

PERCUTANEOUS CLOSURE OF VENTRICULAR SEPTAL DEFECT : AN EXPERIENCE OF SOUHAG UNIVERSITY HOSPITAL

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- VSDs are a common congenital heart disease (approximately 20%). The most common are the perimembranous VSD (around 70%), while completely muscular VSD may occur in around 15% of the cases.
- The standard treatment for Pm VSD is open heart surgery, which is widely performed with minimal operative mortality, although this surgery still carries risks such as complete heart block (CHB), residual shunt, postpericardiotomy syndrome, and wound infection.

- The first VSD closed by a transcatheter approach was done by Lock ,1988. However, transcatheter closure of Pm VSDs using the Pm VSD device were successful for many patients, has been associated with adverse events even for carefully selected individuals. About one eighth of these patients have adverse events, nearly half of them classified as major . The major adverse events include CHB, thromboembolism, and new-onset valvular regurgitations.

- Recently, with the introduction of devices of the Amplatzer family (AGA Medical Corp., Golden Valley, MN, USA), this approach appears to be more promising for a routine use.

- Our Cath .Unit has started device closure of VSD from 2013.The study was conducted on 31 patients (16 male, 15 female) who underwent an attempt of transcatheter closure of VSDs.
- **The following inclusion criteria :**
 1. congenital VSD
 2. Muscular or perimembranous position within the septum.
 3. Haemodynamically significant VSD (demonstrated by clinical data and echocardiography and/or haemodynamic study and/or angiography).
 - 4.In the presence of perimembranous VSD, a subaortic rim as shown by echocardiography in the long axis view must be not less than 5 mm.

Device used.

- The following devices were used: muscular Amplatzer VSD occluder and PDA Amplatzer occluders either ADO1 or ADO 11((St. Jude Medical, St. Paul, Minnesota).
- The Amplatzer muscular occluders were used for closure of 3cases of muscular VSDs and two cases were closed by ADOI.

Procedure

1. Intravenous ceftriaxone injection (50 mg/kg) and Unysun (100mg/Kg) 30 min before the procedure.
2. Intravenous heparin was injected (100mg/Kg) to achieve therapeutic level of anticoagulation (activated clotting time (ACT) > 250 s).
3. The procedure was performed under general anesthesia. Complete right and left heart catheterization was performed.
4. The femoral approach was used in all patients.
5. A left ventricular angiogram was performed in the LAO(60,30) and lateral projections to define the location, size and number of VSD.

6. The appropriate device size is chosen to be equal to or 1-2 mm larger than the VSD size as assessed by echocardiography and angiographic evaluation (maximal size at end-diastole).
7. In case of muscular VSDs, antegrade approach through femoral vein by creation of arteriovenous loop was used. Except in one child had midmuscular VSD in whom the advancement of sheath was impossible antegrade from femoral vein due to tortuosity of the course, so the sheath was advanced retrograde from femoral artery.

- For transcatheter closure of PM VSDs, antegrade approach through femoral vein by creation of arteriovenous loop was used except crossing defect was done by antegrade approach in one case .ADO1 was used in 17 cases and Amplatzer muscular occluders were used in 6 cases
- Retrograde approach was used in PM VSDs that partially closed by aneurysm in three cases , and the appropriate ADO II device is delivered. The ADO II device is chosen with a waist diameter equal to a VSD diameter or 1-2 mm larger.
- Low dose of aspirin (3–5 mg/kg/day) was given for 6 months

Results.

- 1.Age ranged from 2years to 23 years (median 7 years).3 patients were adult.
- 2. Weights ranged between 10 and 60 kg (median 21.5kg).
- One of the patients had associated Trisomy 21.
- One patient had moderate sized PDA that was occluded during the procedure by ADO 1 8/6.
- One patient had ASD II that was occluded during the procedure by ASO 15mm.
- One patient had pulmonary stenosis that underwent to pulmonary valvuloplasty in the same procedure of muscular VSD closure.
- One patient had mild noncompactated LV cardiomyopathy with moderate left ventricular dilation who underwent to midmuscular VSD closure.

- **Procedure time** : median 1 hr 42 min
- **Fluoroscopy time** median :38minutes .
- **Qp :Qs** :median 1.8 .
- **Median pulmonary artery pressure** : 26 mm Hg .

Adverse Events.

- **Device Embolization:** One patient underwent an attempt of PM VSD closure by ADO I 8/6, then device embolization of device to right pulmonary artery had occurred . Although a retrieval attempt was done but it was unsuccessful. This patient had surgical removal of the ADO device from pulmonary artery and VSD closure.
- **Failure:** One adolescence female had PM VSD with aneurysmal tissue; LV opening was 11mm and RV opening was 7mm ,two ADO I 10/8 and 12/10 subsequently were deployed but repeated slipping of the device through the aneurysm .Thus, the procedure was abandoned and the patient was referred for surgical closure .

- **Residual shunt:** A child, 5 years underwent an attempt of PM VSD closure, interrupted IVC was discovered accidentally during procedure. Retrograde approach was decided by using Guiding JR and ADO II 6/4 for closure. The child still has small residual shunt after one year follow up .
- **CAVB** has not been occurred in all patients.

Take Home Message

- Percutaneous closure of PM and muscular VSDs with different Amplatzer occluders has acceptable efficacy and safety.
- A retrograde approach through femoral artery in case of using ADO II or muscular VSD is feasible and more simple technique.
- Deployment can be done under either TTE or TEE.
- Long follow up is mandatory

