ASCeXAM / ReASCE
Practice Board Exam Questions
Sunday

- Spectral Doppler
- Tissue Doppler and Strain Imaging
- Cardiac Masses
- Degenerative Mitral Valve Disease
- Mitral Stenosis/Functional (Ischemic) Mitral Valve Disease
- Mitral Regurgitation

Participate in Board Questions

1. Select Agenda
3a. Ask Questions
3b. Select Practice Board
2. Select Session

4. VOTE
A 65 year old with MVP and MR. What do you conclude from these spectral profiles?

1. He has normal diastolic function
2. The MR is probably not very significant
3. The MR is likely to at least moderate to severe
4. Cannot tell with certainty
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4. Cannot tell with certainty
Doppler + Haemodynamics
This spectral Doppler profile may be seen in:

1. HCM
2. Hypertensive LVH
3. AS
4. 1-3
5. None of above
This spectral Doppler profile may be seen in:

1. HCM
2. Hypertensive LVH
3. AS
4. 1-3
5. None of above
Various Doppler Profiles in HCM

<table>
<thead>
<tr>
<th>LVOT</th>
<th>Mid cavity</th>
<th>MR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Late peaking</td>
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LVOT | Mid cavity | MR
--- | --- | ---
Late peaking | Late peaking | Starts early
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4.5 M/s | Lower velocity than LVOT signal | Can be as high as 8 M/s

A 44 year old man undergoes echo for positive blood cultures. This echo shows

1. Small AV and MV vegetations
2. Lambl's excresences on the MV and AV
3. MV vegetation
4. None of the above
A 44 year old man undergoes echo for positive blood cultures. This echo shows

1. Small AV and MV vegetations
2. Lambl’s excresences on the MV and AV
3. MV vegetation
4. None of the above
The phenomenon indicated by the arrow indicates the existence of:

1. High PA pressures
2. A PDA
3. RV systolic dysfunction
4. Severe PR
5. Sinus rhythm

Adapted from Feigenbaum's Echocardiography
Fourth Edition 1986
What would auscultation reveal in this patient?

1. Loud S1
2. Midsystolic click
3. Soft S1
4. Diastolic rumble
Cases: Mitral Valve Disease and Cardiac Masses

Itzhak Kronzon, MD, FASE

Physical finding?

1. Holosystolic murmur
2. Click
3. Diastolic rumble
4. Gallop
The correct answer is 2 : A click

Note: MVP, End Systolic MR

Normal size LA and LV. EF=65%
Based on this Doppler tracing, the patient also has:

1. Hypertension
2. Aortic Regurgitation
3. Atypical chest pains
4. Paroxysmal AF
Correct answer: A. Hypertension

With MR Velocity of 6.0 m/sec, the gradient between LV and LA is 144 mmHg.
The systolic arterial pressure was 160 mmHg.

How severe is the MR?

1. Mild
2. Moderate
3. Severe
4. Show me PISA or VC
5. RT 3D TEE
The severity of the MR determination will best calculated by:

1. Vena Contracta Diameter
2. Regurgitant volume
3. PISA to calculate EROA
4. Percent of MR jet color area in the LA.
The severity of the MR determination will best calculated by:

A. Vena Contracta Diameter  
B. Regurgitant volume  
C. PISA  
D. Percent of MR jet color area in the LA.

PISA calculation of regurgitant volume

ERO \times VTI = \text{Regurg. Volume}

Courtesy Dr Jae Oh
How severe is the MR?
Regurgitant Volume!

MR is mild-moderate.
CARNEY Complex

- Cardiac myxoma: 72%
- Mammary myxoma: 42%
- Pituitary tumor GH: 10%
- Testicular tumor: 56%
- Schwannoma: 5%
- Skin spotty pigmentation: 65%
1. When obtaining a pulsed wave tissue Doppler signal you should?

a. Turn the wall filters on and turn down the receiver gain.
b. Turn the wall filters off and turn up the receiver gain.
c. Turn the wall filters off and turn down the receiver gain.
d. Turn the wall filters on and turn up the receiver gain.
Doppler Tissue Imaging

1. Turn wall filters off
2. Turn down the gain

2. A 46 year old female was referred for evaluation of chest pain. The regional and global longitudinal peak systolic strain values are shown in the parametric display. The findings suggest?

A. Cardiac amyloidosis
B. Apical HCM
C. Basal inferior infarction
D. Hypertensive heart disease
E. Renal failure
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3. An advantage of “speckle tracking” myocardial imaging over Doppler Tissue Imaging is?

a. Strain values are measured along the axis of the ultrasound beam.
b. Velocity and strain values are measured from standard gray-scale images.
c. Myocardial velocity measurements are not influenced by translational or tethering motion as they are when obtained by pulsed wave tissue Doppler imaging.
d. You can measure longitudinal but not circumferential or radial strain.
3. An advantage of “speckle tracking” myocardial imaging over Doppler Tissue Imaging is?

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c. Myocardial velocity measurements are not influenced by translational or tethering motion as they are when obtained by pulsed wave tissue Doppler imaging.  

d. You can measure longitudinal but not circumferential or radial strain.

4. Negative strain values are consigned to?

a. Shortening, Thickening and Counterclockwise rotation.  

b. Shortening, Thinning and Clockwise rotation.  

c. Lengthening, thickening and Clockwise rotation.  

d. Shortening, Thinning and Counterclockwise rotation.  

e. Shortening, Thinning and Clockwise rotation
4. Negative strain values are consigned to?

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b. Shortening, Thinning and Clockwise rotation.
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d. Shortening, Thinning and Counterclockwise rotation.
e. Shortening, Thinning and Clockwise rotation.

4. Negative strain values are consigned to?

- Positive Values

Routine Practice

- Negative Values

Positive Values
5. A 59 year women with breast cancer being treated with anthracycline based chemotherapy is referred to clinic after the echo reported a reduction in global longitudinal peak systolic strain. The clinician reviewed the echo and requested that the strain values be repeated. Why did the clinician suspect that the strain values were falsely low?

a. Poor tracking  
b. The annulus is incorrectly identified and tracking part of the left atrium.  
c. The region of interest thickness is set too wide and including the pericardium.  
d. End-systole has been incorrectly identified/marked.
6. Compared to pulsed wave tissue Doppler the myocardial velocities obtained by color tissue Doppler are?

   a. Higher
   b. Lower
   c. The same
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a. Higher
b. Lower
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<td>Color TD</td>
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Mitral Valve Disease and Cardiac Masses

Dennis A. Tighe, MD, FASE

Which one of the following is the most commonly encountered cardiac mass lesion?

1. Metastatic (secondary) tumor
2. Atrial myxoma
3. Papillary fibroelastoma
4. Hemangiosarcoma
5. Intra-cardiac thrombus
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Which of the following primary cardiac tumors is most likely to involve the cardiac valves?

1. Myxoma
2. Papillary fibroelastoma
3. Sarcoma
4. Hemangioma
5. Rhabdomyoma
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Which of the following tumor types exhibits the highest propensity for cardiac metastasis?

1. Malignant melanoma  
2. Osteogenic sarcoma  
3. Bronchogenic cancer  
4. Breast cancer  
5. Hypernephroma
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3. Bronchogenic cancer
4. Breast cancer
5. Hypernephroma
Which of the following values is the best estimate of the mitral orifice area?

A. 0.40 cm²  
B. 0.75 cm²  
C. 1.0 cm²  
D. 1.4 cm²  
E. 2.6 cm²
• D. 1.4 cm\(^2\).

• This continuous wave spectral profile of the mitral valve shows increased trans-valvular velocities and a prolonged deceleration time (measured).
  – Given the known deceleration time, the relationship between deceleration time (DT) and mitral pressure half-time (PHT) is:
    \[ \text{PHT (in msec)} = 0.29 \times \text{DT} \]
    – Once the PHT is known, the Hatle formula (MVA (in cm\(^2\)) = 220/PHT) can be used to estimate the mitral orifice area.
      • In this case, the PHT = 163 msec.

• Alternatively, the formula \( \text{MVA} = 759/\text{DT} \) can be utilized.

Two Patients with Mitral Regurgitation due to MVP

A. B.

CW Doppler
When comparing the patients with MR depicted in panels A and B, which of the following statements is **TRUE**?

- A. Color jet area is often smaller among patients depicted in panel A compared to B.
- B. The peak mitral inflow velocity is consistently lower among patients in panel B versus A.
- C. The ERO area by PISA is consistently smaller among patients depicted in panel A versus B.
- D. Clinical outcomes are often better for patients depicted in panel A versus B.

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- D. Clinical outcomes are often better for patients depicted in panel A versus B.**
Case 1

History

• A 61 year-old man
  – Presents to hospital with worsening shortness of breath, back pain, and a 20-pound weight loss over the past 6-months.
  – Two weeks prior to presentation he developed orthopnea.
  – As an outpatient, an oral antibiotic was prescribed for presumed pneumonia.
  – Transferred from an OSH for further care.
**History/Data**

- **PMH**
  - HTN
  - Dyslipidemia
  - CAD
  - Type B aortic dissection 1996

- **SH**
  - Manual laborer
  - Non-smoker
  - No EtOH
  - No illicit drug use

- **Exam**
  - Labored breathing (50% FM); HR 80/min, regular
  - JVD
  - Bilateral rales
  - HSM apex, diastolic decresendo murmur LLSB
  - LE edema

- **Labs**
  - WBC 14, Hgb 9.2
  - SR 1° AVD, IRBBB, LAE
  - Pulm edema, b/l effusions
Based on the history and TEE images, which of the conditions best explains the mitral valve findings?

- A. Myxomatous valve degeneration
- B. Endocarditis involving the aortic valve
- C. Pseudoaneurysm of the mitral-aortic intervalvular fibrosa
- D. Congenital diverticulum
- E. Blood cyst of the mitral valve
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Sub-aortic Complications of IE


An 84-year old woman with Stage IV chronic kidney disease and systemic hypertension presents to an outside hospital with worsening shortness of breath.

- Physical examination and chest radiography were consistent with pulmonary edema
  - Diuretics were given
- Transthoracic echocardiography was performed
Which of the following entities constitutes the most likely etiology for the finding shown?

A. Left atrial myxoma  
B. Intracavitary thrombus  
C. Infective endocarditis  
D. Caseous calcification  
E. Papillary fibroelastoma
Which of the following entities constitutes the most likely etiology for the finding shown?

A. Left atrial myxoma
B. Intracavitary thrombus
C. Infective endocarditis
D. Caseous calcification**
E. Papillary fibroelastoma

Caseous Calcification of the Mitral Annulus

- Relatively rare
  - Estimated prevalence of 0.07%
- Annular-based mass with echoluscencies
  - Putty-like admixture of fatty acids, cholesterol, and calcium
    - "Toothpaste" tumor
    - Rounded
    - Smooth borders
- Posterior location
- Associated conditions
  - Elderly
  - HTN
  - Women
- Natural history appears benign
  - Some cases may regress spontaneously
- Differential diagnosis
  - Abscess
  - Tumors
  - Thrombus

Case 3
Case 2

- An 36-year old woman is referred for echocardiography by her new PCP who heard a heart murmur. She is otherwise asymptomatic. She reports that several years prior she had open heart surgery performed at another institution.
  - An ECG was on-file
  - A transthoracic echocardiogram was performed
Based on the ECG and echocardiography you suspect that the prior surgery was performed for:

A. Infective endocarditis  
B. Rheumatic heart disease  
C. Atrial septal defect  
D. Degenerative valve disease  
E. Hypertrophic cardiomyopathy

Based on the ECG and echocardiography you suspect that the prior surgery was performed for:

A. Infective endocarditis  
B. Rheumatic heart disease  
C. **Atrial septal defect**  
D. Degenerative valve disease  
E. Hypertrophic cardiomyopathy
Ostium Primum ASD
(partial AV canal defect)

- 15-20% of ASDs
- Primum septum does not fuse with endocardial cushions
  - ASD occurs at base of interatrial septum
- Anomalies of AV valves common
  - Cleft MV most common
- Associations
  - Small inlet VSD (“transitional defect”)
  - LVOT elongated/narrowed (“gooseneck deformity”)
  - Sub-aortic stenosis
- ECG
  - LAD
- Echo
  - Cleft AML with MR (directed posterolateral)
  - AV valves in same plane

Degenerative Mitral Valve Disease

Roberto M. Lang, MD, FASE
A 27 year old female presents with shortness of breath. The following 3D TEE is obtained. What is the most likely diagnosis?

1. Dehisced mechanical aortic prosthesis
2. Stenosed bioprosthetic mitral valve
3. Stenosed bioprosthetic aortic valve
4. Dehisced mechanical mitral valve
A 36 year old patient presents with shortness of breath. A TEE was obtained. What is the most likely blood smear associated with this condition?

1. Eosinophilia
2. Red cell changes with lead poisoning
3. Hemolytic anemia
4. Thrombocytopenia
5. Excess of segmented neutrophils

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5. Excess of segmented neutrophils
A 31 woman presents with sudden onset of shortness of breath. A TEE is performed. Which is the most likely location of the culprit lesion?

1. P2 Flail
2. P1 Flail
3. P3 Flail
4. A2 Flail
5. A3 Flail
Which of the following is most consistent with a severe grade of mitral insufficiency?

1. A continuous Doppler signal that is an incomplete envelope of low signal intensity.
2. A Peak E wave velocity of less than 1.2 m per second.
3. A maximal jet area as detected with color Doppler of less than 3.0cm².
4. A reversed systolic pulmonary venous waveform as detected with pulsed wave Doppler.
All of the following clinical situations will limit the accuracy of the pressure half-time method for the measurement of mitral valve area with the exception of:

1. Conditions that alter left atrial compliance.
2. Conditions that alter left ventricular compliance.
3. Rapid heart rate
4. Severe aortic insufficiency.
5. Severe degree of mitral stenosis.
Mitral Stenosis/Functional (Ischemic) Mitral Valve Disease

Robert A. Levine, MD

In what conditions is there diastolic mitral leaflet doming with the leaflet concave toward the LA?

1. Rheumatic MS
2. Rheumatic and calcific MS
3. Rheumatic and congenital MS
4. Rheumatic MS and AI with flow hitting the mitral valve
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In mitral stenosis, which is the best view to guide placement of the beam to measure the narrowest orifice area?

A. The parasternal long-axis view
B. The parasternal short-axis view
C. The apical 2-chamber view
D. The apical 4-chamber view
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C. The apical 2-chamber view
D. The apical 4-chamber view

A patient has mitral stenosis with an E-wave deceleration time of 1000 milliseconds. What is the mitral valve area?

1. 0.22 cm²
2. 0.75 cm²
3. Depends on cardiac output
4. 1.5 cm²
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1. 0.22 cm²
2. 0.75 cm²
3. Depends on cardiac output
4. 1.5 cm²
How does the mitral pressure half time vary with these parameters?

1. Directly with mitral valve area, directly with ventricular stiffness
2. Directly with mitral valve area, inversely with ventricular stiffness
3. Inversely with mitral valve area, directly with ventricular stiffness
4. Inversely with mitral valve area, inversely with ventricular stiffness

$\downarrow$ MV area $\rightarrow$ $\uparrow$ Decel time

$\uparrow$ LV stiffness $\rightarrow$ $\downarrow$ Decel time

© 2005 R. Levine
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What condition can explain the difference in MV area by planimetry and half time in the following patient?

A. Mild aortic insufficiency
B. Post-balloon atrial shunt PFO
C. Moderate mitral regurgitation
D. Left atrial enlargement
MVA = 0.66 cm²

MVA = \frac{750}{\text{Deceleration time}} = \frac{750}{660} = 1.14 \text{ cm}²
What condition can explain the difference in MV area by planimetry and half time in this patient?

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A. Mild aortic insufficiency
► B. Post-balloon atrial shunt PFO
C. Moderate mitral regurgitation
D. Left atrial enlargement
What is the mitral valve area in this patient?

A. 0.82 cm$^2$
B. 1.34 cm$^2$
C. 1.0 cm$^2$
D. Need more data
What is the mitral valve area in this patient?

A. 0.82 cm$^2$
B. 1.34 cm$^2$
C. 1.0 cm$^2$
D. Need more data
**PISA Method**

MVA = Peak Flow/Peak MS velocity

Leonardo Rodriguez

\[ \text{Peak flow rate} = 2\pi r^2 v \left(\frac{\alpha}{180}\right) \]

- \( r = 1.06 \text{ cm} \)
- \( v = 38 \text{ cm/sec} \)
- \( \alpha = 110^\circ \)

\[ \text{Peak flow rate} = 164 \text{ cm}^3/\text{sec} \]

\[ \text{MVA} = \frac{\text{Peak flow rate}}{\text{Peak velocity}} = \frac{(164 \text{ cm}^3/\text{sec})}{(200 \text{ cm/sec})} = 0.82 \text{ cm}^2 \]
What is the mitral valve area in this patient?

A. 0.82 cm²
B. 1.34 cm²
C. 1.0 cm²
D. Need more data
In evaluating mitral stenosis, the pressure half time is calculated as:

a. The time taken to drop to 0.7 x the peak pressure gradient
b. The time taken to drop to half the peak pressure gradient
c. The time taken to drop to half the peak velocity
d. The pressure gradient at half the diastolic filling period
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- b. The time taken to drop to half the peak pressure gradient
- c. The time taken to drop to half the peak velocity
- d. The pressure gradient at half the diastolic filling period
44 yo woman with increasing dyspnea 1 year after difficult childbirth
What intervention would you suggest first?

a. Diuretic

b. Mitral balloon valvuloplasty

c. Surgical mitral valve repair

c. Surgical valve replacement
Before diuretic

After diuretic
Before diuretic: RVSP 80 mmHg

After diuretic: RVSP 31 mmHg
Ischemic MR is caused primarily by which of the following?

1. Coronary ischemia that varies over time
2. Papillary muscle displacement with mitral leaflet tethering
3. Failure of the ischemic papillary muscles to contract
4. Mitral annular dilatation
A ventricular problem: PM displacement causes leaflet tethering
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4. Mitral annular dilatation

In the recent echo-based CardioThoracic Surgical Network study of severe ischemic MR, after CABG and mitral annuloplasty:

1. MR remains repaired in 80% of patients after 2 years
2. MR reoccurs in 59% of patients after 2 years without symptoms
3. MR reoccurs in 59% of patients after 2 years with increased heart failure
4. MR remains in 50% of patients at 6 months but then decreases over 1 year
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A patient with mild ischemic MR develops pulmonary hypertension and dyspnea at a low exercise work load. This can best be explained by:

1. New wall motion or non-ischemic increase in functional MR
2. New ischemic wall motion only
3. Primary increase in pulmonary vascular resistance
4. Diffuse microvascular obstruction with hypokinesis
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4. Diffuse microvascular obstruction with hypokinesis

A patient with an inferior wall MI and no reversible ischemia showed moderate to severe ischemic MR by preop TTE. After OR anaesthetic induction, MR is mild in the absence of hypotension. The surgeon questions your preoperative MR grading. What course can you take?

1. Agree, noting the limitations of echo assessment of MR
2. Suggest intraop Dobutamine stress
3. Suggest intraop volume loading test
4. Confirm that mitral valve repair will not likely be needed
A patient with an inferior wall MI and no reversible ischemia showed moderate to severe ischemic MR by preop TTE. After OR anaesthetic induction, MR is mild in the absence of hypotension. The surgeon questions your preoperative MR grading. What course can you take?

1. Agree, noting the limitations of echo assessment of MR
2. Suggest intraop Dobutamine stress
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4. Confirm that mitral valve repair will not likely be needed
No doming or sudden stop
Commissural fusion: Rheumatic

No commissural fusion
2014 AHA/ACC Guideline for the Management of Patients With Valvular Disease (Nishimura)

- > 1.5 cm² – “Progressive”
- 1.1 to 1.5 cm² – “Severe”
- ≤ 1.0 cm² – “Very severe”

Based on symptoms and improvement with intervention
But MVA ≤ 1.5 cm² may be as’xic!
Echo and Hydrodynamic Assessment of Mitral Stenosis

- Mitral valve area measurement
  - $> 1.5 \text{ cm}^2$ - Mild
  - 1.1 to 1.5 cm$^2$ - Moderate
  - $< or = 1.0 \text{ cm}^2$ - Severe
Quantification of Mitral Regurgitation
Sunil Mankad, MD, FASE
Question 1

41 y/o woman: Dysepsnea on exertion
What is the calculated ERO?

1. 0.45 cm$^2$
2. 0.55 cm$^2$
3. 0.35 cm$^2$
4. 0.65 cm$^2$
5. 0.75 cm$^2$

- PISA Radius = 1.1 cm
- Aliasing velocity 49 cm/sec
- MR Peak Velocity 570 cm/sec
- TVI = 161 cm
Step 1: Calculate proximal MR flow

\[
\text{Flow}_{\text{MR}} = \text{Area}_{\text{PISA}} \times \text{Velocity}_{\text{Alias}} = 2\pi \times R^2 \times V_{\text{Alias}} = 6.28 \times (1.1\text{cm})^2 \times 49 \text{ cm/sec} = 372 \text{ cm}^3/\text{sec}
\]

Step 2: Calculate the mitral ERO

\[
\text{ERO} = \frac{\text{Flow}_{\text{MR}}}{\text{Velocity}_{\text{MR}}} = \frac{372 \text{ cm}^3/\text{sec}}{570 \text{ cm/sec}} = 0.65 \text{ cm}^2
\]
Question 2

44 year old female with dyspnea
LVOT 2.1 cm
(no aortic regurgitation)

LVOT TVI = 20 cm
MV Annulus = 3.9 cm

MV Annulus TVI = 16 cm
What is Mitral Regurgitant Fraction?

A. 54%  •  LVOT 2.1 CM
B. 64%  •  LVOT TVI 20 CM
C. 74%  •  MV ANNULUS DIAMETER 3.9 CM
D. 44%  •  MV ANNULUS TVI 16 CM

Step 1: Calculate LVOT Stroke Volume

\[
\text{LVOT Stroke Volume} = 0.785 \times (2.1 \text{ cm})^2 \times 20 \text{ cm} = 69 \text{ cm}^3
\]
Step 2: Calculate MV Stroke Volume

MV Stroke Volume

\[ \text{MV Stroke Volume} = 0.785 \times (3.9 \text{ cm})^2 \times 16 \text{ cm} = 191 \text{ cm}^3 \]

Step 3: Calculate MR Volume

MV Stroke Volume

\[ \text{MV Stroke Volume} - \text{LVOT Stroke Volume} = \text{MR Volume} \]

\[ 191 \text{ cm}^3 - 69 \text{ cm}^3 = 122 \text{ cm}^3 \]
Step 4: Calculate Regurgitant Fraction (RF)

\[ \text{Mitral RF} = \frac{\text{MR Volume}}{\text{MV Stroke Volume}} = \frac{122 \text{ cm}^3}{191 \text{ cm}^3} = 64\% \]

Step 5: Calculate MR ERO

\[ \text{Effective Regurgitant Orifice} = \frac{\text{MR TVI (161 cm)}}{122 \text{ cm}^3} = 0.76 \text{ cm}^2 \]
Pulmonary Vein: Systolic Flow Reversal

Question 3
• A 66-year-old patient presents with angina, but no symptoms of heart failure. He has a history of hypertension, smoking, type 2 diabetes mellitus, and hyperlipidemia.
• He has a strong family history of coronary artery disease.
• A stress echocardiogram is positive with evidence of cavity dilatation.
• He undergoes cardiac catheterization and left main coronary artery disease is found.
• His echocardiogram reveals an ejection fraction (ef) of 59% and evidence for degenerative (primary) mitral regurgitation.

Which of the following mitral valve echocardiographic parameters should prompt repair of the mitral valve in the setting of concomitant coronary artery bypass grafting?

A. Mitral valve ERO = 41 mm^2
B. MR vena contracta = 0.5 cm
C. MR regurgitant fraction = 43%
D. MR regurgitant volume = 48 cc
### Chronic Primary Mitral Regurgitation: Intervention (cont.)

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>COR</th>
<th>LOE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concomitant MV repair or replacement is indicated in patients with chronic severe primary MR undergoing other cardiac surgery</td>
<td>I</td>
<td>B</td>
</tr>
</tbody>
</table>

2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease

### Quantitation of Mitral Regurgitation

<table>
<thead>
<tr>
<th>Metric</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>MR Volume (cm³/beat)</td>
<td>&lt;30</td>
<td>30 - 44</td>
<td>≥ 60</td>
</tr>
<tr>
<td>Regurgitant Fraction (%)</td>
<td>&lt;30</td>
<td>30 - 39</td>
<td>≥ 50</td>
</tr>
<tr>
<td>ERO (cm²)</td>
<td>&lt;0.20</td>
<td>0.20-0.29</td>
<td>≥ 0.40</td>
</tr>
<tr>
<td>Vena Contracta Width (cm)</td>
<td>&lt; 0.3</td>
<td>0.3 - 0.69</td>
<td>≥ 0.7</td>
</tr>
</tbody>
</table>

42 year old female with mitral stenosis. The Doppler angle of interrogation was sub-optimal

What will this do to the pressure half-time (PHT)?

A. This will overestimate the MVA by PHT
B. This will underestimate the MVA by PHT
C. This will not effect the MVA calculation by PHT
Doppler Angle of Incidence Does Not Influence MVA by PHT


Question 5
54 year old female with mitral stenosis

Mean mitral diastolic mitral gradient = 8 mmHg

Deceleration time = 420 ms

What is the mitral valve area?

1. 1.8 cm²
2. 1.5 cm²
3. 1.2 cm²
4. 1.0 cm²

Doppler Pressure Half-Time

- Concept first described by libanoff and rodbard in 1966
Pressure Half-time

\[ \text{MVA} = \frac{220}{\text{PHT}} \]

\[ \text{PHT} = \text{Deceleration Time} \times 0.29 \]

- the time required for the velocity to drop to ½ the peak pressure

Mitral Valve Area Calculation

- \( \text{PHT} = \text{DT} \times 0.29 \)
  - \( 420 \text{ ms} \times 0.29 = 121.8 \text{ ms} \)
- \( \text{MVA} = \frac{\text{PHT}}{220} \)
  - \( \frac{220}{121.8} = 1.8 \text{ cm}^2 \)