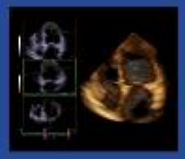


EuroValve

News from Valve Guidelines ESC 2012
What's new and Why ?

Multiple Valve Disease

Christophe Tribouilloy

Amiens, France

Faculty Disclosure

Christophe Tribouilloy

I have **no financial relationships** to disclose related to this presentation.

8.5 Medical therapy

Diuretics reduce congestion. Specific therapy of the underlying disease is warranted.

9. Tricuspid stenosis

Tricuspid stenosis (TS), which is mostly of rheumatic origin, is rarely observed in developed countries although it is still seen in developing countries.[3,12] Detection requires careful evaluation, as it is almost always associated with left-sided valve lesions that dominate the presentation.

9.1 Evaluation

Clinical signs are often masked by those of the associated valvular lesions, especially MS.[12,190] Echocardiography provides the most useful information. TS is often overlooked and requires careful evaluation. The pressure half-time method is less valid for the assessment of the severity of TS than of MS and the continuity equation is rarely applicable because of the frequency with which associated regurgitation is present. Planimetry of the valve area is usually impossible unless 3DE is used. No generally-accepted grading of TS severity exists. A mean gradient $\geq$5 mmHg at normal heart rate is considered indicative of clinically significant TS.[15] Echocardiography should also examine the presence of commissural fusion, the anatomy of the valve and its subvalvular apparatus, which are the most important determinants of repairability and the degree of concomitant TR.

9.2 Surgery

The lack of pliable leaflet tissue is the main limitation for valve repair. Even though this is still a matter of debate, biological prostheses for valve replacement are usually preferred over mechanical ones because of the higher risk of thrombosis carried by the latter and the satisfactory long-term durability of the former in the tricuspid position.[189–191]

9.3 Percutaneous intervention

Percutaneous balloon tricuspid dilatation has been performed in a limited number of cases, either alone or alongside PMC, but this frequently induces significant regurgitation. There is a lack of data on evaluation of long-term results.[192]

9.4 Indications for intervention

Intervention on the tricuspid valve is usually carried out at the time of intervention on the other valves in patients who are symptomatic despite medical therapy. Conservative surgery or valve replacement—according to anatomy and surgical expertise in valve repair—is preferred to balloon commissurotomy, which can only be considered as a first approach in the rare cases of isolated TS (*Table 16*).

9.5 Medical therapy

Diuretics are useful in the presence of HF—but of limited efficacy.

10. Combined and multiple valve diseases

Significant stenosis and regurgitation can be found on the same valve. Disease of multiple valves may be encountered in several conditions, but particularly in rheumatic heart disease and, less frequently, in degenerative valve disease. There is a lack of data on mixed and multiple valve diseases. This does not allow for evidence-based recommendations.[190]

The general principles for the management of mixed or multiple valve disease are as follows:

- When either stenosis or regurgitation is predominant, management follows the recommendations concerning the predominant VHD. When the severity of both stenosis and regurgitation is balanced, indications for interventions should be based upon symptoms and objective consequences, rather than the indices of severity of stenosis or regurgitation.
- Besides the separate assessment of each valve lesion, it is necessary to take into account the interaction between the different valve lesions. As an illustration, associated MR may lead to underestimation of the severity of AS, since decreased stroke volume due to MR lowers the flow across the aortic valve and, hence, the aortic gradient. This underlines the need to combine different measurements, including assessment of valve areas, if possible using methods that are less dependent on loading conditions, such as planimetry.
- Indications for intervention are based on global assessment of the consequences of the different valve lesions, i.e. symptoms or presence of LV dilatation or dysfunction. Intervention can be considered for non-severe multiple lesions associated with symptoms or leading to LV impairment.
- The decision to intervene on multiple valves should take into account the extra surgical risk of combined procedures.
- The choice of surgical technique should take into account the presence of the other VHD. Although repair remains the ideal option, the desire to repair one valve may be decreased if prosthetic valve replacement is needed on another.

The management of specific associations of VHD is detailed in the individual sections.

11. Prosthetic valves

Patients who have undergone previous valve surgery accounted for 28% of all patients with VHD in the Euro Heart Survey.[1] Optimal choice of valve substitute—as well as subsequent management of patients with prosthetic valves—is essential to reduce prosthesis-related complications.

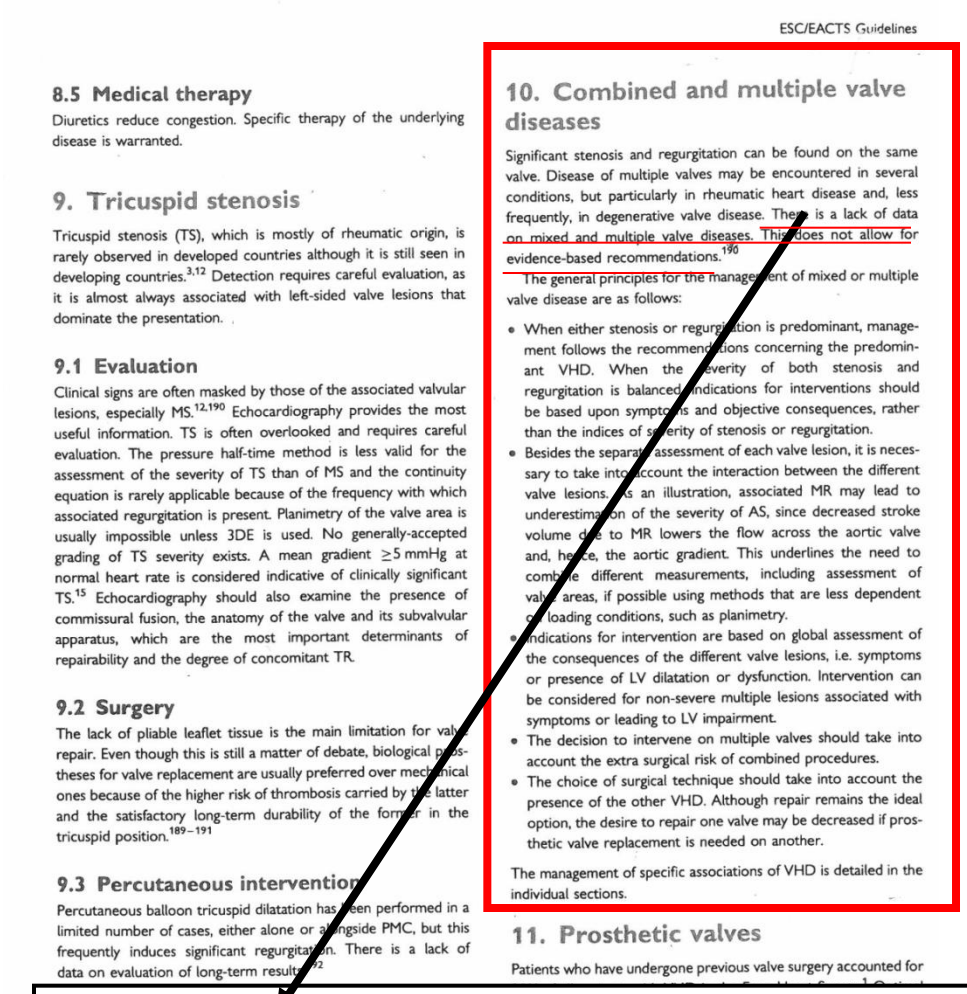
11.1 Choice of prosthetic valve

There is no perfect valve substitute. All involve some compromise and all introduce new disease processes, whether they are mechanical (single tilting disc and bileaflet valves) or biological. The latter include homografts, pulmonary autografts and porcine, pericardial bovine or equine bioprostheses. Xenograft valves can be further subdivided into stented and stentless. Stentless valves may have better haemodynamics but no improvement in long-term

ESC 2012 valve Guidelines -

Include 46 pages,

- 1 short paragraph on multiple VHD



ESC/EACTS Guidelines

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11. Prosthetic valves

Patients who have undergone previous valve surgery accounted for

ESC Guidelines 2012

- 46 pages

- 1 short paragraph on multiple VHD

« There is a lack of data on mixed and multiple VHD. This does not allow for evidence-based recommendations. »

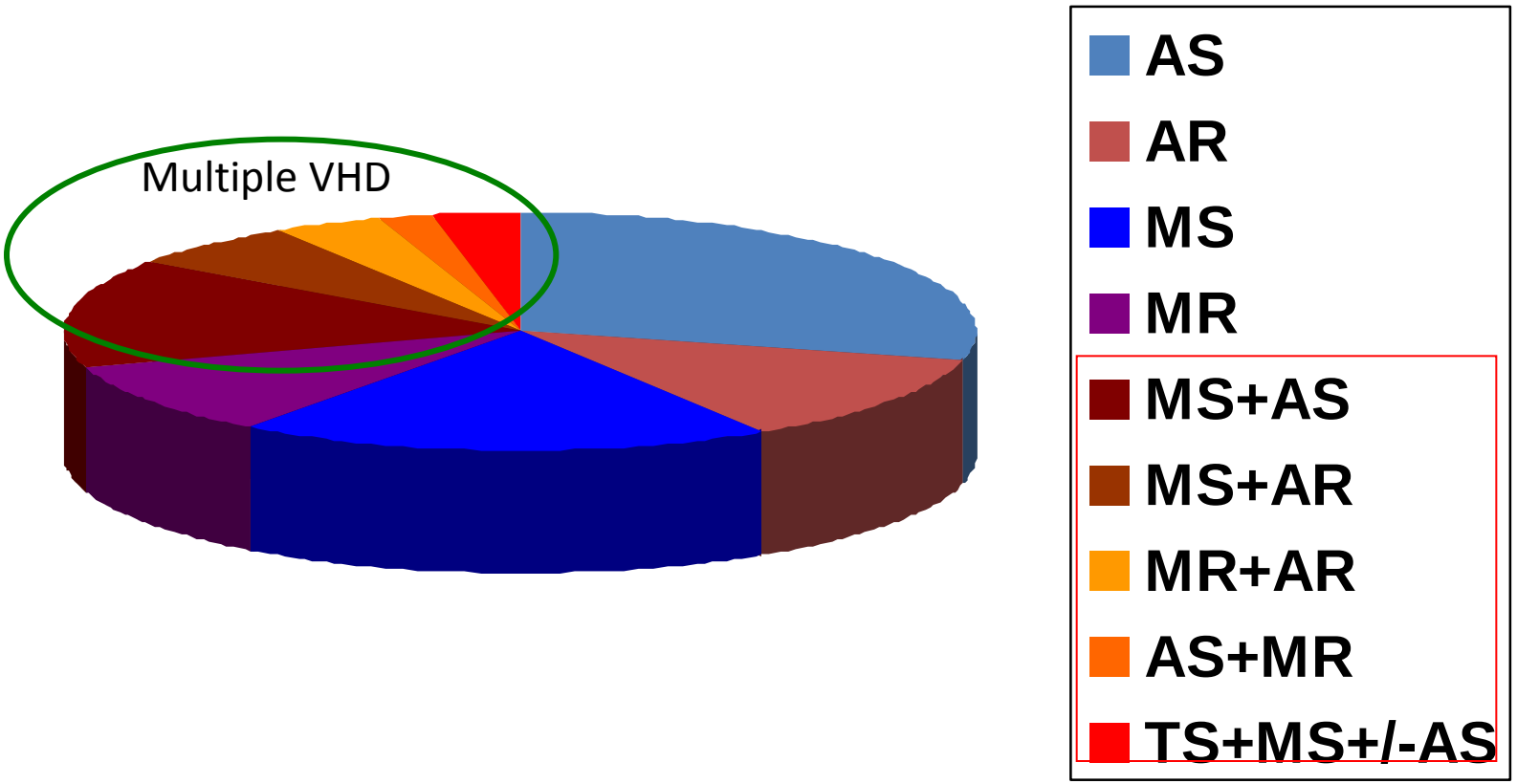
AHA/ACC 2008 Guidelines on the Management of VHD (page e64)

- « Other than recommending evaluation with physical examination, echocardiography, and cardiac catheterization …, **the committee has developed no specific recommendations in multiple VHD** . »

Circulation 2008, September, e1 – e142

Multiple VHD are frequent

1010 necropsies in patients with VHD (age ≥ 15 years)
30% of multiple VHD



Adult Heart Disease. In Roberts WC (ed) FA Davis 1987, pp631-91

Courtesy of P Unger and J Magne

Distribution of Valvular Heart Diseases in the Euro Heart Survey

5001 patients

- **Native Valve Disease** 72%
  - AS 34%
  - AR 10%
  - MS 10%
  - MR 25%
  - Multiple 20%
  - Right 1%
- **Previous Valvular Intervention** 28%
  - Valve Repair 18%
  - Valve Replacement 82%

lung et al. *Eur Heart J* 2003;24:1244-53

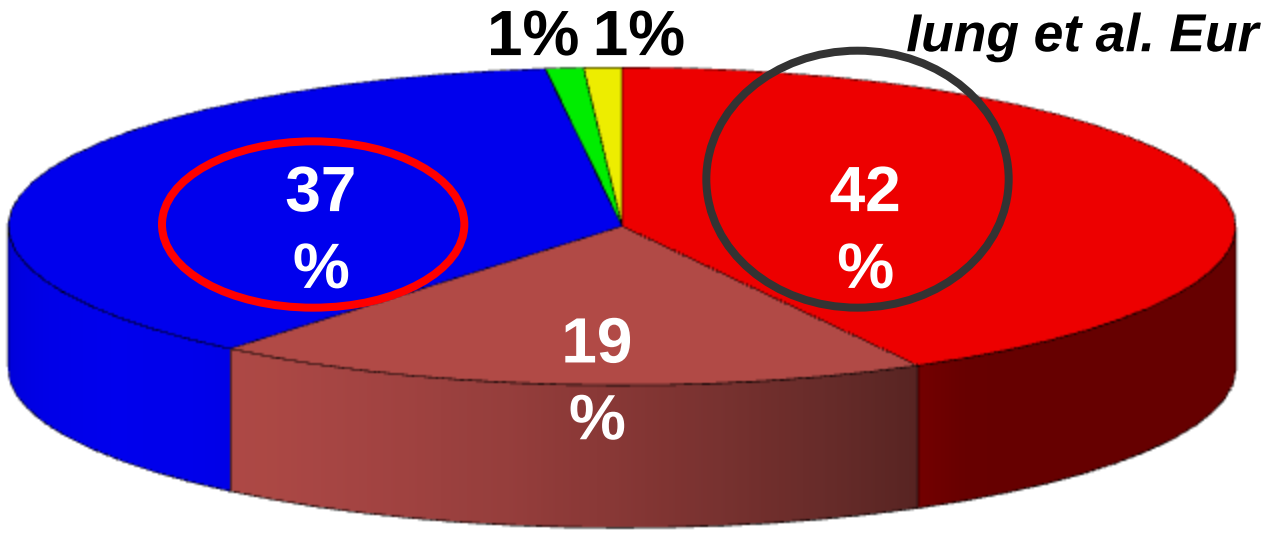
European Heart Journal 2012 - doi:10.1093/eurheartj/ehs109 & European Journal of Cardio-Thoracic Surgery 2012 - doi:10.1093/ejcts/ezs455).

www.escardio.org/guidelines

EACTS

EUROPEAN SOCIETY OF CARDIOLOGY®

Distribution of lesions in Multiple VHD According to the EuroHeart survey



Courtesy of P Unger and J Magne

Causes of multiple VHD

- Rheumatic VHD
- Degenerative calcific VHD (elderly)
- Infective endocarditis
- Radiation therapy
- Drug-induced VHD (anorectic agents, ergot-derived agonist)
- Carcinoid VHD
- Congenital VHD

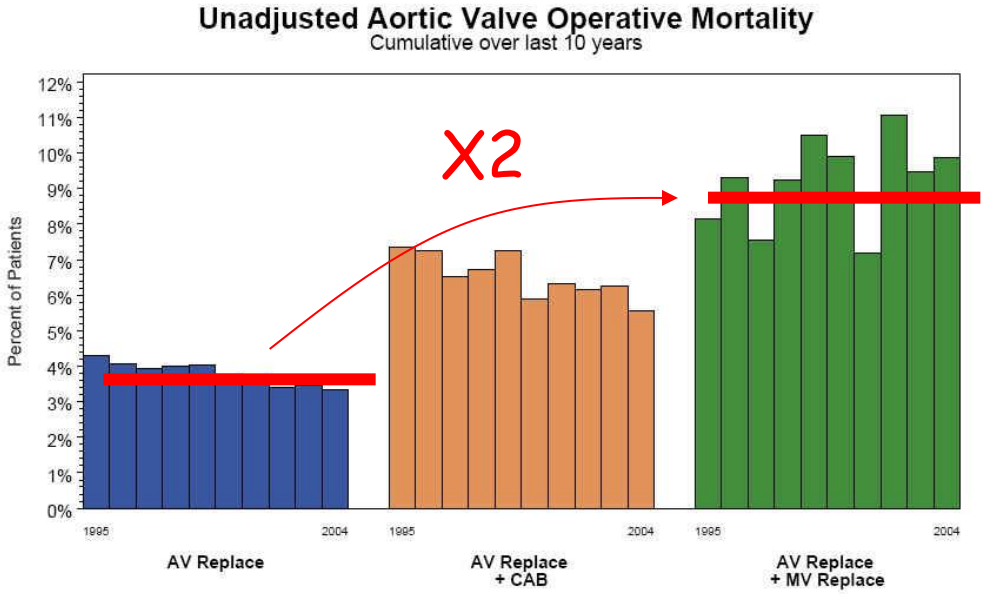
Evaluation of Multiple VHD

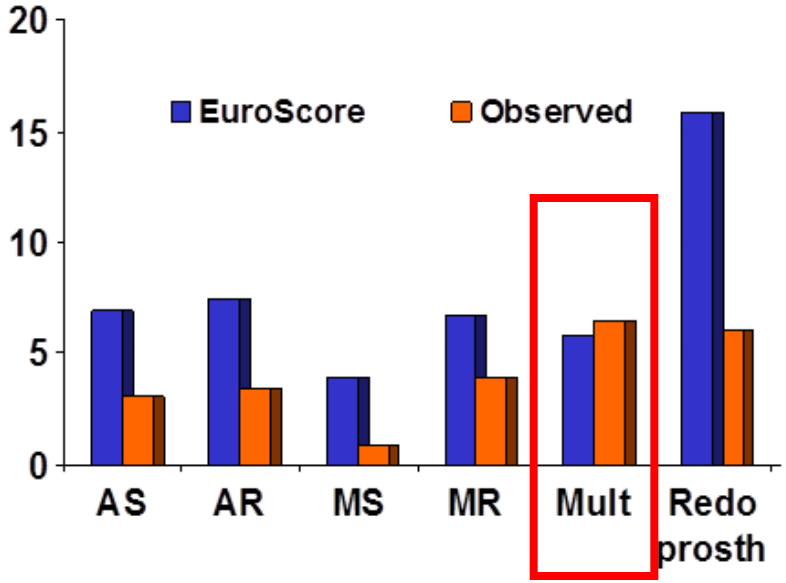
- Combined effects of each valvular lesion
- Echocardiographic evaluation (pitfalls)
  - Echo parameters validated in single-VHD
  - Haemodynamic interactions between valve lesions
  - combined different echo parameters
  - Measurements less dependent on loading conditions (direct planimetry, ERO, vena contracta…)
- Catheterization, CT, MRI

Assessment of Severity of Multiple VHD

Moderate VHD + Moderate VHD
may lead
to severe VHD

Extra Surgical Risk of combined surgery Operative Mortality





STS Database 2005

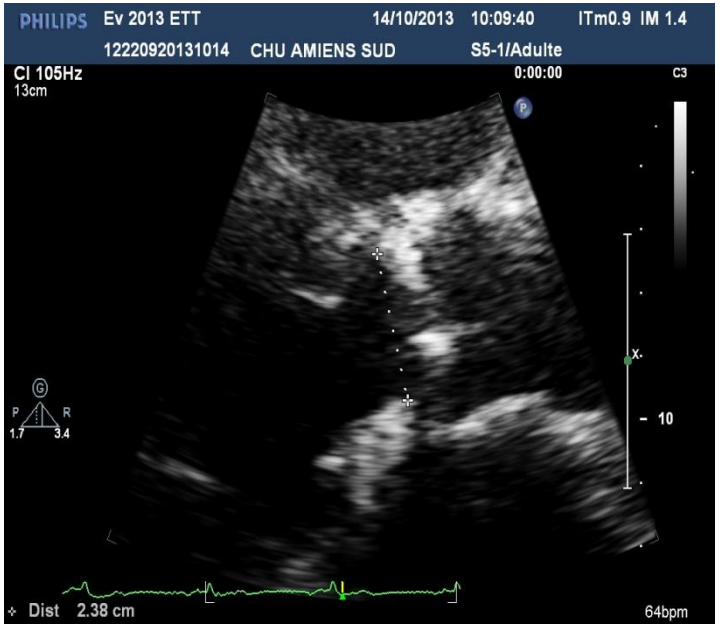
EuroHeart Survey 2003

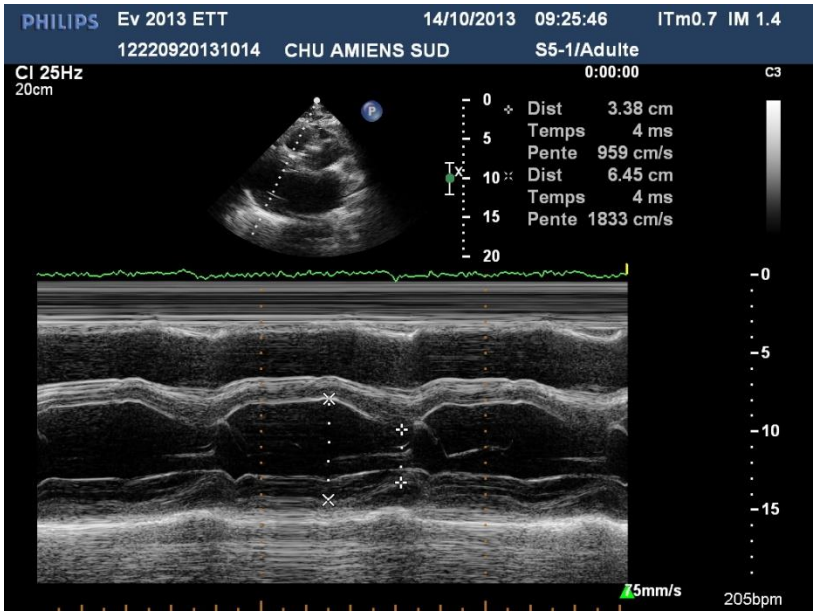
Courtesy of P Unger and J Magne

Clinical case

- Man, 79 yo
- NYHA dyspnea class II-III for 6 months
- No treatment
- BP 120/80 mm Hg,
- HR 88 b/mn
- Systolic murmur 4/6
- No sign of HF

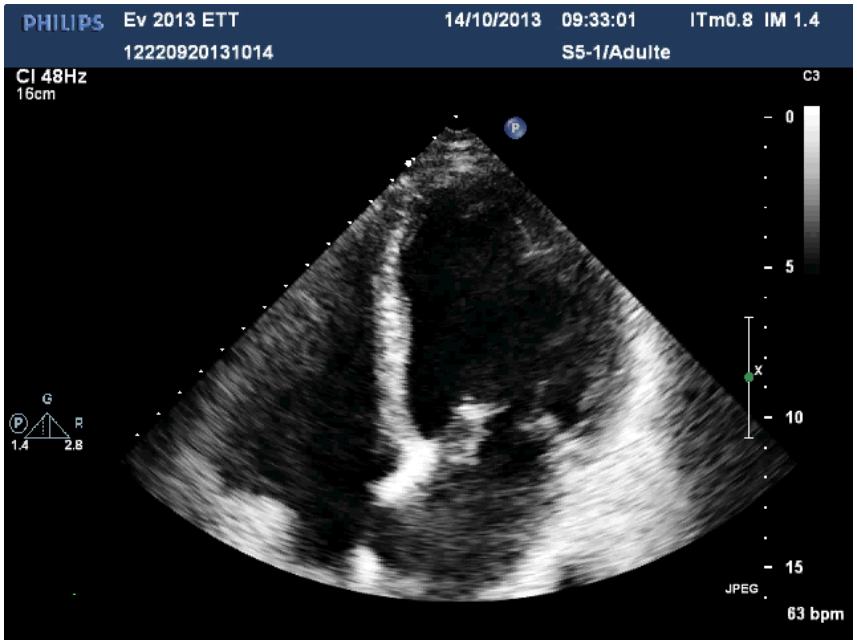
- sinus rhythm

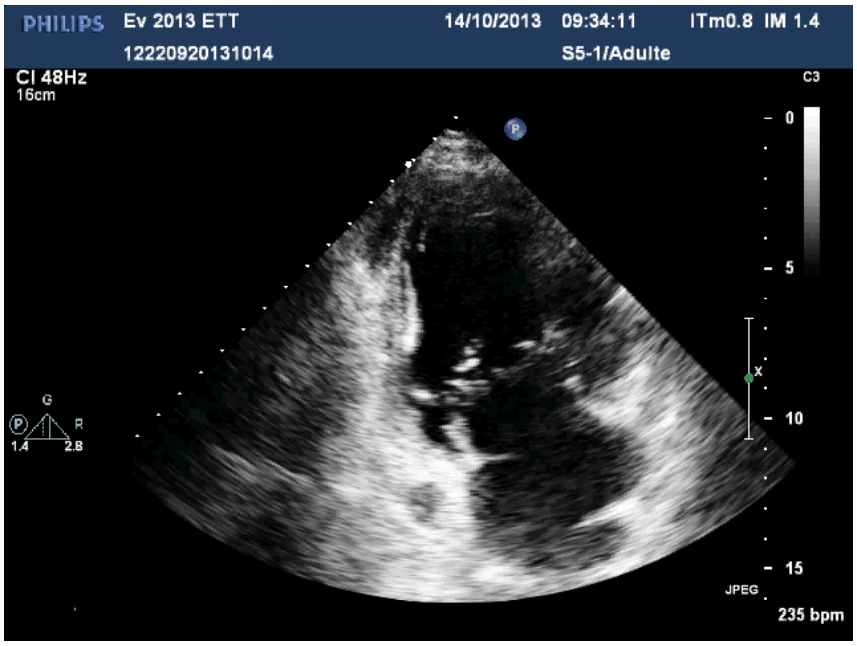




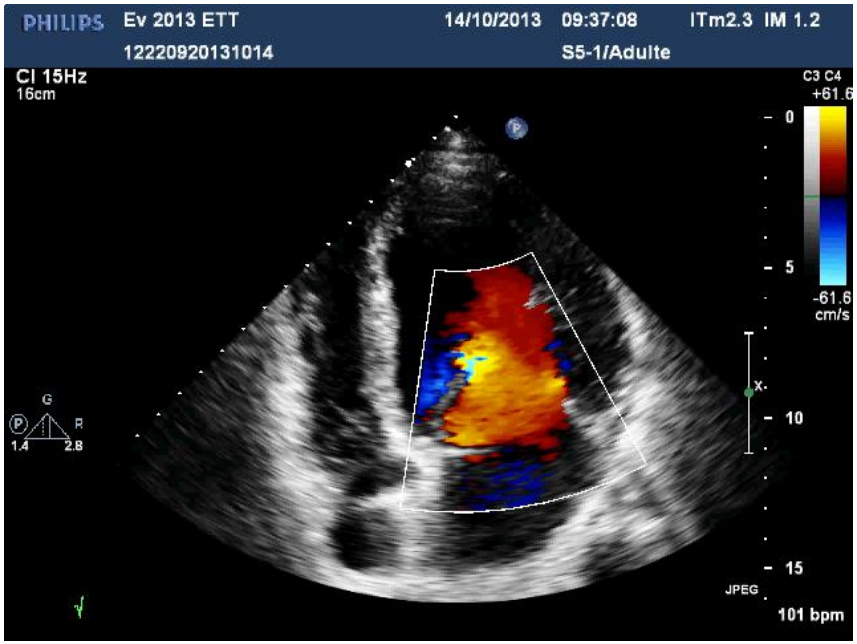
LVEDD 65mm

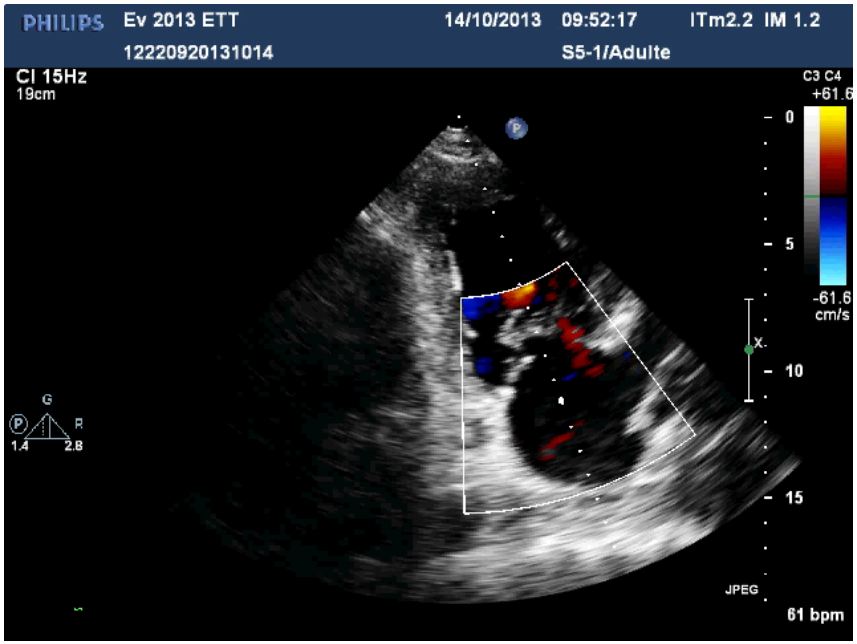
LVESD 34mm



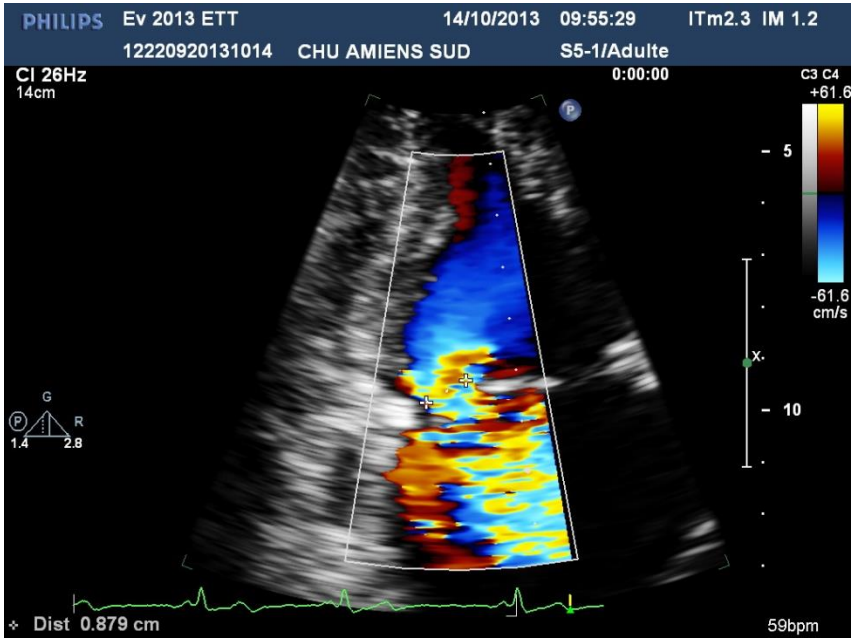


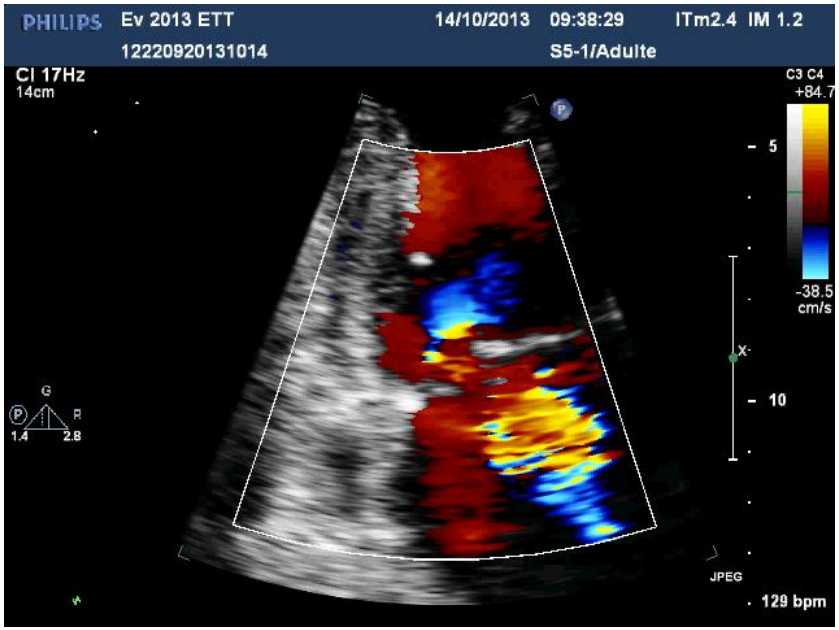
Clinical case





Clinical case

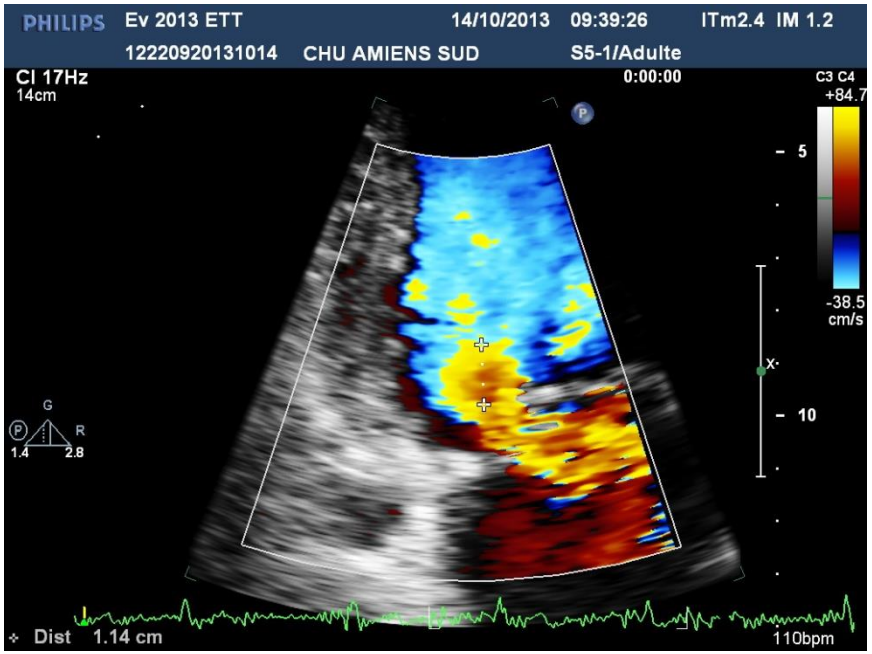


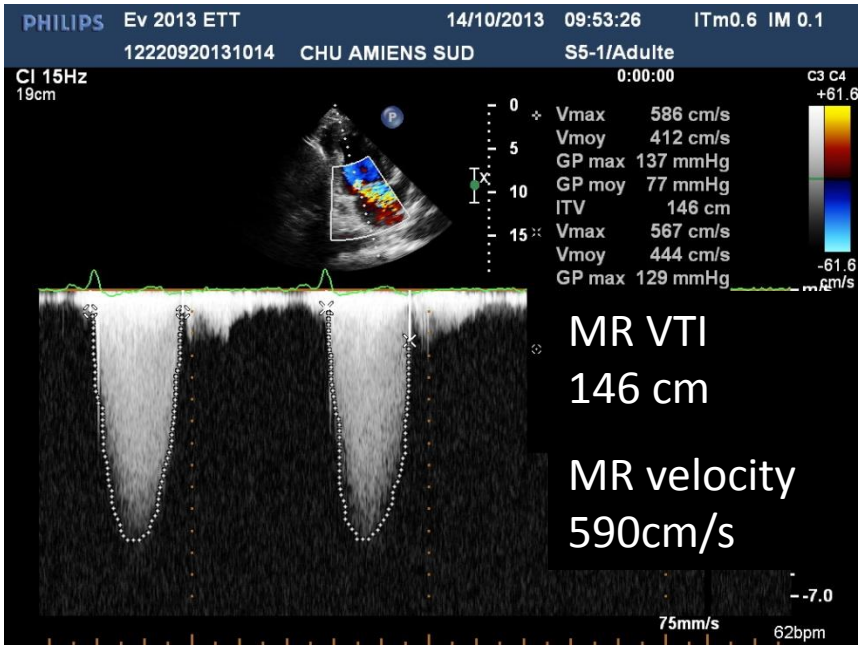


Vena contracta diameter 8 mm

Wide proximal FC

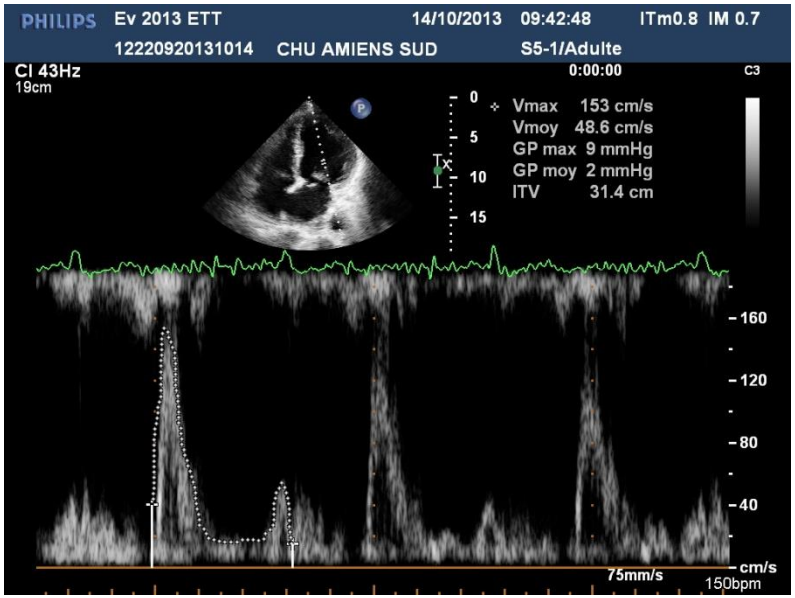
Clinical case

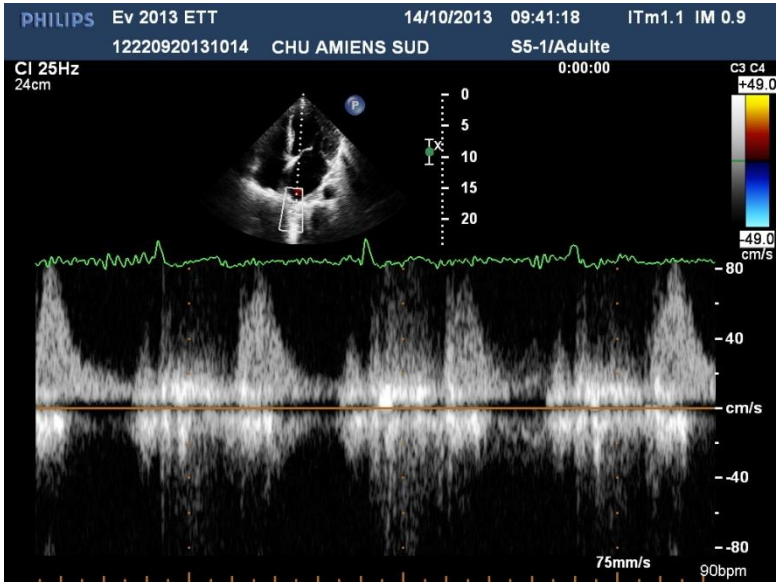




ERO 0.58 cm^2, RV 84ml

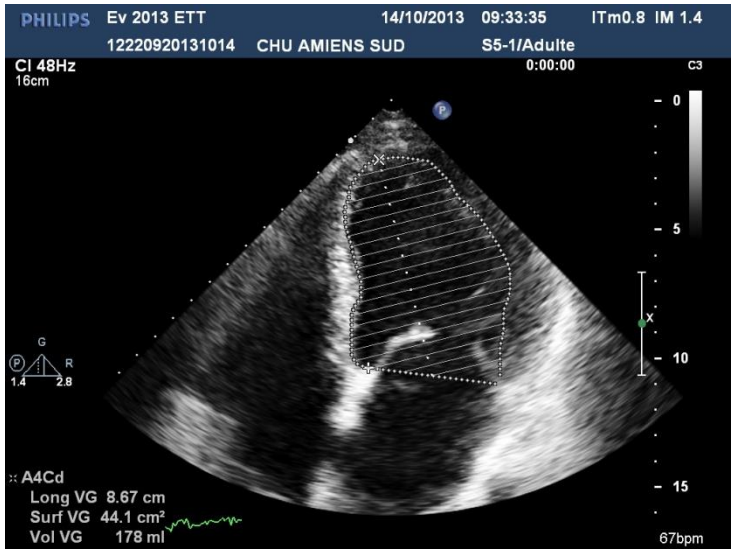
Severe MR

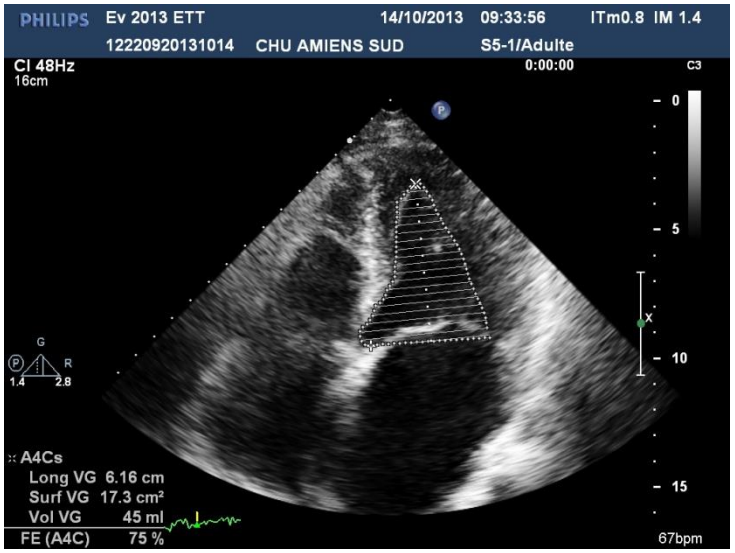




Peak E mitral Vel 1.5 m/s
Mitral VTI 31 cm

systolic pulmonary flow reversal


PHILIPS Ev 2013 ETT 14/10/2013 09:33:35 ITm0.8 IM 1.4
12220920131014 CHU AMIENS SUD S5-1/Adulte
CI 48Hz 0:00:00
16cm
:: A4Cd
Long VG 8.67 cm
Surf VG 44.1 cm²
Vol VG 178 ml
67bpm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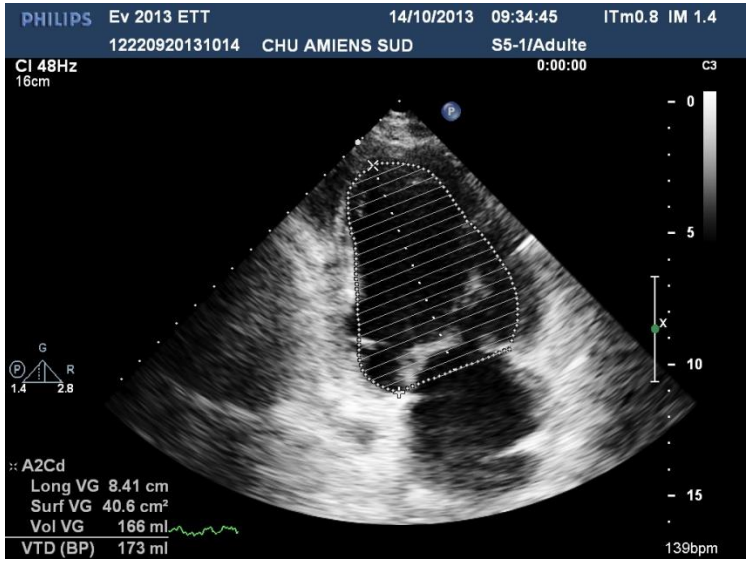
CI 48Hz 0:00:00
16cm
:: A4Cs
Long VG 6.16 cm
Surf VG 17.3 cm²
Vol VG 45 ml
FE (A4C) 75 %
67bpm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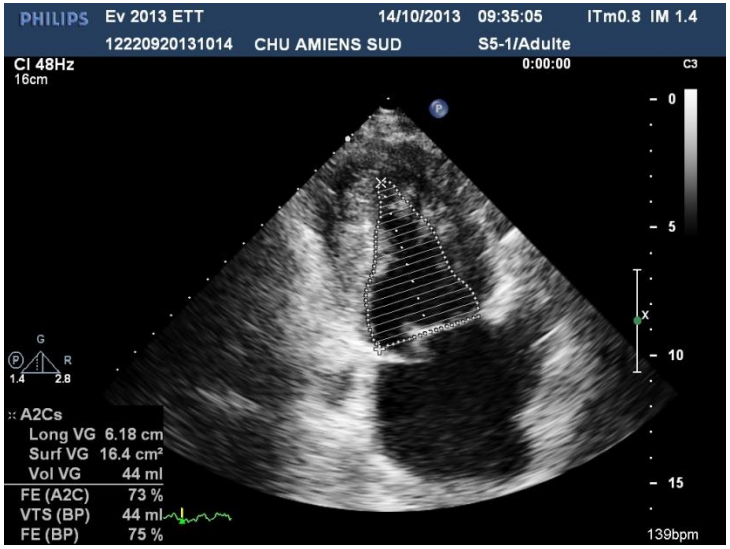
16cm
:: A2Cd
Long VG 8.41 cm
Surf VG 40.6 cm²
Vol VG 166 ml
VTD (BP) 173 ml
139bpm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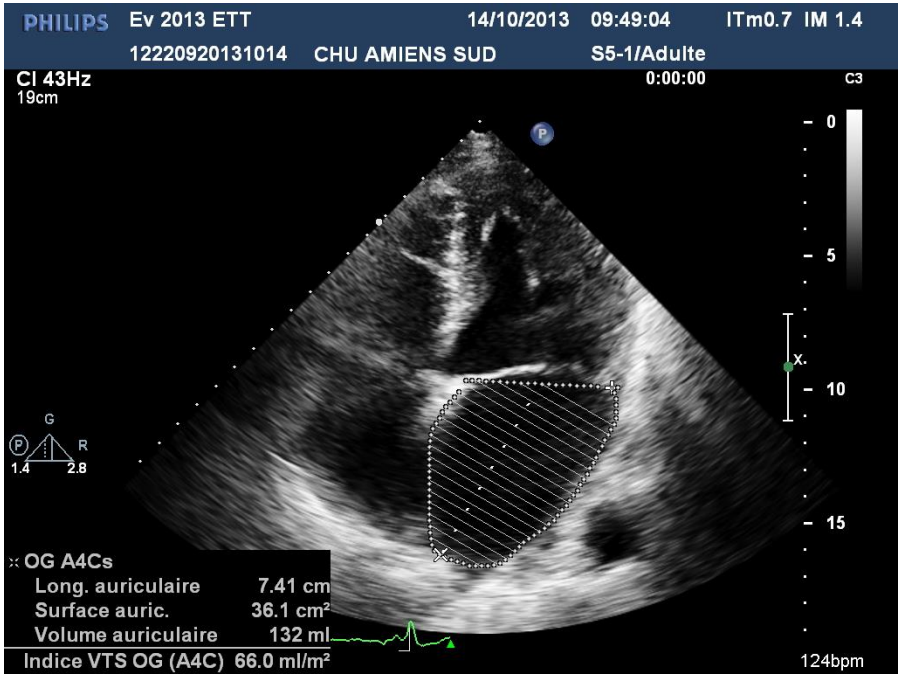
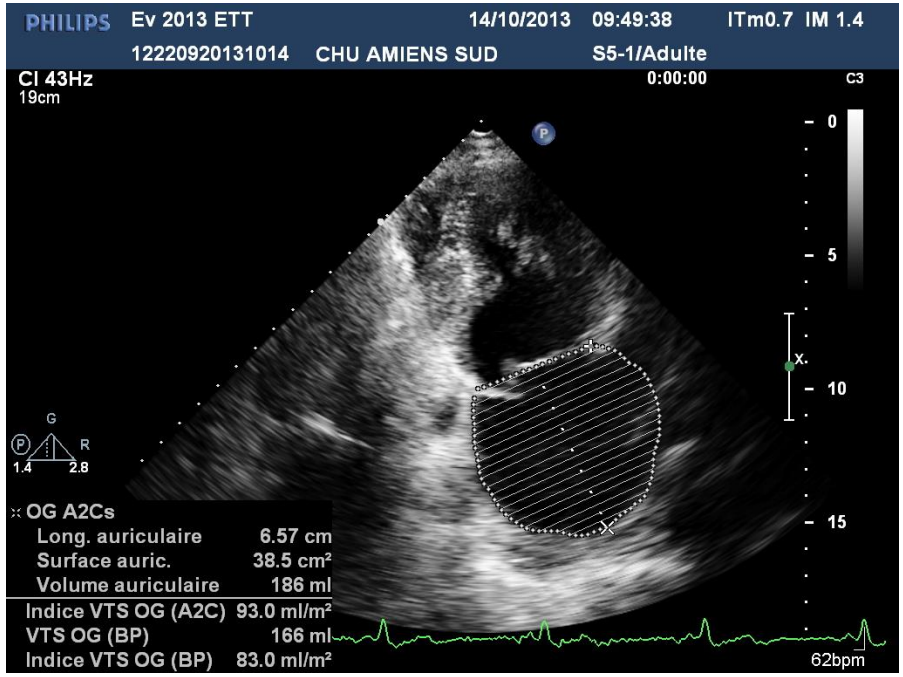
CI 48Hz 0:00:00
16cm
:: A2Cs
Long VG 6.18 cm
Surf VG 16.4 cm²
Vol VG 44 ml
FE (A2C) 73 %
VTS (BP) 44 ml
FE (BP) 75 %
139bpm

EF 75%

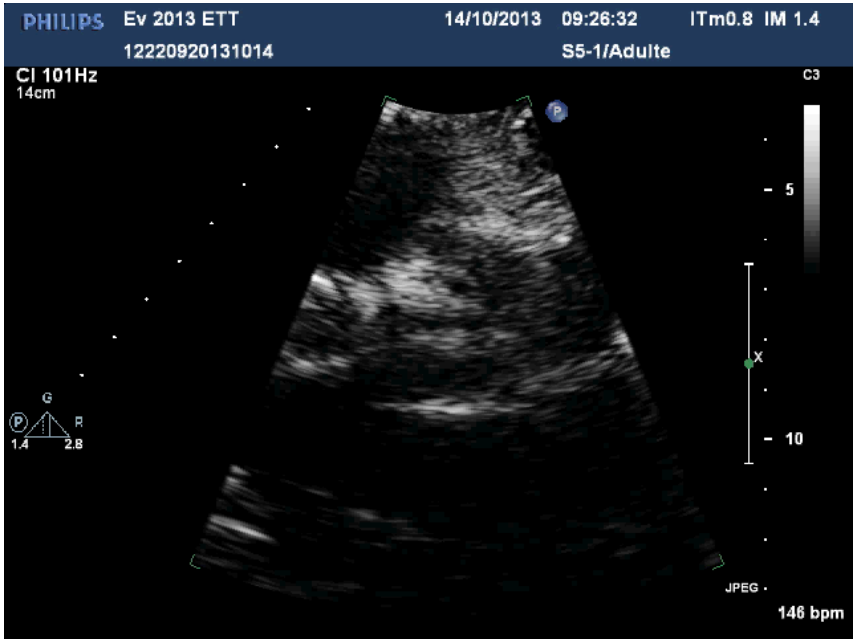
Clinical case





LA area 36cm² **LA Volume 166 ml ; 83 ml/m²**

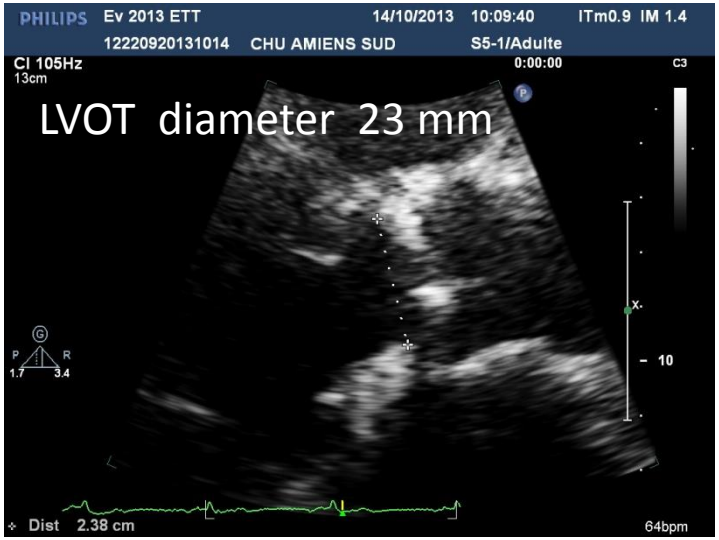
Clinical case

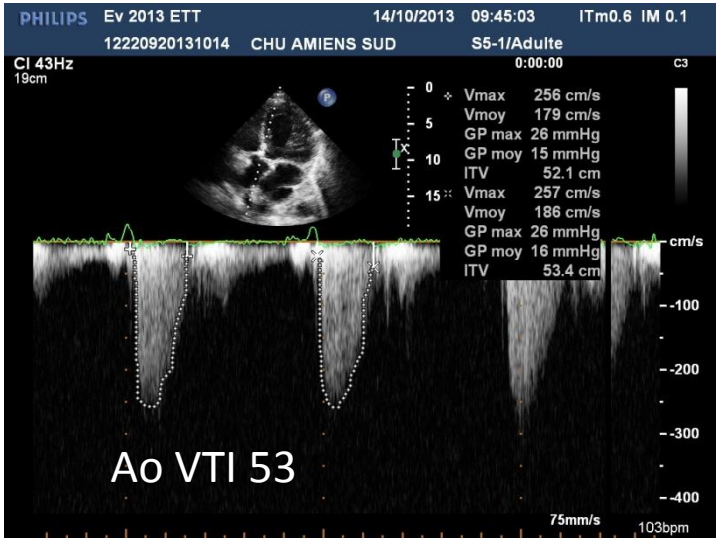


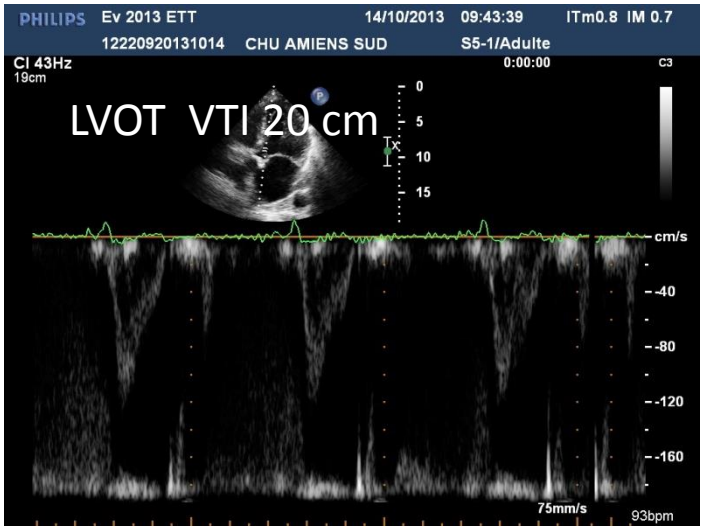
Calcified aortic valve

Mild AR

Clinical case







BSA 1.9cm²

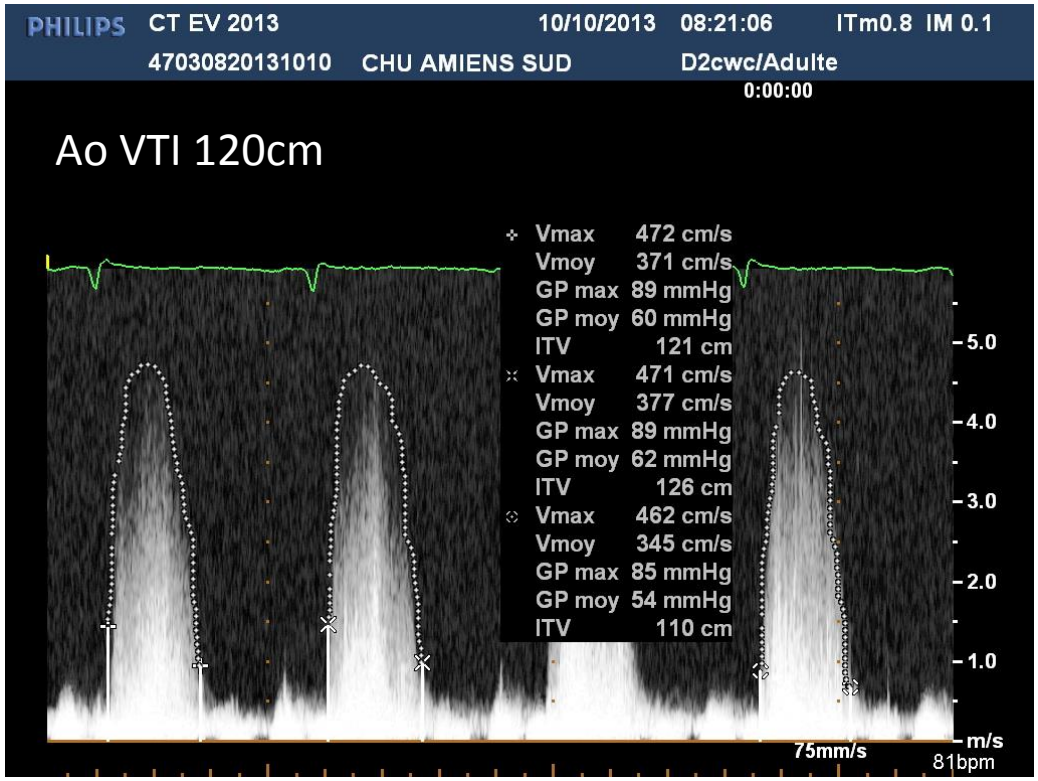
SV 83ml, indexed SV 43ml/m²

Ao Peak Velocity 2.6 m/s

Mean gradient 15 mmHg

AVA 1.57 cm² (0.82 cm²/m²)

Clinical case



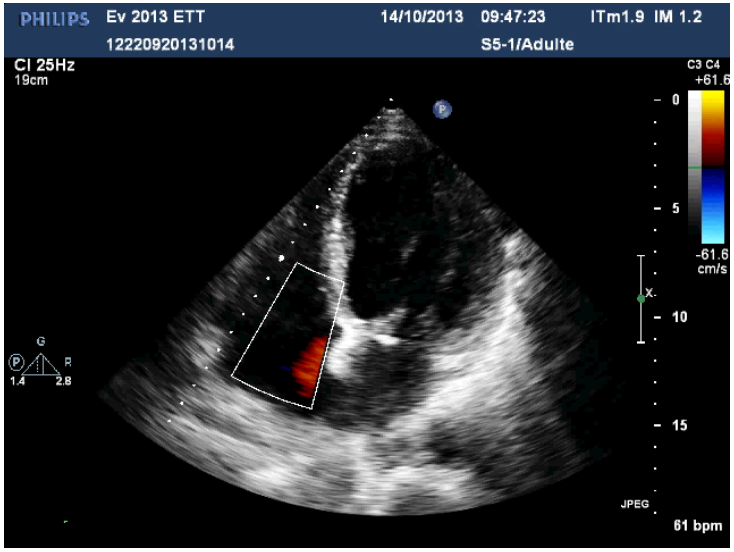
SV 83ml, SVI 43ml/m²

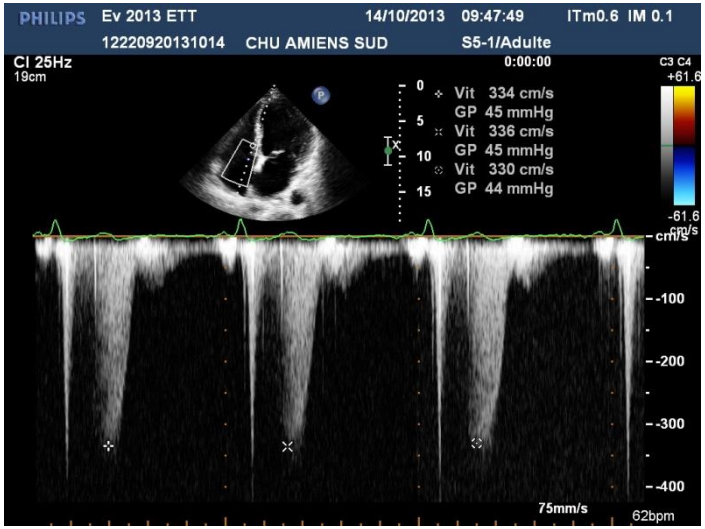
Ao peak Velocity 4.7 m/s

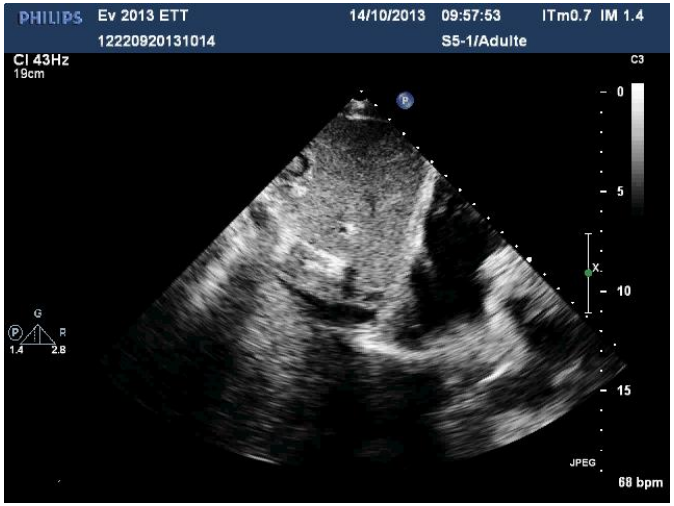
Mean gradient 61 mmHg

AVA 0.69 cm² ; 0.36 cm²/m²

Right parasternal view: severe AS

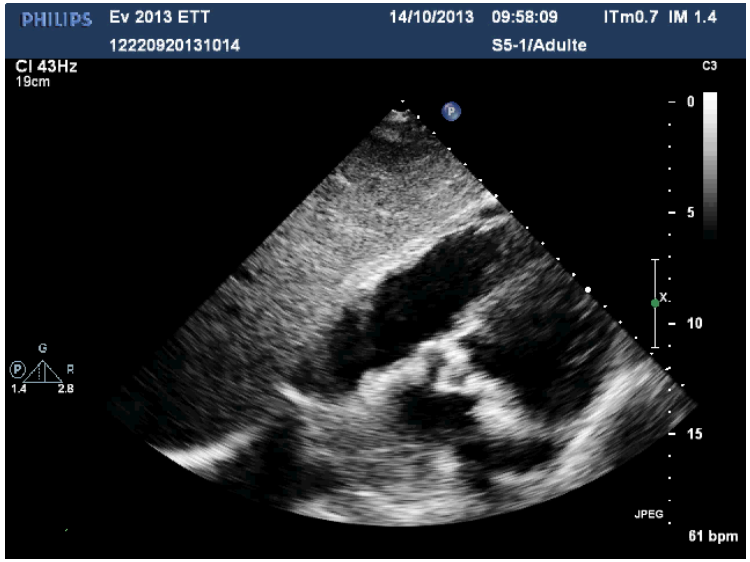


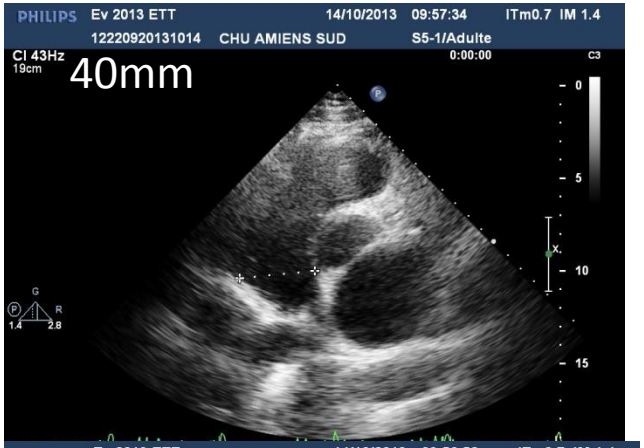


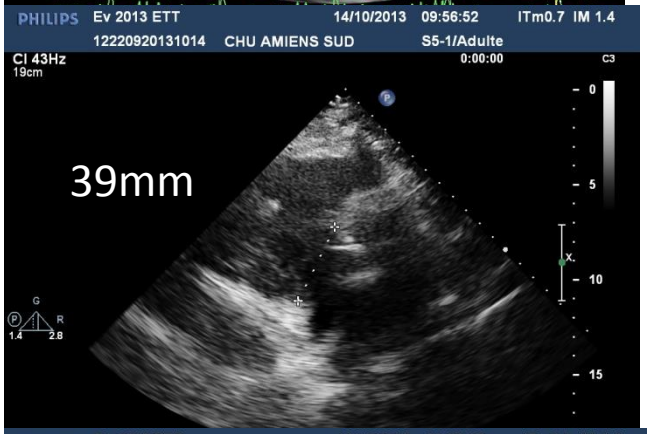


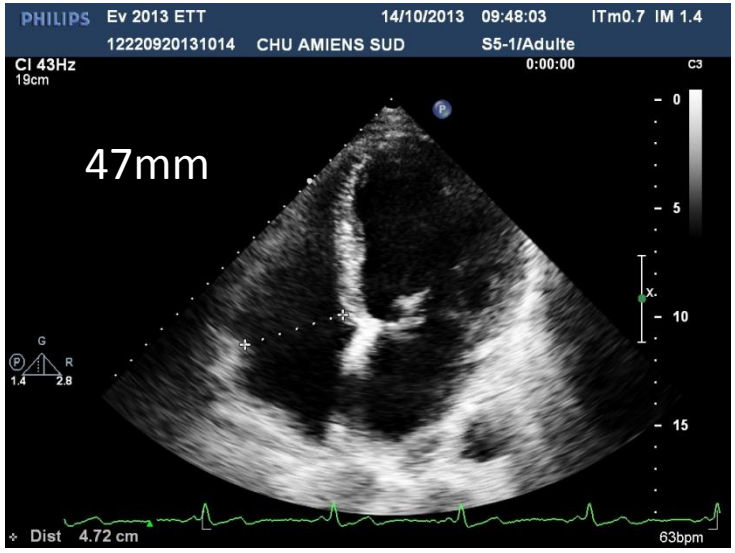
- **Mild TR**

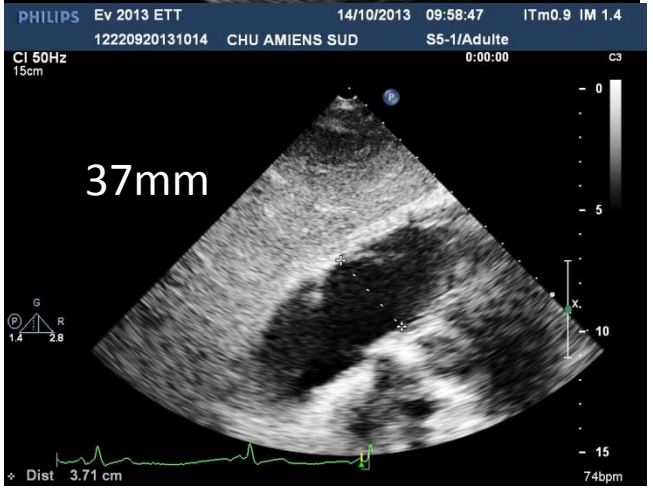
- Peak vel 3.3 m/s - RV- RA gradient 45 mm Hg - systolic PAP # 50 mmHg











Tricuspid annular diameter

Indications for surgery in tricuspid disease

	Class	Level
Surgery is indicated in symptomatic patients with severe TS.	I	C
Surgery is indicated in patients with severe TS undergoing left-sided valve intervention.	I	C
Surgery is indicated in patients with severe primary, or secondary, TR undergoing left-sided valve surgery.	I	C
Surgery is indicated in symptomatic patients with severe isolated primary TR without severe right ventricular dysfunction.	I	C
Surgery should be considered in patients with moderate primary TR undergoing left-sided valve surgery. .	IIa	C
Surgery should be considered in patients with mild or moderate secondary TR with **dilated annulus** (≥ 40 mm or > 21 mm/m²) undergoing left-sided valve surgery.	IIa	C
Surgery should be considered in asymptomatic or mildly symptomatic patients with severe isolated primary TR and progressive right ventricular dilation or deterioration of right ventricular function.	IIa	C
After left-sided valve surgery, surgery should be considered in patients with severe TR who are symptomatic or have progressive right ventricular dilatation/dysfunction, in the absence of left-sided valve dysfunction, severe right or left ventricular dysfunction, and severe pulmonary vascular disease.	IIa	C

European Heart Journal 2012 - doi:10.1093/eurheartj/ehs109 &
European Journal of Cardio-Thoracic Surgery 2012 -
doi:10.1093/ejcts/ezs455).

Clinical case

- Man, 79 yo,

  Dyspnea NYHA class II-III despite medical treatment (furosemide 40mg)

  Normal coronary artery

  Moderate renal failure

  Logistic Euroscore 6 %

- Severe AS

  Severe organic MR (P3 prolapse)

  Mild TR

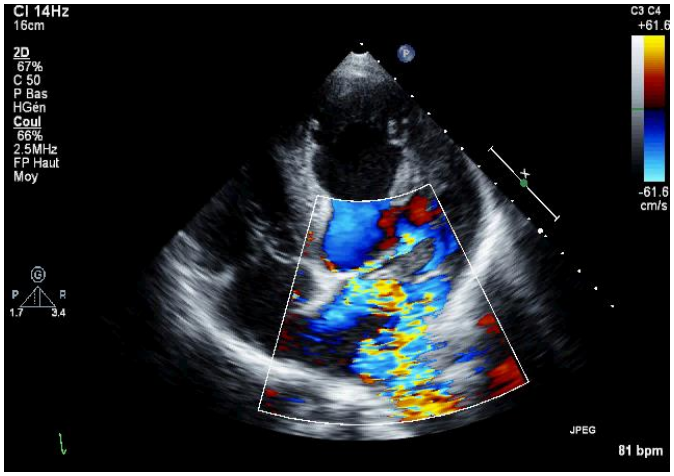
  LV dilatation, EF=75%, mild PAH (SPAP 50mmHg)

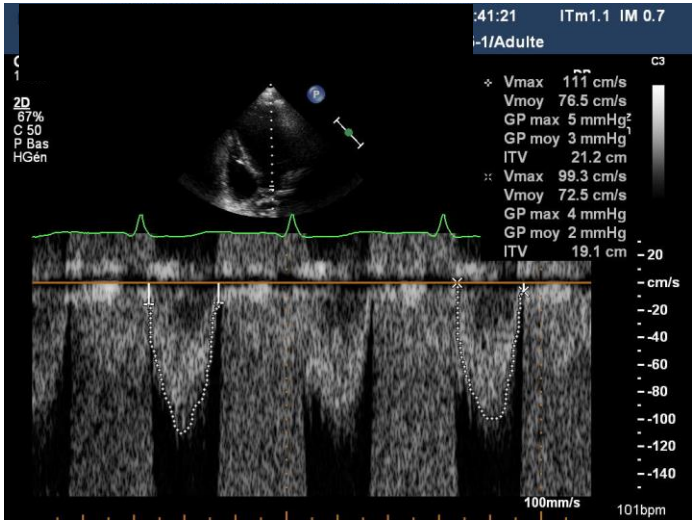
- Decision making: **AVR + MV repair**

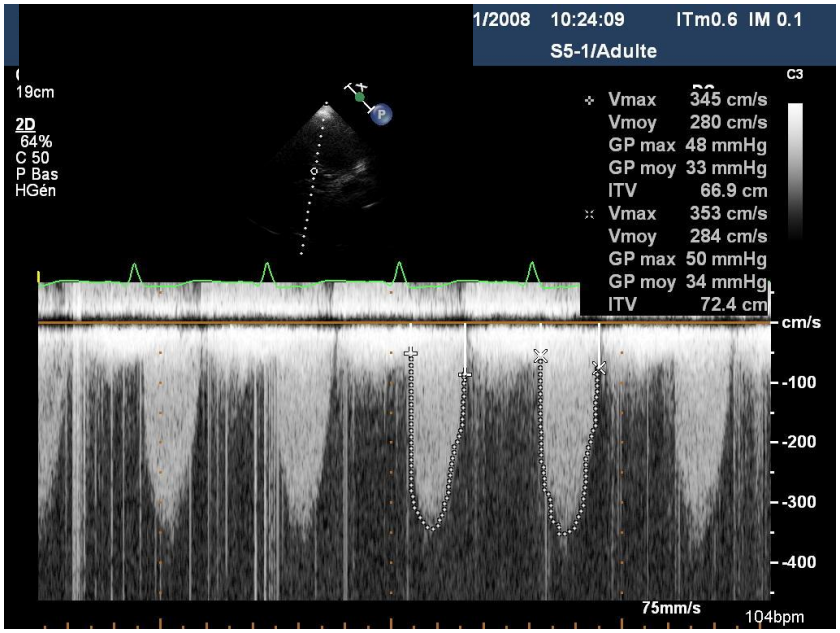
Severe Mitral Regurgitation
Pitfalls for Evaluation of severity of AS

- Severe MR despite preserved EF may:
  - decrease SV and gradient across Ao valve
  - conceale a severe AS behing a low gradient (low flow- low gradient AS)
- Severe MR may mask a significant LVD behind a normal EF
- AF, which frequently complicates MR, may:
  - decrease functional tolerance
  - decrease EF, forward SV, and Ao gradient

Severe MR + Severe LF-LG AS







BSA 1.82 cm²

LVOT diameter 1.9cm; LVOT VTI 20 cm

SV 56.6 ml / **indexed SV 31 ml/m²**

Ao Peak Velocity 3.5 m/s

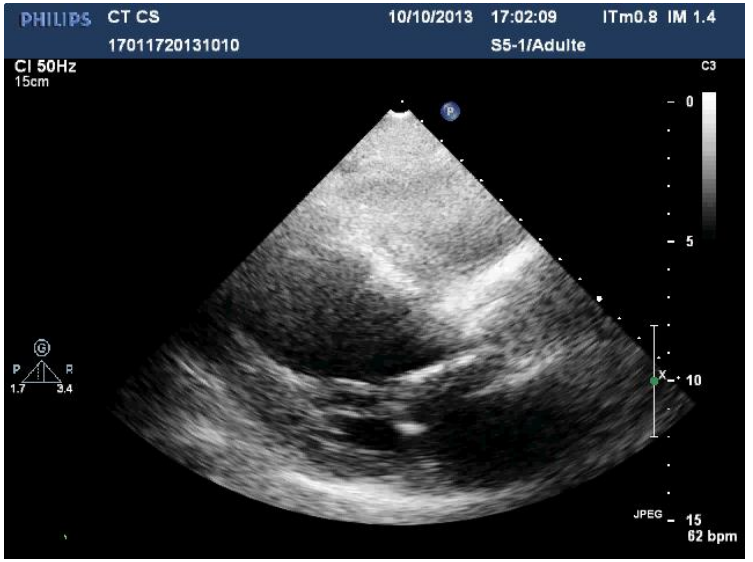
Mean gradient 33 mmHg

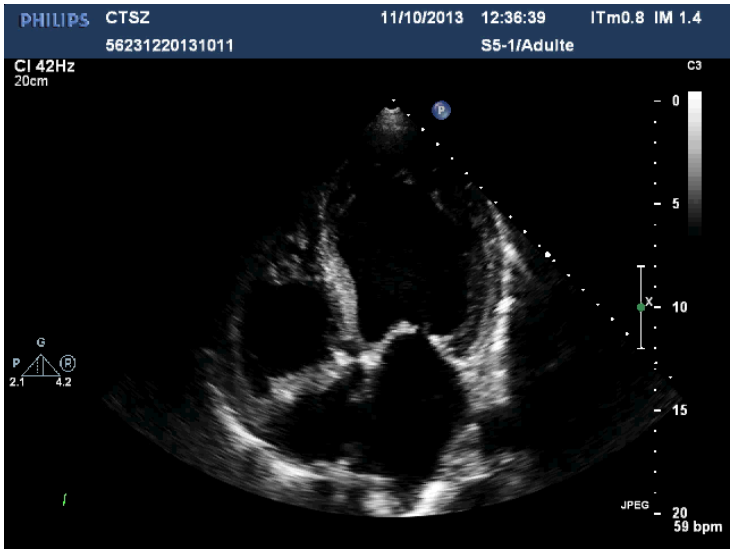
AVA 0.81 cm² ; 0.45 cm²/m²

Clinical case

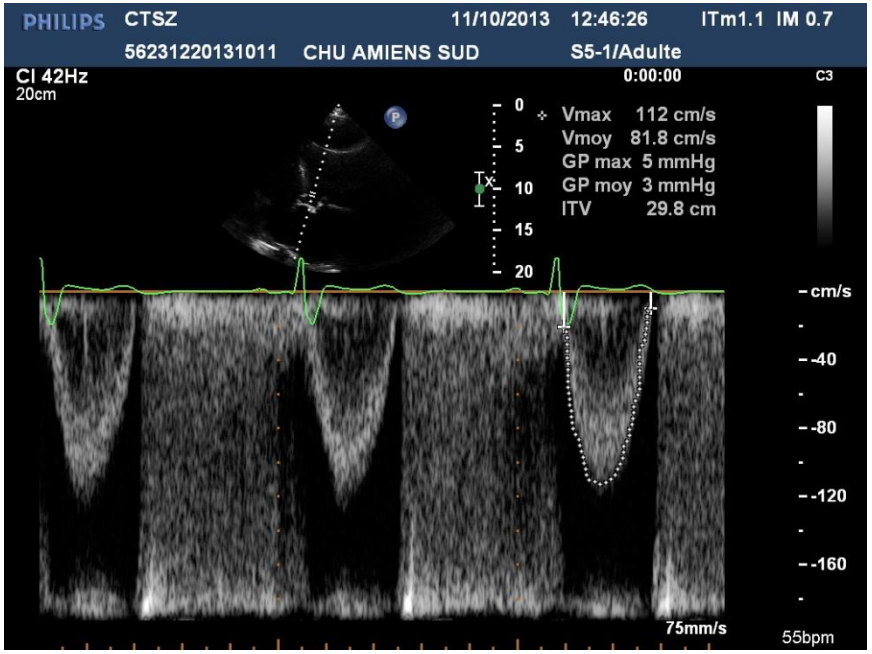
- Man, 81 yo,
- history of hypertension
- Dyspnea NYHA class IIb

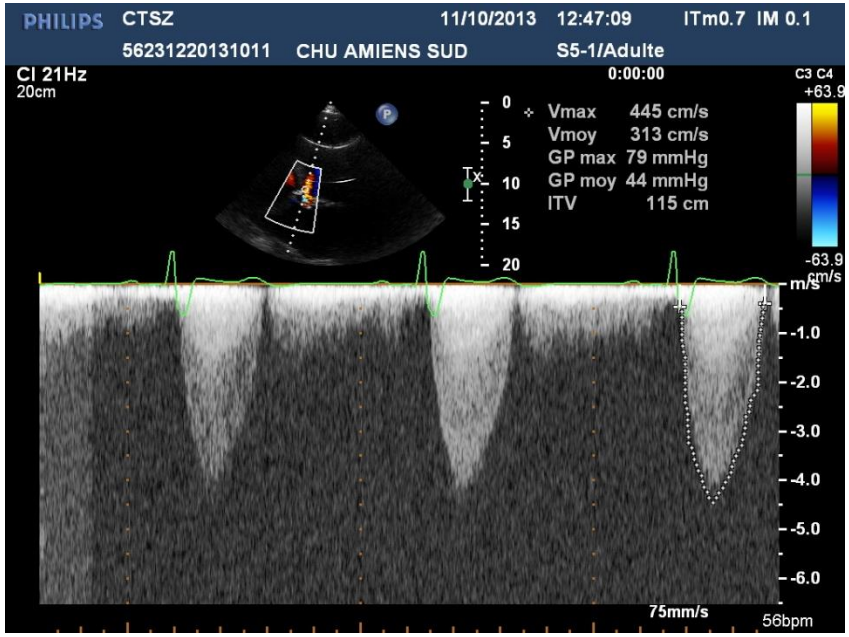
- Severe calcified AS
- Secondary MR
- Mild MV calcification
- Normal EF





Severe calcified AS



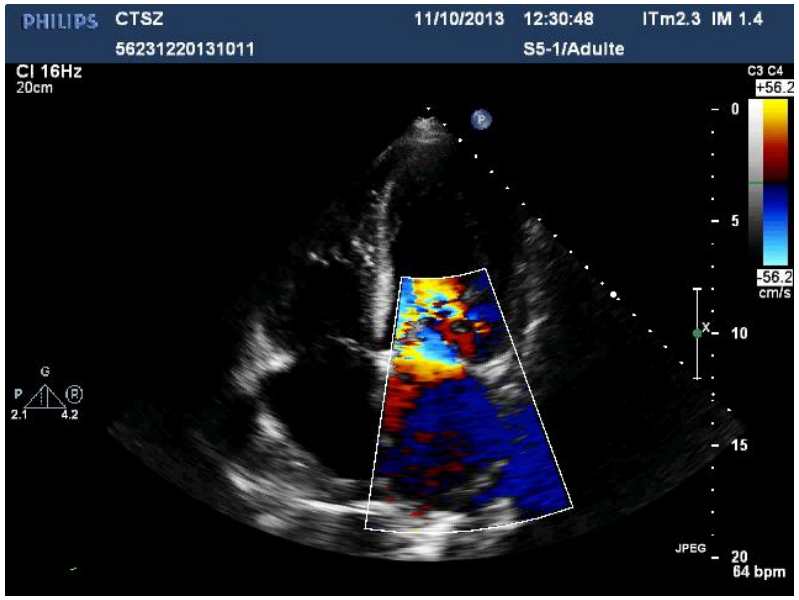


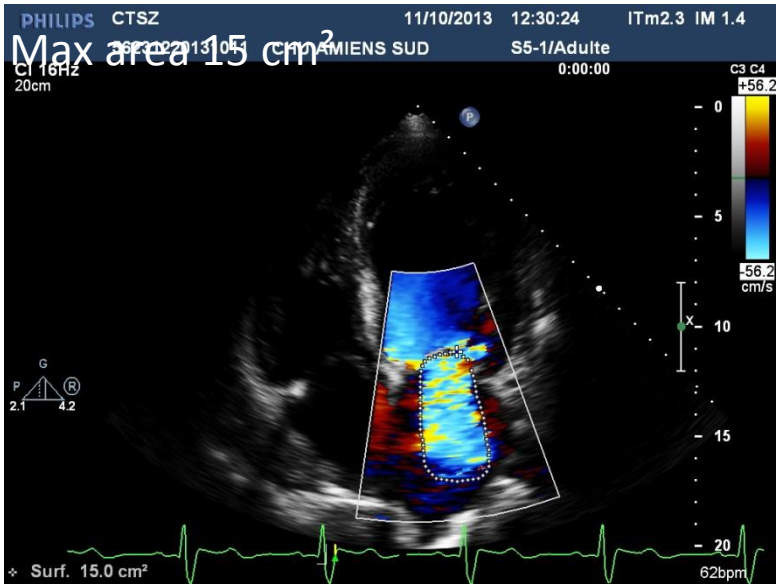
BSA 1 85.cm²
LVOT diameter 2cm;
LVOT VTI 30 cm
SV 94 ml
indexed SV 51ml/m²

Ao Peak Velocity 4.45 m/s

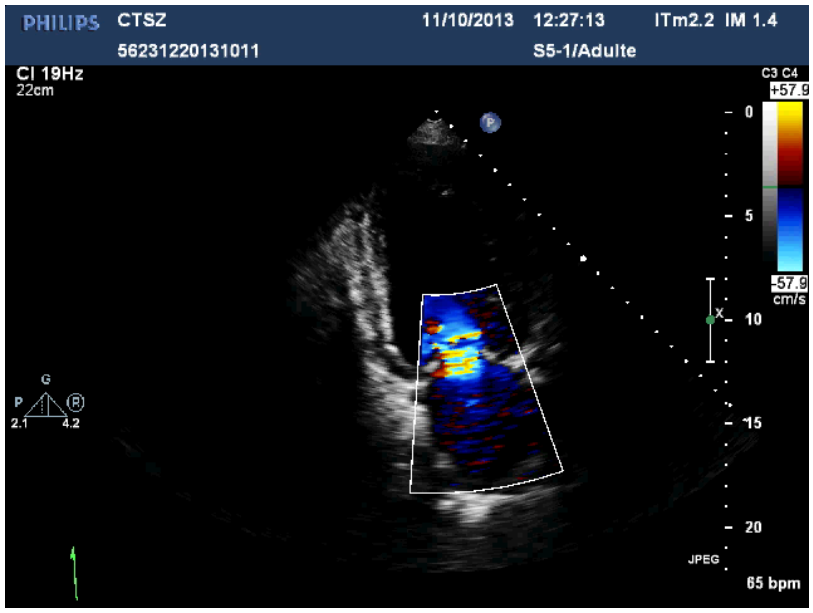
Mean gradient 44 mmHg

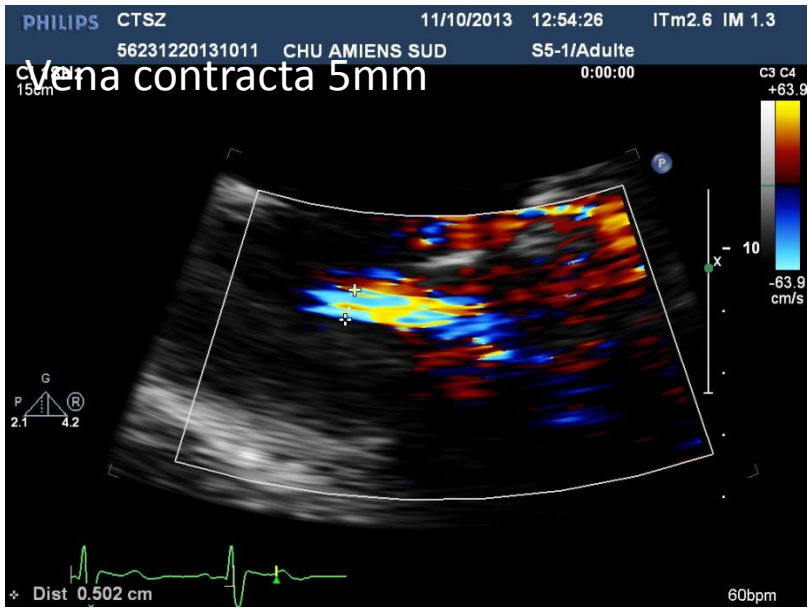
AVA 0.82cm² ; 0.44 cm²/m²



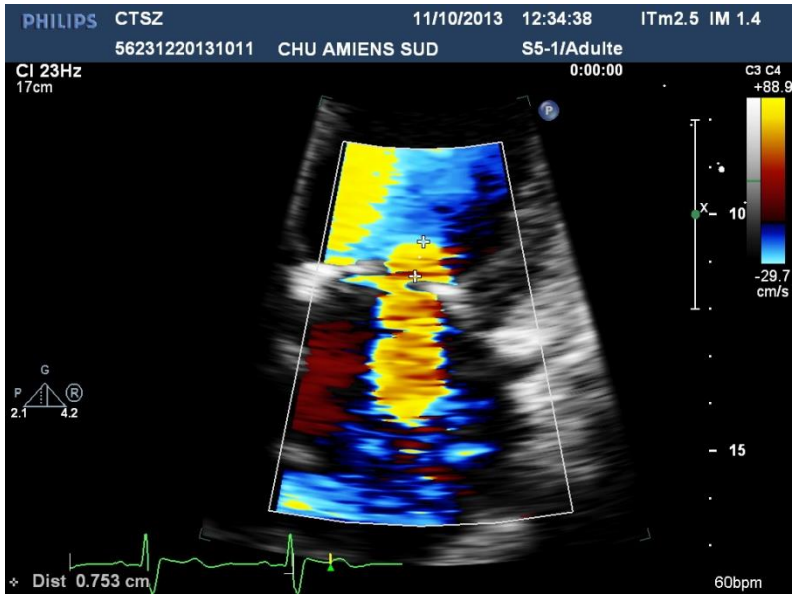


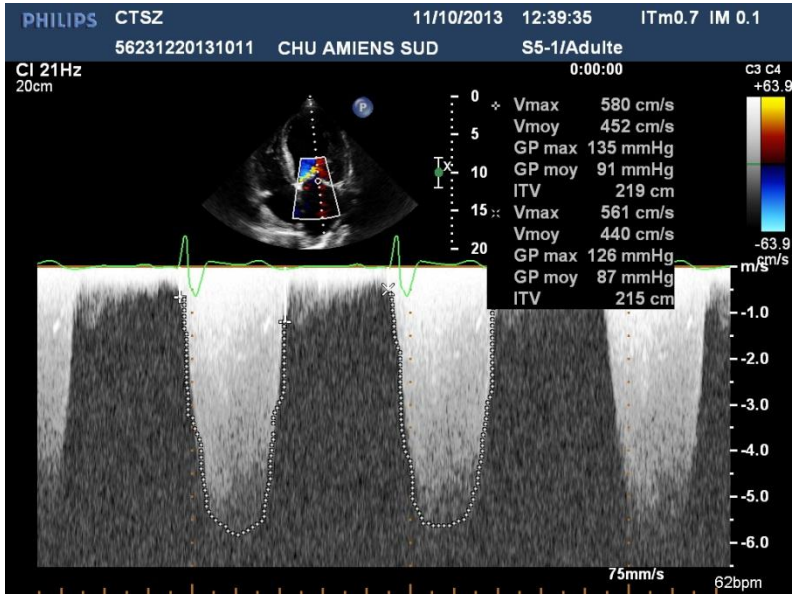
Max area 15 cm^2





Vena contracta 5mm





R= 0.80 cm

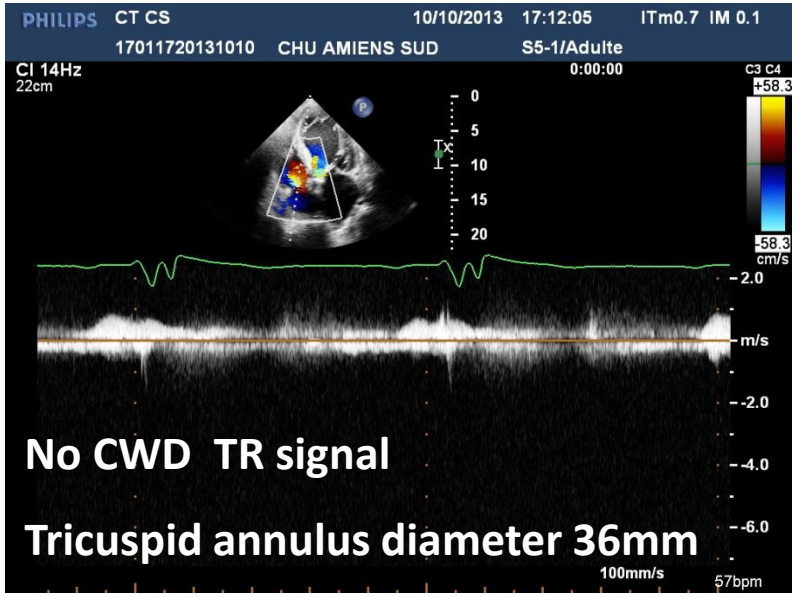
Aliasing Vel. = 30 cm/s

Mitral Peak Vel. 5.70m/s,

Mitral VTI = 217 cm

ERO = 0.22 cm²

RV= 46 ml



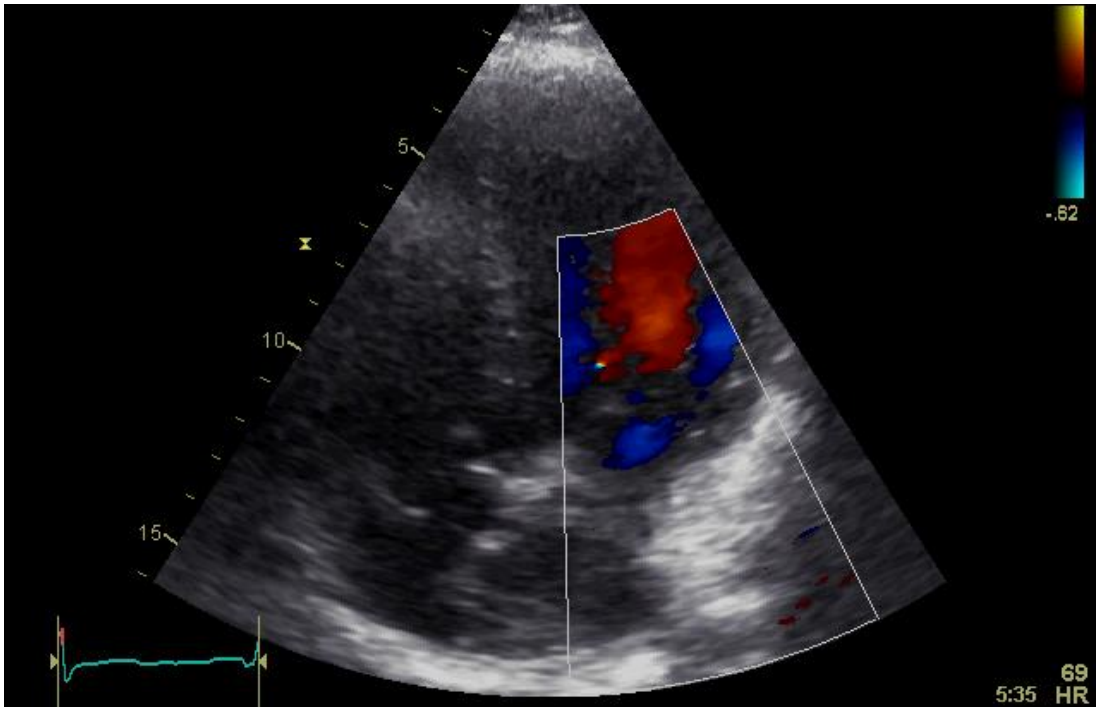
Clinical case

- Man, 81 yo, history of hypertension (enalapril 20mg)
- Dyspnea NYHA class IIb
- Normal coronary artery
- Logistic Euroscore 7%

- Severe calcified AS,
- Secondary MR (ERO 0.22cm²)
- Mild to moderate mitral annular calcification
- no TR, tricuspid annular diameter 36mm
- LVH, EF=62%,

Decision making: Isolated AV replacement
(Trifecta Aortic Bioprosthesis)

decision making: isolated AV replacement (Trifecta Aortic Bioprosthesis)



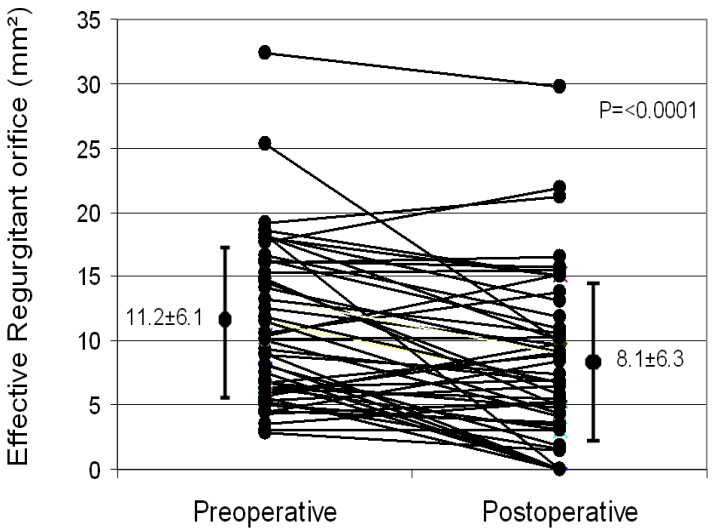
As expected, the functional MR decreased significantly post operatively towards a mild degree

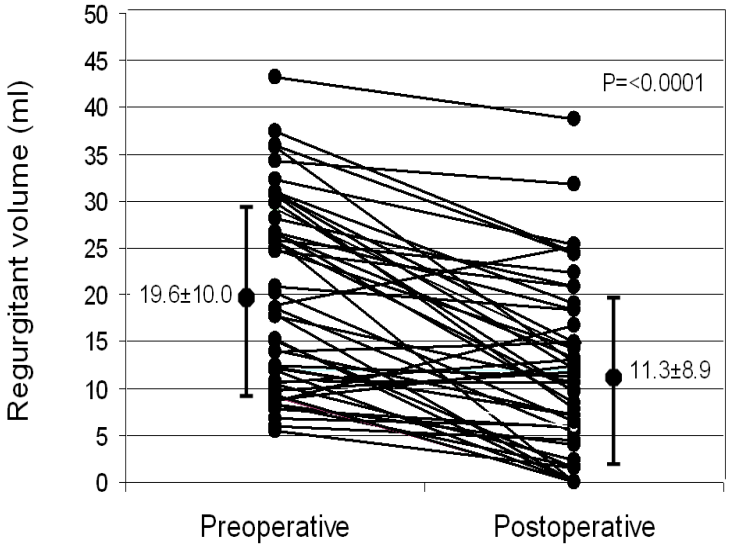
Severe Aortic Stenosis
Pitfalls for Evaluation of MR

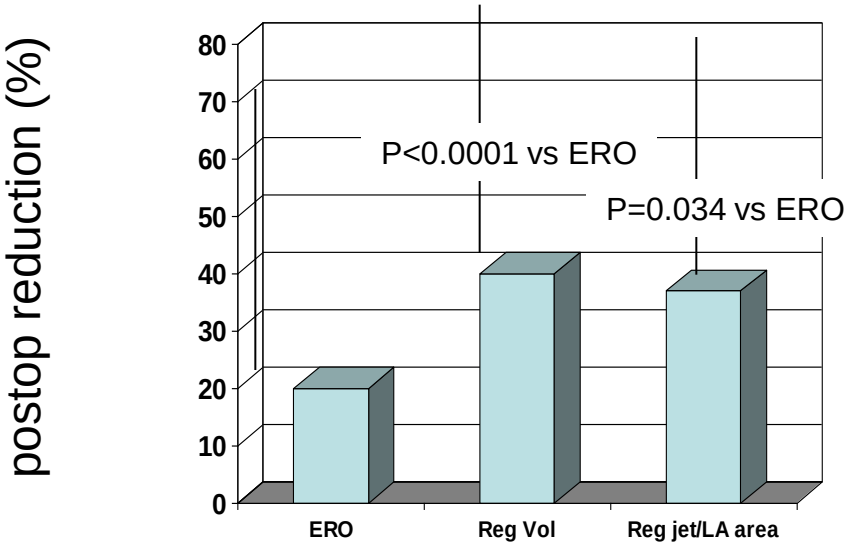
- AS may worsen MR through several mechanisms
  - AS increases LV to LA systolic pressure gradient leading to increase, for any given ERO, the RVand the regurgitant jet area of MR
  - AS leads to chronic pressure overload and LV remodeling which may promote MV deformation and functional MR

- After isolated AVR, severity of functional MR generally decreases greatly and early:
  - systolic LV pressure and mitral gradient drop
  - acute reverse LV remodeling after AVR may lead to improvement in functional MR

Quantitative changes in MR after AV replacement







Unger P et al. Am J Cardiol . 2008; 102:1378

Intervention in Multiple VHD
General principles from ESC VHD Guidelines

- Indications for intervention based on
  - global assessment of the consequences of different valve lesions on symptoms and on LV dysfunction, LA dilatation….
  - operative risk
  - discuss surgery for combined non-severe multiple lesions leading to symptoms, LVD …
- Choice of surgical technique:
  - Repair: the ideal option
  - Desire to repair may be decreased if prosthetic valve replacement is needed on another

Take Home Messages

- Multiple valve diseases are frequent
- Evaluation is challenging
  - Haemodynamic interactions between lesions
  - Global consequences on symptoms, LV ….
  - Tricuspid valve

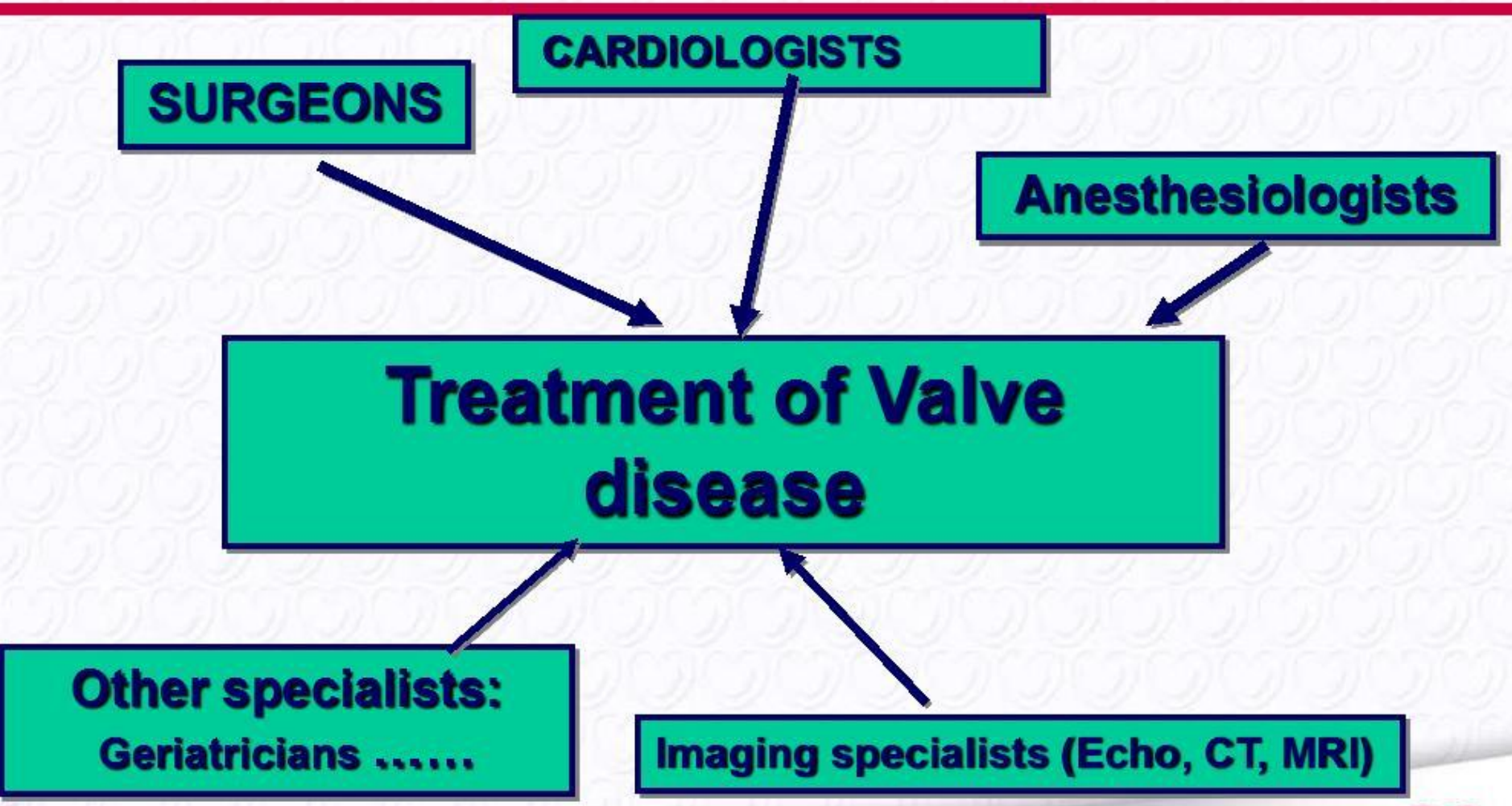
- Management strategy: Heart Team
  - each case must be considered individually
  - Take into account increased operative risk of multiple valve surgery versus risk of leaving a valve unoperated

ESC 2012

The « Heart Team »

Multiple VHD

each case of multiple VHD must be considered individually



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