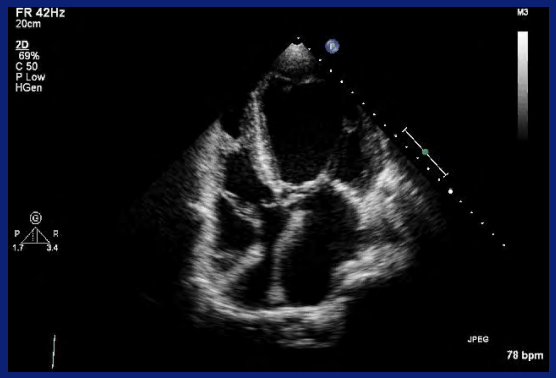
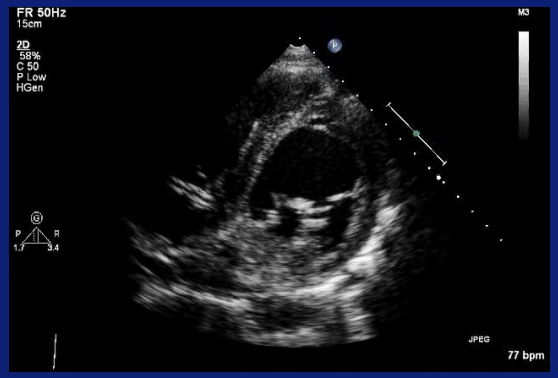
Echocardiographic assessment of unrepaired AVSD



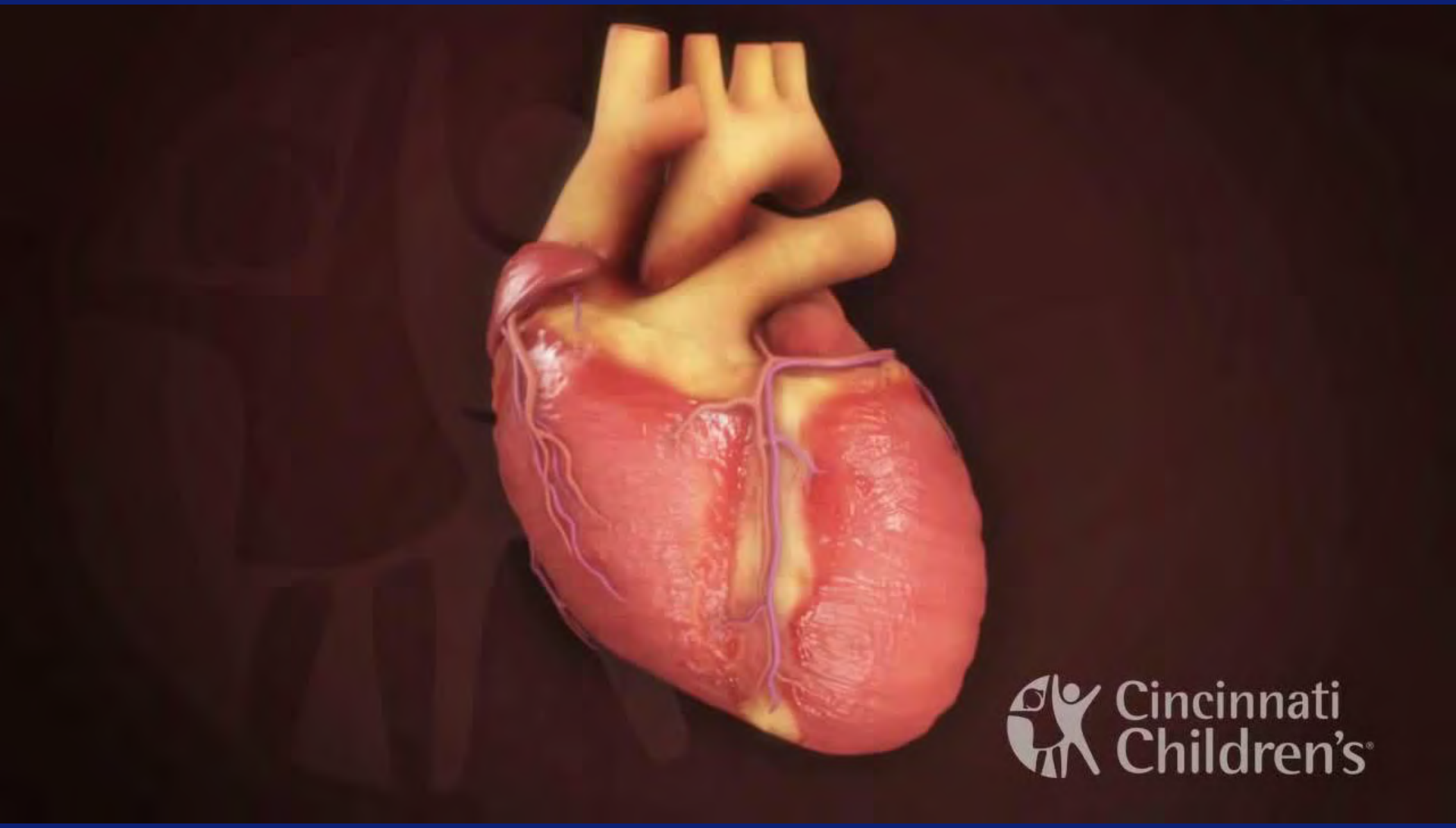


Session 5. Atrioventricular Septal Defects

Multimodality Imaging in ACHD and PH

Annemien van den Bosch

Erasmus MC, Thoraxcenter, Rotterdam, The Netherlands

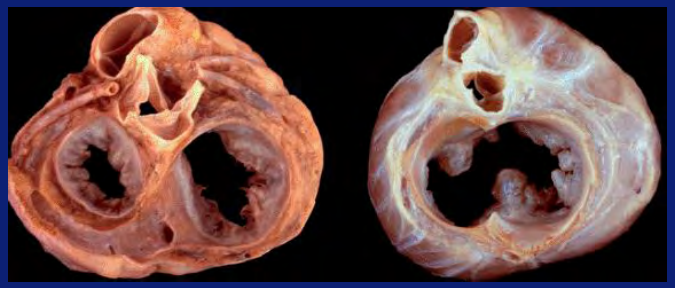

Cincinnati
Children's

The cardinal feature of all AVSDs

Echocardiographic assessment

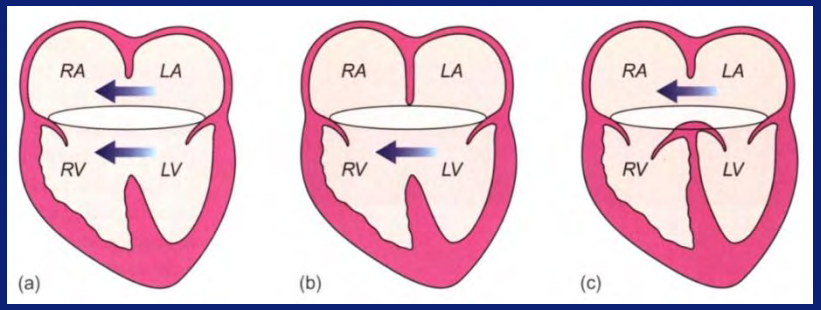
- Common AV junction

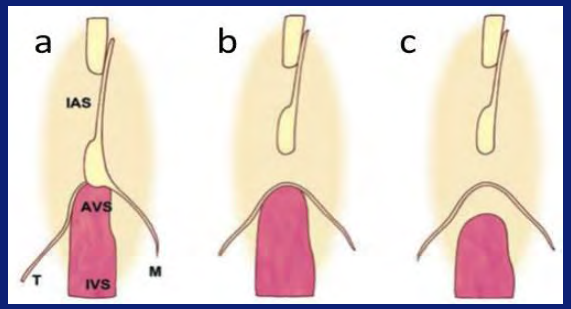
  - AV valves



- Level of shunting across the defect

  Note: influences the clinical presentation





- Unwedged position of the aorta (i.e. “gooseneck deformity”).

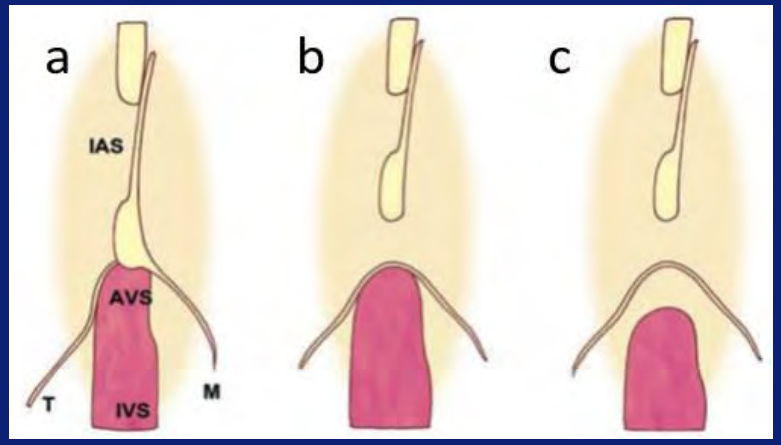
Unrepaired AVSD at adult age

Functionally – all about shunting

Adults

- Complete AVSDs present either after repair or - if unrepaired – majority with Eisenmenger physiology

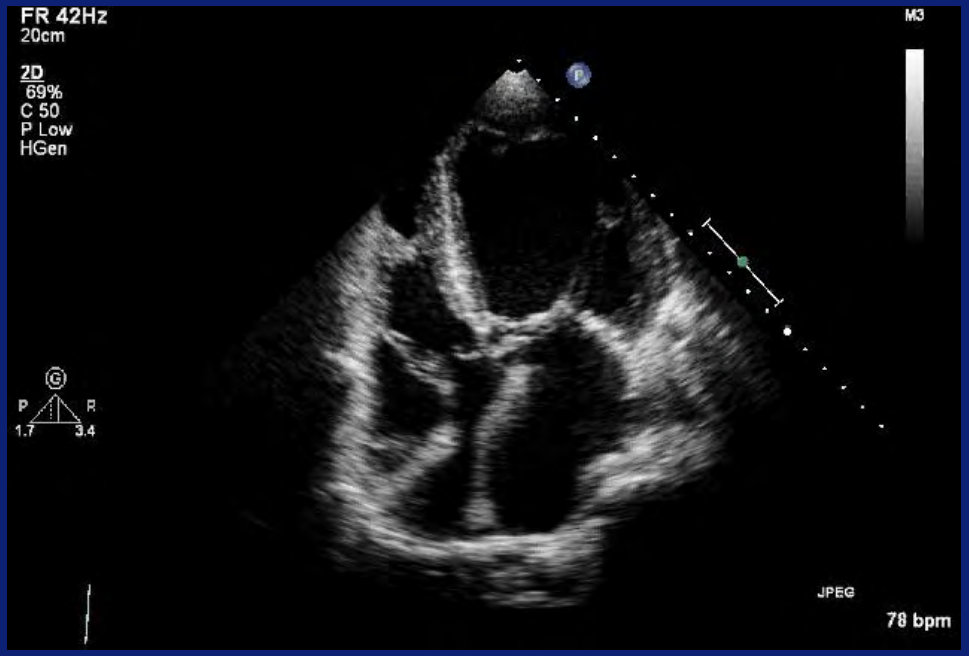
- Incomplete AVSD with fused superior and inferior bridging leaflets. No or very small VSD component



Clinical presentation at adult age

Uncorrected AVSD

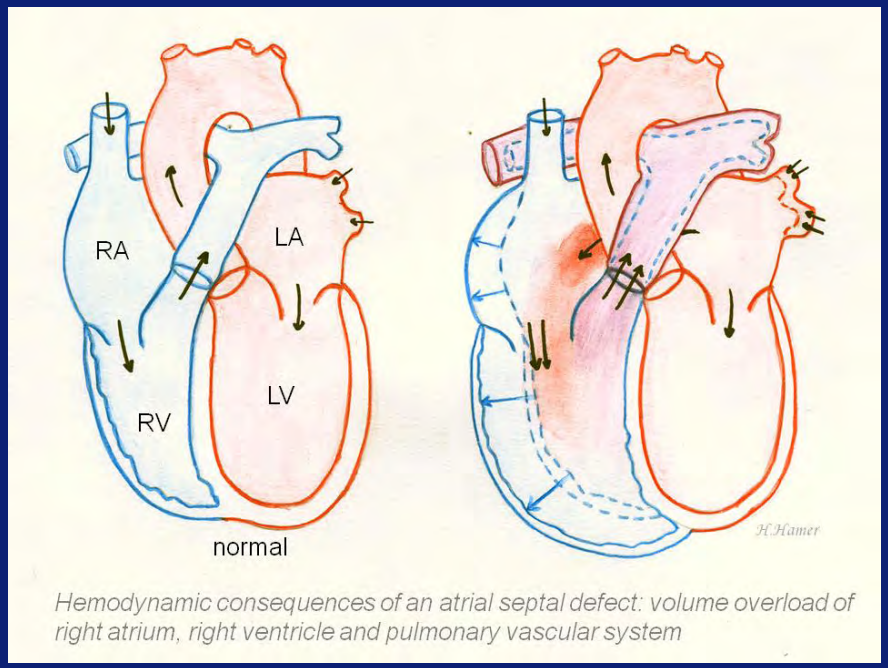
- Atrial fibrillation
- Mitral valve regurgitation
- Reduced exercise capacity
- Screening



Indication for surgery

Indications	Class[a]	Level[b]
Complete AVSD:		
• Cardiac surgery must be avoided in patients with Eisenmenger physiology. In case of doubt, PVR testing is recommended • For indication of intervention see also VSD (Section 4.2)	III	C
Partial AVSD:		
• Surgical closure should be performed in case of significant volume overload of the RV For further details see ASD (Section 4.1)	I	C

Significant volume load of RV



Hemodynamic consequences of an atrial septal defect: volume overload of right atrium, right ventricle and pulmonary vascular system

Eur heart J 2010. Guideline GUCH

Indication for surgery

Indications	Class[a]	Level[b]
Complete AVSD:		
• Cardiac surgery must be avoided in patients with Eisenmenger physiology. In case of doubt, PVR testing is recommended • For indication of intervention see also VSD (Section 4.2)	III	C
Partial AVSD:		
• Surgical closure should be performed in case of significant volume overload of the RV For further details see ASD (Section 4.1)	I	C

Significant volume load of RV

AV valve regurgitation:		
• Symptomatic patients with moderate to severe AV valve regurgitation should undergo valve surgery, preferably AV valve repair	I	C
• Asymptomatic patients with moderate or severe left-sided valve regurgitation and LVESD >45 mm and/or impaired LV function (LVEF <60%) should undergo valve surgery when other causes of LV dysfunction are excluded	I	B[35]
• Surgical repair should be considered in asymptomatic patients with moderate or severe left-sided AV valve regurgitation who have signs of volume overload of the LV and a substrate of regurgitation that is very likely to be amenable for surgical repair	IIa	C

Left-sided AV valve

Eur heart J 2010. Guideline GUCH

Key points to include in echo report

- Complete or partial AVSD
- Size of atrial and ventricular components
- Direction of shunting for both components

Key points to include in echo report

- Complete or partial AVSD
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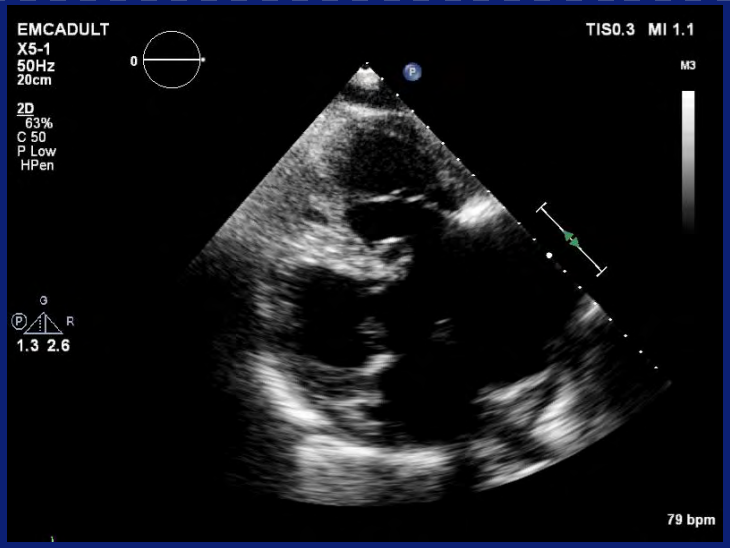
- AV valve chordal anatomy (if considered for surgery, especially straddling)
- AV valve regurgitation

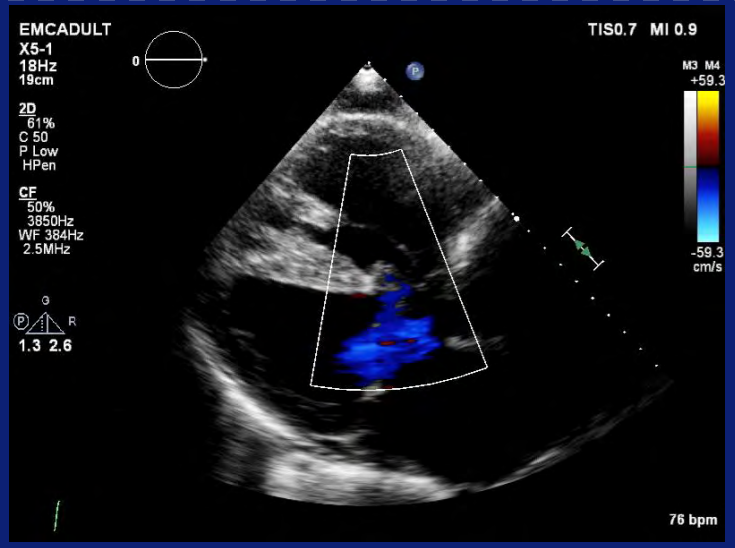
Key points to include in echo report

- Complete or partial AVSD
- Size of atrial and ventricular components
- Direction of shunting for both components
- AV valve chordal anatomy (if considered for surgery, especially straddling)
- AV valve regurgitation
- Estimate of pulmonary pressure
- Other associated lesions
- Ventricular size & function

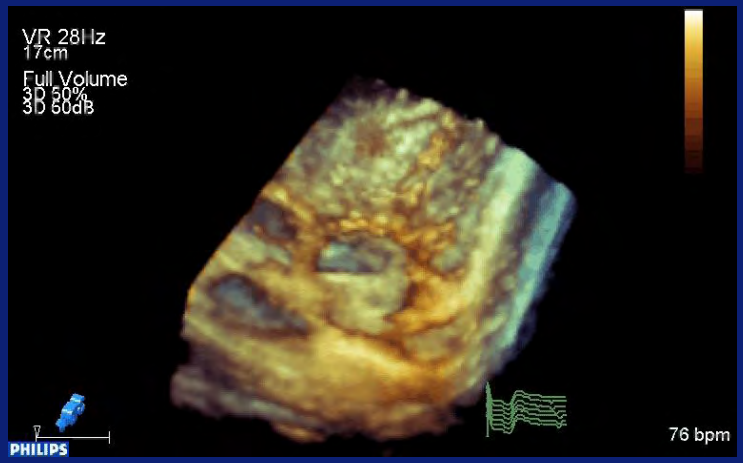
Specific echo views

Parasternal long axis RV inflow view



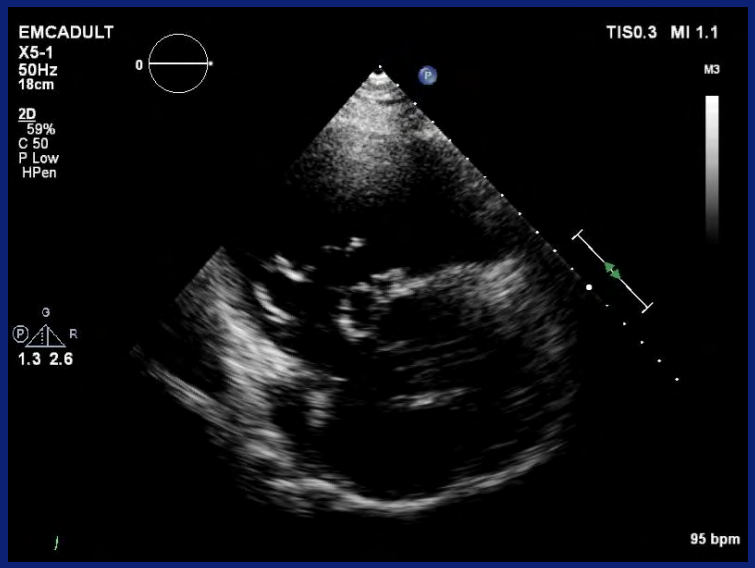


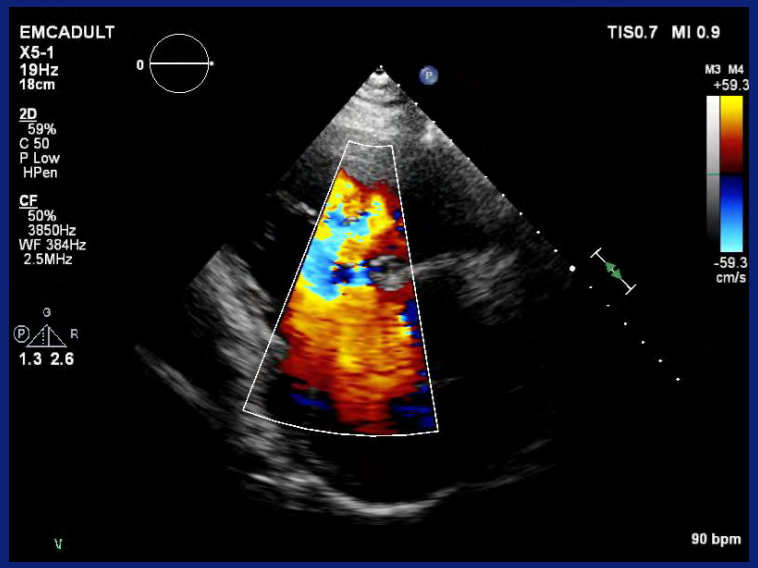
- ASD with clear visualization of AV valves



Specific echo views

Parasternal short axis RV inflow view

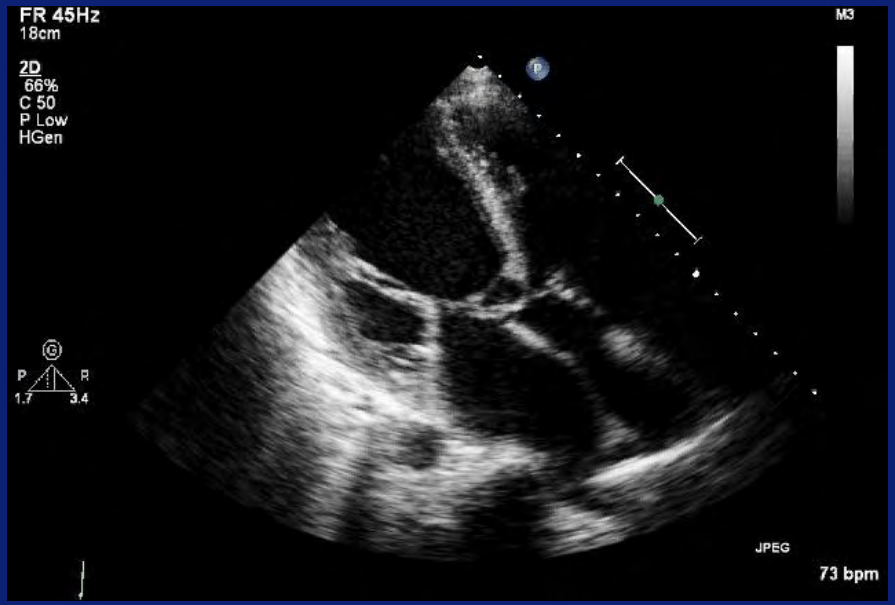




- Another view to visualise ASD and VSD component

Intra-artial shunt

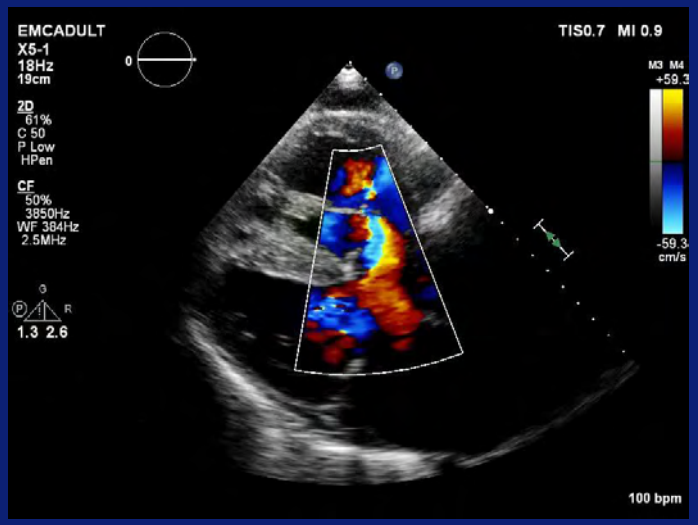
Parasternal long axis RV inflow view

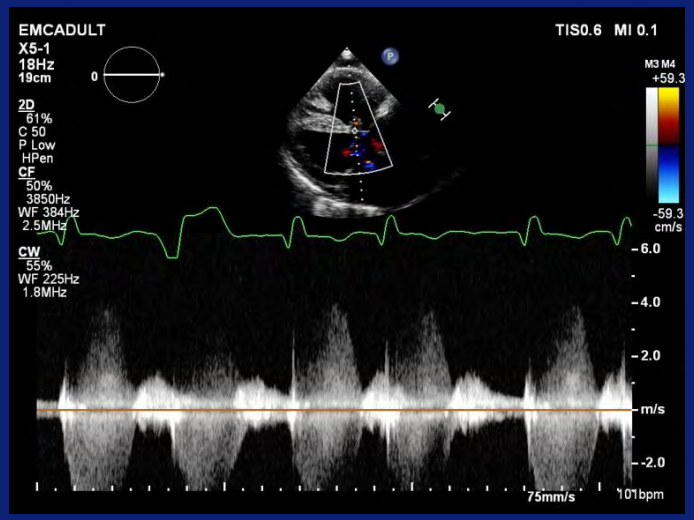


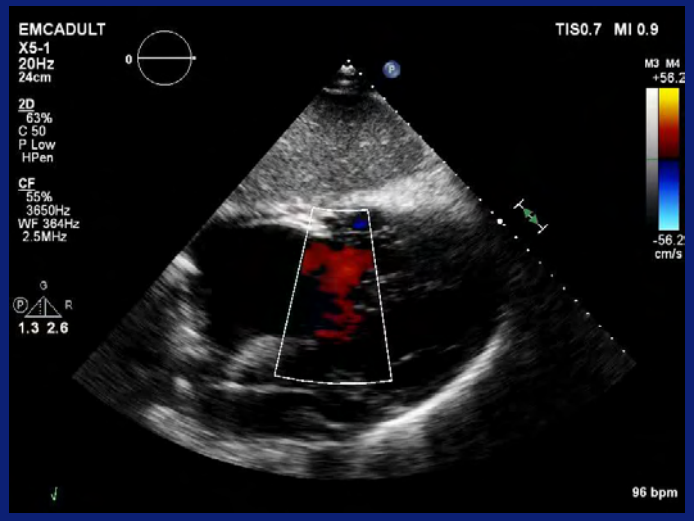
- Clear chordae attachments of the superior bridging leaflet on to the septum

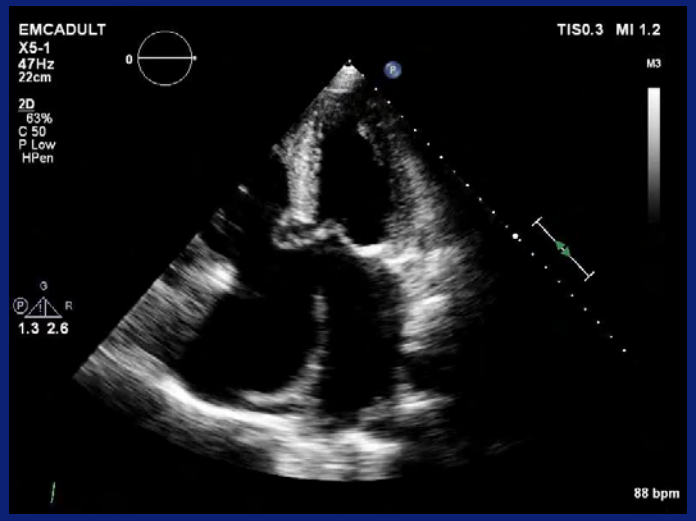
Compleet vs incompleet AVSD

Multiple views



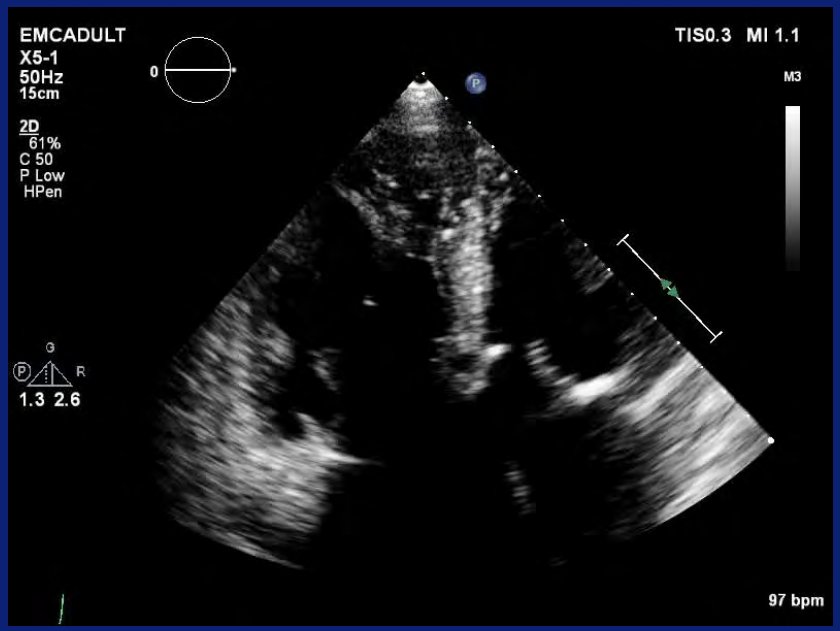


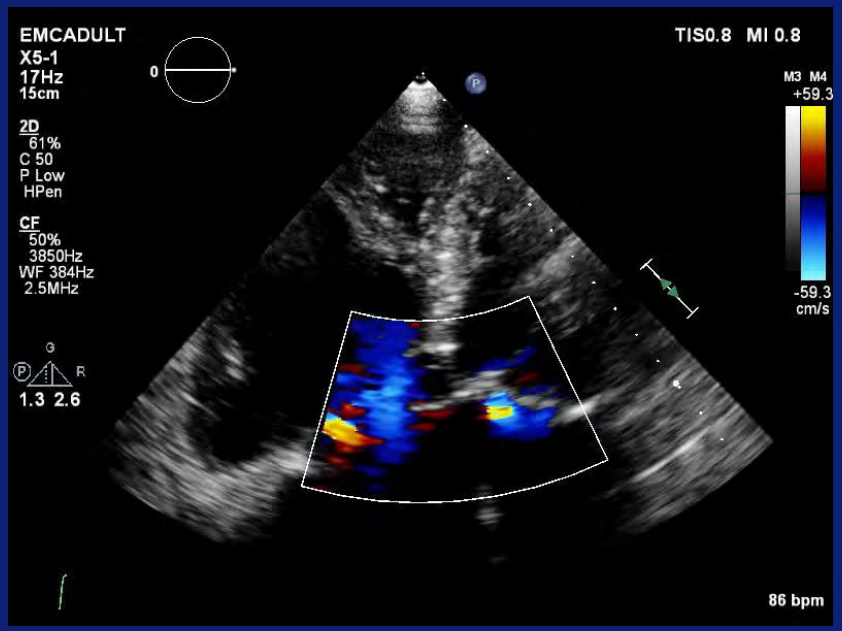




Left–sided AV valve

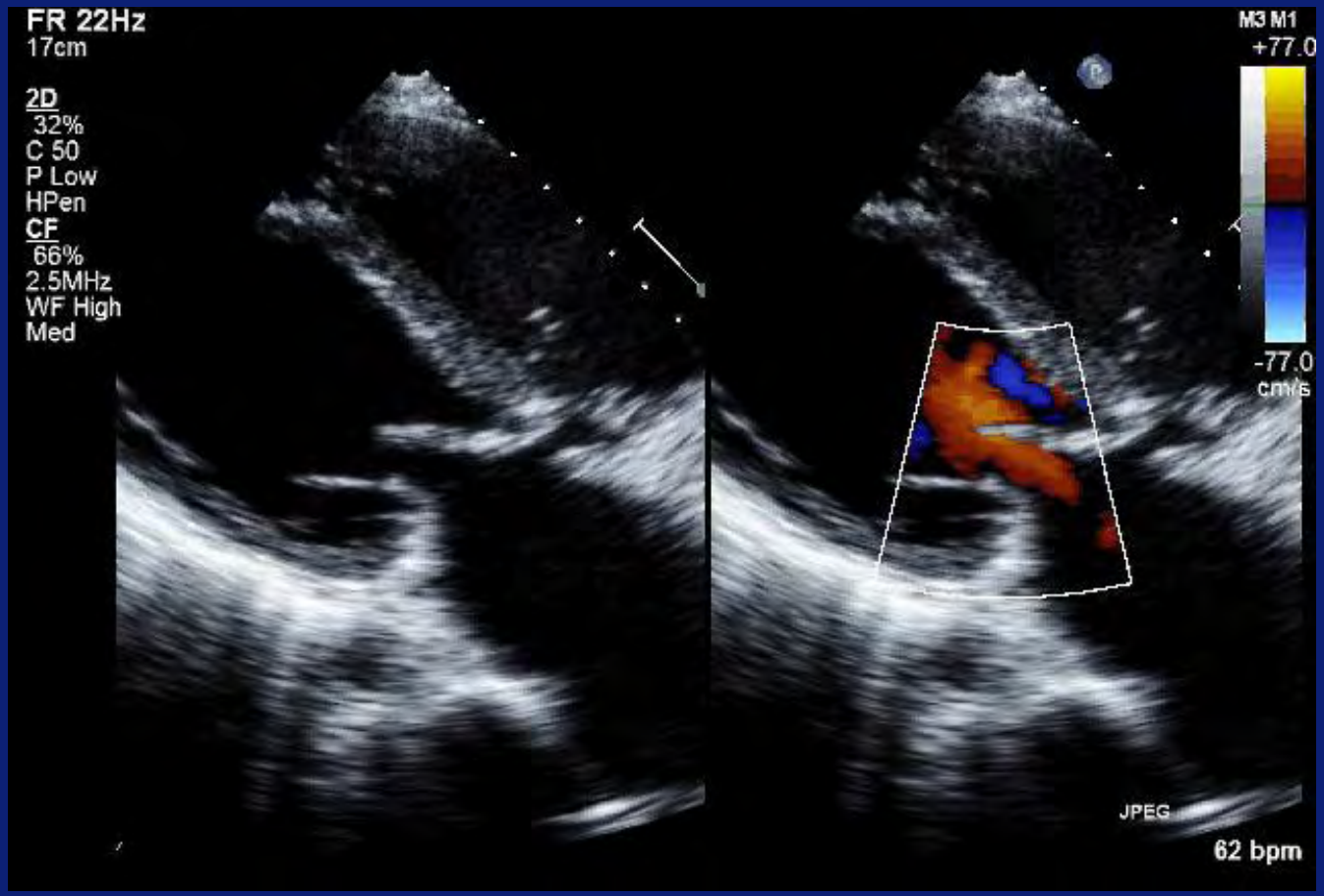
Multiple jets





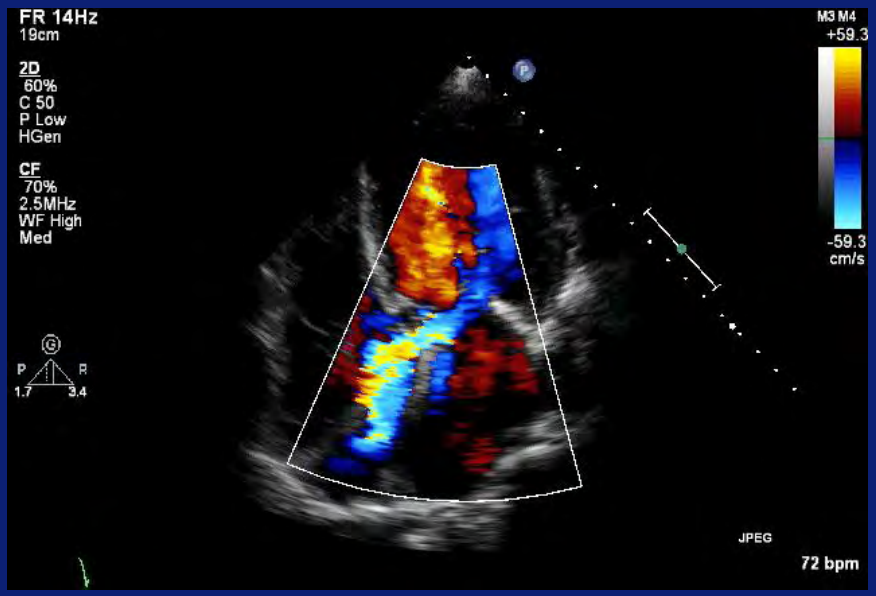
Incomplete AVSD

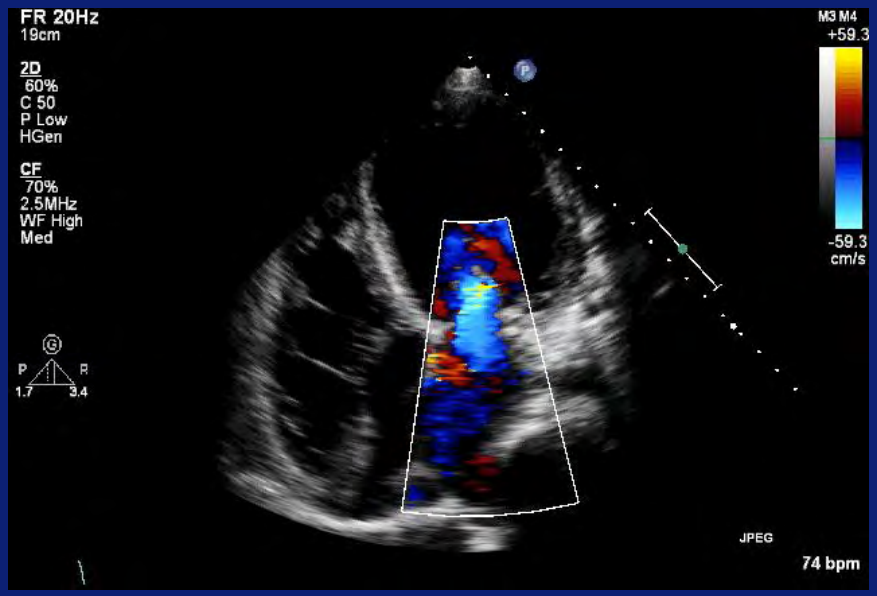
Left-sided AV valve



Left–sided AV valve

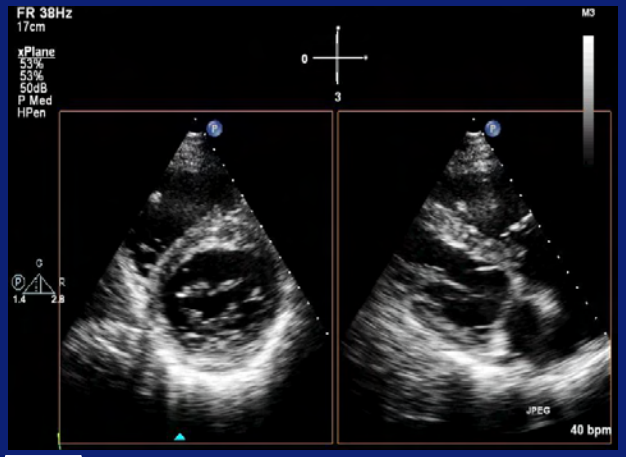
Multiple jets



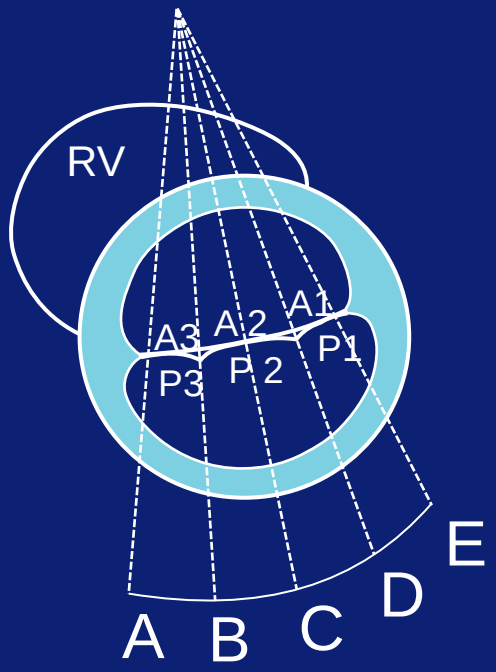


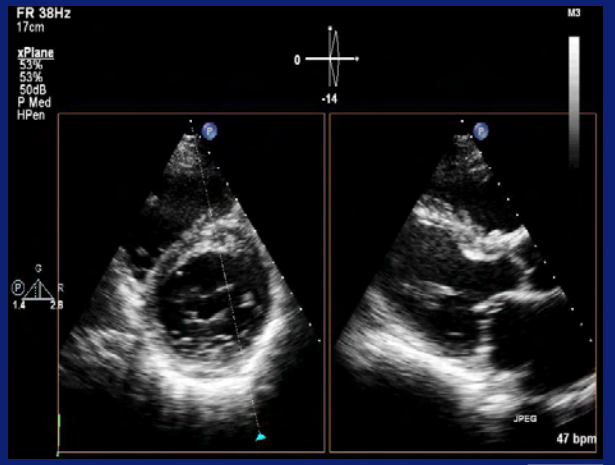
Note: Jet direction

Plan B: Use Biplane imaging

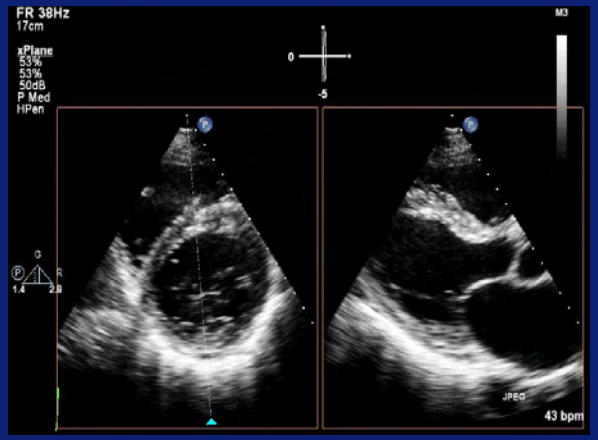


A

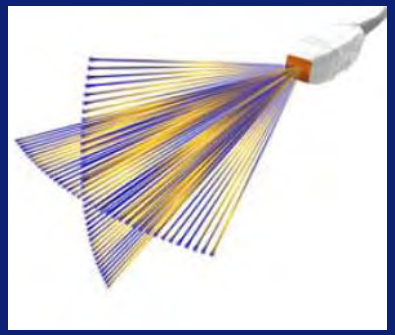




E

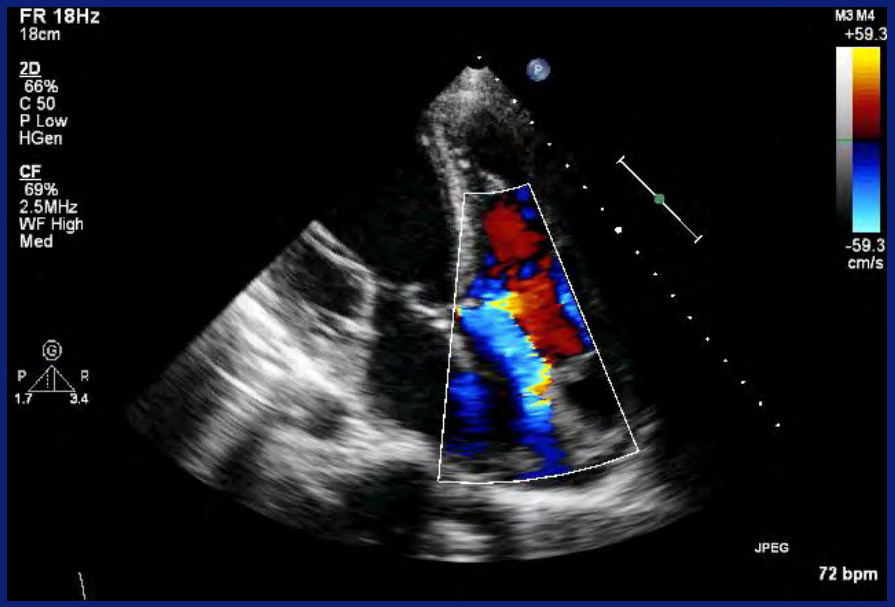


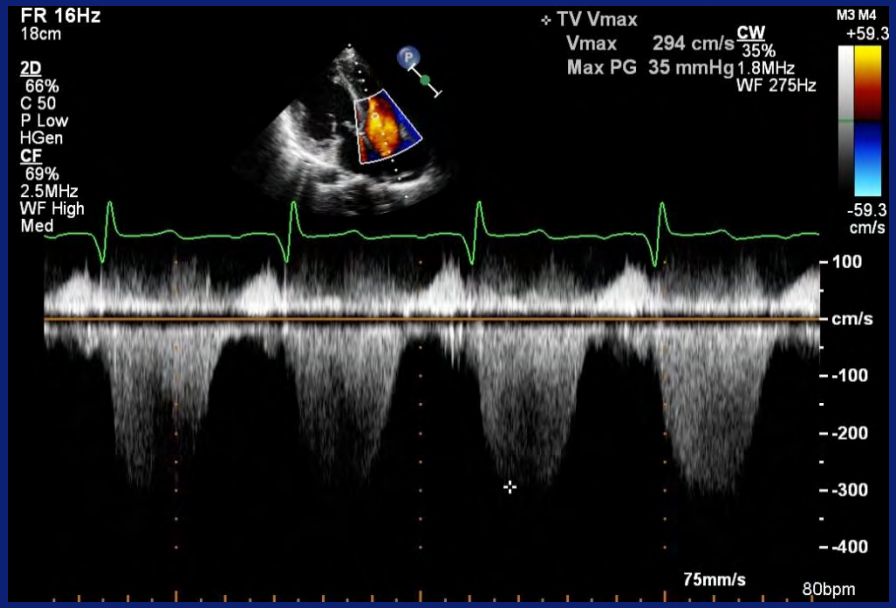
C



McGhie et al
Int J Cardiovasc Imaging 2015

Right-sided AV valve regurgitation





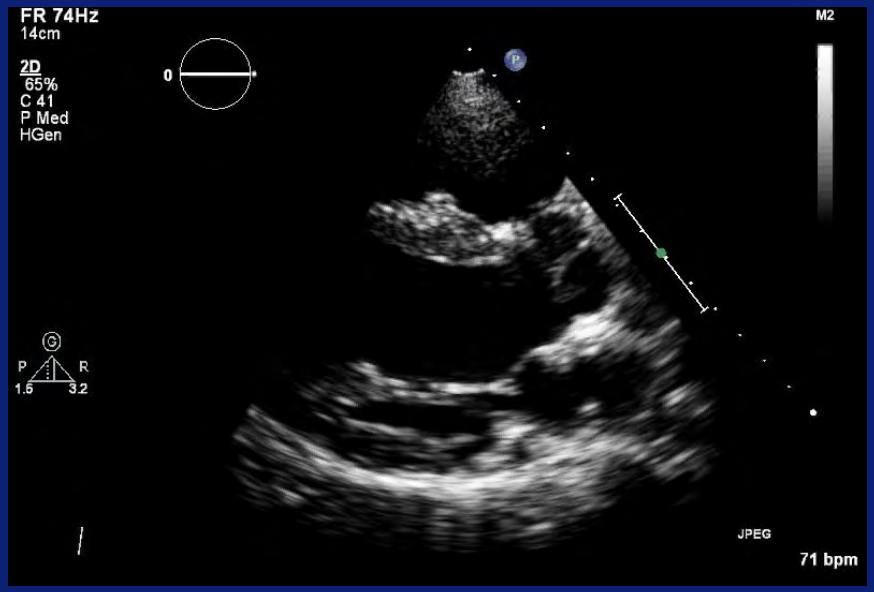
Vmax TR: 2.9 cm/sec

ΔP = 35 mmHg

Direction of the regurgitation jet!

Unbalanced AVSD

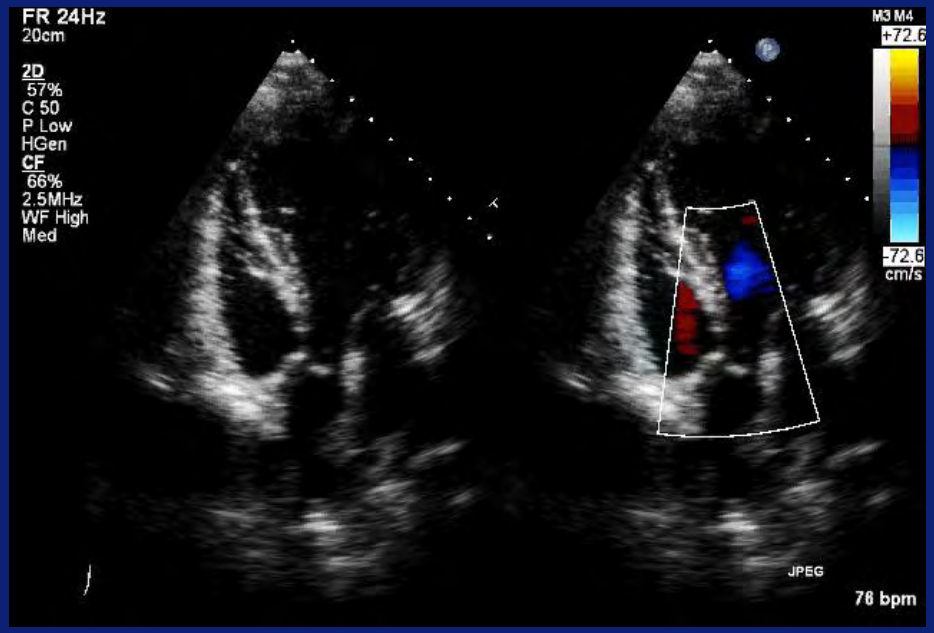
Unwedged position of the aorta

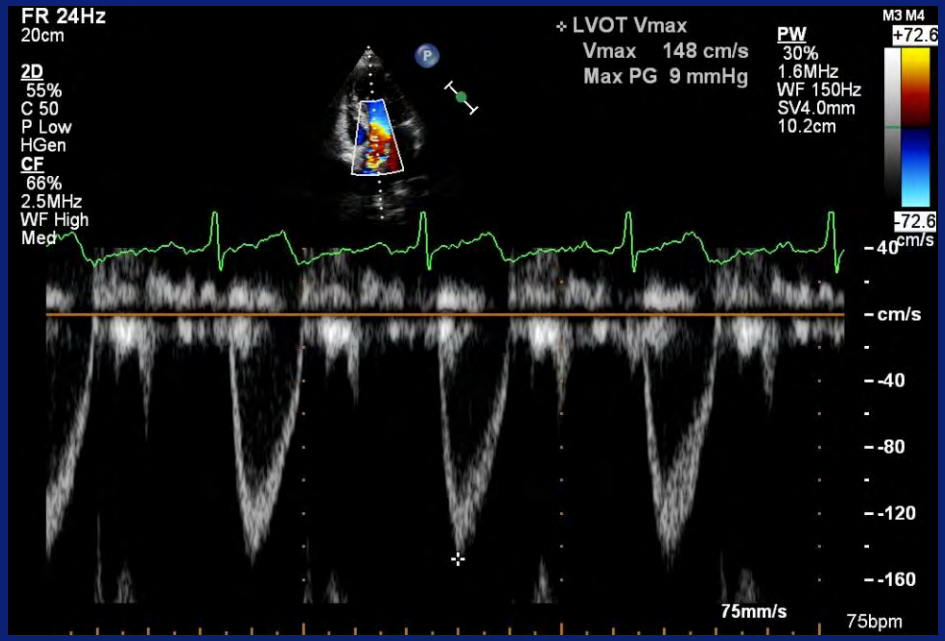


Normal PSLAX?

LVOT obstruction

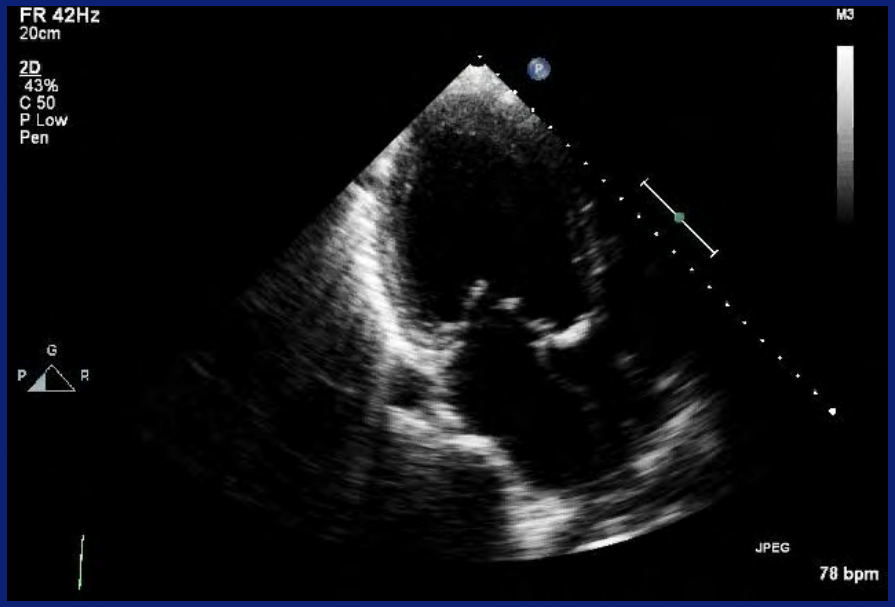
needs to be assessed

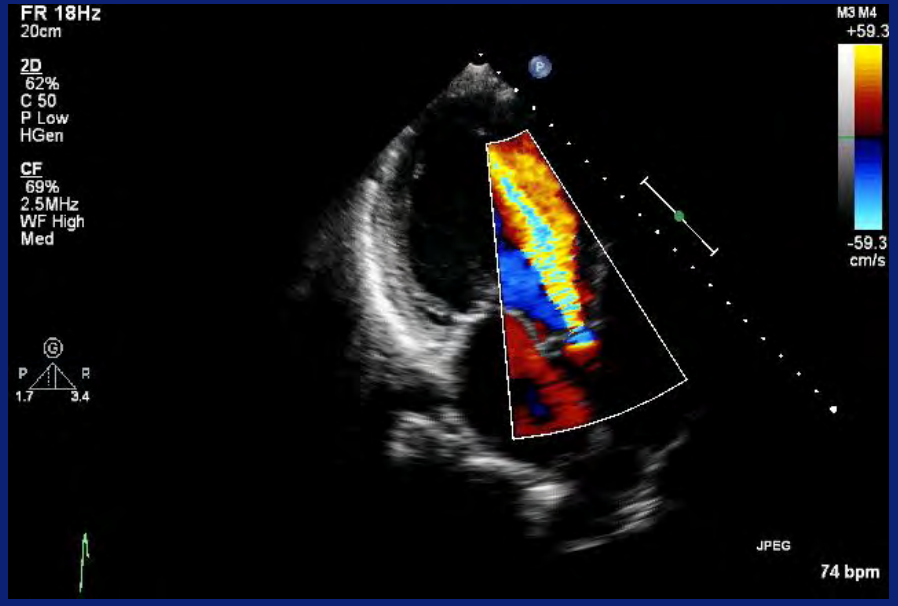




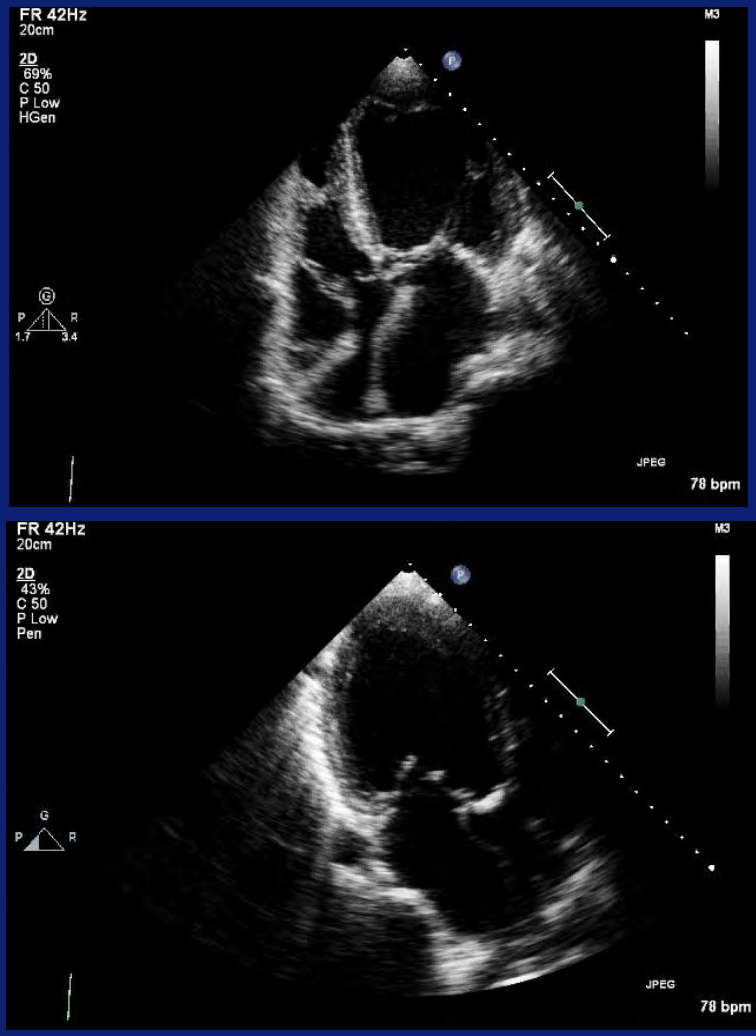
AP5CH

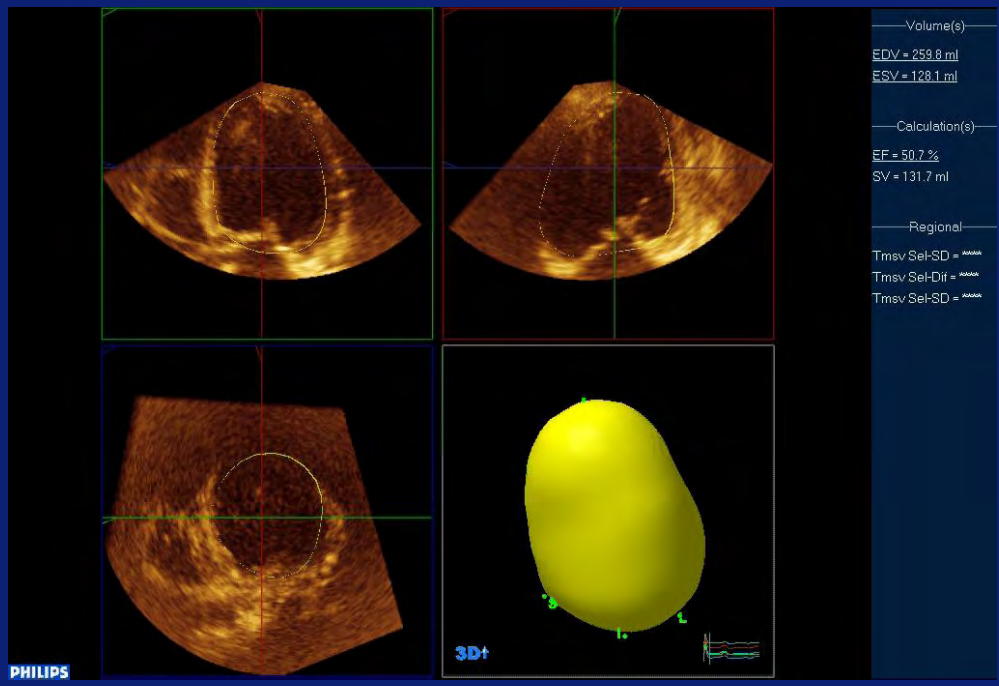
Don’t forget the Aortic valve?





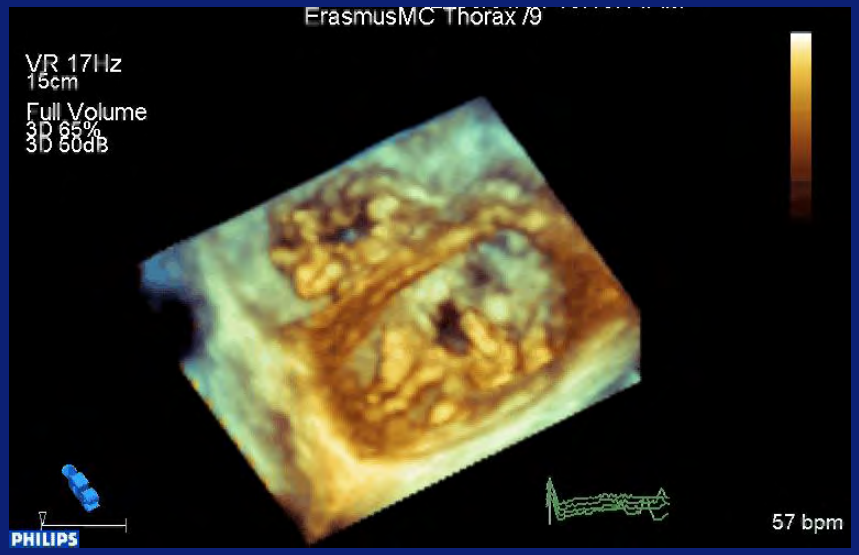
LV volume and EF

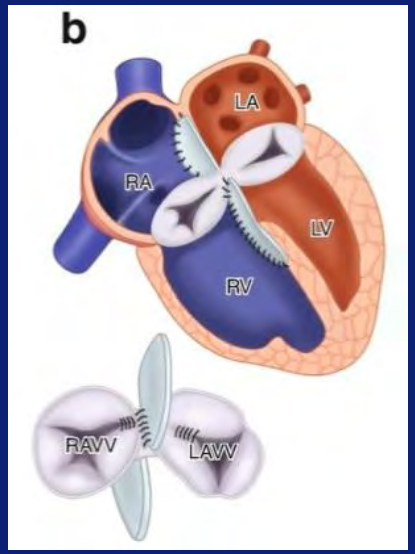




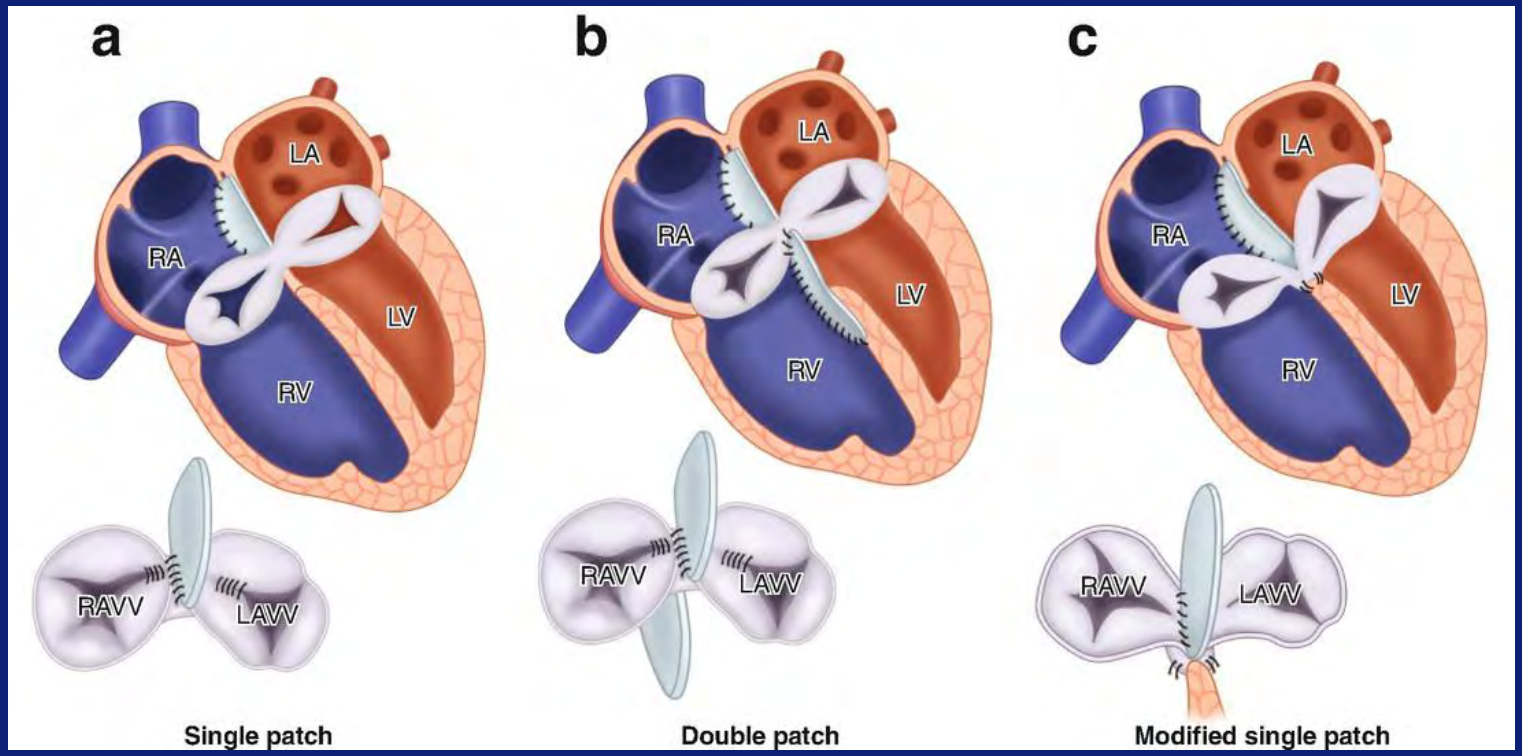
- Shape of the LV is more spherical

Echocardiographic assessment of repaired AVSD



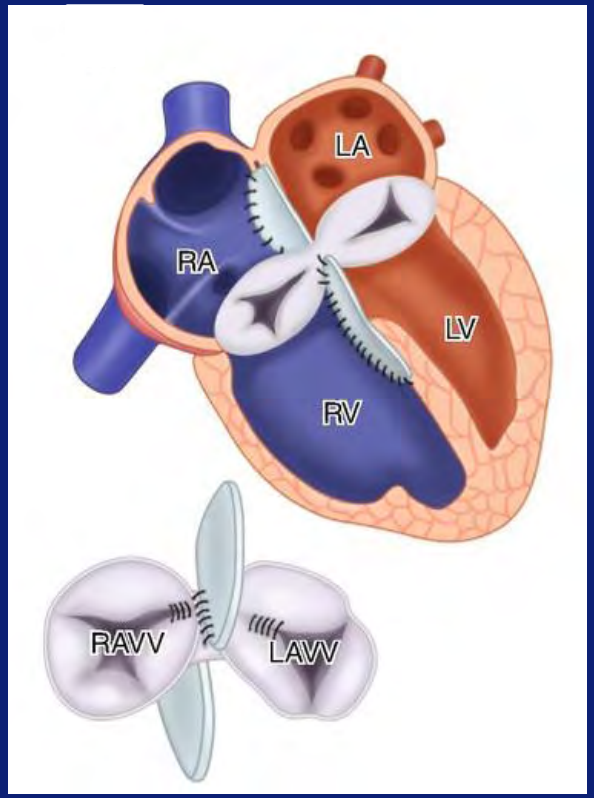


Surgical AVSD correction



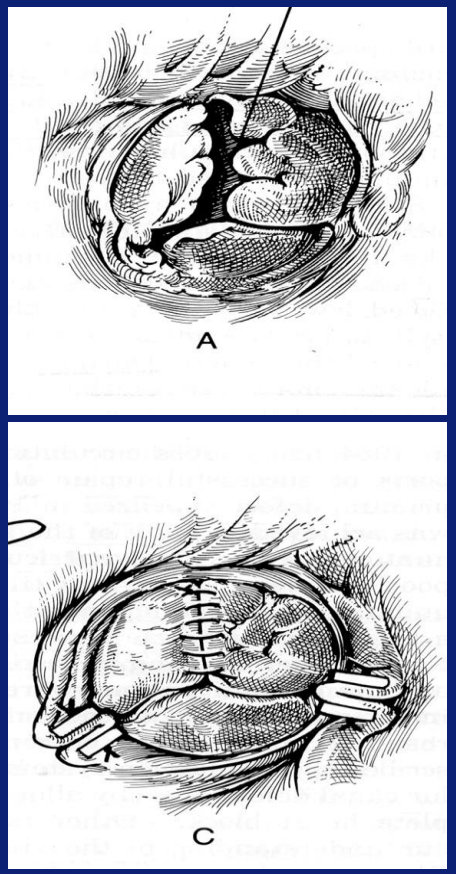
Residual lesions and complications

- Residual shunt (atrial or ventricular level, LV-RA)
- RV and LV dilatation and dysfunction
- Residual elevated pulmonary artery pressure

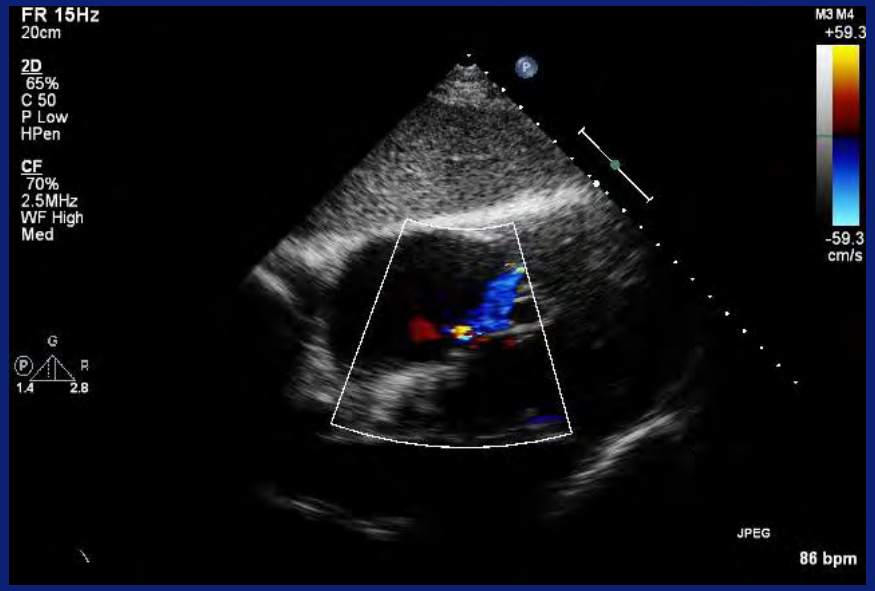


Residual lesions and complications

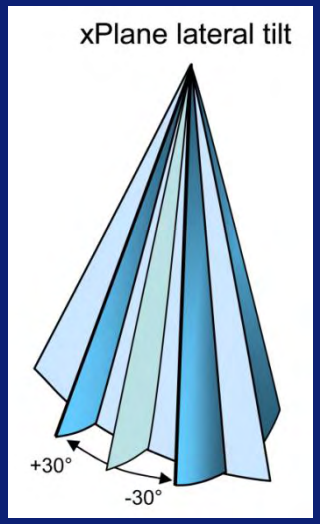
- Left-sided AV valve regurgitation, often through the closure line between superior and inferior bridging leaflet
- Right-sided AV valve regurgitation
- LVOT obstruction

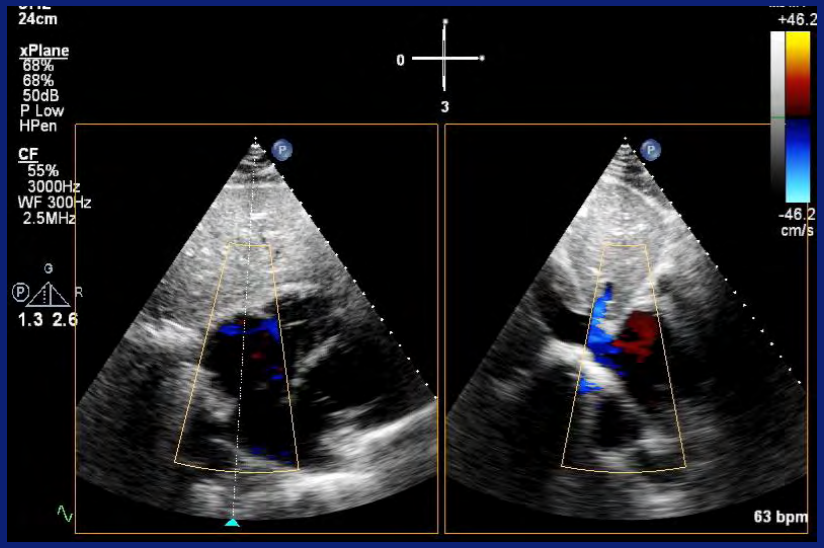


Residual ASD: often multiple

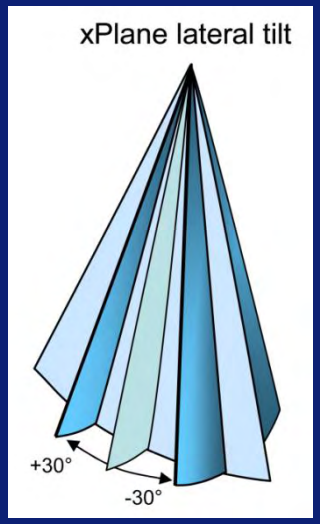


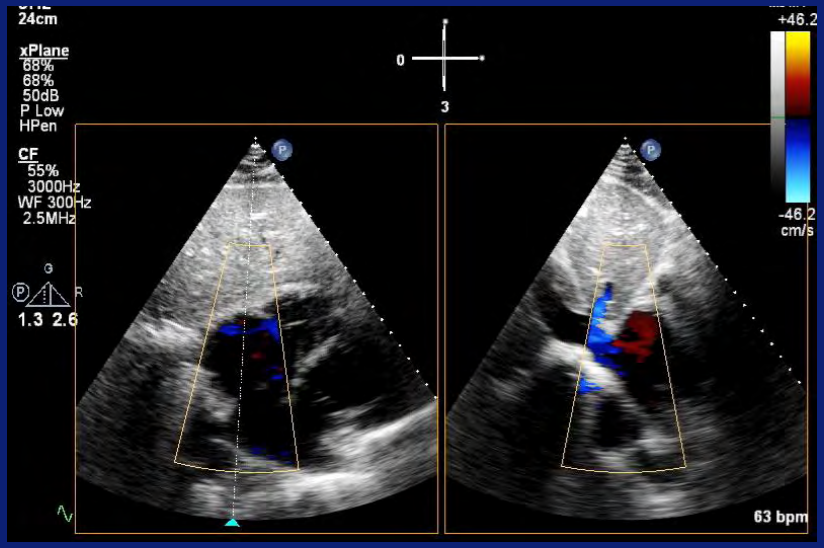
Plan B

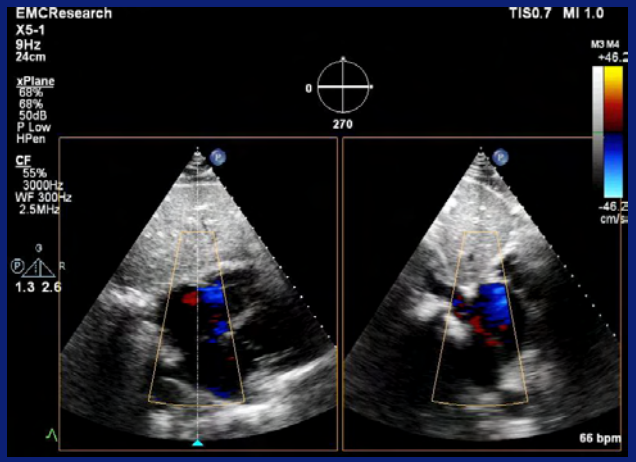

xPlane lateral tilt
+30°
-30°

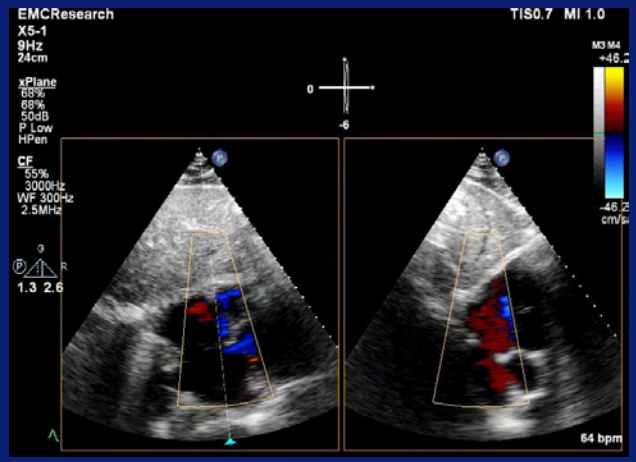

24cm
xPlane
68%
68%
50dB
P Low
HPen
CF
55%
3000Hz
WF 300Hz
2.5MHz
1.3 2.6
+46.2
-46.2
cm/s
63 bpm

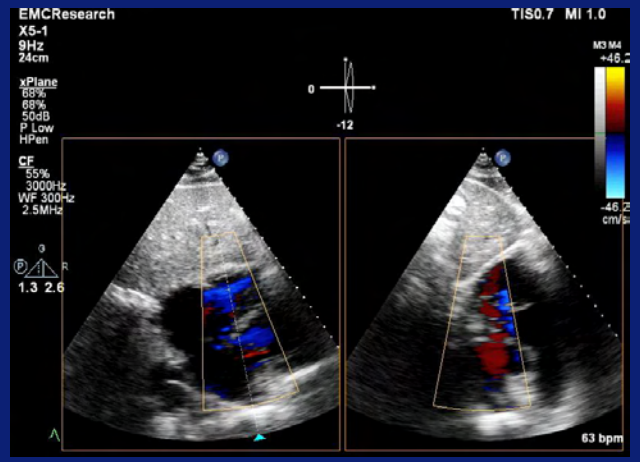
Plan B


xPlane lateral tilt
+30°
-30°


24cm
xPlane
68%
68%
50dB
P Low
HPen
CF
55%
3000Hz
WF 300Hz
2.5MHz
1.3 2.6
0
3
+46.2
-46.2
cm/s
63 bpm


EMCResearch
TIS0.7 MI 1.0
X5-1
9Hz
24cm
xPlane
68%
68%
50dB
P Low
HPen
CF
55%
3000Hz
WF 300Hz
2.5MHz
1.3 2.6
270
66 bpm

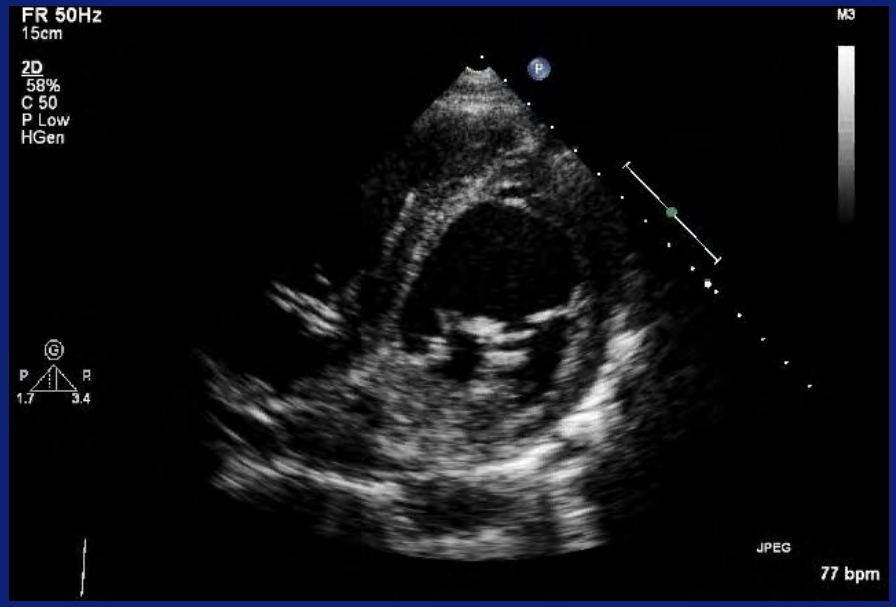

EMCResearch
TIS0.7 MI 1.0
X5-1
9Hz
24cm
xPlane
68%
68%
50dB
P Low
HPen
CF
55%
3000Hz
WF 300Hz
2.5MHz
1.3 2.6
-6
64 bpm

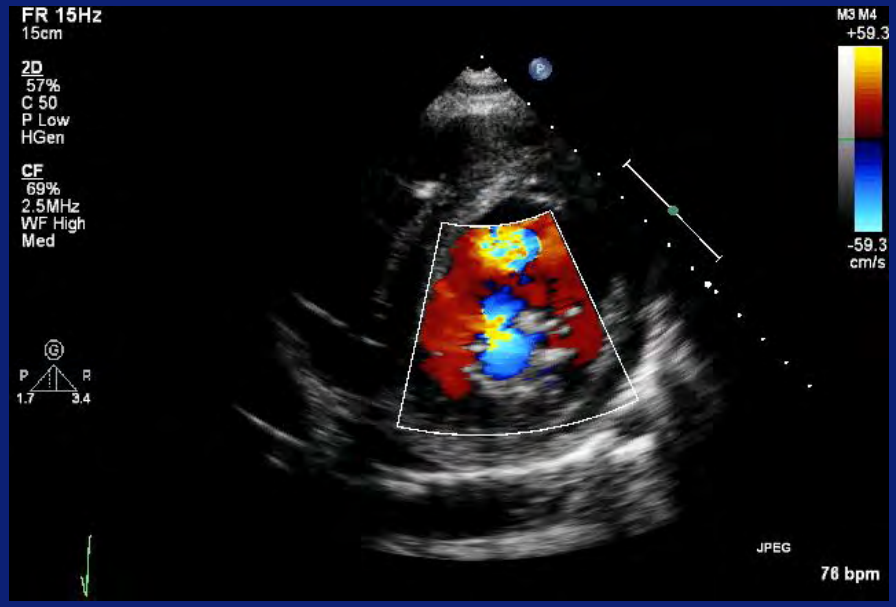

EMCResearch
TIS0.7 MI 1.0
X5-1
9Hz
24cm
xPlane
68%
68%
50dB
P Low
HPen
CF
55%
3000Hz
WF 300Hz
2.5MHz
1.3 2.6
-12
63 bpm

SWEEP

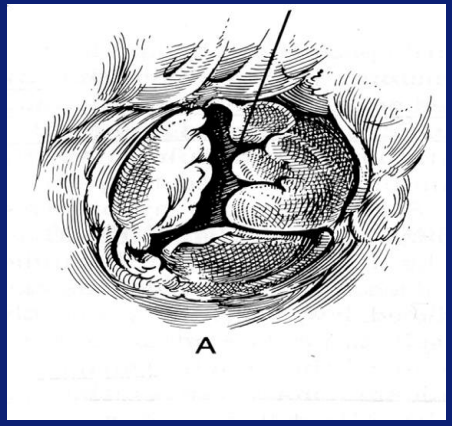
Left-sided AV valve regurgitation

PSAX



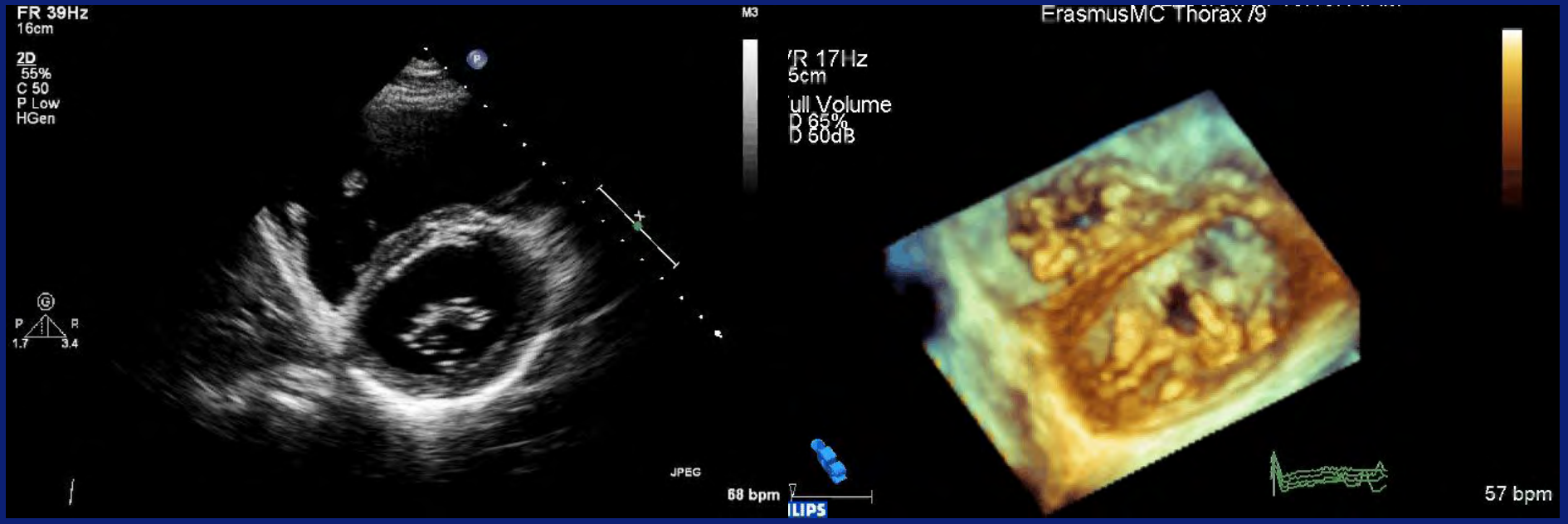


- Valve morphology
- Mechanism and grade of regurgitation
- Evaluation of valve apparatus



Left-sided AV valve

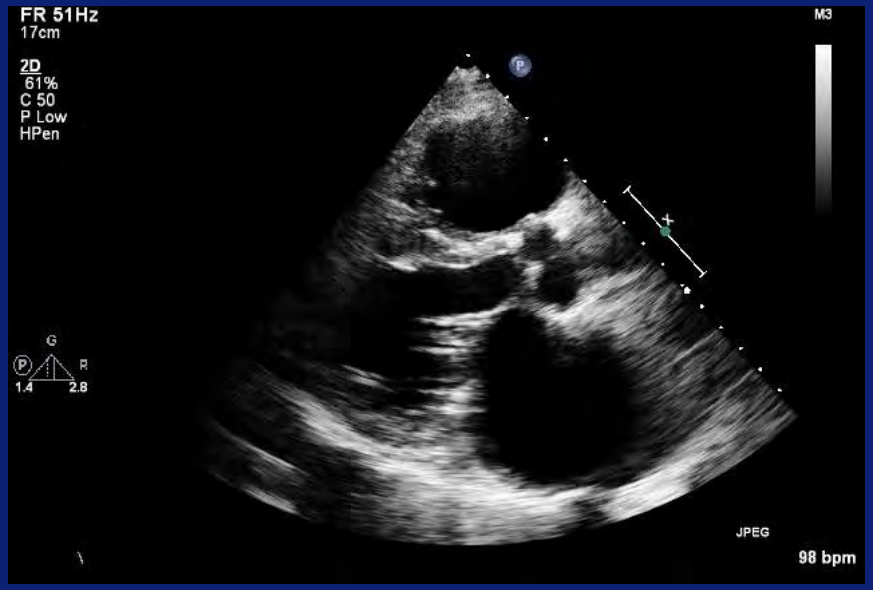
3D vs 2D echo

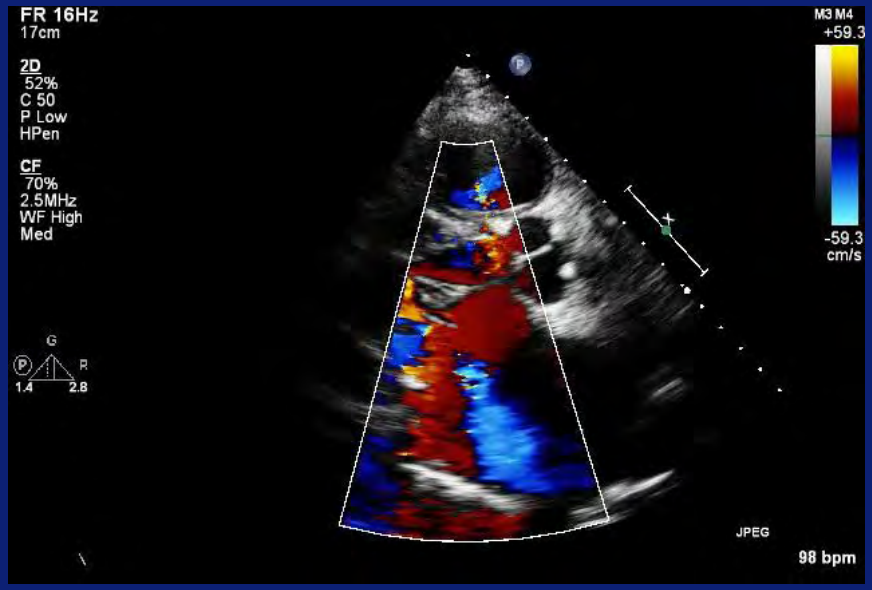


- 3 leaflets of the left AV valve
- commissure between anterior and posterior bridging leaflets

Left-sided AV valve regurgitation

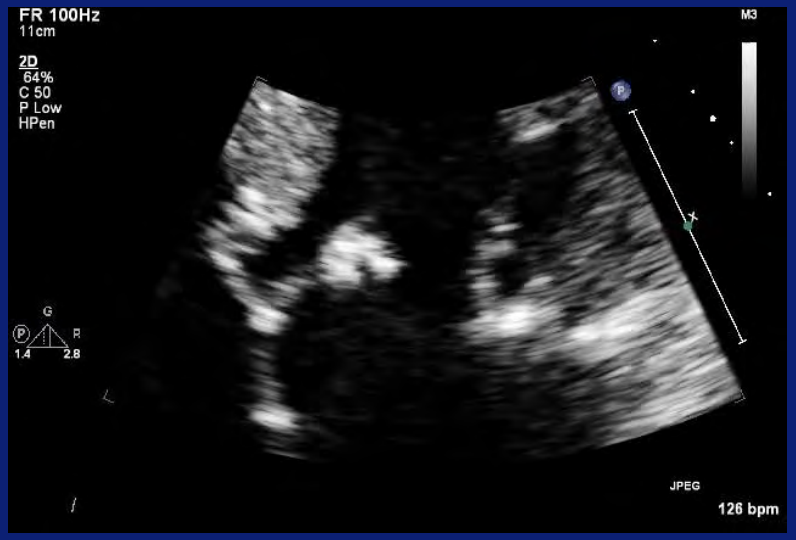
PLAX

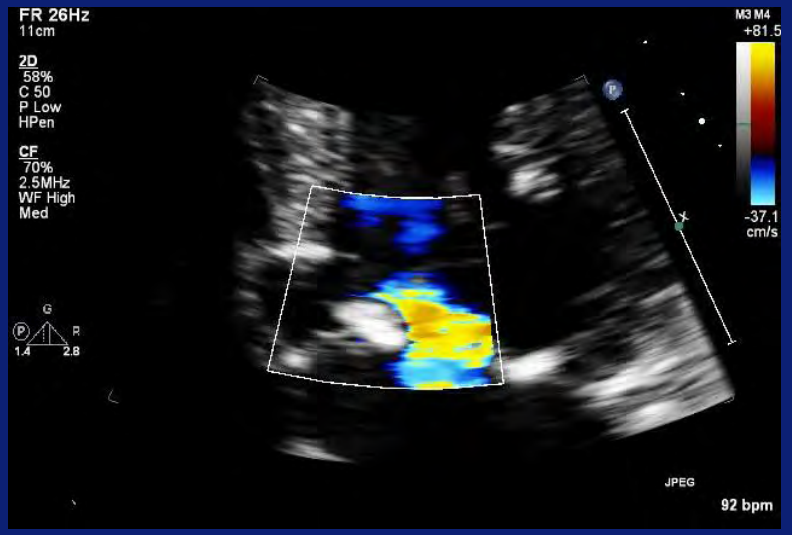




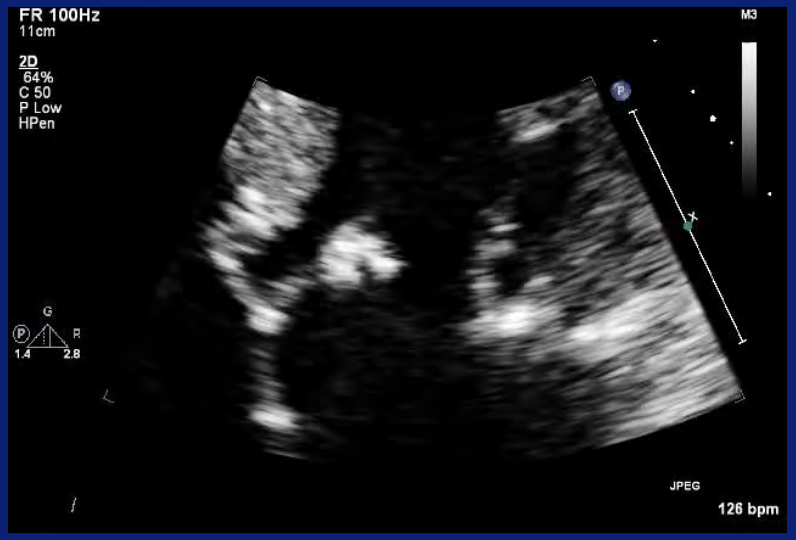
The commissure between the superior and inferior bridging leaflets is visualised in the parasternal long axis

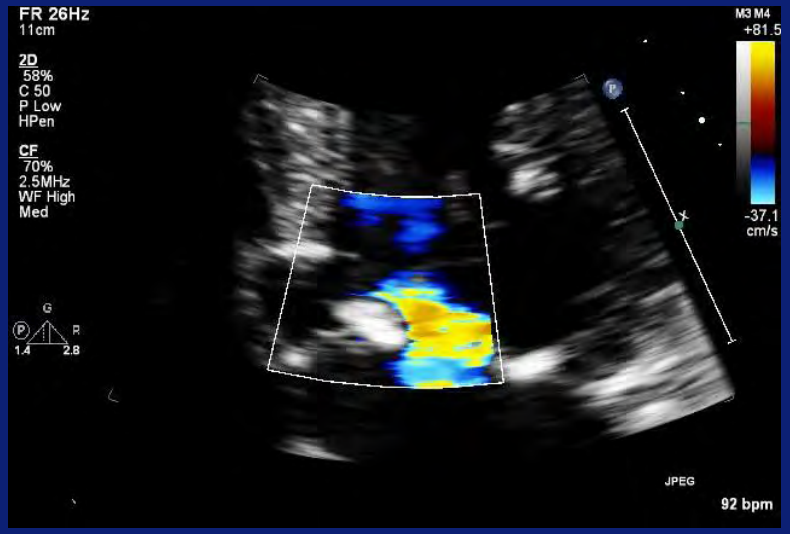
Residual AV-valve regurgitation

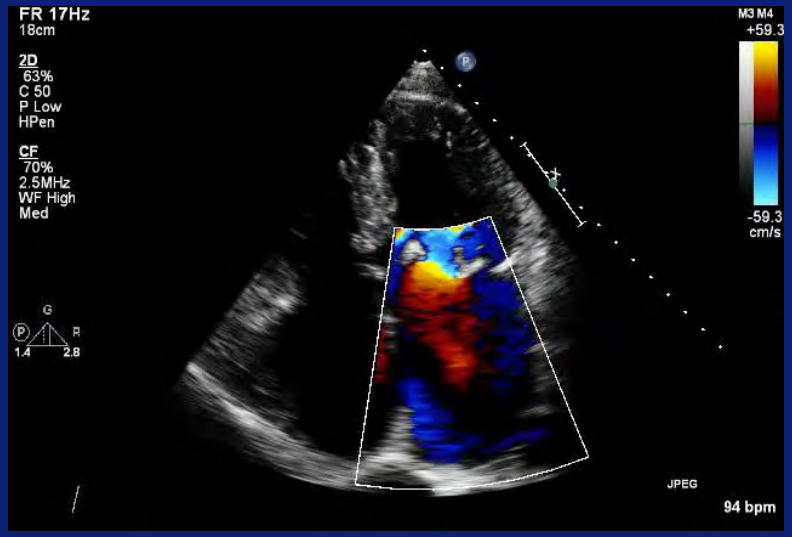




Residual AV-valve regurgitation





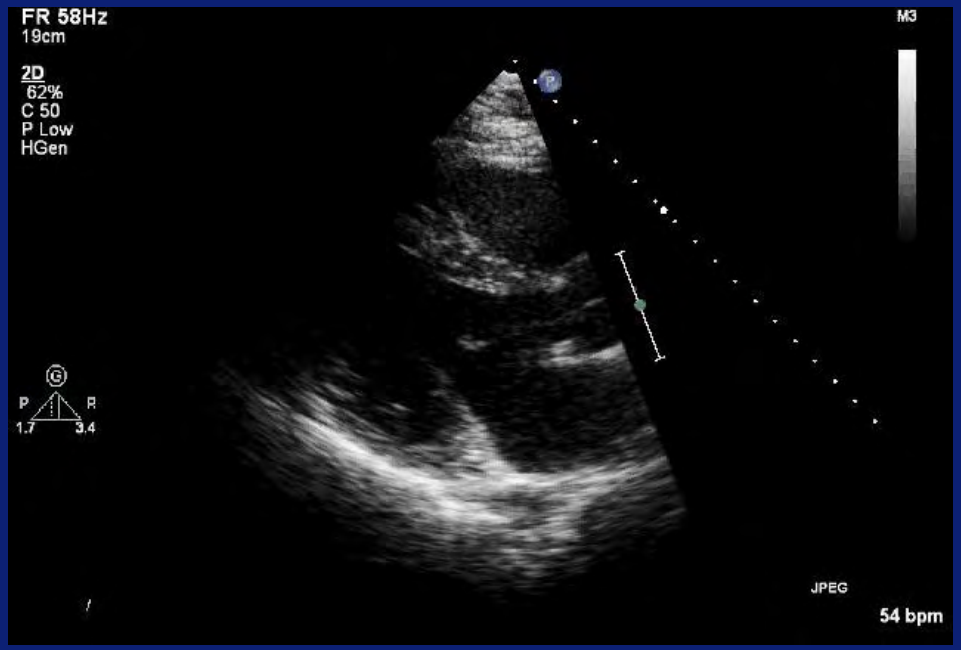


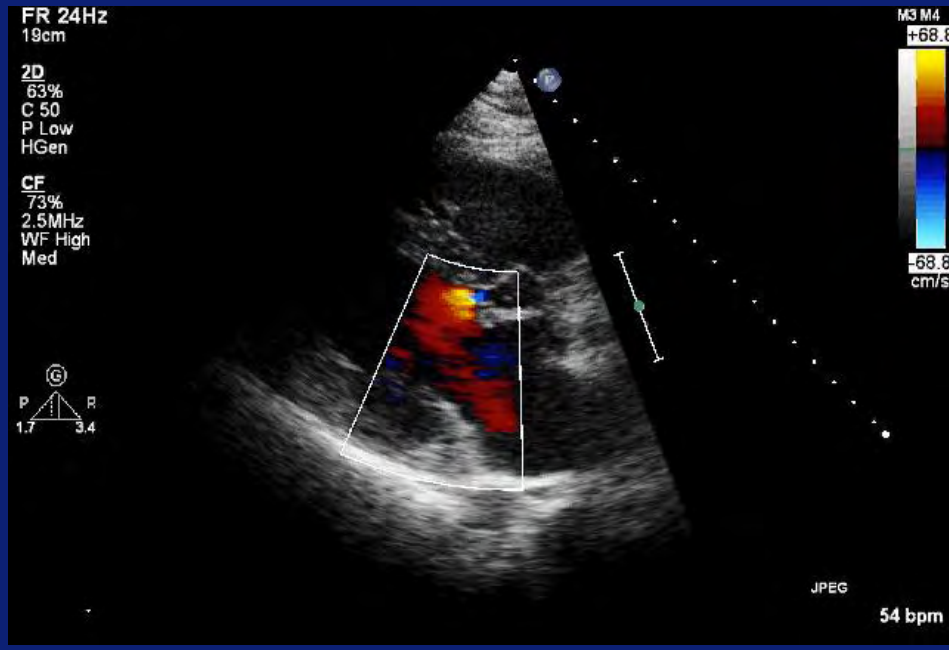
Casus

41 year old woman

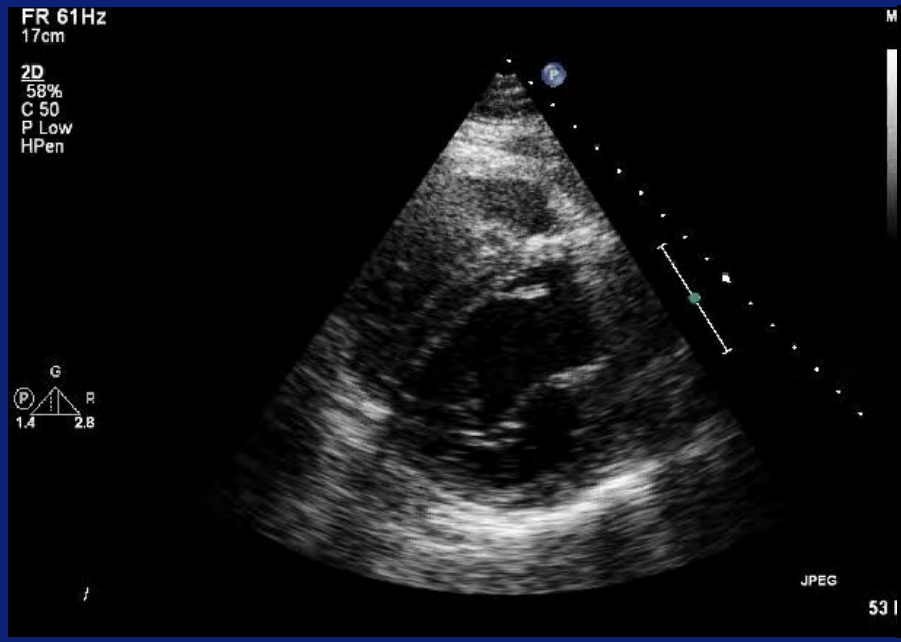
History: 1984 surgical correction of incomplete AVSD

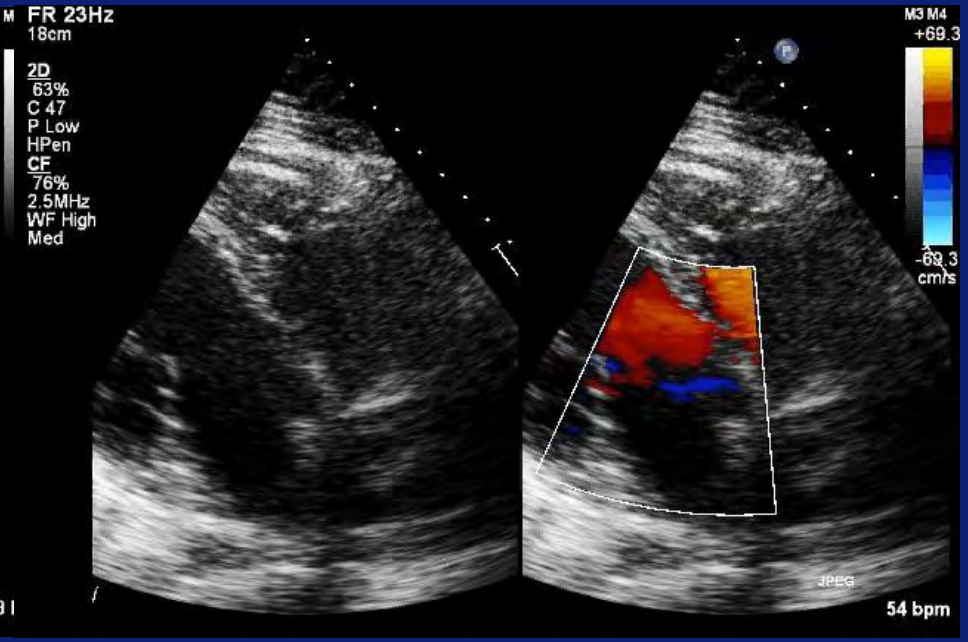
Note: Length 168 cm, weight 120 kg!





What is the mechanism of Left-sided AV valve regurgitation?

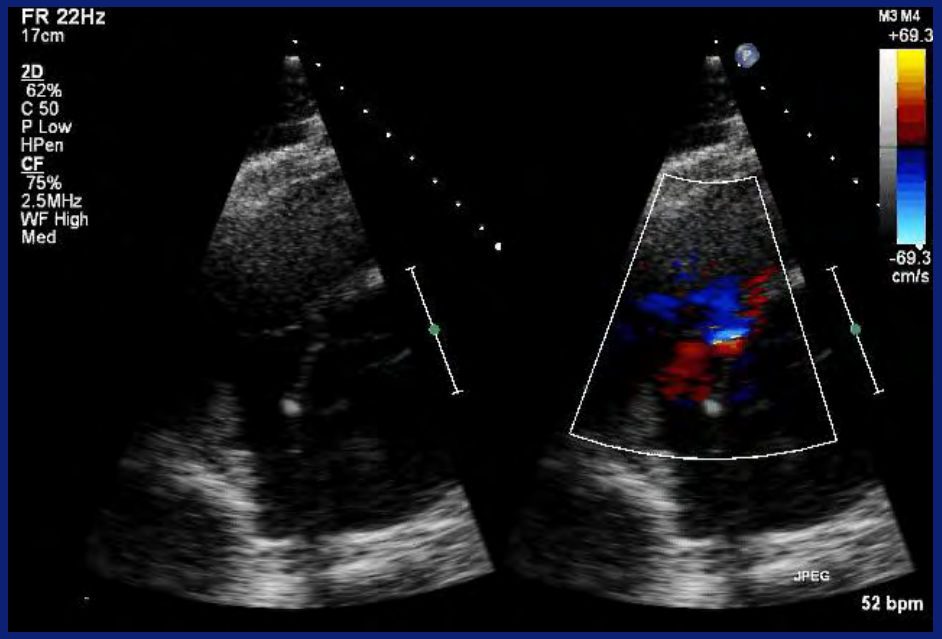


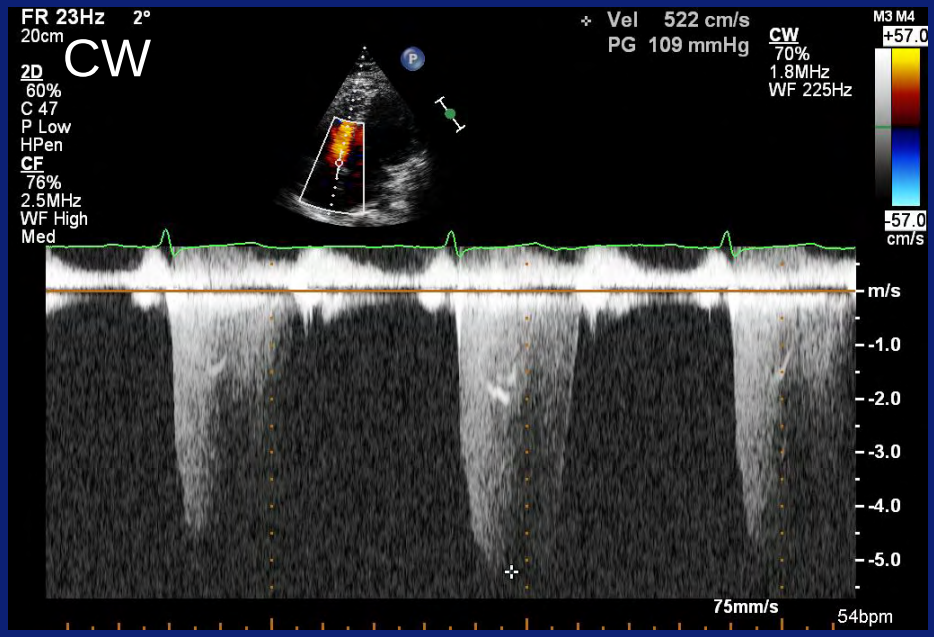


PSSAX

RV inflow

Right-sided AV valve

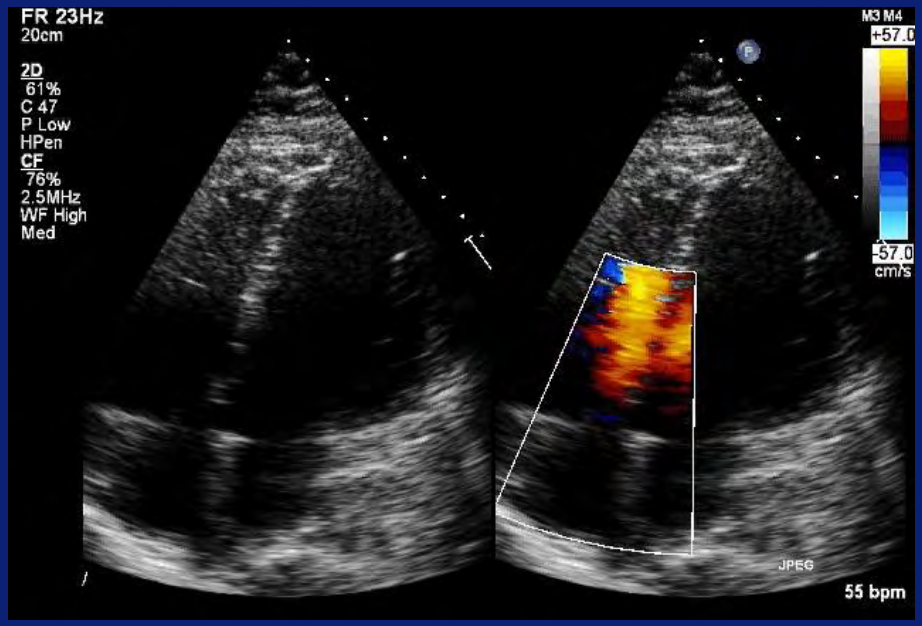




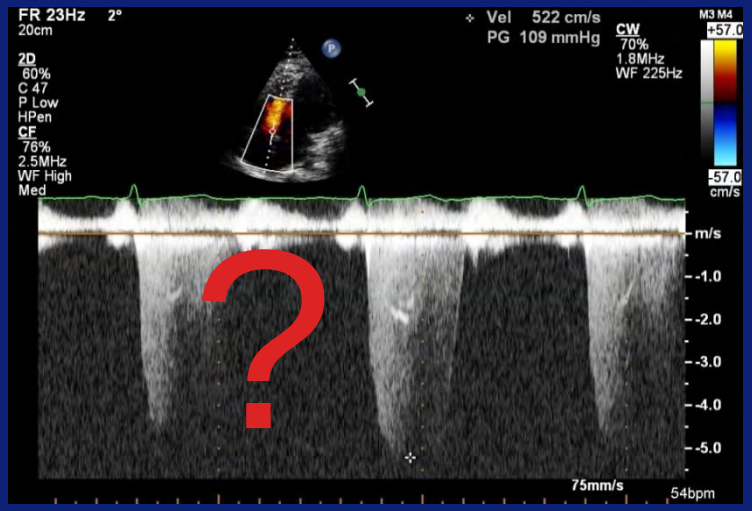
PSSAX

Vmax 5.2 m/s!

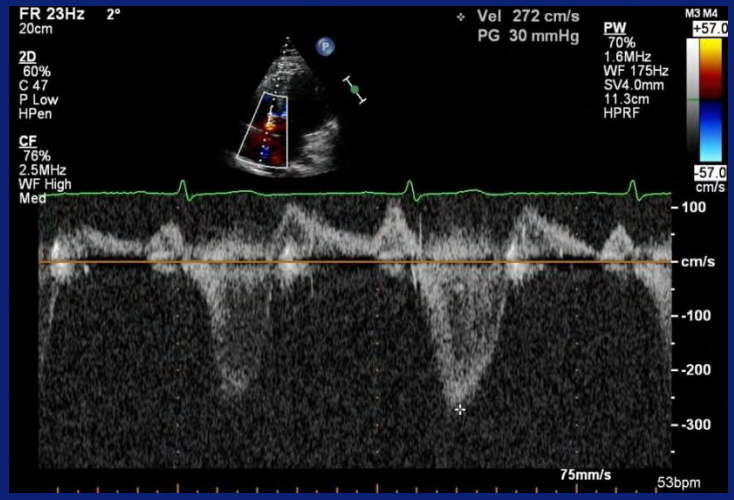
What do you think?



AP4CH

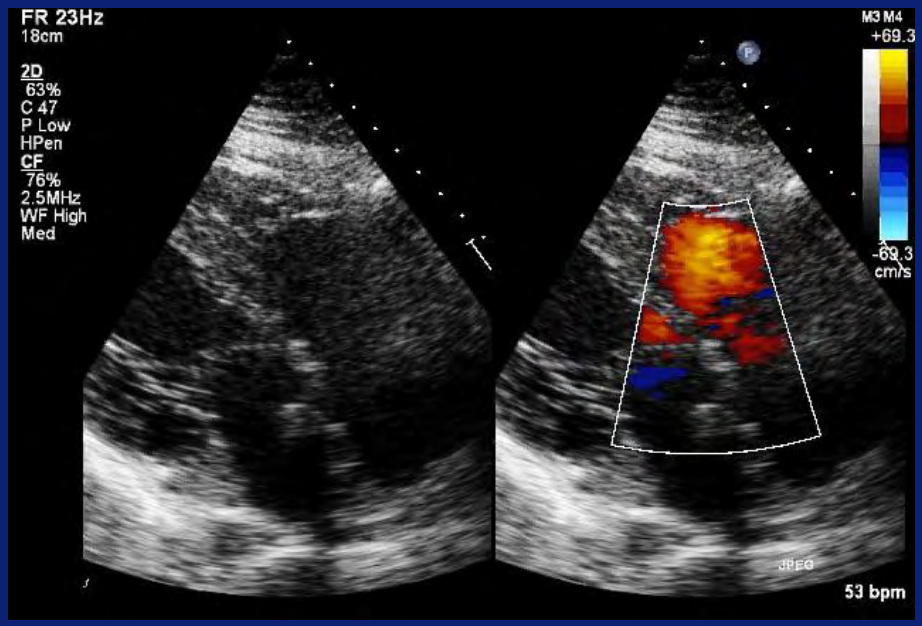


CW: Vmax 5.2 m/s

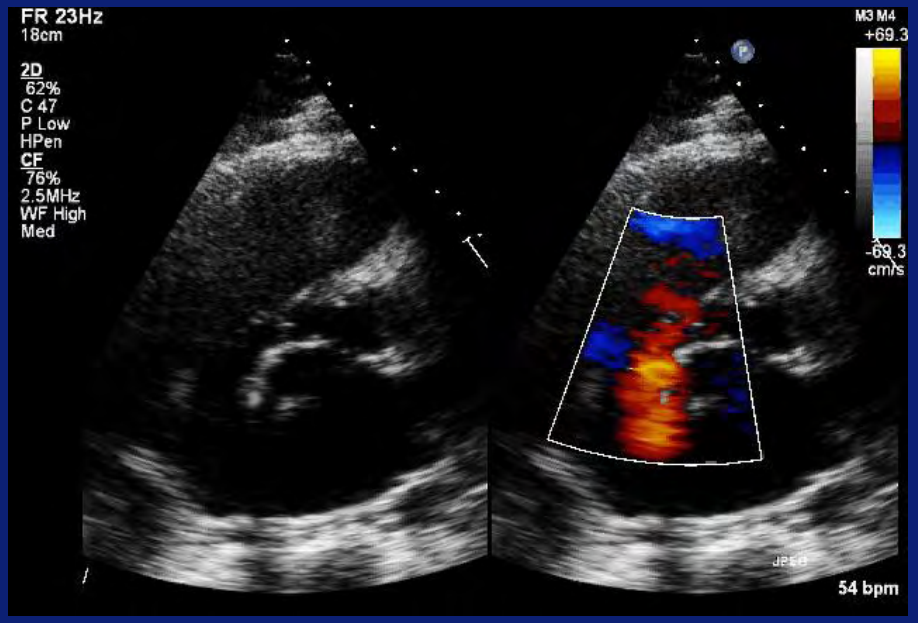


PW: Vmax 2.7 m/s

Shunt: What is its origin?



RV instroom



PSSAX

Shunt between the LV and RA throungh the AV junction

Summary

- Echocardiography has a key role in the diagnosis, management and long-term follow-up

- Use the echo protocol – especially for follow-up

- Echo gives excellent visualisation of anatomy
  - AV valves and regurgitation
  - ASD and VSD
  - hemodynamic evaluation

Summary

Postoperative follow-up

- **First time at the ACHD outpatients clinic:**

  - Complete work-up

  - Special attention for residual shunts, AV-valve regurgitation, LVOT obstruction and PH

- **Short echo protocol:**

  - LV dimensions and function (3D)

  - LA volumes

  - RVSP


Thank you for your attention