SNS COLLEGE OF ALLIED HEALTH SCIENCES- COIMBATORE 35

DEPARTMENT : DEPARTMENT OF CARDIAC TECHNOLOGY

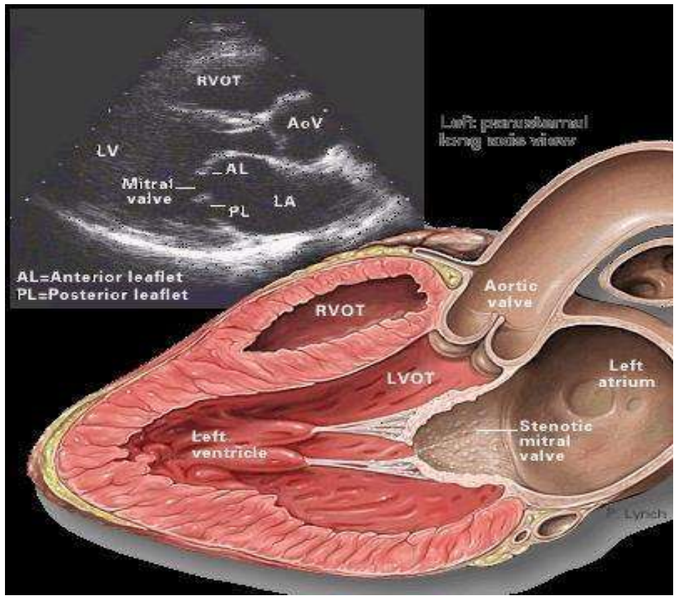
SUBJECT : ECHOCARDIOGRAPHY

TOPIC : ECHO ASSESSMENT OF MITRAL STENOSIS

MITRAL STENOSIS

INTRODUCTION:

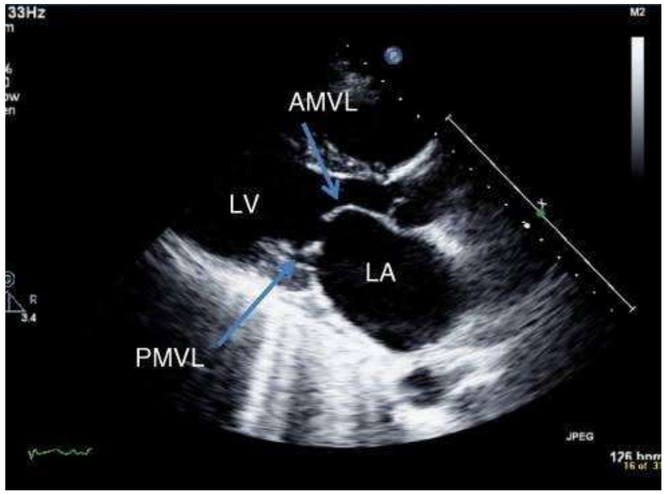
- The area of normal mitral valve is about 4 to 6 cm2
- This are is sufficient allow blood from LA to LV .
- When any disease process decreases the mitral valve area, mitral stenosis (MS) develops. As mitral stenosis progresses over time, the pressure in the left atrium rises.
- In rheumatic heart disease, an autoimmune attack on the mitral valve produces thickening of the valve leaflets. The mitral valve is often described as having a “fish-mouth” appearance.



ECHOCARDIOGRAPHY

DIGNOSIS – ECHOCHOCARDIOGRAPHY

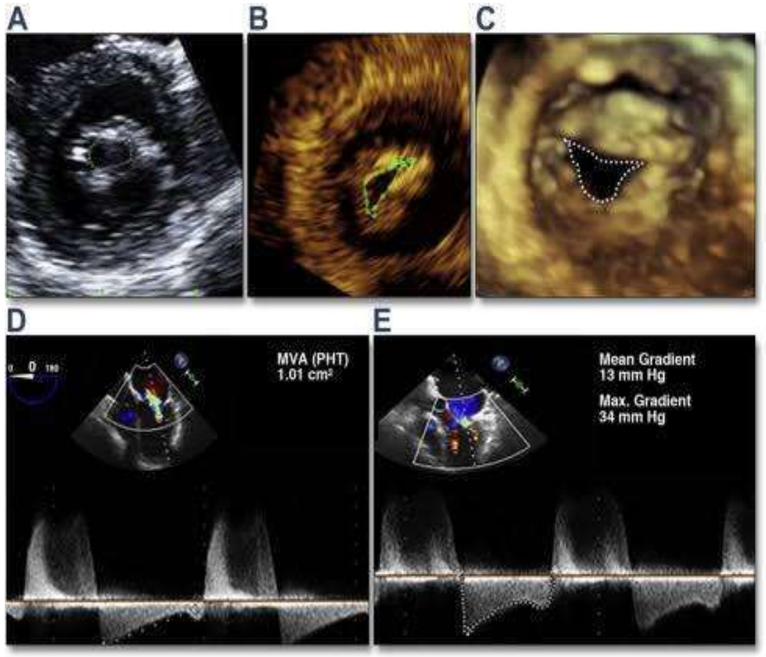
- Echocardiography is the primary means to both diagnose and evaluate the severity of mitral stenosis. The mitral leaflet tips become calcified and thickened.
- A characteristic “hockey stick” appearance of the anterior mitral leaflet is seen
- The two most important measurements made on echocardiography include the pressure gradient between the left ventricle and left atrium and the mitral valve area.
- Because transmitral velocities can be determined, the transmitral pressure gradient can be calculated using the modified Bernoulli equation,
- The pulmonary artery pressure can be calculated to assess the severity of pulmonary hypertension.



QUANTIFICATION OF MITRAL VALVE AREA

Quantification of MVA

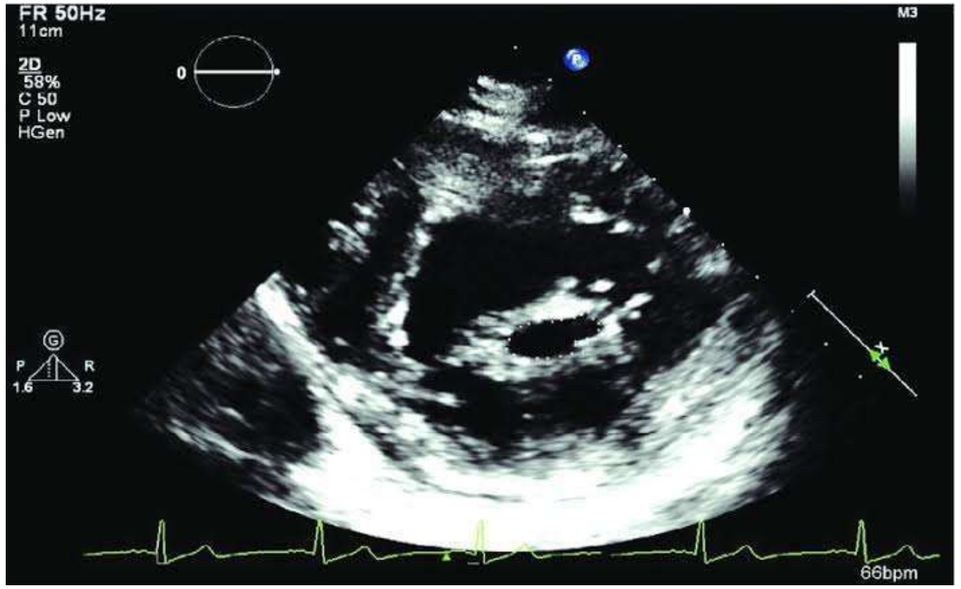
1. **Direct planimetry**
2. **Pressure half time**
3. **Continuity equation / PISA**



	Pressure gradient (mmHg)	Mitral valve area (cm2)
Normal	0	>4.0
Mild	1-5	2.5 -4.0
Moderate	6-10	1.0 – 2.5
Severe	>10	<1.0

PLANIMETRY 2D – MVA

- Planimetry is performed from a parasternal short-axis view with the transducer positioned so that the mitral valve is imaged in the perpendicular plane, in which the mitral valve orifice is smallest.
- A frame is chosen during early diastolic filling, at a time when the mitral valve shows maximal opening excursion.
- Planimetry technically challenging and requires good imaging skills



PLANIMETRY 2D

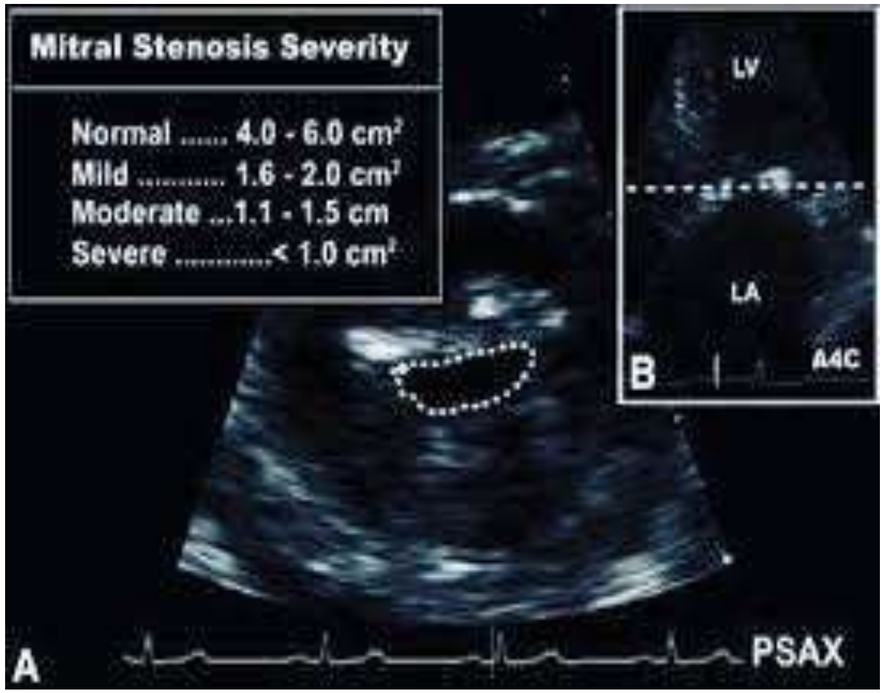
It cannot be done in all patients, such as:

a) those who cannot be imaged from a parasternal approach,

b) those with poor image quality,

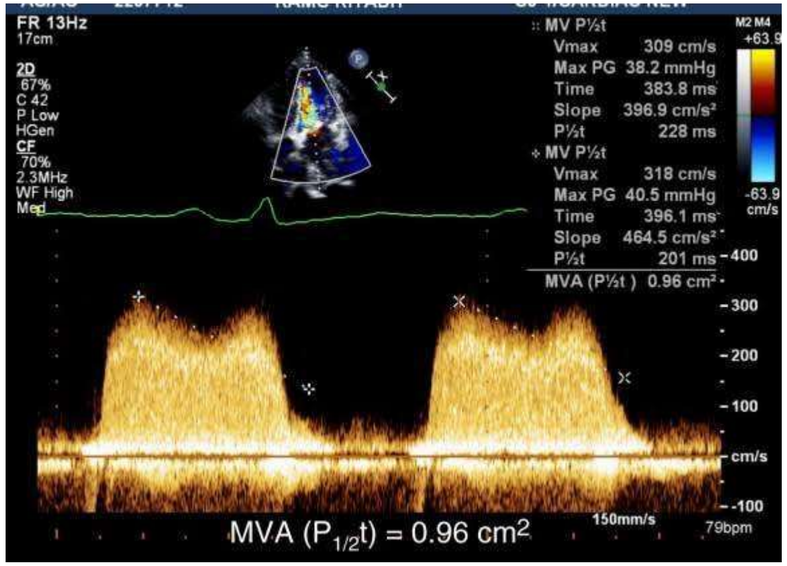
c) when the cut plane cannot be optimally aligned to the smallest orifice, and

d) in calcified valves, when dropouts and artifacts do not permit the investigator to view the mitral valve orifice.



PRESSURE HALF TIME

- Quantification using the pressure half-time method is based on the assumption that the rate at which the gradient drops during diastole corresponds to the severity of mitral stenosis.
- The speed with which the gradient drops can be measured from the slope of the diastolic inflow signal (deceleration slope).



PRESSURE HALF TIME

MITRAL STENOSIS:

- Measurement PHT in a patient with severe mitral stenosis
- Mitral valve area is estimated by dividing 220 (empirical value) by the pressure half-time
- MVA = 220 / PHT
- Although the PHT technique is easy to use, there are numerous conditions in which the calculated mitral valve area is unreliable and this method should be used with caution. Especially in the following settings

1. Diastolic dysfunction –can lead to over estimation of MS severity
2. Aortic regurgitation – can lead to under estimation of MS severity
3. After valvuloplasty – PHT is unreliable
4. Heavily calcified valves - - unreliable

PISA (PROXIMAL ISOVELOSITY SURFACE AREA)

- Several other methods of quantification have been suggested.
- These include calculations based on the continuity equation and the PISA method.
- The main limitation of the continuity method is that it cannot be employed in
- The presence of mitral regurgitation and/or aortic regurgitation. Thus, it is rarely used

MVA = (D2LVOT/4) x (VTIAortic / VTIMitral)

The proximal isovelocity surface area (PISA) method uses the aliasing velocity of mitral inflow to calculate the mitral flow volume, which is divided by the peak velocity of diastolic mitral inflow to derive the mitral valve orifice area.

Although this method is quite appealing, it is limited by the fact that the PISA is usually not truly hemispheric, as assumed in the formula.

MVA = ∏(r 2) x (Valiasing)/Peak Vmitral x/180

INTERROGATIONS

1. What are the common diagnostic consideration for mitral stenosis?
2. What is PISA?
3. Define MS pathophysiology ?

REFERENCES

1. Echo made easy ,samkkadora

2. Echomanual , Joe K oh

3. Text book of echocardiography , Amuthan

THANK YOU