Device Closure of a Postoperative Residual Atrial Septal Defect after Seven Years

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INTRODUCTION

Postoperative residual atrial septal defect (ASD) is well explained and is usually small and of no hemodynamic significance, but large residual atrial septal defects are to be closed. Here we report a case of postoperative residual ASD which was reported as a small residual ASD in the immediate postoperative period, later presented to us with hemodynamically significant large residual symptomatic ASD. The residual ASD was successfully closed with a Floret ASD occluder device.

PRESENTATION OF CASE

A 32-year-old lady presented with gradually progressive dyspnoea on exertion class II for the last 2-3 years. She had undergone ASD surgical closure with pericardial patch repair, at 25 years of age. Preoperative echocardiography at that time showed 28 mm ostium secundum ASD with deficient posterosuperior and aortic rim, left to right shunt, right atrial and ventricular enlargement and moderate pulmonary artery hypertension. A preoperative cath study at that time recorded pulmonary artery pressure of 52/18 mm Hg and the mean pressure was 31 mm Hg. Oximetry documented a step up in oxygen saturation in the right atrial level with 2.7:1 shunt and pulmonary vascular resistance 3 woods units. Postoperative transthoracic echocardiography after two weeks showed hemodynamically insignificant, small residual ASD. The patient was symptomatically better during the initial follow up visits. Now she again presented with class-II symptoms.
On clinical examination, she was emaciated. There was mild pallor; there was no cyanosis or clubbing. Mean jugular venous pressure was not elevated with normal jugular venous waveforms. Precordial examination showed right ventricular apex with prominent left parasternal pulsations and epigastric impulse and there was a grade 4/6 ejection systolic murmur in the left second and third intercostal space near the left sternal border. Electrocardiogram showed right bundle branch block with normal PR interval.

Chest x-ray showed cardiomegaly with prominent main pulmonary artery and right pulmonary artery shadows. Transthoracic echocardiography showed a large residual ASD with left to right shunt and moderate pulmonary arterial hypertension.

Transoesophageal echocardiography was done, which confirmed the presence of an ASD of 23 mm size with adequate rims (see figures 1 and 2), total septal length was 51 mm, suitable for percutaneous device closure.

After confirming the suitability for device closure the patient was taken for it with a 30 mm Floret ASD occluder device (Meril Life Science). The right femoral vein puncture was done. Oximetry run and shunt ratio were calculated to confirm the hemodynamic effect of residual ASD. Qp/Qs was 2.8: 1 and pulmonary vascular resistance was 4.3 woods unit. 6F MPA catheter was used to cross the ASD and positioned in the right upper pulmonary vein, 0.035 inch extra stiff wire was introduced through the MPA catheter, which was then removed, retaining the wire in position. Then 14F ASD delivery sheath was introduced through the wire and then the wire was taken out.

The device was preloaded in a 14F device loader cable, introduced into the delivery sheath and the ASD closure was done conventionally. The position was verified by fluoroscopy in the left anterior oblique (LAO) and the posteroanterior (PA) view (see figure 3). Transthoracic echo confirmed that the rims were caught adequately and there was no residual flow across the interatrial septum.

There was normal IVC, SVC inflow and no new-onset AV valve regurgitation. 3500 IU unfractionated heparin was used during the procedure according to the body weight. The patient was discharged the next day on a 150 mg aspirin daily dose. Transthoracic echocardiography on follow up at one month showed no residual ASD (see Figures 4 and 5) and the patient was symptomatically better. She is symptom-free at 2 years post-procedure.

Ostium secundum ASD is the most common congenital heart disease in the adult. Hemodynamically significant, large atrial septal defects can lead to progressive pulmonary artery occlusive disease and reversal of left to right shunt, progressive RV failure, or development of arrhythmias. Hence closure is indicated when identified. Earlier closure is the option of treatment either by percutaneous device closure or surgical closure if the defect is not suitable for device closure.
Ostium secundum ASD closure can be done either with ASD occluder devices or with surgical repair. The main difficulty with device closure is deficient rims, other than the aortic rim and very large size. Patients who are not suitable for device closure can be treated with open surgical closure with pericardial patch repair. Surgical closure of ASD has been successfully done since the 1970s. The main disadvantage of surgical closure is the need for midline sternotomy, thoracotomy, and presence of a surgical scar on the atrium, pain and long hospital stay. Postoperative residual ASD is explained in 7-8% of surgical closures but these are rarely hemodynamically significant.\textsuperscript{[1,2]} But large hemodynamically significant postoperative residual atrial septal defects need interventions and in such cases, percutaneous closure is explained in suitable cases and it avoids the need for a redo surgical closure which has its practical difficulties.

The most frequent complications after surgical closure are atrial fibrillation (adult 10%, paediatric 1.2%) and post-pericardiotomy syndrome (adult 2%, paediatric 4.7%). The occurrence of residual ASD after surgical closure in long term follow up studies is maximum up to 7-8%. The development of the residual defect may be associated with problems in the surgical technique or degeneration of the graft.\textsuperscript{[3]} Hemodynamically significant residual ASDs are rare and if present, they need to be closed.

An easy option for addressing postoperative residual atrial septal defects is percutaneous ASD closure by device, which is usually a safe procedure. However, major complications may rarely develop after transcatheter ASD occlusion, which includes perforation of the atrial wall, atrial arrhythmias and embolization of the device. The rate of such complications is less than 2%. Even though rare, aortic erosion is one of the major and fatal late complications reported after ASD device closure. The complication rates increase as the size of the device used gets bigger.\textsuperscript{[4]} Percutaneous device closure of residual ASD is a safe and simple method in selected cases. Our case had hemodynamically significant ASD evidenced by the development of PAH, preoperative Qp/Qs ratio of 2.8:1, hence closure was indicated. The probable reason for enlargement of small residual ASD, in this case, may be the partial degeneration of the pericardial patch. The initial ASD in our patient had deficient posterior and aortic rims while in the residual ASD these rims appeared adequate and this helped us in proceeding with device closure. Percutaneous closure should be the treatment of choice in such cases if anatomy is favourable as in our case. However, if the defect is not suitable for device closure, redo surgery would be the option for closure with its associated postoperative complications.

**CONCLUSIONS**

Percutaneous device closure is an option of closure in hemodynamically significant postoperative atrial septal defects with relatively lesser complications, in suitable cases.

**REFERENCES**