Case study

Killing two birds in one stone:-Percutaneous treatment of a large ASD and Pulmonary Stenosis in the same setting in an adult patient-A case report.

Abstract

Severe 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. When occurs separately they can be treated with transcatheter intervention. 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 simultaneous percutaneous BPV

(Balloon Pulmonary Valvuloplasty) done with Inoue balloon and transcatheter ASD device closure in a single setting.

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

Introduction

It is relatively uncommon condition 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 PS valvular[3,4]. In present days the transcatheter closure of ASD by using various percutaneous occlusion devices in both children and adults, offers an alternative to surgical treatment as it has got better clinical and follow-up results [5,6]. Whenever feasible transcatheter ASD closure and BPV for isolated ostium secundum ASD and isolated PS 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 getting 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 cases 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 Doppler 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 56 mmHg across the pulmonic valve suggestive of moderate PS (Pulmonary stenosis) . Pulmonary valve annulus was 24.5mm (Fig 1 and Fig 2). We considered this patient to have potential myocardial damage due to volume and pressure

overload so planned simultaneous transcatheter intervention to prevent cardiac dysfunction. RighI heart catheterization was performed before intervention that showed systolic RV pressure of 56 mmHg and MPA systolic pressure of 13 mmHg that is suggestive of gradient of 43 mmHg.Patient was planned for BPV followed by transcatheter ASD closure. BPV was attempted with Innoue balloon 24 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

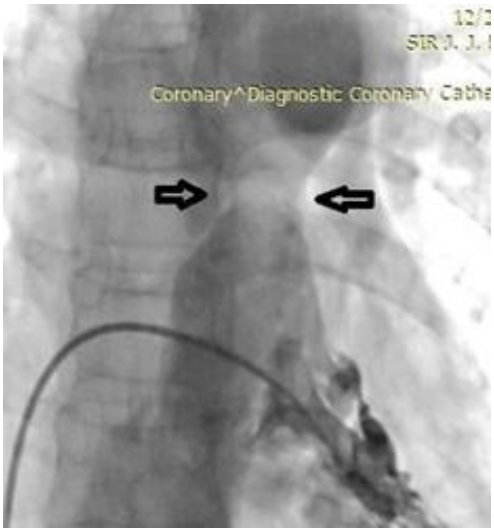

Fig 2

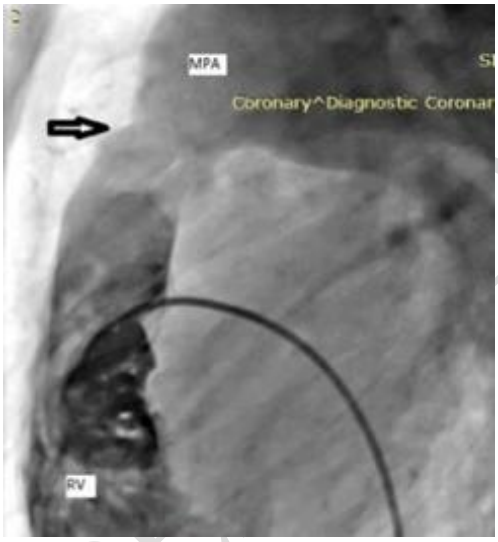

Fig 3

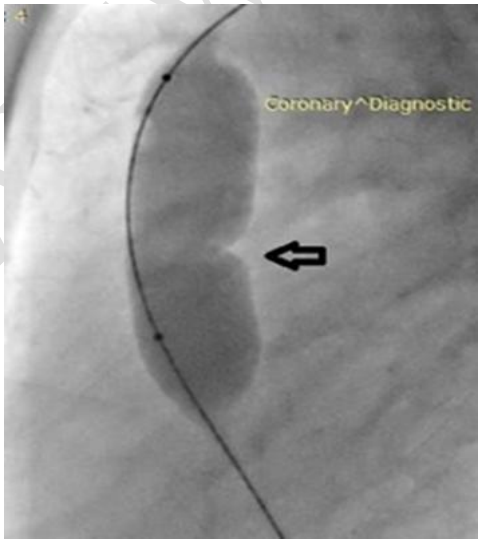

FIG 4

FIG 5

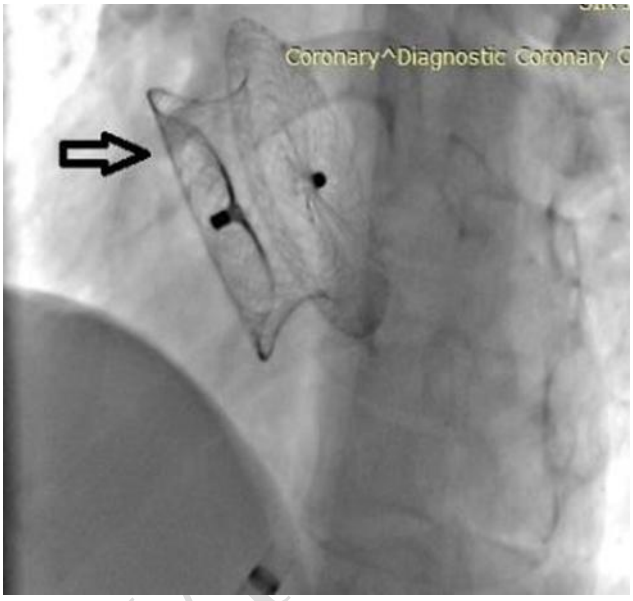

Fig 1-5: Gradient across the pulmonic valve

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]. PFO (Patent foramen ovale) in association with congenital pulmonic stenosis, is often grouped under "isolated pulmonic stenosis" and this is justified in view of the frequent presence of PFO in the normal population (25 %)[14]. Survival to adult life is no doubt uncommon in these forms of congenital heart disease, and only isolated cases have been reported[15,16] .PS in association with ASD is found infrequently in middle age to older persons because right heart failure and so secondary right to left shunt develop, resulting in early morbidity and mortality. Therefore, survival to at such age group is probably determined by the severity of the stenosis and the size of the atria1 septal defect, as well as by the magnitude and direction of the shunt.

We describe the successful simultaneous transcatheter treatment of a secundum atrial septal defect complicated by valvular pulmonary stenosis in an adult.

Indications for valvular pulmonary stenosis are symptoms or a resting gradient ≥40 mmHg [17].Atrial septal defect closure is also recommended for patients of any age who present with a haemodynamically significant defect. In this case, transthoracic echocardiography showed large atrial septal defect with right atrial and ventricular dilation coexisted with valvular pulmonary stenosis with a 66-mmHg peak pressure gradient. We speculated that right ventricular pressure and volume overload influenced the left ventricle and caused the ST-T change in the electrocardiogram. Therefore, we considered that early intervention should be performed to prevent further myocardial damage.

Open-heart surgery has been considered the initial choice for this combination. On the other hand, the transcatheter technique for the treatment of CHD has considerably progressed in the past decade.

Percutaneous transcatheter pulmonary valvuloplasty has become the initial choice for valvular pulmonary stenosis in all age groups, even in neonates[18]. Transcatheter closure of a secundum atrial septal defect has also become a feasible and effective method even in infants[19]. Furthermore, combining multiple interventions in a single catheterisation affords benefits to such patients, which

obviates the need for a second interventional procedure[20]. On the basis of these reports, we chose simultaneous catheter treatment instead of surgery.

Choosing a correct and reasonable sequence of treatments to ensure the safety of transcatheter interventional therapy is crucial.The repair that should be performed first is controversial, but some previous reports recommended performing percutaneous transcatheter pulmonary valvuloplasty before transcatheter closure of the atrial septal defect from a technical view, which would limit the possibility of potentially dislodging the atrial septal defect device. Furthermore, an increase in left-toright shunting after the initial correction of pulmonic stenosis and if not treated will lead to right ventricular volume overload and its sequelae [21]. We performed pulmonary valvuloplasty first and then atrialseptal defect closure in the same session and we obtained successful results with no major complications. However, during follow-up, abnormal ST-T changes returned to normal pattern but the incomplete right bundle branch block emerged. We speculated that the pressure overload decreased but the influence of volume overload still remained. We need to continue to check this patient's cardiac function.

Conclusion

Simultaneous transcatheter correction is a safe and effective therapeutic option even in patients with large OS ASD combined with valvular pulmonary stenosis.

Consent

Patient consent for publication has been obtained by the authors.

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