Case study

Killing Two Birds in One Stone-Percutaneous Treatment of a Large ASD And Pulmonary Stenosisin the Same Setting in an Adult Patient-aCase Report.

Abstract

Pulmonary stenosis (PS) associated with a huge ostium secundum Atrial septal defect (ASD) is relatively uncommon. In such condition, a significant left-to-right shunt across ASD is prevented by significant obstruction at pulmonary valve level and hence it protects the pulmonary bed until adulthood. Transcatheter intervention is the treatment of choice when they occur separately but when they occur together, ideal treatment option is not clear. As per literature, percutaneous transcatheter pulmonary valvuloplasty was performed first, followed by transcatheter closure of the secundum atrial septal defect. We report a case of combined ASD (Atrial septal defect) with moderate PS (Pulmonary stenosis), where we performed percutaneous BPV

(Balloon Pulmonary Valvuloplasty) with Inoue balloon firstfollowed by transcatheter ASD device closure in the same setting.

Key words: percutaneous treatment; atrial septal defect; pulmonary stenosis

Introduction

It is relatively uncommon in adult patients to have Ostium secundum type ASD in association with PS. If present such patients can have deleterious effect on right ventricular systolic function[2].Percutaneous BPV has replaced surgery as the initial treatment of choice in patients of all ages with pure valvular PS [3,4]. In present days the transcatheter closure of ASD by using various percutaneous occlusion devices offers an alternative to surgical treatment in both adults and children, as it has got better clinical and follow-up results [5,6]. Whenever feasible BPV and transcatheter ASD closure for isolated PS and isolated ostium secundum ASD respectively, are the preferred treatment options for adults[7].But when these two conditions seen together in an individual, ideal treatment plan is still debatable. Although there are many reports [1,8,9,10,11]of such patients being treated by a transcatheter technique, either as a staged procedure or combined in a single setting, but there is no clear idea as to which procedure should be performed first[8,9].Tyshak balloon is most commonly used for BPV. There are few case reports of BPV done with the Inoue balloon[12].

Case Report

A 35-year-old man presented with history of breathlessness and palpitation. On physical evaluation, he was dyspneic and auscultation revealed ejection systolic ejection murmur over the pulmonic area and wide split, fixed second heart sound. ECG (Electrocardiogram) findings suggestive of incomplete RBBB with right axis deviation, right ventricular hypertrophy with strain pattern. Chest Xray revealed marked cardiac enlargement, predominantly of the right ventricle, and a dilated main pulmonary artery segment. Transthoracic ECHO (Echocardiography) confirmed dilated RA (Right Atrium) and RV (Right Ventricle) with a 38mm ostium secundum ASD with adequate rims and a peak gradient of 60 mmHg across the pulmonic valve suggestive of moderate PS (Pulmonary stenosis). Pulmonary valve annulus was 23.5mm (Fig 1 and Fig 2). As the patient is having

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significantvolume and pressure overload, we planned simultaneous transcatheter intervention to prevent further myocardial damage and cardiac dysfunction. Right heart catheterization was performed before intervention showed systolic RV pressure of66 mmHg and MPA systolic pressure of 13 mmHg,that is suggestive of a gradient of 53 mmHg.Patient was planned for BPV followed by transcatheter ASD device closure. BPV was attempted with Innoue balloon of size 26 mm shown in Fig. 3 and Fig. 4. After the BPV, gradient across the pulmonic valve decreased to 24mmHg. In same setting Immediately after this, a 40-mm Amplatzer Septal Occluder was implanted in the atrial septum to close the ASD shown in Fig.5.

Fig 1

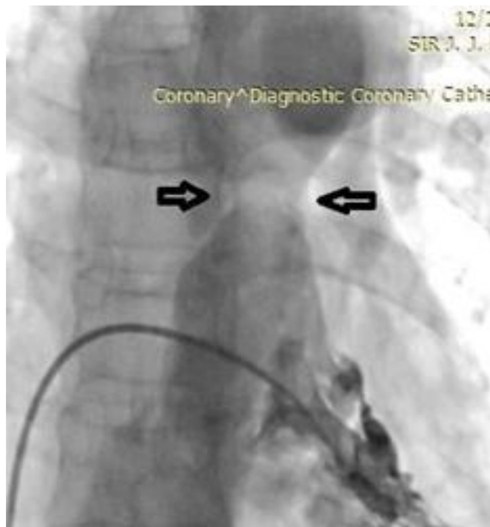

Fig 2

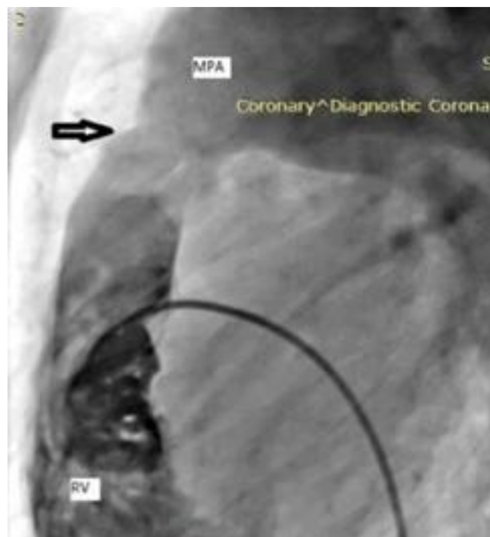

Fig 3

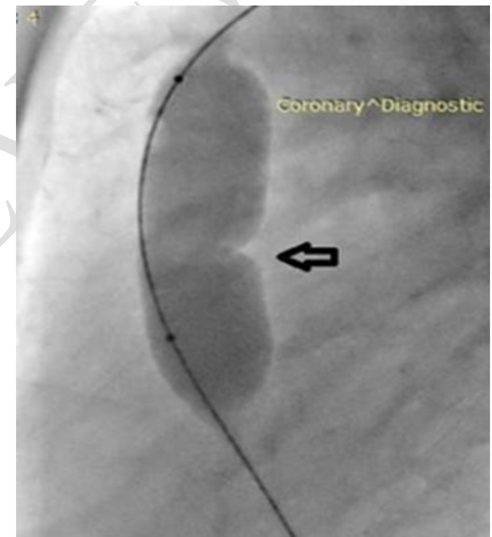

FIG 4

FIG 5

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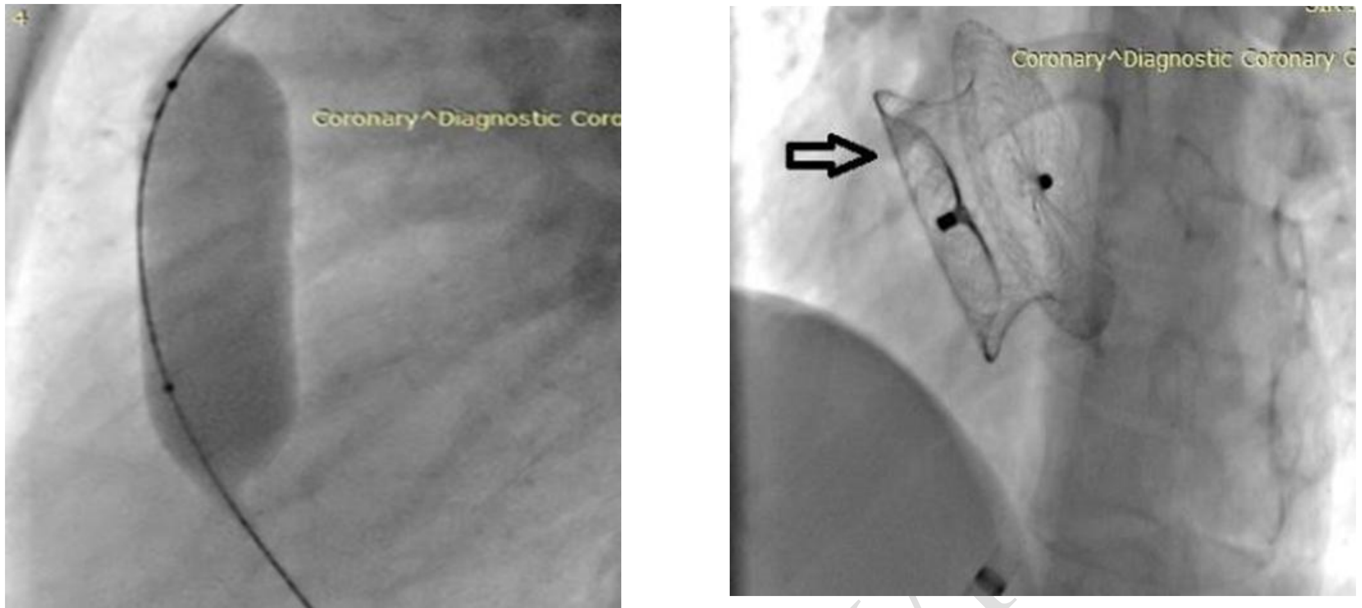

Fig 1-5: Gradient across the pulmonic valve

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Discussion:

Incidence of PS with VSD (Ventricular septal defect) has been reported to vary between 1.0 and 8.5 % and it is between 1.0 and 2.0 % with ASD in all age groups.[13] Association of congenital pulmonic stenosis with PFO (Patent foramen ovale), is often grouped under "isolated pulmonic stenosis" and this is justified as PFO is frequently present in the normal population (25 %)[14]. In these forms of congenital heart diseases, survival to adult life is uncommon and only isolated cases have been reported[15,16].ASD in association with PS is found infrequently in middle age to older persons because of the development of right heart failure and secondary right to left shunt, resulting in early morbidity and mortality. Therefore, the severity of the stenosis and the size of the atria1 septal defect, as well as the magnitude and direction of the shunt determines the survival upto this age group.

We describe the simultaneous transcatheter treatment of a huge ostium secundum ASD associated with valvular PS in an adult patient.

Indications for valvular pulmonary stenosis are symptoms or a resting gradient ≥40 mmHg [17].Closure of an ASD is recommended, when a haemodynamically significant defect is present. In our case, transthoracic ECHO showed a large ASD with severe dilatation of right atrium and right ventricle associated with valvular PSof60-mmHg peak pressure gradient. As the patient is symptomatic and there is severe dilatation of right atrium and ventricle, we decided to do an early intervention to prevent further myocardial damage.
The initial treatment of choice for this type of combined lesion has been open heart surgery in the past. However, there is huge progression of transcatheter techniques for the treatment of acyanotic congenital heart diseases in the recent past.

The initial choice for valvular pulmonary stenosis in all age group of patients is percutaneous transcatheter pulmonary valvuloplasty[18]. Transcatheter closure of a secundum atrial septal defect has also become a feasible and effective method in all age group of patients[19]. Furthermore, combining multiple interventions in a single

catheterisation affords multiple benefits to such patients, by obviating the need for a second interventional procedure and reducing the cost and time [20]. So instead of surgery, we chose simultaneous catheter treatment for this patient.

It is always crucial to choose a correct and reasonable sequence of treatment to ensure the safety of interventional transcatheter therapy.Which repair to be performed first is controversial, but some previous case reports recommended performing percutaneous transcatheter pulmonary valvuloplasty first, followed by transcatheter closure of the atrial septal defect[21,22]. Because it would limit the possibility of dislodging the ASD device from a technical point of view. Furthermore,if the ASD device closure is not done immediately, it may lead to right ventricular volume overload and its sequelae due to an increase in left-toright shunting after the initial correction of pulmonic stenosis [23]. In this patient, we performed pulmonary valvuloplasty first followed by ASD device closure in the same setting.We obtained successful results with nountoward event during or after the procedure. However, during follow-up, the right ventricular hypertrophy returns to normal but the ECG continues to show incomplete right bundle branch. So, we speculated that the influence of volume overload still remains but the pressure overload has decreased. Patient is in continuous follow up with us and is doing well.

Conclusion

In patients with large OS ASD with valvular pulmonary stenosis, simultaneous transcatheter correction is a safe and effective therapeutic option by preventing a second intervention and also reduces cost and time.

Consent

As per international standards or university standards, patients' written consent has been collected and preserved by the author(s).

Ethical Approval:

As per international standards or university standards guideline participant consent and ethical approval has been collected and preserved by the authors.

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