MITRAL REGURGITATION

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MITRAL VALVE

ANATOMY

ANNULUS

LEAFLETS

CHORDAE

PAPILLLARY MUSCLES

FUNCTION

LEFT ATRIUM

ANNULUS

LEAFLETS

CHORDAE

PAPILLARY MUSCLES

LEFT VENTRICLE

VALVE ANALYSIS

Etiology → The Cause of Valve Disease

Lesions → The Result of the Disease Process

Dysfunction → The Result of the Lesions

LESIONS

Quality of tissue (Pliability of leaflet)

Quantity of tissue

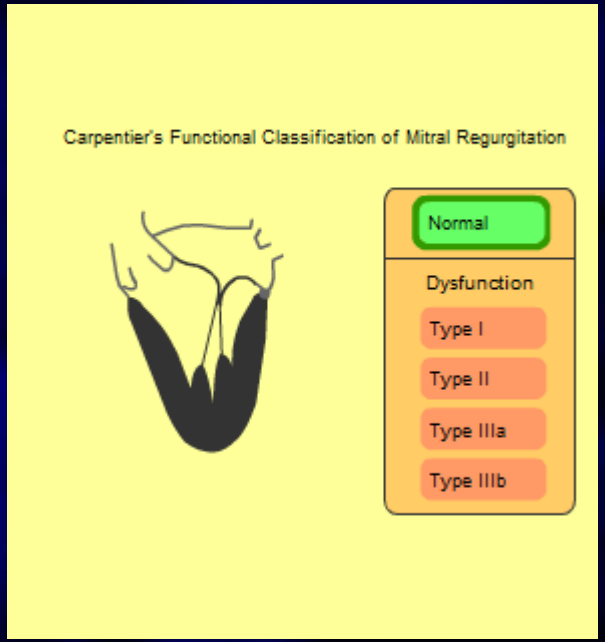
Calcifications (Leaflet, LV wall)

DYSFUNCTION: CARPENTIER'S CLASSIFICATION

TYPE I : NORMAL LEAFLET MOTION
- ANNULAR DILATION
- LEAFLET PERFORATION

TYPE II : EXCESSIVE LEAFLET MOBILITY
- PROLAPSE
- FLAIL

TYPE III : REDUCED LEAFLET MOBILITY OR MOTION
- CHORDAE SHORTENING, LEAFLET THICKENING
- INCOMPLETE COAPTATION

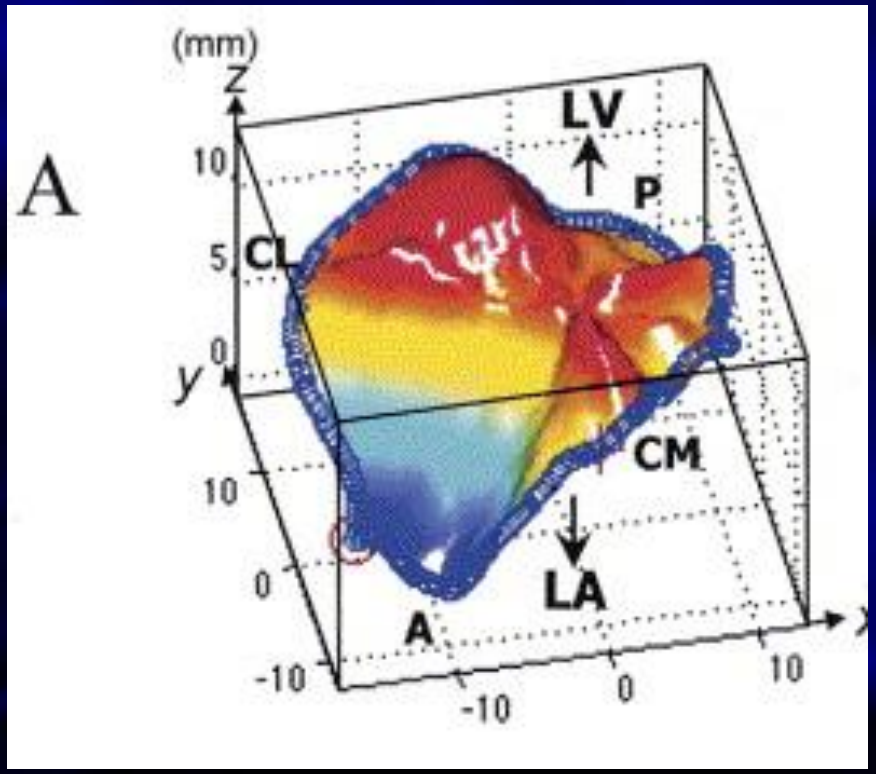


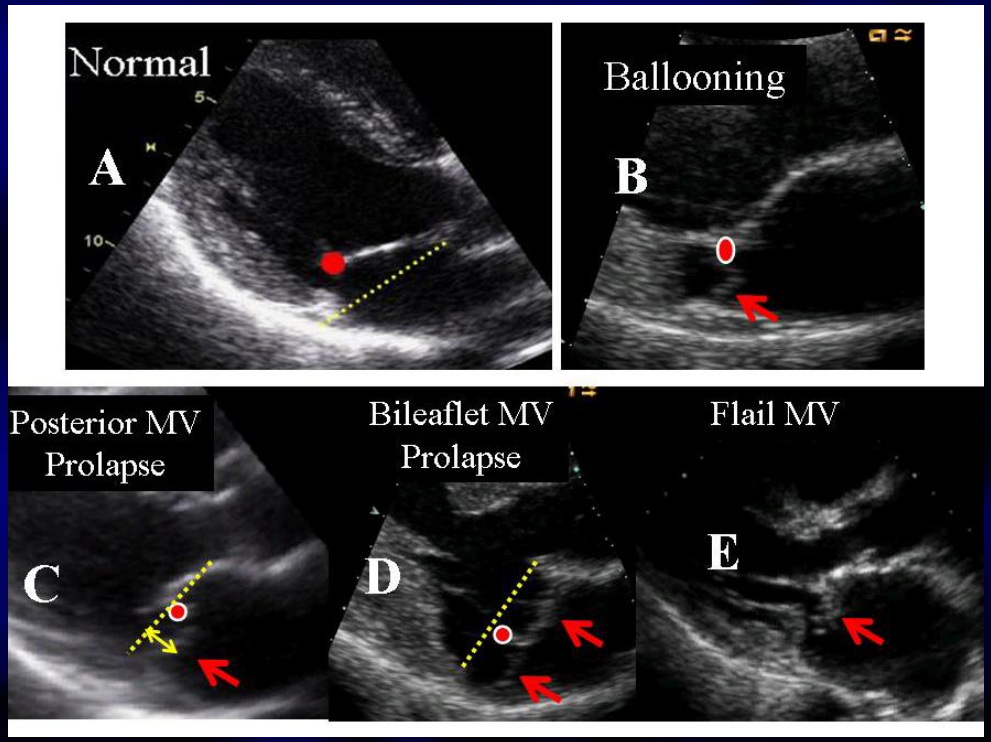
CAUSES

	ETIOLOGY	
MECHANISM	NON-ISCHEMIC	ISCHEMIC
ORGANIC	Rheumatic, prolapse,flail leaflet, endocarditis, etc	Ruptured PM
FUNCTIONAL	Cardiomyopathy	Post-MI

DEGENERATIVE (Barlow, FED, Marfan)

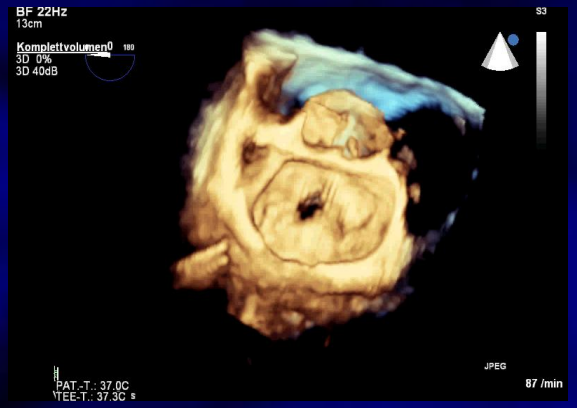
ballooning, prolapse, flail

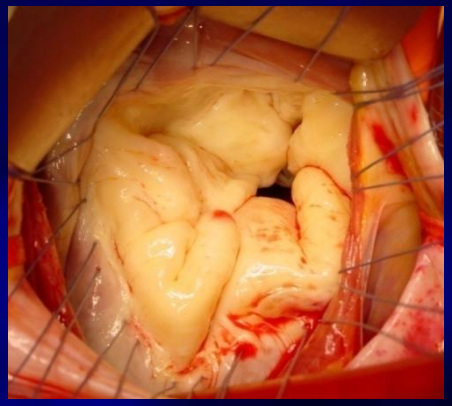


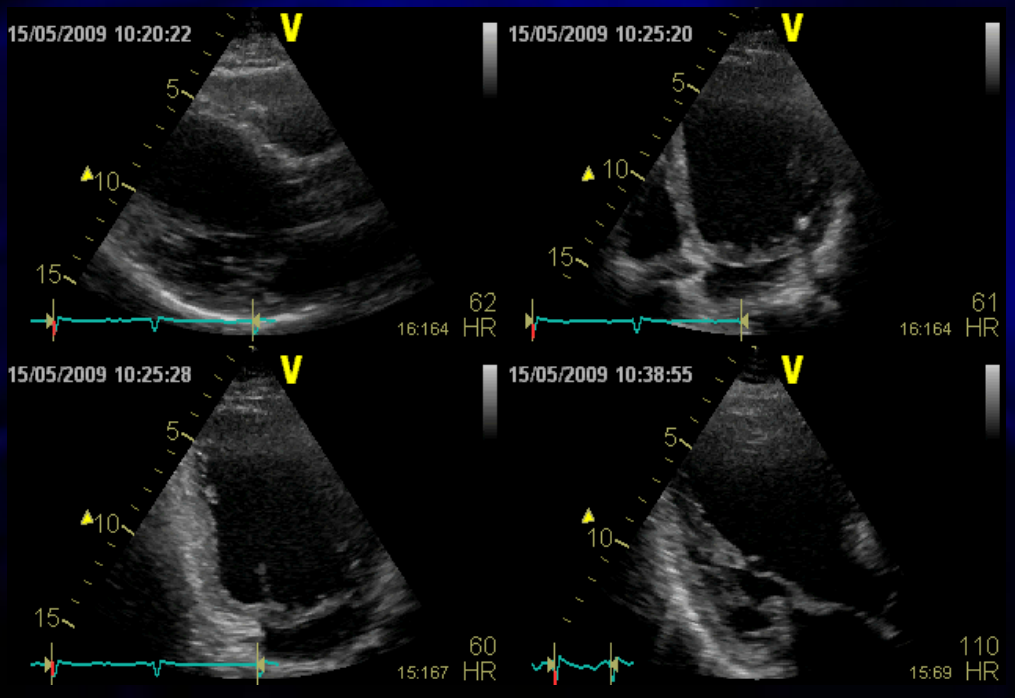


Mitral annulus is saddle shaped
Parasternal Long Axis View

Barlow disease

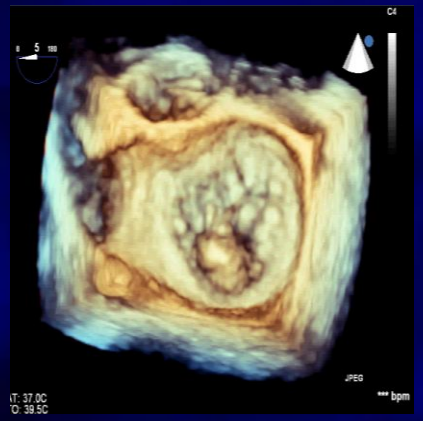


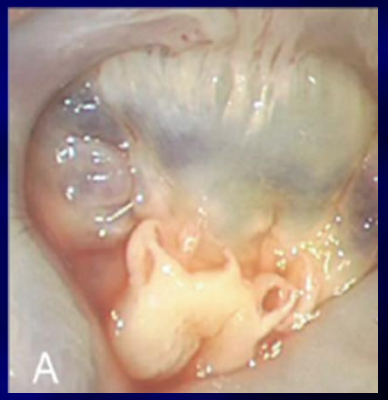


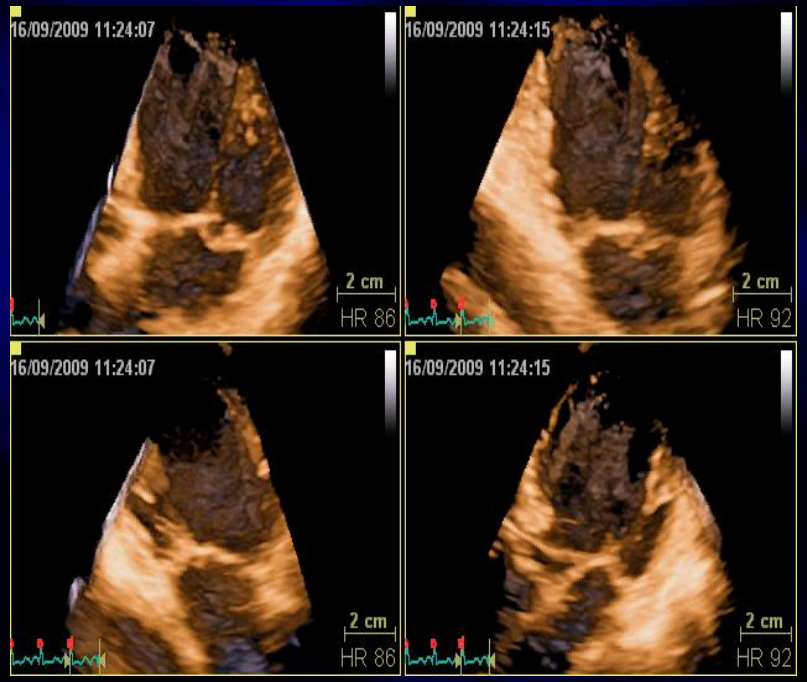


Thickened (> 5mm), Redundant tissue

Fibroelastic Deficiency





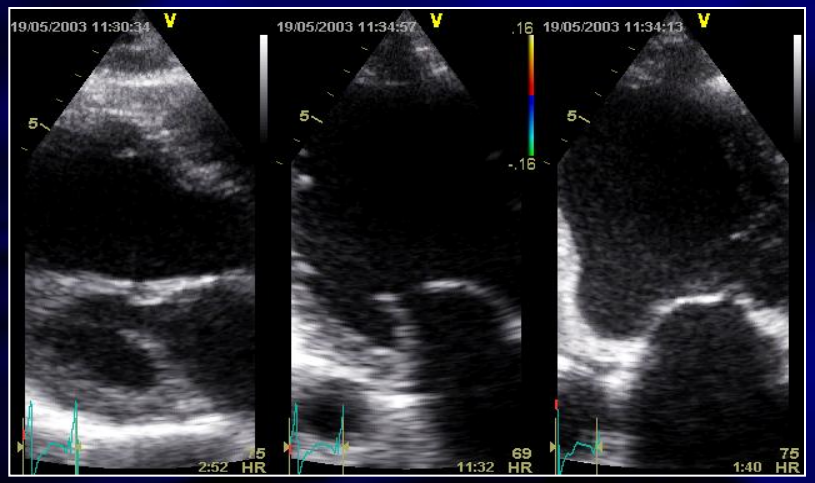


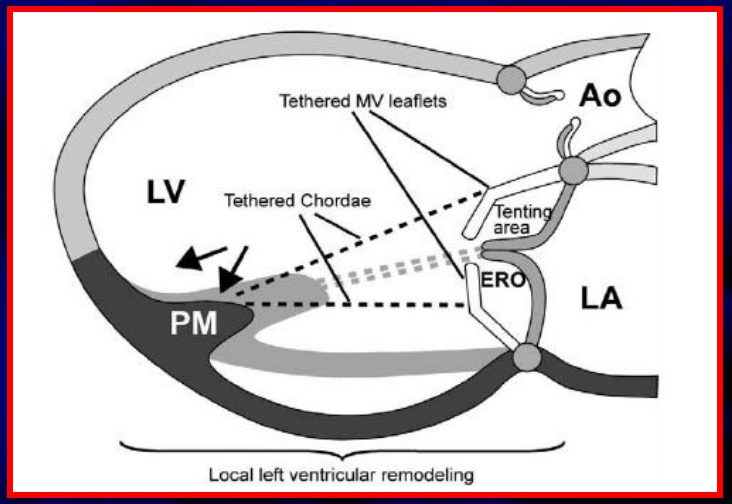
P2 Prolapse

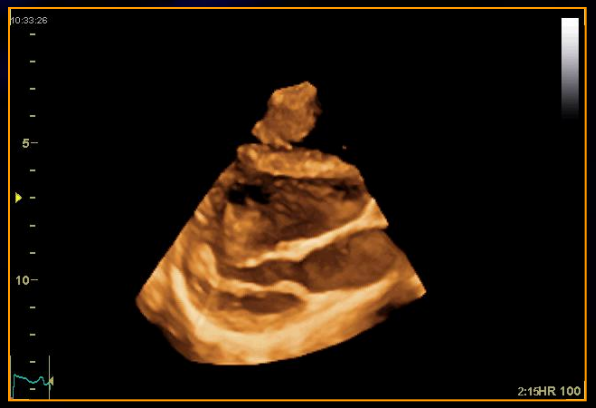
FUNCTIONAL MR

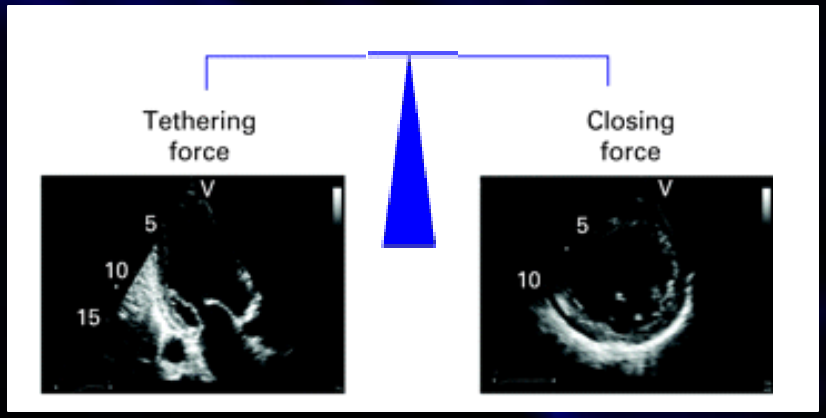
Normal leaflets, Annular dilation, LV dilation + spherical +

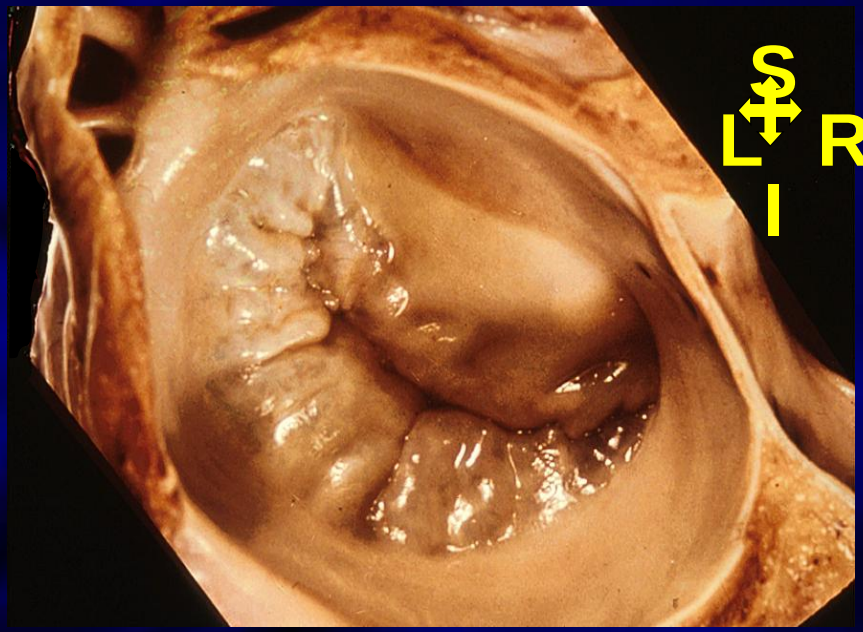
Altered geometry + PMs displacement + WM abnormalities







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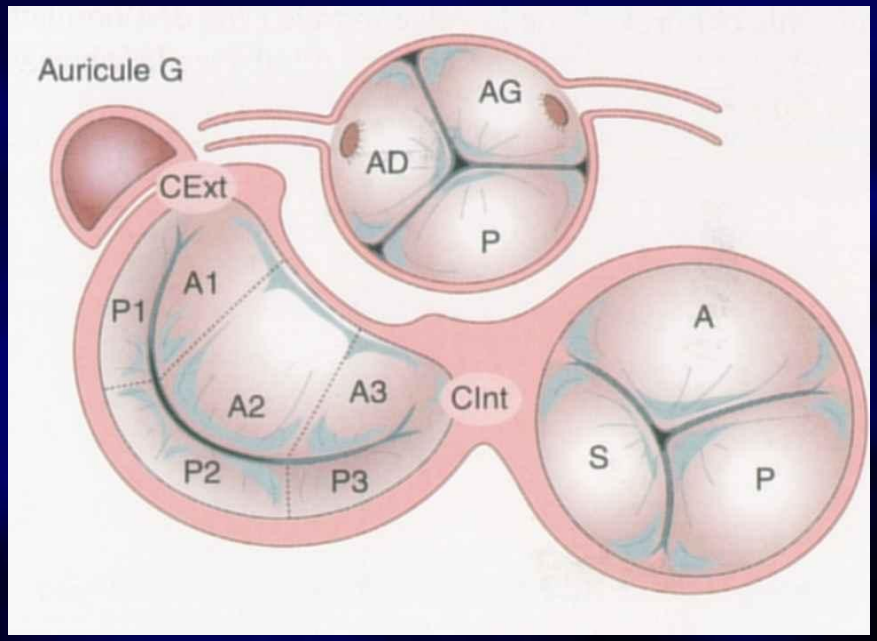
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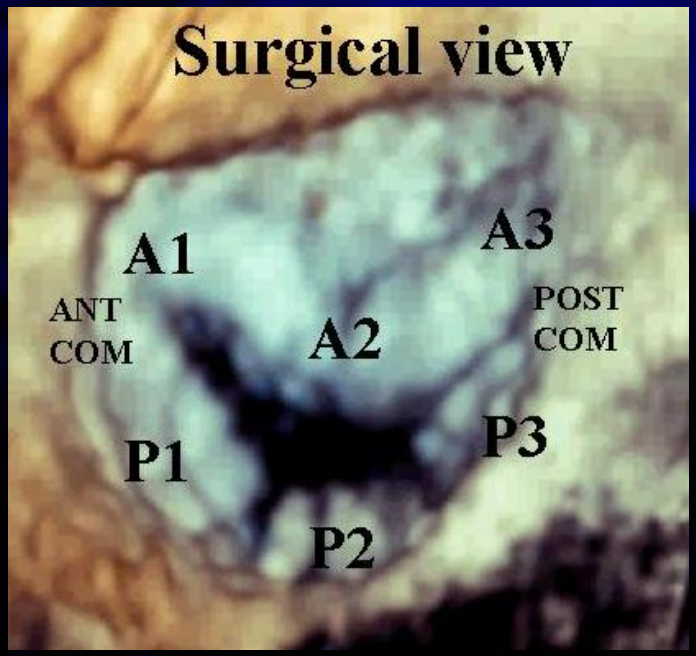
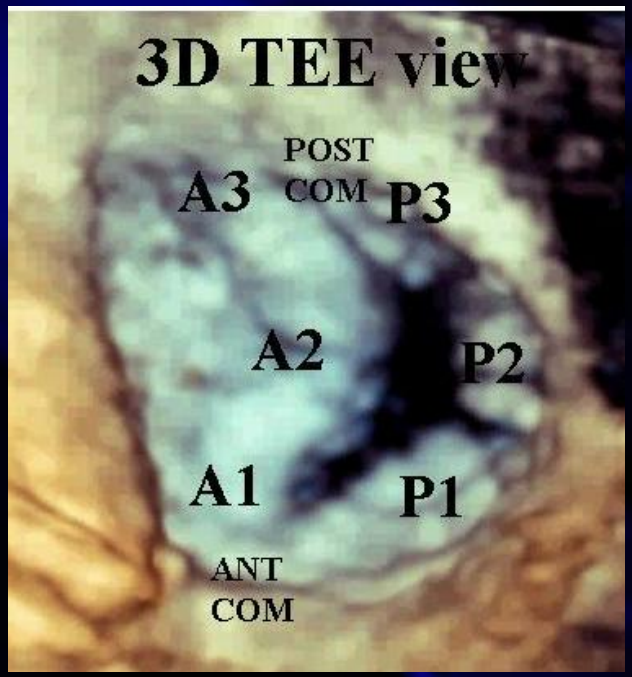
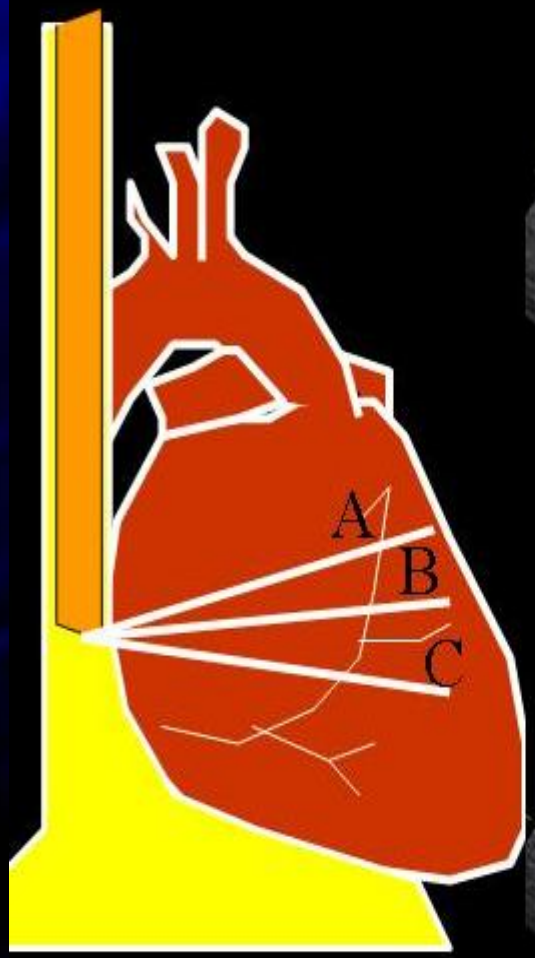
P3

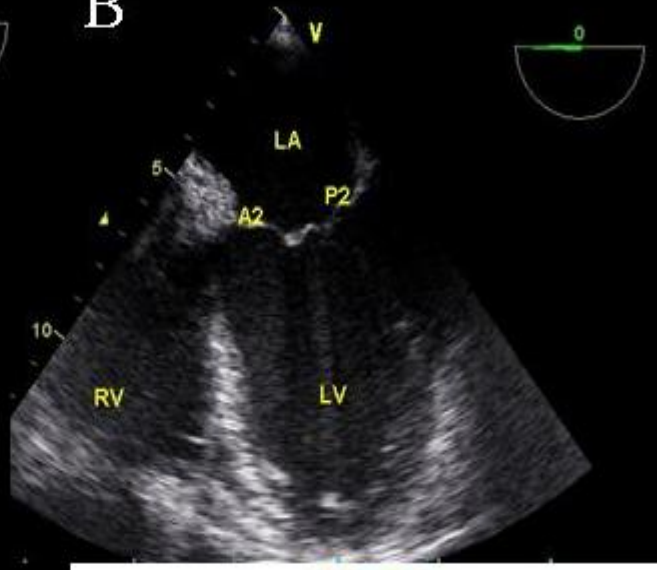

Surgical view
A1
A3
ANT
COM
POST
COM
A2
P1
P3
P2

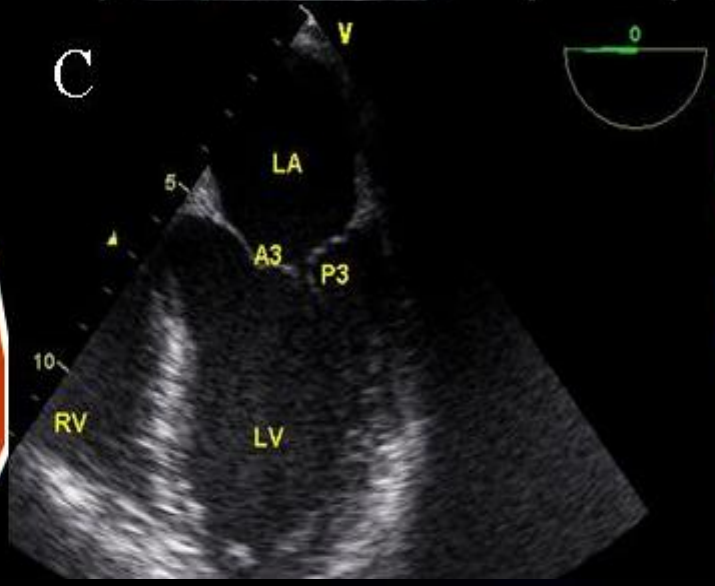

3D TEE view
POST
COM
A3
P3
A2
P2
A1
P1
ANT
COM

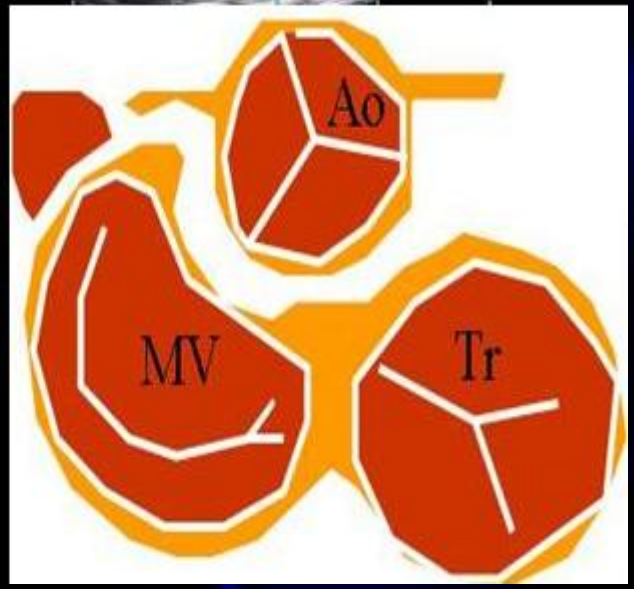
4-Chamber View at 0°

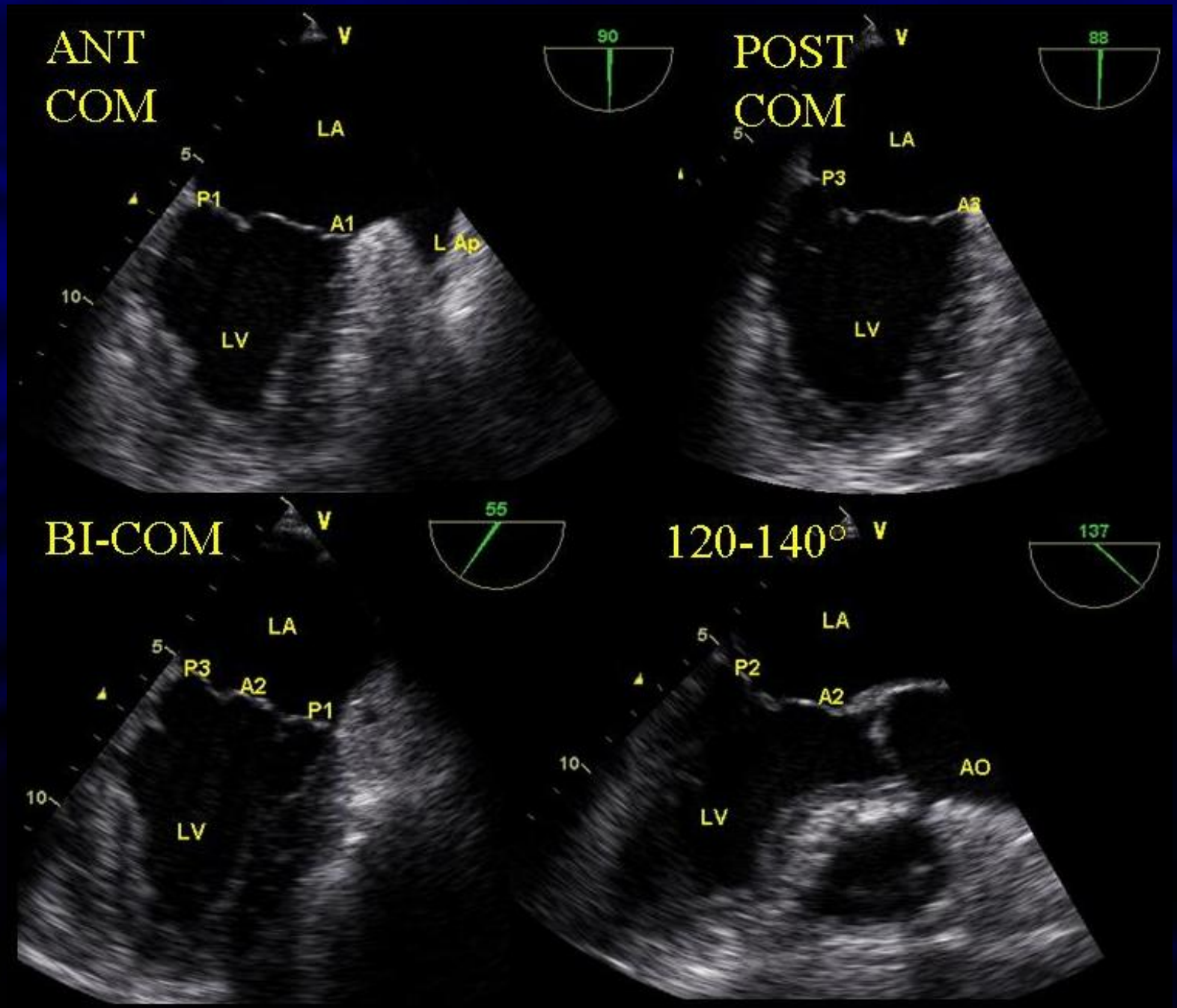
TEE Probe










ANT
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LA
P1
A1
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COM
LA
P3
A3
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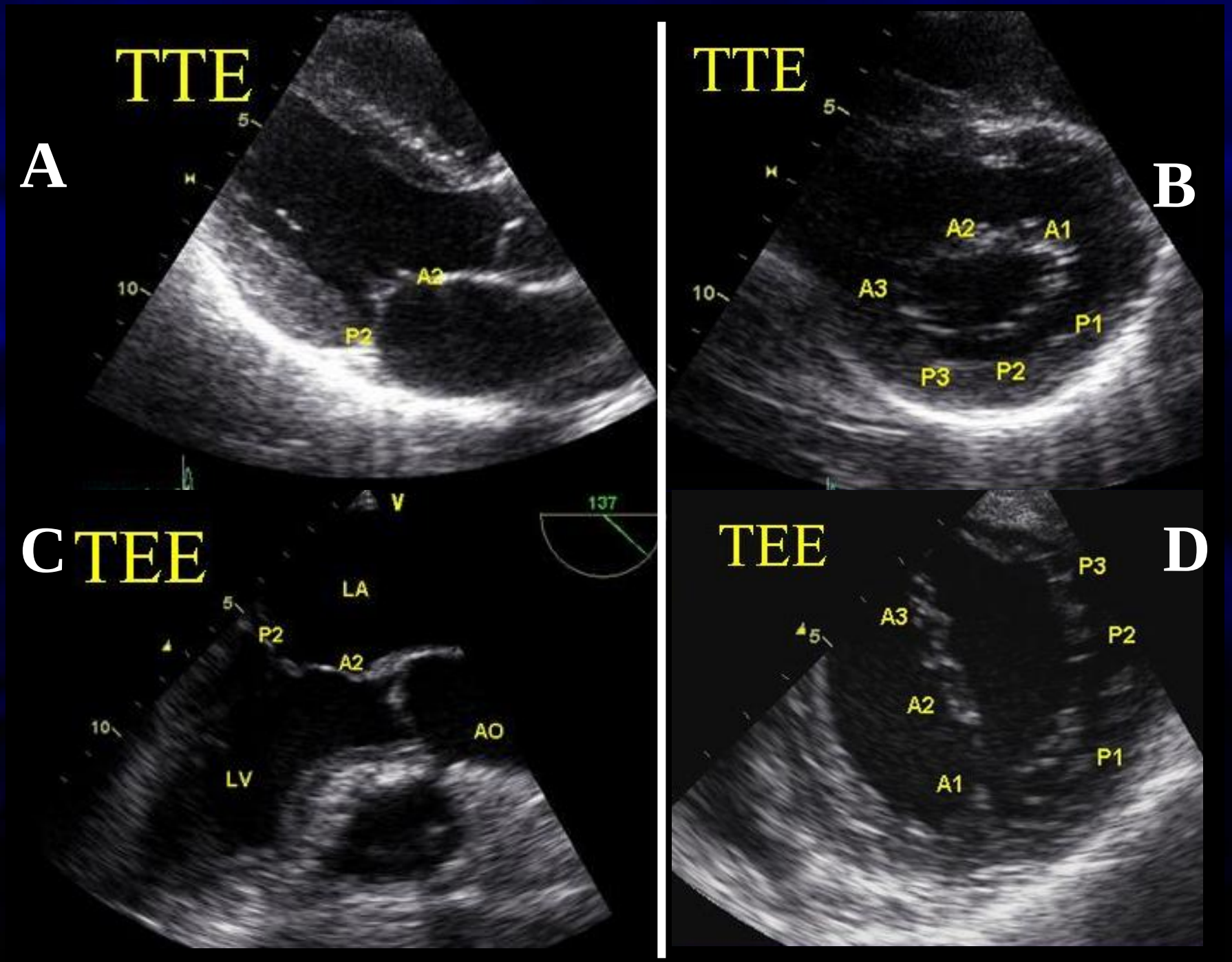
P3
A2
P1
LV
120-140°
LA
P2
A2
AO
LV


TTE
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10
A2
P2
TTE
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A1
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TEE
V
137
LA
5
P2
A2
10
AO
LV
TEE
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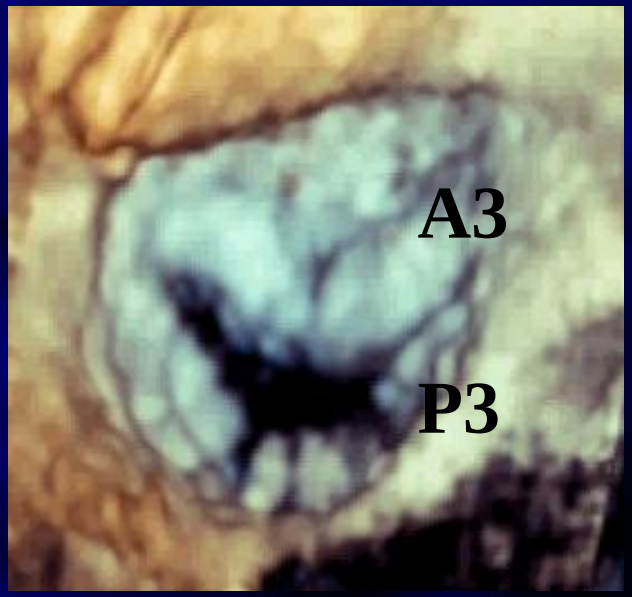
P2
A2
P1
A1


A2
P2


A1
P1


A3
P3


TTE
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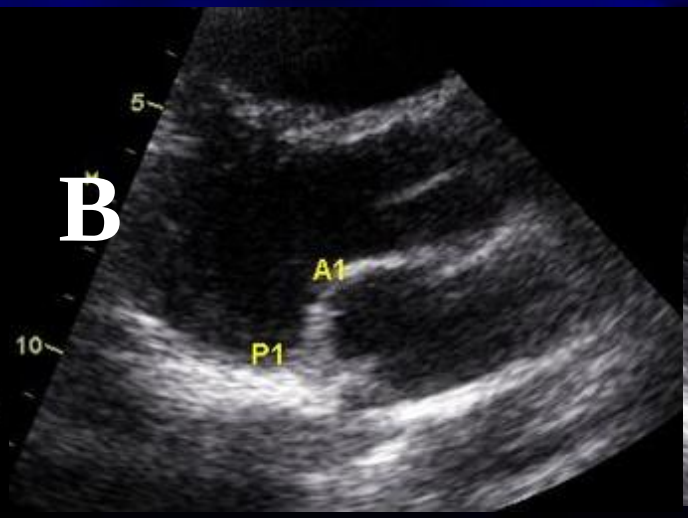
A2
P2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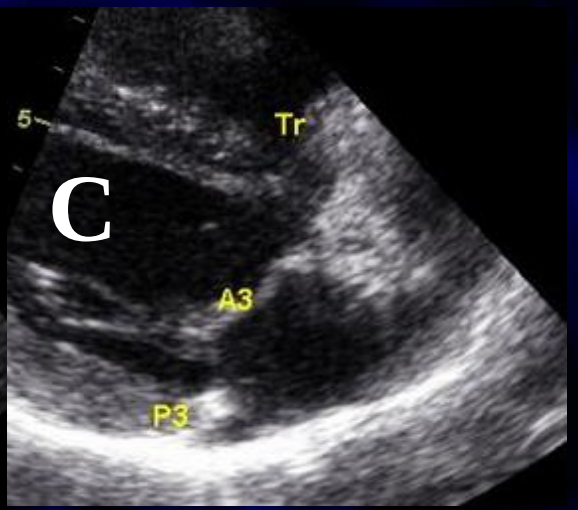
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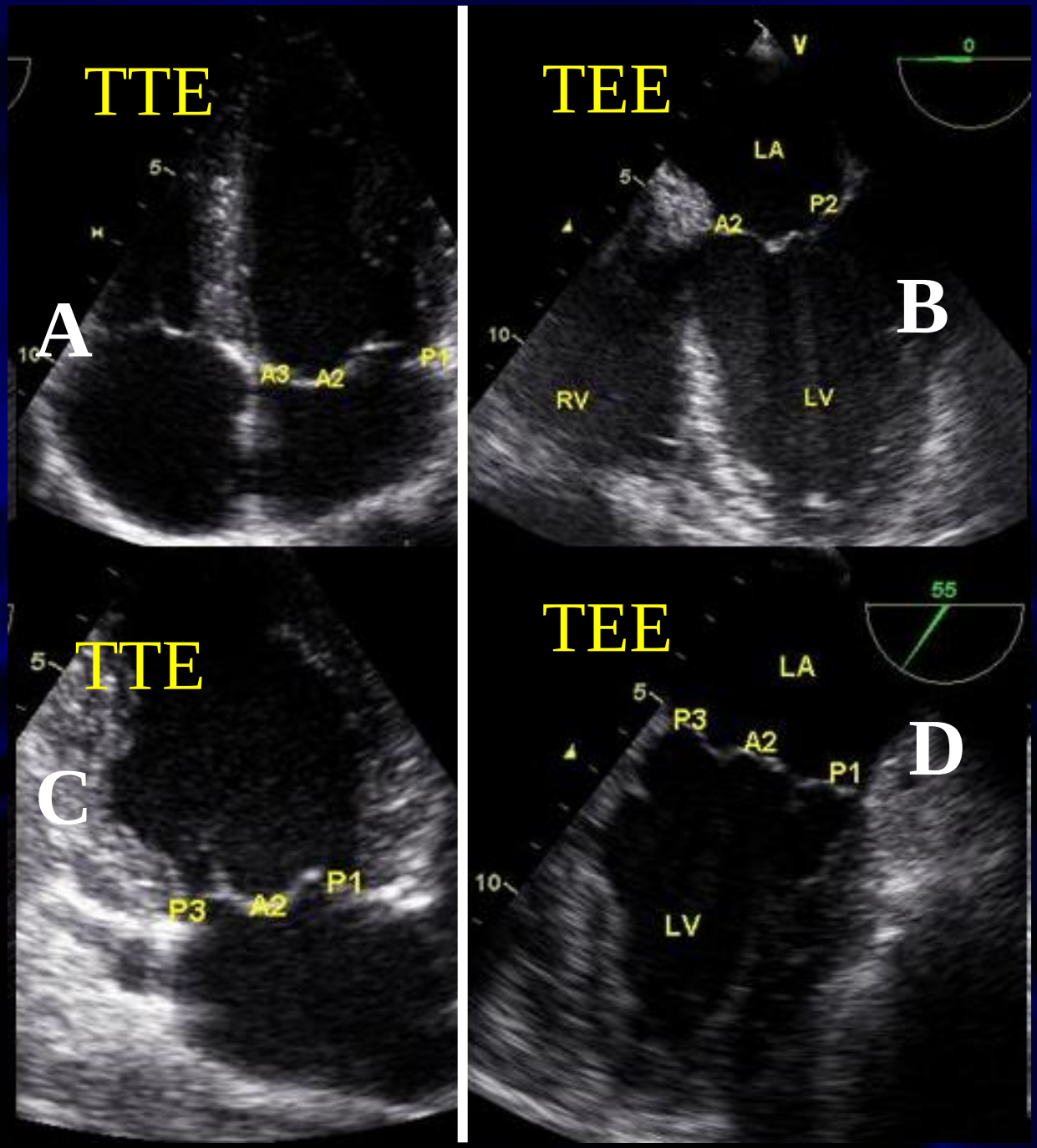
TTE
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TTE
C
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P3
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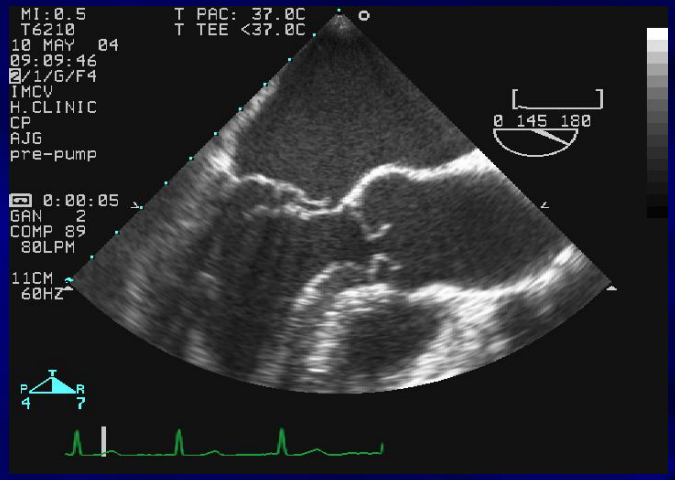
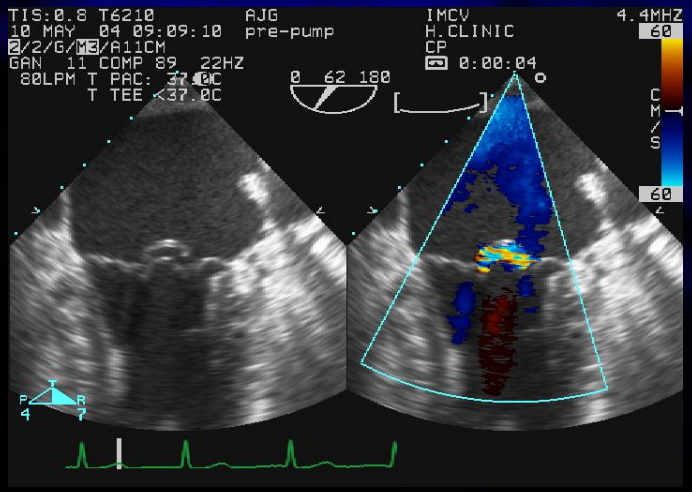
55
LA
5
P3
A2
P1
10
LV

Type II P2
(long axis 130-150°)

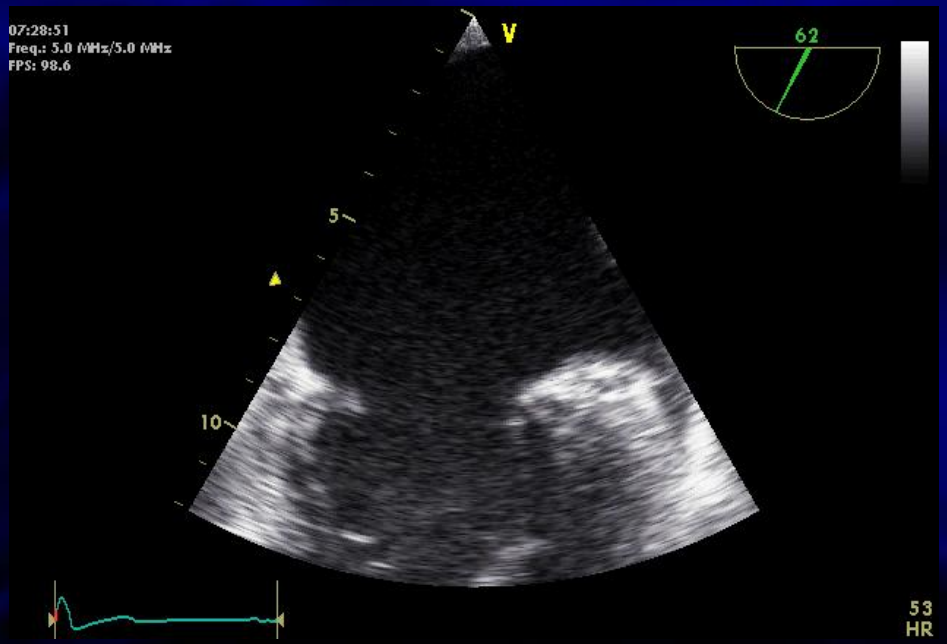


Type II P2
(bi commissural 45-60°)



Post Commissure – P3

Type II P3

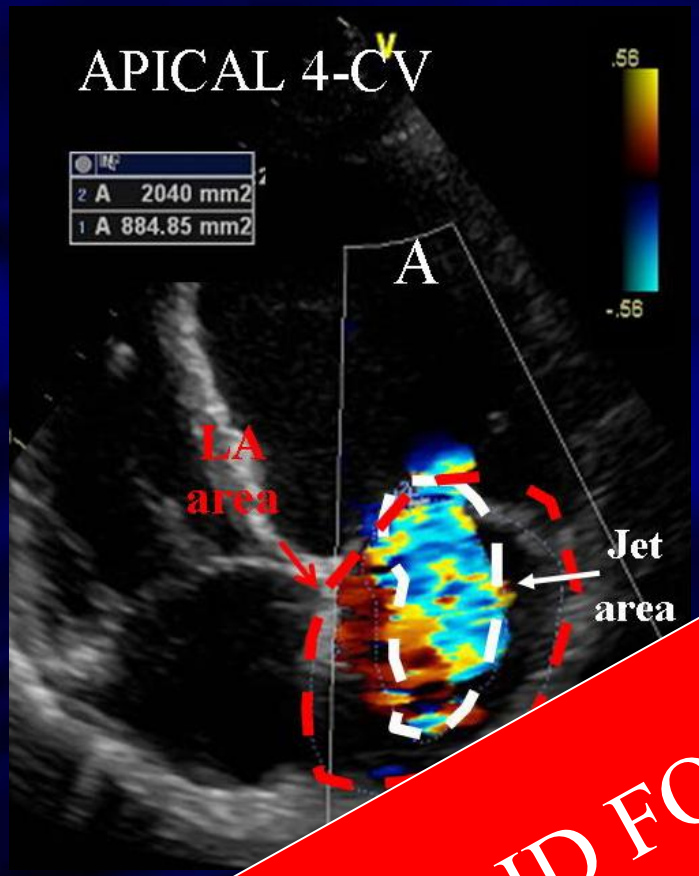


Anterior commissure – P1

Mitral valve analysis: recommendations

(1) TTE is recommended as the first-line imaging modality for mitral valve analysis.
(2) TEE is advocated when TTE is of non-diagnostic value or when further diagnostic refinement is required.
(3) 3D-TEE or TTE is reasonable to provide additional information in patients with complex mitral valve lesion.
(4) TEE is not indicated in patients with a good-quality TTE except in the operating room when a mitral valve surgery is performed.

Color flow mapping



- Aliasing velocity of
- Optimize
- valuation
- eparate mild to severe)

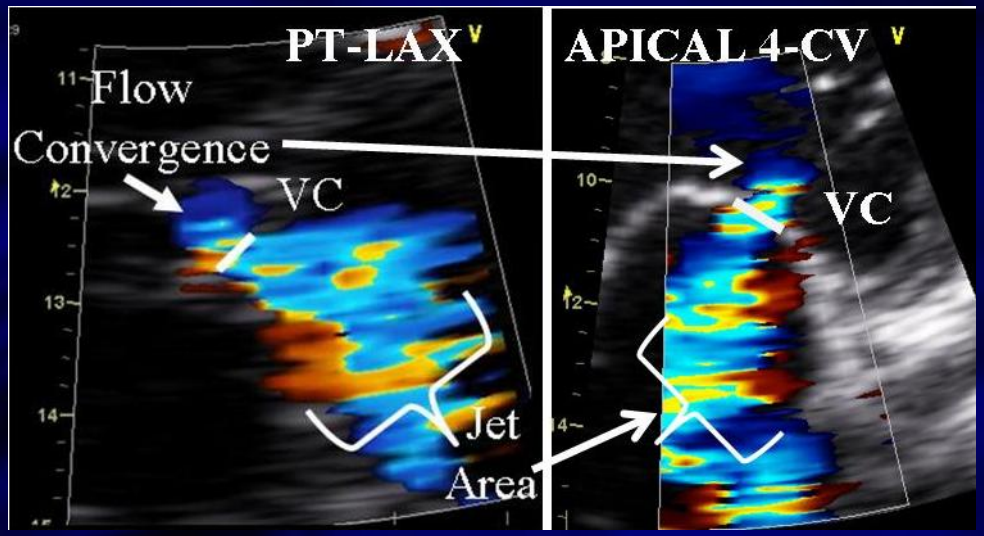
NOT VALID FOR MR QUANTIFICATION

Limita

- Te settings, PRF), Direction of the jet (Coanda effect)
- Load ions, Left atrial size

VENA CONTRACTA WIDTH

The narrowest portion of the MR jet downstream from the orifice

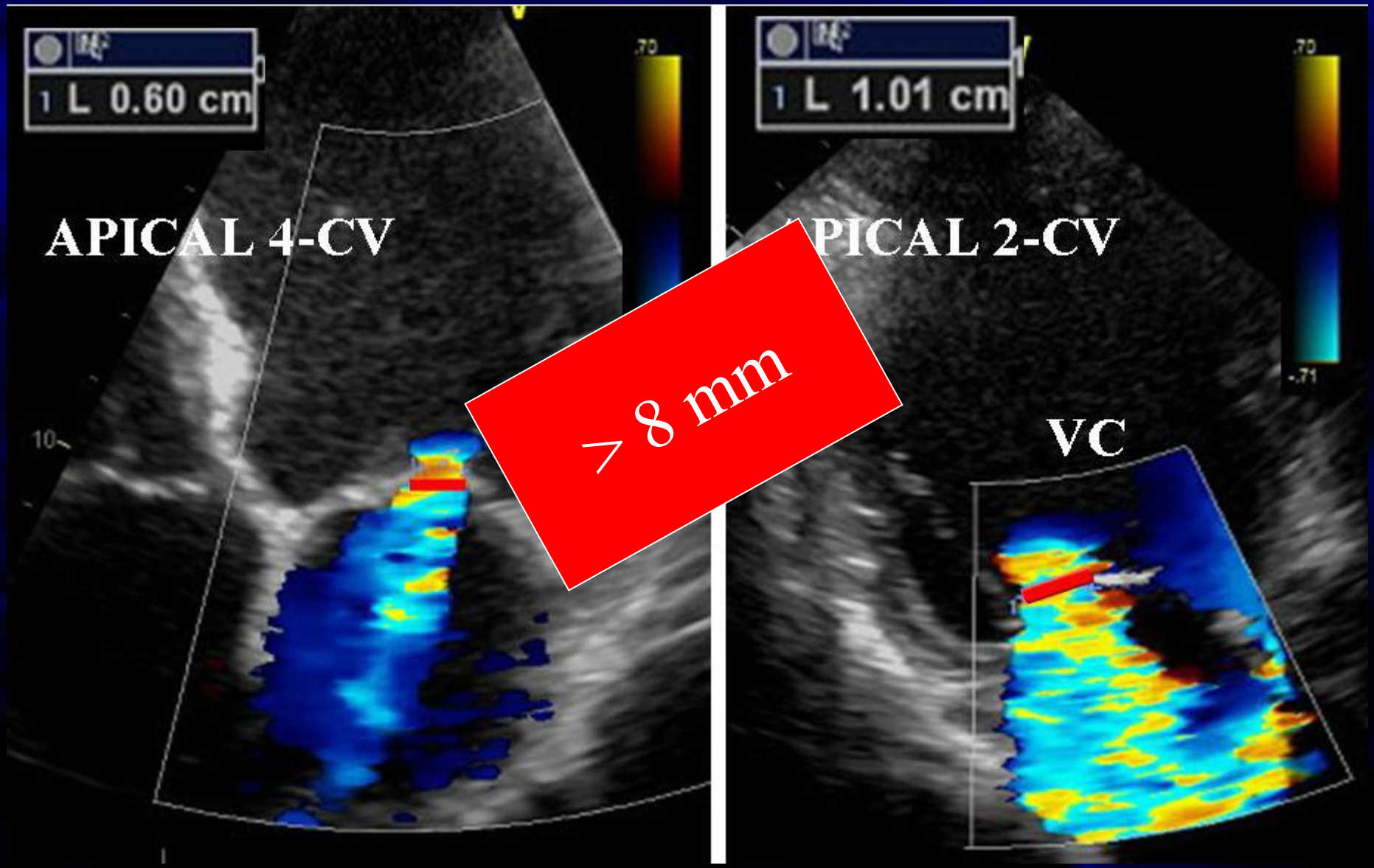


Limitations

- Lateral resolution
- Phasic changes
- Multiple jets
- Non-circular orifice

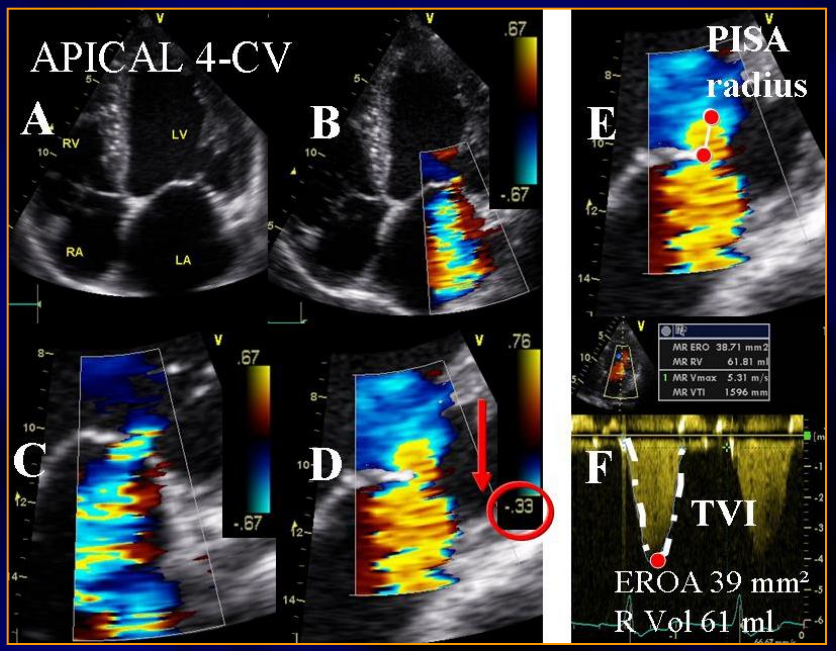
- 2 orthogonal planes, Color sector as narrow as possible
- Zoom to optimize visualization
- Maximal lateral and temporal resolution
- Mild MR < 0.3 cm, Severe MR ≥ 0.7 cm

VENA CONTRACTA WIDTH



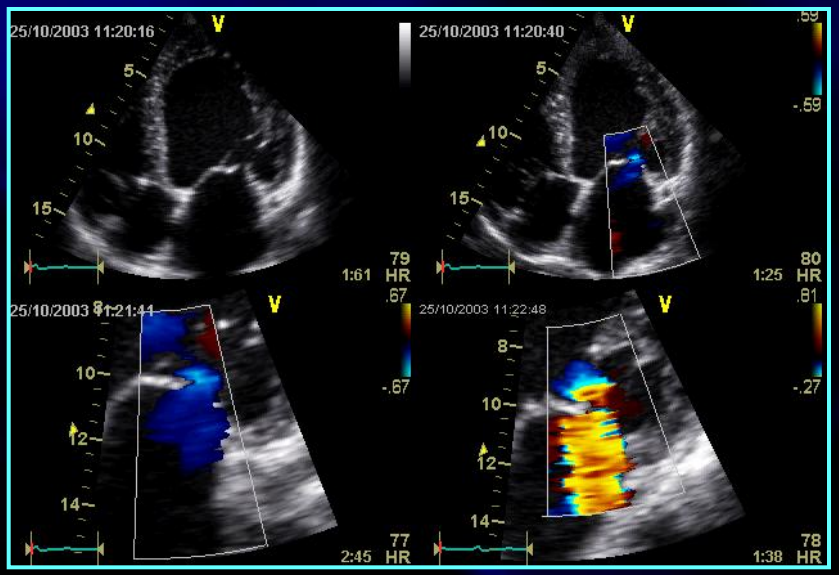
PISA METHOD

1. Optimize 2-D color
2. Zoom or RES
3. Shift the color scale
4. Measure the PISA
5. MR CW Doppler
6. Calculate mitral ERO/RV



BENEFITS

1. Less affected by hemodynamic factors
2. Etiology of MR or Other valve disease do not affect ERO calculation
3. Can be used with eccentric jets



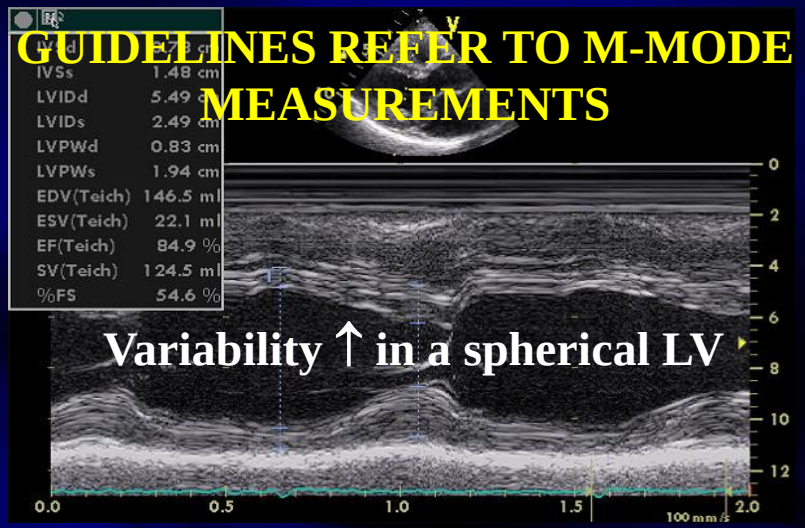
Integrating indices of MR severity

Parameters	Mild	Moderate	Severe
Qualitative			
Mitral valve morphology	Normal/Abnormal	Normal/Abnormal	Flail leaflet/ ruptured PMs
Colour flow MR jet	Small, central jets	Intermediate	Very large central jet or eccentric jet adhering, swirling and reaching the posterior LA wall
Flow convergence zone	No or small	Intermediate	Large
CW signal of MR jet	Faint/Parabolic	Dense/Parabolic	Dense/Triangular
Semi-quantitative			
VC width (mm)	< 3	Intermediate	≥ 7 (>8 for biplane)
Pulmonary vein flow	Systolic dominance	Systolic blunting	Systolic flow reversal
Mitral inflow	A wave dominant	Variable	E wave dominant (>1.5 cm/s)
TVI mit/TVI Ao	<1	Intermediate	≥1.4
Quantitative			
EROA (mm^2)	< 20	20-29 ; 30-39!	≥ 40
R Vol (ml)	< 30	30-44 ; 45-59!	≥ 60

+ LV and LA sizes + sPAP

CONSEQUENCES

- LV DIMENSION AND EF
- LV SHAPE, LA SIZE
- PULMONARY PRESSURES
  - < 50 mmHg at rest
  - < 60 mmHg at exercise
- VENTRICULAR FUNCTION ?
- DYNAMIC COMPONENT AT EXERCISE



WHAT TO FOLLOW IN AN ASYMPTOMATIC PATIENT WITH NORMAL LV FUNCTION

Moderate MR → clinical every year + echo every 2 years

Severe MR → clinical every 6 months + echo every 1 year

*** or if EF 60-65% (ESD 40-45 mm) → echo every 6 months**

- PROGRESSION OF MR : MARKED INDIVIDUAL DIFFERENCES

- PROGRESSION OF LESION :
  - NEW FLAIL LEAFLET
  - INCREASE OF ANNULUS SIZE

- EVOLUTION OF LV END-SYSTOLIC DIMENSION OR VOLUME
  - LV EJECTION FRACTION
  - LA SIZE AND AREA
  - PULMONARY SYSTOLIC PRESSURE
  - EXERCISE CAPACITY

- OCCURRENCE OF ATRIAL ARRHYTHMIAS

European Journal of Echocardiography
doi:10.1093/ejechocard/jeq031

European Association of Echocardiography recommendations for the assessment of valvular regurgitation. Part 2: mitral and tricuspid regurgitation (native valve disease)

Patrizio Lancellotti (Chair)[1*], Luis Moura[2], Luc A Pierard[1], Eustachio Agricola[3], Bogdan A. Popescu[4], Christophe Tribouilloy[5], Andreas Hagendorff[6], Jean-Luc Monin[7], and Luigi Badano[8], and Jose L. Zamorano[9] on behalf of the European Association of Echocardiography