

CASE REPORT

Double Intervention in Single Sitting in a Girl with Atrial Septal Defect and Patent Ductus Arteriosus: A Case Report

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Summary:

Atrial septal defect (ASD) and patent ductus arteriosus (PDA) are commonly encountered problems and constitute about 20% of all congenital heart lesions. Association of these two conditions in a single patient is not very uncommon. Both these conditions can be treated by placing intracardiac devices. Double interventional

closure of Atrial Septal Defect (secundum type) and Patent Ductus Arteriosus was performed in single sitting in a 12 year-old girl in Catheterization Laboratory of CMH Dhaka. This is the first ever-reported double interventional closure of two separate diseases in a single patient in single setting, which led writing this report.

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Introduction:

Surgical treatment of various septal defects has been established for long. Closure of septal defects in catheterization laboratory has also been introduced long ago when Patent ductus arteriosus (PDA) was closed first in 1967¹. In 1979 Rashkind et al, reported on an umbrella device for PDFA closure. Then came other devices like Gianturco coils, detachable coils, Cardioseal and Amplatzer PDA occluder^{2,3,4,5}. Major options for closing Atrial septal defect (ASD) for the last 10 - 15 years are: Clamshell device, Sideris 'buttoned device', ASDOS device, 'Angwel wings' device, Amplatzer ASD device, Amplatzer PFO device and Cardioseal. The progress of ASD device closure has been slow since first use in 1976 because of some device related complications^{6,7}.

But Amplatzer ASD device is safe where a large device could be delivered through a small sheath and chance of embolization is less⁸. In the present case a detachable coil of 5x3 mm size was used for PDA occlusion and a 24 mm AMPLATZER ASD occluder was used for ASD closure. This patient is under

follow up for the last 15 months, no complication was encountered and is leading a normal life.

Case report:

Miss. 'S' a twelve year old girl was diagnosed as a case of Atrial Septal Defect (ASD) and Patent Ductus Arteriosus (PDA) two years before. She was asymptomatic and her weight gain was within normal limit. She was diagnosed incidentally when she reported to the paediatrician for treatment of respiratory tract infection. Who detected a systolic murmur and referred her to paediatric cardiologist for cardiac evaluation. On examination: her oxygen saturation was 98%, an ejection systolic murmur of grade $3/6$ was detected in upper left parasternal area, chest X-ray showed normal sized heart with

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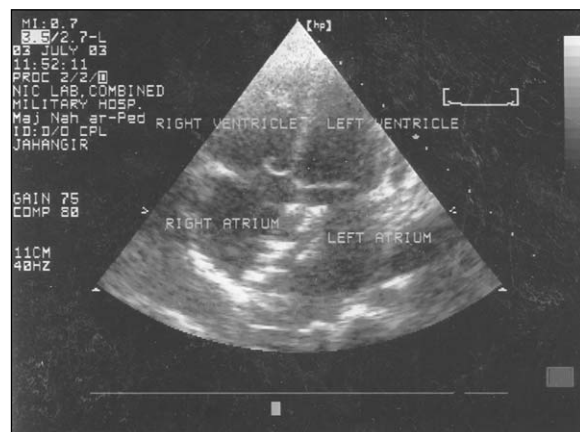


Fig-1 : Echocardiography showing ASD device on both side of atrial septum.

slightly increased pulmonary vascularity, ECG showed incomplete right bundle branch block (RBBB), and Echocardiography with Color Doppler showed large secundum ASD II° and a small PDA. ASD size was 18 mm, superior rim was 16 mm and inferior rim was 12 mm. Total size of interatrial septum was 46 mm. PDA size was 3.5 mm and pressure gradient across PDA was 90 mm Hg. As the size of ASD and PDA was favorable for Device and Coil closure, the procedure was planned and performed on 27th September, 2004 under ketamine anaesthesia.

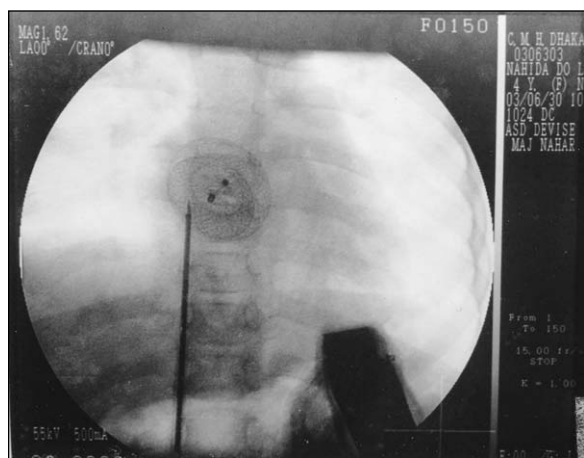


Fig-2: ASD device just released from device delivery cable.

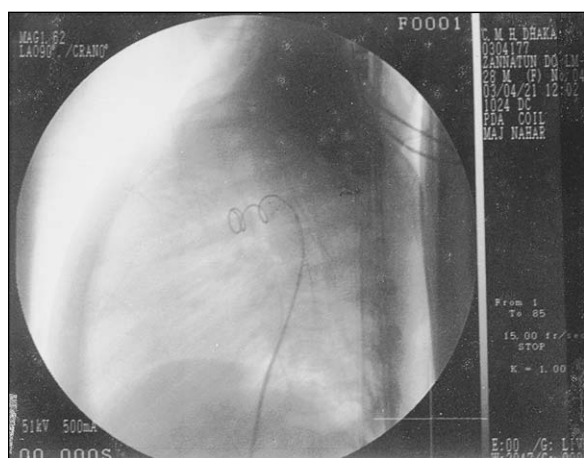


Fig-3 : PDA coil attached to delivery system inside PDA.



Fig-4 : X-ray chest showing PDA coil and ASD device in position.

Procedure:

Equipments used: 6 Fr catheter introducer sheath, 5 Fr catheter introducer sheath, 5 Fr Torcon catheter, 0.038 Terumo wire, 0.035 super stiff wire, 5 Fr GL catheter, pigtail catheter, 5 Fr NIH catheter, PDA coil 5x3 mm, PDA coil delivery system, block Aid ASD occluder, ASD device delivery system, Touhy brost adaptor, sizing plate, sizing balloon and normal paediatric drape. (Source: Amplatzer Septal Occluder and Delivery System, Instructions for used. AGA Medical Corporation, 682 Golden valley, MN 55427 USA).

Drug used: Injection Ketamine 2 mg/kg, Inj. Midazolam 0.1 mg/kg.

Procedure:

The patient was sedated initially with Inj. Ketamine and Midazolam and secured to the table with leucoplast. She was then connected to ECG and pulse oximetry and base line readings taken. Cleaning and draping was done leaving both femoral area exposed. The groins were anaesthetised with 1% Lignocaine. A 5 Fr sheath was placed in right femoral artery and a 6 Fr sheath into right femoral vein. A saturation and pressure run was performed in all the chamber of right heart and left atrium with 6 Fr NIH catheter. An aortogram was then performed with pigtail catheter and PDA identified. PDA size was calculated and it was 3 mm. A 5 x 3 mm coil was selected. Coil was then attached to delivery system and introduced through RFA through a Torcon catheter, which was previously placed in the main pulmonary artery

though PDA. Delivery cable was forwarded to MPA, two loops were released and then delivery cable was withdrawn to aorta and rest of the coil loop was released. Aortogram after 10 minutes showed complete occlusion.

A GL catheter was then placed in the left upper pulmonary vein and a supper stiff wire was passed and secured in a branch vein. Catheter and sheath removed afterwards. ASD size was measured with a sizing balloon. Both echo & fluoroscopy guide was taken to see complete occlusion of ASD with sizing balloon. Sizing plate correlates with 22 mm. So a 24 mm device was selected. ASD device delivery sheath was introduced through guide wire to left atrium (LA) and dilator with wire removed. ASD device was attached to delivery cable through loader and then loaded. Loader was then attached to delivery sheath through a Touhy brost adaptor and device forwarded to LA. LA disc delivered followed by subsequent release of right atrial (RA) disc. Whole procedure was done under echo guide and obstruction to surrounding structure over ruled. Then device was released from delivery coil. Fluoroscopy time for both intervention was 45 minutes.

Echocardiography with color Doppler repeated on the next day, which showed no residual shunt through ASD and PDA.

Discussion:

A variety of techniques have been used to achieve non-surgical closure of PDA since 1967 when Porstmann et al reported the use of an evalon plug¹. Then Rashkind et al reported on an umbrella device for closure of PDA in 1979¹. Next generation was Rashkind PDA occluder. The incidence of residual shunting was high with this device (10 – 30%) and it was expensive and difficult to implant. So it was replaced by a number of devices, which are easier to use, cheap and effective. Now a days, coils and Amplatzer PDA occluder are gaining popularity because they are found more effective and Ductus occluder is suitable for larger ductus also^{2, 3,4,5}.

Transcatheter technique for closure of secundum ASD have been in evaluation since the original report by King and Mills in 1976^{6,7}. Recent procedural modifications have been introduced in an attempt to

minimize the size of the delivery sheath and reduce complication that can arise from device embolization⁸. The final decision to implant the device is largely based on balloon sizing of the ASD during cardiac catheterization⁹. Only the subjective criteria of ASD size and measurement of superior and inferior rim on echocardiography have been used as a criteria to select patient for device closure⁹. But still echocardiography is a good investigation to select cases and also to do the follow up on already done cases.^{10, 11}. Block aid ASD occluder was used in our patient. These devices are promising. The most important advantage is that it could be delivered through a small sheath and it can be used for larger defects also. Chance of embolization is also less¹².

In our patient both ASD (Secundum) and PDA was found suitable for device closure and attempt was taken to performed both interventions in the same sitting. After this case, 4 cases of double interventions in same sitting were done in CMH Dhaka which included intervention of ASD and PDA and intervention of ASD with pulmonary valvoplasty. Double intervention of two separate congenital heart lesion is the latest technology and case reports are yet to be published.

Conclusion:

Isolated PDA coil occlusion have been done in 60 cases so far in paediatric cardiology unit of CMH, Dhaka. Isolated ASD closure of 30 children and adult has been performed jointly by paediatric and adult cardiologists in catheterization laboratory of CMH Dhaka. This is the first case in our experience where coil occlusion of PDA and device closure of ASD was performed in same sitting in a patient with ASD secundum and small PDA with achievement of total occlusion of shunt in both the lesions. This is the first ever case of double device closure in same sitting in any cardiac centre of Bangladesh, which will definitely be a milestone for future cardiologists.

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