

Transcatheter closure of VSD using Duct Occluder device

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Anatomy of VSD

1. Perimembranous VSD: Aneurysm septal membranous (TV or PA obstruction), AR

2. VSD supcrystal beneath PV or/and AV→

Laubry Pezzi syndrome (AV prolapsed)

3. Inlet VSD (AVSD)

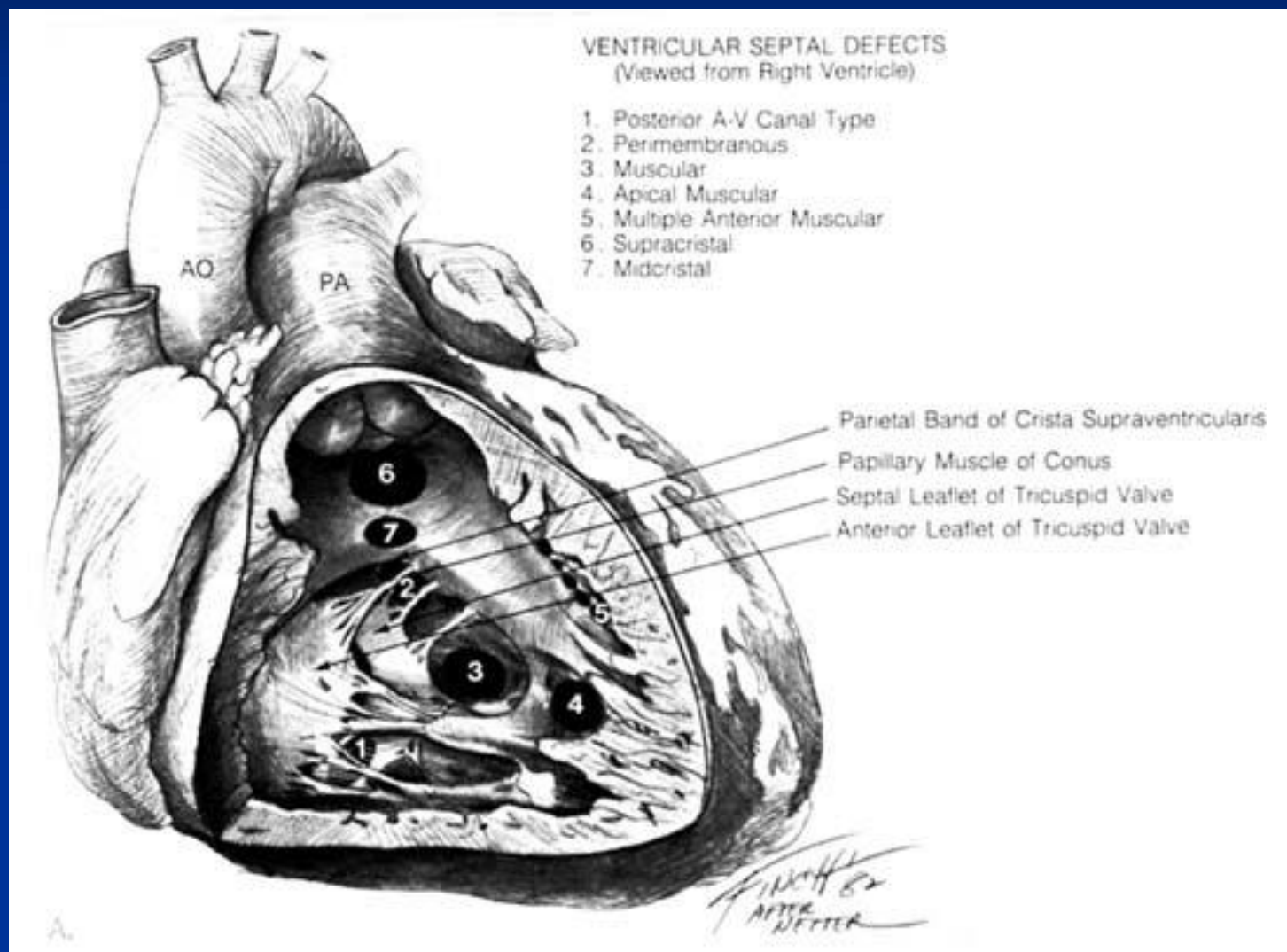
4. Muscular VSD

- + Apical

- + Marginal

- + Central

Various locations for VSDs



Hemodynamic Classification

Type	Size	AP/PS	RP/RS	Qp/Qs
Ia	Resistive	<0.3	<0.3	1.0-1.5
Ib	Resistive	<0.3	<0.3	1.5-2
IIa	Resistive	0.3-0.7	<0.5	>2
IIb	Non resistive	0.7-1	<0.8	>2

Hemodynamic Classification

Nom	Size	AP/PS	RP/RS	Qp/Qs
III	Non resistive	>1	>1	<1
VI	Non resistive	<0.7	<0.5	>2

VSD Ia and Ib: Malade de Roger

VSD IIa and IIb: VSD high debit

VSD III: Eissenmenger (large VSD)

VSD IV: VSD and Pulmonary stenosis

VSD management

VSD IA (Roger): Follow up

VSD IIa: Surgery if

- Medical treatment failure

- Pulmonary pressure increasing

- LV too large

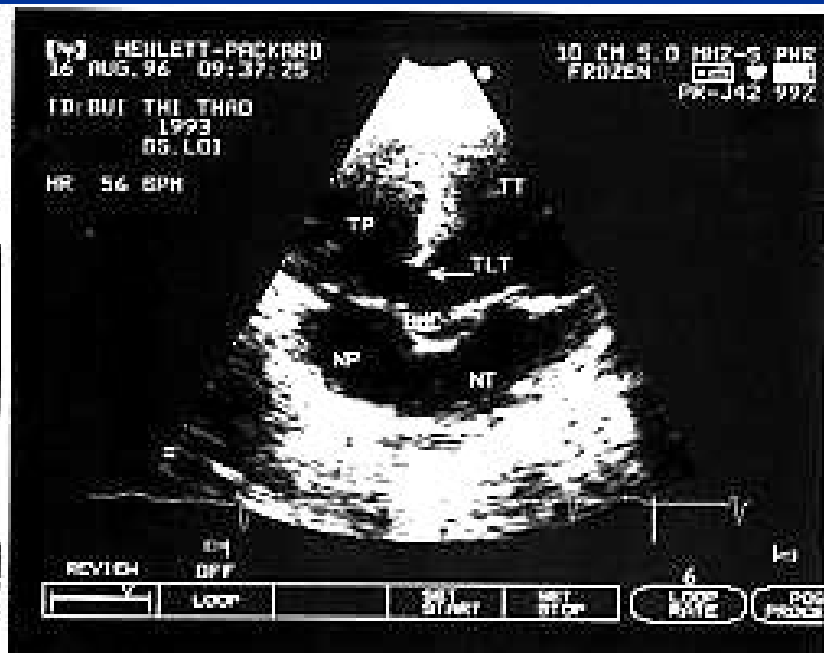
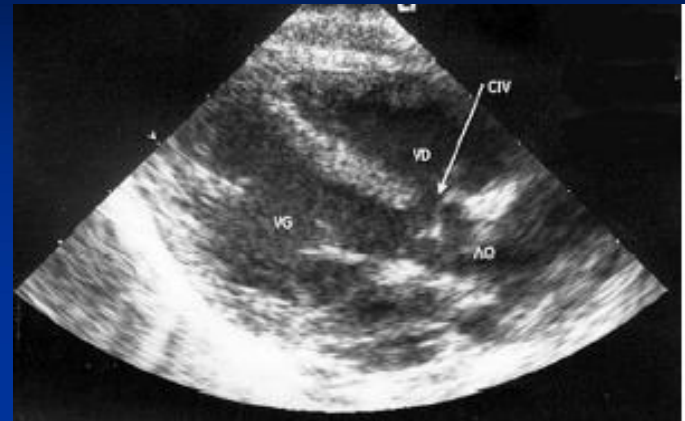
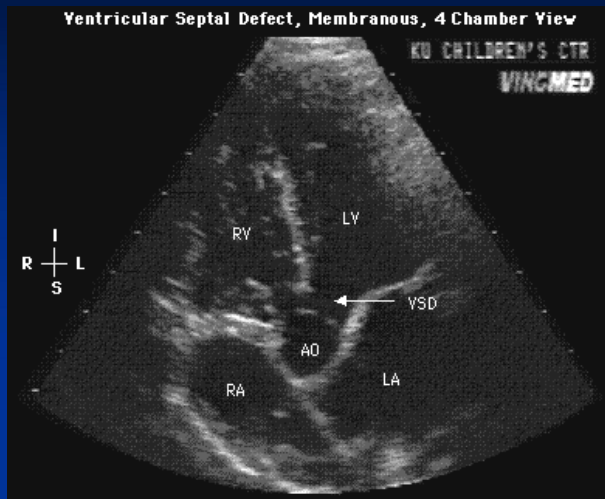
- More than 1 year

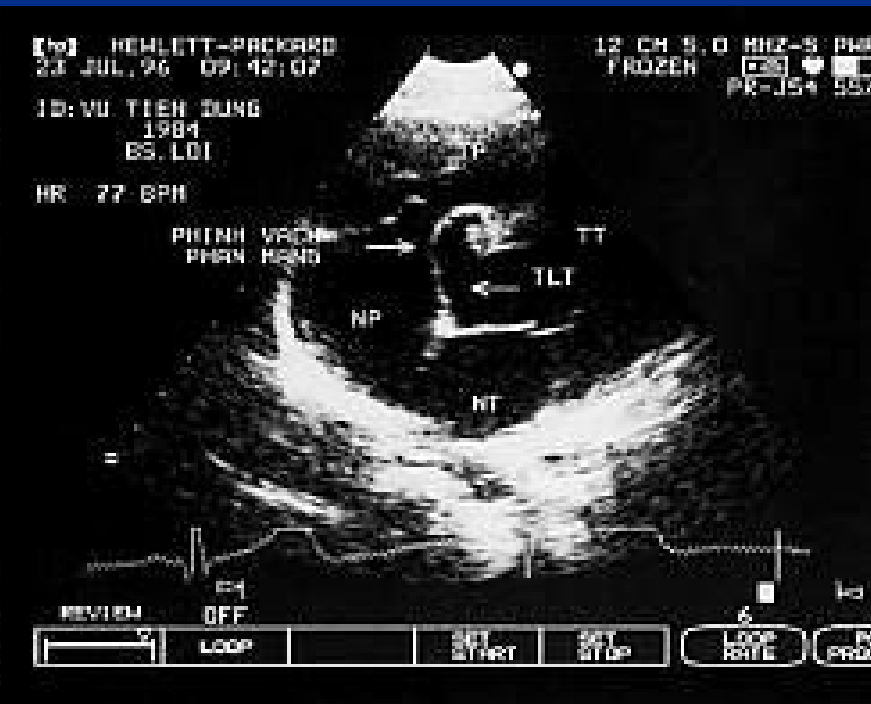
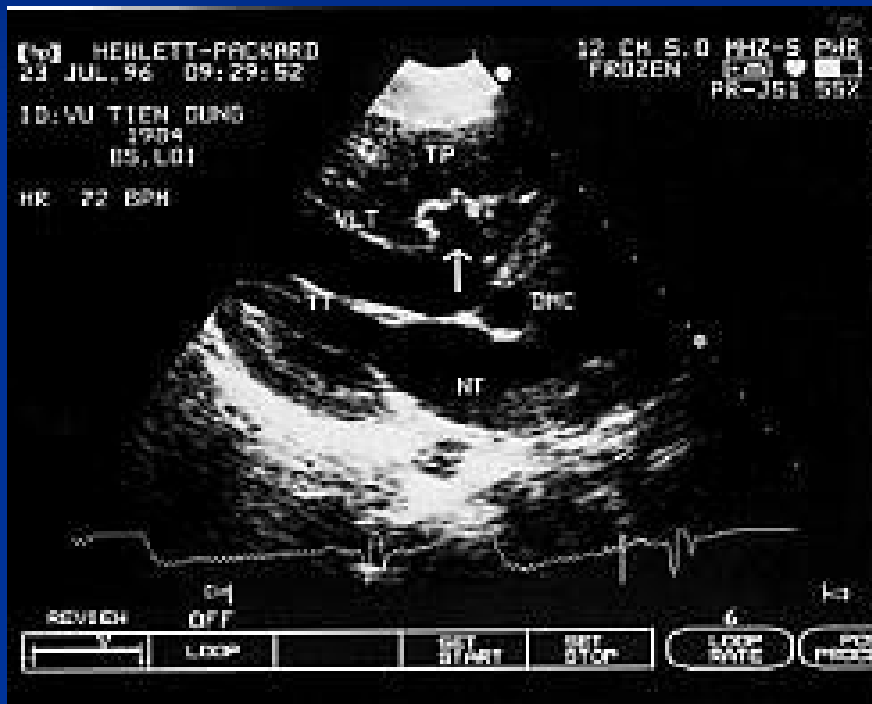
VSD IIb: Surgery if single VSD, PA banding
multiple VSD patient <9month total
correction after

VSD+IA, VSD + RVOT obstruction: Surgery

VSD type IB ?????

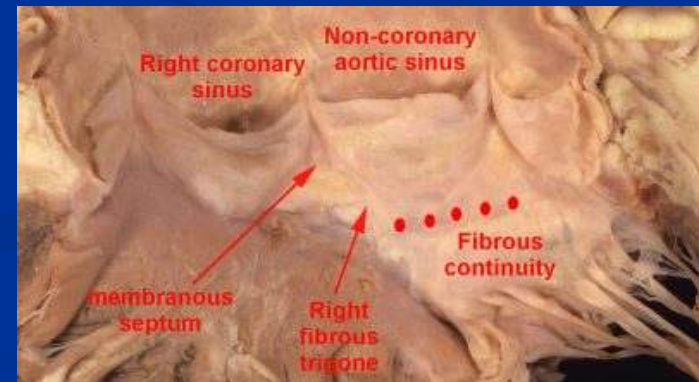
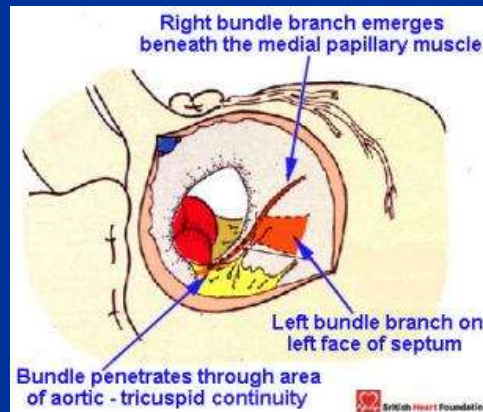
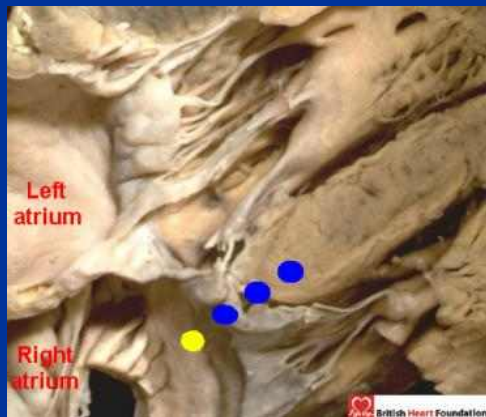
- + 75% of VSD
- + Wait and see ?
- + Osler, AR, LV hemodynamic ...
- + Surgery complication?
- + Intervention complication?





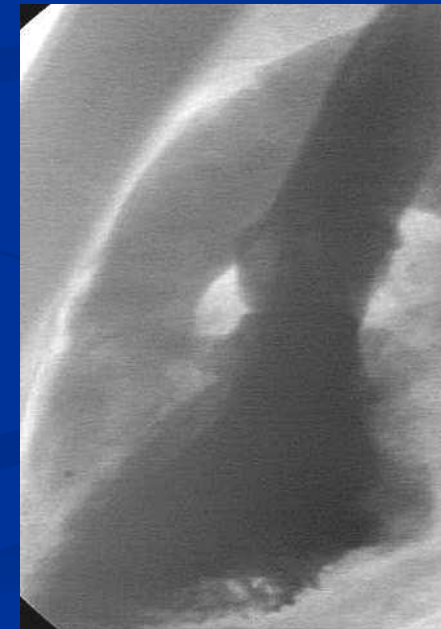
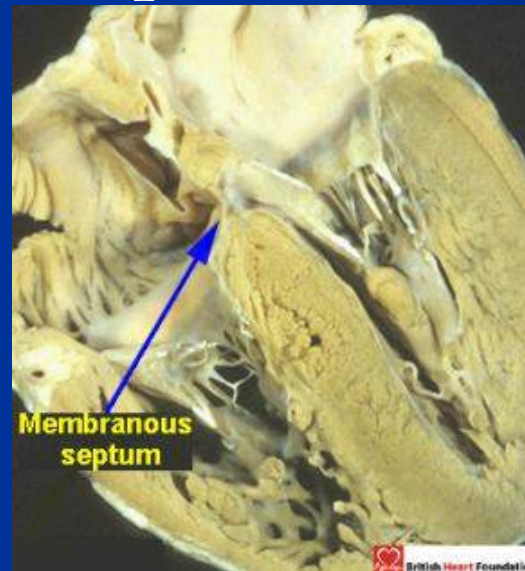
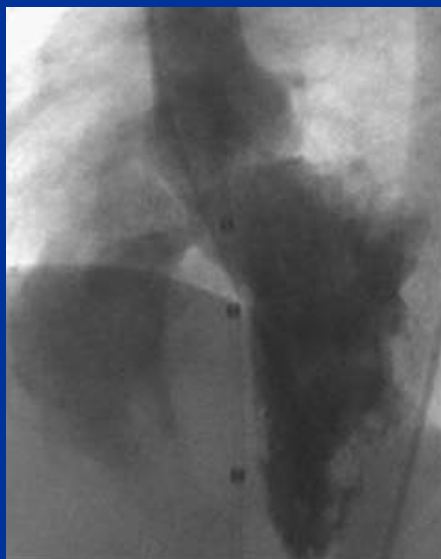
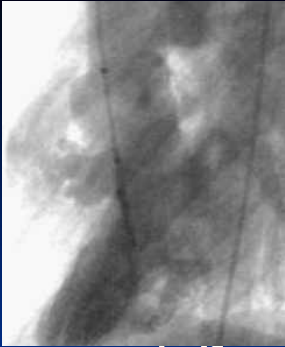
Introduction

- The transcatheter occlusion of VSD is considered to be one of the most sophisticated and complex interventional procedures. Percutaneous closure of a perimembranous VSD is valuable alternative to surgical closure.
- Complications are embolization of the device and arrhythmic (double disk device)



Introduction

- The PM VSD have edge, ampulla's (triangle) form in 90%, look like type A of PDA. Using PDA device for VSD closure is reasonable.
- Carefully patient's selection and long term follow up is very important.

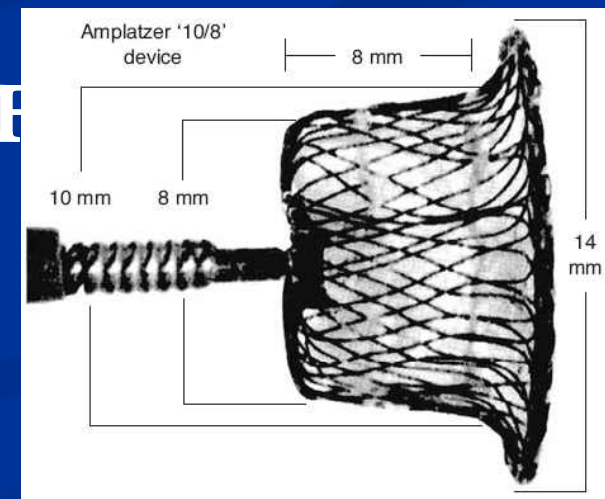


Introduction

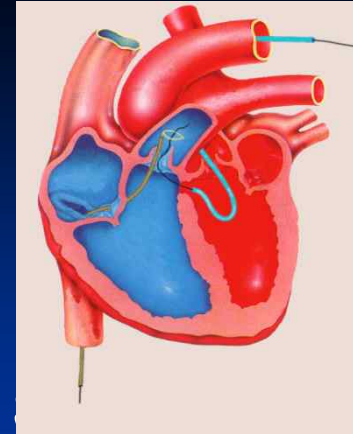
- The PDA device (Amplatzer Duct Occluder, Cocoon Duct occluder) is stable and adapter with 6 to 8F sheath (smaller than VSD device with same left disk diameter)
- The first VSD close by PDA device in Vietnam Heart Institute in December, 2002

The Duct Occluder Device

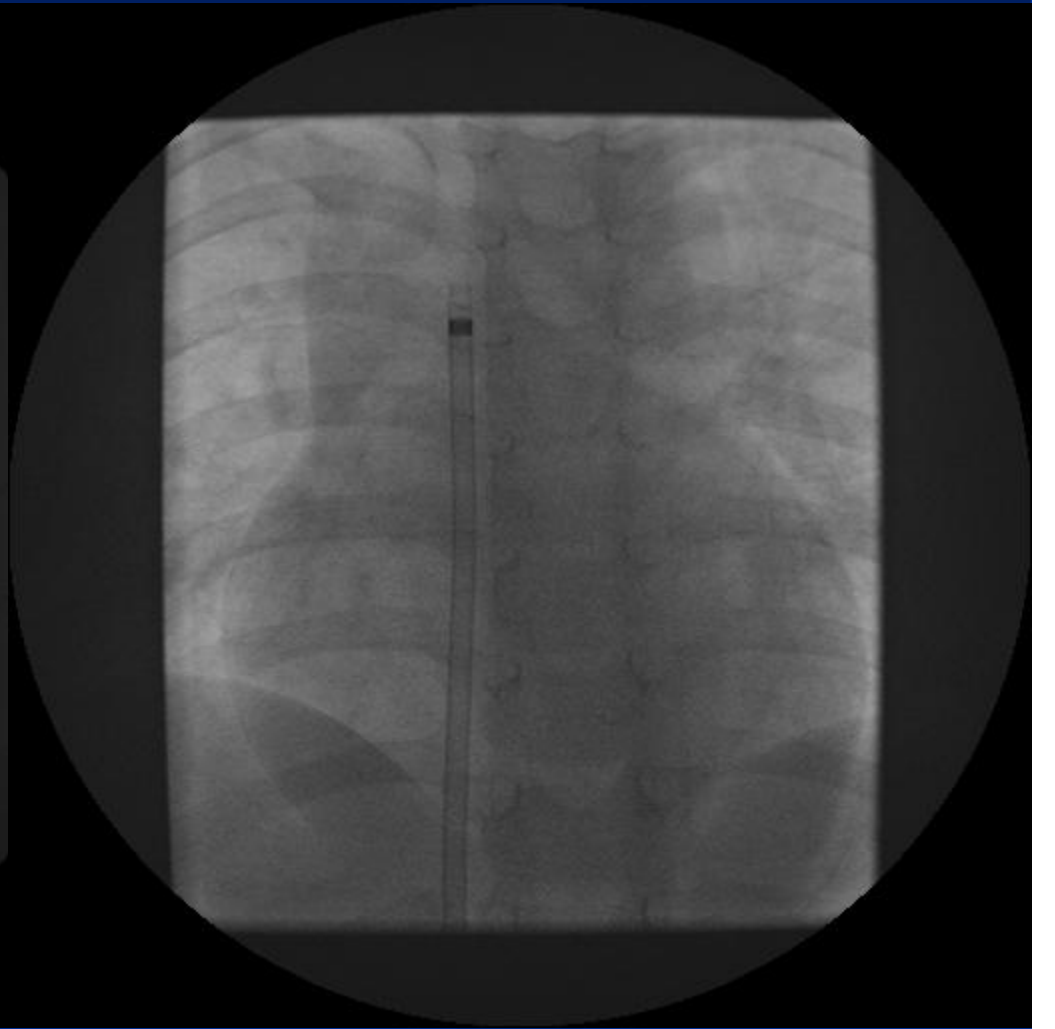
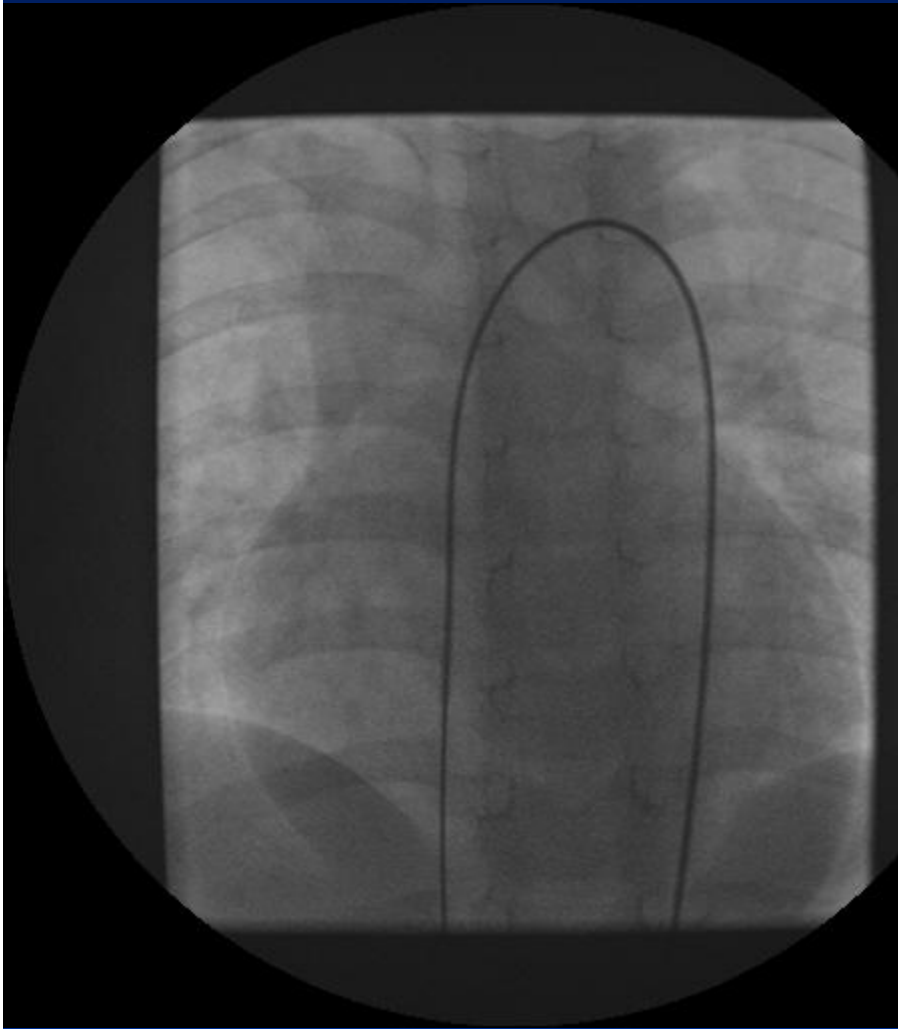
- The occluder is a cone-shaped device 7 mm in length made of a 0.004-inch Nitinol wire mesh.
- Prostheses are currently available in sizes ranging from 5-4 to 16-14 mm at increments of 2 mm.
- Delivery sheath from 6F to 8F
- The price is reasonable.



Protocol

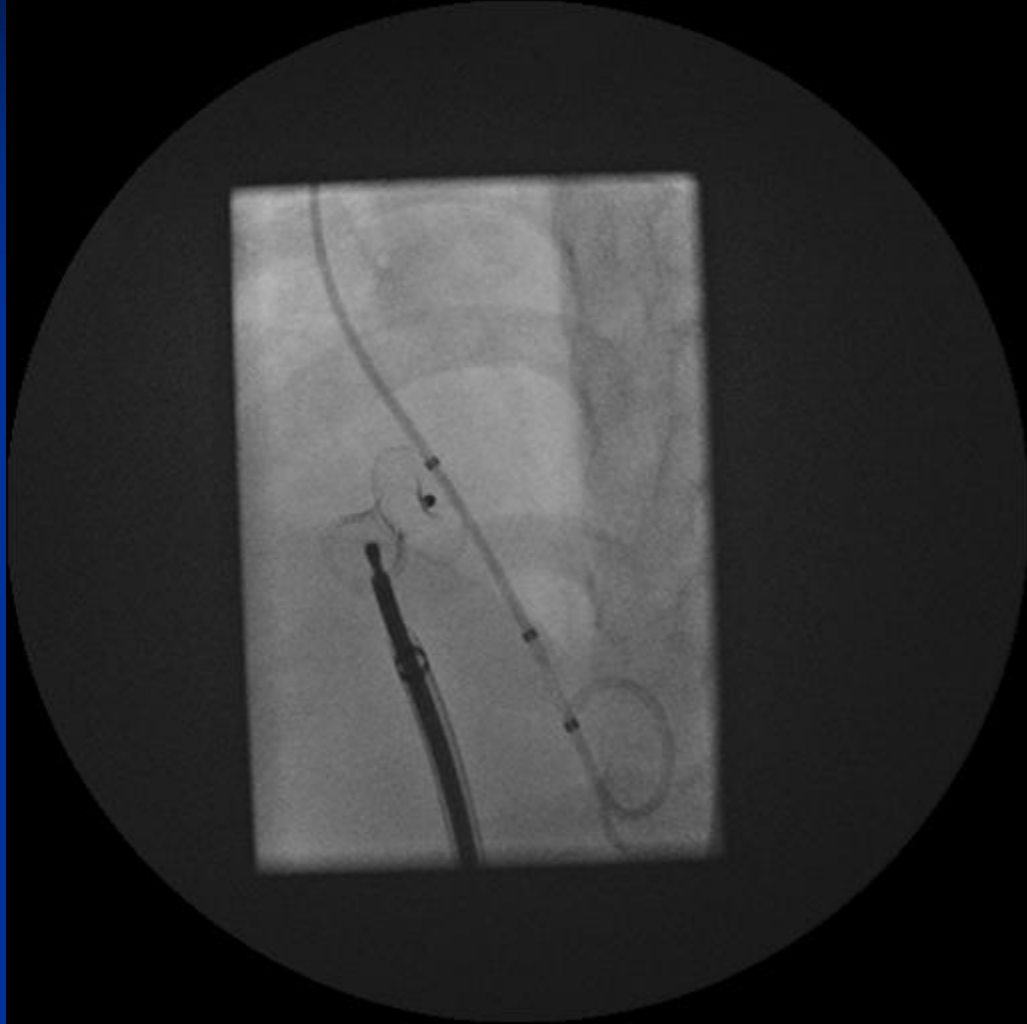


- VSD was crossed from the LV with coronary catheter (JR4) or AM catheter.
- Guide wire Terumo was advanced into the pulmonary artery or the vena cava.
- The tip of the Terumo wire was captured with a snare to create an arterio-venous loop.
- 6 to 8F long sheath was introduced over the loop wire to the ascending aorta.



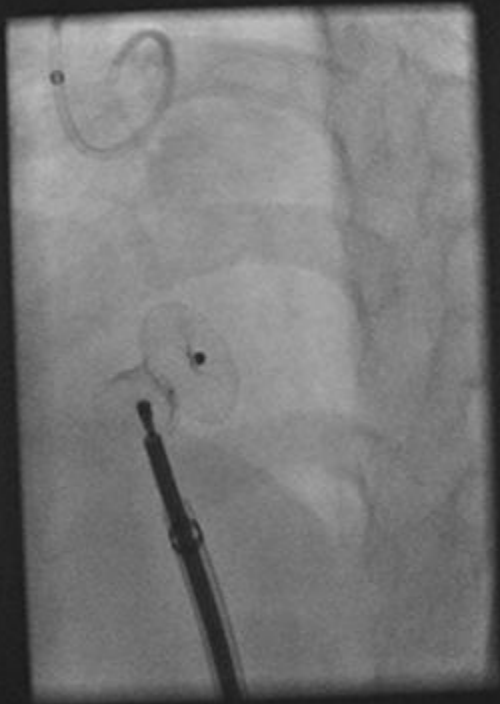
Protocol

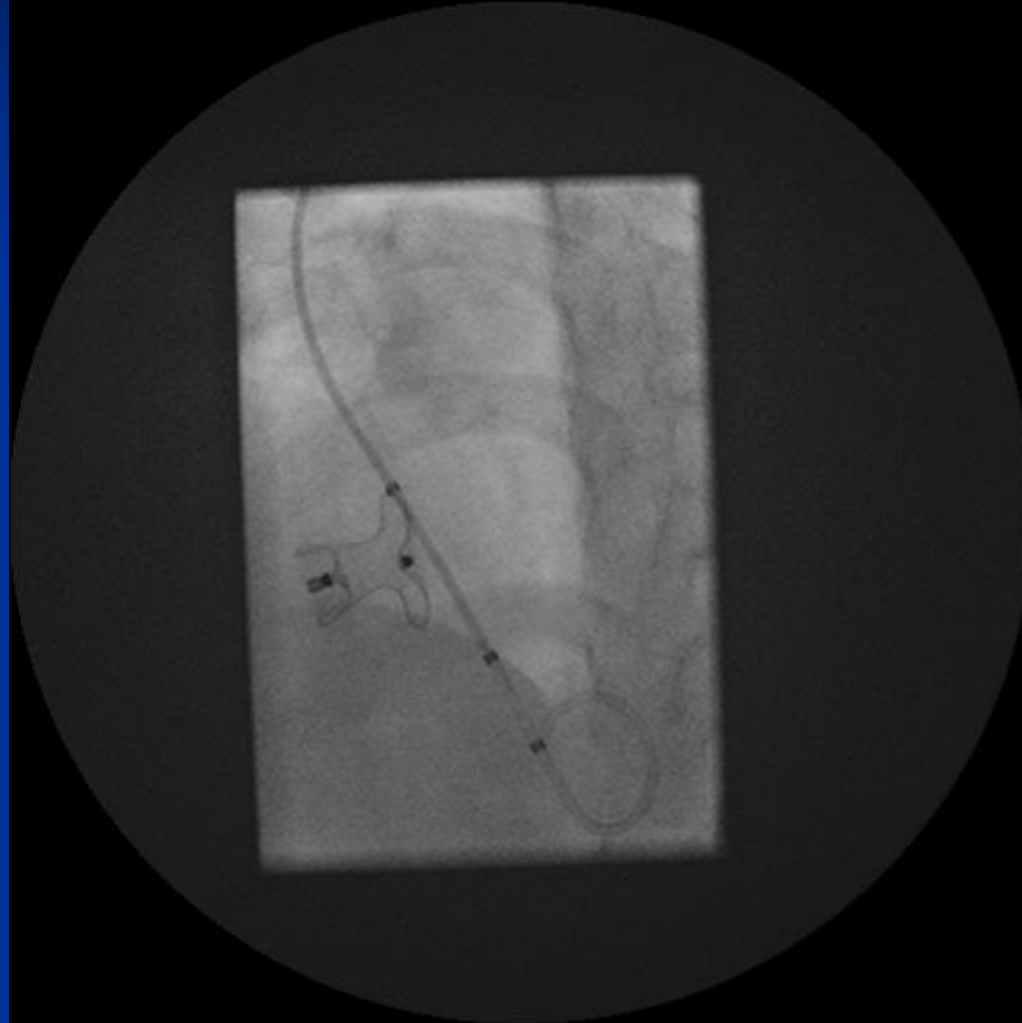
- The 6F to 8F sheath (adapted to Device size selection) was introduced over the loop wire to the ascending aorta.
- The left disk open just beneath aortic valve and pull back to the VDS.
- After check by angiography, the body of device was open in the defect.



Protocol

- Angiograms of the LV and the aorta were performed after device detachment to assess device position and the efficacy of closure.
- Echocardiographic assessment included device arm position and integrity, contact with valve structures, residual flow through the defect.
- Follow-up studies with clinical examination and angiogram were carried out at various times after coil or device





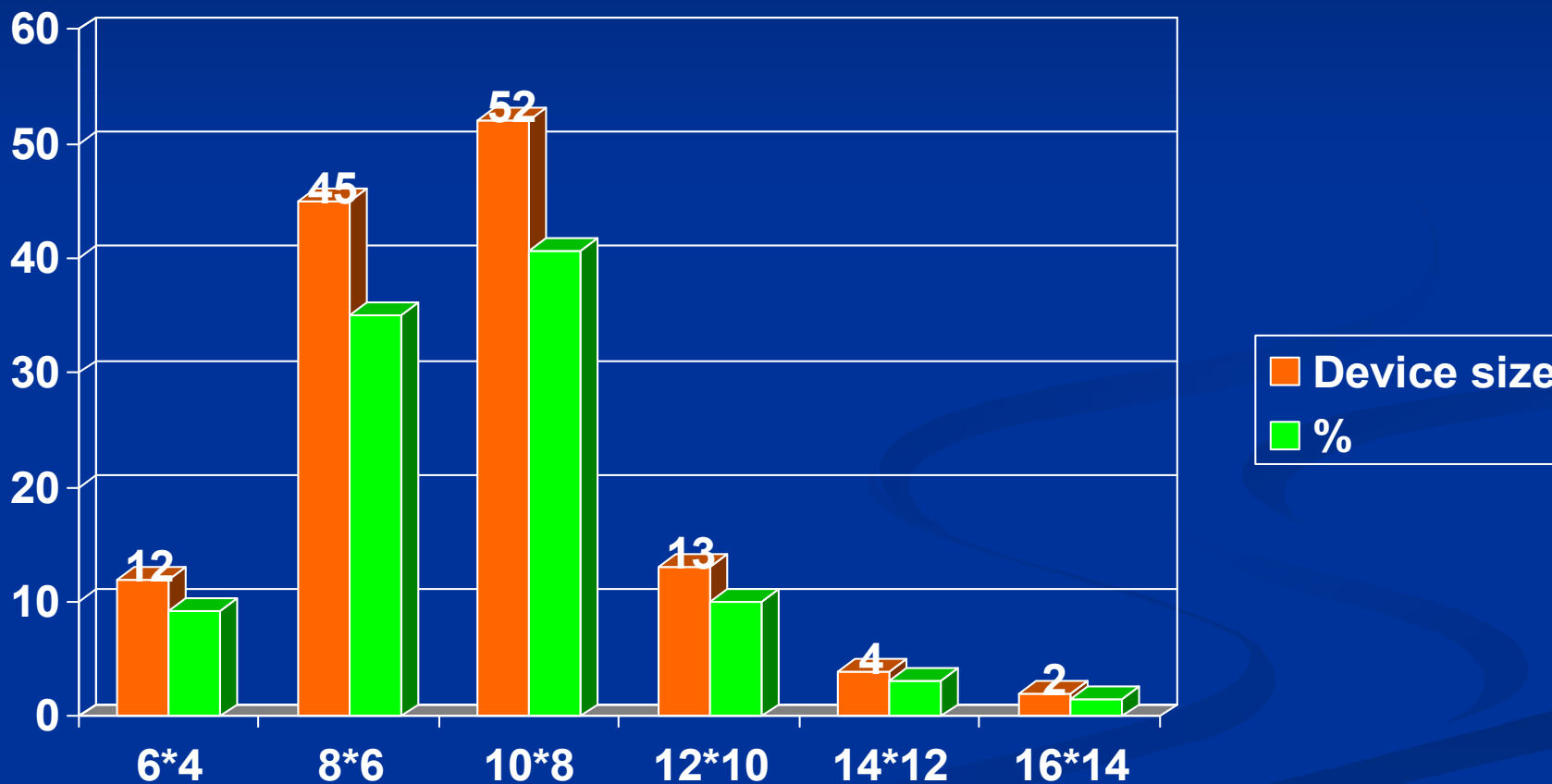
Results

- 133 patients with clinical evidence of a VSD.
- December 2002 – June 2009
- The body weight ranged from 6.5 to 58 kg.
- The sizes of the defect (Right Ventricle size) ranged from 3 to 8 mm, measured by means of TTE and or angiography.
- Q_p/Q_s varied from 1.5 to 3.2 mean 1.8
- Follow up: 6 month (max 7 years)

Results

- ADO was successfully implanted in 128 patients (97%).
- Device embolization (1 case), not proper position (1), too big VSD (2) and AO valve touched (1).
- There were no procedure's complications: No impairment of the tricuspid and aortic valve, and no important arrhythmias.

Device size



Results

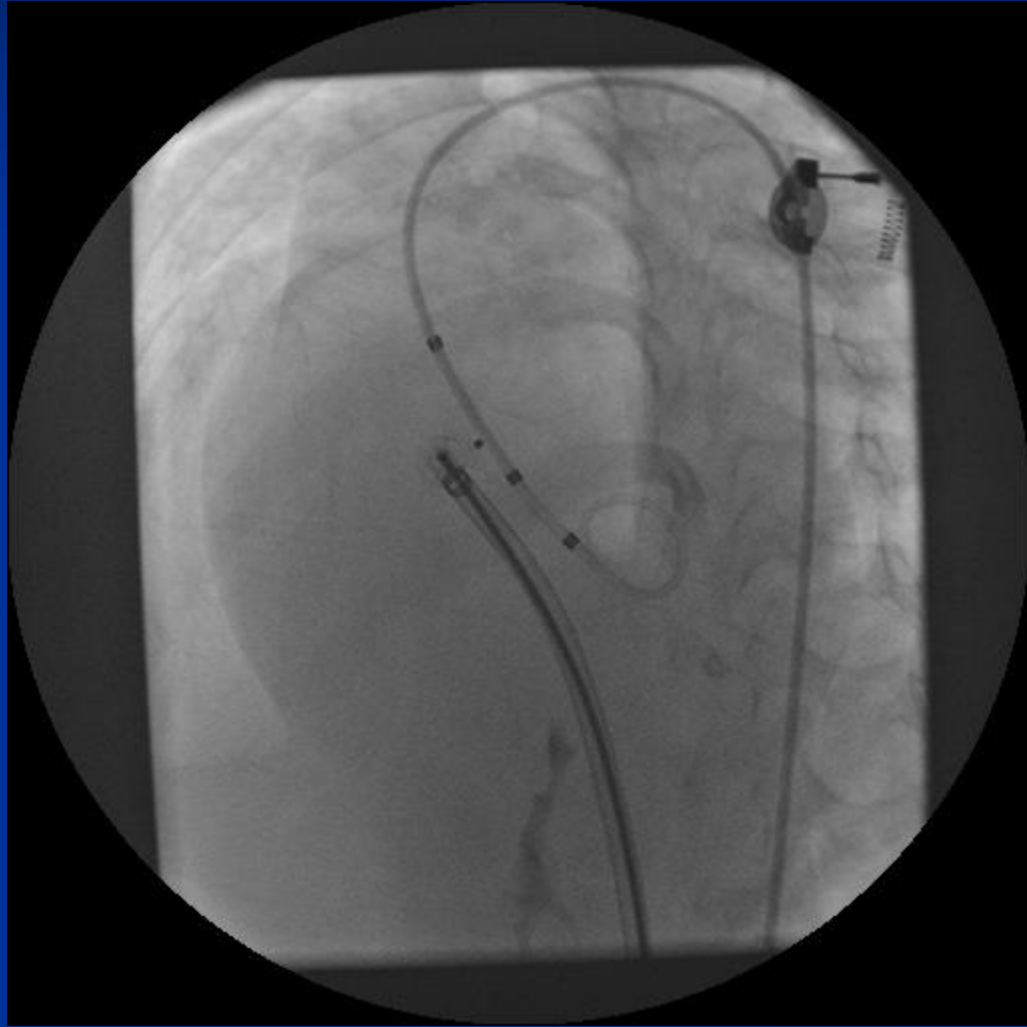
- Angiogram complete occlusion was observed in 120 cases (93%) after 10 minutes.
- Residual shunt was demonstrated after 24h is 6% (7 cases) and after 1 month is 2 cases (2%).
- No AV bloc transitory after 6 month follow up (max 7 year)

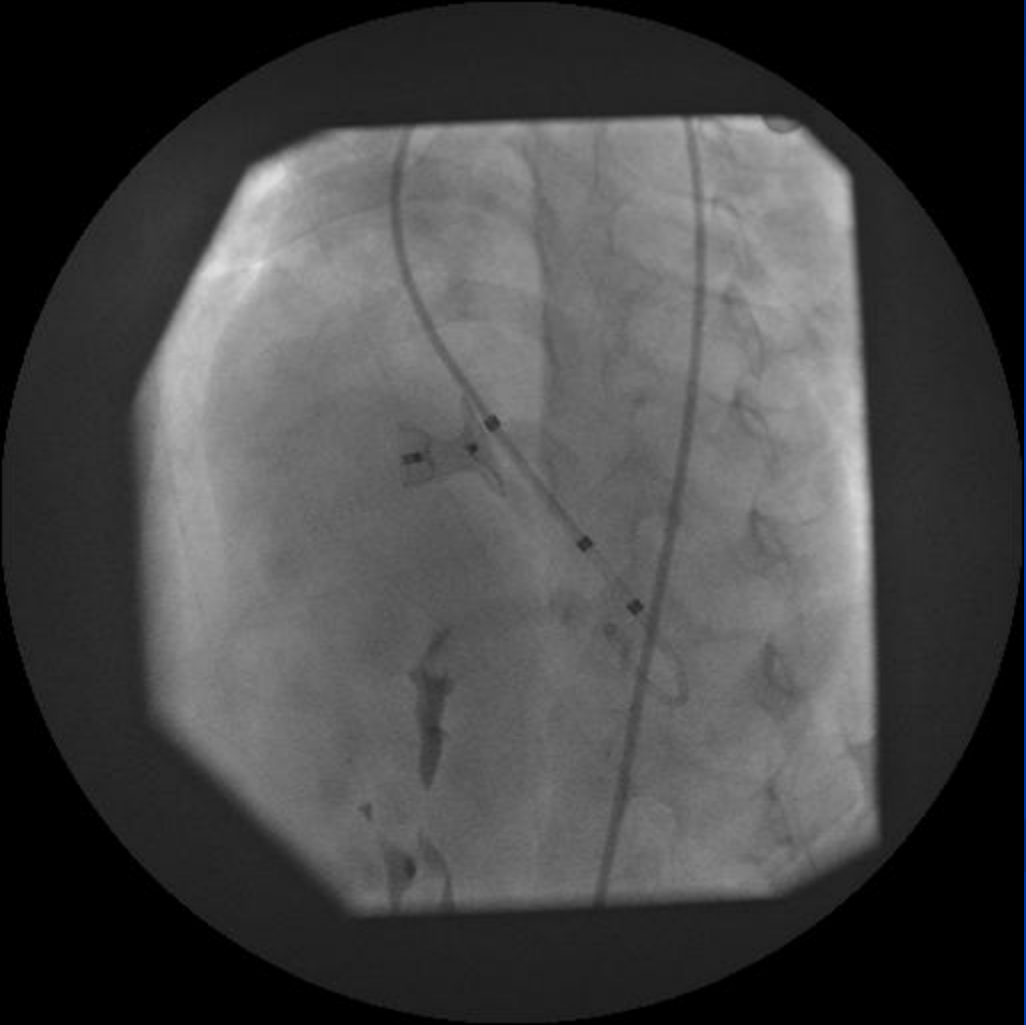
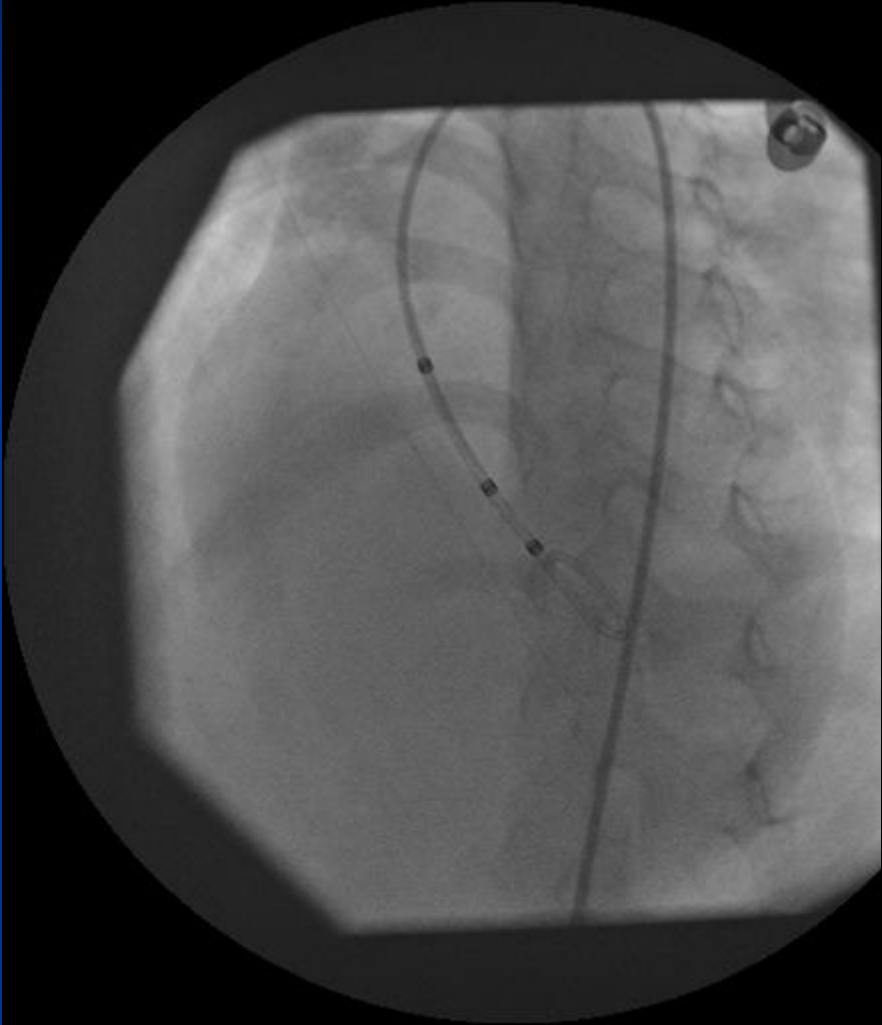
Discussion

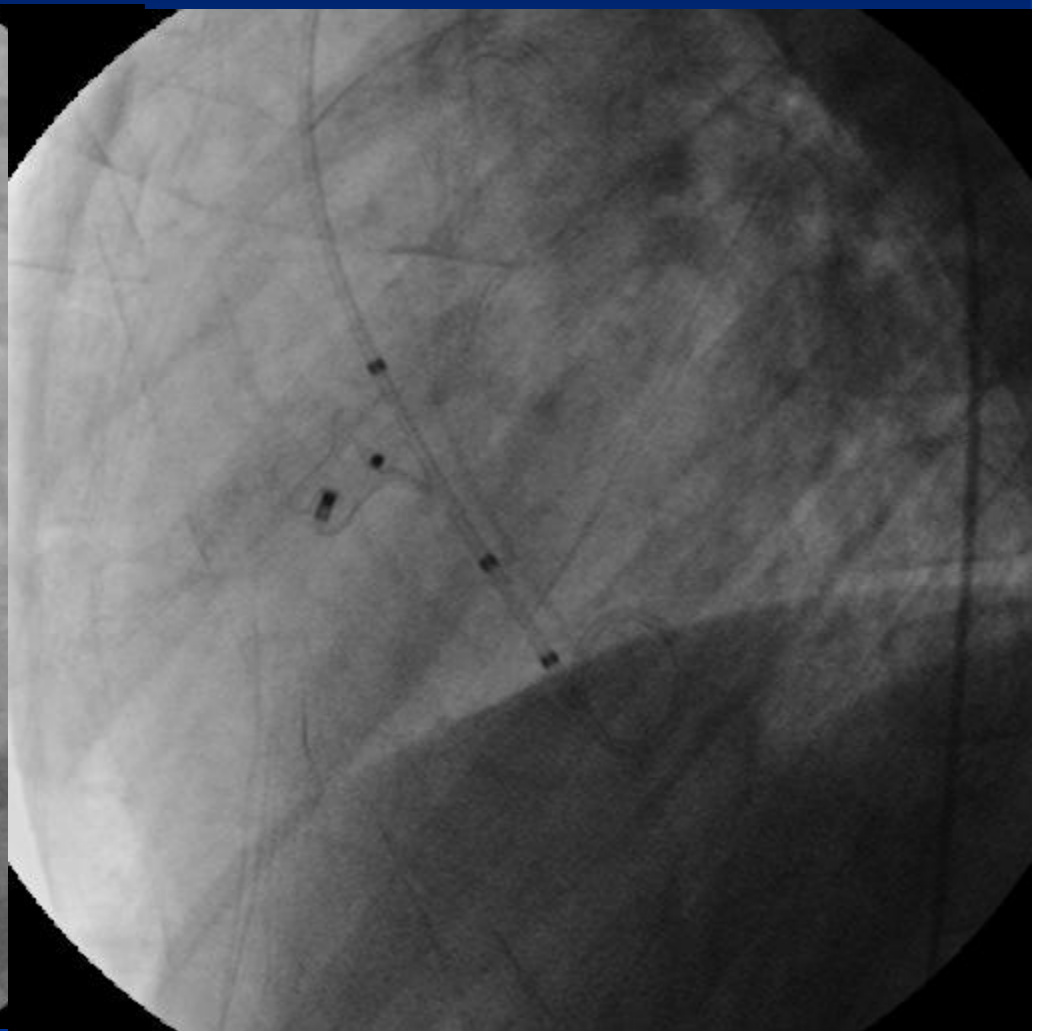
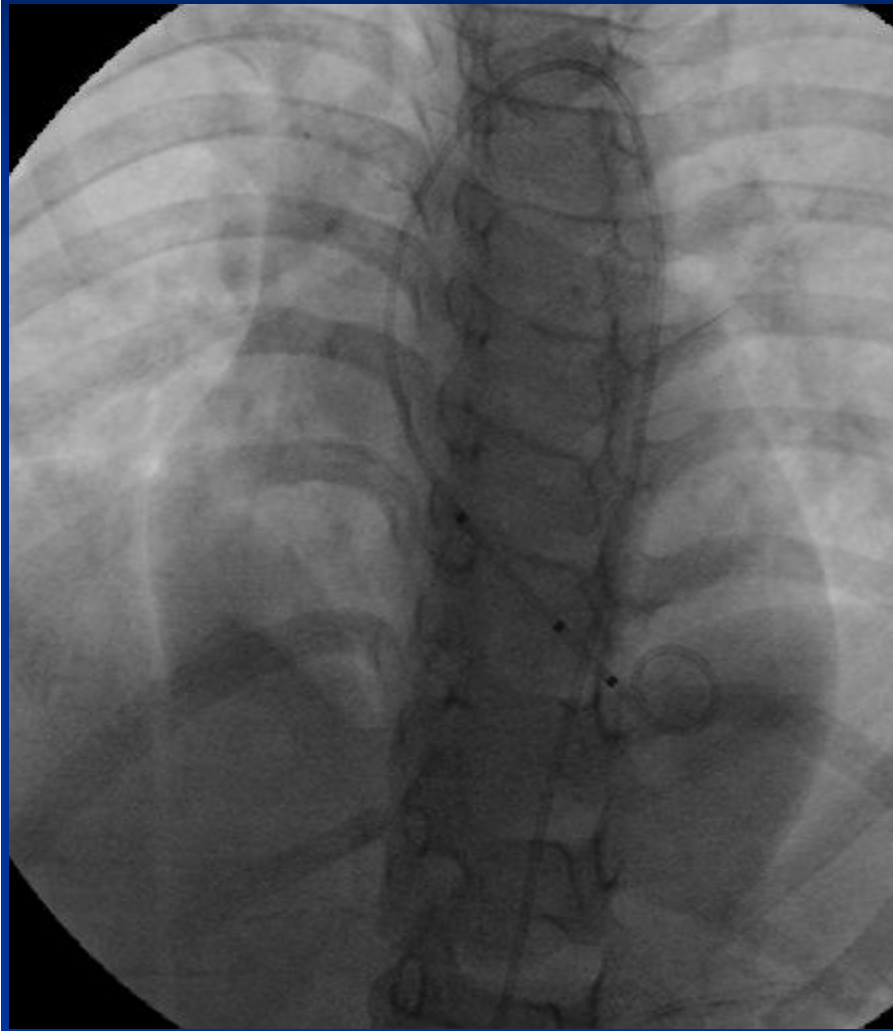
- Umbrella-shaped devices have been proved to be suitable and effective in occlusion of muscular VSD and perimembranous VSD.
- The ADO have high rate complete closure (98% after 1 month follow up). The ADO price is cheaper than another device.

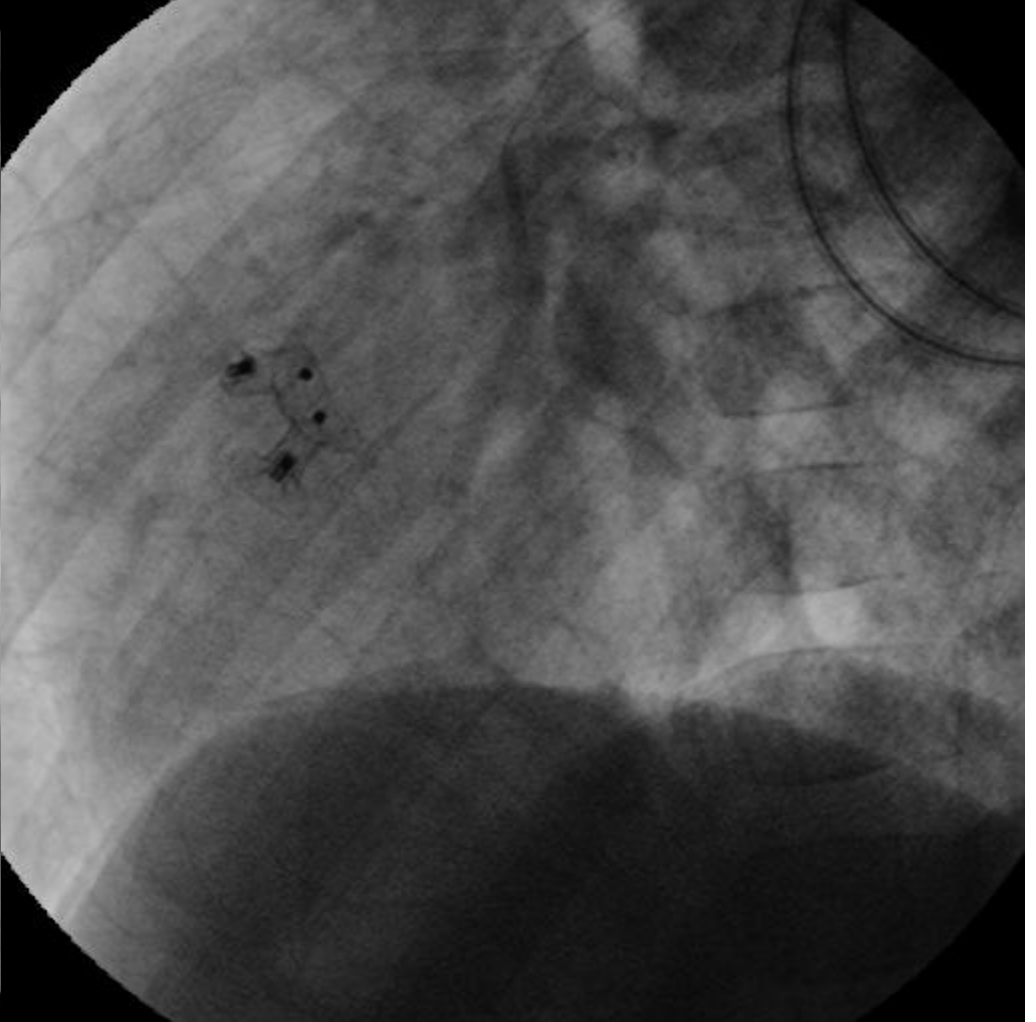
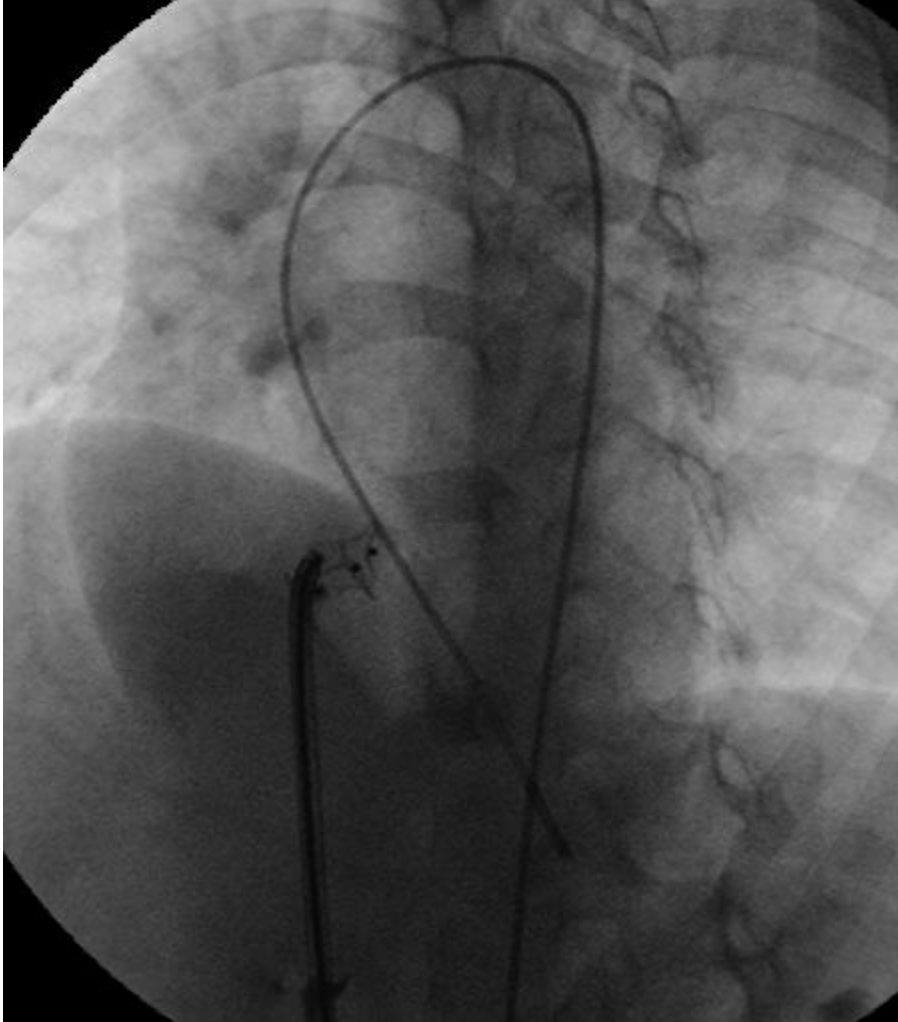
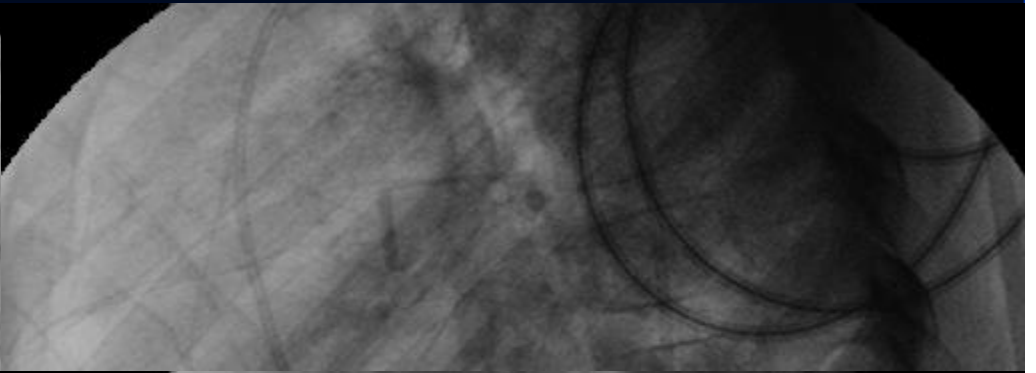
Tips and Tips full

- For the choice of a proper size of the device, it is important to measure the diameter of VSD (right and left ventricle size).
- Using echocardiography or angiography, the smaller diameter of the oval VSD can be measured.
- 2 device can be use for 1 patient









Conclusion

- The Amplatzer Duct occluder has demonstrated its capability of avoiding impairment of the aortic and tricuspid valve function, and arrhythmia problems.
- Further data are necessary to assess the efficacy and safety of this device application