

Combined Transcatheter Closure of Atrial Septal Defect and Pulmonary Valve Balloon Dilation

Mostafa Behjati-Ardakani¹, Seyed Mahmood Sadr-Bafghi², and Abbas Andishmand²

¹ Department of Pediatric Cardiology, Yazd Cardiovascular Research Center, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

² Department of Cardiology, Yazd Cardiovascular Research Center, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

Received: 18 Jun. 2011; Received in revised form: 8 Dec. 2011; Accepted: 14 Sep. 2012

Abstract- Critical pulmonary valve stenosis (CPVS) and atrial septal defect (ASD) is an uncommon form of congenital heart disease. Concurrent transcatheter pulmonary valvuloplasty and closure of secundum atrial septal defect appears to be an interesting alternative to surgical correction. We present the simultaneous balloon valvuloplasty of critical pulmonary stenosis (PS) with supra systemic right ventricular pressure and medium sized secundum ASD with right to left shunt.

© 2012 Tehran University of Medical Sciences. All rights reserved.

Acta Medica Iranica, 2012; 50(10): 710-712.

Keywords: Pulmonary valve stenosis; Balloon dilation

Introduction

Transcatheter pulmonary valve balloon dilation has become the treatment of choice for adult patients with isolated pulmonary valve stenosis (1,2). Transcatheter closure of secundum atrial septal defect with Amplatzer device in adult patients is efficient and safe, with excellent long-term success rate (3-5). There are a few case reports where valvar PS and secundum ASD were treated concurrently by transcatheter procedure (6).

Case Presentation

A 35 year old female referred by adult cardiologist for treatment of ASD and PS. She had a history of palpitation and dyspnea on mild exertion. There was history of cyanosis on mild exertion.

Electrocardiogram showed prolonged PR interval, right axis deviation, right atrial hypertrophy and right ventricular hypertrophy with strain. The chest X-Ray showed moderate cardiomegaly, prominent main pulmonary artery and decreased pulmonary vascular marking. The echocardiogram revealed a secundum ASD of 22 mm with appropriate rims and critical pulmonary valvar stenosis with a peak systolic pressure gradient of 180 mmHg and post stenotic dilation of the main pulmonary artery. The patient was taken up for transcatheter closure of ASD and balloon pulmonary valvuloplasty. Informed consent was obtained. On

cardiac catheterization, the right ventricular pressure was supra-systemic, and the peak to peak systolic gradient across the pulmonary valve was 220 mmHg. Also, pulmonary blood flow/ systemic blood flow ratio (QP/QS) was 1/0.9(right to left shunt). Right ventricular angiography in anteroposterior and lateral views showed severe valvar PS, post stenotic dilation and moderate TR.

Left upper pulmonary vein (PV) injection in hepatoclavicular projection showed medium sized ASD with good rims. Balloon stretched diameter of the ASD was 22mm Figure 1.



Figure 1: Shows measurement of the stretched diameter of the atrial septal defect with a sizing balloon catheter.

Corresponding Author: Mostafa Behjati-Ardakani

Cardiovascular Research Center, Afshar Hospital, Jomhourri Boulevard, Yazd, Iran.

Tel: +98 351 5231421, 913 1514821, Fax: +98 351 5253335, E-mail: dr_behjati@yahoo.com

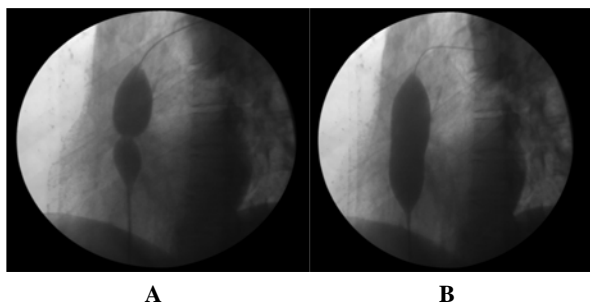


Figure 2. (A): Shows critical balloon pulmonary waist using a Tyshak balloon, (B): shows balloon pulmonary valvuloplasty using a Tyshak balloon disappearance of the waist indicates commissural separation and an excellent result.

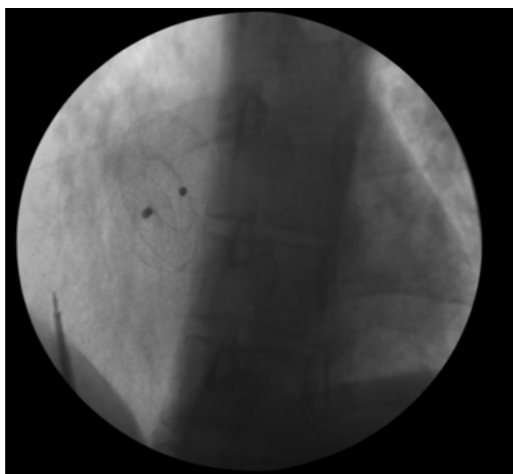


Figure 3. Left anterior oblique view showing the Amplatzer device was fully deployed and was released by unscrewing.

Pulmonary annulus diameter was 23 mm. All procedure was performed under local anesthesia and transthoracic and fluoroscopy guidance. At first, pulmonary valvuloplasty was performed with a 25mm Tyshak balloon, so as to avoid catheter manipulation after placement of the ASD device Figure 2. The ASD was closed using a 24 mm Amplatzer Septal Occluder. There was no residual shunt and complication on transthoracic echocardiography immediately and 24h after device implantation.

On follow up 1, 6 and 12,24,36,48 month, there was no residual shunt and no significant gradient across the pulmonary valve.

Discussion

Rapid advances in interventional cardiology have changed the therapeutic modality for many patients with complex congenital heart disease. Percutaneous

pulmonary balloon valvuloplasty has become a procedure of choice for adult patients with isolated valvar PS (1).

Transcatheter closure of secundum atrial septal defect is an alternative to surgical repair in selected patients (3-5).

In many countries, effective and safe transcatheter interventions now exist for closure of ASD, ventricular septal defect (VSD) and patent ductus arteriosus (PDAs).

However, the simultaneous transcatheter treatment of critical valvar PS and large ASD is rare (1,7,8). The first case of combined treatment of balloon pulmonary valvuloplasty and atrial septal defect was described in 1997 by Yib et al in a 7 year old girl (9). Recently, report on concurrent transcatheter therapy of valvar PS and secundum ASD has been increased tremendously (7,8,10-12).

The decision to combined attempt pulmonary valve dilation and device closure of ASD depends upon various factors: 1) size of ASD 2) adequate ASD rims 3) degree of pressure gradient across the pulmonary valve.

In our patient pulmonary valvuloplasty was performed first so as to minimize catheter manipulation after implantation of ASD device. In our patient, improvement of symptoms, cyanosis and increased arterial O_2 saturation was observed during the procedure.

In combined critical PS and ASD, disappear of cyanosis after balloon on valvuloplasty related to good right ventricular compliance. Persistent cyanosis, despite relief of right ventricular outflow obstruction could be related with poor right ventricular dysfunction.

The major advantages of percutaneous closure of ASD 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 disadvantage of such procedure especially in Iran is higher cost compared to cardiac surgery. However complete occlusion of the ASD and immediate relief of pulmonary obstruction were demonstrated at the end of procedure and confirmed the next day, 1, 6 ,12 mo and yearly thereafter by transthoracic echocardiography. In conclusion, the combined trans-catheter closure of atrial septal defect and pulmonary balloon valvuloplasty is feasible and effective and achieve a satisfactory outcome.

References

1. Inglessis I, Landzberg MJ. Interventional catheterization in adult congenital heart disease. *Circulation* 2007;115(12):1622-33.
2. Rao PS, Galal O, Patnana M, Buck SH, Wilson AD. Results of three to 10 year follow up of balloon dilatation of the pulmonary valve. *Heart* 1998;80(6):591-5.
3. Patel A, Lopez K, Banerjee A, Joseph A, Cao QL, Hijazi ZM. Transcatheter closure of atrial septal defects in adults > or =40 years of age: immediate and follow-up results. *J Interv Cardiol* 2007;20(1):82-8.
4. Elshershari H, Cao QL, Hijazi ZM. Transcatheter device closure of atrial septal defects in patients older than 60 years of age: immediate and follow-up results. *J Invasive Cardiol* 2008;20(4):173-6.
5. Majunke N, Bialkowski J, Wilson N, Szkutnik M, Kusa J, Baranowski A, Heinisch C, Ostermayer S, Wunderlich N, Sievert H. Closure of atrial septal defect with the Amplatzer septal occluder in adults. *Am J Cardiol* 2009;103(4):550-4.
6. Atiq M, Khan SA, Tipu FA, Amin Z. Combined treatment for multiple cardiac defects with interventional techniques. *Pediatr Cardiol* 2008;29(5):890-3.
7. Turkey S, Abdullah E, Celal A, Cenap Z, Nurdan E, Fadli D, Halil D, Ali AN, Ahmet C. Multiple transcatheter interventions in the same session in congenital cardiopathies. *J Cardiovasc Dis Res* 2010;1(4):181-90.
8. Tomasov P, Linhartova K, Antonova P, Adlova R, Alan D, Veselka J. Combined percutaneous treatment of atrial septal defect and pulmonic or aortic stenosis in adult patients. *Arch Med Sci* 2010;6(6):976-80.
9. Yip WC, Chan KY, Godman MJ. Simultaneous transcatheter valvuloplasty and Amplatzer septal occlusion for pulmonary valvar stenosis and secundum atrial septal defect. *Ann Acad Med Singapore* 1998;27(4):578-81.
10. Song ZY, Shu MQ, Hu HY, Tong SF, Ran BL, Liu JP, Li YH, He GX. Clinical efficiency and safety analysis of transcatheter interventional therapy for compound congenital cardiovascular abnormalities. *Clin Cardiol* 2007;30(10):518-21.
11. Cheng SQ, Liu JP, Sun X, Li J, Zhang J, Liu LW, Deng YL, Niu YC. Analysis and follow-up study on 8 children with combined congenital heart disease treated with simultaneous trans-catheter therapy. *Zhongguo Dang Dai Er Ke Za Zhi* 2008;10(5):599-602.
12. Zhang YY, Zhu WH, Xia CS, Gong FQ, Xie CH, Huang XM, Kang ML. Transcatheter therapy of combined congenital heart diseases in children. *Zhejiang Da Xue Xue Bao Yi Xue Ban* 2006;35(3):327-30.