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CLASSIFICATION AND MECHANISMS OF MITRAL REGURGITATION

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MITRAL REGURGITATION
Echocardiographic assessment

- ✓ Localization of the pathology
  - (which leaflet? which scallop?)
- ✓ Mechanism of regurgitation
- ✓ Grade of regurgitation

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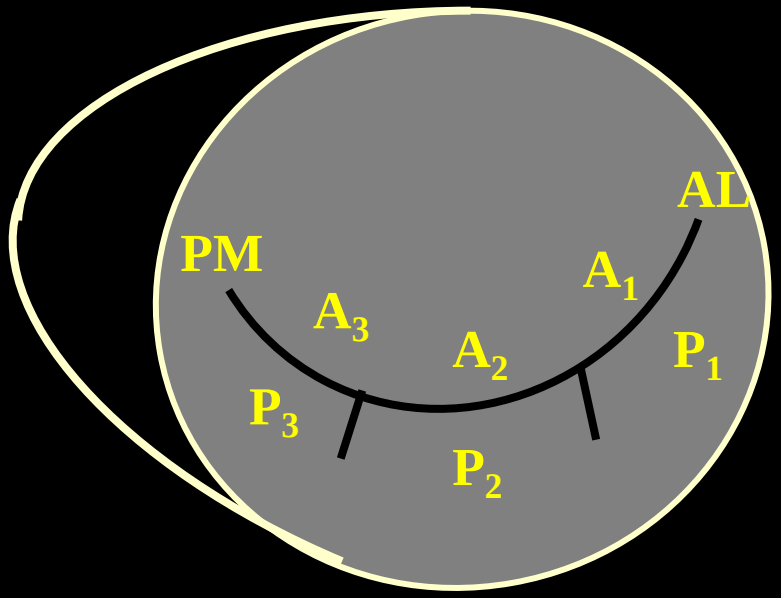
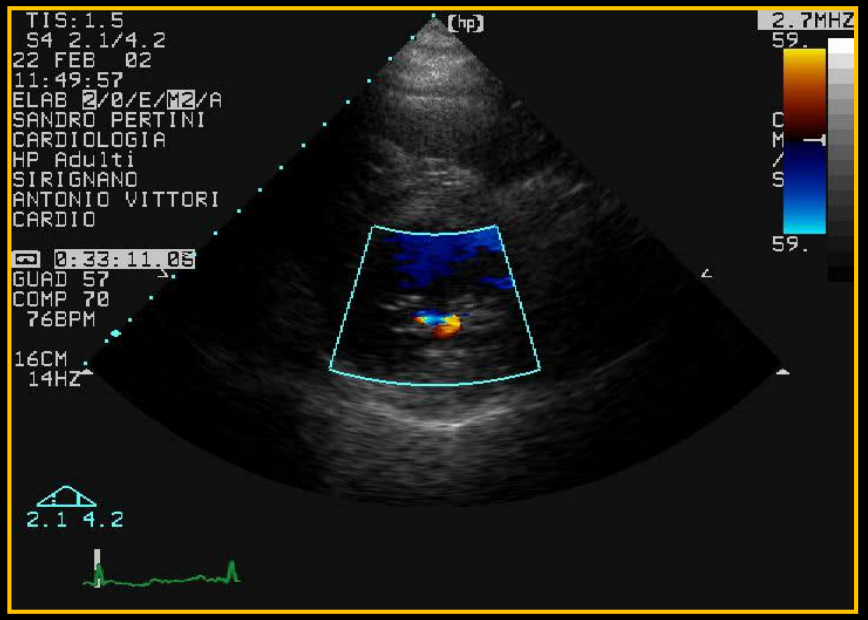
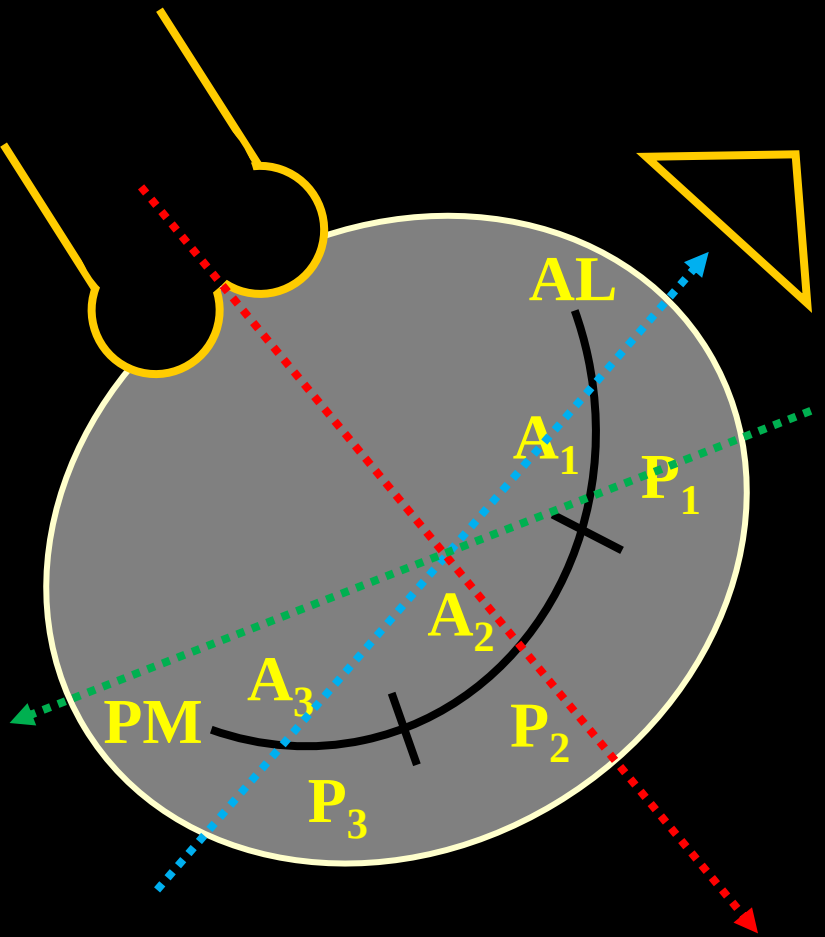
GLOBAL APPROACH, TTE

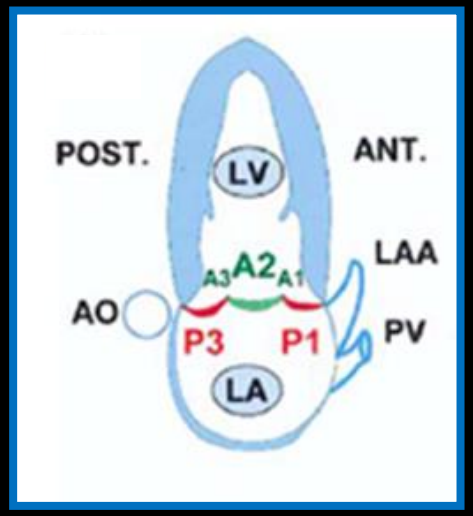
Transthoracic basal short-axis

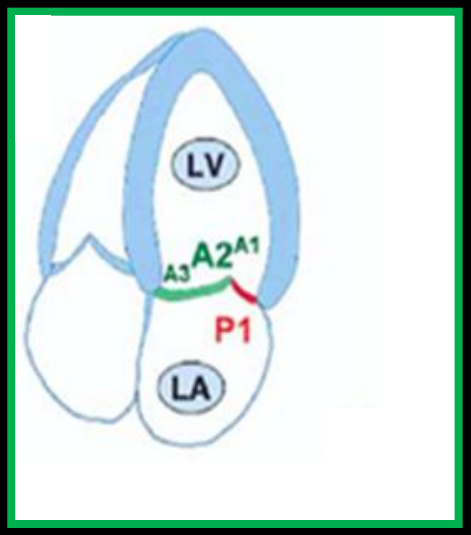


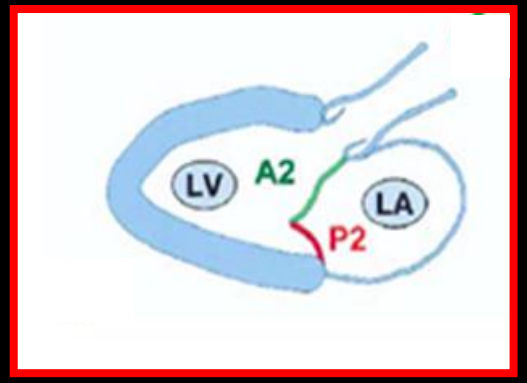


SEGMENTAL APPROACH, TTE

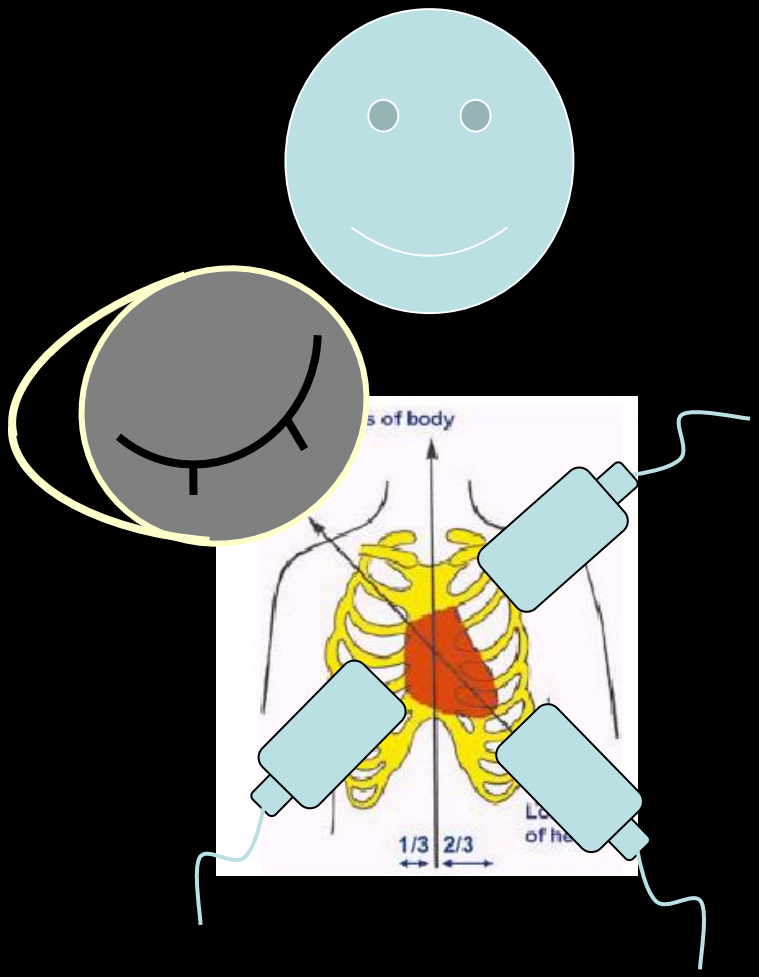








SEGMENTAL APPROACH, TTE



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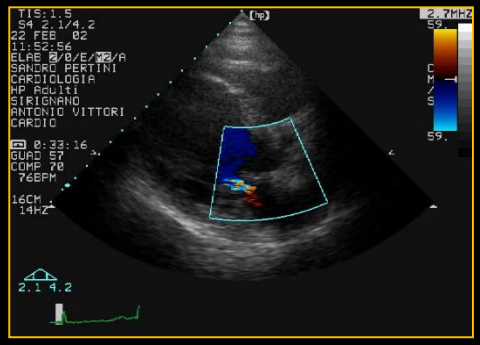
P_3



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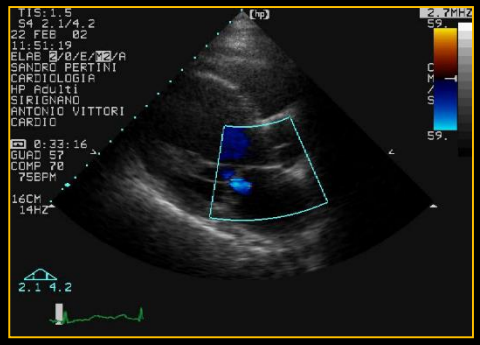

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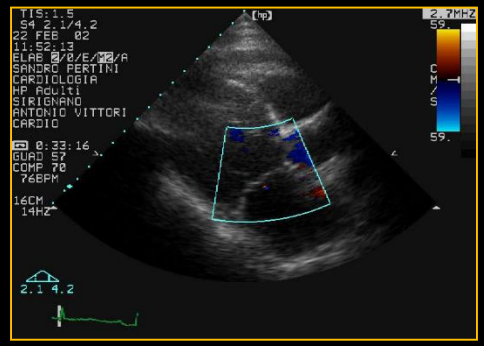
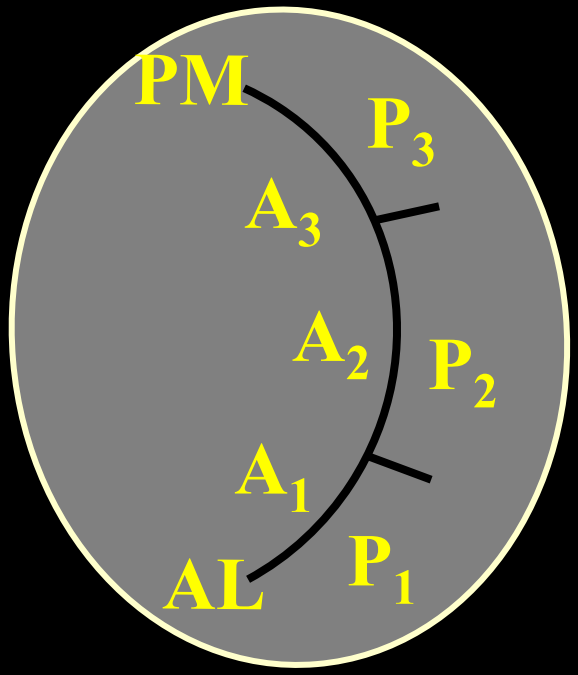
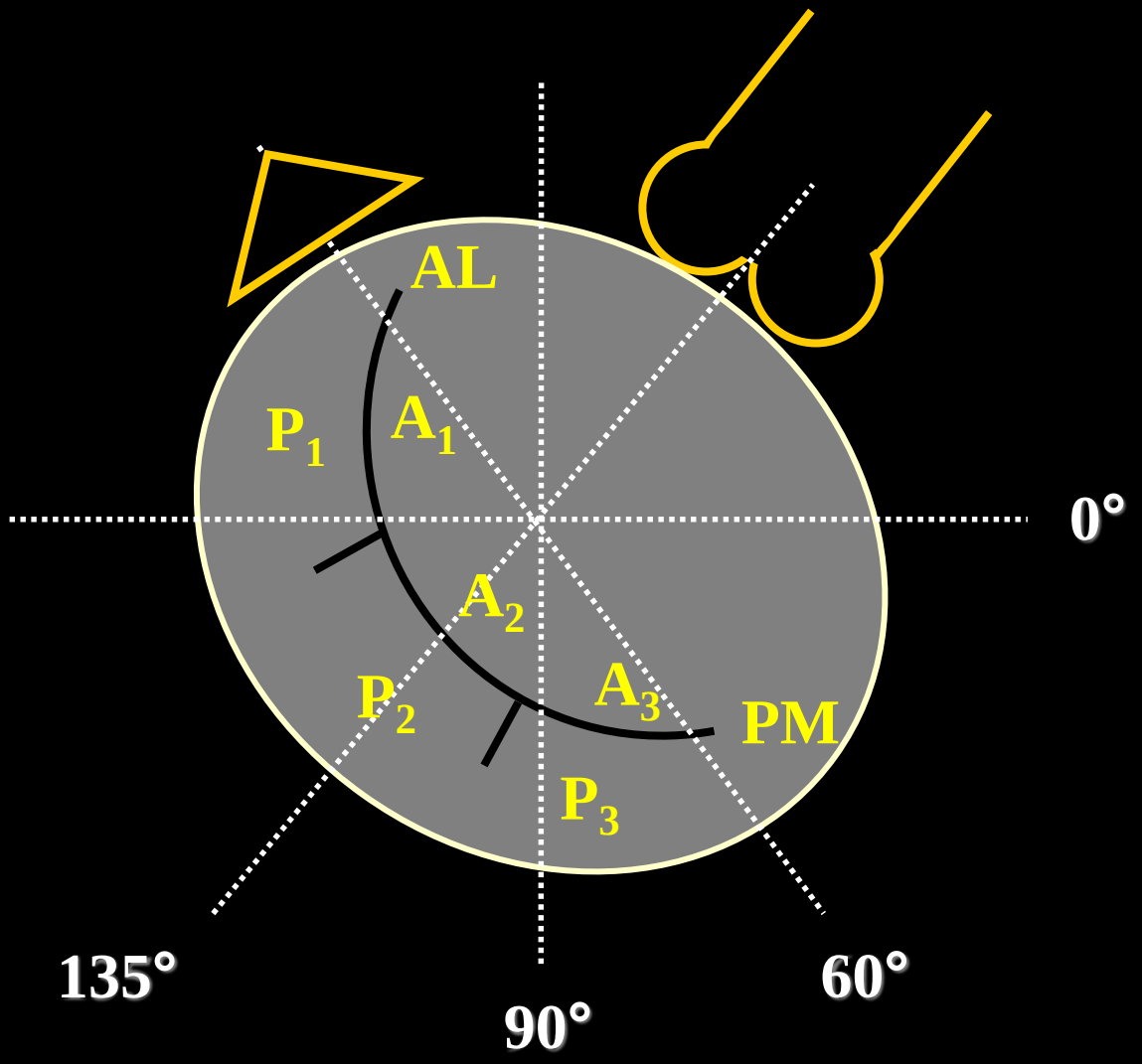


GLOBAL APPROACH, TEE

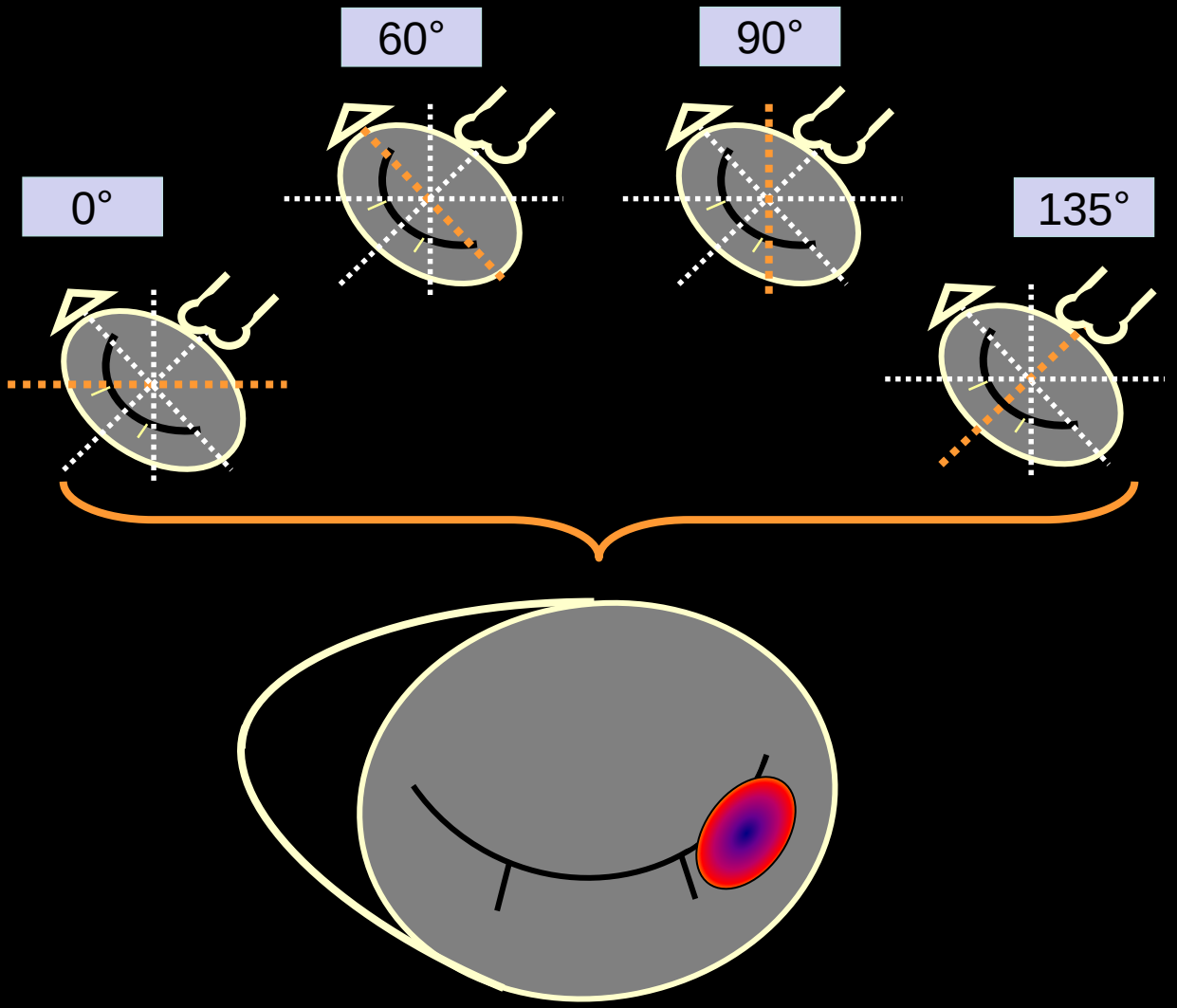
Transgastric basal short-axis



SEGMENTAL APPROACH, TEE



SEGMENTAL APPROACH, TEE

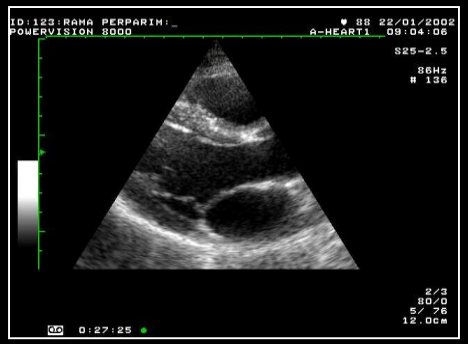


CLOSURE OF THE LEAFLETS

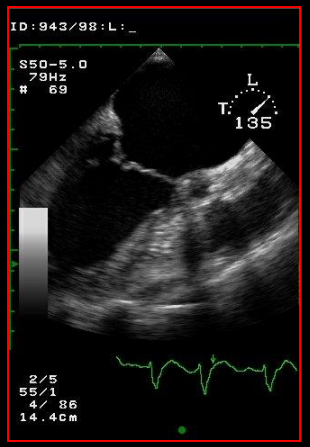
- **APPOSITION**
  - Symmetrical overlap of the leaflets

- **COAPTATION**
  - Closure of the leaflets

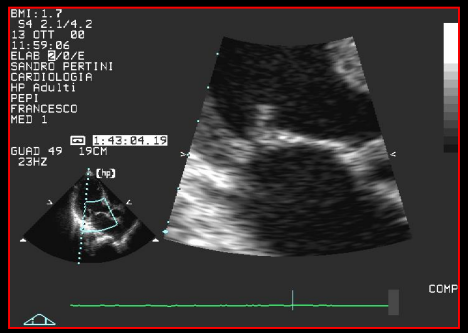
CLOSURE OF THE LEAFLETS



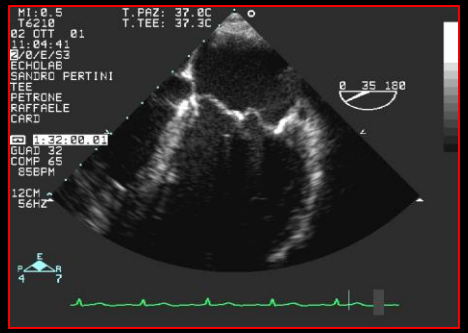
Coaptation



Apposition

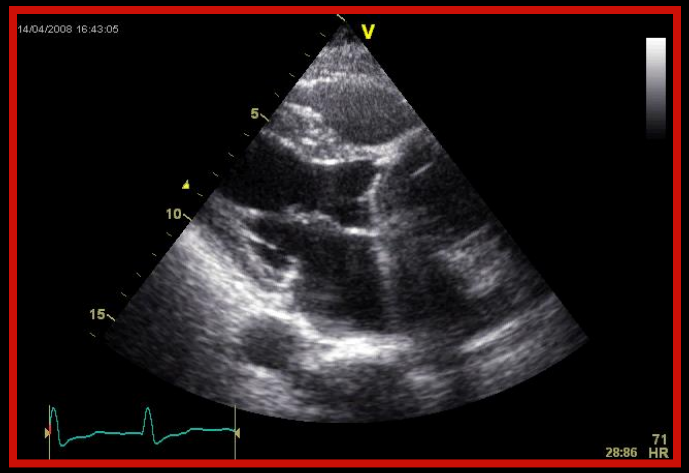


Coaptation
Apposition

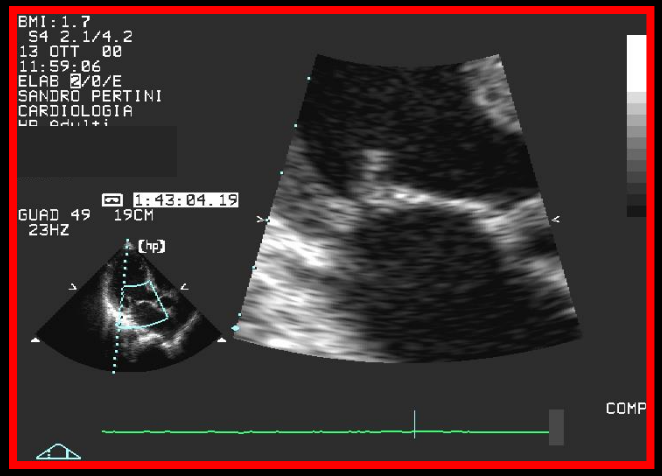


VALVULAR PATHOLOGY

- MOTION OF THE LEAFLETS



- CLOSURE OF THE LEAFLETS



MITRAL REGURGITATION
Echocardiographic assessment

- ✓ Localization of the pathology
  - (which leaflet? which scallop?)
- ✓ Mechanism of regurgitation
- ✓ Grade of regurgitation

Carpentier's Functional Classification of Mitral Regurgitation

restricted leaflet motion during systole

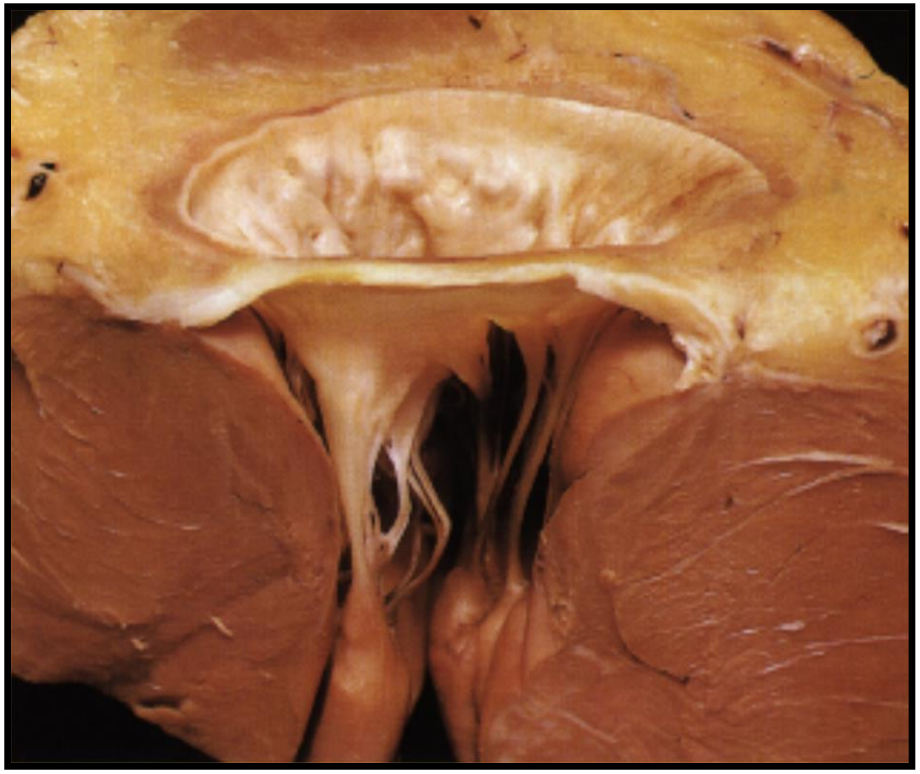
- Normal
- Dysfunction
  - Type I
  - Type II
  - Type IIIa
  - Type IIIb

MITRAL VALVE APPARATUS

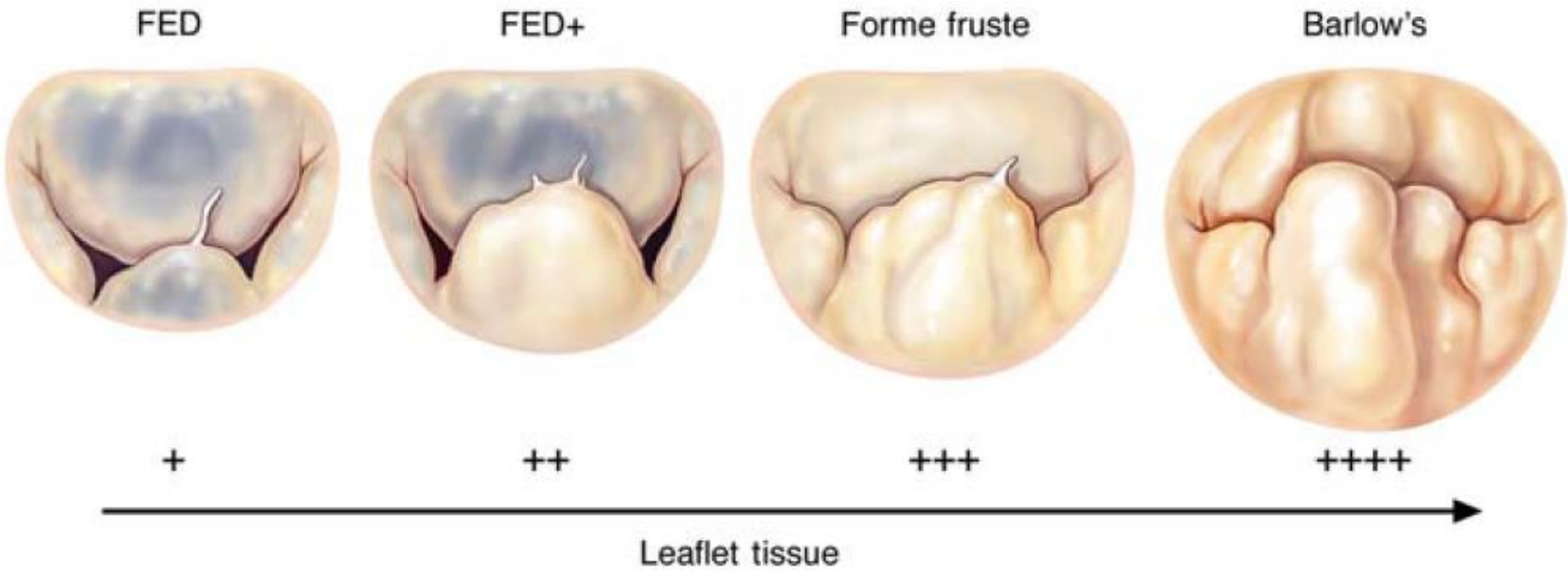
SECONDARY

- ✓Leaflets
- ✓Commissures
- ✓Chordae
- ✓Annulus
- ✓Papillary muscles
- ✓Ventricular wall

PRIMARY

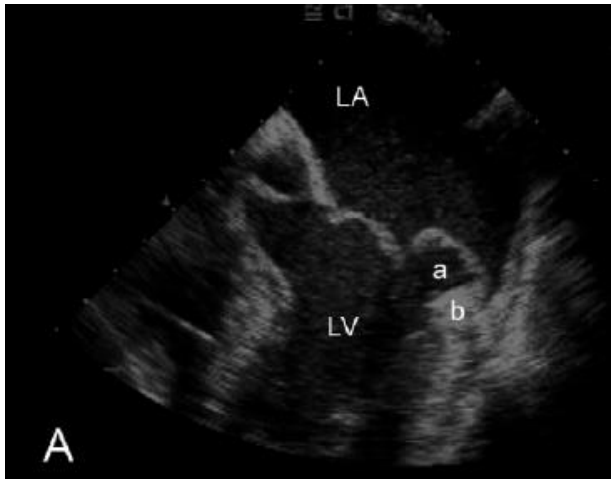


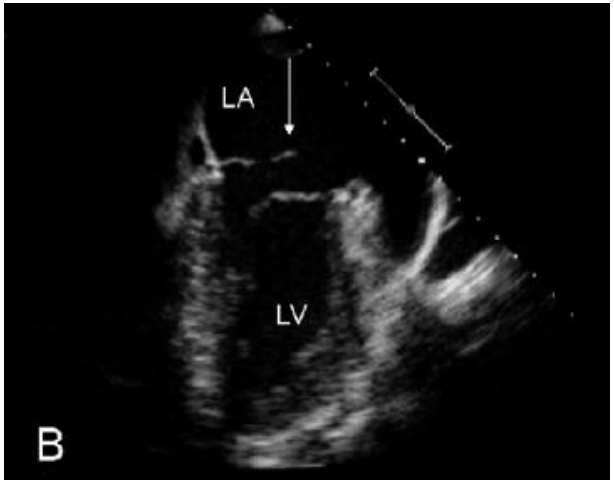
SPECTRUM OF DEGENERATIVE MITRAL DISEASE

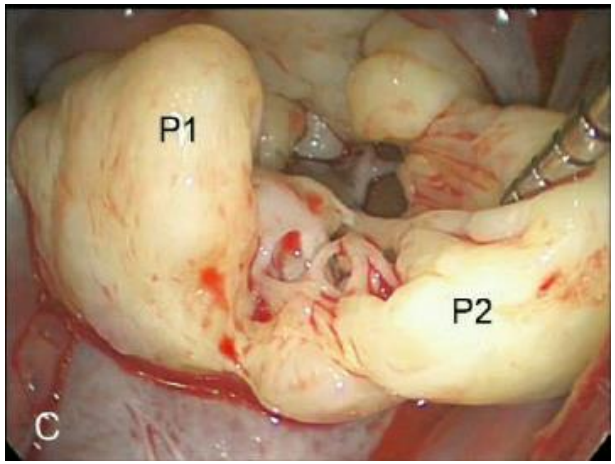


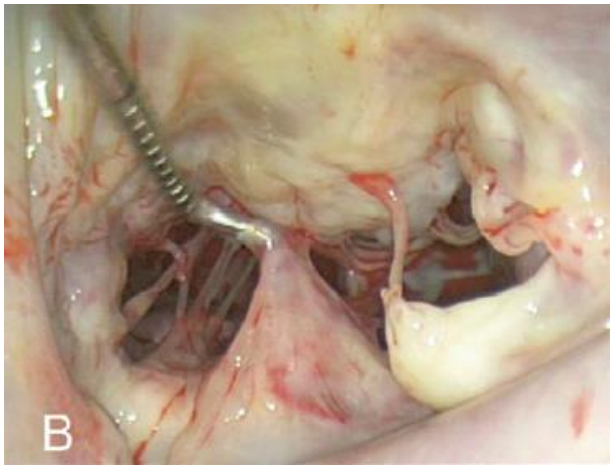
Adams DH, et al. Eur Heart J 2010;31:1958-1967.

PRIMARY MITRAL REGURGITATION





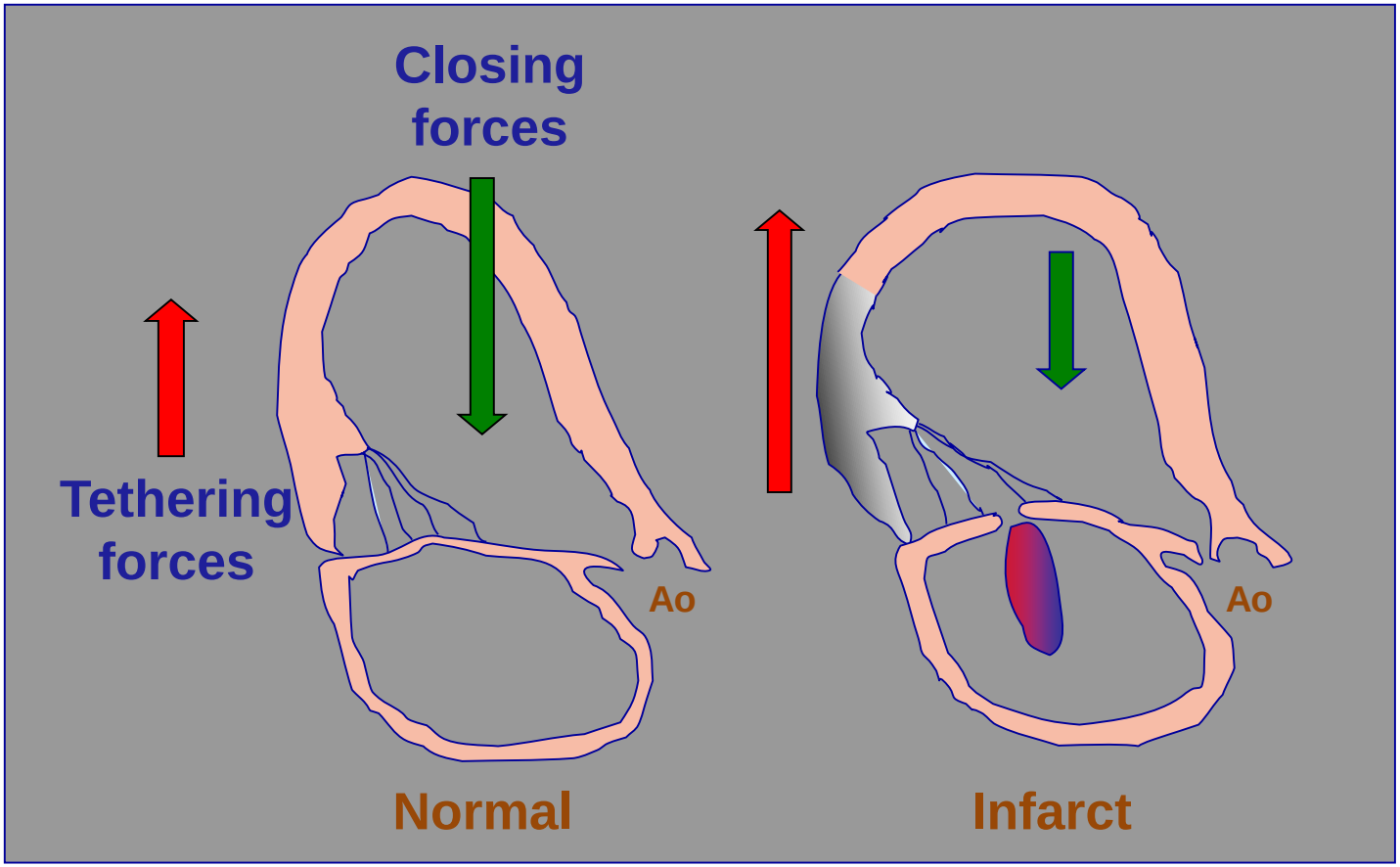




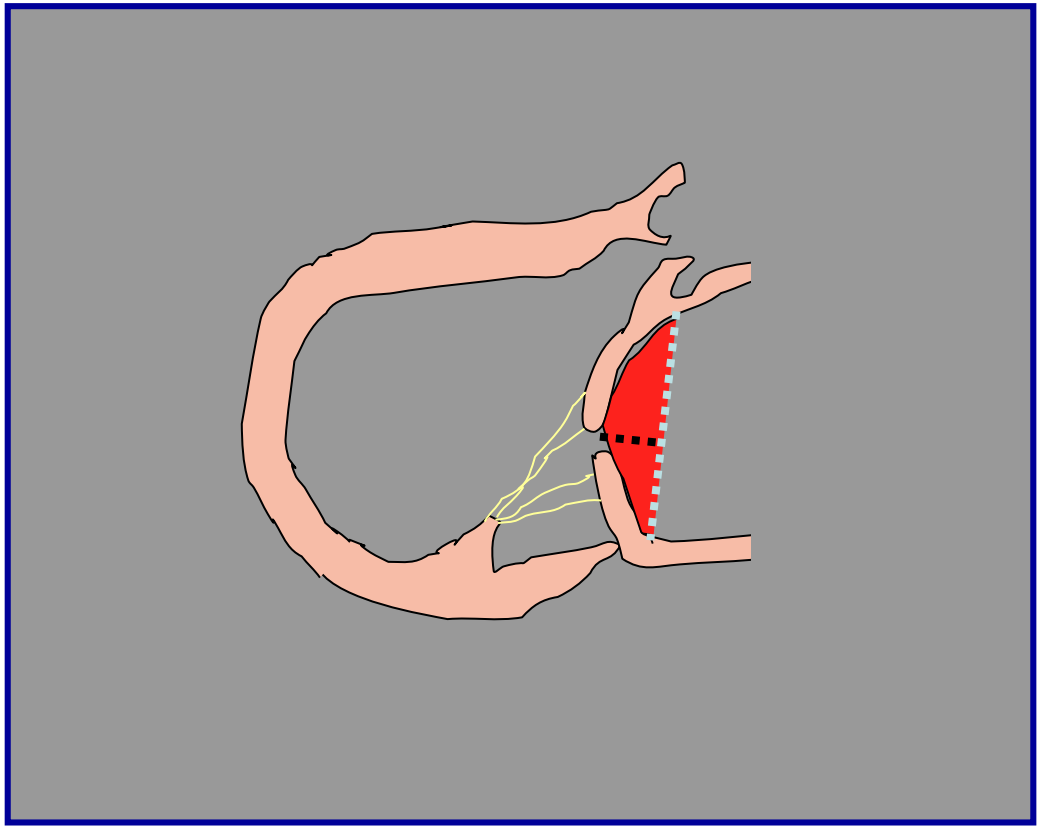
Barlow's disease

Fibroelastic deficiency

SECONDARY MITRAL REGURGITATION



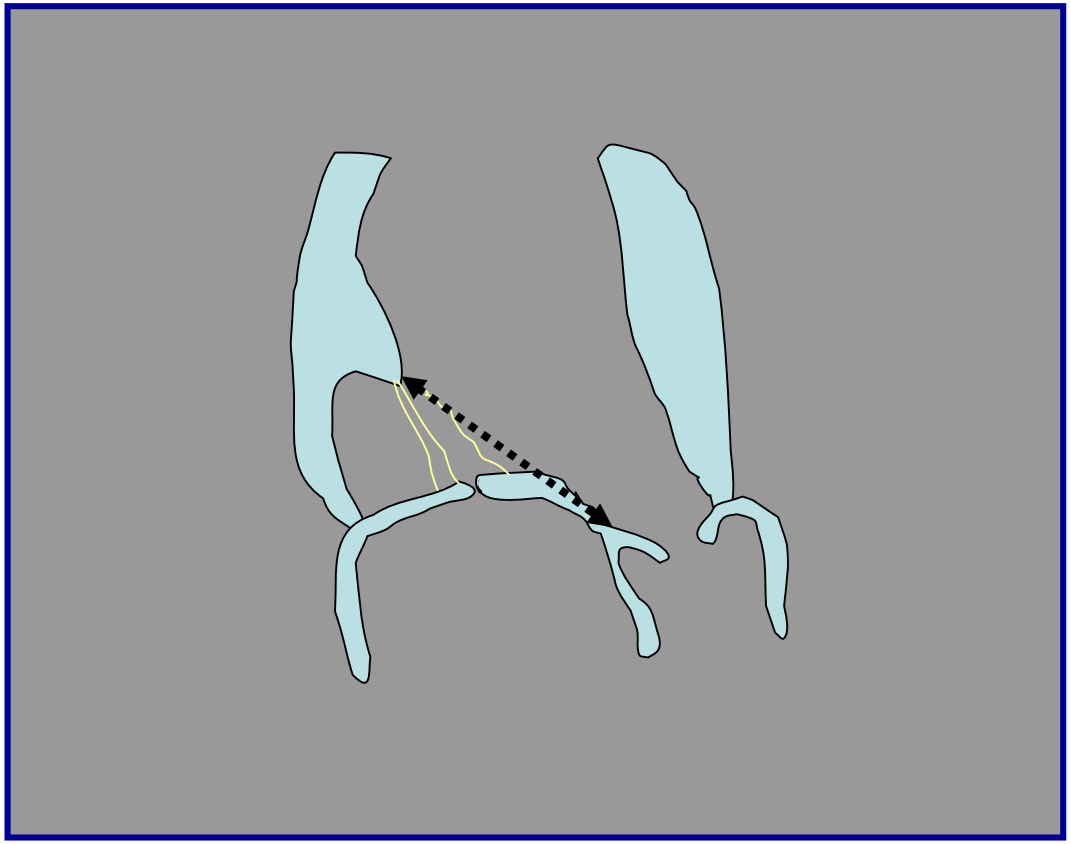
MITRAL DEFORMATION



Tenting area

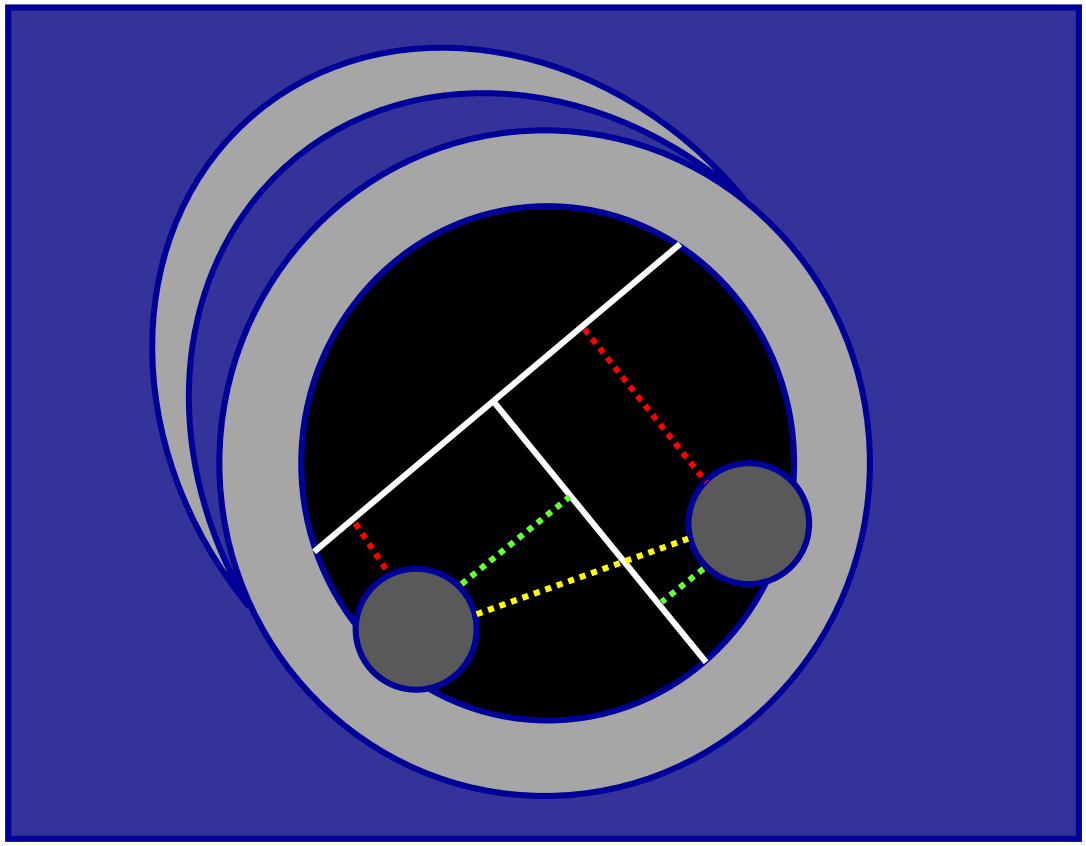
Coaptation distance

LOCAL LV REMODELING



PPM – intervalvular fibrosa

LOCAL LV REMODELING



Posterior displacement

Lateral displacement

Interpapillary distance

MITRAL REGURGITATION

Diagnosis of mitral regurgitation is not difficult, but …..

..... how severe is this leak???

MITRAL REGURGITATION
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MITRAL REGURGITATION
Assessment of the severity

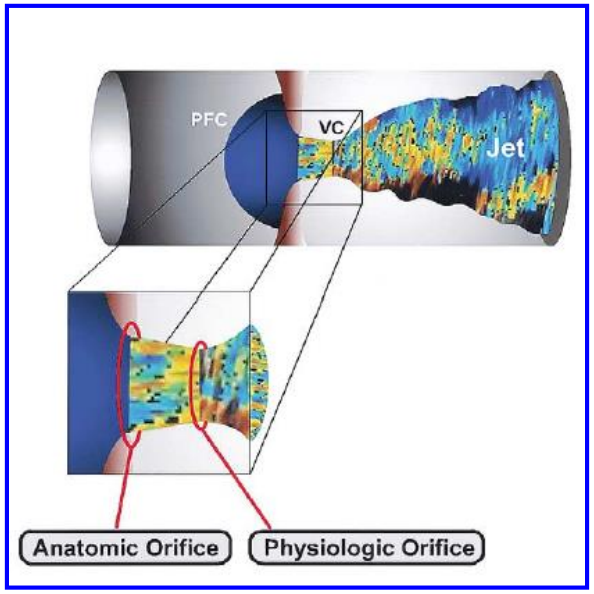
QUALITATIVE

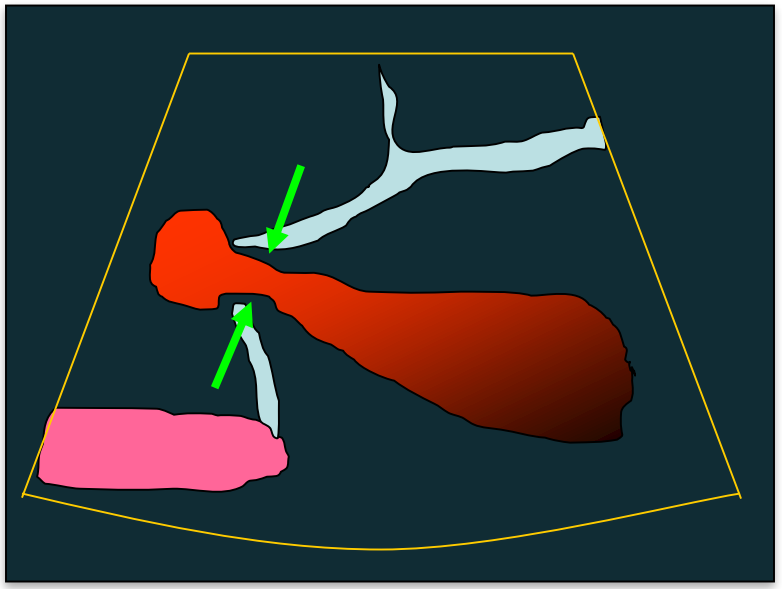
- ✓ Colour flow area
- ✓ Vena contracta
- ✓ CW Doppler
- ✓ Pulmonary veins
- ✓ Mitral inflow

QUANTITATIVE

- ✓ 2D PISA
- ✓ Volumetric
- ✓ 3D VC/PISA

VENA CONTRACTA





The narrowest portion of a jet that occurs at or just downstream from the orifice

3 mm	7 mm
Mild MR	Gray zone / Severe MR

Messages

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Vena Contracta

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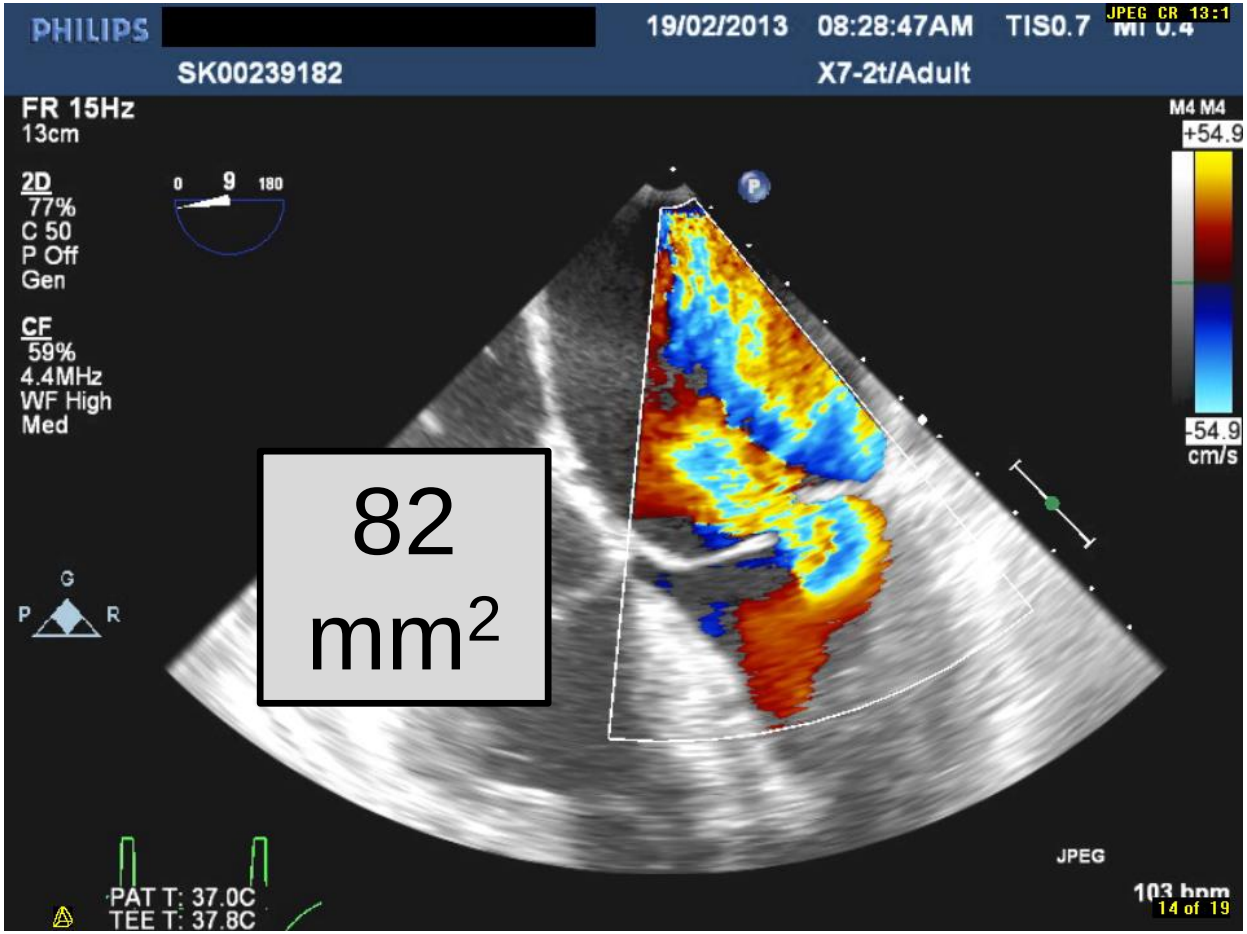
Re: [echocardiography] Vena Contracta

I'm not going to answer all of your questions but i will adress some issues regarding Vena Contracta. fFrst assume you have a perfect circle for a regurgitant orafice. You are using a 2D slice perpendiclar to the orafice so that if your not dead center your narrowest width will be narrower than the orafice. If the orifice is oval then different views will yield different widths.

blond52000 <***blond@...***> wrote:

> I posted the following question about a week ago:
> "When exactly do you measure the vena contracta width to estimate regurgitant lesions - at the norrowest point in early, mid or late systole (MR)/diastole (AR)? What do you do if it changes from frame to frame? What do you do if it is an eccentric jet? What do you do if in different views it has differnt widths?"
> I got no reply to my question mean yet. I'm still hoping for advice.
> Thanks,
> Dave



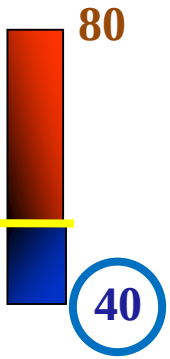
$$\text{ERO} = \frac{6.28 \times 1.1^2 \times 54}{500}$$

Simplified PISA method

$$ERO = \frac{6.28 \times r^2 \times V_{aliasing}}{V_{MR}}$$

$$ERO = \frac{6.28 \times r^2 \times 40}{\pm 500}$$

$$ERO = r^2 \times \frac{250}{500} \cong \frac{r^2}{2}$$



ISCHEMIC MITRAL REG

- ✓ERO is instantaneous
- ✓Timing is not addressed
- ✓MR is a dynamic entity

PRIMARY MITRAL REGURGITATION
Exercise stress echocardiogram

PRIMARY MITRAL REGURGITATION
Exercise echo parameters

Table 1
Exercise echocardiographic parameters useful for risk stratification

Parameters		References
Primary MR		
Exercise-induced increase in ERO area	>+10 mm^2	Magne et al[10]
Exercise-induced increase in regurgitant volume	>+15 mL	Magne et al[10]
Exercise systolic pulmonary arterial pressure	>60 mm Hg	Magne et al[11]
LV contractile reserve		
Exercise-induced changes in LV ejection fraction	>+4%	Lee et al,[4] Lancellotti et al[6]

Magne al. Cardiol Clin 2013;31:311-321.

MITRAL REGURGITATION
Echocardiographic assessment

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Patient Evaluation

- **Clinical assessment**
  - Symptoms, comorbidities, patient education.
  - Auscultation.
- **Echocardiography**
  - Key examination to confirm diagnosis and assess severity and prognosis.
  - Need to check consistency between the different echocardiographic findings (severity, mechanism, anatomy of valvular disease) and with clinical assessment.

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

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