TRANSCATHETER CLOSURE FOR
DOUBLY COMMITTED VSD

DO NGUYENTIN MD.
MEDICAL UNIVERSITY OF HCMC
CHILDREN HOSPITAL 1
1. SUB-AORTIC VSD

2. INTRA-CONAL VSD

3. DOUBLY COMMITTED VSD

4. SUB-PULMONIC VSD
Doubly Committed Subarterial Ventricular Septal Defect

- SCV
- PT
- PV
- VSD
- RA
- TV
- AoV
- PT
- AoV
- MV
- PV
Echocardiographic delineation of various VSDs

- Subpulmonary
- Perimembranous
- Subaortic
- Inlet
- Mid-muscular
- Marginal
- Apical
## Prevalence of VSD Types

<table>
<thead>
<tr>
<th>Name</th>
<th>Year</th>
<th>No. VSD</th>
<th>Perimemb. %</th>
<th>Subpulm. %</th>
<th>Musc. %</th>
<th>Inlet %</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soto B</td>
<td>1943</td>
<td>507</td>
<td>69.6</td>
<td>6.9</td>
<td>18.2</td>
<td>6.8</td>
<td>Mexico</td>
</tr>
<tr>
<td>Van der Hauwaert</td>
<td>1983</td>
<td>220</td>
<td>75.9</td>
<td>5.9</td>
<td></td>
<td></td>
<td>Europe</td>
</tr>
<tr>
<td>A.G. Eroglu</td>
<td>2003</td>
<td>1096</td>
<td>65.6</td>
<td>3.3</td>
<td>33.3</td>
<td>0.6</td>
<td>Turkey</td>
</tr>
<tr>
<td>Glen, S.</td>
<td>2004</td>
<td>1127</td>
<td>76</td>
<td>24</td>
<td></td>
<td></td>
<td>UK</td>
</tr>
<tr>
<td>Ando M</td>
<td>1977</td>
<td>146</td>
<td>52</td>
<td>30.9</td>
<td>15.7</td>
<td>1.4</td>
<td>Japan</td>
</tr>
<tr>
<td>Hong CY</td>
<td>1983</td>
<td>646</td>
<td>59.4</td>
<td>28.2</td>
<td>0.8</td>
<td>10.7</td>
<td>Korea</td>
</tr>
<tr>
<td>Lue HC</td>
<td>1986</td>
<td>332</td>
<td>75</td>
<td>22.6</td>
<td>0.6</td>
<td>0.9</td>
<td>Taiwan</td>
</tr>
<tr>
<td>Tatsuno K</td>
<td>1989</td>
<td>551</td>
<td>66.1</td>
<td>31.6</td>
<td>0.5</td>
<td>1.8</td>
<td>Japan</td>
</tr>
<tr>
<td>Layangool</td>
<td>2003</td>
<td>1977</td>
<td>74.8</td>
<td>17.5</td>
<td>3.9</td>
<td>2.2</td>
<td>Thailand</td>
</tr>
</tbody>
</table>

Courtesy Dr. Layangool T.
WHY I CLOSE INFUNDIBULAR VSD?
Natural history of subarterial infundibular VSD

395 pts.

1. Aortic valve deformity: 43.5%
   • Aortic valve prolapse (AVP) without AR: 19.5%
   • Aortic valve prolapse with AR: 24%

2. No aortic valve deformity: 47.3%
   • Pulmonary hypertension (PHT): 59.4%
   • AVP and AR develop most frequently at 5 to 8 years
   • AVP present in all pts. without PHT at age of > 30 years

Am Heart J 1984; 108(5): 1312–1317
Momma K et al
214 pts.

73% of 139 asymptomatic pts. develop AVP

80% of pts. with AVP develop AR

AVP and AR:

• 1 year: 8%
• 5 years: 30%
• 10 years: 64%
• 15 years: 83%
Etiology of aortic valve prolapse

1. Lack of support of aortic sinus and annulus by infundibular septum

2. Structural defect in the base of the aortic sinus itself

3. Hemodynamic influence during both systole and diastole
Doubly Committed Subarterial Ventricular Septal Defect

This entity consists of 2 different pathologies:

1. L-R-Shunt
2. Aortic valve deformity

Management: Curative Treatment and Prophylaxis
Presence of Ao Valve prolapse

- Severity of prolapse
- Presence and severity of AR
X1 Distance: 6.58 mm

X2 Distance: 2.51 mm
WHICH INFUNDIBULAR VSDs CAN BE CLOSED BY DEVICE?
MORPHOLOGY OF INFUDIBULAR VSD

1. NO MSA
2. LIMITTED OR NO AORTIC RIM
3. THE SEVERITY OF AORTIC VALVE PROLAPSE AND AR
4. EXTENSION OF DEFECT FROM PULMONIC TO AORTIC: SUBPULMONIC, INTRACONAL, SUBAORTIC, DOUBLY COMMITTED
SEVERE AORTIC VALVE PROLAPSE

1. MALALIGNMENT BETWEEN SETUM AND RCC of AORTA

2. THE TRUE HOLE MAY BE BIGER THAN ON ECHO

3. THE PROLAPSED CUSP IS WEAK AND NO SUPPORT FROM CONAL SEPTUM : NOT STRONG ENOUGH FOR KEEPING THE DEVICE.
Can we close the defect by device

1. Aortic valve?
2. Pulmonary valve?
3. Stability of the device (without support mechanism)?
4. RVOT?
5. Arrhythmias?
PATIENT SELECTION

1. BODY WEIGHT > 10 KG
2. NO SEVERE AORTIC VALVE PROLAPSE
3. NO MODERATE TO SEVERE AR
4. TRUE DEFECT < 7 mm
5. NO OTHER CARDIAC ABNORMALITIES
HOW I CLOSE INFUNDIBULAR VSD?
TRANSCATHETER CLOSURE OF SUBPULMONIC VSD

TECHNIQUES

1. LATERAL VIEW FOR ANGIOGRAM
2. VSD CROSS WITH CUT PIGTAIL
3. MEASURE THE HOLE AFTER CROSSING LONG SHEATH
4. ALWAYS CHECKING AR DURING DEPLOYING THE DEVICE
TRANSCATHETER CLOSURE OF SUBPULMONIC VSD

TECHNIQUES

DEVICE SELECTION:

1. PFM COIL
   - RIGHT SIDE: DIAMETER OF VSD IN RV PLUS 2
   - LEFT SIDE: PLUS AT LEAST 4 ACCORDING TO PROLAPSE

2. ADO II
   - LENGTH: 4 mm
   - WAIST DIAMETER: SMALLEST DIAMETER + 1 OR 2

3. OTHER: NO EXPERIENCE.

3. ADO I: NOT SUITABLE
X1 Distance: 6.58 mm

X2 Distance: 2.51 mm
WHAT RESULTS FROM INFUNDIBULAR VSD CLOSURE BY DEVICE?
33 pts. (11 perim. VSD, 22 DCVSD)
Age: 1 - 29 y. (9.8)
Body weight: 10 – 83 kg (34.5)
VSD diameter by TEE: 2.5 – 8 mm (4.7)

Pre-existing AR:
Trivial/mild: 8/33 (24.3%)
Moderate: 1/33 (3%)

Results:
Small residual shunt: 6/33 (18.2%)
Moderate/large: 0/33 (0%)

AR at 6 months:
Trivial/mild: 11/33 (24.3%)
Moderate: 0/33
44 pts. (24 male, 17 female)

Age: 2 - 38 y. (12.6)
Body weight: 10 – 74 kg (31.6)
VSD diameter by TEE: 2.5 – 8 mm (4.1)

Pre-existing AR:
None: 16/41 (39%)
Trivial/mild: 22/41 (53.6%)
Moderate: 3/41 (7.3%)

Results:
Technical success: 41/44 (93%)
Technical failure: 3/44 (7%)

Reasons of failure:
No stable coil formation
Too little coil loops on LV side ➔ too large residual shunt
Clinical Results:

Small residual shunt: 6/41 (14.6%)
Moderate/large: 1/41 (2.4%) → Surgical removal

AR (FU 6 – 63 months):
None: 23/40 (57.5%)
Trivial/mild: 16/40 (40%)
Moderate: 1/40 (2.5%)

Pre-existing AR:
None: 16/41 (39%)
Trivial/mild: 22/41 (53.6%)
Moderate: 3/41 (7.3%)

Development of AR after Coil Closure

Progressive: None
Unchanged: 40%
Regressive: 60%
65 CASES INFUDIBULAR VSD CLOSURE

1. SUCCESFUL: 61 CASES

2. HEMOLYSIS 2 CASE

3. TECHNICAL FAILURE 2 CASES
1. **HEMOLYSIS:** RESIDUAL SHUNT DUE TO

2. **TECHNICAL FAILURE:** THE DEVICES WERE NOT STABLE DUE TO

   1. UNDERESTIMATED THE SIZES OF DEFECTS
   2. THE DEVICE CONFIGURATION WAS CHANGED
CONCLUSIONS

1. DCVSD is common in Asia

2. Progressive AVP and AR are an important issue

3. Timing closure can reduce the severity of AR and prevent further progression.

4. Infundibular VSD is the most difficult type

5. Pfm coil and ADO II: acceptable devices

6. Preliminary results of coil occlusion show similar data compared to surgical closure. Long-term results should be strictly evaluated
Dear Colleague,

With the topic of VSD from A to Z, the congress 2013 became successful internationally that attracted the attention and brought the new insight and innovation to all experts and specialists in the field. HCMC Pediatric Cardiology and Congenital Heart Disease Society is proud to announce that The 4th Vietnam Congress of Congenital and Structural Heart Diseases with the topic “Fistula from A to Z” will be held from January 8 - 10, 2014 in Ho Chi Minh City.
Dear Colleague,

With the topic of VSD from A to Z, the congress 2013 became successful internationally that attracted the attention and brought the new insight and innovation to all experts and specialists in the field. HCMC Pediatric Cardiology and Congenital Heart Disease Society is proud to announce that The 4th Vietnam Congress of Congenital and Structural Heart Diseases with the topic “Fistula from A to Z” will be held from January 8 - 10, 2014 in Ho Chi Minh City.

BOARD OF DIRECTORS

- Bharat Dalvi
  - India
- Do Nguyen Tin
  - Viet Nam
- Hoang Trong Kim
  - Viet Nam
- Le Trong Phi
  - Germany
- Lee Beeson
  - Canada
- Mohammed Omar Galal
  - Saudi Arabia
- Neil Wilson
  - United Kingdom
- Nguyen Lan Hieu
  - Viet Nam
- Nina Wunderlich
  - Germany
- Pham Nguyen Vinh
  - Viet Nam
- Shakeel A. Qureshi
  - United Kingdom
- Vu Minh Phuc
  - Viet Nam
THANKS FOR YOUR ATTENTION

SEE YOU IN HO CHI MINH CITY JAN 8-10, 2014