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# When and How VSD is closed by catheter?

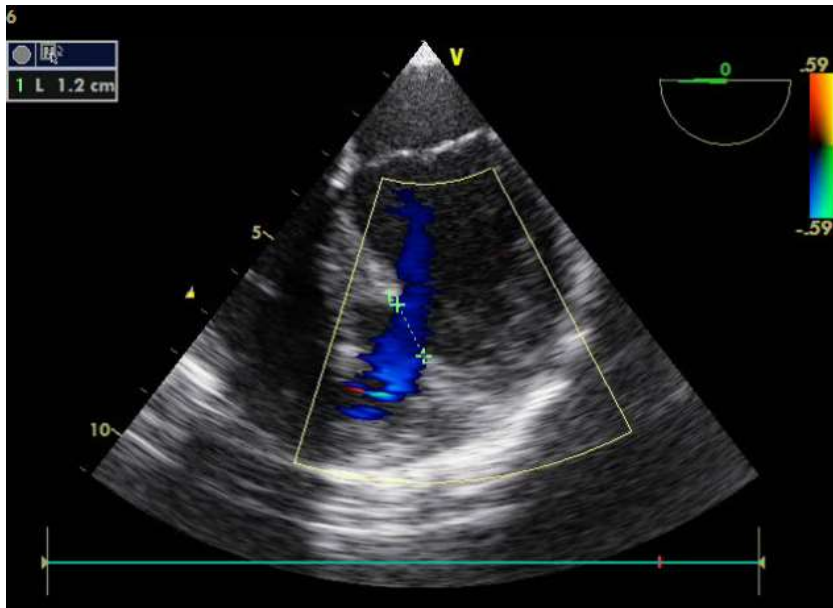
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## Who is candidate for transcatheter VSD?

## Muscular VSD



**Who is candidate for surgical repair?**

## When to close VSD?

Heart failure

Failure to thrive

Recurrent respiratory infections (defined as  $\geq 6$  events/ year)

Cardiothoracic ratio  $\geq 0.55$  (chest X-ray)

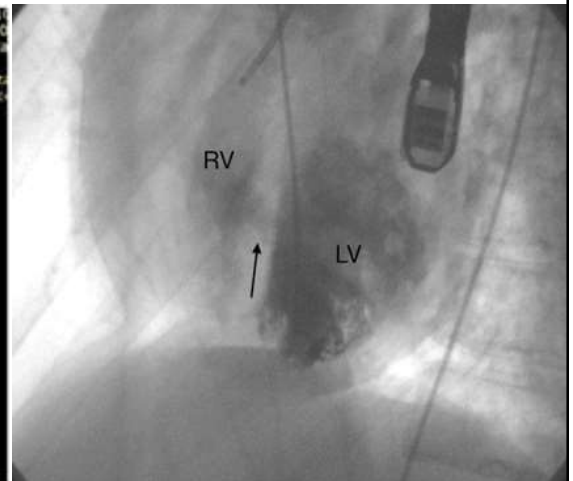
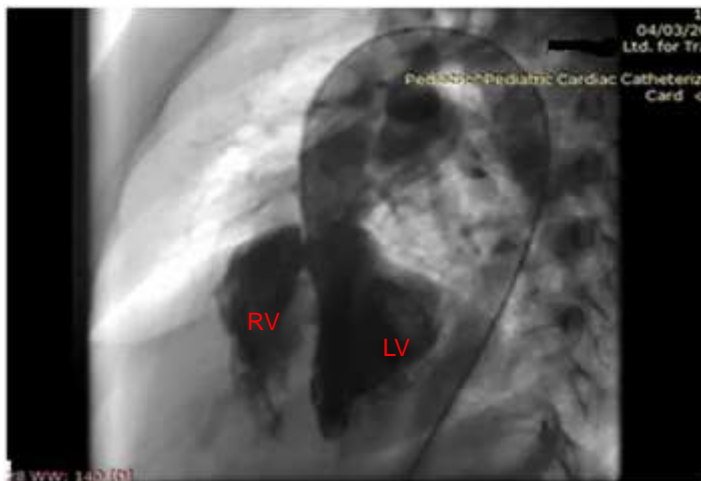
LA/AO  $> 1.5$  (echo)

LVEDD z-score  $\geq 2.0$  (echo)

QP/QS ratio  $> 1.5$  ( cardiac catheterization)

History of infective endocarditis

## Left ventriculogram



PMVSD 60° LAO/20°Cranial

MVSD Hepatoclavicular 35° LAO/35° Cr

## The value of Left Ventriculogram

The size of the defect

The feasibility of crossing the defect

The decision of the catheter materials (JR, Cobra, etc.)

The distance to the aortic valve

In "aneurysm": no rim necessary

The central perforation should be used for closure

multiperforated aneurysm

To abandon the procedure if anatomy is not suitable

## Types of Devices

### pmVSD

ADOI

ADOII

PFM

### MVSD

MVSD

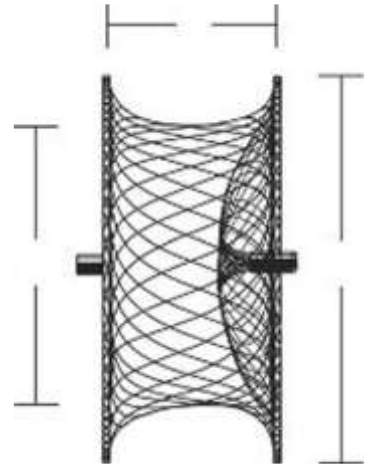
PFM

ASD

ADOII

## Amplatzer Occluder MVSD

- It is a self-expandable device with nitinol wires
- Two flat discs having a diameter 8 mm larger than a central connecting waist (7-mm long)
- The diameter of the waist determines the size of the device,
- The sizes from 4 to 18 mm.
- Three Dacron polyester patches are sewn with polyester thread into both discs and the connecting waist.



A: Device size/ waist diameter (mm)  
B: Disc diameter  
C: Waist length (mm)

## Amplatzer Ductal Occluder I

- It is a self-expanding and self-centering device,
- Nitinol wire mesh.
- It is mushroom-shaped with a low profile and consists of a flat retention disk and a cylindrical main body, into which polyester fibers are sewn.
- The retention disk is 4 mm larger than the main body.



## Amplatzer ductal occluder II

- Based on nitinol wire meshes.
- ADO II device is a modification of the ADO I device
- Two low-profile retention discs and a connecting waist.
- Flexibility of the articulations allows this device to simplify the treatment in a range of patients and specific defect anatomies that are more challenging
- For VSD  $< 6.5$  mm and a distance  $> 3$  mm between the upper margin of the VSD and aortic valve



## pfm-Le VSD coil

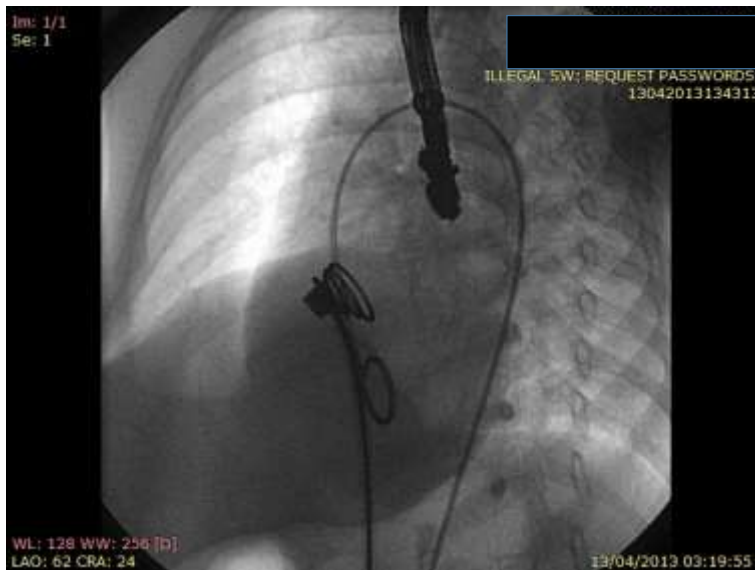
- Coil design more flexible than a cage design
- No radial force inside the septum
- The distal (LV) loops are reinforced & covered with Dacron fibers
- The proximal loops are reversed & without fibers
- The proximal loops are Retrievable for repositioning maneuvers
- Three components to handle  
 Long sheath – guiding catheter – coil  
 (connected to a wire/release handle)



## Selection of the device size

- According to both angiographic and TEE
- VSD occluder 1–2 mm larger than the maximum size of the defect is chosen.

## PFM in pmVSD



# Complications of Percutaneous VSD closure

1.3 up to 5 %.

- **Embolization of the device** learning curve
- **Cardiac perforation**  
placing and moving guide wires, delivery sheath and the device).
- **Stroke** (frequently related to air embolism).
- **Deaths** (rare).
- **Haemolysis**, frequently transient.
- **Aortic regurgitation** (related to PMVSD closure).
- **Disturbances of conduction** (related to PMVSD closure). **Complete heart block (CAVB)**

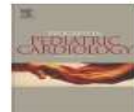
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## Transcatheter closure of perimembranous ventricular septal defects (VSDs) using the Amplatzer duct occluder I device

R. Sobhy, MD, Lecturer of Pediatrics, A El-Sisi, MD, Professor of Pediatrics, AM Fattouh, MD, Assistant Professor of Pediatrics \*, HM Agha, MD, Professor of Pediatrics, SA El-Saiedi, MD, Professor of Pediatrics, W Attia, MD, Assistant Professor of Pediatrics, DM Abdelaziz, MD, Lecturer of Pediatrics, H Hamza, MD, Professor of Pediatrics

Characteristic of the 28 studied patients who underwent VSD closure.

Variables	Median (range)
Age (years)	4 (13 months-12 years)
Weight (kg)	15 (6.5-51)
BSA (m <sup>2</sup> )	0.64 (0.4-1.39)
Angiographic minimum VSD diameter (mm)	5.2 (3.75-9)
Procedural details	
Fluoro time (min)	55 (34.5-99)
Device diameter/length	Number of patients (%)
6 × 4	5 (17.9%)
8 × 6	8 (28.6%)
10 × 8	13 (46.4%)



## Clinical findings of 28 cases

Clinical findings of the included patients	
Variable	Number (%)
Presence of failure to thrive	8 (28.6%)
Pulmonary hypertension	10 (35.7%)
Associated cardiac defects	7 (25%)
Patients on antifailure treatment	20 (71%)
History of infective endocarditis	1 (3.5%)
Recurrent respiratory infections	10 (35.7%)
Other systemic illnesses	3 (10%)

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## Success Rate

**24/28 cases (85.7%)**

**Immediate closure 22/24 (91.7%)**

**At 3 months 23/24 cases (95%)**

**1/24 trivial aortic regurgite**

**No Heart block**

## **Perimembranous Ventricular Septal Defect Device Closure: Choosing Between Amplatzer Duct Occluder I and II.**

### **Conclusion**

- **ADOI and ADOII are equally safe and effective in pmVSD closure.**
- **ADOII use, although cheaper than ADOI, is limited to smaller VSDs.**
- **The choice between ADOI and ADOII can be decided by TTE prior to procedure which is convenient in low economic programs.**

[El-Sisi A, Sobhy R, Jaccoub V, Hamza H. Pediatr Cardiol. 2017](#)

## **Take Home Message**

- **Transcatheter VSD closure is feasible for indicated selected case**
- **The procedure requires a wider range of catheter materials**
- **Strategy of avoidance of procedural complications**
- **Ability to abandon the procedure in insecure or anatomically inappropriate situations**