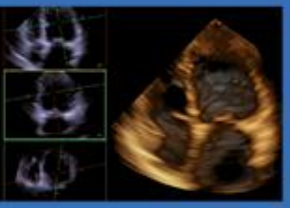


EuroValve
April 26-27, 2018

Interactive session: what is your diagnosis?

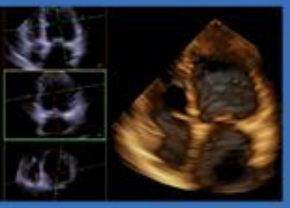
A pitfall

Augustin COISNE, MD, PhD Student

Department of Echocardiography and Cardiovascular Explorations

Heart Valve Clinic

Lille University Hospital
augustin.coisne@chru-lille.fr



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Faculty disclosure

AUGUSTIN - COISNE

I have **no financial relationships** to disclose.

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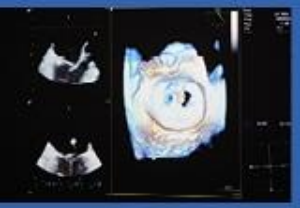
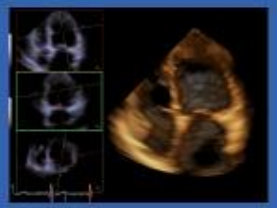
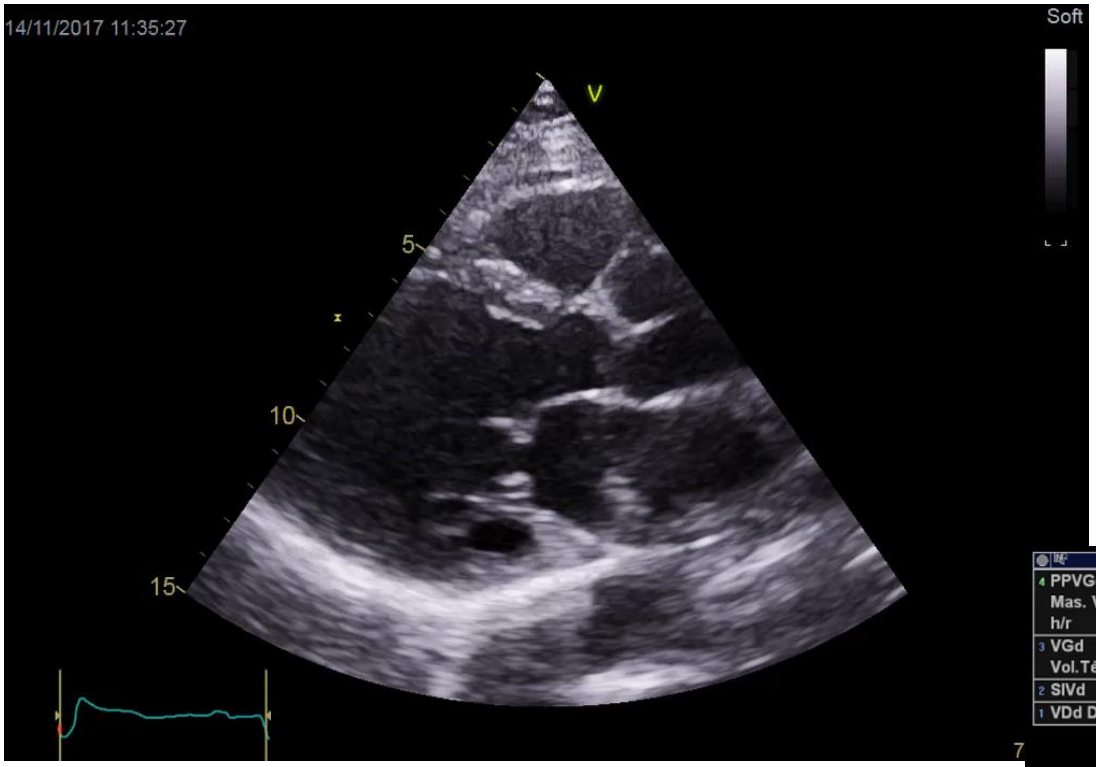
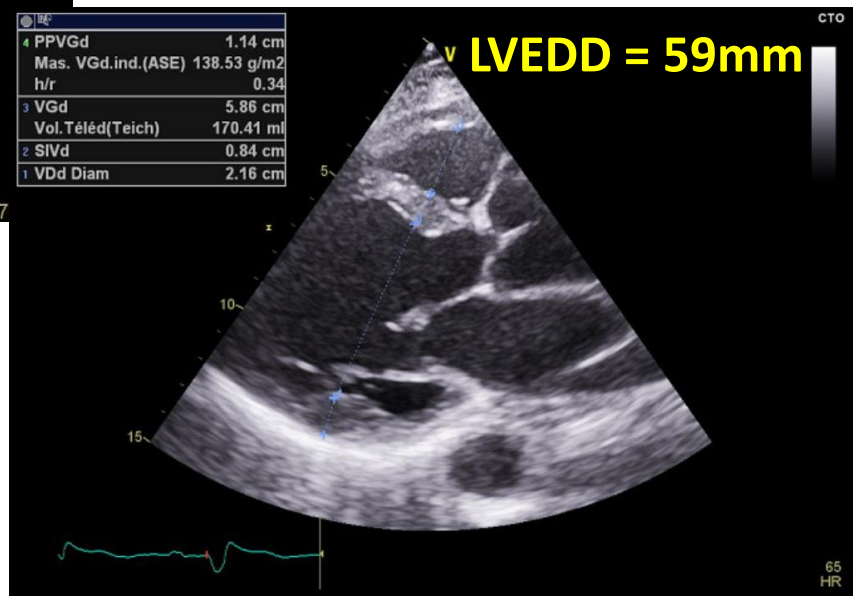
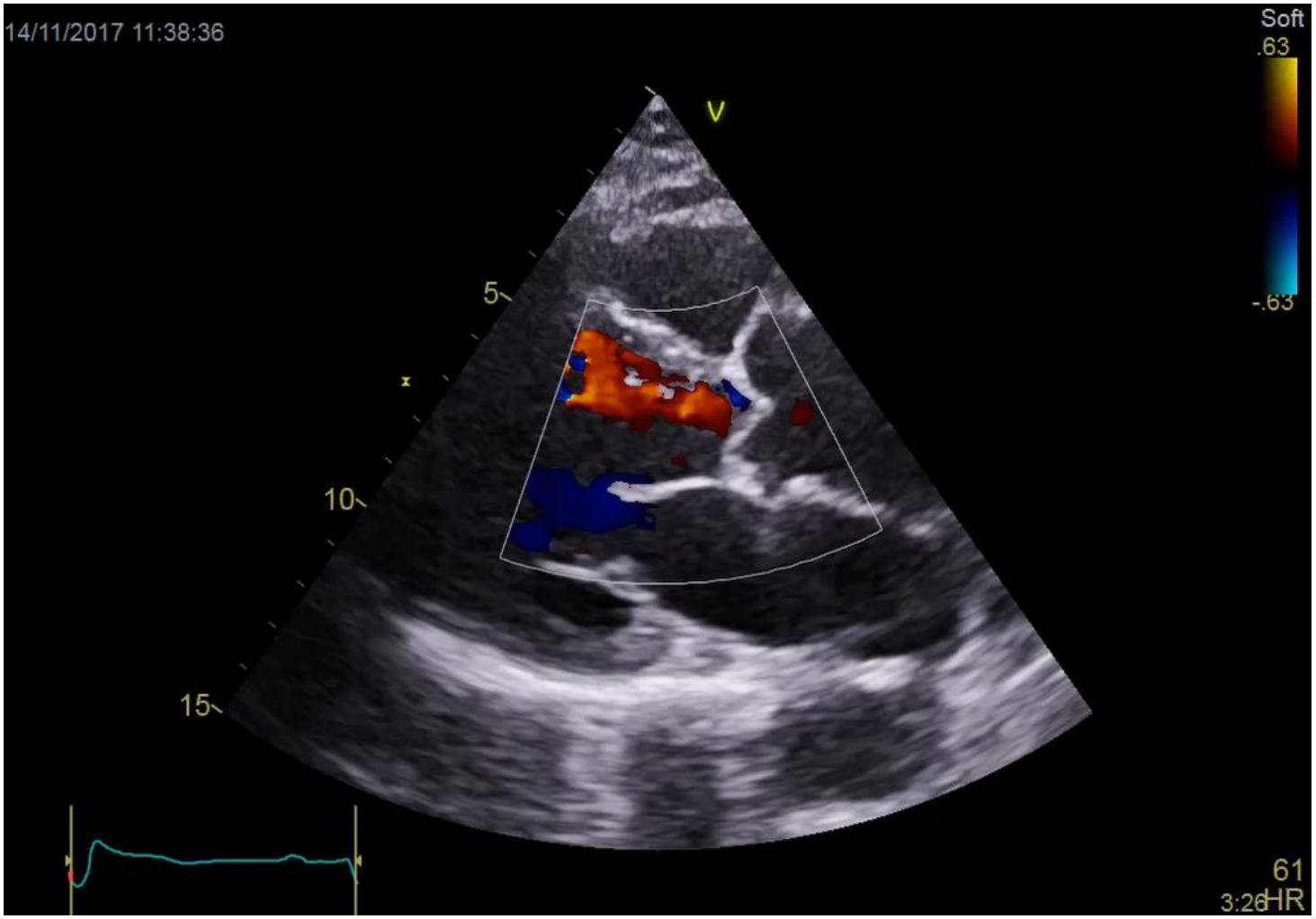
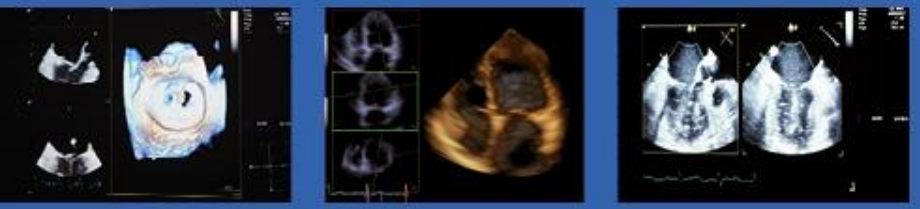




- 45 yo, Height: 1m75, Weight: 60kg -> BSA = 1.7m²
- No medical history
- No treatment
- No symptoms but diastolic murmur
- Very good condition, Hiking 10km at weekends
- Addressed for the reevaluation of a severe AR in order to perform cardiac surgery
- BP before TTE : 139/89 mmHg


14/11/2017 11:35:27
Soft
V
5
10
15


PPVGd 1.14 cm
Mas. VGd.ind.(ASE) 138.53 g/m2
h/r 0.34
VGd 5.86 cm
Vol.Téléd(Teich) 170.41 ml
SIVd 0.84 cm
VDd Diam 2.16 cm
CTO
V
LVEDD = 59mm
5
10
15
65
HR


14/11/2017 11:38:36
Soft
.63
-.63
V
5
10
15
61
HR



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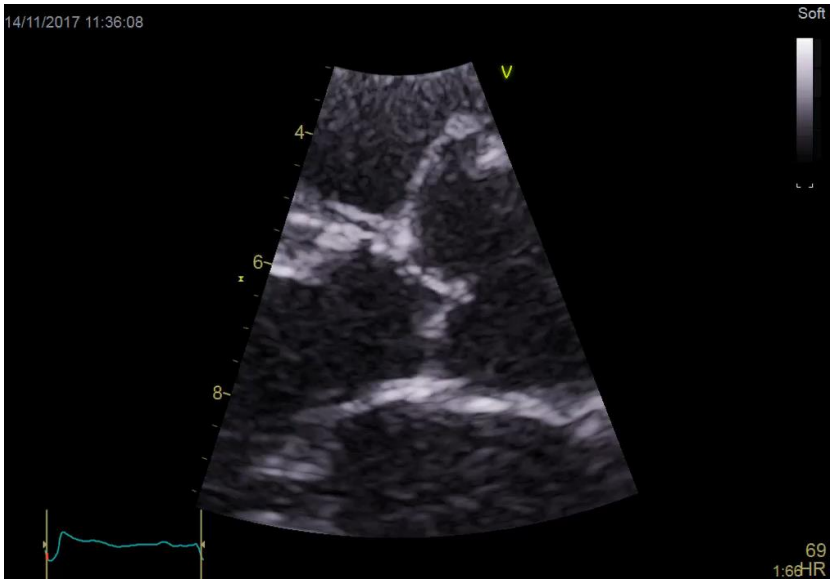
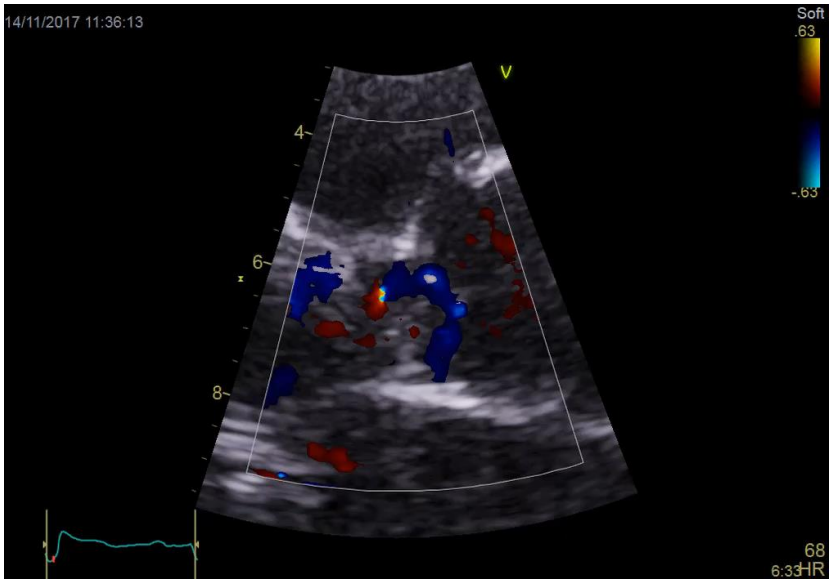
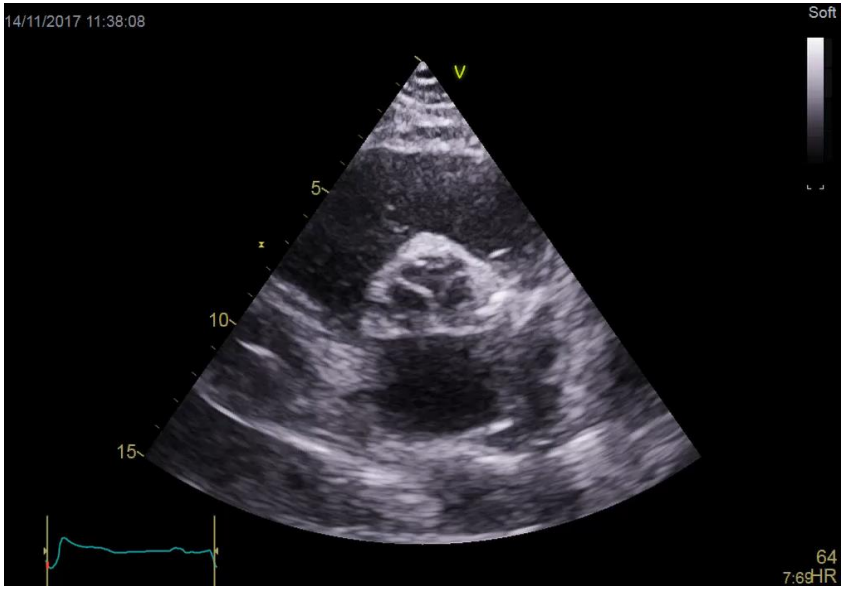
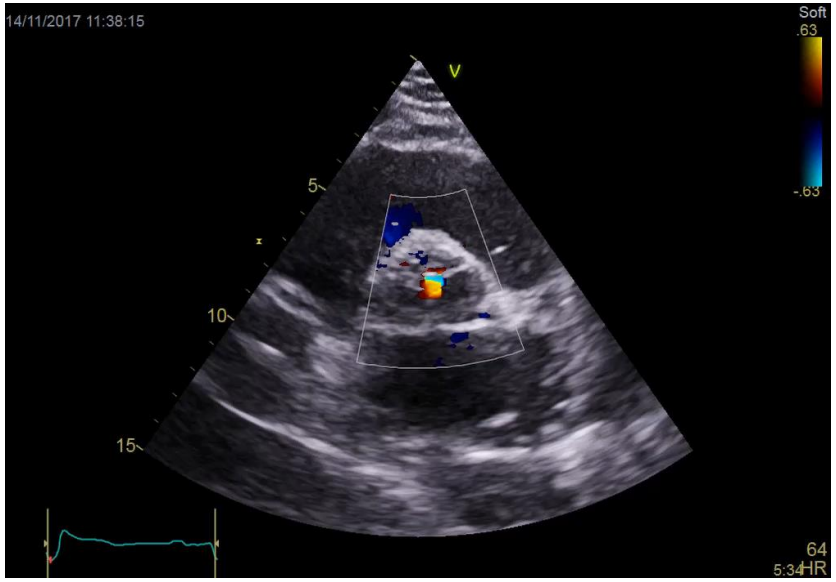
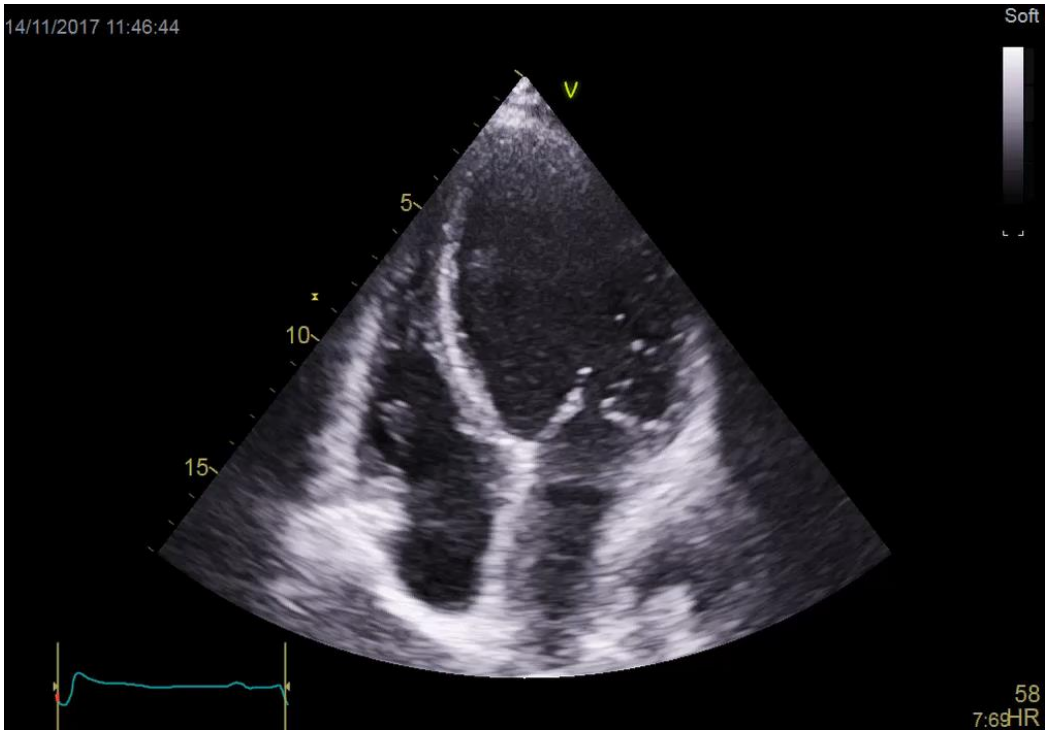






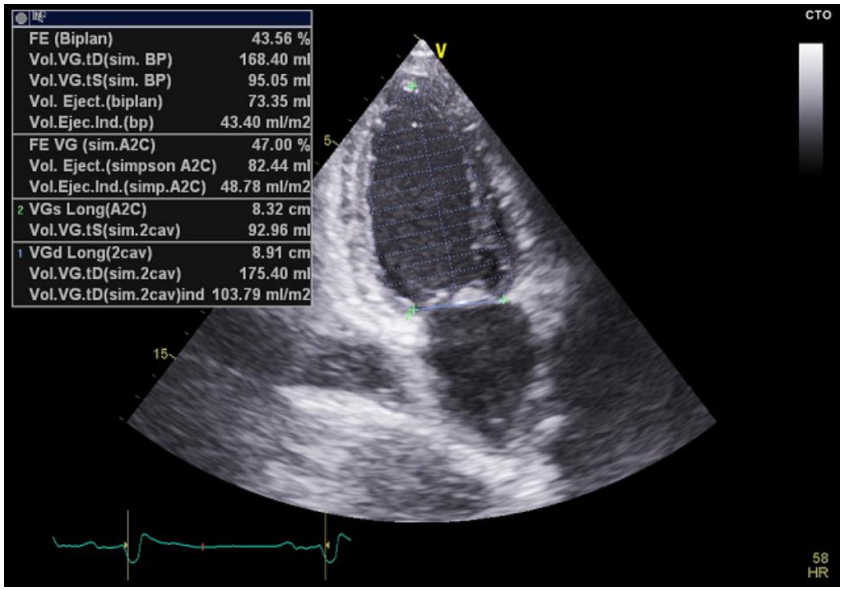


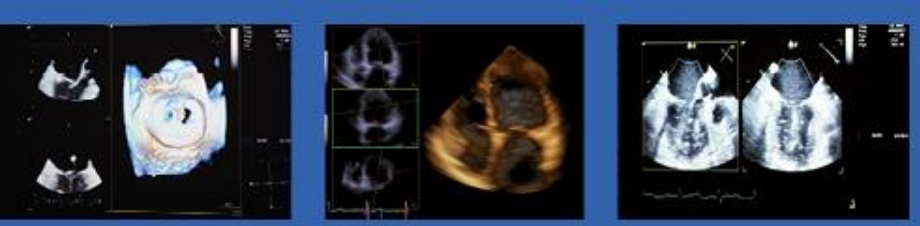


LVEF = 43%

LVEDV = 168ml

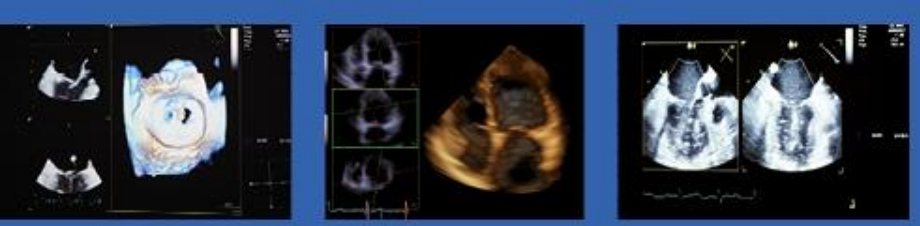
99ml/m²





Do you perform cardiac surgery?

A. Yes
B. No
C. Ascending aorta measurement is missing



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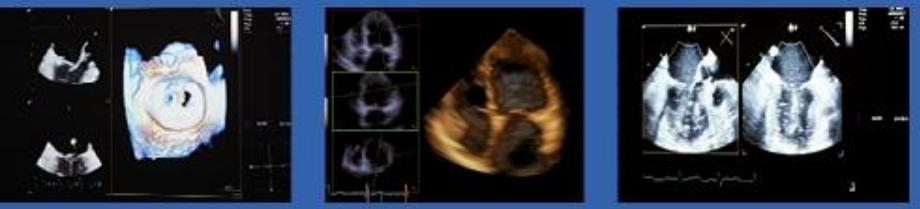

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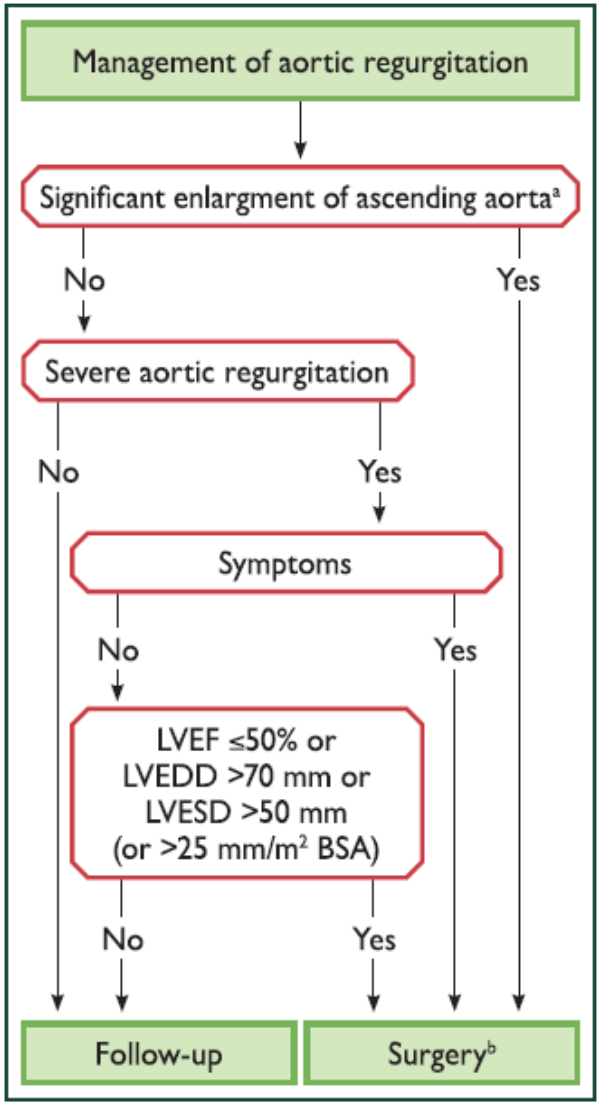
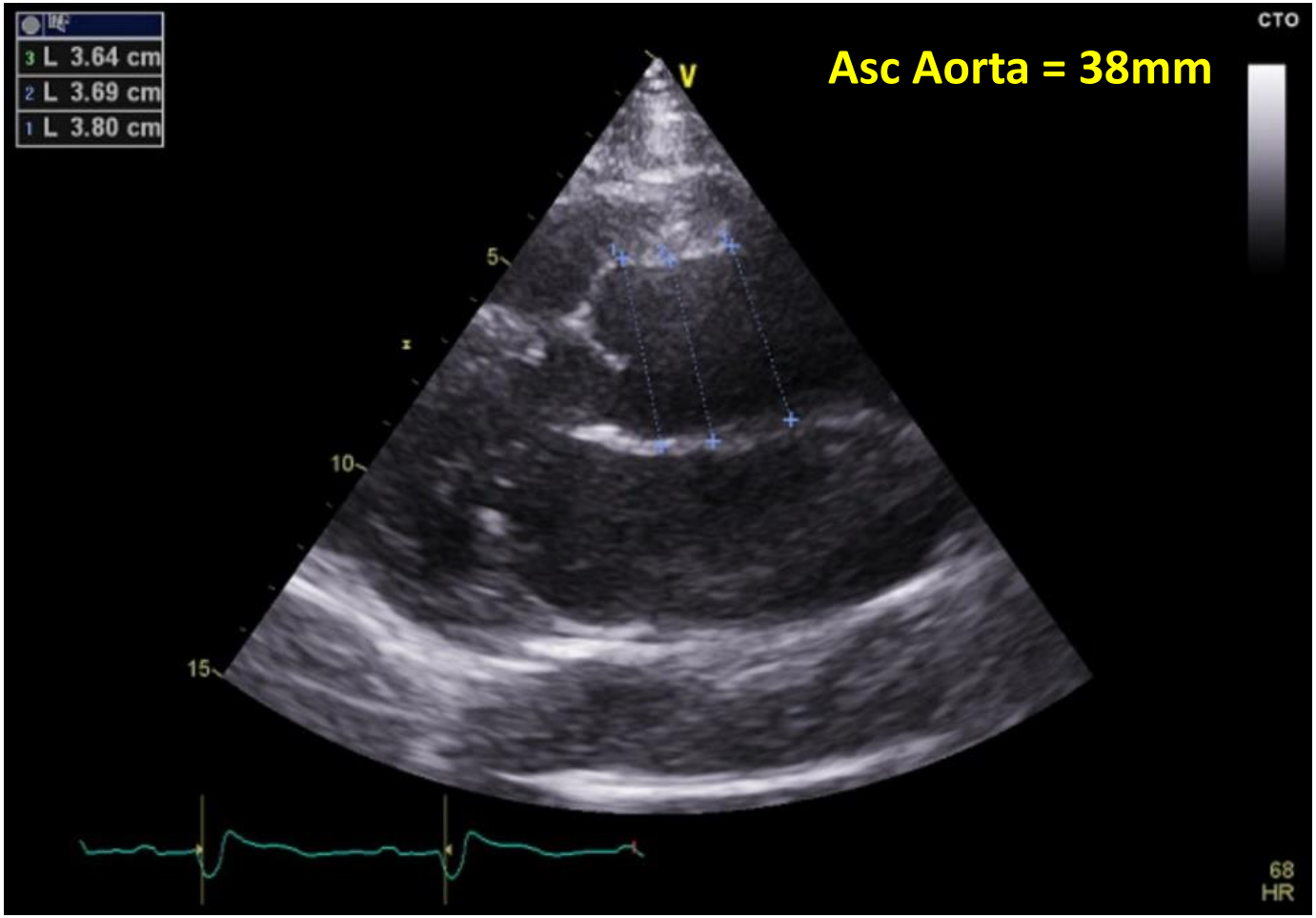
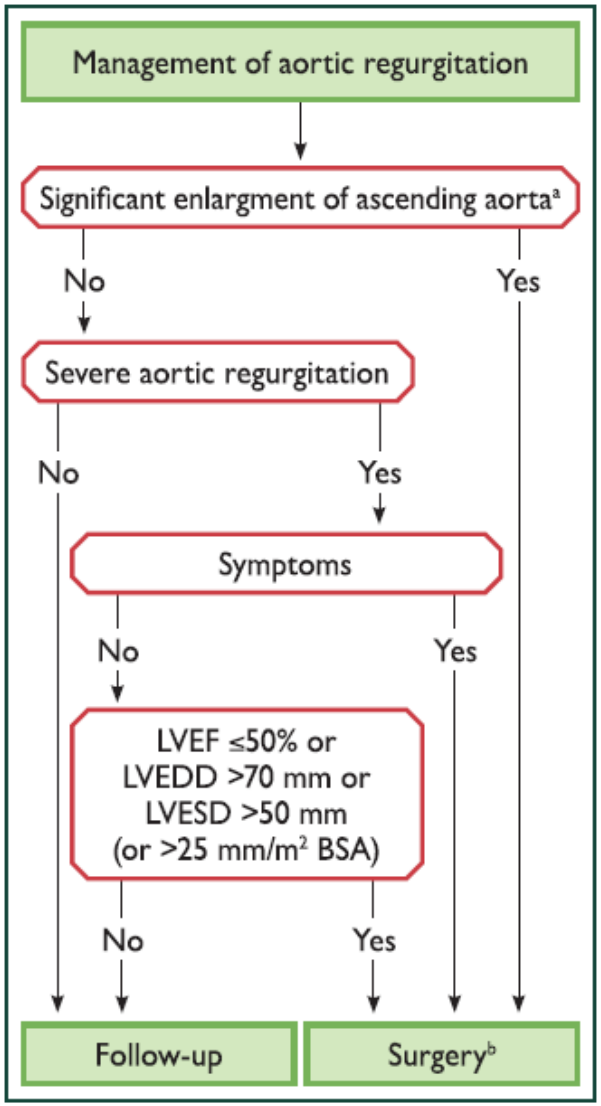


B. Aortic root or tubular ascending aortic aneurysm[d] (irrespective of the severity of aortic regurgitation)		
Aortic valve repair, using the reimplantation or remodelling with aortic annuloplasty technique, is recommended in young patients with aortic root dilation and tricuspid aortic valves, when performed by experienced surgeons.	I	C
Surgery is indicated in patients with Marfan syndrome who have aortic root disease with a maximal ascending aortic diameter ≥50 mm.	I	C
Surgery should be considered in patients who have aortic root disease with maximal ascending aortic diameter:	IIa	C
• ≥45 mm in the presence of Marfan syndrome and additional risk factors[e] or patients with a *TGFBR1* or *TGFBR2* mutation (including Loeys–Dietz syndrome).[f]	IIa	C
• ≥50 mm in the presence of a bicuspid valve with additional risk factors[e] or coarctation.	IIa	C
• ≥55 mm for all other patients.	IIa	C
When surgery is primarily indicated for the aortic valve, replacement of the aortic root or tubular ascending aorta should be considered when ≥45 mm, particularly in the presence of a bicuspid valve.[g]	IIa	C

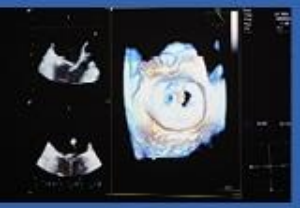
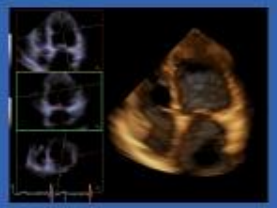
Baumgartner et al. European Heart Journal (2017) 38, 2739–2791


3 L 3.64 cm
2 L 3.69 cm
1 L 3.80 cm
Asc Aorta = 38mm
CTO
5
10
15
68
HR



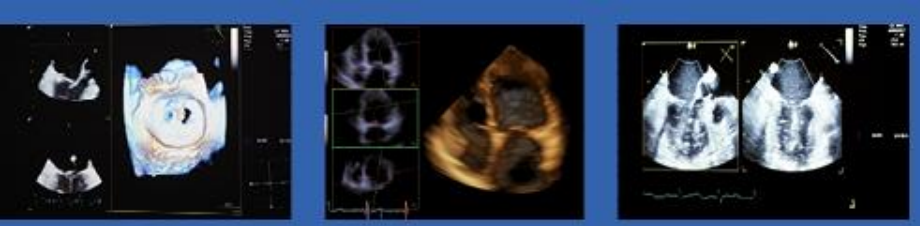
Indications for surgery	Class[a]	Level[b]
A. Severe aortic regurgitation		
Surgery is indicated in symptomatic patients.[57,58,66,67]	I	B
Surgery is indicated in asymptomatic patients with resting LVEF ≤50%.[57,58]	I	B
Surgery is indicated in patients undergoing CABG or surgery of the ascending aorta or of another valve.	I	C
Heart Team discussion is recommended in selected patients[c] in whom aortic valve repair may be a feasible alternative to valve replacement.	I	C
Surgery should be considered in asymptomatic patients with resting ejection fraction >50% with severe LV dilatation: LVEDD >70 mm or LVESD >50 mm (or LVESD >25 mm/m² BSA in patients with small body size).[58,66]	IIa	B

Baumgartner et al. European Heart Journal (2017) 38, 2739–2791

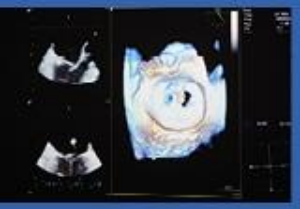
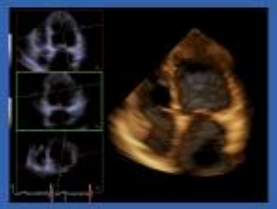
	Aortic regurgitation
Qualitative	
Valve morphology	Abnormal/flail/large coaptation defect
Colour flow regurgitant jet	Large in central jets, variable in eccentric jets[a]
CW signal of regurgitant jet	Dense
Other	Holodiastolic flow reversal in descending aorta (EDV >20 cm/s)
Semiquantitative	
Vena contracta width (mm)	>6
Upstream vein flow[c]	–
Inflow	–
Other	Pressure half-time <200 ms[f]
Quantitative	
EROA (mm^2)	≥30
Regurgitant volume (mL/beat)	≥60
+ enlargement of cardiac chambers/vessels	LV

Lancellotti et al. European Journal of Echocardiography (2010) 11, 307–332



What is the AR severity ?

A. Mild
B. Moderate
C. Severe
D. AR quantification is not complete

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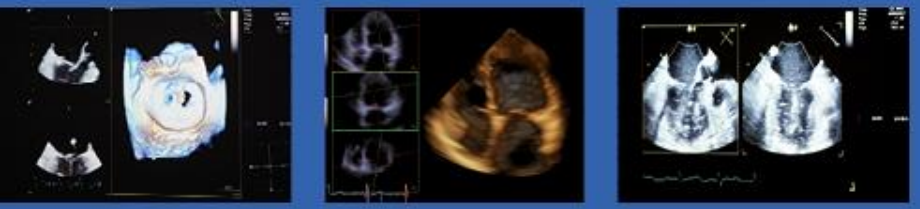

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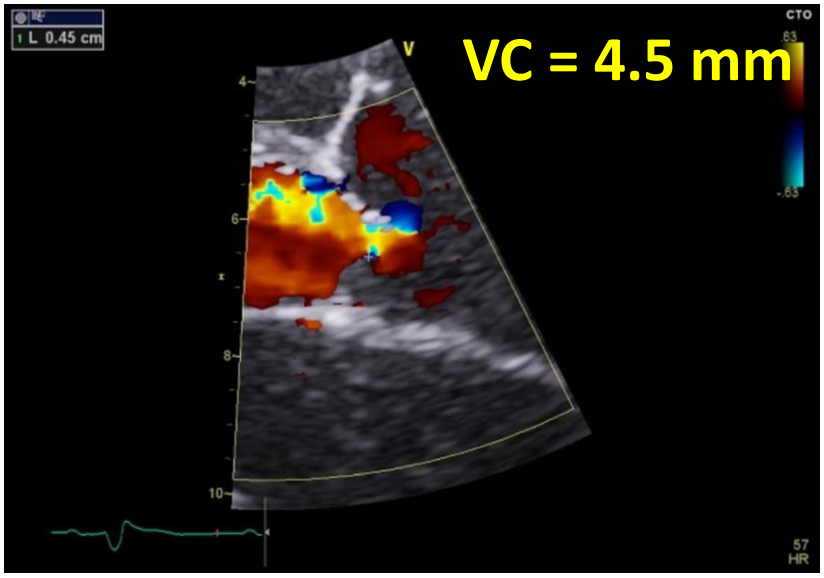
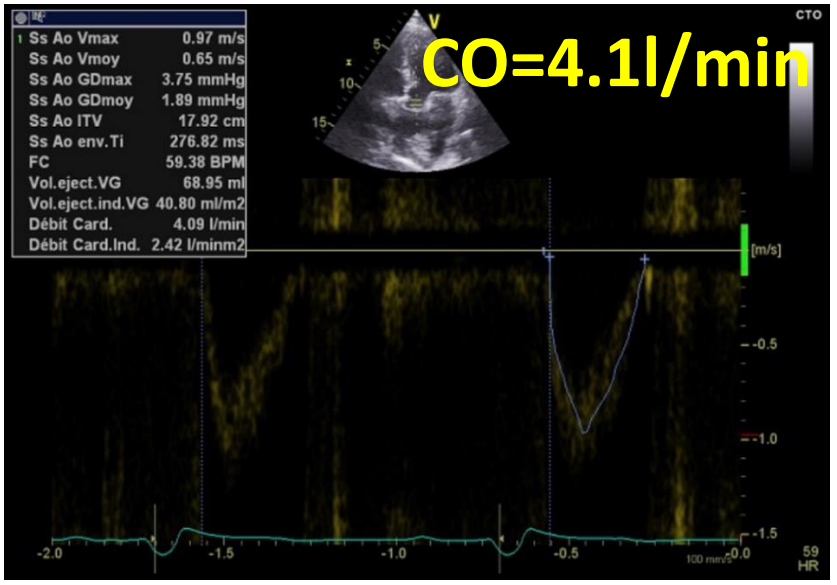
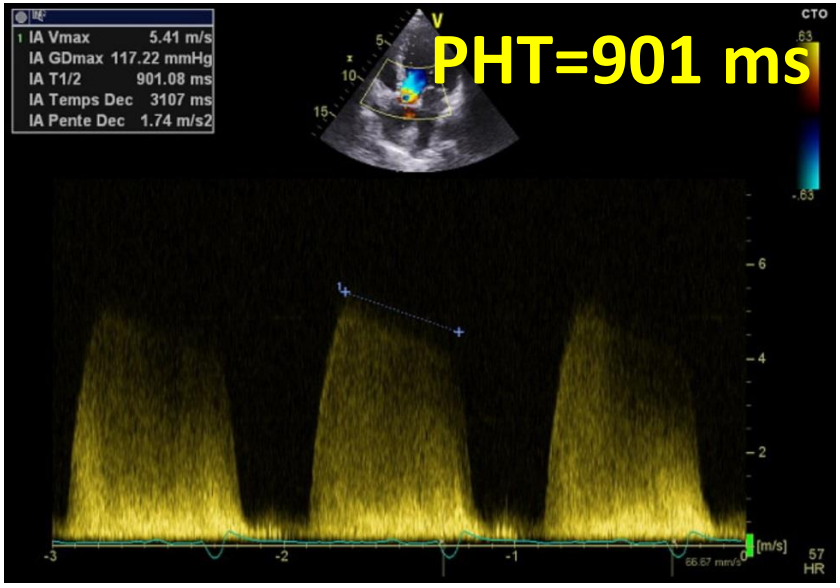


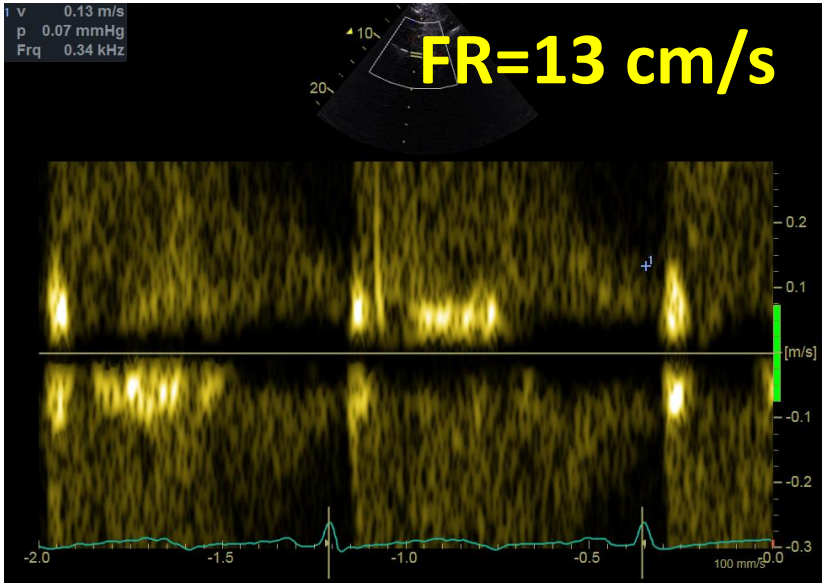
VC = 4.5 mm



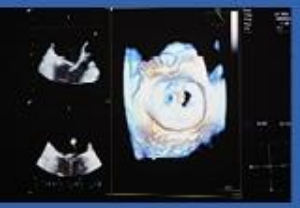
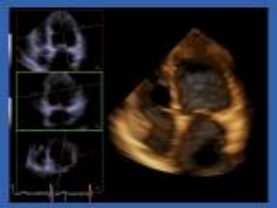
CO=4.1l/min



PHT=901 ms

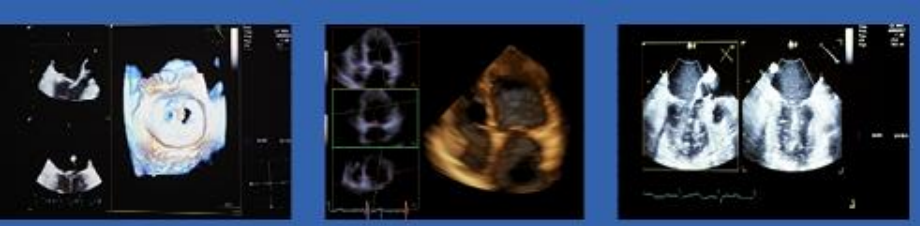


FR=13 cm/s

Which semiquantitative parameter is the most accurate ?

A. Cardiac Output
B. Vena Contracta Width
C. Pressure Half Time
D. Holodiastolic flow reversal in descending aorta



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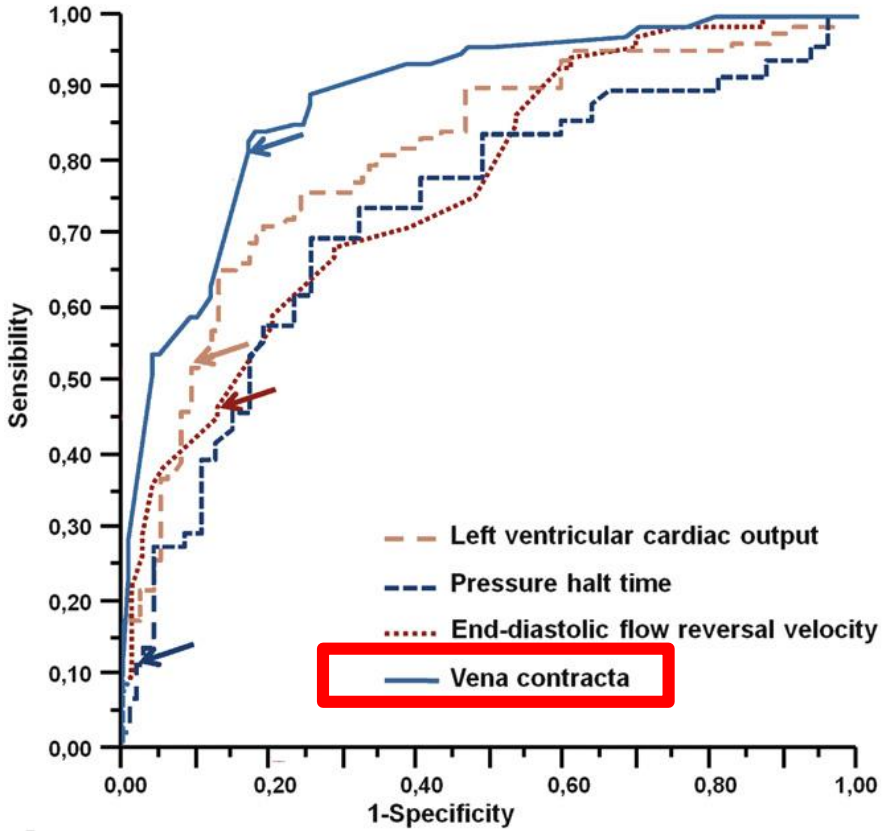


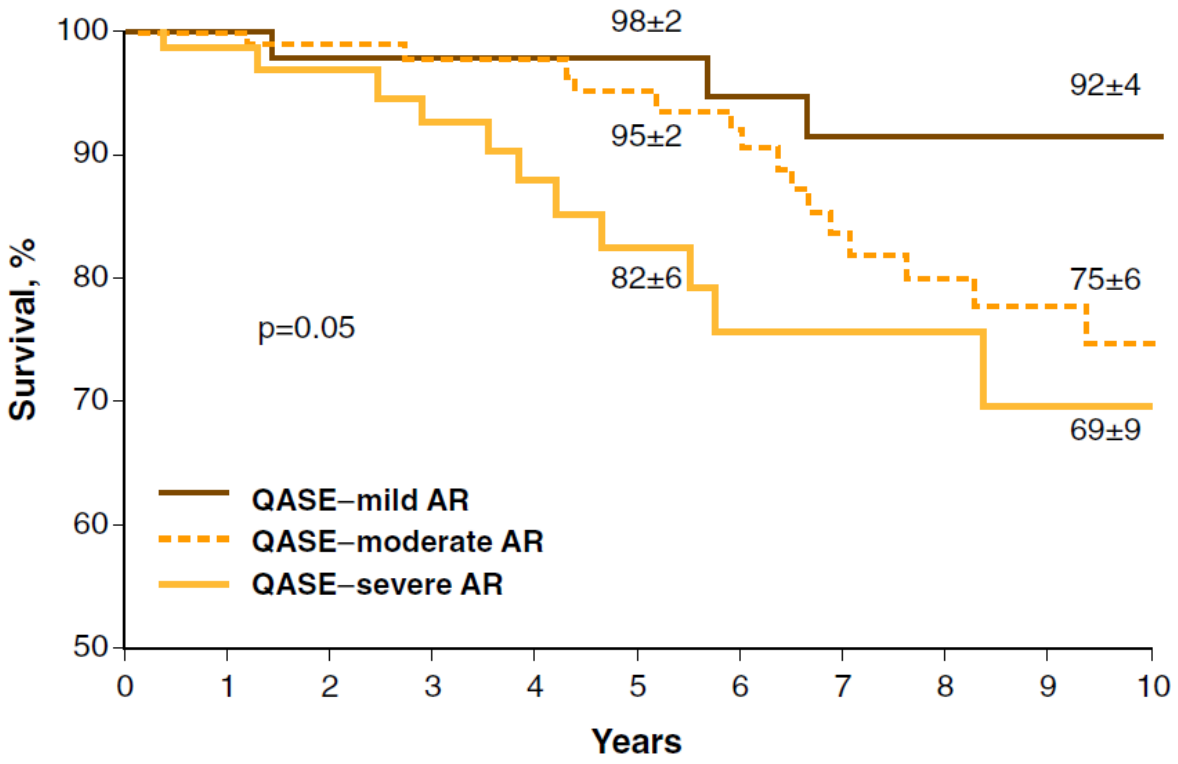
Detaint et al. JACC Img 2008. 2000. Messika-Zeitoun et al. JASE 2011.

Table 4 Diagnostic value of various thresholds of diastolic VC for severe AR (performed in 173 patients)

VC (mm)	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
3	100	13	47	100
4	97	32	52	94
5	93	61	65	92
6*	81	83	78	85
7	51	96	90	72
8	23	99	94	63
9	8	100	100	59

Detaint et al. JACC Img 2008. Tribouilloy et al. Circulation 2000. Messika-Zeitoun et al. JASE 2011.

Quantification predicts outcomes …

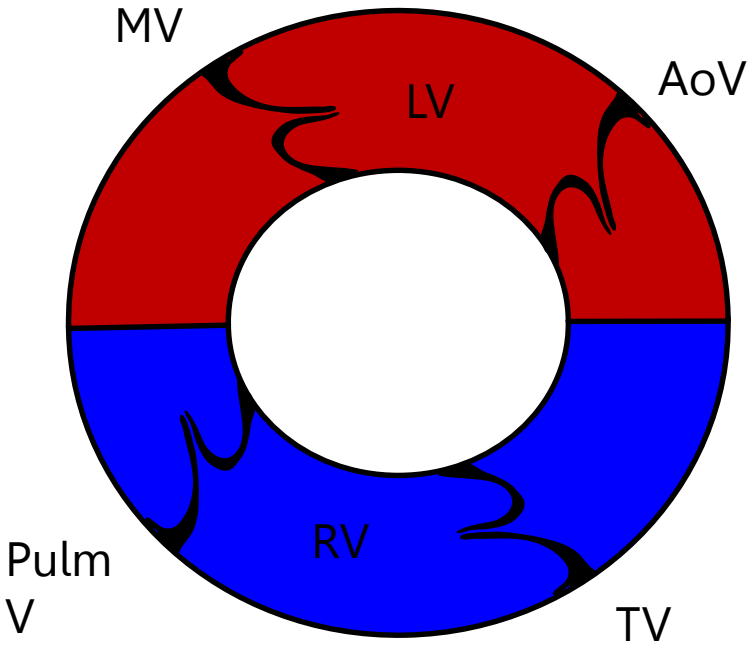


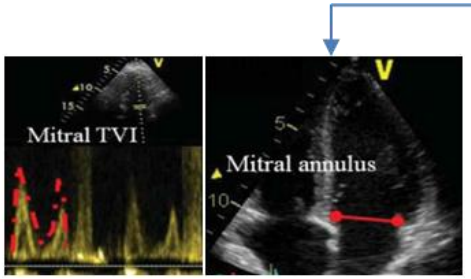
Detaint et al. JACC Img 2008

In Physiology … all stroke volumes are equal

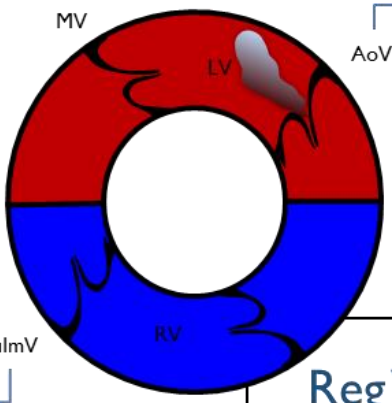
In patient with isolated AR …

Ao Stroke Volume
=
LV Stroke Volume
=
Systemic Stroke Volume
+
Regurgitant Volume

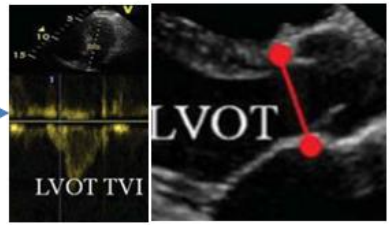




MV

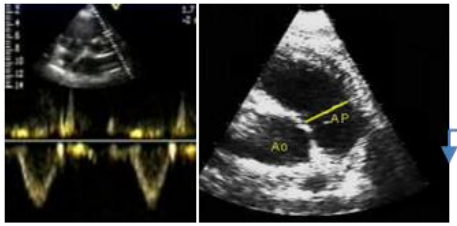


AoV



or

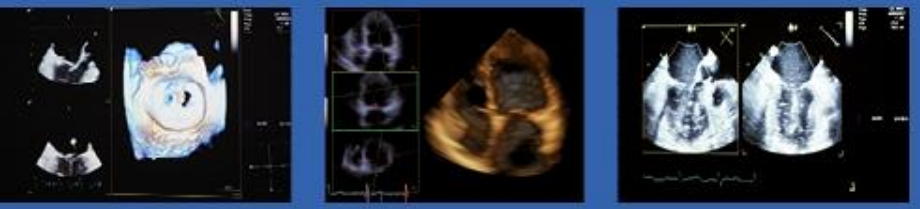
PulmV



Reg Volume = LVOT SV – systemic SV

ERO = Reg Vol / Reg TVI

Enriquez-Sarano et al. Circulation 1993. Tribouilloy et al. JACC 1998
Messika-Zeitoun et al. JASE 2011. Detaint et al. JACC Img 2008



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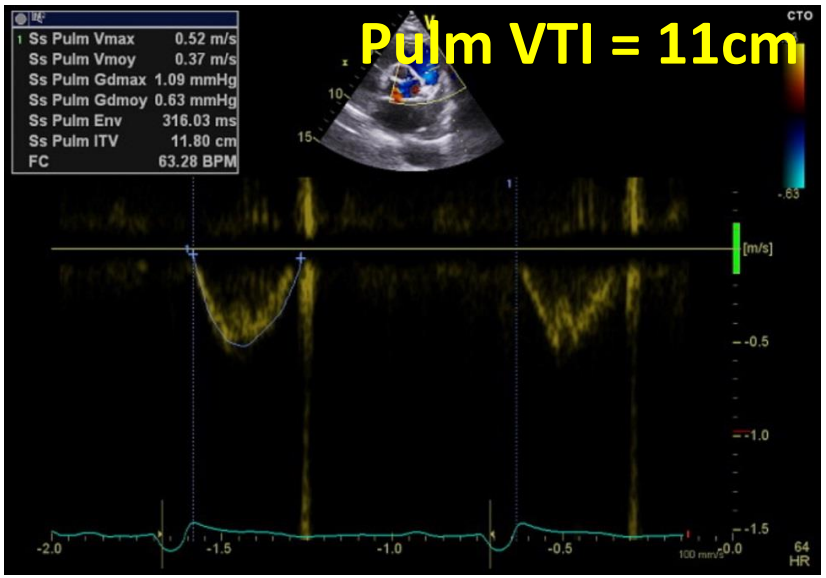
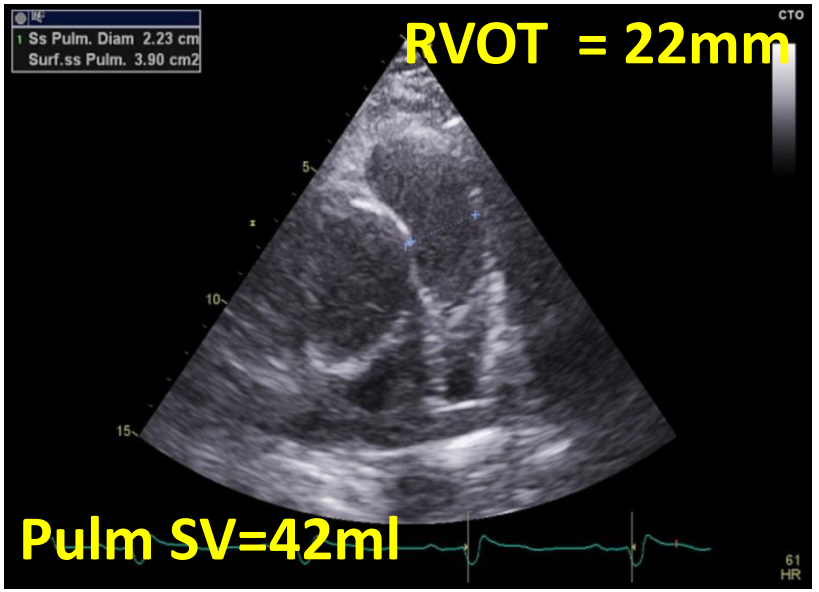
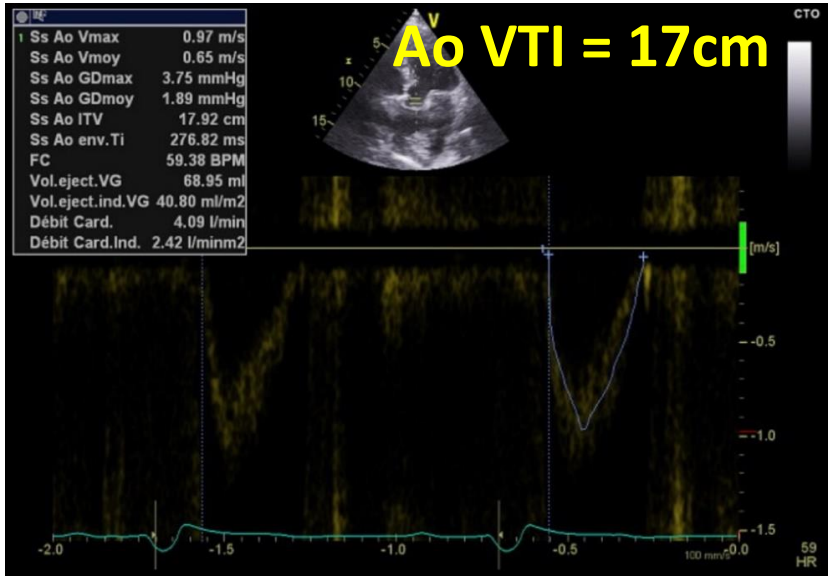
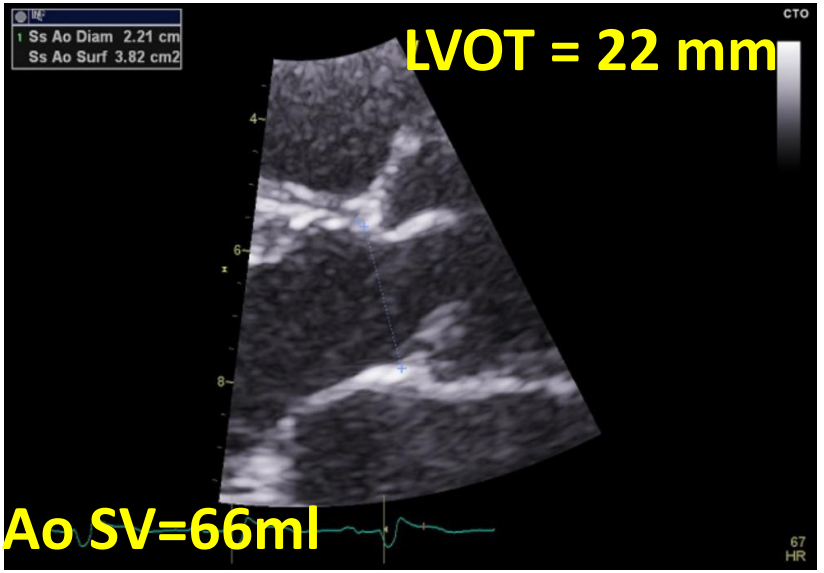
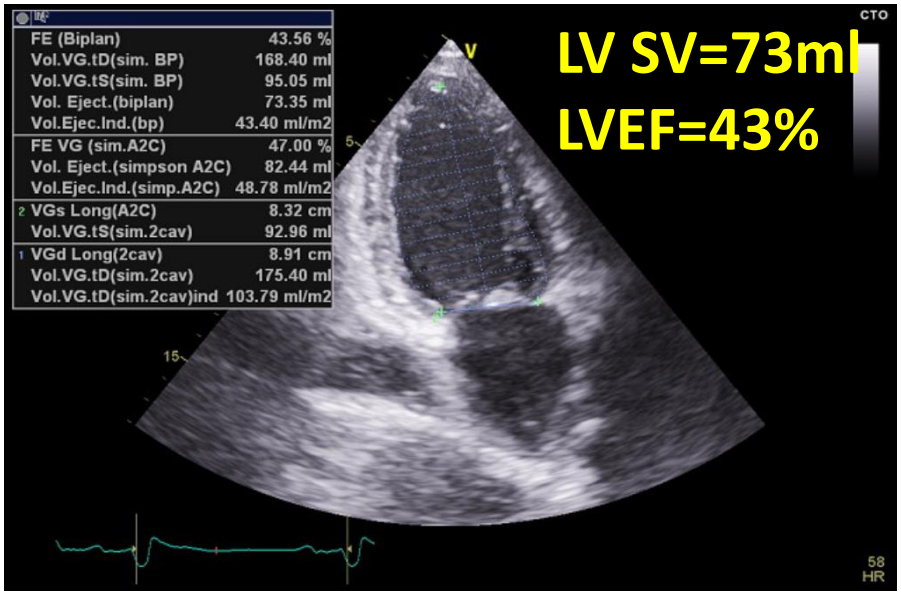


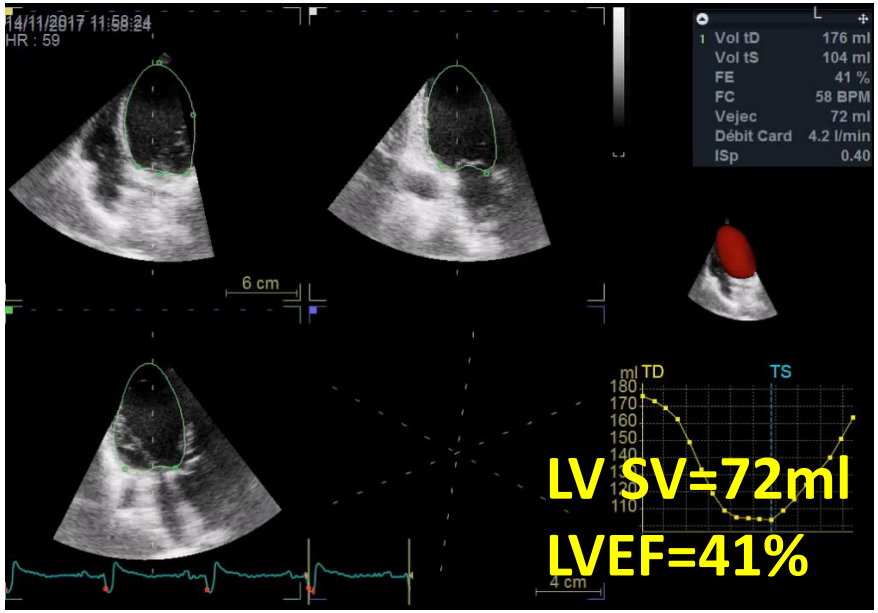




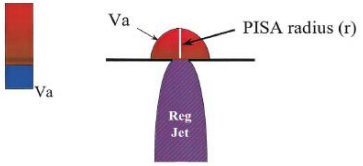


AR volume = LVOT SV – Systemic SV = 66 – 42 = 24 ml





Quantification by flow convergence method



Reg Flow = $2\pi r^2$ x Va
EROA = Reg Flow / PkV_{Reg}

A reference method … but not feasible or inaccurate in ~30 %

1- Multiple jets, non circular orifice

2- Non planar geometry: 10% of AR, aortic dilation

3- Very eccentric jet => misalignement of Reg Flow

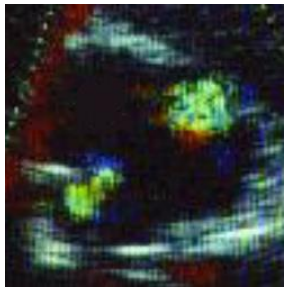
80% of Bicuspide valve … Bicuspide valve is frequent (20% of native AR)

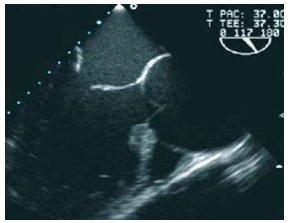
4- Non visualisation of AR flow convergence:

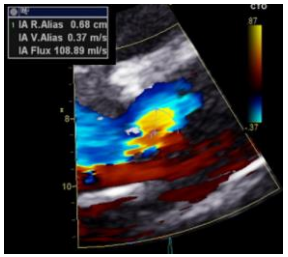
common because of thickened/calcified valve shadow

from 10% (*Tribouilloy et al. JACC 1998.) Up to 74% ! (Yamachika et al. JASE 1997)*
and even 94% in mild AR *(Yamachika et al. JASE 1997)*

5- Atrial Fibrillation …

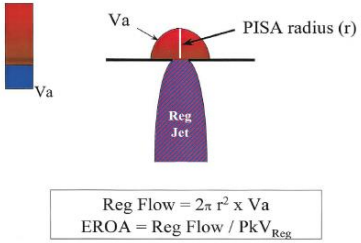


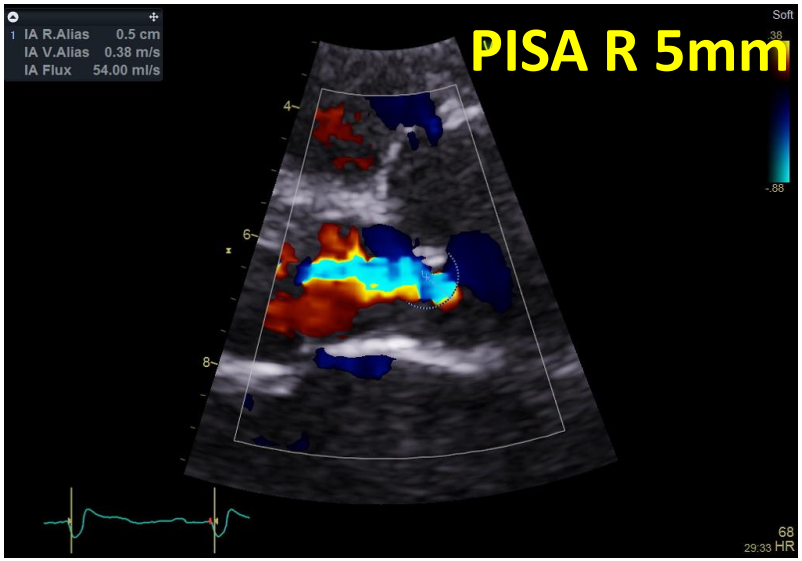


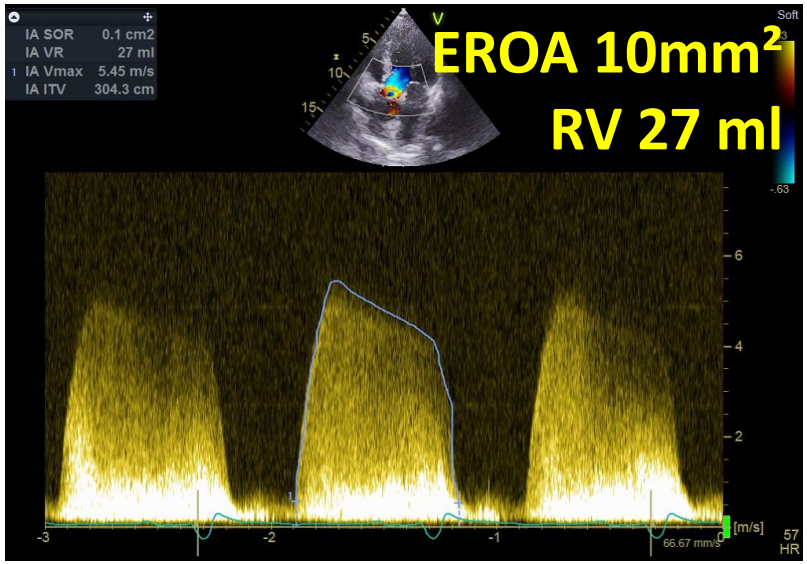


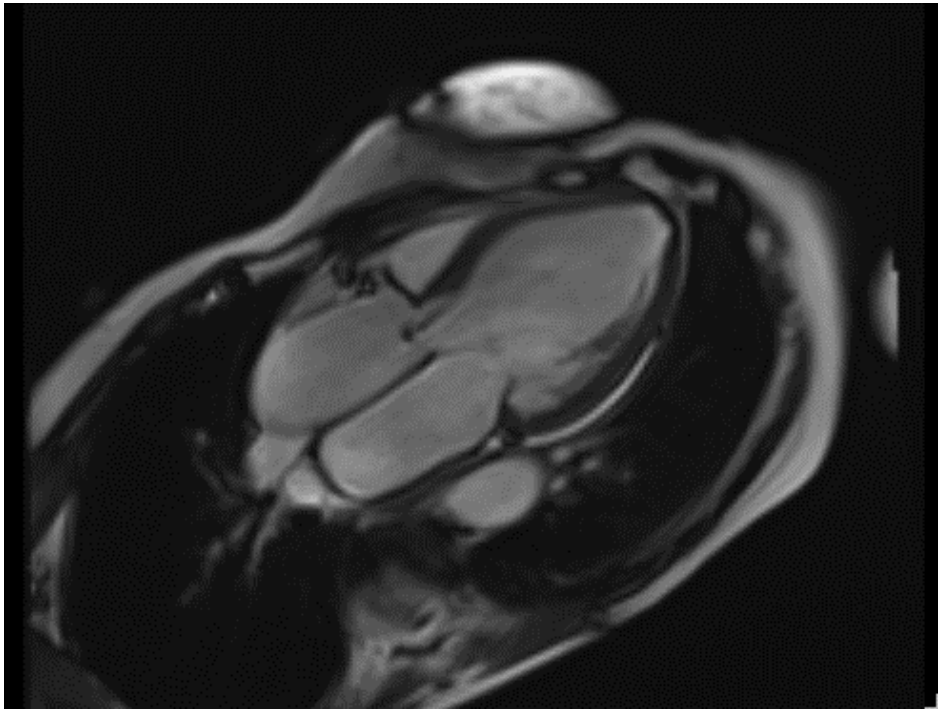
Cohen et al. JASE 1996. Evangelista et al. Am Heart J 2000. Detaint et al. JACC Img 2008. Iung et al. EHJ 2003.

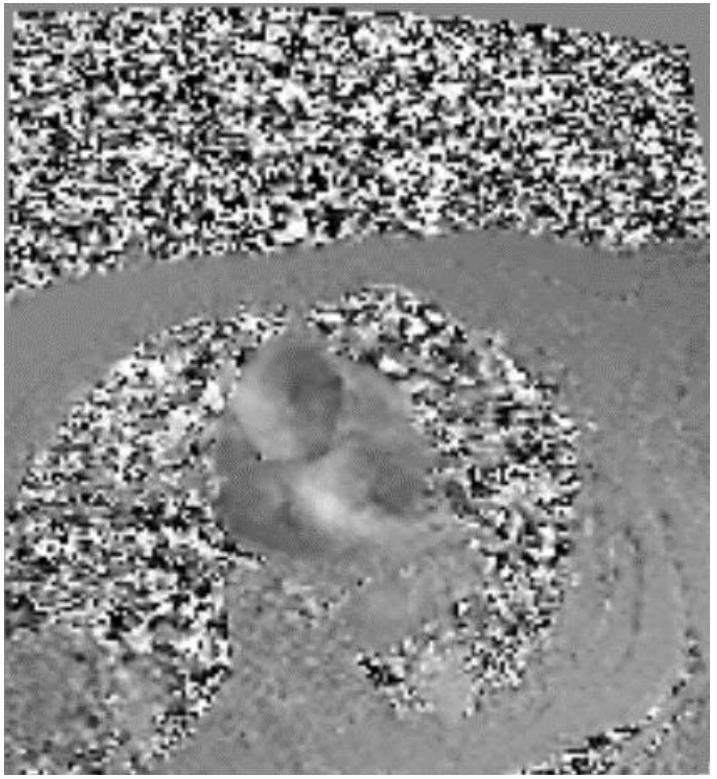
Quantification by flow convergence method





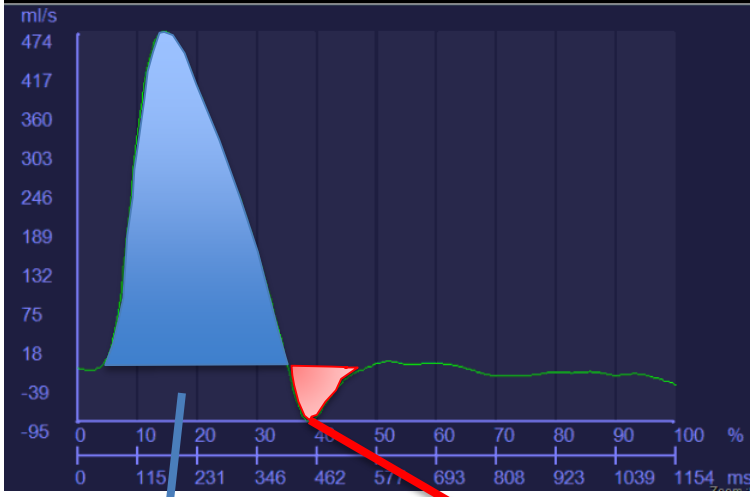






Courtesy of Dr Pontana, Service d'Imagerie Cardiaque. Lille University Hospital. France

Date de l'examen:	21/11/2017	Venc:	500 cm/s
Taille du patient:	170 cm	Ajustement de phase en arrière-plan:	Non
Poids du patient:	60 kg	Zone:	0 to 1154.2 ms
Surface corporelle:	1.695 m2	Région:	ssAo
Type de résultat:	Flux		



Date de l'examen	21/11/2017	Venc:	500 cm/s
Taille du patient	170 cm	Background Phase Adjustment:	Non
Poids du patient	60 kg	Range:	0 to 1154.2 ms
Surface corporelle	1.695 m2		

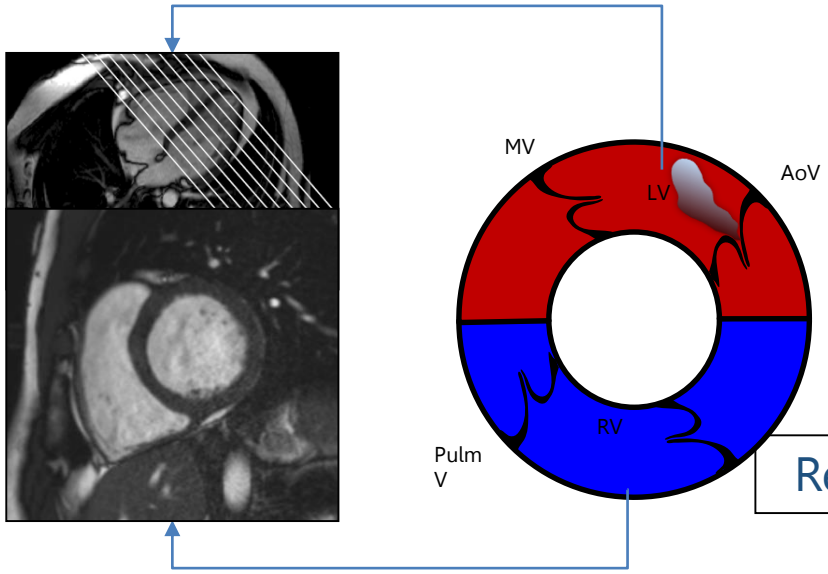
Flow Quantification — Region: ssAo

Flux		Vitesse et pression	
Flux moyen hors limites	62.498 ml/s	Vitesse moyenne	7.991 cm/s
Volume antérograde	93.553 ml		9.951 cm/s
Volume rétrograde	21.418 ml		7.6 ms
Volume net antérograde	72.135 ml		732 cm/s
Fraction de régurgitation	22.894 %		9 ms
			992 mmHg
			5 cm2
			13 cm2
			62 cm2

Aortic Anterograde flow

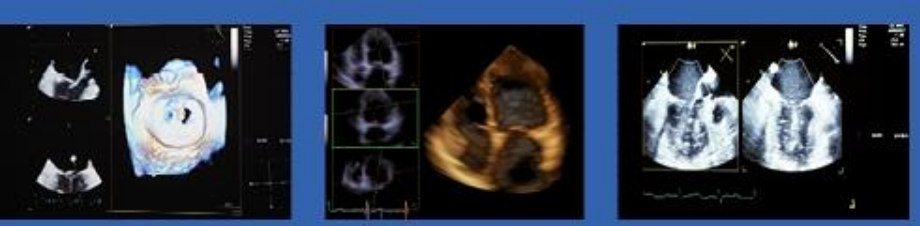
Aortic Regurgitation flow

SSFP Cine MRI for ventricular volumetric SV



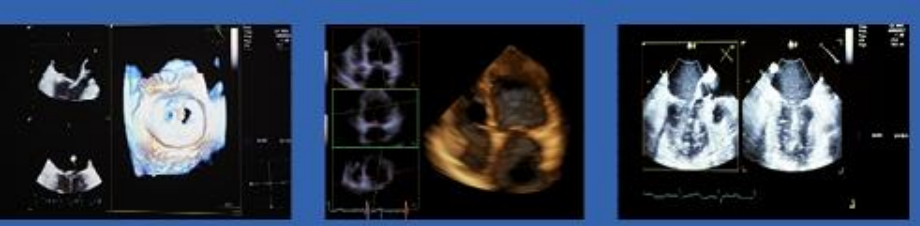
Reg Volume = LV SV – RV SV

Myerson et al. J Card Magn Res. 2012. Sechtem et al. Radiology. 1987



What is the AR severity ?

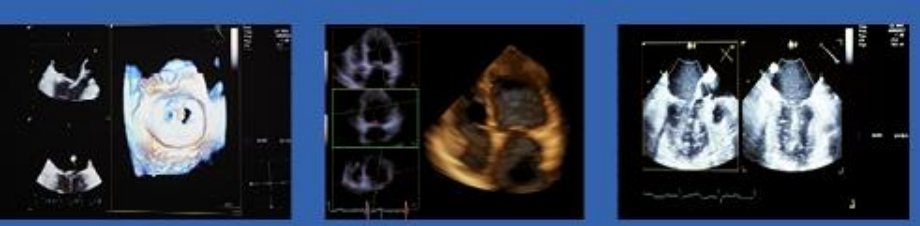
A. Mild
B. Moderate
C. Severe
D. AR quantification is not complete



What is the AR severity ?

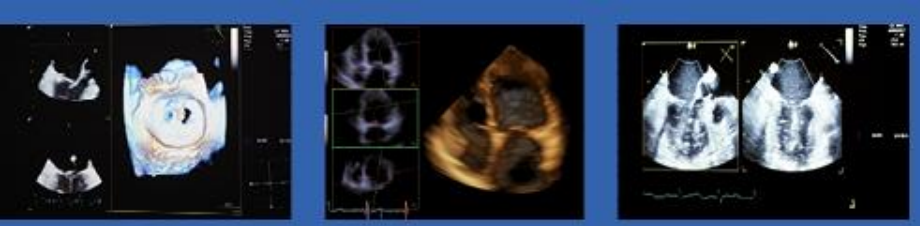
A. Mild
B. Moderate
C. Severe
D. AR quantification is not complete

Volume	Flow convergence	MRI
24	27	21



Do you perform cardiac surgery?

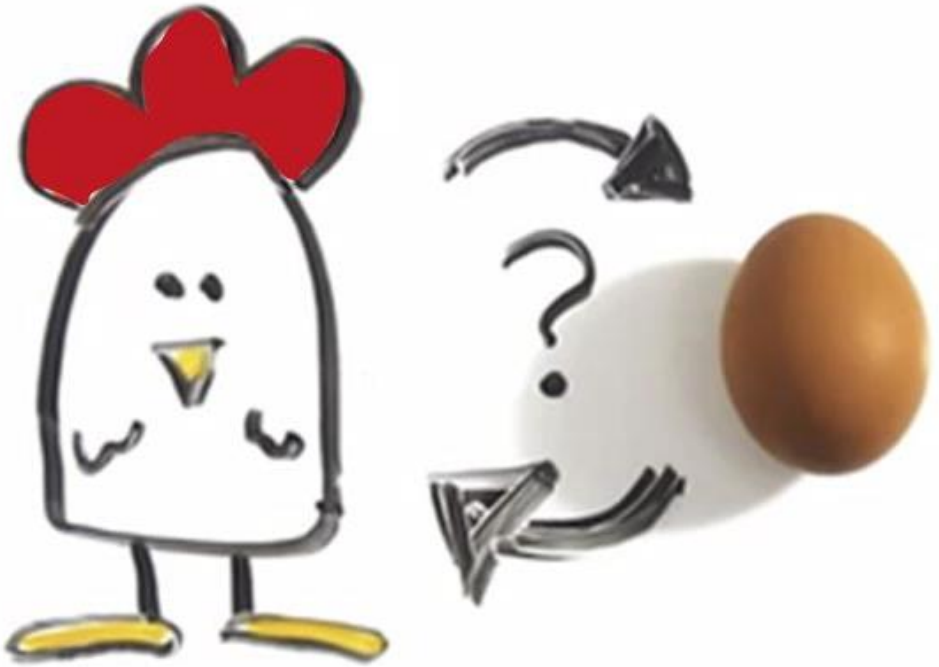
A. Yes
B. No
C. Ascending aorta measurement is missing



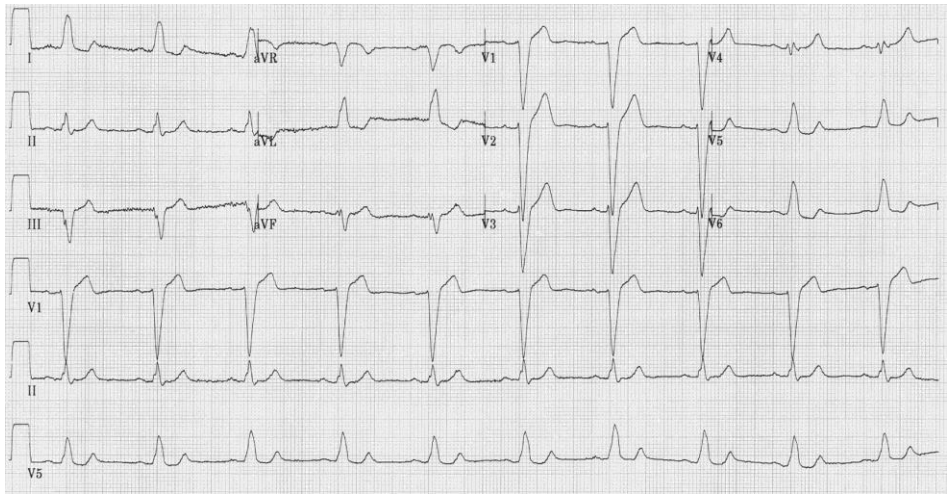
Do you perform cardiac surgery?

A. Yes
B. No
C. Ascending aorta measurement is missing

AR and LV enlargement



- No coronary artery disease
- Optimized medical treatment including CRT



- Follow-up. Asymptomatic

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Call for abstracts & clinical cases
31 May

Early registration
30 September

Late registration
31 October

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