When and How VSD is closed by catheter?

Hala Mounir Agha, MD

Professor of Pediatrics & Pediatric Cardiology
Director of Pediatric Postoperative Cardiac ICU
Cairo University Specialized Pediatric Hospital (CUSPH)
2018

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 ≥6 events/ year)

Cardiothoracic ratio ≥0.55 (chest X-ray)

LA/AO >1.5 (echo)

LVEDD z-score ≥2.0 (echo)

QP/QS ratio > 1.5 (cardiac catheterization)

History of infective endocarditis

Left ventriculogram
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

<table>
<thead>
<tr>
<th>ADOI</th>
<th>ADOII</th>
<th>PFM</th>
</tr>
</thead>
</table>

MVSD

<table>
<thead>
<tr>
<th>MVSD</th>
<th>PFM</th>
<th>ASD</th>
<th>ADOII</th>
</tr>
</thead>
</table>

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.

Amplatzer Ductal Occcluder 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)
Clinical findings of 28 cases

<table>
<thead>
<tr>
<th>Variable</th>
<th>Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presence of failure to thrive</td>
<td>8 (28.6%)</td>
</tr>
<tr>
<td>Primary hypertension</td>
<td>10 (35.7%)</td>
</tr>
<tr>
<td>Associated cardiac defects</td>
<td>7 (25%)</td>
</tr>
<tr>
<td>Patients on antiplatelet treatment</td>
<td>20 (71.4%)</td>
</tr>
<tr>
<td>History of infective endocarditis</td>
<td>1 (3.6%)</td>
</tr>
<tr>
<td>Recurrent respiratory infections</td>
<td>10 (35.7%)</td>
</tr>
<tr>
<td>Other systemic illnesses</td>
<td>3 (10%)</td>
</tr>
</tbody>
</table>

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 Fatouh, MD, Assistant Professor of Pediatrics *, HM Agha, MD, Professor of Pediatrics

Success Rate

24/28 cases (85.7%)
Immediate closure 22/24 (91.7%)
At 3 months 23/24 cases (95%)
1/24 trivial aortic regurge
No Heart block
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.


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