
CASE REPORT

Profound reflex bradycardia and sustained PSVT with device occlusion of Patent Ductus Arteriosus (PDA) in two adult patients with sub-systemic pulmonary hypertension

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Birjandi H, Maleki MH, Forouzandehfar G, et al. Profound reflex bradycardia and sustained PSVT with device occlusion of Patent Ductus Arteriosus (PDA) in two adult patients with sub systemic pulmonary hypertension. *Int J Heart Res.* 2022; 5(4):1-3.

ABSTRACT

Patent Ductus Arteriosus (PDA) is one of the most frequent congenital heart diseases in children and accounts for up to 10% of all congenital heart defects. Transcatheter PDA closure is now regarded as a routine procedure for children with low peri procedural complications and it has improved immediate, short, and long-term outcomes.

In this article, we investigated two adult patients with Pulmonary Hypertension due to patent ducts arteriosus. In both cases PDA was closed with device. During the intervention patients had dysrhythmia. However, long-term follow up showed satisfactory results.

Key Words: PDA; Pulmonary Hypertension; Dysrhythmia; Device closure

INTRODUCTION

Patent Ductus Arteriosus (PDA) is one of the most frequent congenital heart diseases in children and accounts for 5%-10% of all congenital heart defects. PDA has an incidence rate of one in 2000 in full-term infants and it is more common in females rather than in males [1]. Transcatheter PDA closure with the Amplatzer Duct Occluder (ADO) was first described in pediatric patients in 1998 [2]. Transcatheter PDA closure is now regarded as a routine procedure for children with low periprocedural complications and it has improved immediate, short, and long-term outcomes according to the results of several studies [3-5]. Surgical closure of a Patent Ductus Arteriosus (PDA) in cases with pulmonary hypertension with calcification of the wall of the vessel can be with complications [6]. We investigated two adult patients with Pulmonary Hypertension (PH) that patent ducts arteriosus were closed with the device and also had dysrhythmia during the intervention.

CASE A

A 30 year-old man with 70 kg of body weight was referred to our hospital due to a murmur and fatigue. He was suffering from

fatigue and shortness of breath. He had normal systolic and diastolic pressure with a 40-mmHg difference and O₂ saturation 95%. A loud continuous murmur was heard during an examination. Further inspections did not reveal additional abnormalities. The electrocardiogram showed a normal sinus rhythm 80 beats per minute. Echocardiography revealed a dilated and hyperdynamic left ventricle and left atrium due to a large PDA with a continuous pure left-to-right shunt. PDA had 11 mm diameter with SPG 42 and DPG 4 mmHg. The cardiac valves showed no abnormalities except for a mild pulmonary regurgitation with a peak pressure gradient of 55 mmHg that is suggestive of elevated pulmonary artery pressure and sub-systemic PH. Angiography was performed and DAO injection at lateral view demonstrated very large PDA and aneurismal PA.

Then amp later septal occlude device occlutech 16 mm deployed at the ductus, after intervention PAP was dropped to slightly above normal (Table 1). After the procedure, DAO injection at lateral view showed small residual PDA and PA injection at (Left Coronary Arteries) LAO view demonstrated no LPA stenosis afterward.

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TABLE 1
Demographic data, PAP, NYHA before and after the intervention, and device type in Case A

Sex	Age	PAP		NYHA		Pain	Arrhythmia	Device
		before procedure	after procedure	before procedure	after procedure			
M	73 yr	80/50 (61)	50/20 (33)	III	I	ap=23	Profound sinus bradycardia	Occluder 16mm

After the procedure, the patient showed profound bradycardia (HR=50 BPM) compared to the HR before the procedure (80 BPM), with normal systolic and diastolic arterial pressure (Figure 1). The Electrocardiography (ECG) showed bradycardia with sinus arrhythmia (sinus bradycardia) (Figure 2). In follow-up evaluation echocardiography showed PAP decrease to normal (trivial PI with a PPG=23 mmHG) without any residual PDA and heart rate gradually return to normal range cm, with a continuous left-to-right shunt

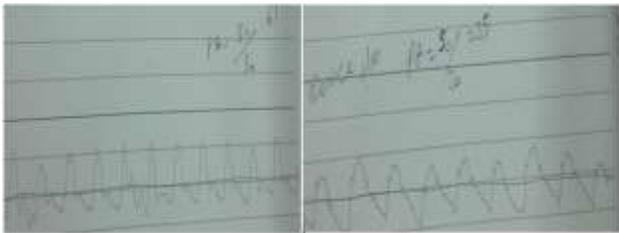


Figure 1) Changes in systolic, mean, and diastolic pulmonary arterial pressure before and after the occlusion of PDA

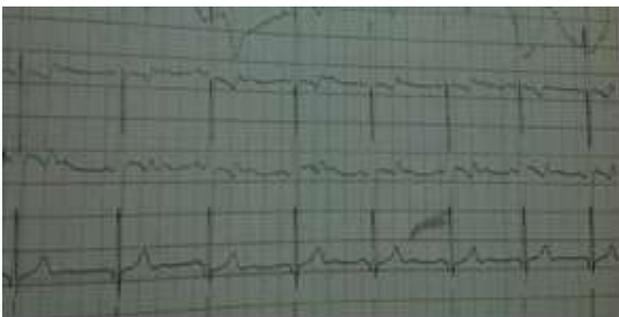


Figure 2) Electrocardiograms after intervention show sinus bradycardia

CASE B

A 27-year-old female was referred to our hospital for treatment of PDA which was diagnosed after an epistaxis examination. She had previously been diagnosed with severe pulmonary hypertension with a poor response to medical therapy although his exercise capacity had gradually deteriorated over the past year. Echocardiography showed large window type PDA (size=0.88*1.25

and sub-systemic PH, Moderate Eccentric TR (PPG=124 mmHg), dilated 4 chambers (LV>RV), RVH, Hyper trabeculated LV with a preserved LV EF. Angiography was performed thus (Depressor Anguli Oris) DAO injection at Lat view demonstrated a very large PDA and dilated aneurysmal PA.

mild MR. Then amp later septal occluder device Cardiofix 16 mm deployed at the ductus. After the procedure, PAP dropped 25% DAO injection at lateral view demonstrating mild foaming through the device. PA injection at LAO view demonstrated no LPA stenosis afterward. During the procedure, patients run sustained PSVT, resistant to Carotid Sinus massage & adenosine finally managed by Verapamil infusion (Figure 3). Follow-up echocardiography showed MVP, Mild Eccentric MR Trivial to Mild Eccentric TR (PPG=40 mmHg), the upper limit of normal size 4chambers of heart preserved LV ejection fraction, AV VTI=17 cm, normal size MPA, no LPA stenosis. The postoperative course of two patients was excellent. Follow-up with echocardiography and color Doppler showed effective closure of the PDA in two cases, pulmonary pressures decrease to normal (or upper normal) levels, and the patient's clinical condition also gradually improved (Table 2).



Figure 3) Electrocardiograms during intervention showed an episode of SVT

TABLE 2
Demographic data, PAP, NYHA before and after the intervention, and device type in case B

Sex	Age	PAP		NYHA		Pain	Arrhythmia	Device
		before procedure	after procedure	before procedure	after procedure			
F	35 yr	138/80 (100)	100/55 (75)	III	I	Spap=40	Sustained PSVT	Cardiofix 16mm

DISCUSSION

PDA closure is indicated in the following situations: the presence of a PDA (except for the silent PDA and severe irreversible pulmonary vascular diseases); silent PDA should be closed in the occurrence of endocarditis; if pulmonary hypertension (pulmonary artery pressure>2/3 of systemic artery pressure or pulmonary artery resistance>2/3 of systemic arterial resistance) is present, there must be a net left to right shunt of 1.5:1 or more or evidence of pulmonary artery reactivity with reversibility test [1, 7]. In case A the PAP was sub-systemic with a pure left to right shunt and in case of B, PAP was

systemic with a positive reactivity test so we decided to close both cases and the PAP dropped significantly immediately after PDA closure. Transcatheter closure of PDA Surgical repair has been an established method. However, it may be technically more difficult for adults with calcification. In addition, there are more advantages to transcatheter in comparison to surgical repair closure of PDA such as short hospitalization and lack of surgical scar. Thus, transcatheter closure has become the first-line treatment of most PDA in children and adults. Although the implantation of single or multiple devices of various sizes has been a safe procedure for a complete occlusion [8], it has limited success in complete closure when PDA is large [8]. In the above cases, the size of the PDA was large, nevertheless, the procedure was successful.

Arrhythmias in adults with PDA are well known, including atrial fibrillation and/or atrial flutter occur in congestive heart failure due to chronic volume overload by PDA [9]. However, Ventricular Tachycardia (VT) is rare among adults with PDA [10]. PDA is an L-R shunt lesion that results in left heart volume overload. In the case reported by Fujii et al., VT originated from the ventricular outflow tract, whereas pulmonary artery hypertension was mild. Therefore, the relation between VT and PDA is unclear [11]. In the case of A, by the beginning of the intervention, profound bradycardia with a minimal heart rate of 45 and an average heart rate of 55-60 were observed. However, the patients' vital signs were stable so we did not use any drug and he was discharged in good condition. In the case of B, the patient went PSVT during the intervention and we tried to control the heart rate with carotid massage and adenosine but the patient did not respond to these maneuvers and we controlled the heart rate with verapamil. The PSVT did not recur and the patient was discharged with a normal sinus rhythm. In summary, further studies are needed in adults with PDA to clarify: LV remodeling including diastolic function and arrhythmia before and after the closure of PDA; and the effects of medical therapy and prevention of LV dysfunction after the closure of PDA.

CONCLUSION

Despite the occurrence of dysrhythmia during PDA device closure in adult patients with pulmonary hypertension, since these dysrhythmias are transient, PDA can be closed with confidence in these patients.

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