

# Ahmad S. Omran MD, FACC, FESC, FASE

Consultant Cardiologist

Department of Anesthesia and Pain Management

Toronto General Hospital- UHN

University of Toronto


UHN Toronto General Toronto Western Princess Margaret Toronto Rehab
COURAGE LIVES HERE

UNIVERSITY OF TORONTO

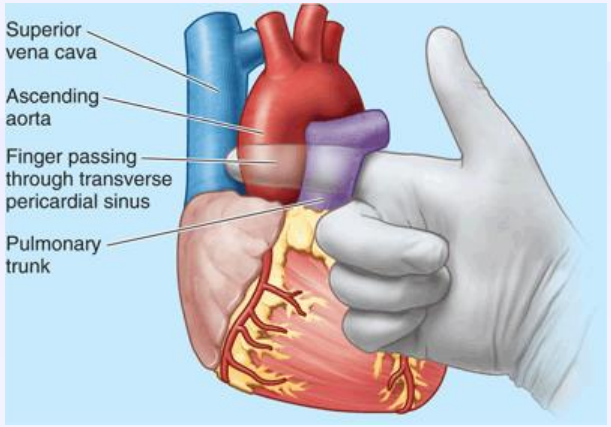
# PTE Mock Exam # 1 Review
# (supporting slides)

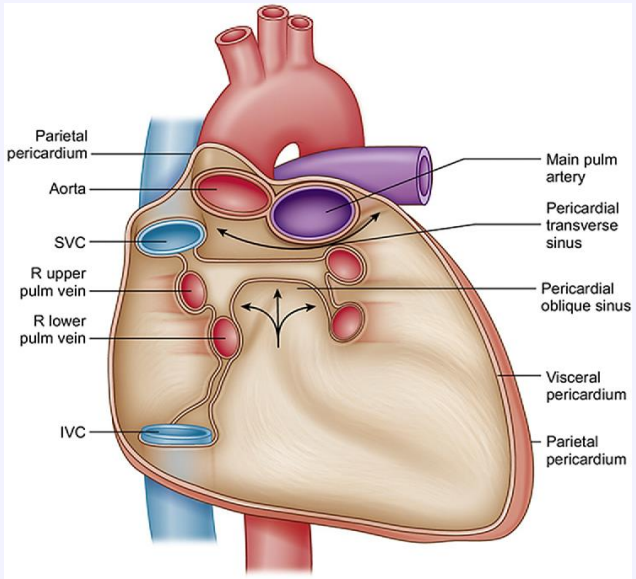
**May 29, 2019**
**Toronto General Hospital**

# Question 3

## Sinuses of pericardium

- 2 sinuses in the serous pericardium are formed during development of the heart (Transverse & Oblique)
  - **Transverse sinus**
- A recess behind pulmonary trunk & ascending aorta
- Boundaries:
- **Ant:** Pulmonary trunk & ascending aorta.
- **Post**: SVC &Upper part of the 2 atria
- **Above:** Rt. Pulmonary artery
- **Below**: the 2 atria mainly Lt.



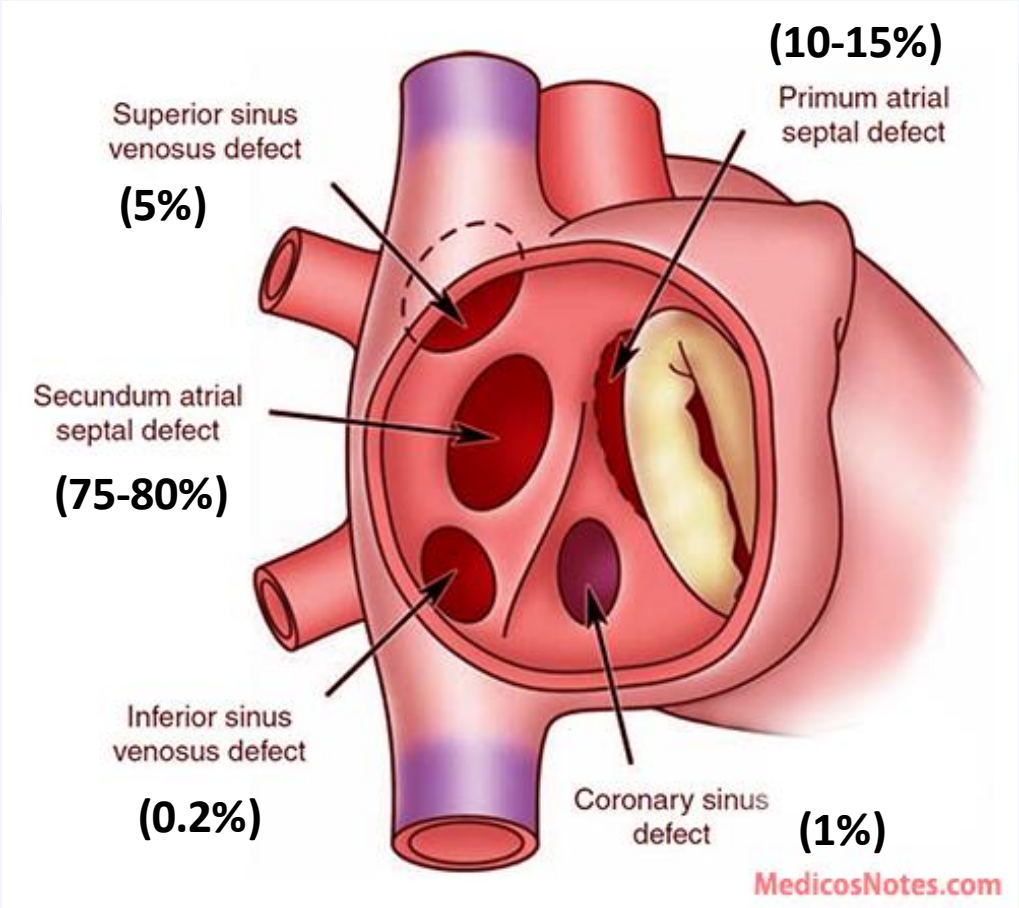
# Question 4

**Table 1** Preimplantation TTE/TEE "*red-flag*" findings

| |
|---|
| **Left Ventricle and Interventricular Septum** |
| Small LV size, particularly with increased LV trabeculation |
| LV thrombus |
| LV apical aneurysm |
| Ventricular septal defect |
| **Right Ventricle** |
| RV dilatation |
| RV systolic dysfunction |
| **Atria, Interatrial Septum, and Inferior Vena Cava** |
| Left atrial appendage thrombus |
| PFO or atrial septal defect |
| **Valvular Abnormalities** |
| Any prosthetic valve (especially mechanical AV or MV) |
| > mild AR |
| ≥ moderate MS |
| ≥ moderate TR or > mild TS |
| > mild PS; ≥ moderate PR |
| **Other** |
| Any congenital heart disease |
| Aortic pathology: aneurysm, dissection, atheroma, coarctation |
| Mobile mass lesion |
| Other shunts: patent ductus arteriosus, intrapulmonary |

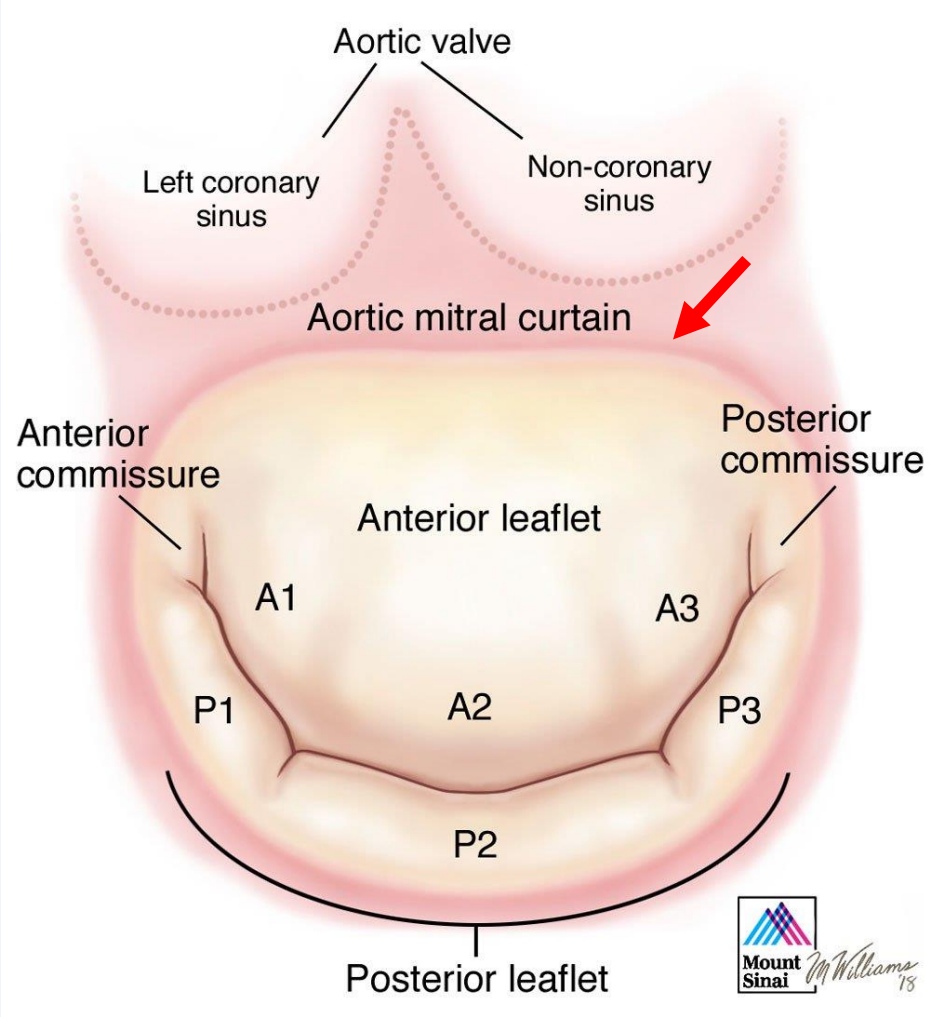
**ASE guidelines, 2015**

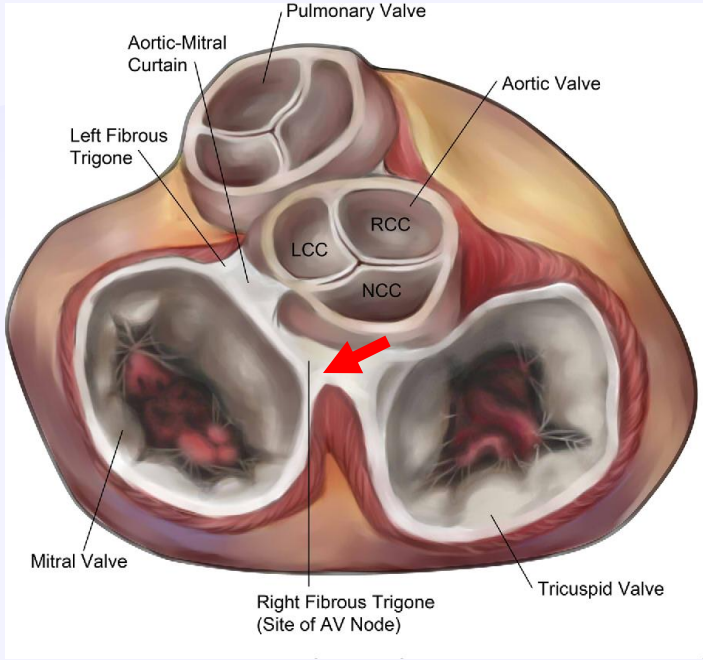
# Question 5




**Atrial septal defects**

# Question 9

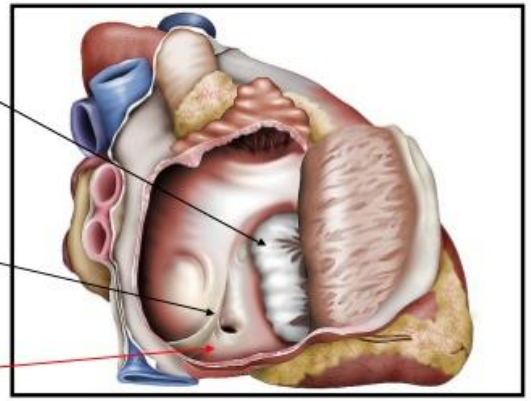

Aortic valve
Left coronary sinus
Non-coronary sinus
Aortic mitral curtain
Anterior commissure
Posterior commissure
Anterior leaflet
A1
A3
P1
A2
P3
P2
Posterior leaflet
Mount Sinai
M Williams '18


Pulmonary Valve
Aortic-Mitral Curtain
Aortic Valve
Left Fibrous Trigone
RCC
LCC
NCC
Mitral Valve
Right Fibrous Trigone (Site of AV Node)
Tricuspid Valve

# Question 10

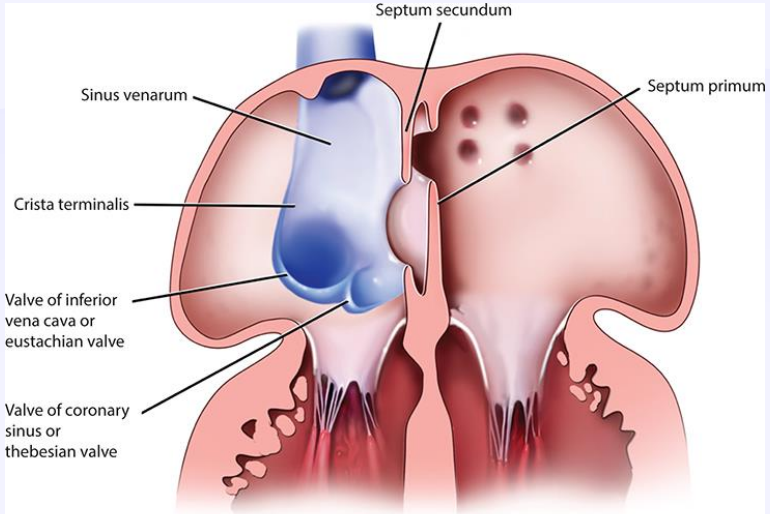
## Valves obstructing catheter or lead advancement

- Tricuspid annulus
- Coronary sinus
- Thebesian valve

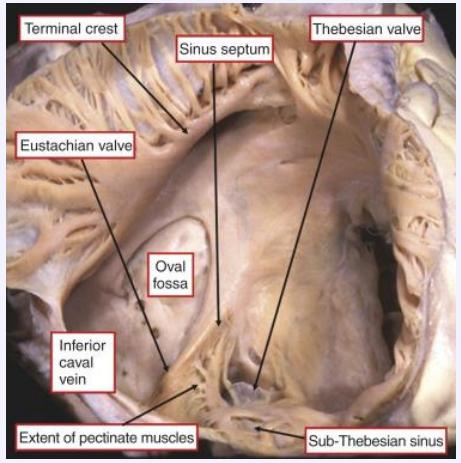


Membranous valve covering postero-inferior aspect of CS ostium

In 10-20% of cases, can impede CS cannulation

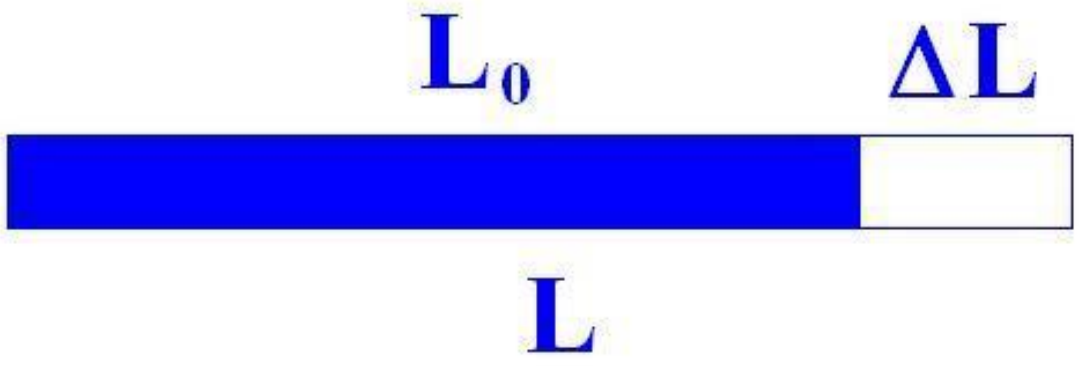





**Thebesian valve**

# Question 14




$$\varepsilon = \frac{L - L_0}{L_0} = \frac{\Delta L}{L_0}$$

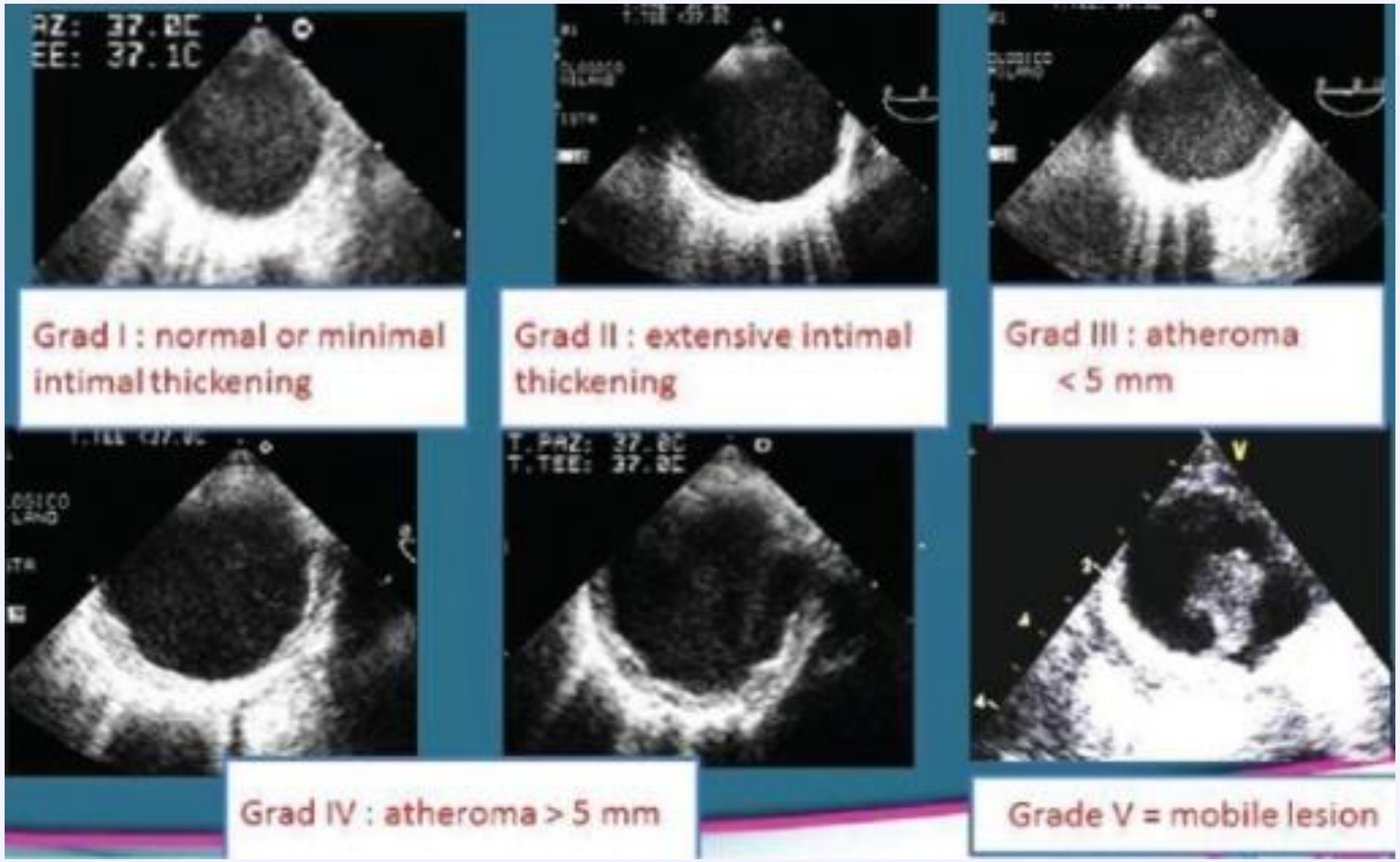
Stiqlen

**Strain, “stretching” means the deformation( unit less)**


**Strain Rate** is the rate by which the deformation occurs, i.e. deformation of strain per time unit. The unit of strain rate is /s or $s^{-1}$.

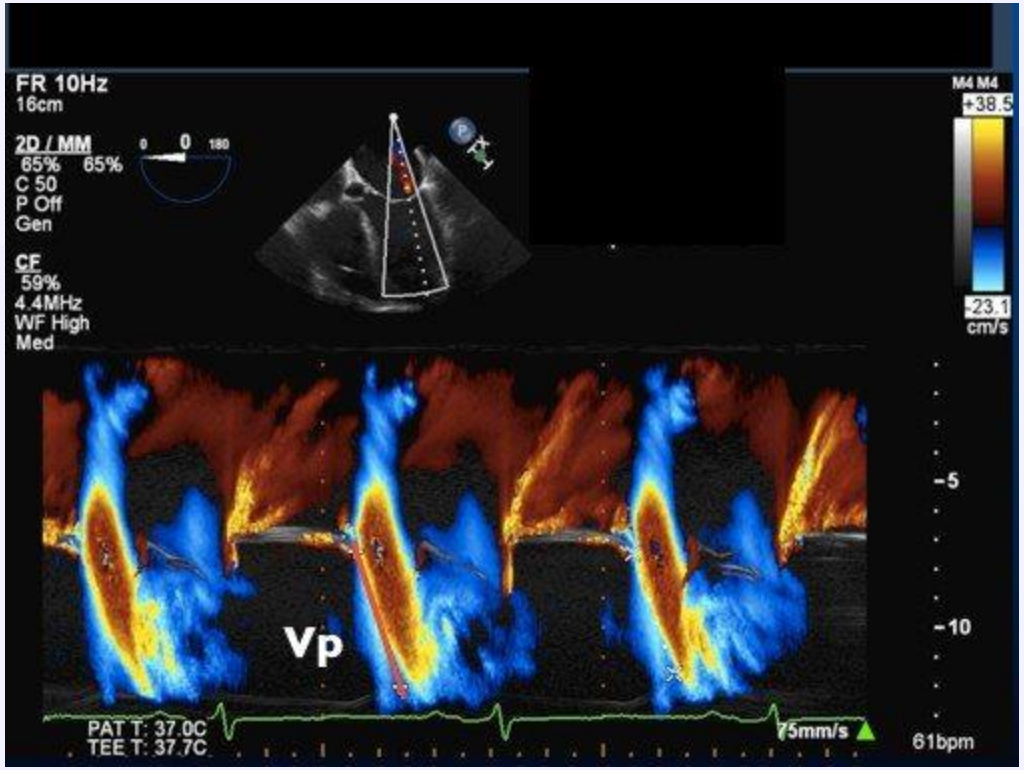
$$\dot{\varepsilon} = \frac{\Delta\varepsilon}{\Delta t}$$

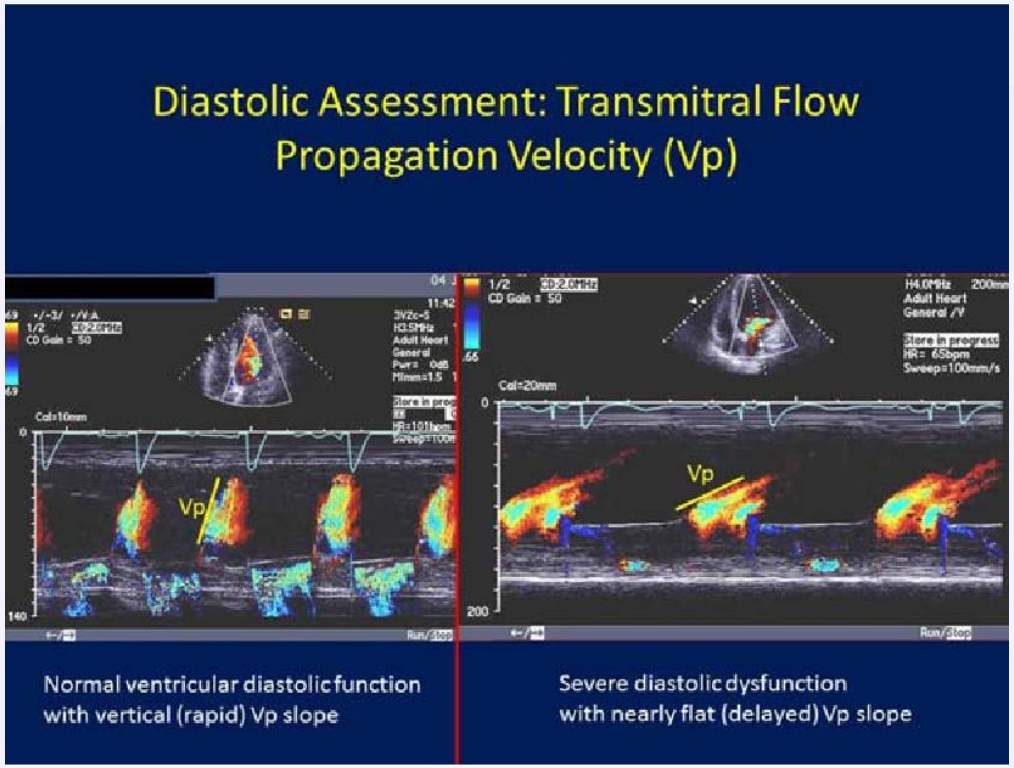
# Question 15




**Montgomery classification of aortic atheroma**

# Question 17




**Normal > 45 cm/s. Severe diastolic dysfunction < 35 cm/s**

**Colour M-mode propagation velocity**

# Question 19

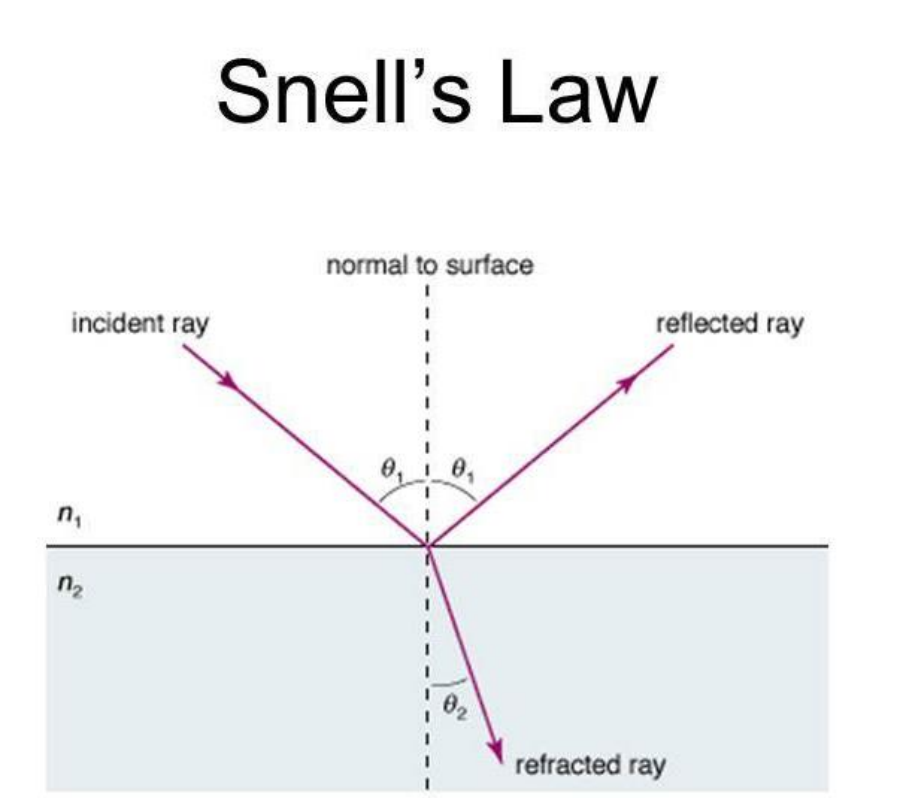
## Stages of Chronic Aortic Regurgitation (cont.)

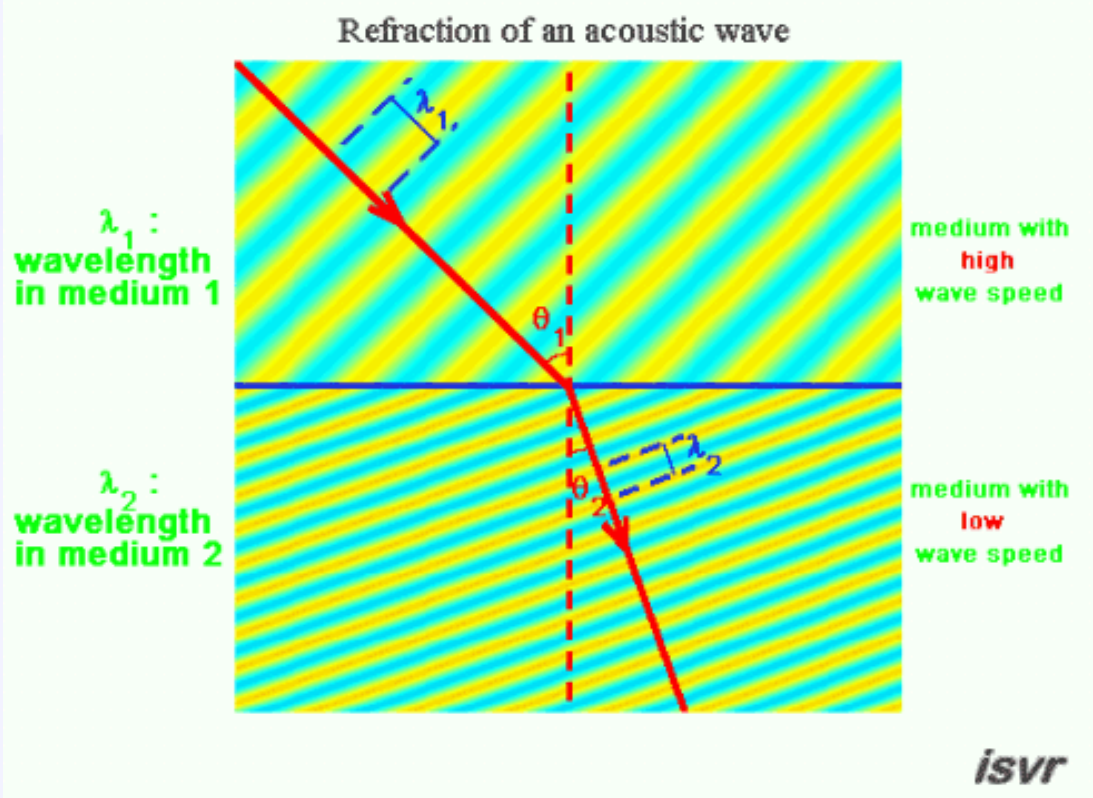
| Stage | Definition | Valve Anatomy | Valve Hemodynamics | Hemodynamic Consequences | Symptoms |
|---|---|---|---|---|---|
| D | **Symptomatic severe AR** | • Calcific valve disease<br>• Bicuspid valve (or other congenital abnormality)<br>• Dilated aortic sinuses or ascending aorta<br>• Rheumatic valve changes<br>• Previous IE with abnormal leaflet closure or perforation | • **Severe AR**:<br>○ Doppler jet width ≥65% of LVOT;<br>○ Vena contracta >0.6 cm,<br>○ Holodiastolic flow reversal in the proximal abdominal aorta,<br>○ RVol ≥60 mL/beat;<br>○ RF ≥50%;<br>○ ERO ≥0.3 $cm^2$;<br>○ Angiography grade 3+ to 4+<br>○ In addition, diagnosis of chronic severe AR requires evidence of LV dilation | • Symptomatic severe AR may occur with normal systolic function (LVEF ≥50%), mild-to-moderate LV dysfunction (LVEF 40% to 50%) or severe LV dysfunction (LVEF <40%);<br>• Moderate-to-severe LV dilation is present. | • Exertional dyspnea or angina, or more severe HF symptoms |

*Helping Cardiovascular Professionals Learn. Advance. Heal.*

**ACC/ AHA 2017**

# Question 22




**Snell's law in refraction (sound, light and radar)**

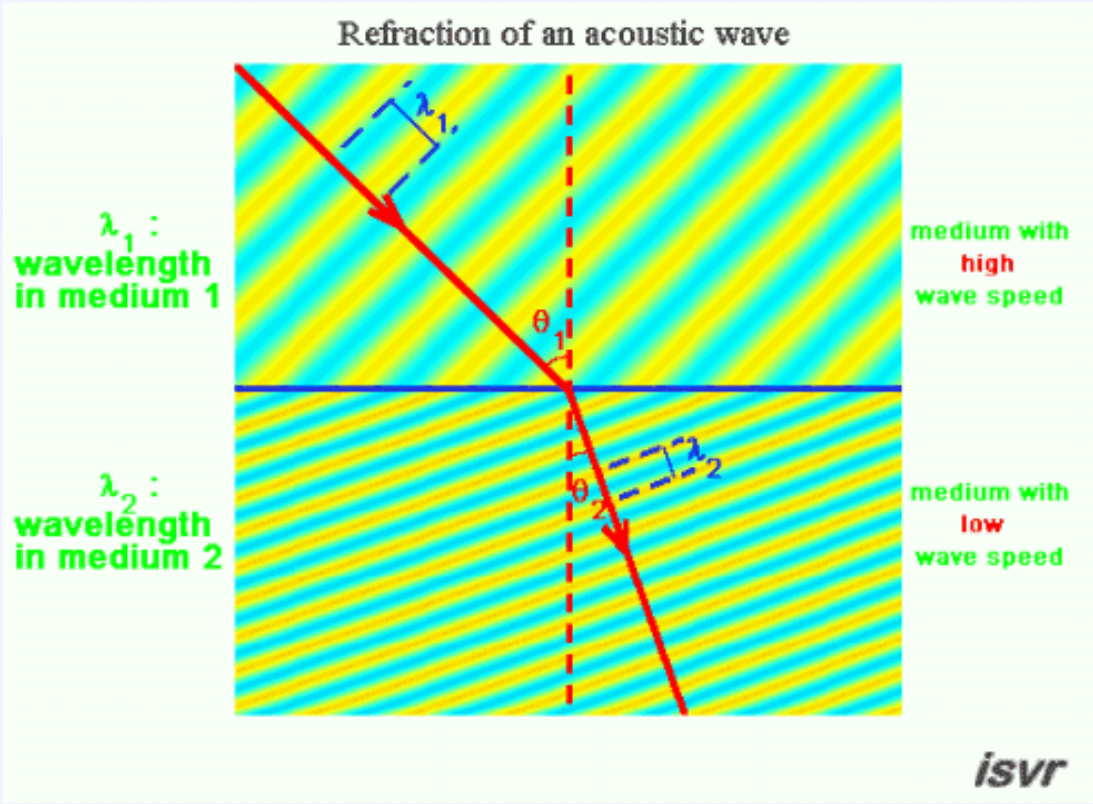
# Question 22

$$v = f\lambda$$

v = speed/velocity

f = frequency

λ (lambda) = w

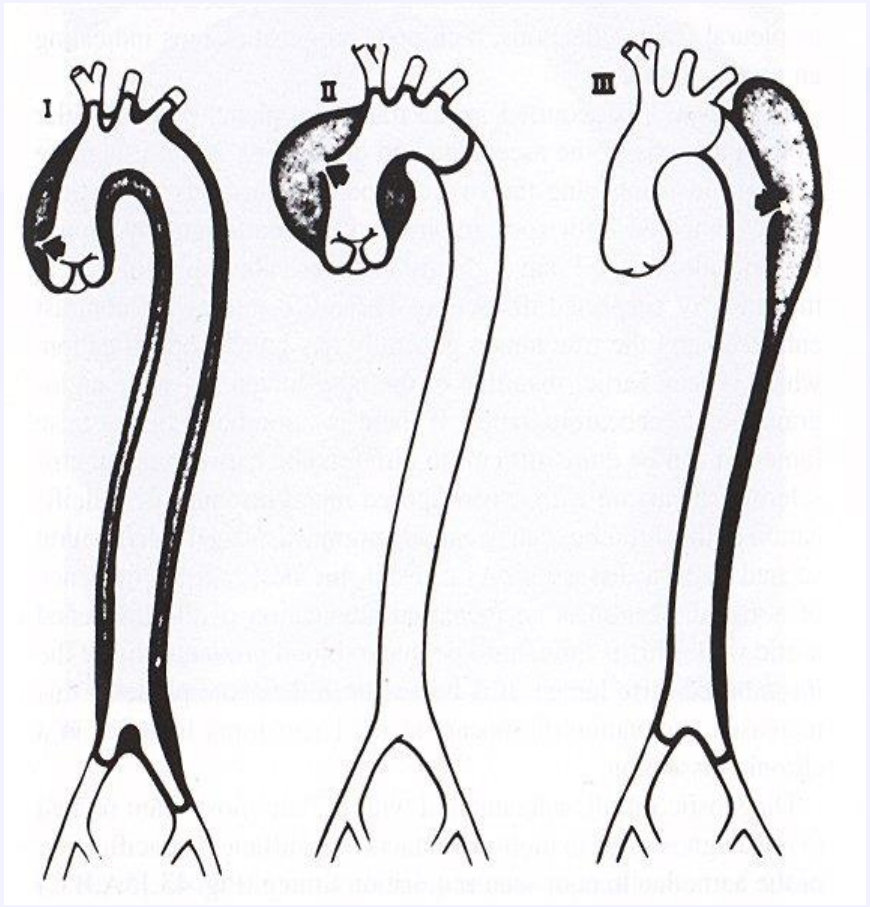



**Snell's law in refraction (sound, light and radar)**

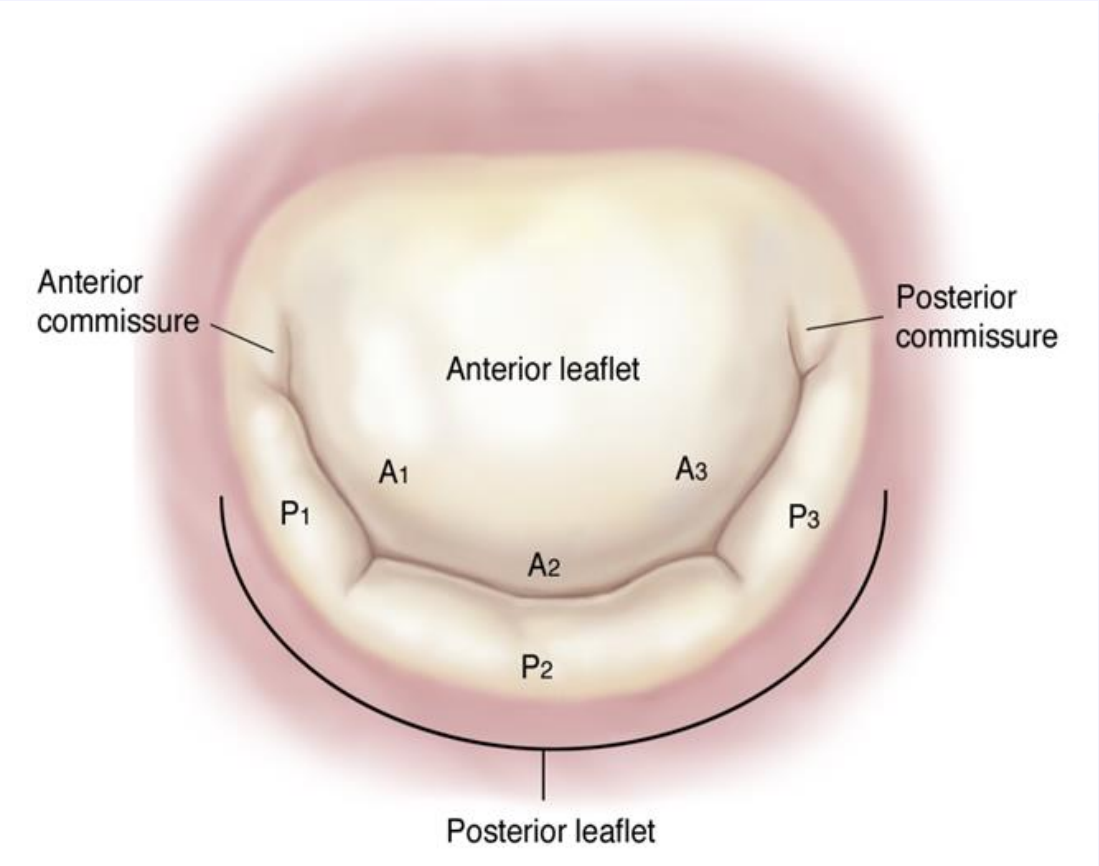
# Question 24

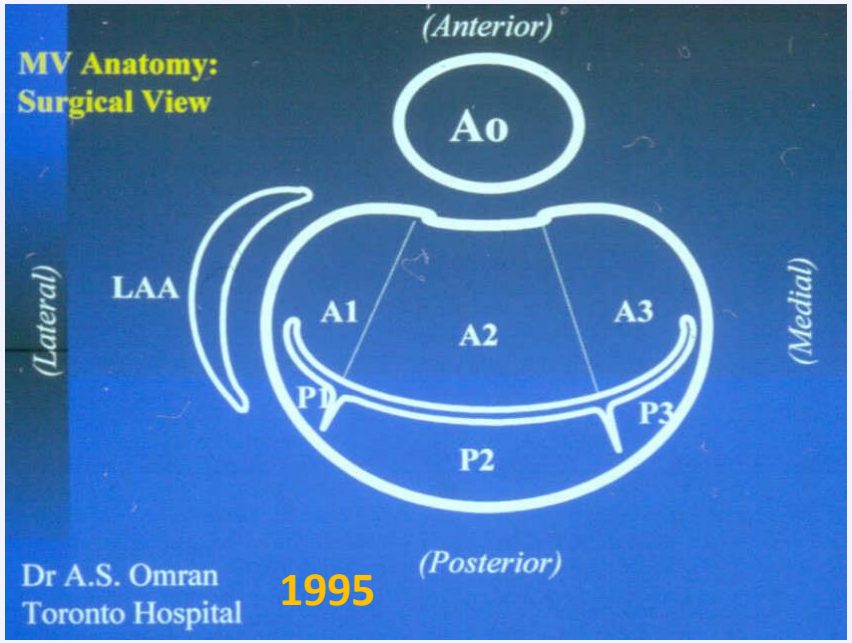
De Bakey

Stanford

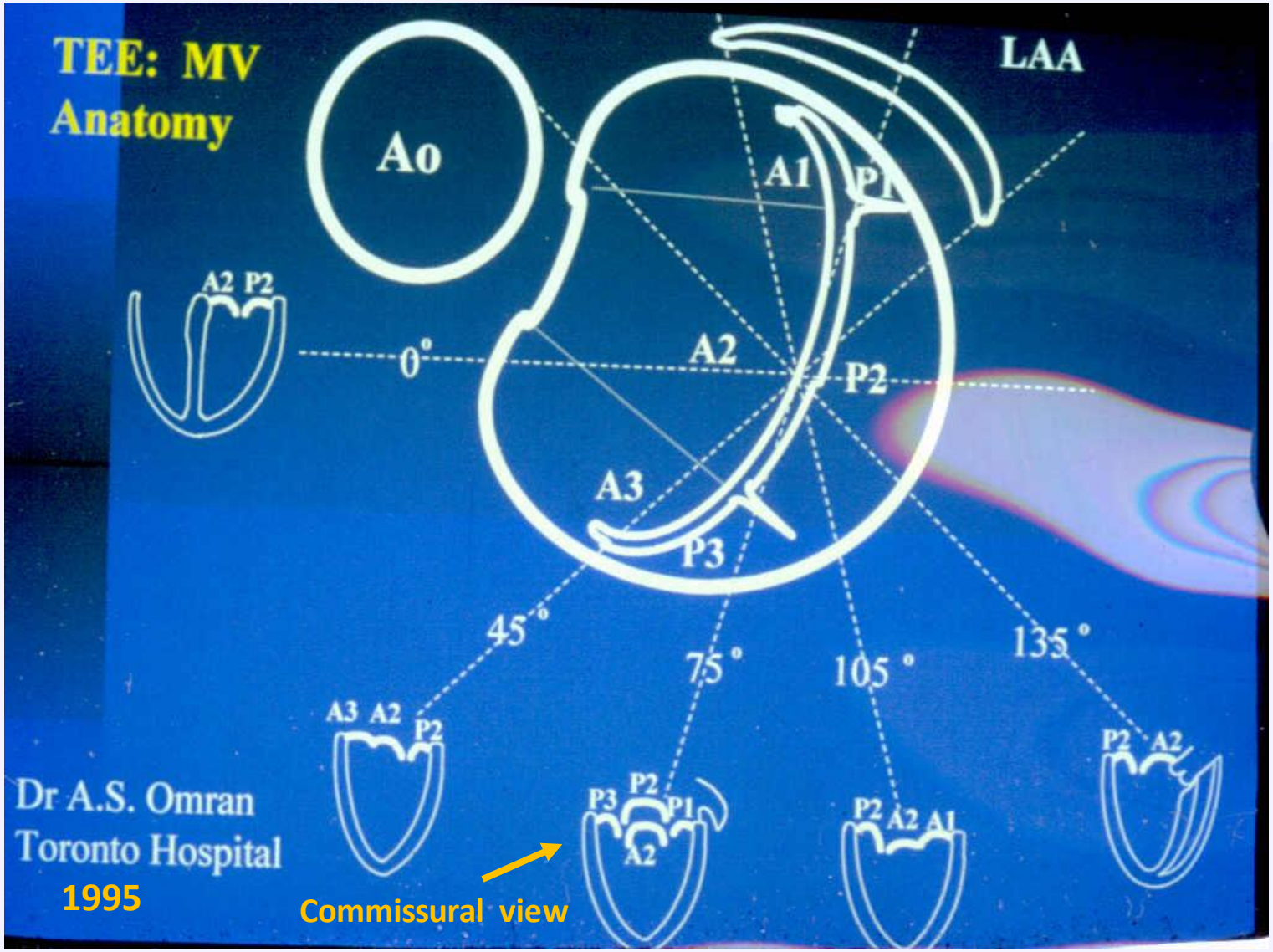


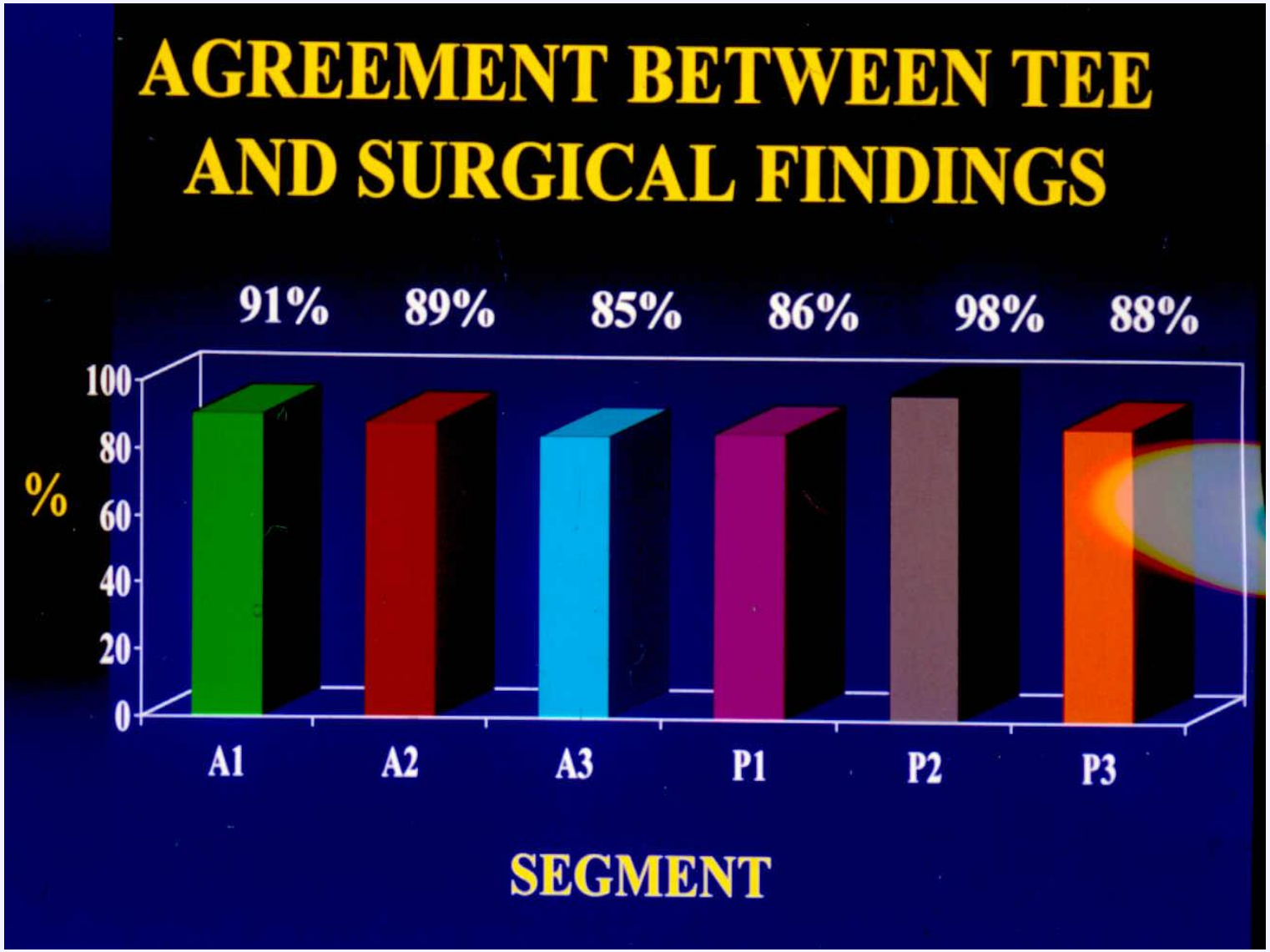
# Question 30

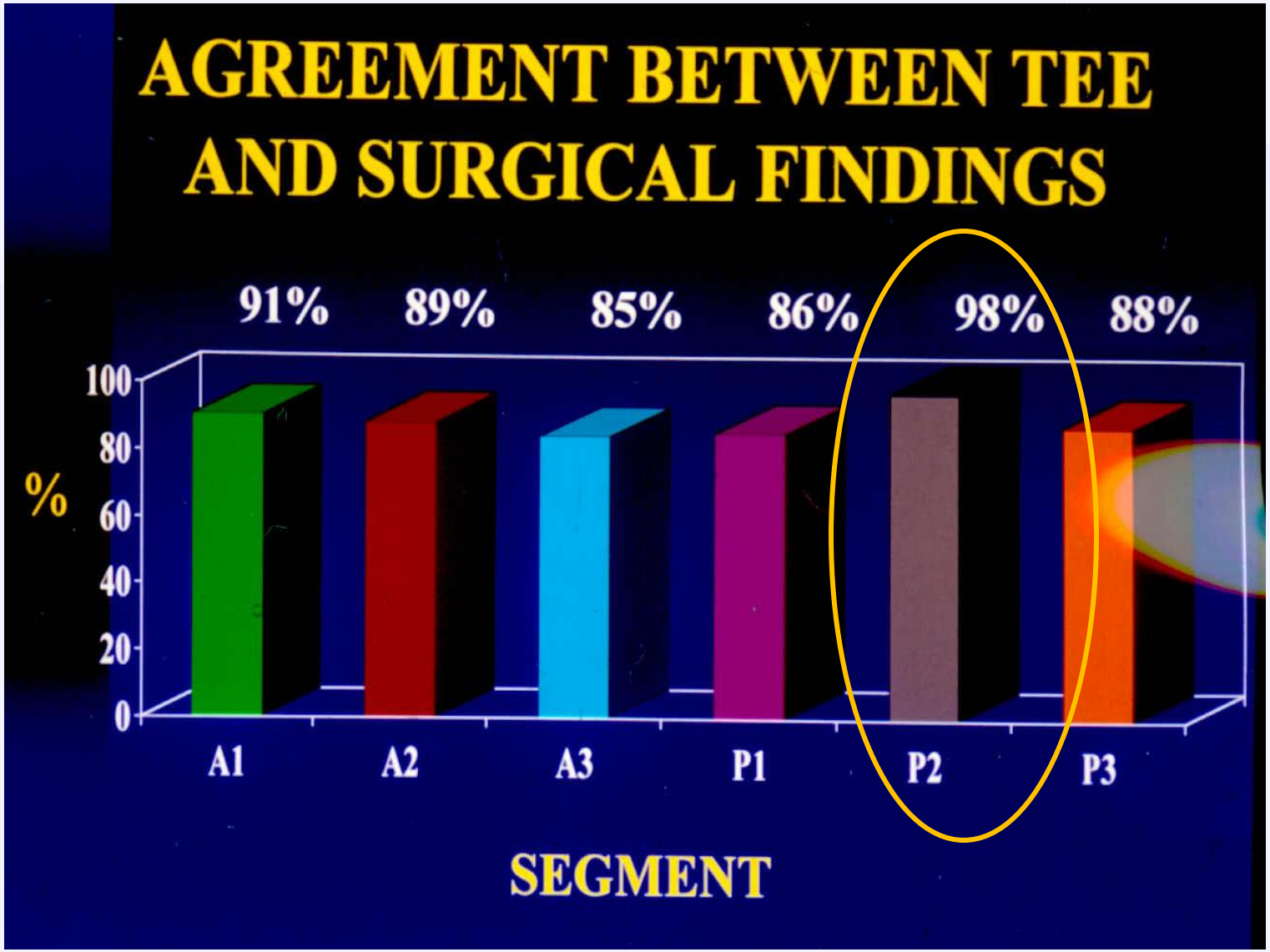



**Carpentier's anatomic classification of the MV (segmental classification)**


TEE: MV
Anatomy
LAA
Ao
A1
P1
A2 P2
0°
A2
P2
A3
P3
45°
75°
105°
135°
A3 A2
P2
P3
P2
P1
A2
P2 A2 A1
P2 A2
Dr A.S. Omran
Toronto Hospital
1995
Commissural view


AGREEMENT BETWEEN TEE AND SURGICAL FINDINGS
91%
89%
85%
86%
98%
88%
100
80
60
40
20
0
%
A1
A2
A3
P1
P2
P3
SEGMENT


AGREEMENT BETWEEN TEE AND SURGICAL FINDINGS
91%
89%
85%
86%
98%
88%
100
80
60
40
20
0
%
A1
A2
A3
P1
P2
P3
SEGMENT

# Intraoperative Transesophageal Echocardiography Accurately Predicts Mitral Valve Anatomy and Suitability for Repair

Ahmad S. Omran, MD, Anna Woo, MD, Tirone E. David, MD,
Christopher M. Feindel, MD, Harry Rakowski, MD, and Samuel C. Siu, MD, SM, *Toronto, Ontario, Canada*

**Mitral valve (MV) repair is the procedure of choice for MV prolapse or flail. However, valve repair is more technically demanding and requires a precise definition of MV morphology to determine the timing, complexity, and feasibility of repair. We prospectively examined 170 consecutive patients with MV prolapse or flail referred for MV repair. The MV valve was systematically assessed by intraoperative transesophageal echocardiography. MV anatomy was independently assessed at the time of operation. Accuracy of transesophageal echocardiography in identifying MV segments ranged from 90% to 97%, and was best for the middle segment/scallop of either anterior or posterior leaflet. MV repair was successful in 91% of patients. Success rate was the lowest (78%) in the presence of extensive bileaflet disease involving at least 2 segments of each leaflet. Independent predictors of unsuccessful repair were central jet of mitral regurgitation, calcification or severe dilatation of the mitral annulus, and extensive leaflet disease with involvement of at least 3 segments.** (J Am Soc Echocardiogr 2002;15:950-7.)

# Question 31

European Journal of Cardio-Thoracic Surgery 48 (2015) 344–346
doi:10.1093/ejcts/ezv230 Advance Access publication 4 July 2015

**EDITORIAL**

Cite this article as: Alfieri O, Lapenna E. Systolic anterior motion after mitral valve repair: where do we stand in 2015? Eur J Cardiothorac Surg 2015;48:344–6.

## Systolic anterior motion after mitral valve repair: where do we stand in 2015?

Ottavio Alfieri* and Elisabetta Lapenna

Department of Cardiac Surgery, IRCCS San Raffaele Scientific Institute, Milan, Italy

**2015**

* Corresponding author. Department of Cardiac Surgery, IRCCS San Raffaele Scientific Institute, Via Olgettina 60, 20132 Milan, Italy. Tel: +39-02-26437102; fax: +39-02-26437125; e-mail: alfieri.ottavio@hsr.it (O. Alfieri).

**Table 1:** Risk factors for SAM

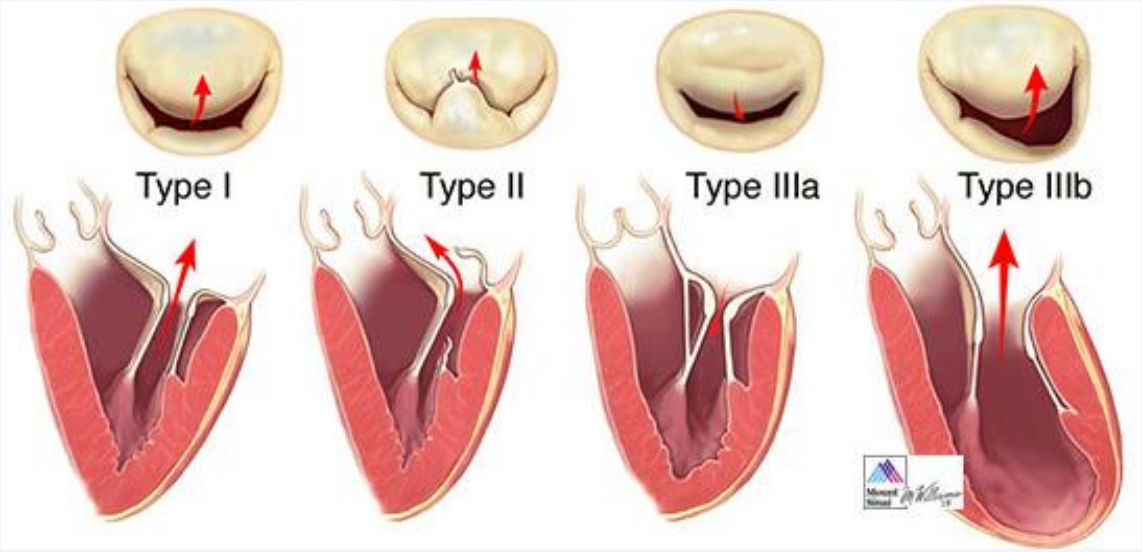
| Patient-related | Procedure-related |
|---|---|
| Presence of excessive leaflet tissue (Barlow's disease) with a tall posterior leaflet (>15 mm) | Inadequate reduction of the posterior leaflet height (which still remains >15 mm) |
| Ratio between the heights of the anterior and posterior leaflets ≤1.3 | Insertion of a small prosthetic ring |
| Aorto-mitral plane angle <120° | |
| Distance between the interventricular septum and the mitral leaflet coaptation point <25 mm | |
| Thick basal interventricular septum (>15 mm) | |
| Small and hyperkinetic left ventricle | |
| Anterior displacement of the papillary muscles | |

# Question 32

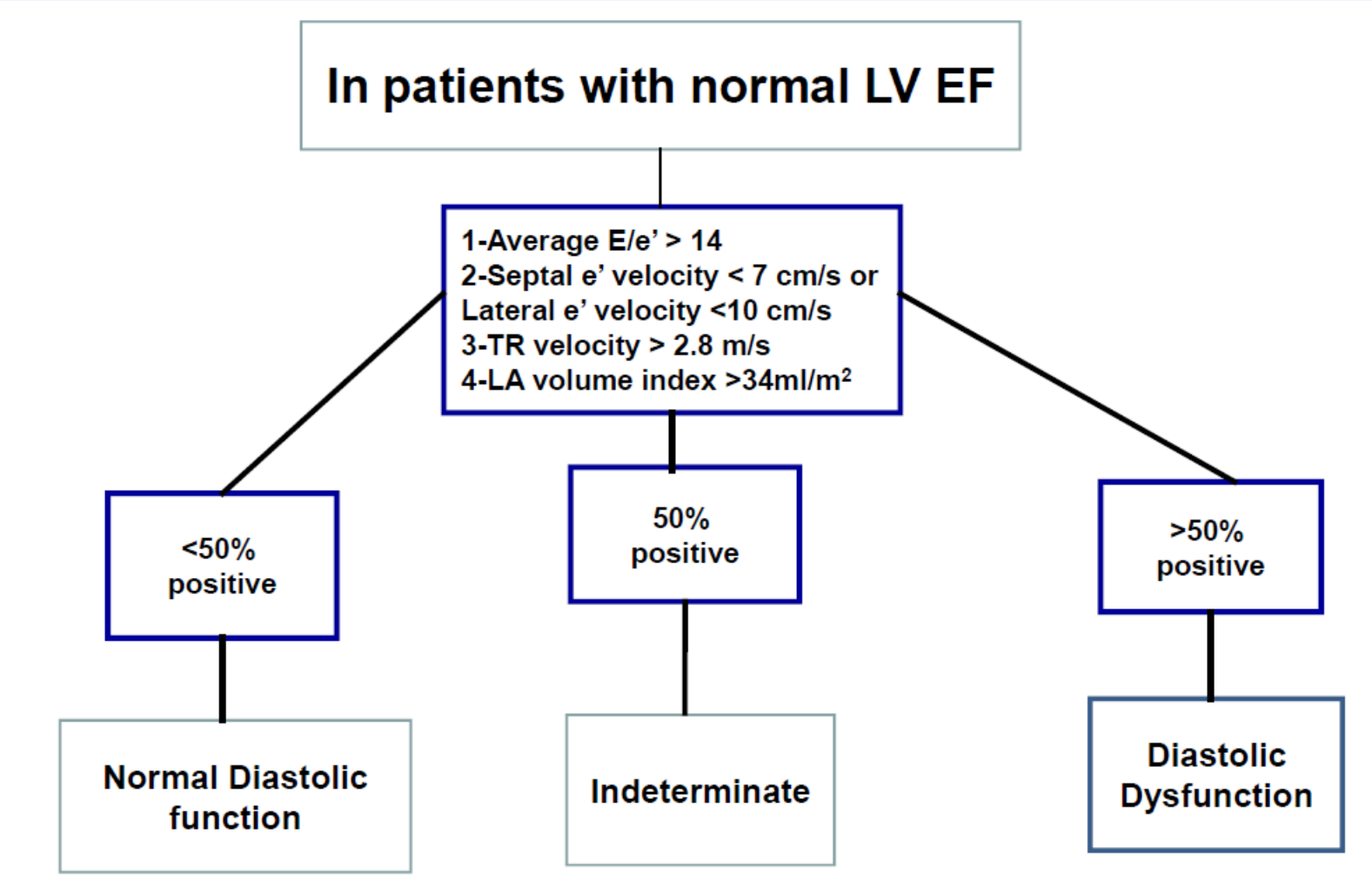
J Thorac Cardiovasc Surg. 1983 Sep;86(3):32 37. **Cardiac valve surgery--the "French correction".** Carpentier A

## *Carpentier's "Functional Classification"*

| | |
|---|---|
| Type I | Normal leaflet motion |
| Type II | Excess leaflet motion (leaflet prolapse) |
| Type III | Restricted leaflet motion |
| IIIa | Restricted opening |
| IIIb | Restricted closure |

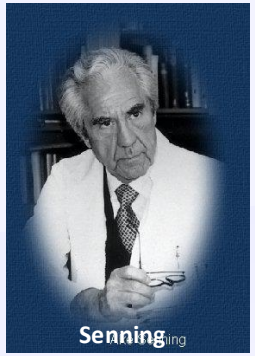


# Question 39

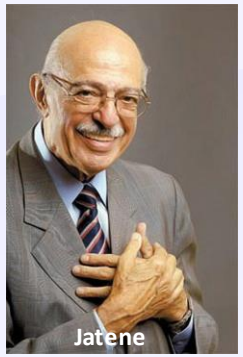


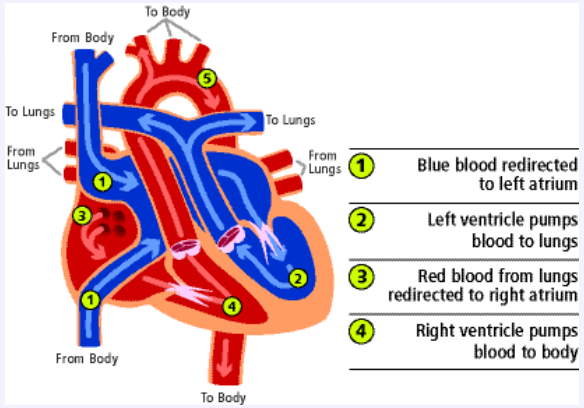

2016 ASE diastolic function guidelines

# Question 40, 41

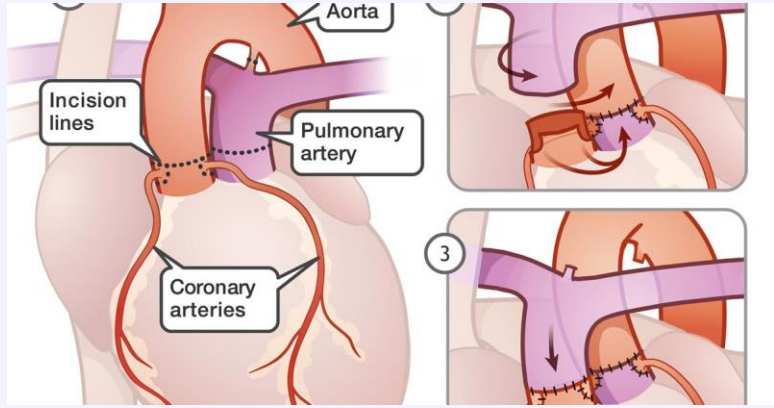







First atrial switch operation was done in D-TGA by a Swedish cardiac surgeon Ake Senning in 1959 (he implanted the first cardiac pacemaker as well in 1958). In 1962 , Mustard at Sick Kids Hospital, Toronto introduced the new technique for baffling




First arterial switch operation was done by Brazilian surgeon, Adib Jatene in 1975


Toronto
Thank you.