

A Window inside a Closed Window “Re-closed by Device”: A Case Report

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Abstract

Background: Atrial septal defects are among the most common types of congenital heart disease that may go undiagnosed in childhood and may initially be found in adulthood. Surgical repair by pericardial patch can be required depending on the size and type of ASD for the treatment of this condition. This report includes a case of

a patient who complained of newly developed dyspnoea after the surgical treatment for ASD.

Case Summary : A 28-year-old young man who underwent a surgical patch closure for ASD at the age of 22 years presented to the outpatient department and was complained of dyspnoea. Since childhood, he had suffered from exertional dyspnoea due to an unknown cause. Transthoracic echocardiography revealed dilated

RA & RV and a large (23-25 mm) ASD (Secundum) with left to right shunt with mild PAH. Transoesophageal echocardiography (TOE) also revealed a large (28-30 mm) ASD (Secundum) with left to right shunt with mild PAH. The patient underwent surgical treatment, and his symptoms improved significantly. One year later, he again developed exertional dyspnoea which was initially related to heavy exercise but recently it began to appear with mild exertion but not in rest. His Transthoracic echocardiography (TTE) revealed dilated RA, RV & MPA. IVS was paradoxical in motion. A newly developed ASD (11-15 mm) was seen with left to right shunt with adequate rim & mild pulmonary hypertension (PASP: 42 mmHg). He was advised for ASD Device Closure.

Discussion: This patient experienced exertional dyspnoea since childhood and even continued suffering from this symptom 01 year after surgical correction of a large ASD (Secundum). A large left-to-right shunt flow from the RA to the LA by centrally perforated pericardial patch with adequate rims was found using TTE. This diagnosis should be considered in patients complaining of persistent exertional dyspnoea after the surgical repair of ASD.

Keywords: Atrial Septal Defect, Surgical Closure, Complication, Postoperative, Device Closure

Learning points: It is important to understand the need of further evaluations to achieve an accurate diagnosis in patients complaining of persistent dyspnoea after surgical treatment for congenital heart disease.

Introduction

Atrial septal defects are among the most common types of congenital heart disease that may go undiagnosed in childhood and may initially be found in adulthood. 1 Device closure has become more frequent over the past

few decades, surgical closure is still an important option for some patients, depending on the size and type of ASD. 2 This report includes a case of a patient who complained of newly developed dyspnoea after the surgical closure of ASD, with some interesting findings on transthoracic echocardiography (TTE).

Case presentation

The patient was a young normotensive & non-diabetic Bangladeshi male who was diagnosed as ASD at the age of 22 years and underwent surgical patch closure. He regularly visited the outpatient clinics of both cardiology and cardiothoracic surgery department. When he was a child, he was less active than the other children of his age. In his school days, he experienced shortness of breath during heavy physical activities such as playing. Because the dyspnoea persisted, he presented to our hospital at the age of 22 years; however, investigations, such as TTE and TEE, confirmed a large ASD (Secundum) with left to right shunt with mild PH as the specific cause of his symptoms. His TTE showed (Figure1):

- A large secundum ASD (23-25 mm) with left to right shunt with adequate rims
- Dilated RA, RV & PA
- Paradoxical IVS otherwise, normal.
- Good LV systolic function (LVEF: 60%)
- Mild TR with Mild Pulmonary hypertension (PASP: 45 mmHg)



Figure 1: TTE showed large ASD Secundum

After TTE he was advised for TEE. Subsequently his TEE showed the following (Figure 2):

- A large secundum ASD (23-25 mm) with left to right shunt with adequate rims.
- Dilated RA, RV & PV
- Mild TR with Mild Pulmonary hypertension (PASP: 42 mmHg)



Figure 2: TEE showed large ASD secundum

Following TEE, he was advised for ASD device closure. But, according to patient's choice at the age of 22 years, he underwent for a surgical correction for the ASD. Following the surgical correction, he was under regular follow-up. Within the first month of his surgery, he was quite well & his dyspnoea reduced significantly. His TTE showed the following (Figure: 3):

- S/P ASD patch closure with no residual shunt
- Mildly dilated RA, RV & PA.
- Paradoxical IVS
- Good LV systolic function (LVEF: 60%)
- Trivial TR (PASP: 30 mmHg)

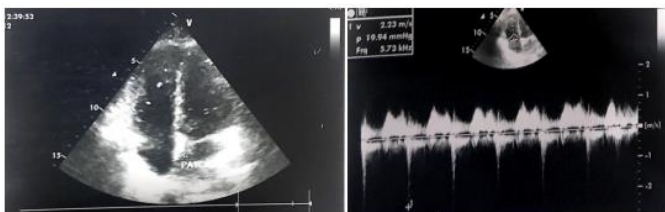


Figure 3: TTE showed ASD patch closure with no residual shunt

But after 01 year dyspnoea reappeared & continued. His TEE showed the following (Figure 4):

- S/P- ASD Patch Closure
- Newly developed ASD (11-15 mm) with left to right shunt with adequate rim

- Dilated RA, RV & P
- Paradoxical IVS otherwise, normal.
- Good LV systolic function (LVEF: 60%)
- Mild Pulmonary hypertension (PASP: 55 mmHg)

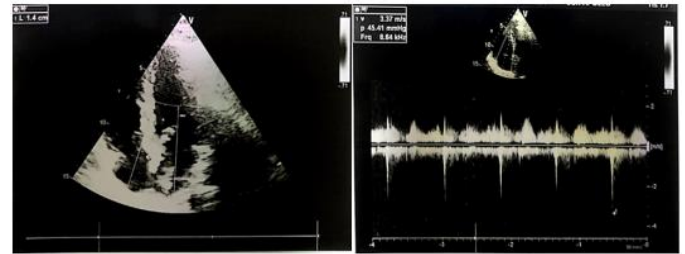


Figure 4: TTE showed medium sized residual ASD secundum

- He was then advised for transesophageal echo, which showed the following (Figure: 5) S/P - ASD closure
- Newly developed medium ASD, size about 10-14 mm with left to right shunt and adequate rims
- Dilated RA, RV & PV
- Mild MR
- Good LV systolic function (LVEF: 60%)
- Mild TR with mild pulmonary hypertension



Figure 5: TEE showed medium sized residual ASD secundum

After TEE, he was advised for ASD device closure. But the patient party refused to do any further procedure at that moment rather they continued on medical management. 03 months before he came for follow-up with worsening exertional SOB.

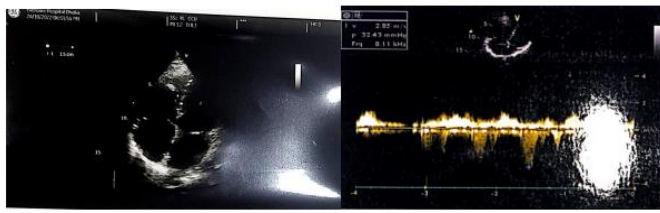


Figure 6: Echo showing central echo drop out (~15 mm) inside previously placed pericardial patch

He then went for a TTE which showed (Figure 6) dilated RA & RV with central echo drop out (~11-15 mm) inside previously placed pericardial patch (Figure: 6) with mild PH (PASP: 42 mmHg) that correlates with previously diagnosed new ASD. He was then advised for ASD device closure.

As per advice, the patient got himself admitted for ASD device closure. On admission, his blood pressure was 110/70 mmHg, pulse rate was 82 beats/min, and respiratory rate was 20 breaths/min. His oxygen saturation was normal (95% at room air). His pre procedural ECG showed his heart rate was 82 beats/min, regular with frequent ventricular ectopic (Figure: 7).

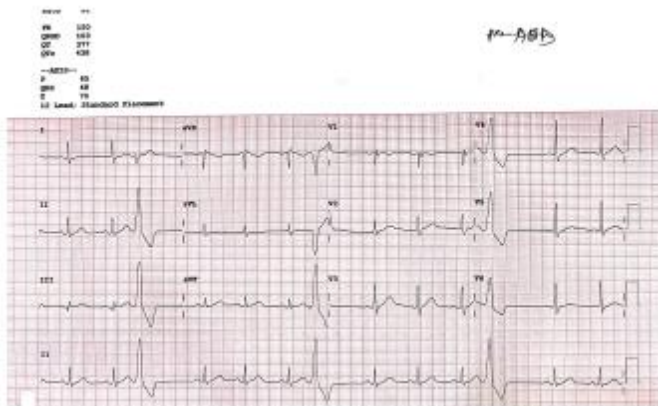


Figure 7: Pre-procedural ECG

His chest X-ray showed features of pulmonary hypertension & congested lung fields (Figure: 8).



Figure 8: Chest X-ray showing features of pulmonary hypertension & congested lung fields

Finally, the patient underwent device closure procedure by an Amplatzer Septal Occluder (Size 20) from Abbott® Medical of USA of the newly diagnosed medium sized ASD in the center of the previously placed pericardial patch (Figure 9). The device position was ascertained by per-procedure TTE (Figure 10).

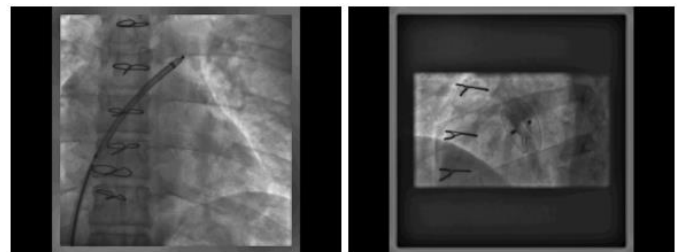


Figure 9: ASD device closure procedure by Amplatzer Septal Occluder (Size 20) from Abbott® Medical of USA.

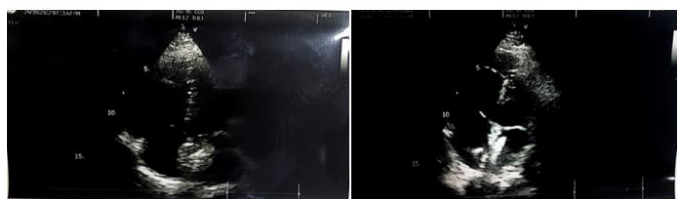


Figure 10: Per-procedure TTE of ASD device closure procedure by Amplatzer Septal Occluder (Size 20) from Abbott® Medical of USA to ascertain device position.

His post procedural ECG showed his heart rate was 65 beats/min, regular with disappearance of ventricular ectopic (Figure: 11).



Figure 11: Post ASD device closure ECG

His post device closure echo showed (Figure 12):

- S/P-ASD + ASD Device Closure
- ASD device in situ with no residual shunt
- Dilated RV
- Mild RV dysfunction with TAPSE:13 m
- Paradoxical IVS; Otherwise normal
- Good LV systolic function (LVEF: 55-60%)
- Trivial TR with PASP :36 mmHg

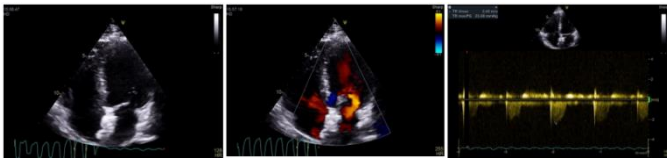


Figure 12: Post ASD device closure Echo showing successful ASD device closure procedure

His post device closure 01-month follow-up echo showed (Figure13):

- S/P-ASD + ASD Device Closure
- ASD device in situ with no residual shunt
- Normal chamber dimension
- Good RV function with TAPSE: 17 mm
- IVS is jerky & mildly paradoxical in motion; otherwise, normal
- Good LV systolic function (LVEF: 60%)
- Trivial MR with MR dp/dt: 4272 mmhg/S

- Trivial TR with PASP: 29 mmhg

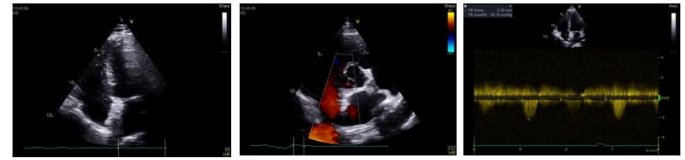


Figure 13: Post ASD device closure 01-month follow-up echo showing successful ASD device closure procedure

Discussion

Atrial septal defect is a common congenital heart defect accounting for about 7-10%. The secundum type of ASD is the most common form, accounting for 75% of all ASD types. 3 If a large defect is left untreated, prolonged left-to-right shunting and excessive pulmonary blood flow may lead to right-sided heart failure, pulmonary hypertension, and Eisenmenger syndrome¹

Surgical closure is considered a required treatment. 3 Remnant intracardiac shunt or improper closure of ASD can cause persistent left to-right shunt flow and subsequent heart failure, which can be a more common complication of intracardiac shunt after surgical correction of ASD. In those cases, the sign of right heart strain is mostly observed. In this case, a new ASD was developed at the center of the pericardial patch which is utterly a rare incidence.

Regarding the patient from this study, although his past surgical history was a successful surgical closure of the previous ASD, it is ascertained that the surgical patch was placed properly. Cardiac CT or MRI can be alternative diagnostic tools; 4 however, they also have some limitations. Echocardiography with agitated saline is a feasible option. If an individual has adequate echocardiographic windows & the defect is a tiny one, TTE with saline contrast test may provide a clue for the diagnosis.

Unfortunately, this patient had good acoustic windows,

even the subcostal view. If the diagnosis by TTE is insufficient because of the inadequate visualization of relevant structures, TOE must be considered for visualization of the structures. This patient has been suffering from heart failure for many years. The delayed diagnosis may result in paradoxical embolism and high cardiac output heart failure via left-to-right shunt flow. Long-term regular follow-up after surgical closure is important because of the late onset of atrial arrhythmias and stroke, particularly in adults older than 40 years. 5 Many cases were reported regarding device related complications. Moreover, we presented a rare case that proceeded to the development of a new ASD in the center of a normal functioning pericardial patch.

Conclusion

In patients complaining of persistent dyspnoea after surgical closure of ASD, the possibility of complications should be considered.

Transoesophageal echocardiography can be a useful method to understand the complex anatomy in such cases. The study team wants to clear their dilemma what may be the cause of development of such a rare complication where a closed window was reopened & required to reclose it with a device?

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