Case Report

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Transcatheter Closure of Atrial Septal Defect and Balloon Pulmonary Valvuloplasty with Inoue Balloon in Adult Patients.

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Abstract

Secundum type atrial septal defect combined with pulmonic stenosis is a relatively uncommon condition in adult patients. When occurred separately they can be treated with transcatheter intervention. When they occur together ideal treatment option is not clear. We report a case of combined percutaneous pulmonary valvuloplasty done with the Inoue balloon and transcatheter atrial septal defect closure in an adult patient.

Keywords: Adult; Atrial Septal Defect Occlusion; Combined Percutaneous; Balloon Pulmonary Valvuloplasty.

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Introduction

Secundum type atrial septal defect (ASD) combined with pulmonic stenosis (PS) is a relatively uncommon condition in adult patients.[1] Transcatheter ASD closure and Balloon Pulmonary Valvuloplasty (BPV) for isolated secundum ASD and isolated PS are the preferred treatment option for adults when anatomically feasible.[2] When these conditions occur together ideal treatment plan is still a matter of debate. There are several reports[1,3,4,5,6,7,9] of patients being treated by a transcatheter technique, either staged or combined, with no clear agreement as to which procedure should be performed first.[3,4,5,6] Tyshak balloon is most commonly used for BPV. There are cases reports of BPV done with the Inoue balloon.[8,9,10,11] We report a case of combined BPV with the Inoue balloon and transcatheter ASD closure in patients with ASD and PS in an adult patient.

Case Report

A 22-year-old woman referred for intervention with the diagnosis of ASD secundum and PS. At clinical evaluation, she was diagnosed with ASD secundum and severe pulmonary valve stenosis. Trans-thoracic Doppler echocardiography showed dilated Right Atrium (RA) and Right Ventricle (RV) with a (20-mm) ostium secundum ASD and a gradient (54mmHg) across the pulmonic valve as shown in Fig.1. Pulmonary valve annulus was 21mm. Trans esophageal echocardiogram (TEE) was done which showed maximum ASD size of 20.8 mm with absent Aortic rim with all other rims present shown in Fig. 2 and 3. Patient was planned for BPV followed by transcatheter ASD closure. BPV was attempted with Tyshak balloon (6x24), balloon was unstable, caused bradycardia and hypotension due to long inflation and deflation time. BPV was attempted with the inoue PTMC balloon (24mm) shown in Fig. 4. After the BPV gradient across the pulmonic valve decreased to 31mmHg as shown in Fig 5. Patient was discharged and called for transcatheter ASD closure after a month. Patients underwent transcatheter ASD closure with 28 mm Amplatzer septal occluder shown in Fig.6. At one year of follow up gradient across the pulmonic valve was 15 mmHg. RA and RV was normal in size. No tricuspid regurgitation shown in Fig.7 and 8.

Figure 1: Gradient across Pulmonary Valve before BPV.

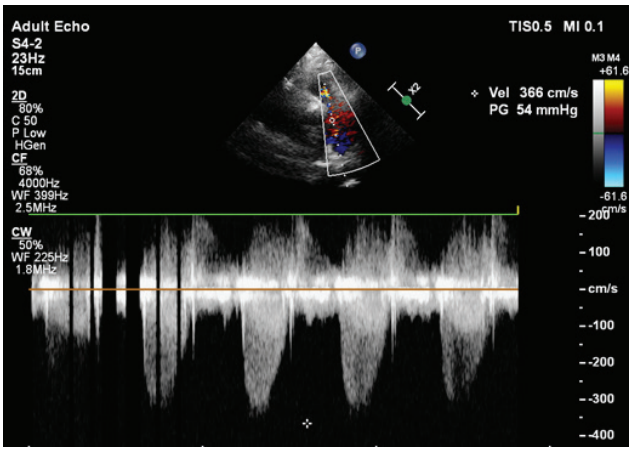


Figure 2: ASD in TEE Bi-Caval View.

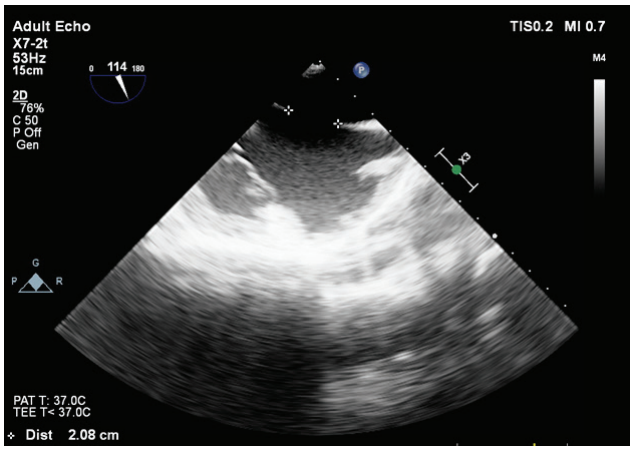


Figure 3: ASD in TEE Short Axis View.

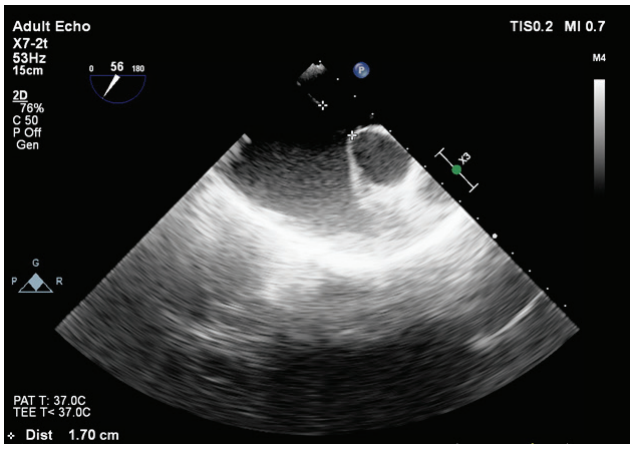


Figure 4: BPV with Inoue Balloon.

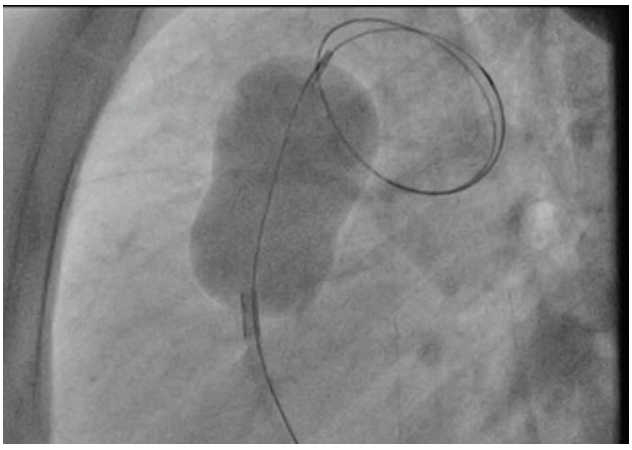


Figure 5: Gradient across Pulmonary Valve after BPV.

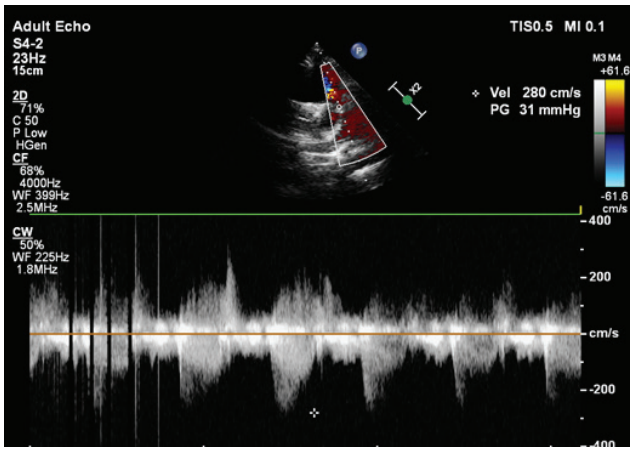


Figure 6: Post ASD Device Closure.

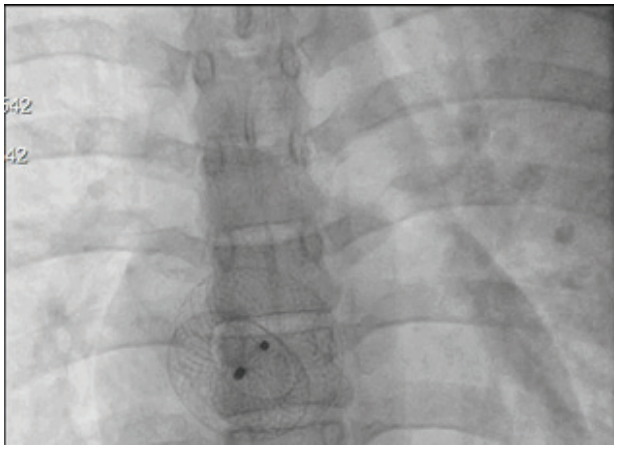


Figure 7: Gradient across Pulmonary Valve at One year follow up.

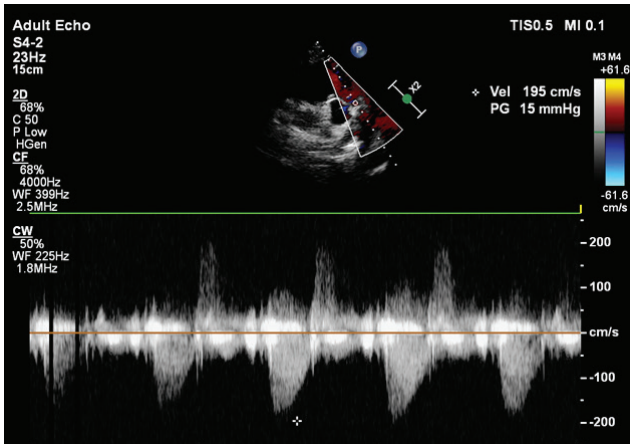
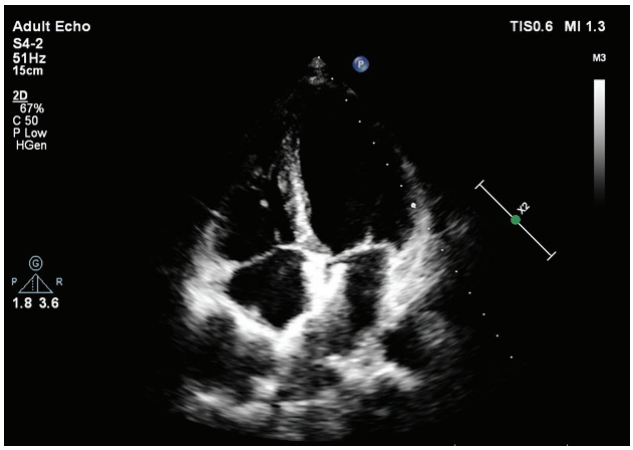


Figure 8: Echocardiogram at One year follow up.



Discussion

Rapid advances in interventional cardiology have changed the therapeutic modality for many patients with complex congenital heart disease.[7] Several reports describe transcatheter approach for the treatment of combined secundum type ASD and PS. They vary in answering the question which defect should be treated first and whether the procedures should be staged or combined.[3,4] Treating the ASD first should eliminate the left to right shunt and thus also the right ventricle volume overload and possibly lower the pressure gradient across the pulmonic valve, enabling one to reassess the pulmonic stenosis severity. On the other hand, addressing the pulmonic stenosis first lowers the peri-procedural risk of ASD device dislodgement.[1]

In our case we used Inoue balloon for BPV. With Tyshak balloon, balloon instability and long inflation and deflation time causes bradycardia and hypotension.[7,8,9] Inoue balloon has relatively short and flexible balloon and a rapid inflation and deflation cycle (approximately 4-5s) allowing fast hemodynamic recovery. It also allows graded dilations by increasing the size of the same balloon, thus preventing cumbersome exchanges of balloons.[8] It has a unique property of self-positioning, enabling it to anchor at the pulmonary valve during inflation, thus preventing abrupt forward movement and damage to the Pulmonary Artery (PA).[9,10] The risk of overdilation of the pulmonary valve is also minimized due to the size-adjustable nature of the Inoue balloon making stepwise dilation possible.[11] BPV with the Inoue balloon makes the procedure much more convenient.

The major advantages of combination of transcatheter ASD closure and BPV for patients with ASD and PS are the short hospital stage, absence of thoracotomy, open heart surgery and admission to an intensive care unit, thus avoiding subsequent surgical scar and post-operative pain. The major limitation in this case report is: as this case was reported in a retrospective manner, we cannot provide the hemodynamic studies.

Conclusion

Combined transcatheter ASD closure and BPV is feasible and effective and achieve a satisfactory outcome. BPV with Inoue balloon is convenient and effective.

Disclosure: The authors who were members of the editorial team were not involved in any steps in the editing/publication process.

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