was diagnosed with an atrial septal defect with a left-to-right shunt, inferior deficient rim, and mild pulmonary hypertension. The patient underwent surgical ASD closure. The operation was successful, and the TEE examination revealed no residual flow after the procedure. After five days of follow-up, the patient was discharged, and after over two years of continuous monitoring, he had no complaints.

Discussion

In patients with non-self-closing defects, ASD is discovered inadvertently between the ages of 20 and 40 when complications such as right heart failure due to increased ventricular workload, atrial arrhythmias, and pulmonary hypertension develop. ASD closure in childhood and early adulthood has a good prognosis, but in older individuals, the risk-benefit ratio is not as straightforward.⁵

This 50-year-old patient's complaint of exhaustion, right atrium and ventricle dilation, and diastolic dysfunction in the left ventricle indicated ASD closure. Percutaneous transcatheter closure is the first safe and practical approach based on the above description. However, due to the patient's numerous issues, surgical ASD closure was undertaken. First, this patient lacked sufficient inferior rim. There are only 3.3% of secundum ASD patients who have a defective posteroinferior rim.¹ If percutaneous transcatheter closure is maintained, a suboptimal rim poses several hazards. The insufficient posteroinferior rim

increases the chance of early embolisation by entering the inferior vena cava. The funnel-shaped, flexible connector between the IVC and the right atrium allows the device to slip.^{6,7} There is an oversized device technique to treat ASD secundum cases with floppy rims, but it is not recommended for ASD with posteroinferior floppy rims.⁸

To the best of the author's knowledge, only three studies used a retrospective cohort design, which investigated the transcatheter ASD closure approach in the ASD secundum type with inferior deficiency rim.^{6,7,9} Two-thirds of patients with inferior-posterior rim deficit had device embolisation, total atrioventricular block, or right-to-left shunt. Patients with inferior-posterior rim insufficiency should have surgical closure. In addition, the Amplatzer septal occluder's right atrial disc is 5 mm larger than the amplatzer waist. Consequently, it is recommended that the atrial septal rim be greater than 5 mm. Device shifting may occur shortly after implantation. The occluder could produce right-to-left shunting in our patient's insufficient rim by crossing the inferior vena cava. Furthermore, the patient's rim was thin and floppy, which can facilitate occluder dislodgement.

Secondly, in addition to assessing the rim size, ASD size also needs to be considered.⁸ In this patient with a 20 mm atrial septal defect diameter, the atrial septal defect met the criteria for percutaneous transcatheter closure. Nevertheless, as the shape of an ASD is often not always circular, some diameters are longer than others. If the longest diameter of ASD exceeds 38 mm, this can be a contraindication of the percutaneous transcatheter closure approach. Balloon sizing or 3D echocardiography can determine the size and shape of ASD more precisely. However, this patient was not carried out due to limited facilities. Moreover, it has been demonstrated that despite being relatively simple to perform, the balloon-sizing procedure overestimates the abnormalities and has some hazards, such as iatrogenic enlargement of ASD, interatrial septum rupture, and thoracic pain. Although the conventional approach still incorporates the balloon size of the defect, its utility has been decreased when utilizing three-dimensional echocardiography or ICE. This study demonstrates that ICE-guided ASD closure without balloon size is secure, productive, and associated with few perioperative and long-term consequences.¹⁰

Thirdly, the patient should have no comorbidities, such as arterial hypertension, chronic ischaemic heart disease, mitral regurgitation, aortic stenosis and regurgitation, atrial fibrillation, or left ventricular diastolic or systolic dysfunction.⁵ When a left-to-right shunt is sufficiently

significant to generate physiological sequelae and the right atrial and RV enlargement is without cyanosis during rest or exercise, it is of class IIa and the recommendation is that an adult with secundum ASD should undergo surgical closure.^{2,3}

Conclusion

Percutaneous transcatheter ASD closure is the preferred treatment for ASD secundum in adults, as it is more successful and safer than surgery. However, this case may also teach us that surgical ASD closure may be an option for older patients with an inadequate, thin, and floppy rim (particularly the inferior rim) and no comorbidities.

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