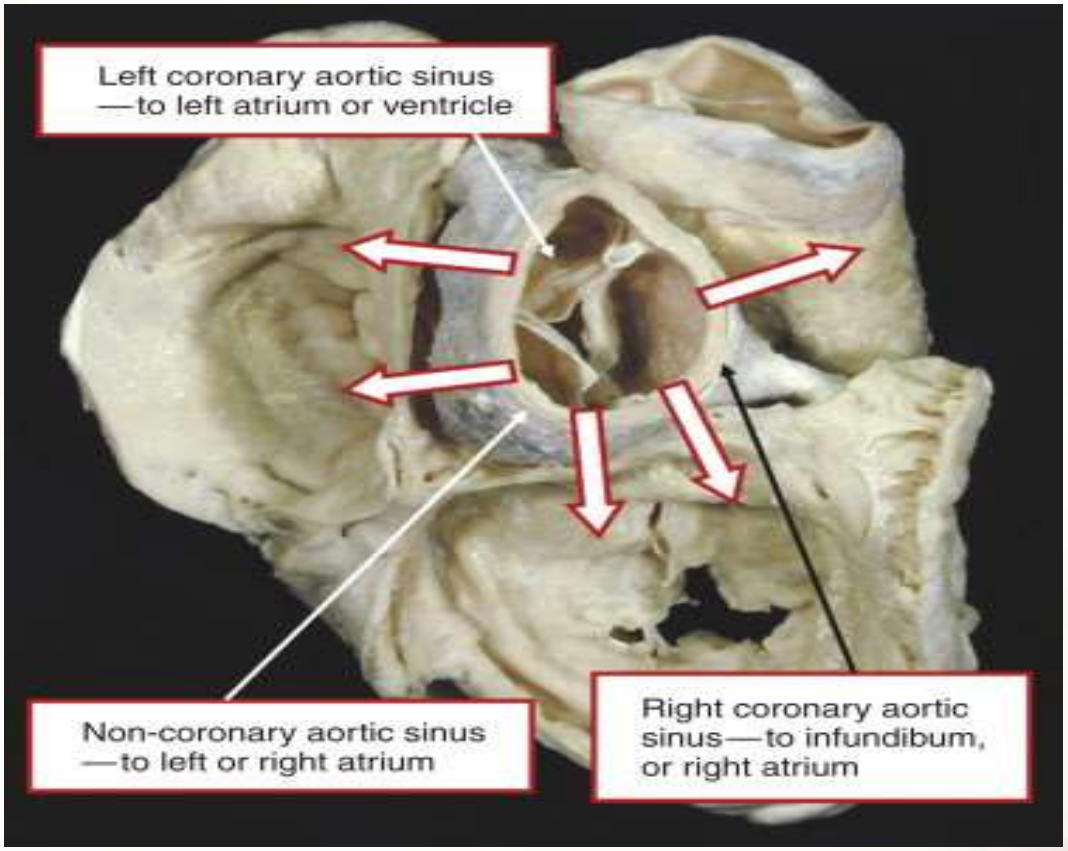
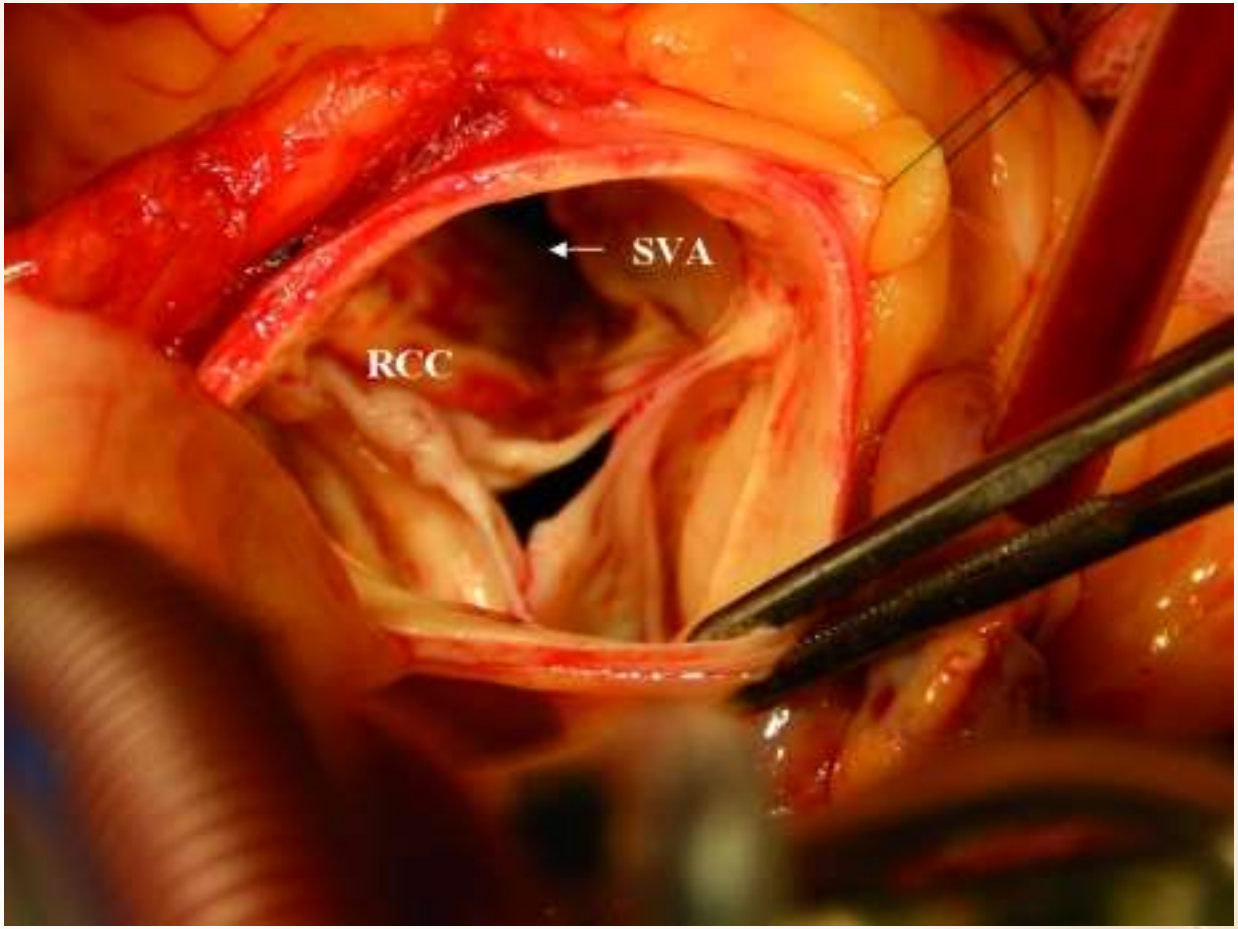
Transcatheter management of ruptured sinus valsalva

Jou-Kou Wang, MD
Department of Pediatrics,
National Taiwan University Hospital
TCTAP 2016


Left coronary aortic sinus —to left atrium or ventricle
Non-coronary aortic sinus —to left or right atrium
Right coronary aortic sinus—to infundibum, or right atrium

Ruptured SVA

paediatric cardiology 3rd



Ruptured sinus valsalva aneurysm (I)

- deficiency in normal elastic tissue & abnormal development of bulbus cordis (SVA)
- Rupture of SVA leads to intracardiac shunting (mostly RV) occurring at 3rd & 4th decades

Ruptured sinus valsalva aneurysm (II)

- more common in asian population, association with outlet type VSD
- male dominant, (3~4 : 1)
- right sinus valsalva (65-85%)
  Non coronary sinus valsalva (10-30%)
  left sinus (< 5 %)
- association with VSD & AR
- sudden onset of symptoms
- conventional treatment surgery

* Murashita et al. ATS 2002;73:1466-71
* Wang et al. ATS 2007;84:156-60

Origin & site of rupture

TABLE 1. Origin and site of rupture in RSVA

Origin	Chamber of rupture (n)					Patients (n)
	RV	RA	LA	LV	PA	
Right coronary sinus	85*	36		1		122 (76.7)
Noncoronary sinus	4	31				35 (22.0)
Left coronary sinus			2		1†	2 (1.3)
Total	89 (56.0)	67 (42.1)	2 (1.3)	1 (0.6)	1†	159 (100)

Data in parentheses are percentages. *RSVA,* Ruptured sinus of Valsalva aneurysm; *RV,* right ventricle; *RA,* right atrium; *LA,* left atrium; *LV,* left ventricle; *PA,* pulmonary artery. *In 1 patient with bicuspid aortic valve, RSVA originated from anterior sinus; this patient was included in right coronary sinus group. †In 1 patient with RSVA originating from left coronary sinus, RSVA protruded into left atrium and pulmonary artery simultaneously.

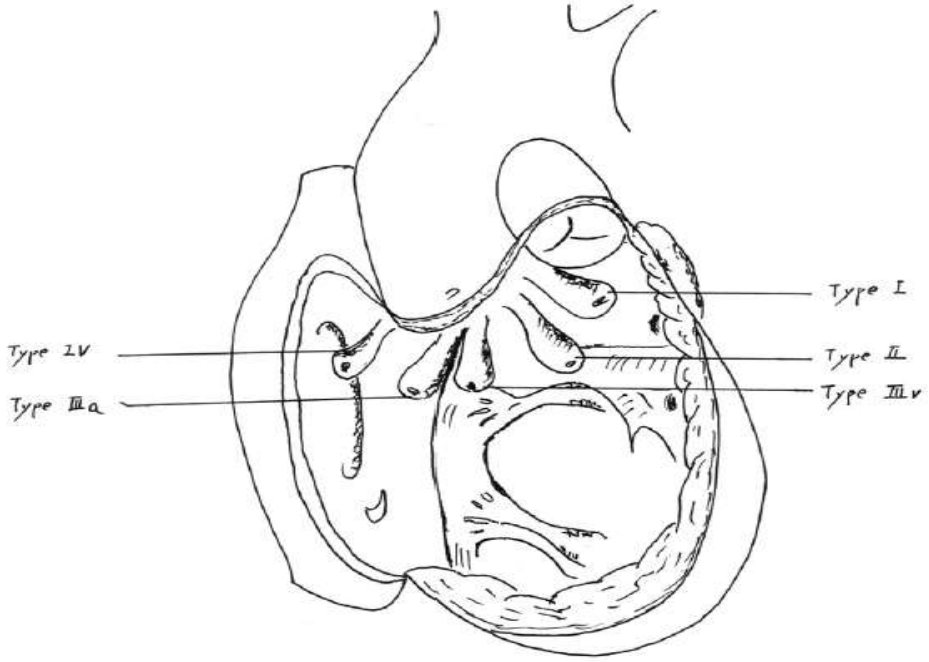
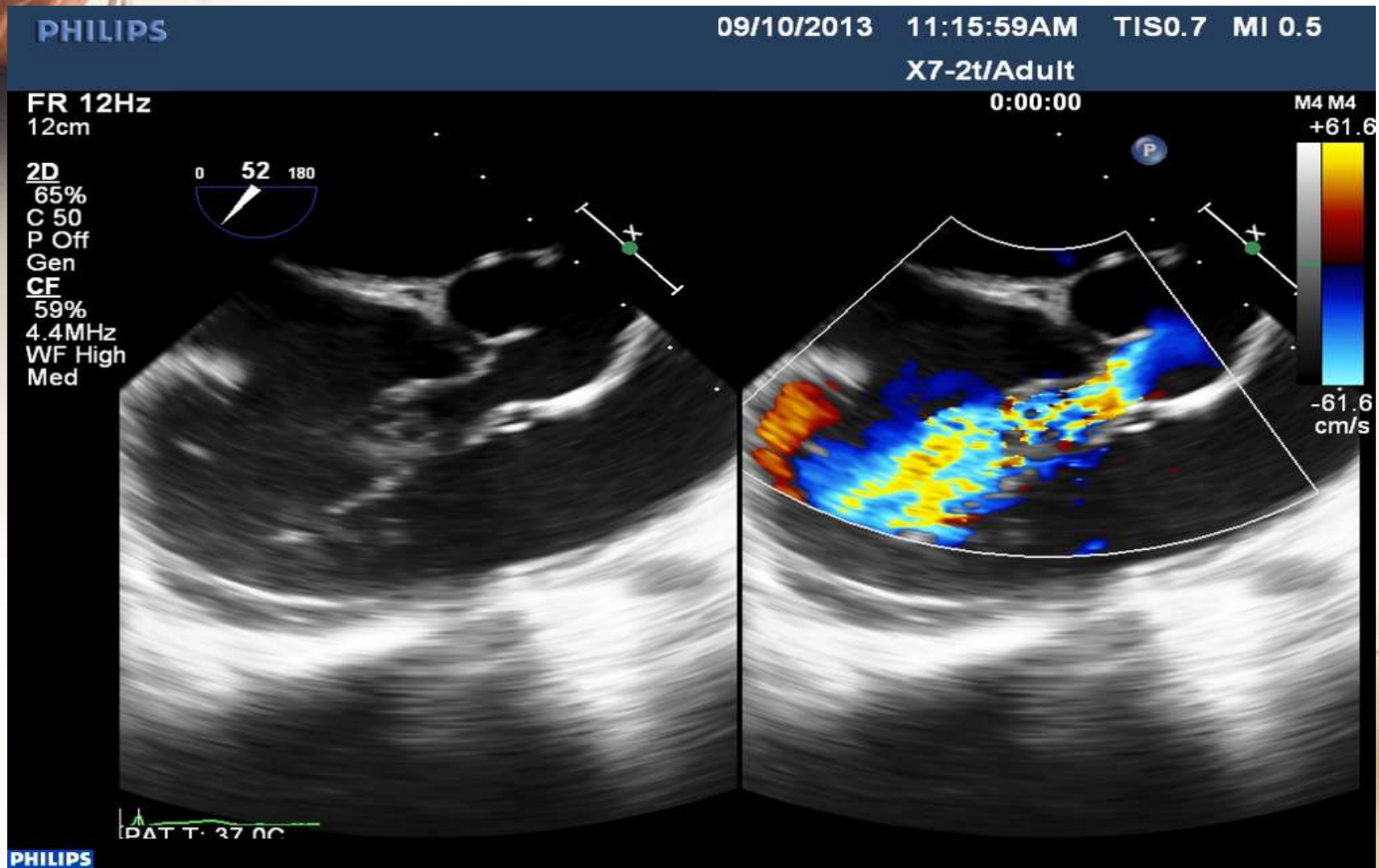


FIGURE 1. Illustration of types I to IV ruptured sinus of Valsalva aneurysm (RVSA) in modified Sakakibara classification system.

Imaging studies for planning RSVA closure

- CT/MRI
- Echocadiography :precordial, TEE,
  3-D TEE
- Angiography

TEE imaging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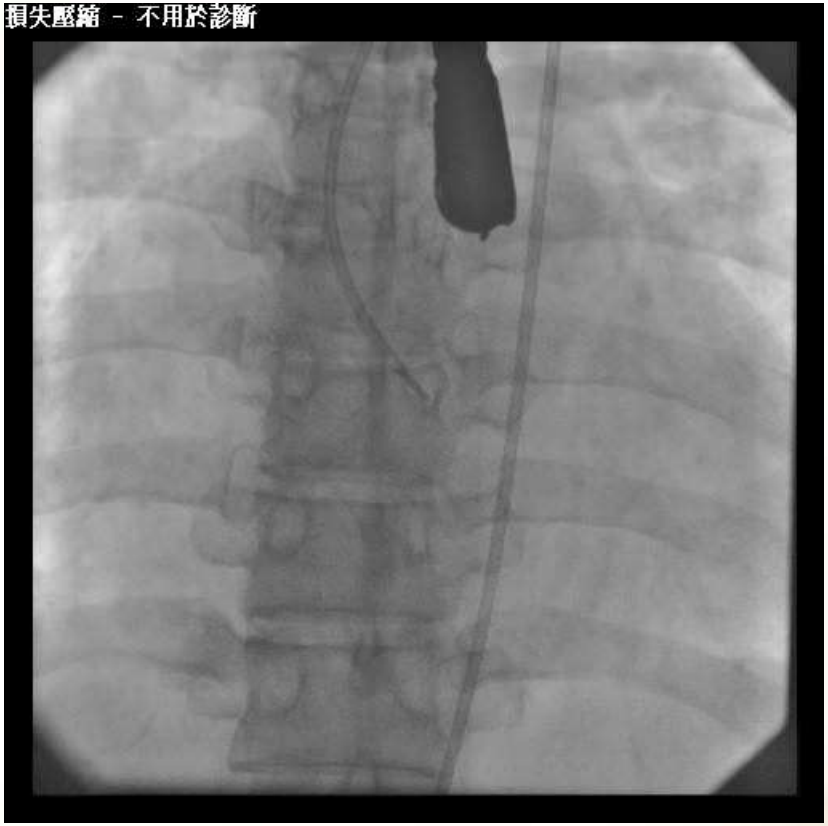
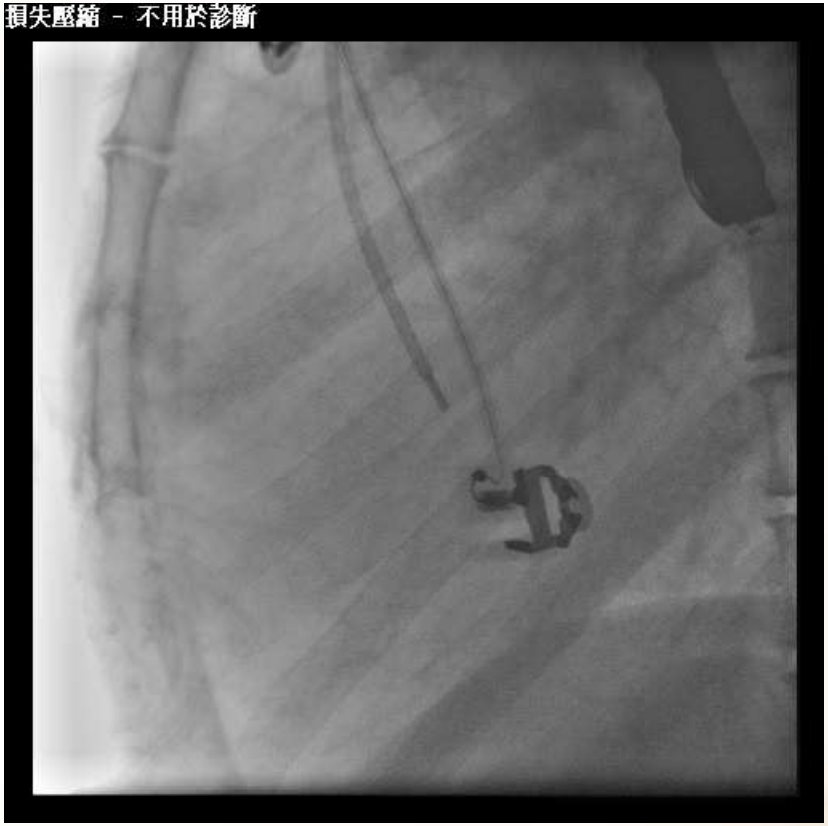
Ruptured SVA aortogram



Ruptured SVA aortogram



Catheter closure of ruptured SVA (I)

- evaluation with Echo,CT & MRI
- Angio to identify detailed anatomy & associated anomalies
- TEE guidance
- General anesthesia

Devices used in transcatheter closure of ruptured sinus valsalva aneurysm

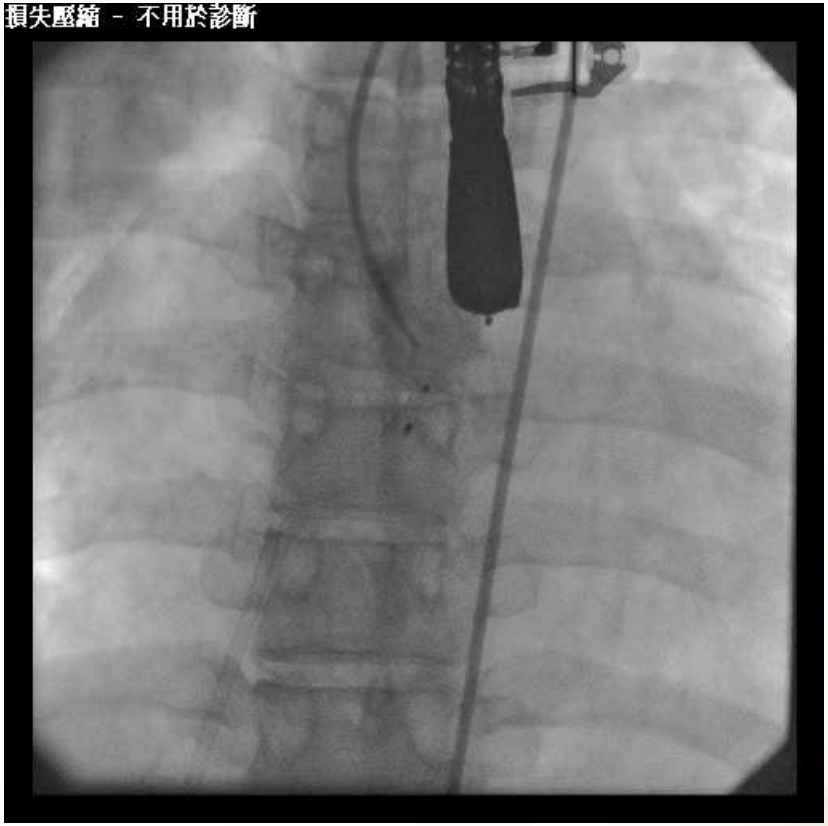
- Rashkind umbrella device
- Coil (0.052, 0.038)
- Amplatzer duct occluder
- Amplatzer septal occluder
- muscular VSD occluder
- pm VSD Chinese device

Device size selection in closure of ruptured SVA

- Device:
  * ADOI
  * VSD muscular occluder
- Size
  * ADOI 2-3 mm larger than narrowest dimension
  * VSD occluder 3-5 mm larger than narrowest dimension

Guan et al. J Invasive Cardiol 2013;25:492-6
Chang CC. Circulation J 2006

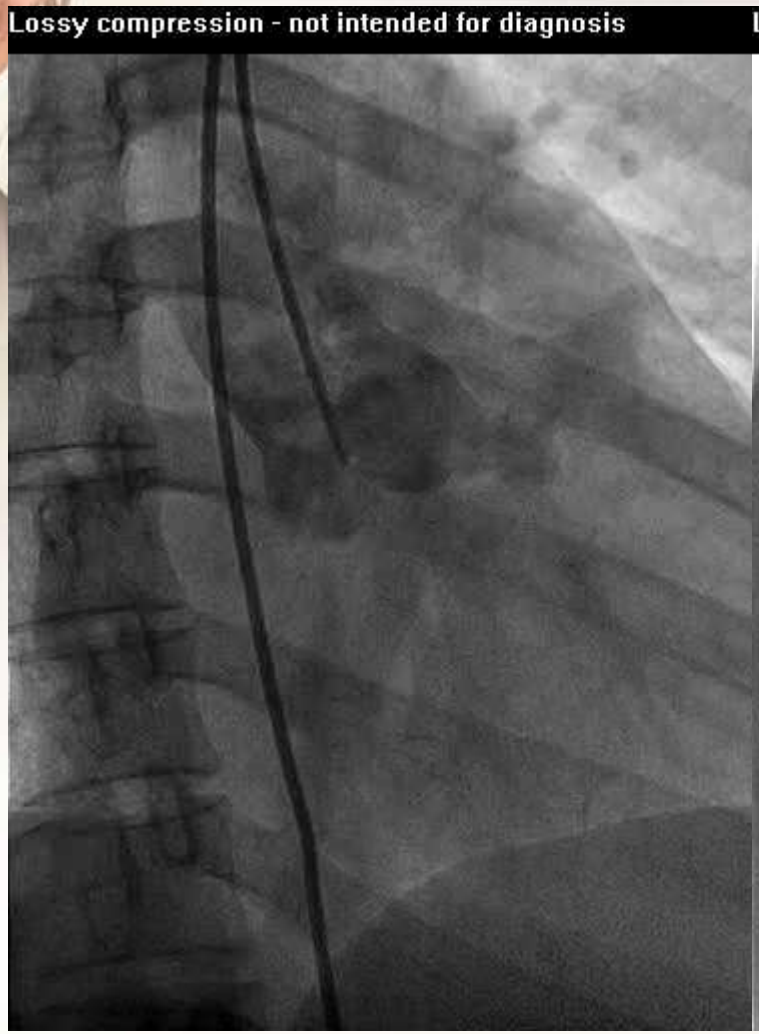
ADO closure ruptured SVA



損失壓縮 - 不用於診斷

損失壓縮 - 不用於診斷

RSVA to RVOT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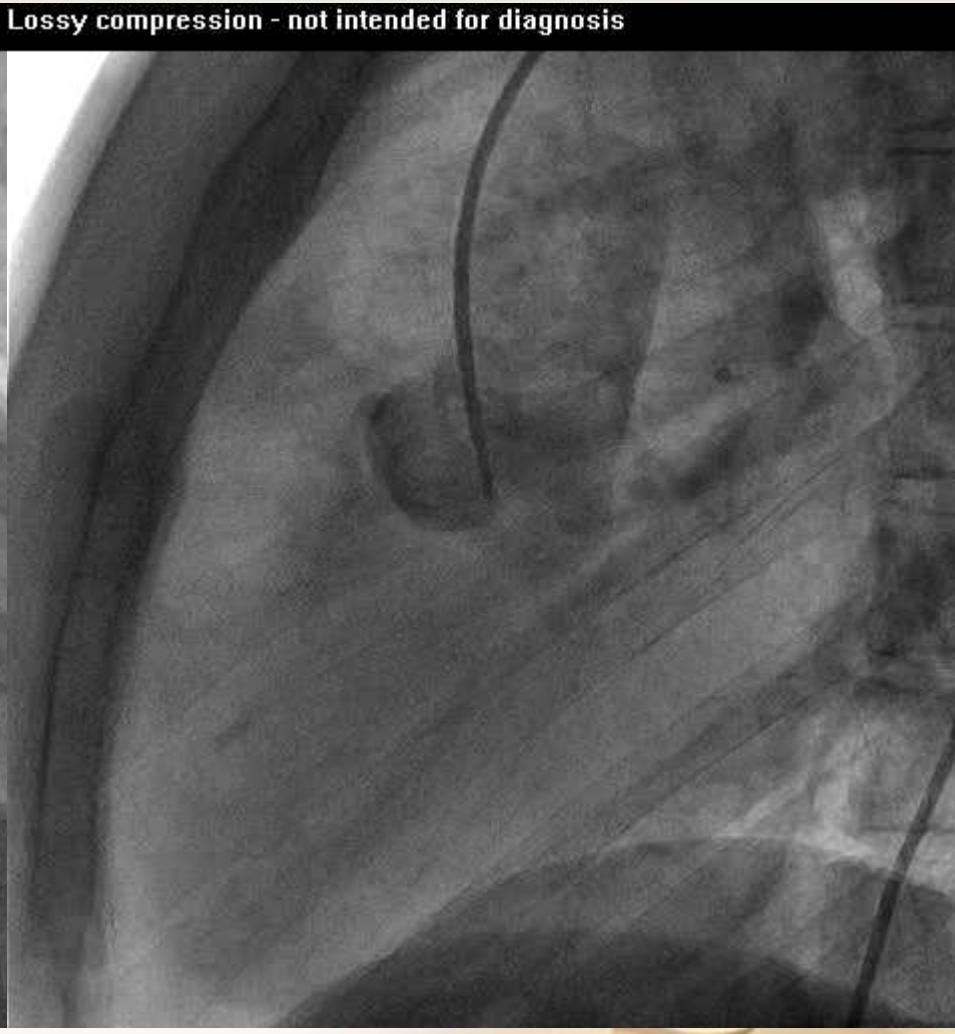
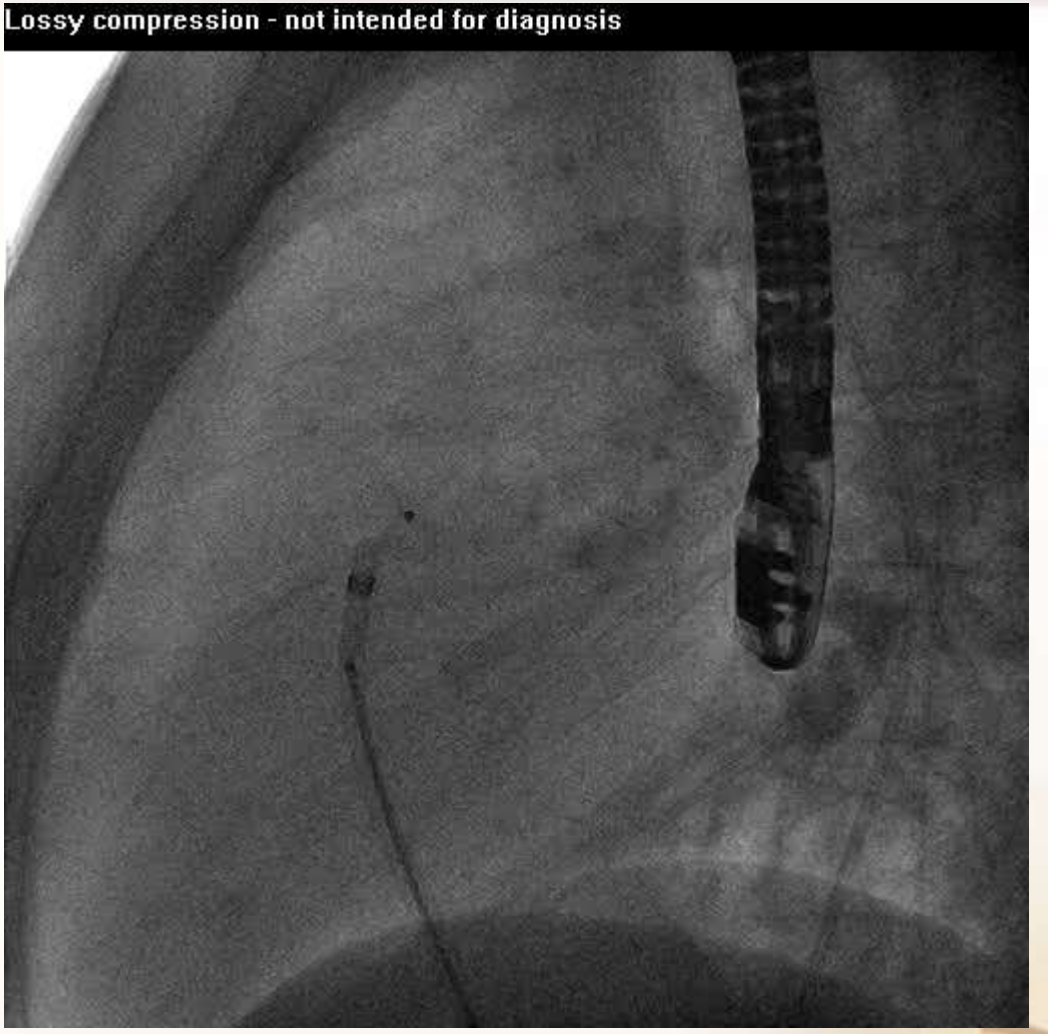
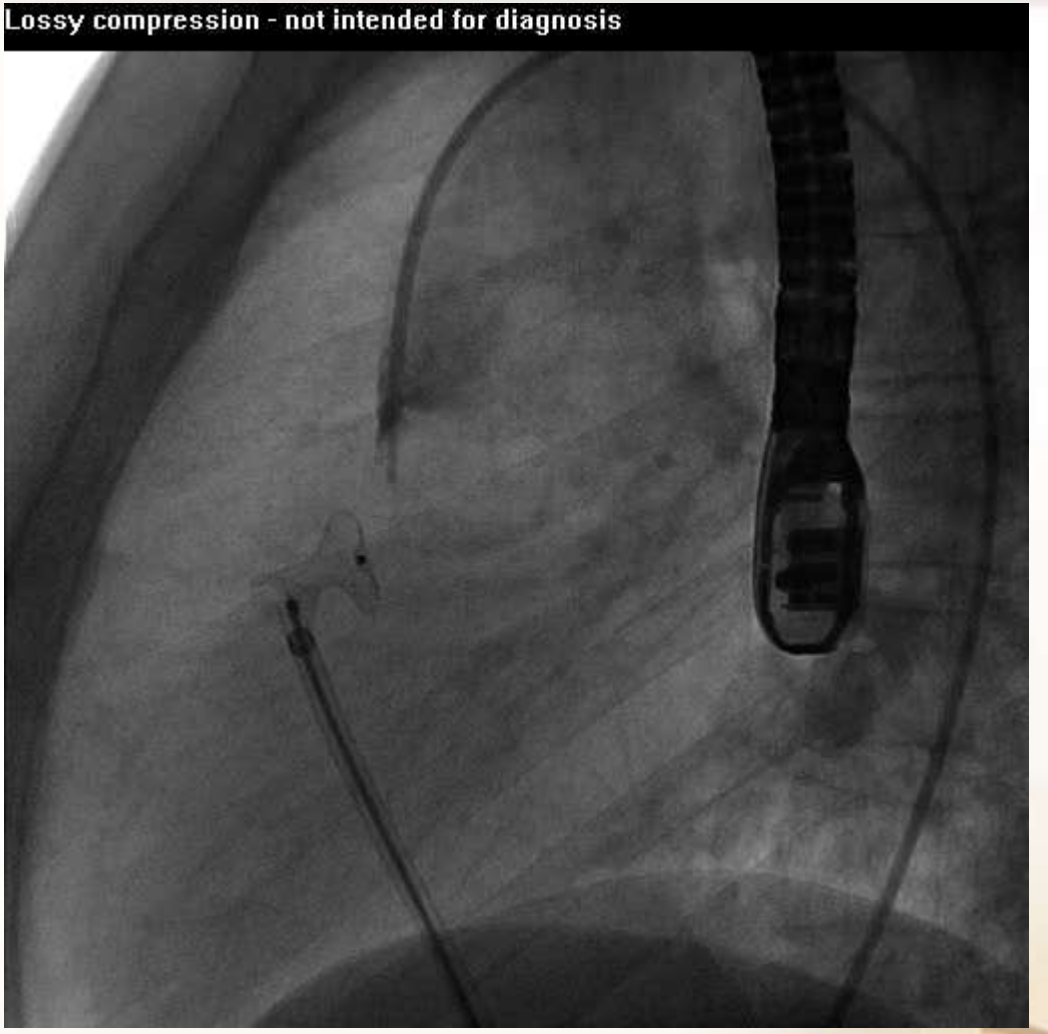

Lossy compression - not intended for diagnosis

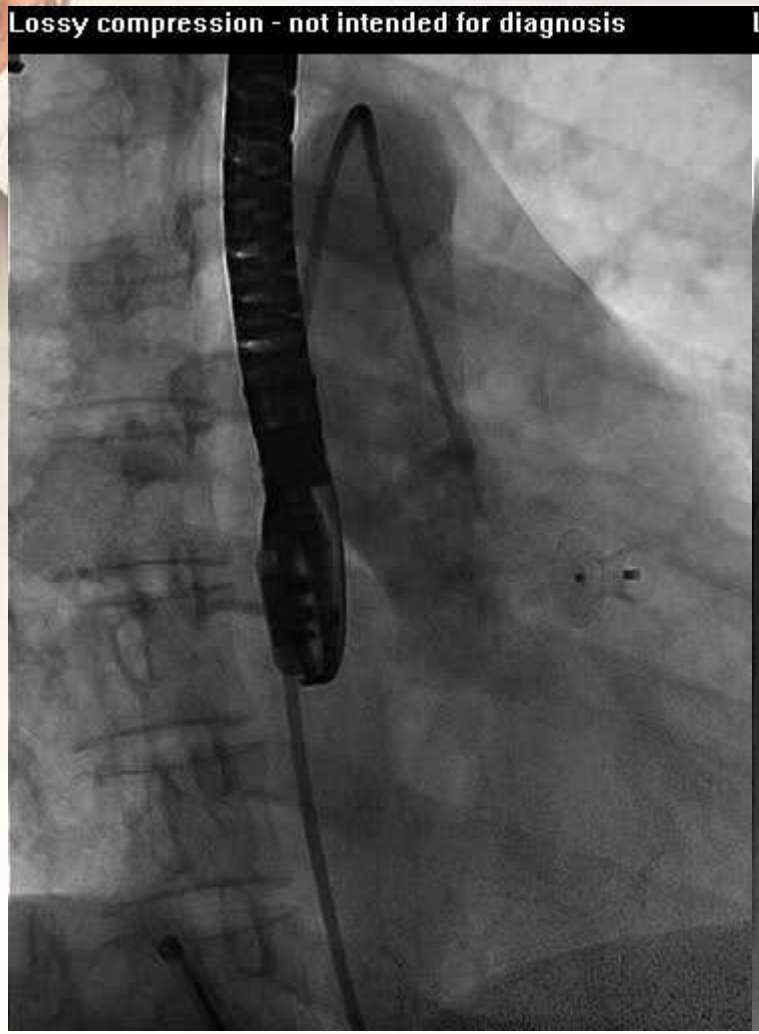
RSVA ADO deployment

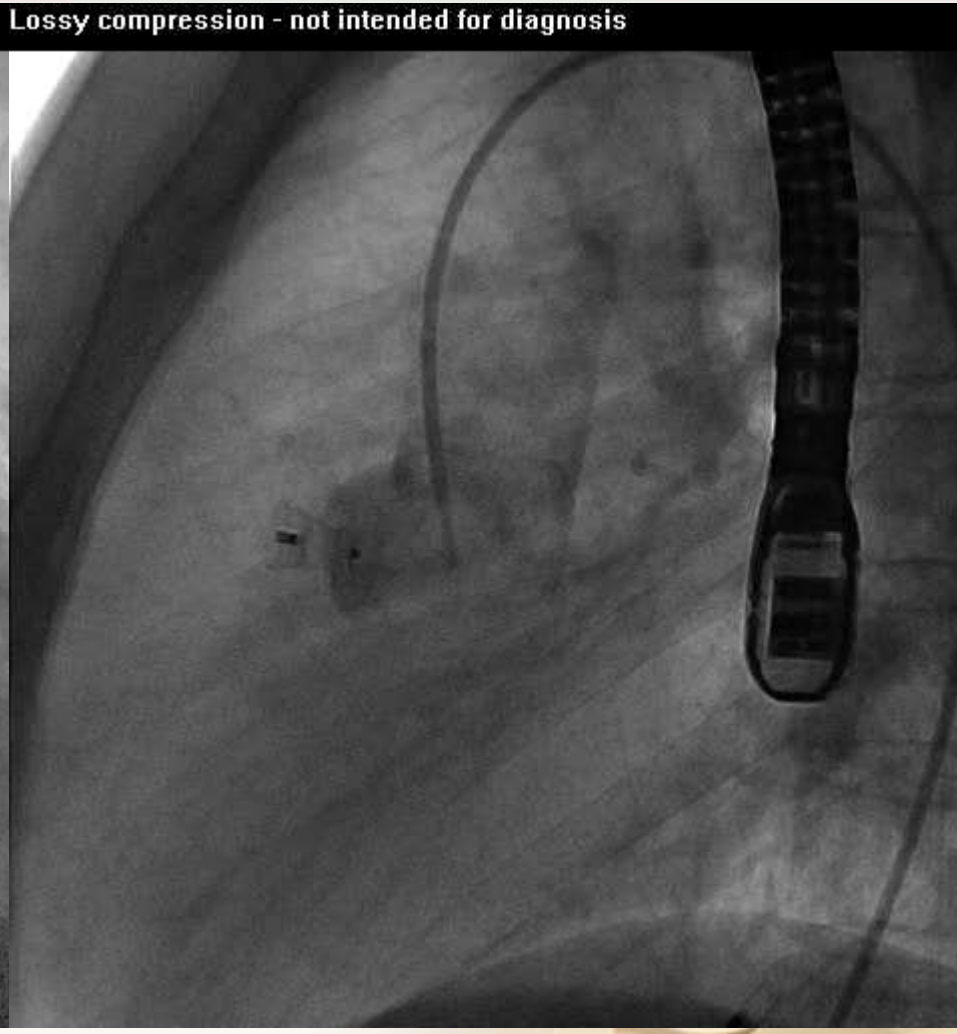


Before detachment

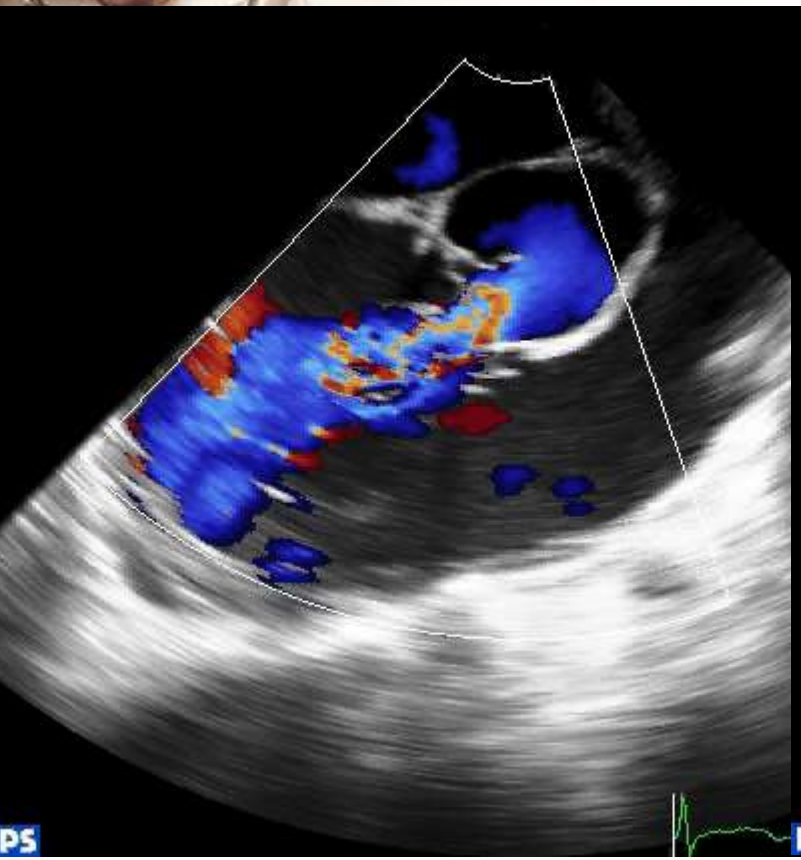


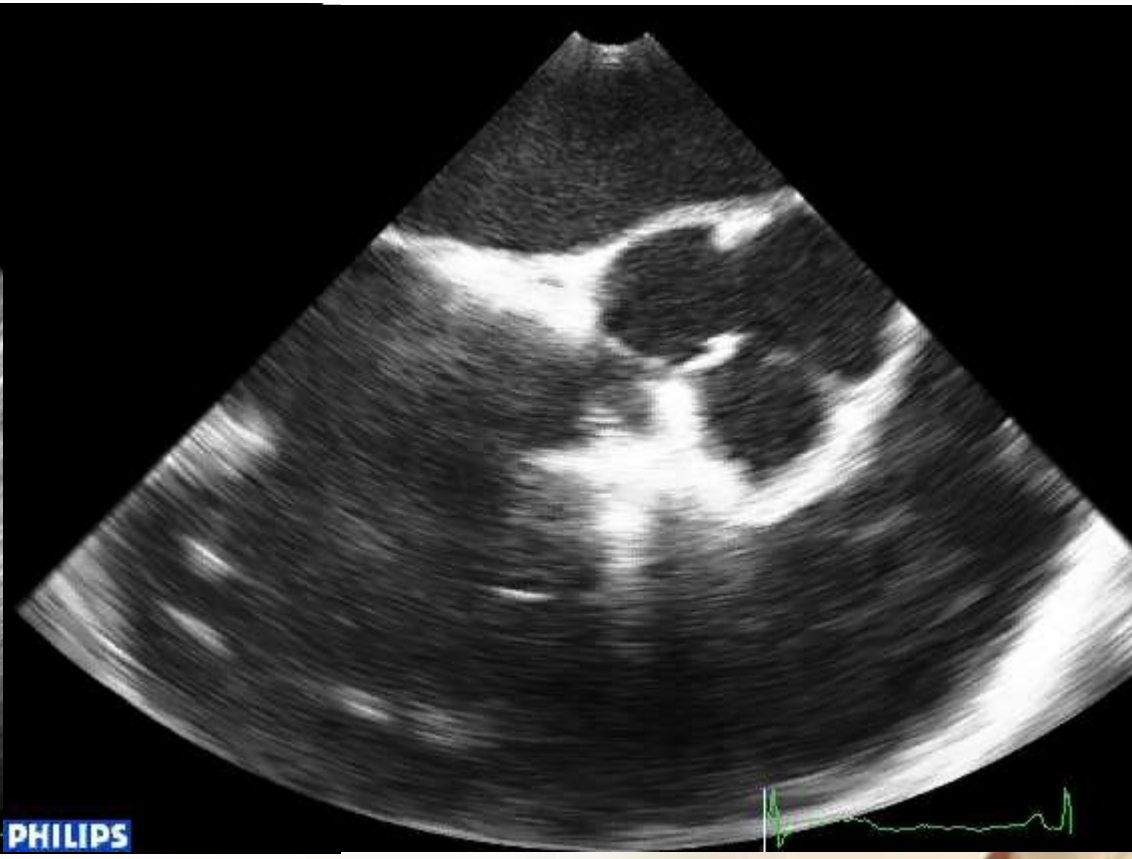
RSVA to RV post ADO

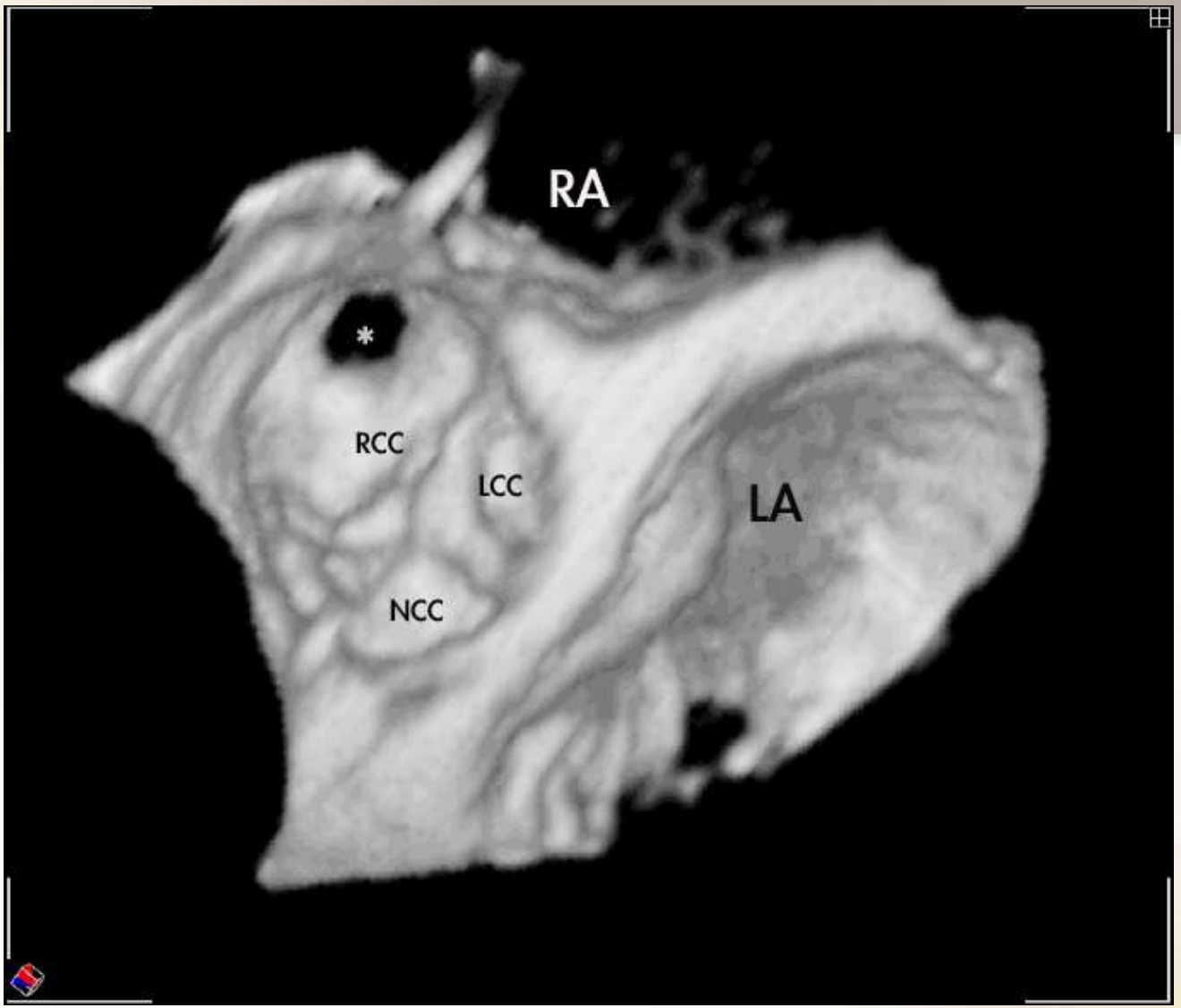




RSVA ADOI closure



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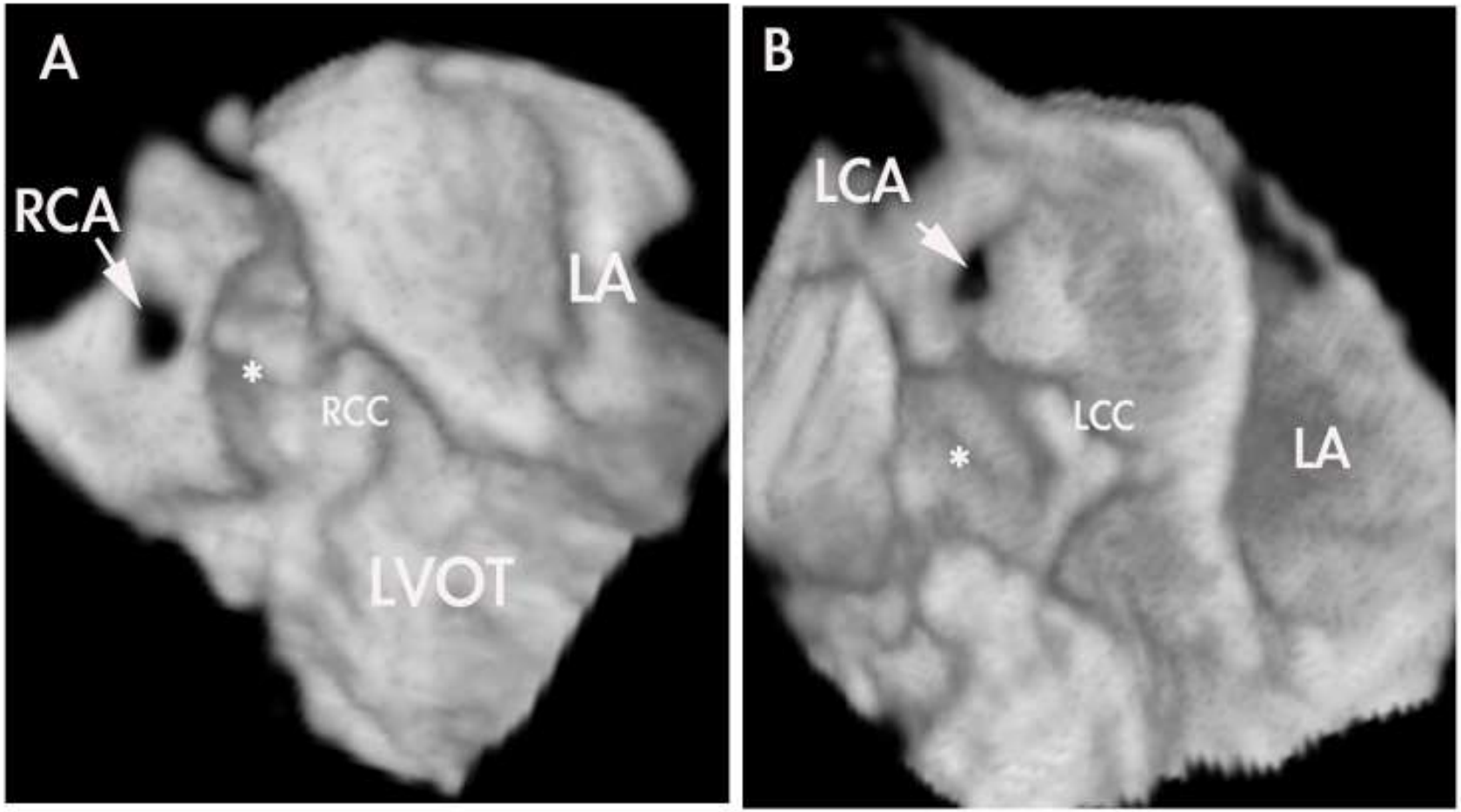
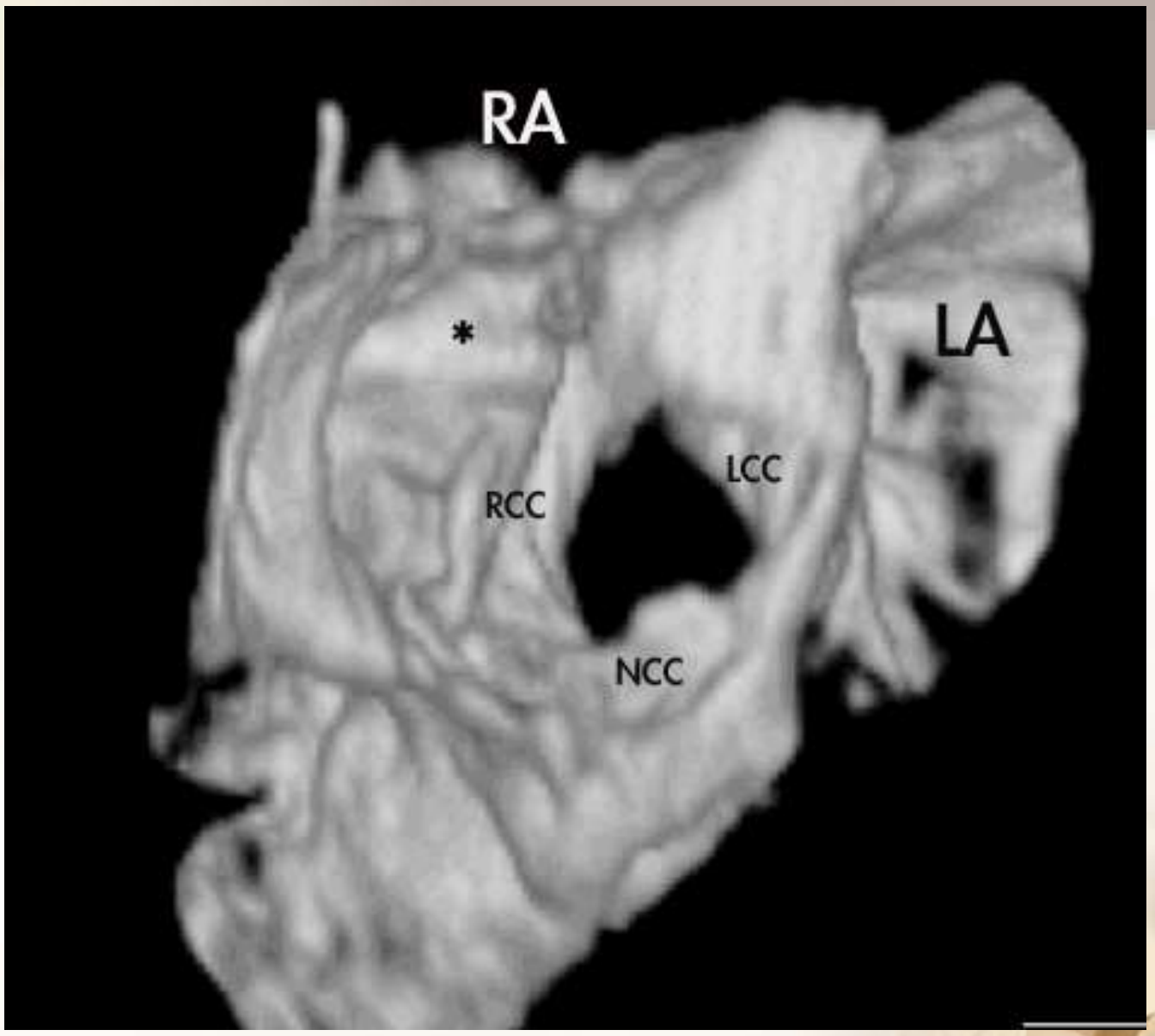
Coronary ostium & device

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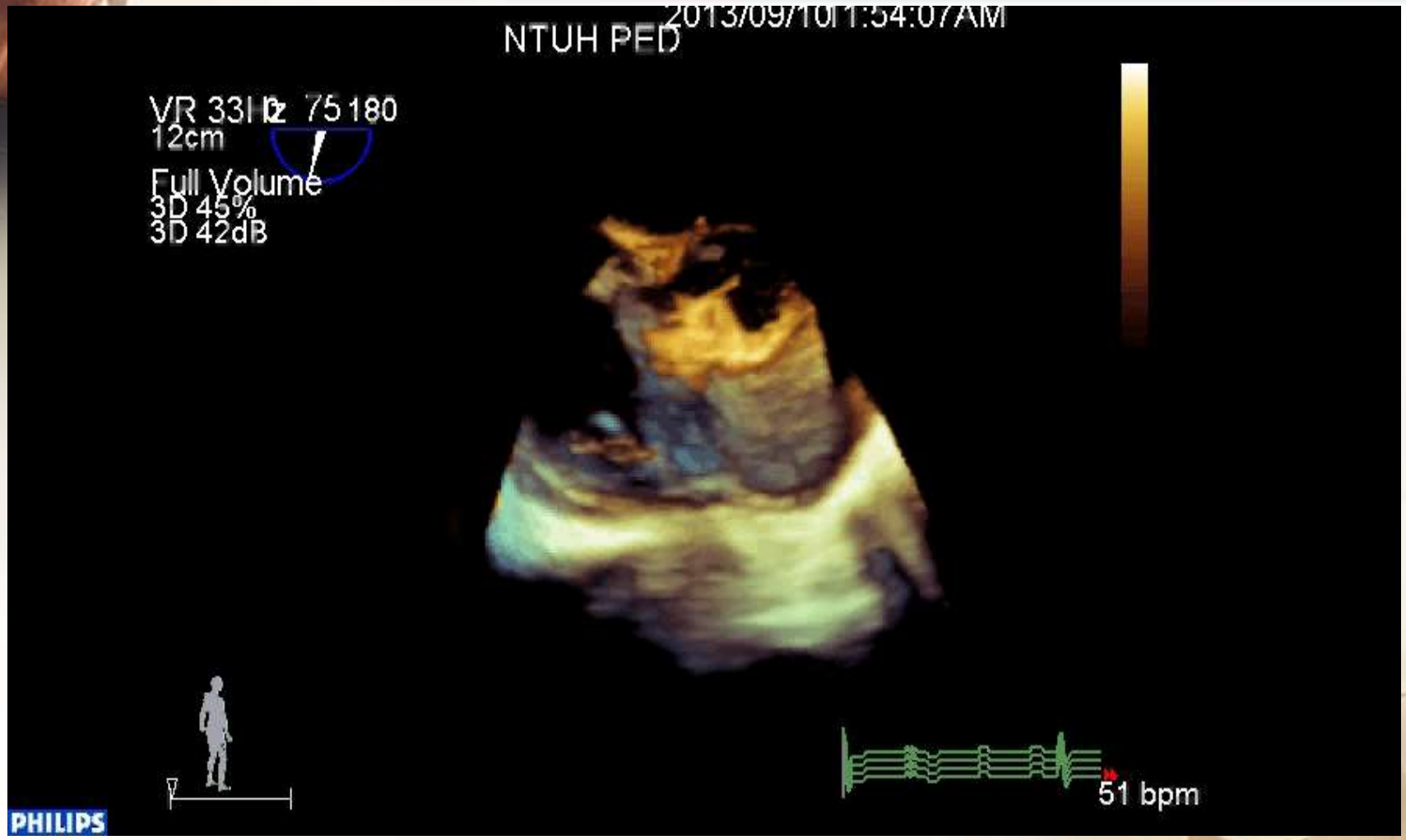
3D RSVA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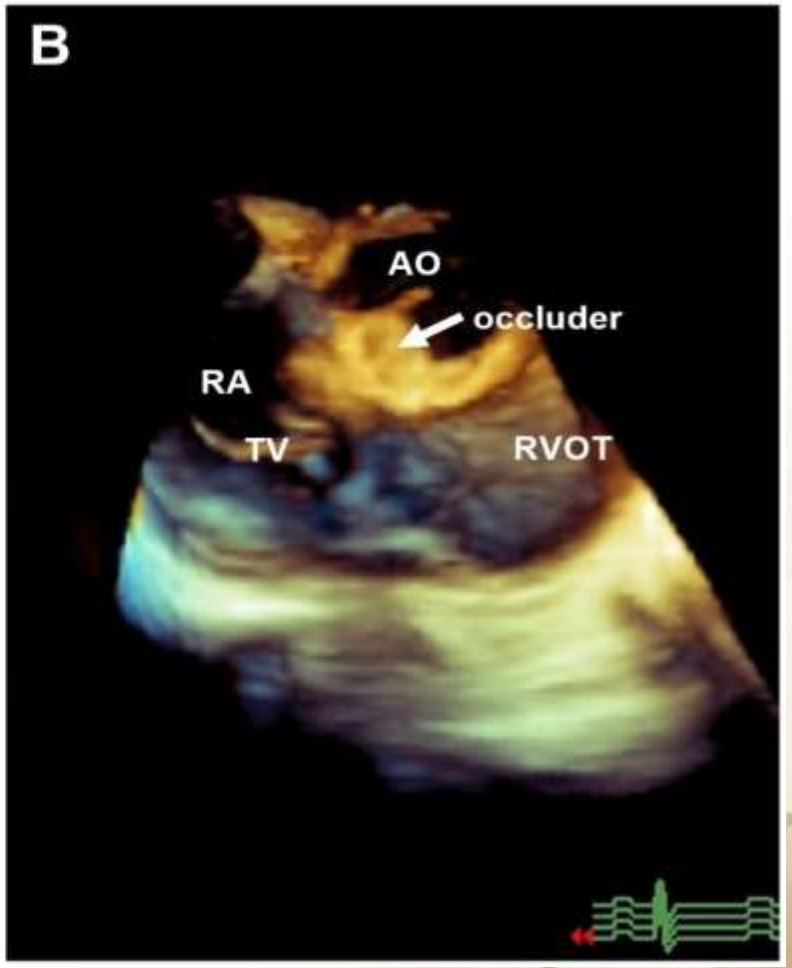
3-D Ruptured SVA



Residual shunt

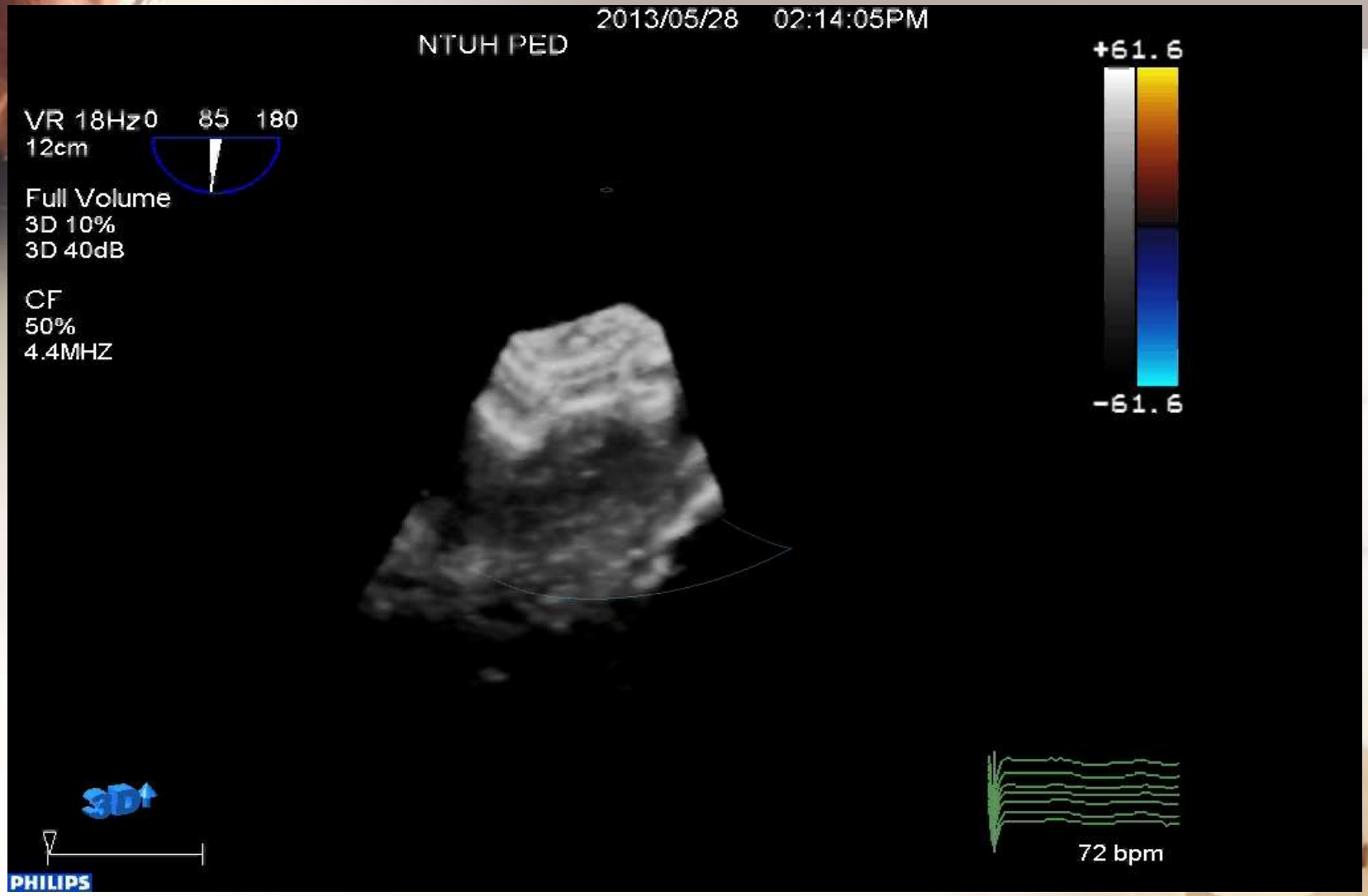


Table 2
Baseline characteristics of patients in each type.

	Total group	Window-like	Aneurysmal	Tubular	Other rare conditions
Patients (*n*)	30(100)	17(56.7)	5(16.7)	5(16.7)	3(10.0)
Involved sinus of Valsalva					
RCS [*n* (%)]	19(63.3)	10(33.3)	3(10.0)	4(13.3)	2(6.7)
NCS [*n* (%)]	11(36.7)	7(23.3)	2(6.7)	1(3.3)	1(3.3)
Related cardiac chamber					
RA [*n* (%)]	16(53.3)	10(33.3)	2(6.7)	3(10.0)	1(3.3)
RV [*n* (%)]	14(46.7)	7(23.3)	3(10.0)	2(6.7)	2(6.7)
Associated VSD [*n* (%)]	6(20.0)	4(13.3)	0	0	2(6.7)
Associated AR [*n* (%)]	3(10.0)	2(6.7)	0	0	1(3.3)

Data are expressed as number (percentage). NCS, non coronary sinus; RA, right atrium; RCS, right coronary sinus; RV, right ventricle; AR, aortic regurgitation; VSD, ventricular septal defect.

Mild AR in 5 /17 widow type

Table 3
Interventional information and outcomes for different types.

Type	Patients (n)	Defect size (mm)	Occluder size (mm)	Occluders used (*n*)			Complications [*n* (%)]		
				Small-waist double-disk	Muscular	Asymmetric	Occluders retrieval	Residual shunts	Occluder related AR
Total	30	6	8	24	7	2	2(6.7)	5(16.7)	5(16.7)
Window-like	17	4	8	17	0	2	0	3(10.0)	5(16.7)
Aneurysmal	5	6	8	5	0	0	0	0	0
Tubular	5	7.5	10	0	5	0	0	0	0
Other rare conditions	3	6	11	2	2	0	2(6.7)	2(6.7)	0

Data are expressed as number (percentage).
AR, aortic regurgitation.

NTUH experience in RSVA transcatheter closure (I)

1. N = 14 (introgenic, after surgery n =3)
   F 7, M 7 age 38 ± 14

2. Qp/ Qs 2.1 ± 0.4

3. Pulse pressure 55 ± 15 mmHg

NTUH experience in RSVA transcatheter closure (II)

1. Right sinus valsalva n =11,
   Non coronary sinus valsalva n = 3

2. Aortic opening 4-8 mm
   mean 6.2 ± 1.3 mm

3. Drainage RA n = 11, RV n = 3

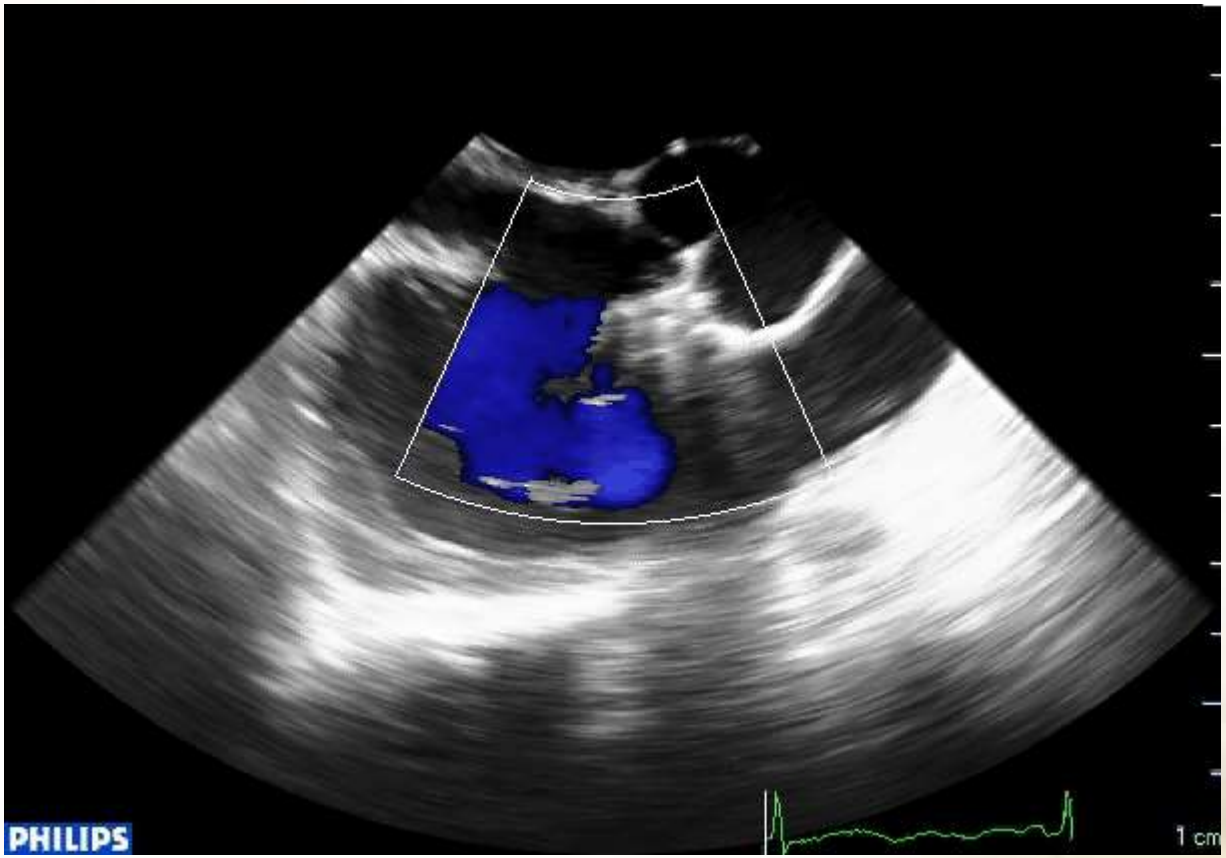
4. ADO I n = 12
   muscular VSD occluder n = 1
   Vascular plug II n = 1

Results

1. Successful deployment in n =13
   The remaining one had large residual, underwent second device one week later but he died of multi-organ failure
2. No one had residual shunt
3. No one had AR
4. Symptomatic improvement in all surviving patients.

conclusions

- Transcatheter closure of RSVA is feasible in majorities of patients.
- ADOI is an ideal device.
- Echocardiographic monitoring is mandatory.
- Long term follow-up is required.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Original article

Angiographic features of ruptured sinus of Valsalva aneurysm: New classification

Suxuan Liu (MD)[a,1], Xudong Xu (MD)[a,1], Feng Chen (MD)[a], Zhenzhen Zhao (MD)[b], Yigang Zhang (MD)[c], Cheng Wang (MD)[d], Jun Xiang (MD)[e], Guangwei Wu (MD)[f], Xiaoli Chen (MD)[g], Xianxian Zhao (MD)[a,*], Yongwen Qin (MD)[a,*]

[a] Department of Cardiology, Changhai Hospital, Second Military Medical University, Shanghai, China
[b] Department of Anesthesiology, Changhai Hospital, Second Military Medical University, Shanghai, China

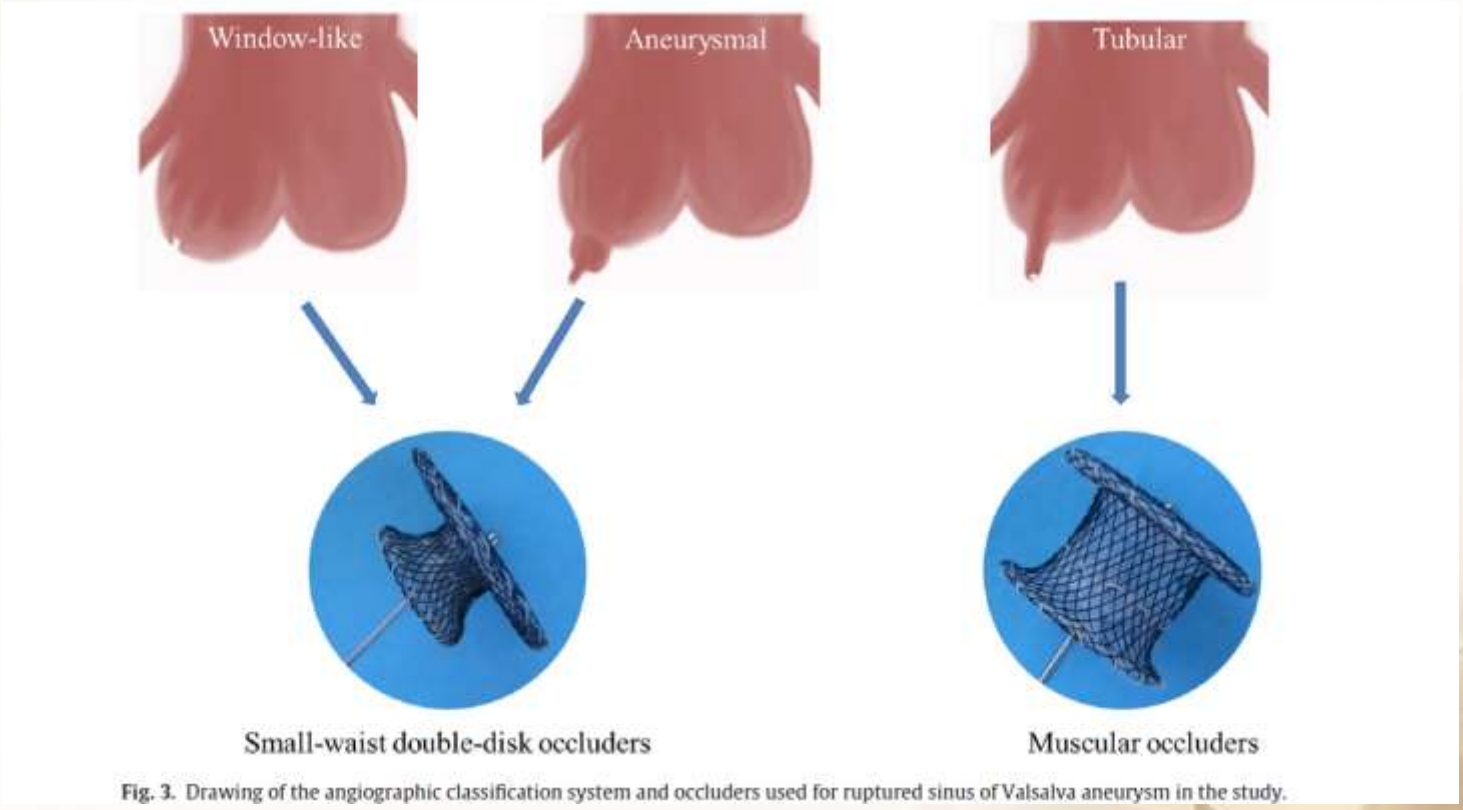
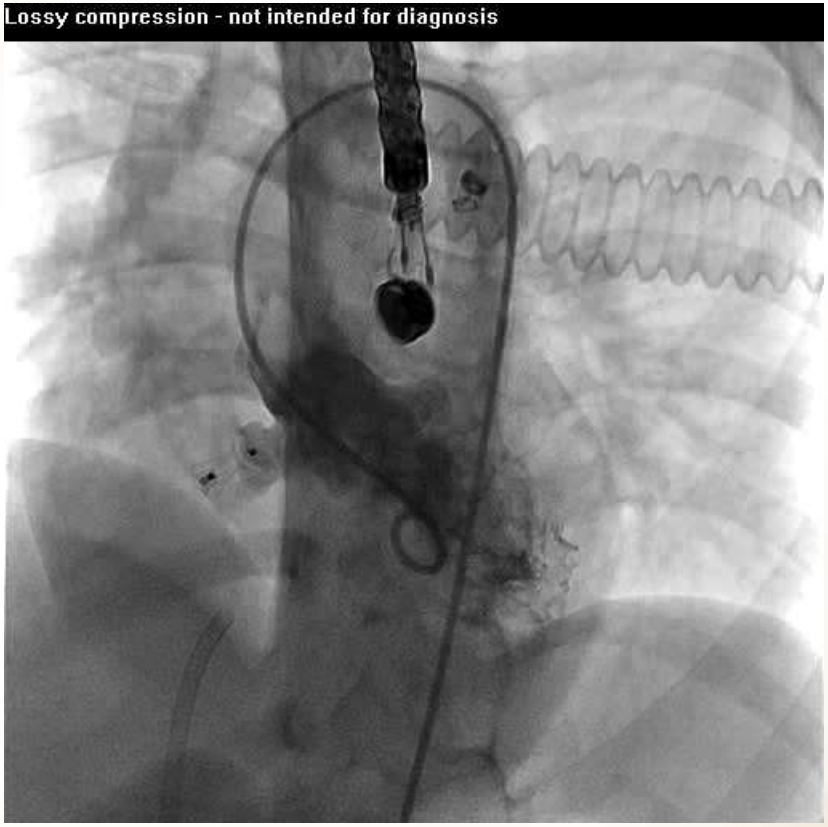
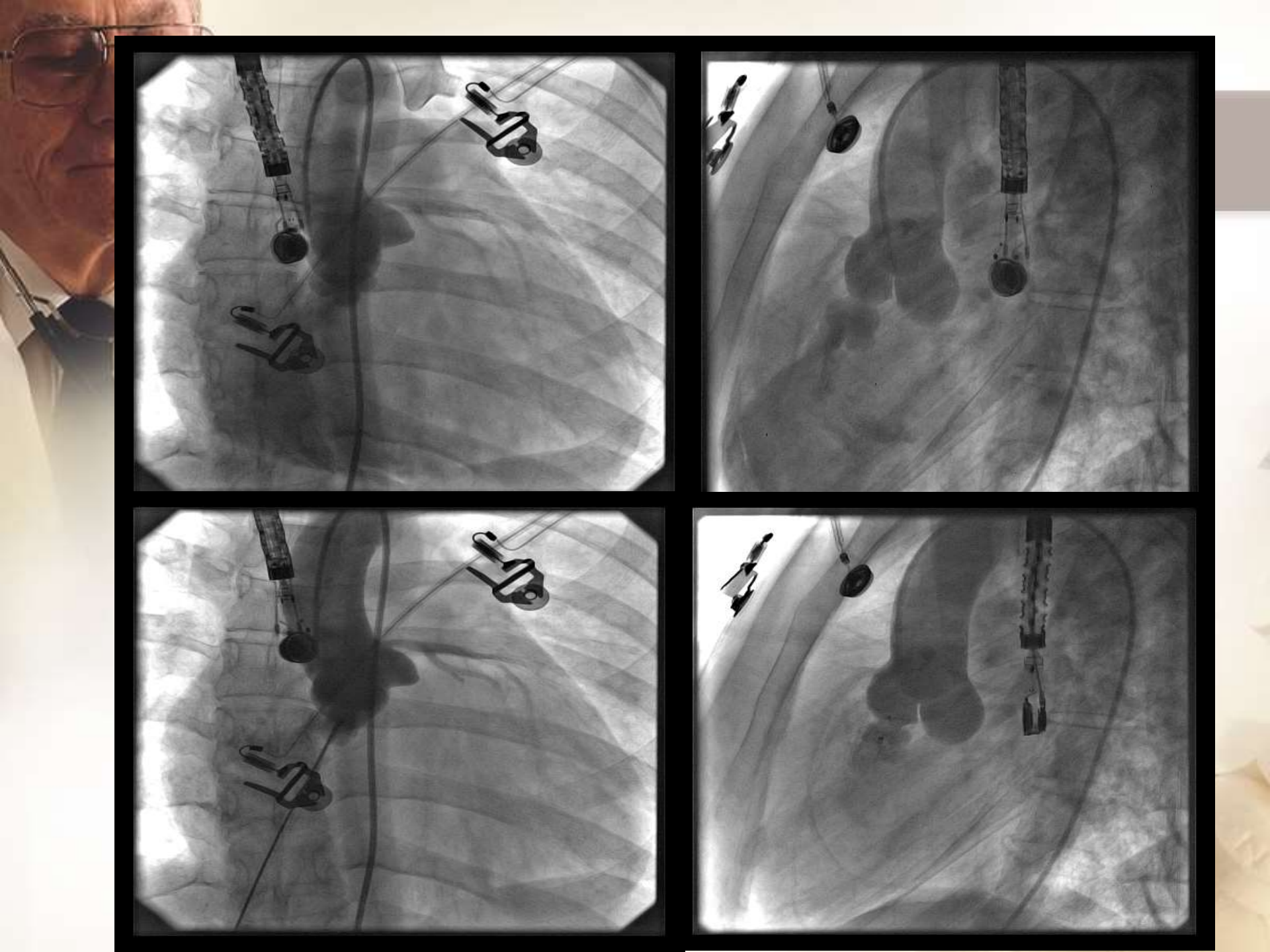
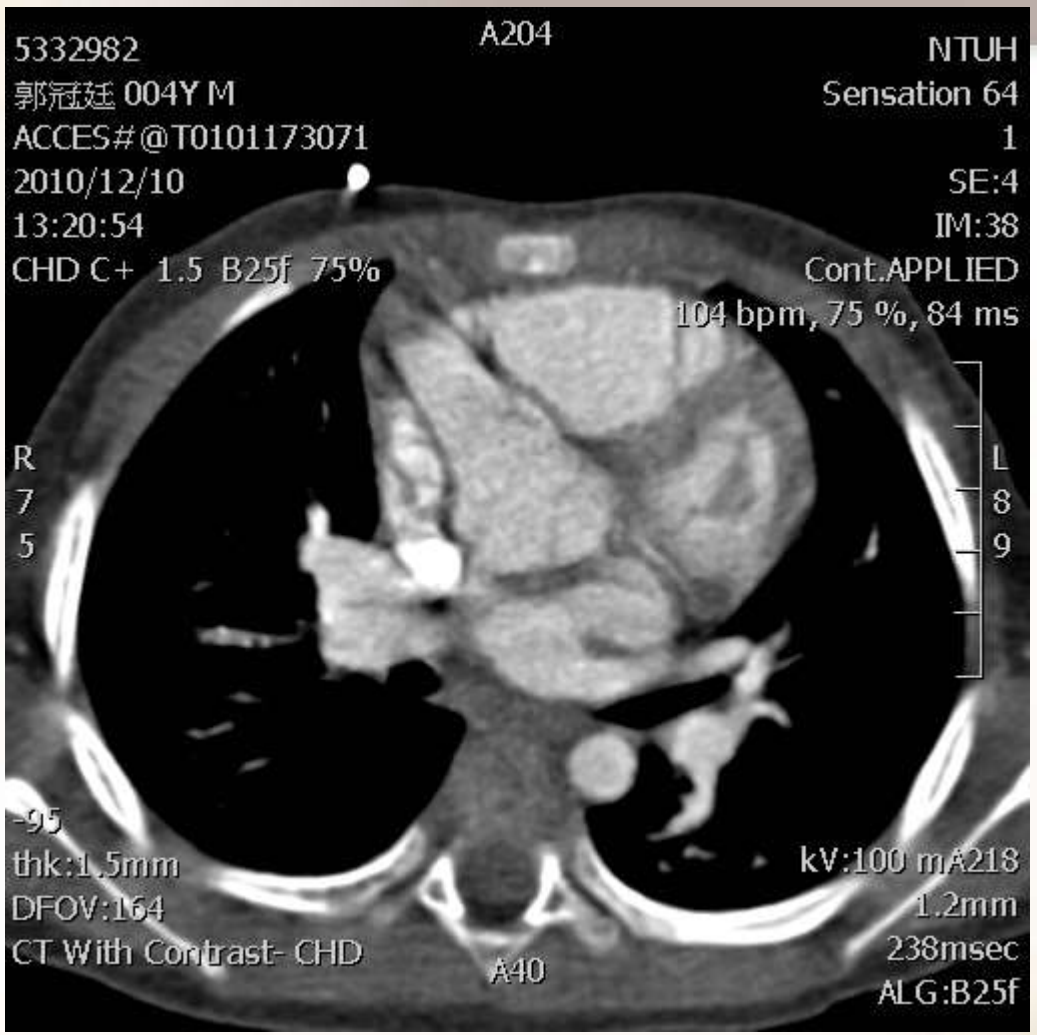


Fig. 3. Drawing of the angiographic classification system and occluders used for ruptured sinus of Valsalva aneurysm in the study.

pVSD closure with ADO



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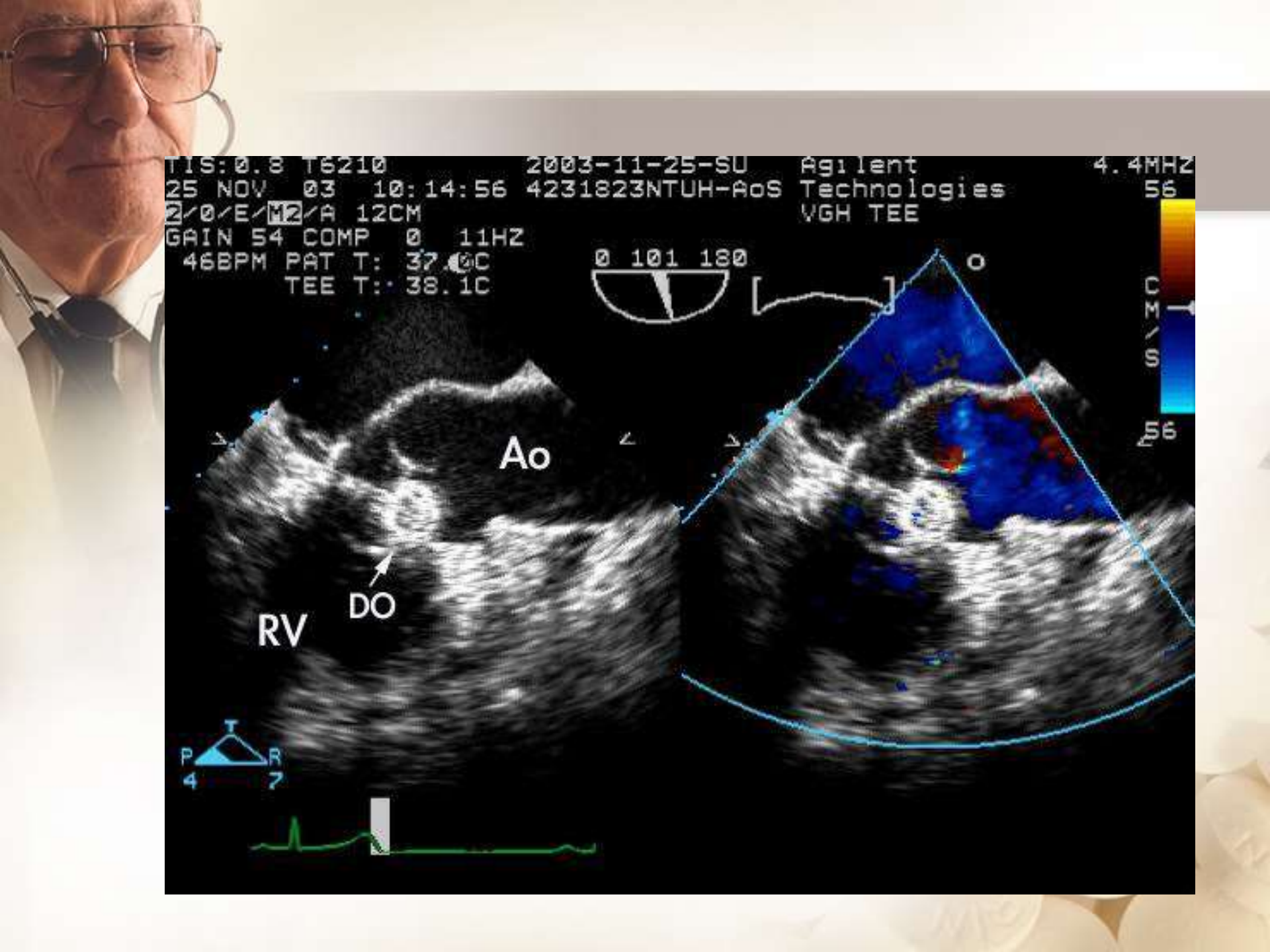
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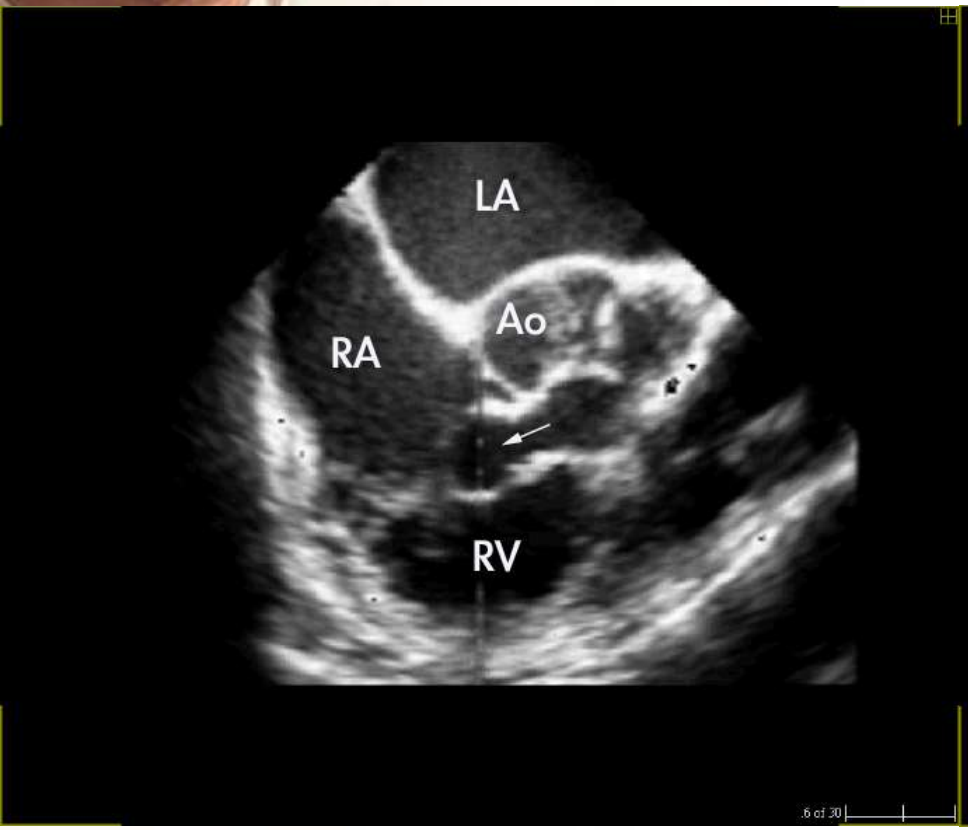
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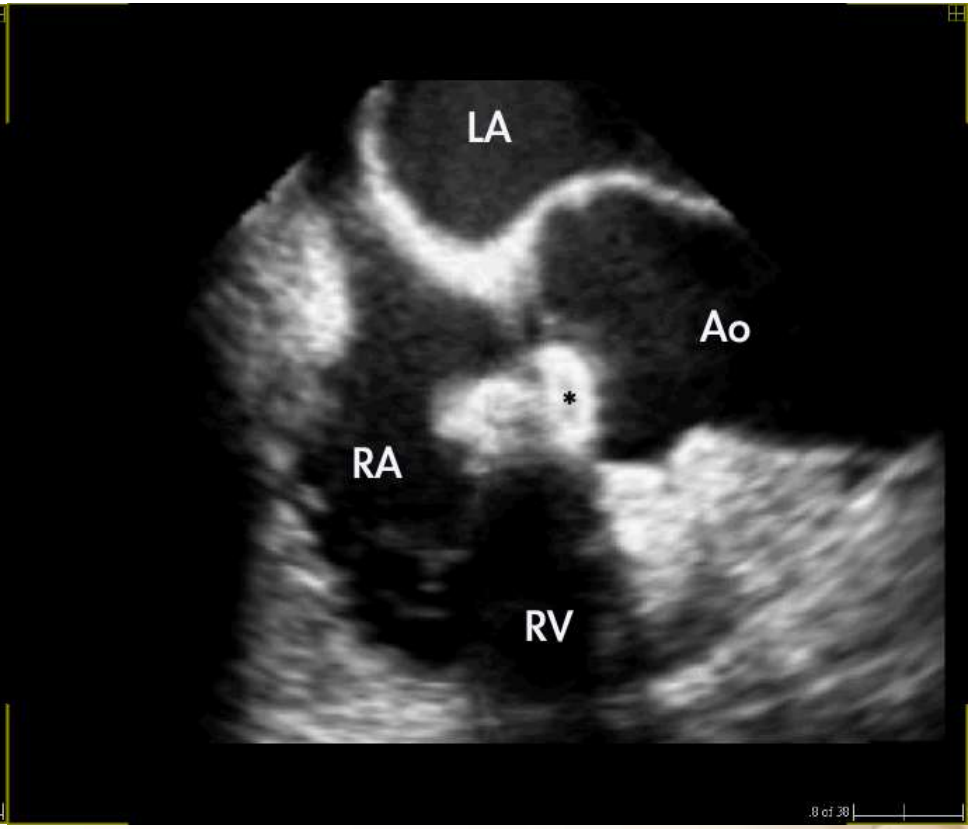
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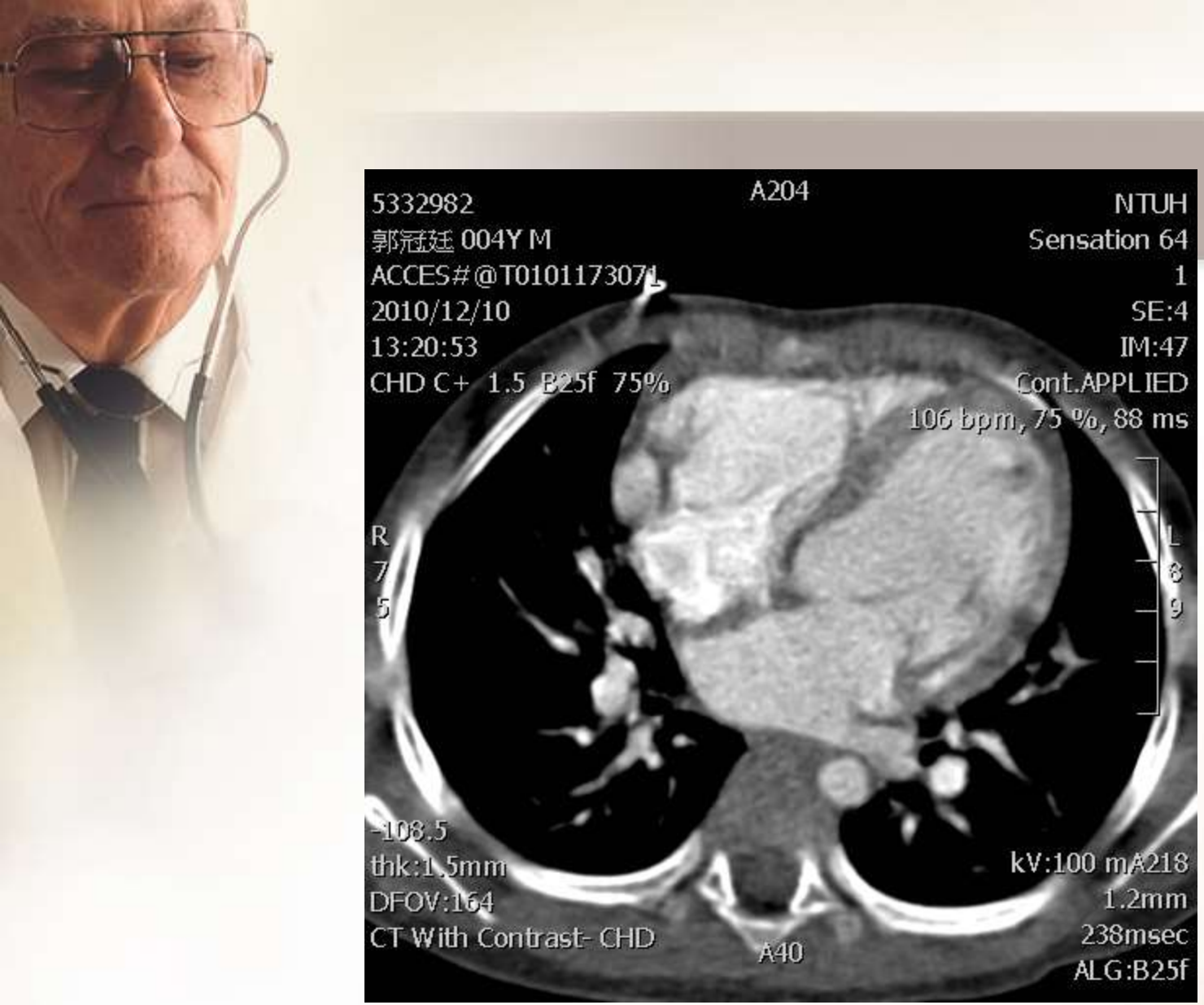
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Sensation 64
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106 bpm, 75 %, 88 ms
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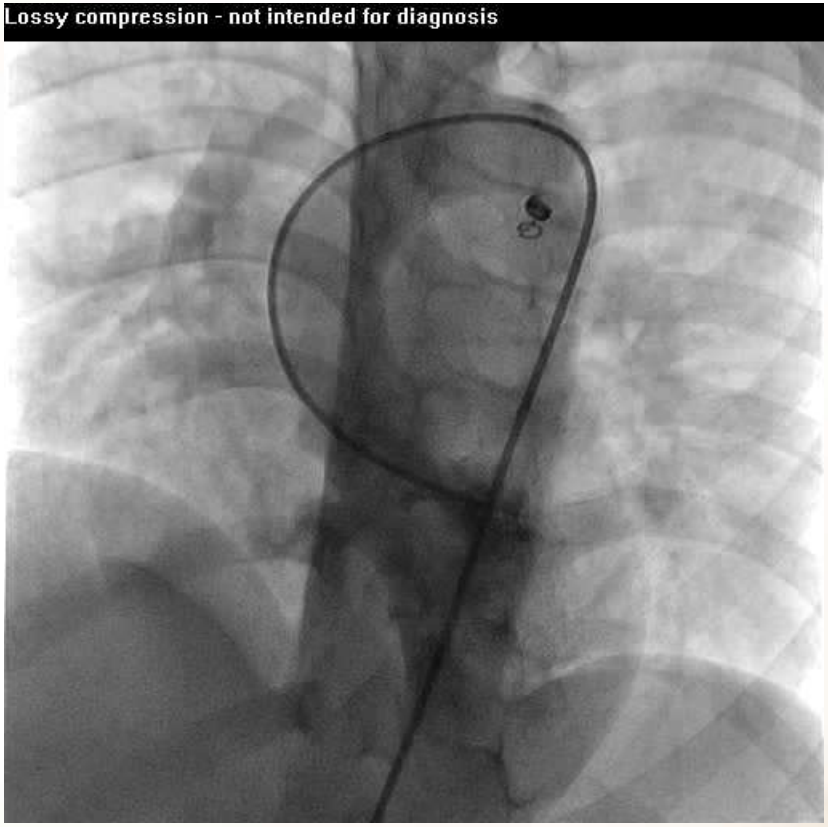
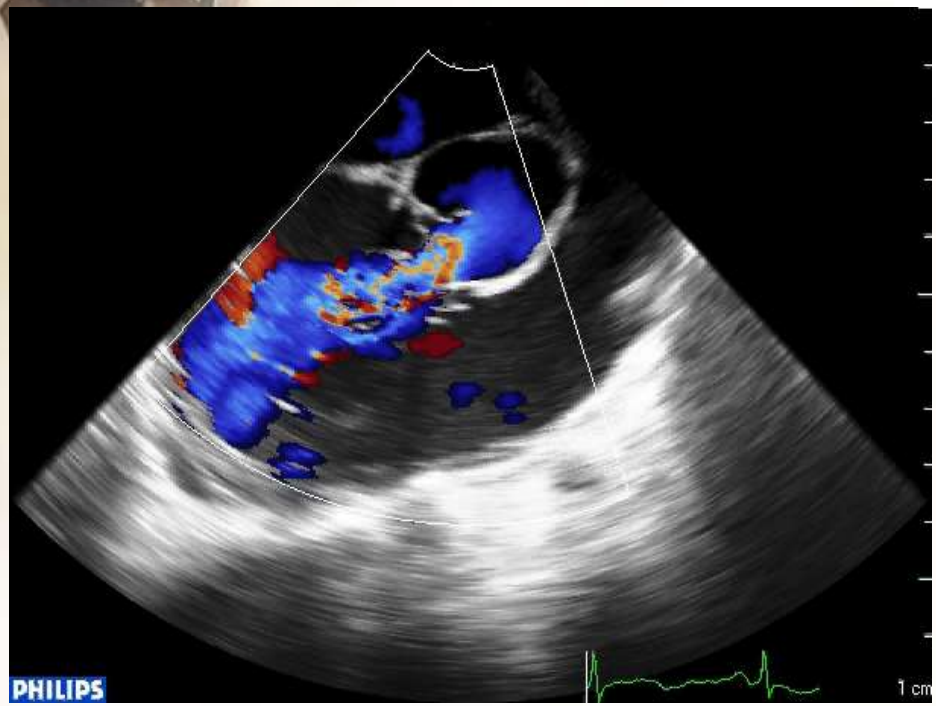
-108.5
thk:1.5mm
DFOV:164
CT With Contrast- CHD
A40
kV:100 mA218
1.2mm
238msec
ALG:B25f

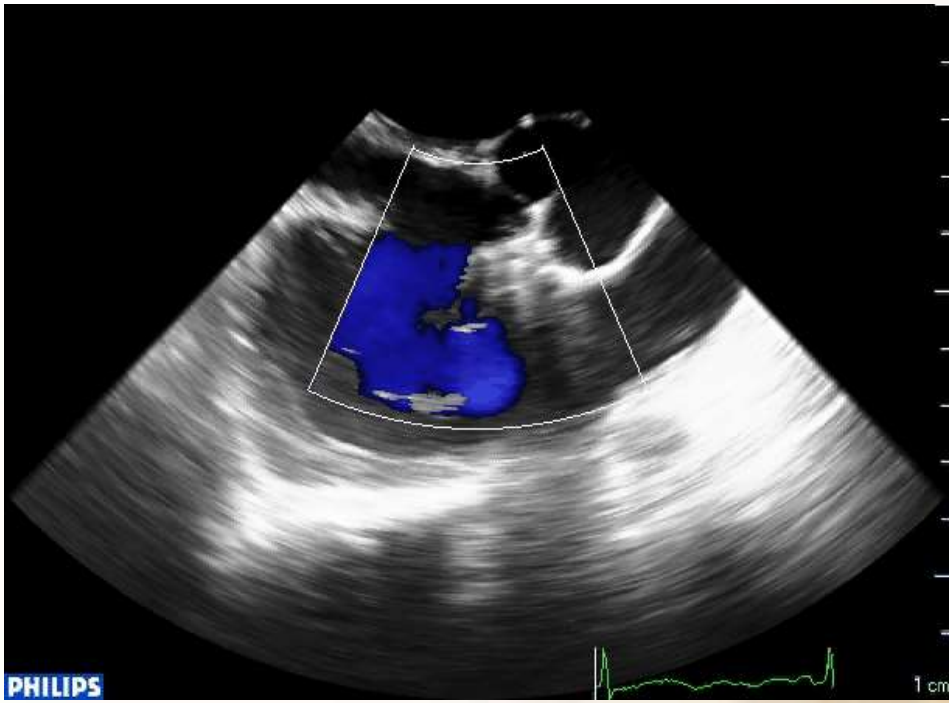

RA
*
LA
LCC
RCC
NCC

pVSD closure with ADO



Ruptured SVA ADO closure





RSVA or paravlvular leak after valve