

Mitral Valve Disease



PRESENTED BY

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Mitral Regurgitation



- ❖ Clinical presentation.
 - Signs and Symptoms
 - Physical finding.
 - Differential Diagnosis of holosystolic murmur.
- ❖ Etiology and path physiology.
- ❖ Medical therapy
- ❖ Surgical therapy
- ❖ Post surgical follow –up care.

Hemodynamic of Mitral Regurgitation



THE SPECTRUM OF MR IS BEST

APPROACHED BY AN ANATOMICAL

*UNDERSTANDING OF THE **MITRAL***

APPARATUS..

Mitral valve Apparatus

**1-Cusps or leaflets.
(anterior/ posterior)**

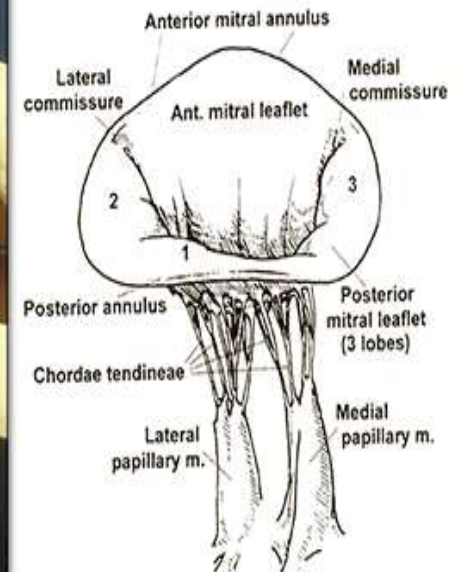
2-Mitral annulus.

3-Chordae tendineae.

4-Papillary muscles

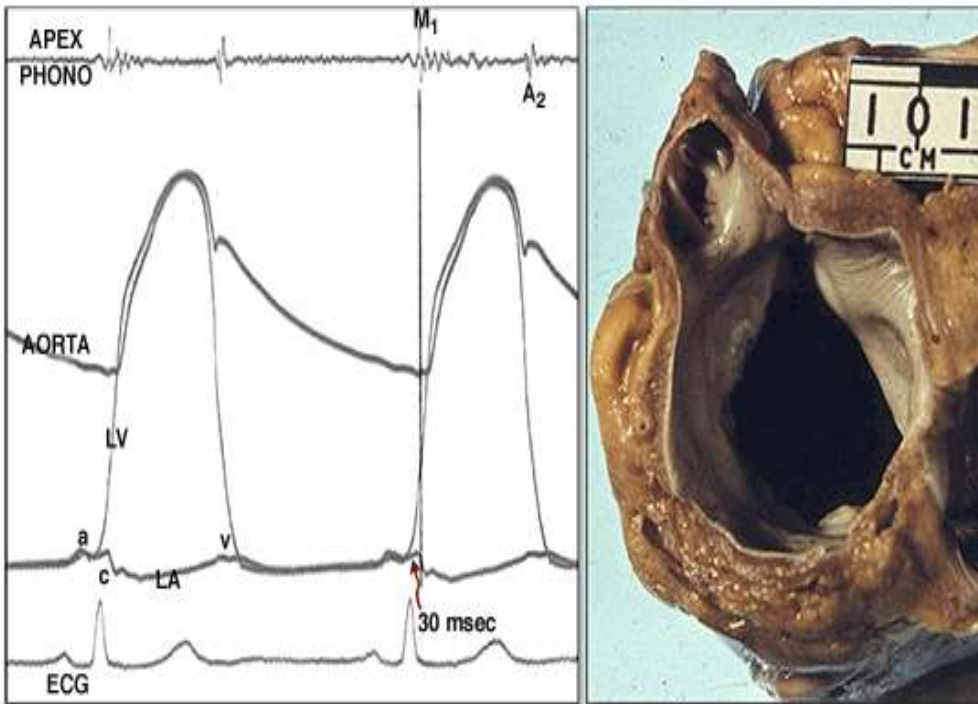
5-Left ventricle muscle

The Normal Mitral Apparatus



cross-sectional area of the orifice of the normal open mitral valve

Hemodynamics of Flow Across the Normal Mitral Orifice



- varies between **3-5 cm²**, depending on the size of the subject
- Simultaneous LV and LA there is **no significant gradient** during diastolic flow across the normal mitral valve. pressures,

Looking Down at a Fully Competent, Closed Mitral Valve



Causes of Mitral Regurgitation

CUSP	Retraction	C.R.V.D.
	Perforation	B.E.
	Expansion	Floppy
CHORDAE	Short	C.R.V.D.
	Long	Floppy
	Broken	B.E. Floppy
Papillary Muscle	Rupture	I.H.D.
	Fibrosis	I.H.D.
Ring	Dilation	Marfan
LV	Dilation	LV Dysfunction

CRVD = chronic rheumatic valve disease
BE = bacterial endocarditis



see that there are two very clear-cut perforations in **mitral cusp** with some residual vegetations attached at one of the edges.

Example of Healed Bacterial Endocarditis





chordae are very markedly **thickened**—thickened because adjacent chordae have fused together. We have thus fibrous pillars, which are really very short and are holding down the cusps and preventing their upward movement. It is very easy to see that if you hold down the mitral cusps, you will get regurgitation.

Example of Typical Rheumatic Mitral Regurgitation





Case of
ischemic
papillary
muscle
necrosis.

The stump of
a **papillary
muscle** may
prolapse up
into the atria

Ischemic Papillary Muscle Necrosis

Prolapse of a Stump of
Papillary Muscle into the Atria



Causes of Mitral Valve Disease

Mitral Regurgitation

Chronic

- Mitral Valve Prolapse Associated with Floppy Mitral Valve - Isolated or a part of Recognized connective tissue disorder syndrome (e.g. Marfan Syndrome, Ehlers-Danlos syndrome)
- Congenital
- Chronic Rheumatic Valvulitis
- Kawasaki Disease
- Ischemic Heart Disease with Wall Motion Abnormalities or Papillary Muscle Dysfunction
- Cardiomyopathy
- Dilated
- Hypertrophic
- Chronic Renal Failure
- Carcinoid Heart Disease
- Mitral Annular Calcification
- Therapy with Ergotamine
- Prosthetic Valve Malfunction

Acute

- Infective Endocarditis
- Severe Papillary Muscle Ischemia or Rupture
- Chordae Tendineae Rupture

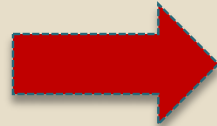
Mitral Stenosis

- Congenital (Rare)
- Rheumatic
- Prosthetic Valve Malfunction

Hemodynamic of MR



- The compliance of the LA depends **primarily** on the **time** available for the LA to adapt to the volume load



- **chronic severe MR**, time is available for the compliance of the LA to increase, whereas with
- **acute severe MR**, there is sudden marked elevation of both the V wave and the mean LA pressure

Pathophysiology of Chronic MR

Mitral Regurgitation

Blood Ejection into LA
During LV Systole
(Small Amount with Gradual Increase)

↑ LV - LA Blood Volume

↑ LV - LA Size
(Gradual ↑)

↑ LV - LA Compliance

↑ Slightly or Normal
LV Diastole and LA Pressure

LV - LA Dysfunction

Dyspnea, Arrhythmias

↓ Forward Stroke
Volume

Fatigue

LA = Left Atrium

LV = Left Ventricle

↑ = Increase

↓ = Decrease

Hemodynamics continue....



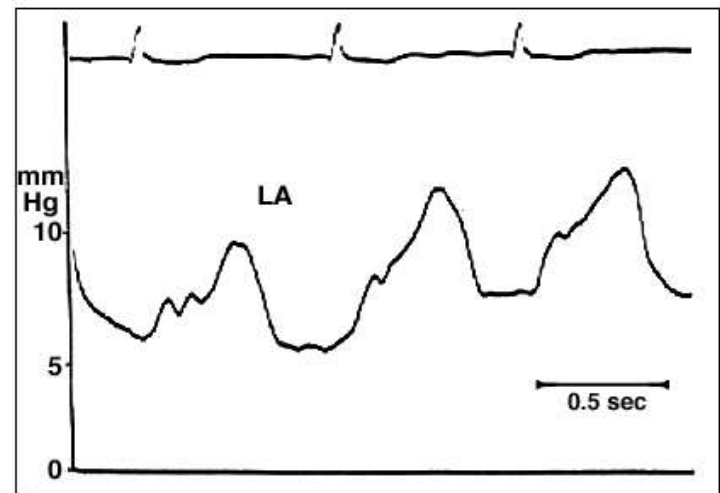
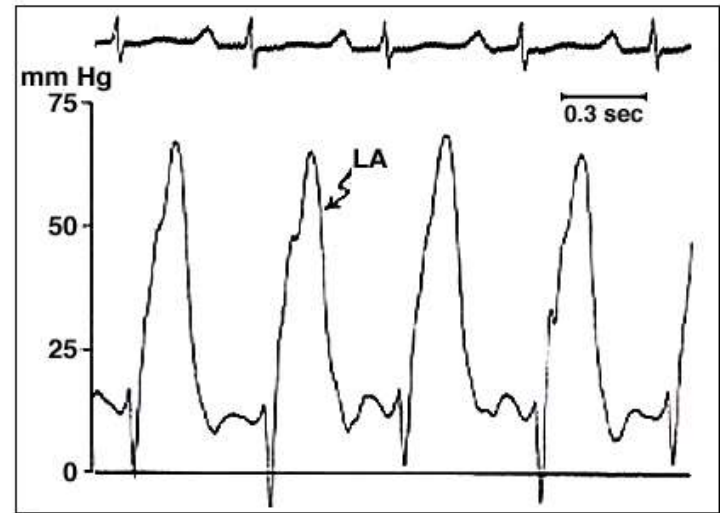
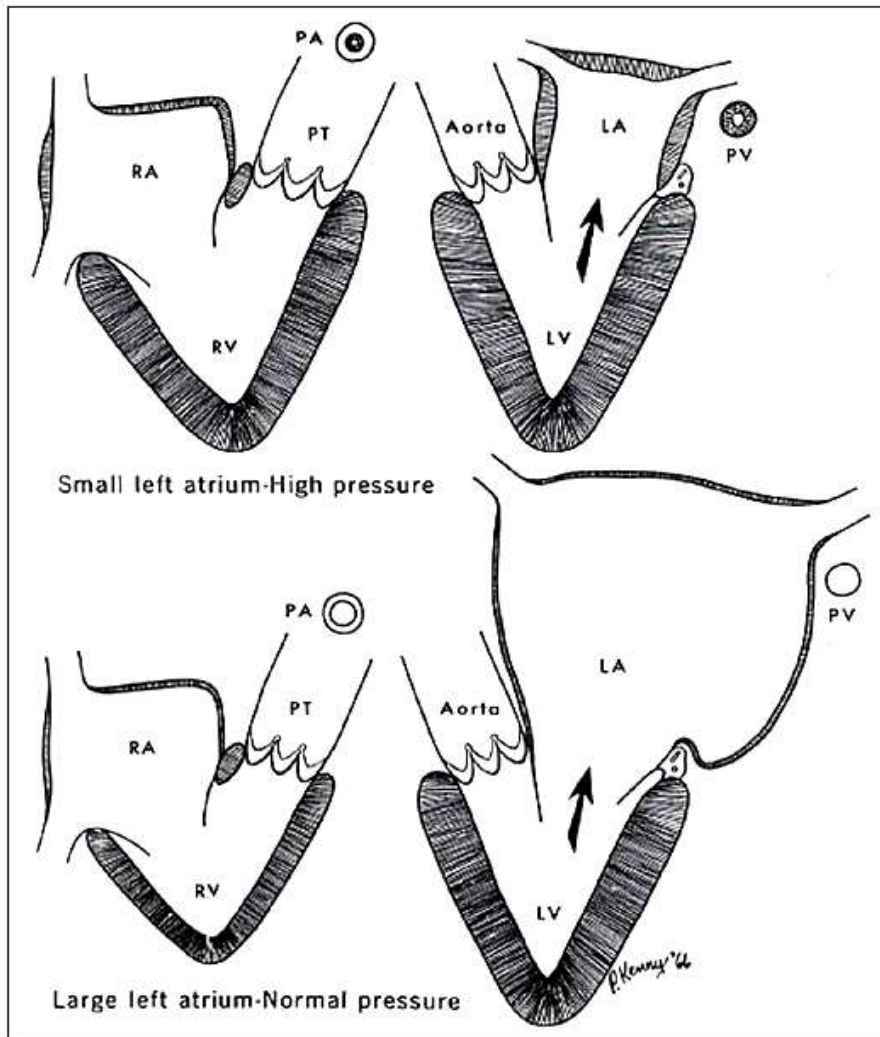
Acute MR

- the **LA** is relatively **small** and the high pressure within it is reflected back into the pulmonary vessels and RV.
- The latter physiological event is severe hypertrophy of the LA and RV walls, and marked intimal proliferation and medial hypertrophy of the pulmonary arteries (PA), arterioles, and veins (PV)

Chronic MR

- the **LA** cavity is of **giant** size and its wall is thin. It is thus able to “absorb” the LV pressure without reflecting it back into the pulmonary vessels or RV.
- As a consequence, pulmonary vessels remain normal and the RV wall does not thicken. PT = pulmonary trunk.

Two Extremes of the Spectrum of Mitral Regurgitation



Signs and Symptoms

Acute MR

- Symptoms Caused by pulmonary congestion (restdyspnea,orthopnea),
& *possible*
- signs of diminish forward flow,including cardiogenic shock

Chronic MR

Asymptomatic **Symptomatic:-**

Exercise intolerance & exertional dyspnea

Orthopnea &PND

Fatigue, diminish forward

COP.CHF

Long-standing MR:-

pulmonary Hypertensions with symptoms of RV failure

AF

Physical Finding



General

BP: Normal

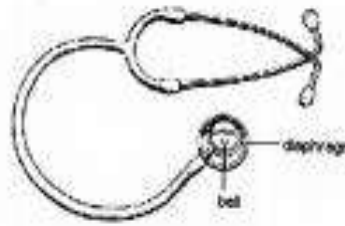
Arterial pulse: sharp upstroke in severe MR

JVP : prominent a wave (NSR with pulmonary HT), prominent v wave (severe TR)

Palpation:-

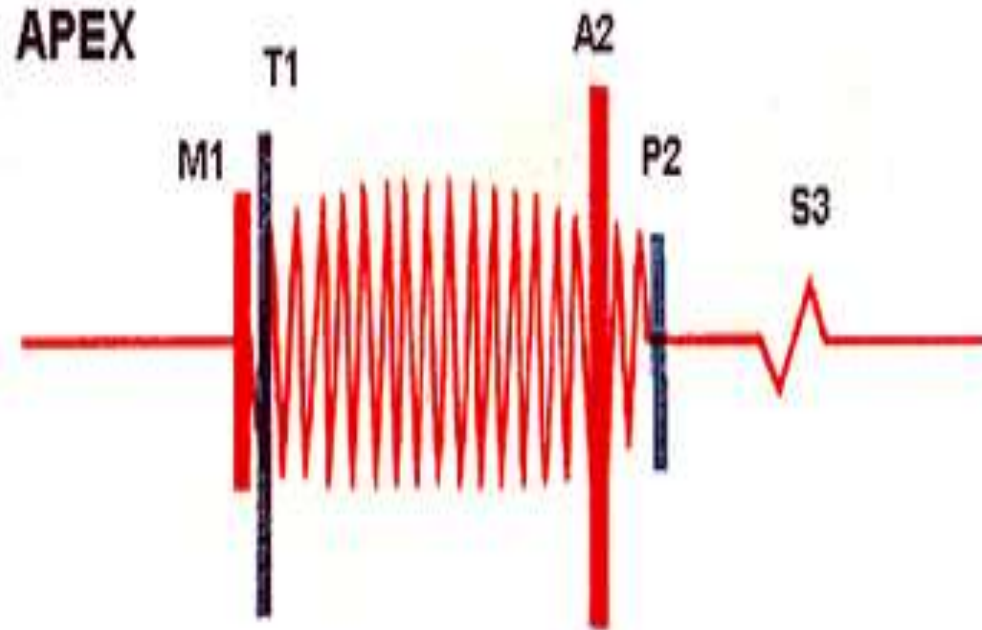
2) Systolic thrill at apex, hyperdynamic LV, laterally displaced apex beat
Brisk systolic impulse and palpable rapid-filling wave
Rocking motion of the chest with each cardiac cycle

Auscultation



- **S1** : soft, absent or buried in the systolic murmur
- **S2** : normal or wide splitting in severe MR

Pan systolic murmur radiating to axilla.



Soft S1
Wildly splitted S2
S3 in severe MR
Pansystolic murmur radiating to axilla

Assessing Severity of Chronic Mitral Regurgitation



Measure the Impact on the LV:

- Apical displacement and size
- Palpable S3
- Longer/louder MR murmur (chronic MR)
- S3 intensity/ length of diastolic flow rumble
- Wider split S2 (earlier A2) unless HPT narrows the split

Differential Diagnosis of holosystolic murmur.



✓ **MR**

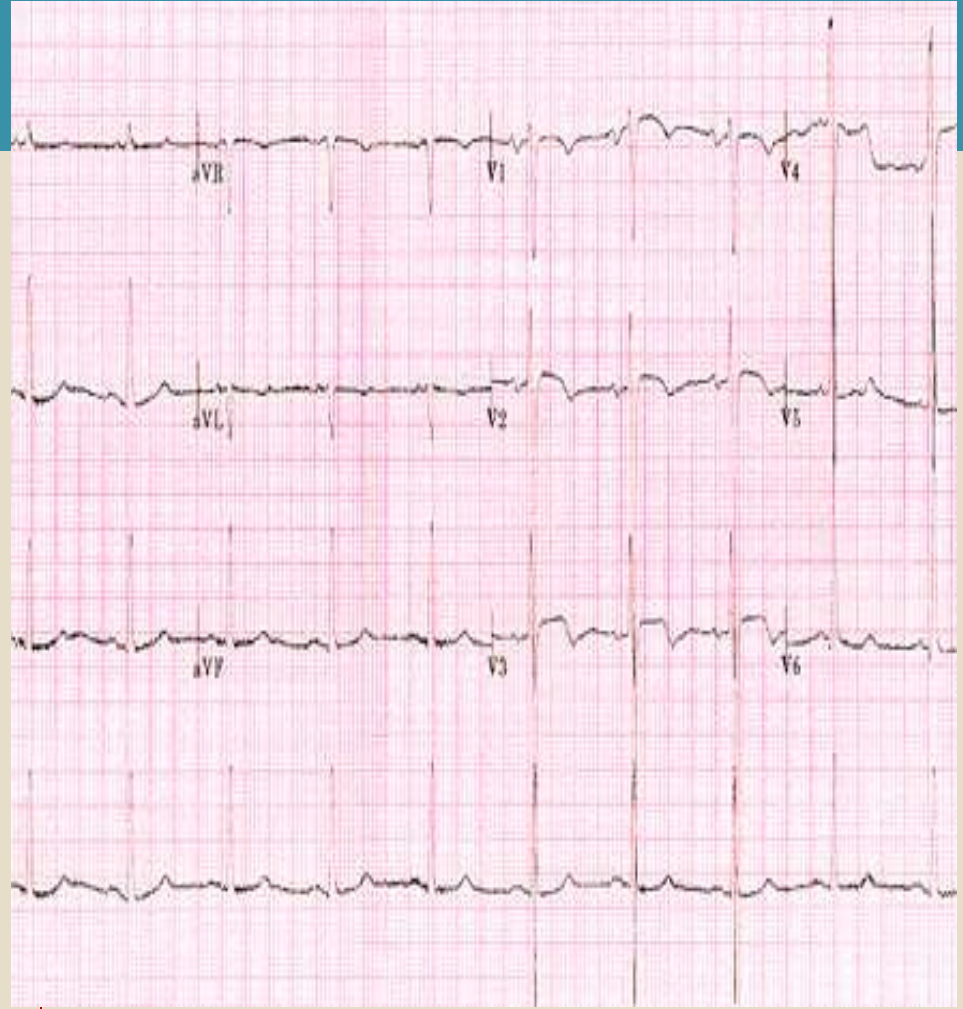
✓ **TR**

✓ **VSD**

Investigations

ECG

- LA enlargement
- Afib
- LVH (50% pts. With severe MR)
- RVH (15%)
- Combined hypertrophy (5%)





○ **CXR**

↑ LV

↑↑ LA

↑ pulmonary
vascularity

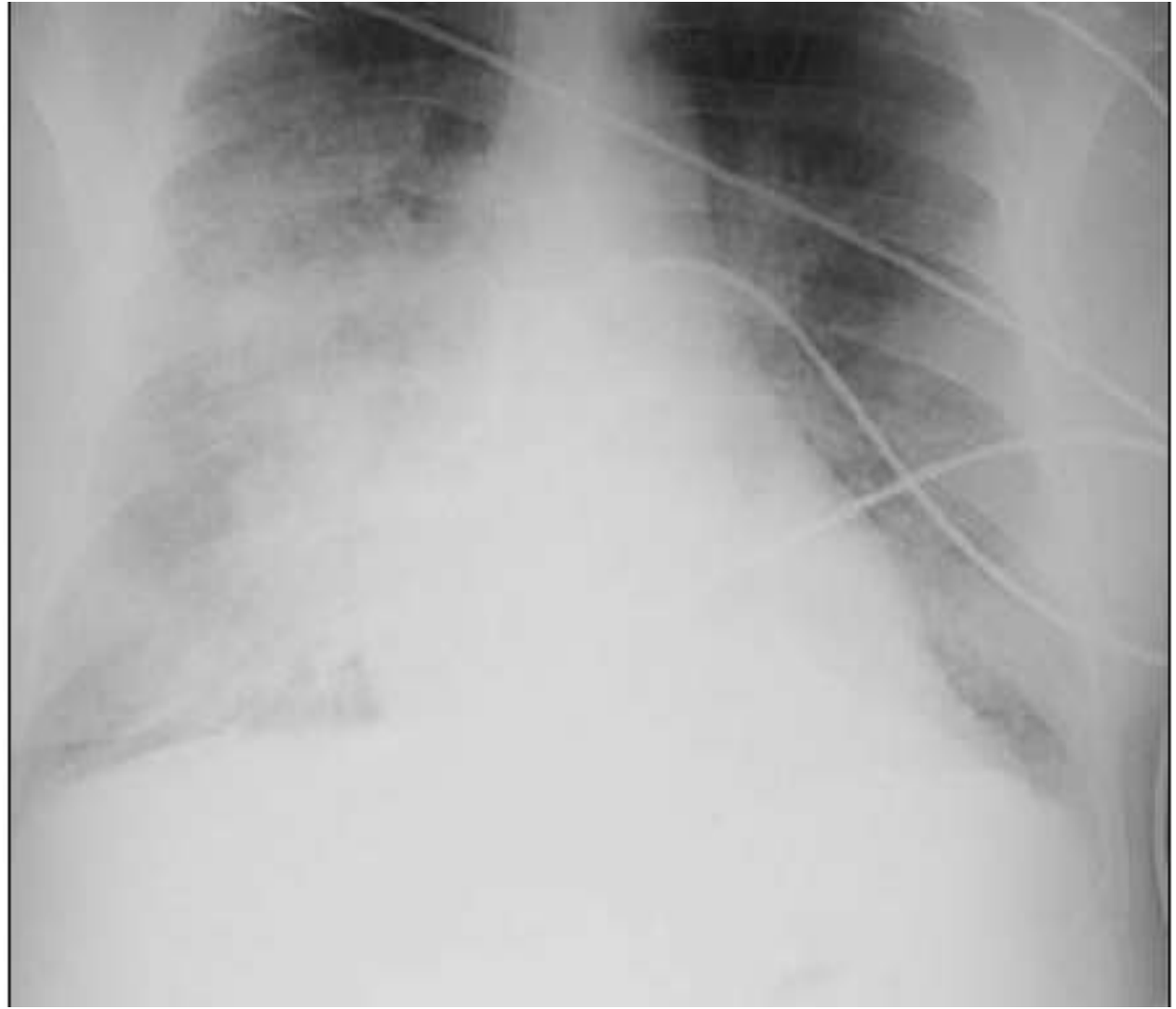
CHF

Ca++

MV/MAC

:

Investigations



Echocardiography



- Baseline evaluation to identify etiology, quantify severity of MR
- Assess and quantify LV function and dimensions
- Annual or semi-annual surveillance of LV function, estimated EF and LVEDD in asymptomatic severe MR
- To establish cardiac status after change in symptoms
- Baseline study post MVR or repair

Echocardiography

- Etiology:
 - flail leaflets (chord/pap rupture)
 - thick (RHD)
 - post mvt of leaflets (MVP)
 - vegetations(IE)
- Severity:
 - regurgitant volume/fraction/orifice area
 - LV systolic function
 - increased LV/LA size, EF

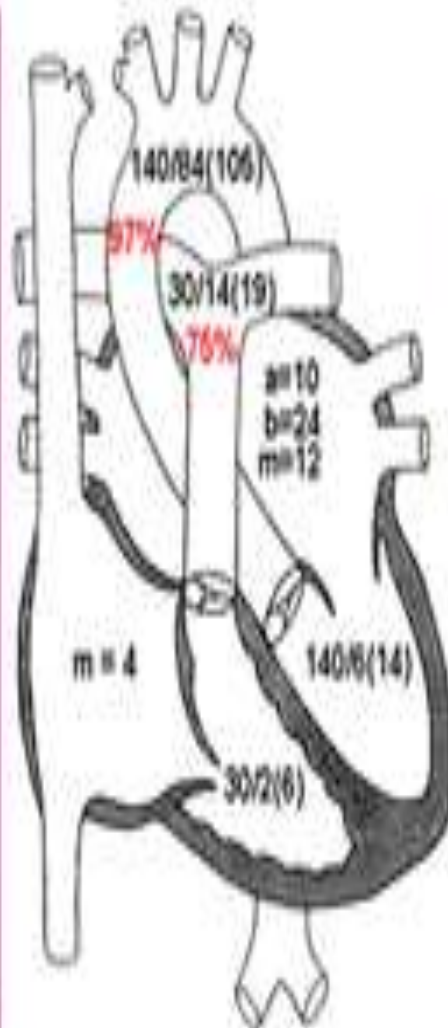
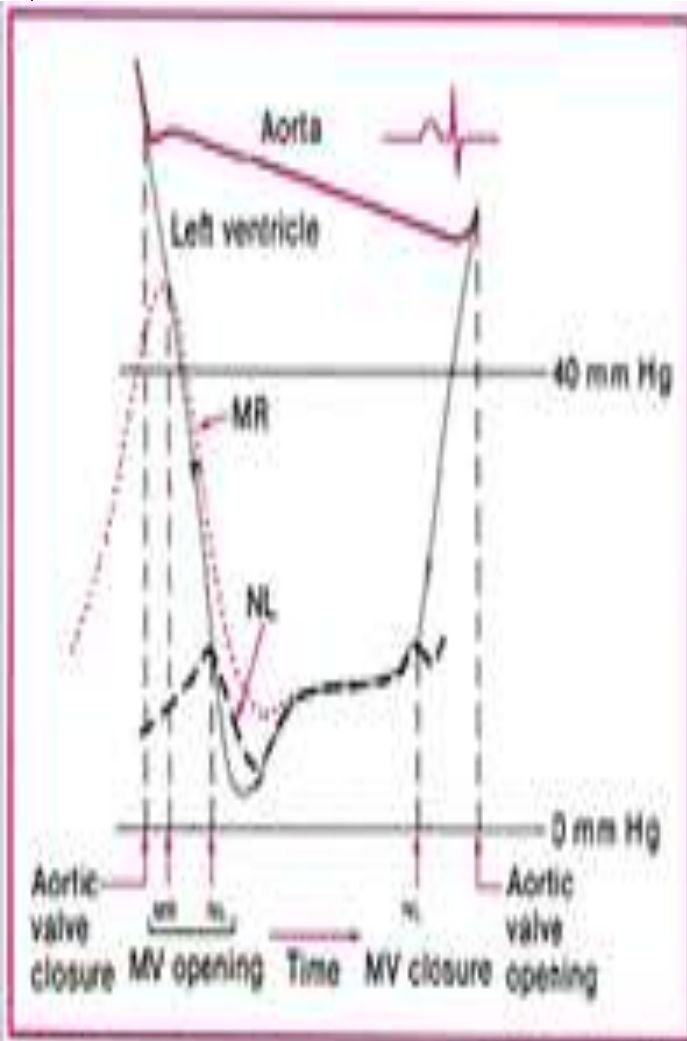


Cardiac catheterization and angiography

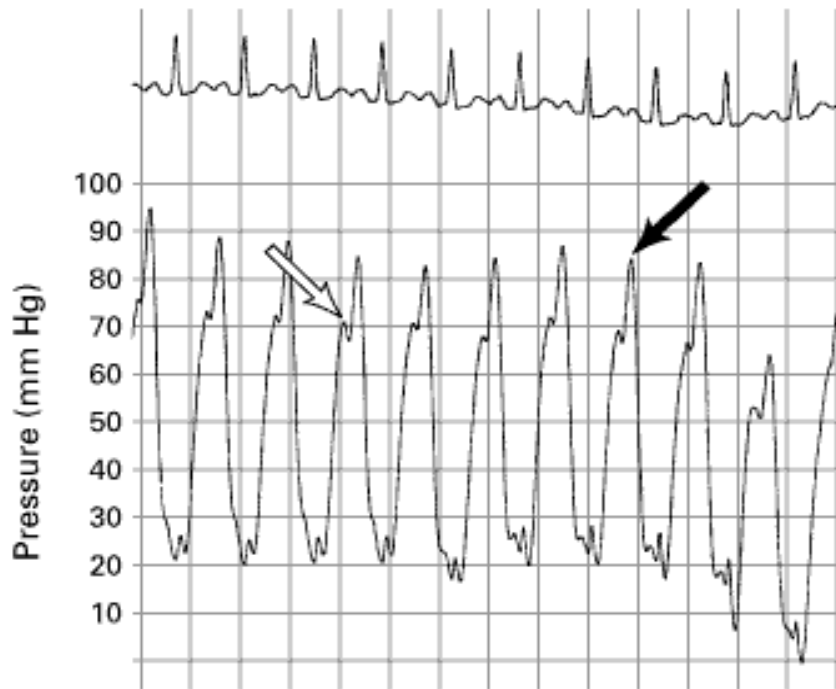


- 1-PCWP or LAP
 - slightly increased with prominent v wave
2. Early diastolic LA _ LV gradient
3. Left ventriculogram in the right anterior oblique view
 - dilated LV, Dilated LA, Mitral regurgitation

Cardiac catheterization and angiography

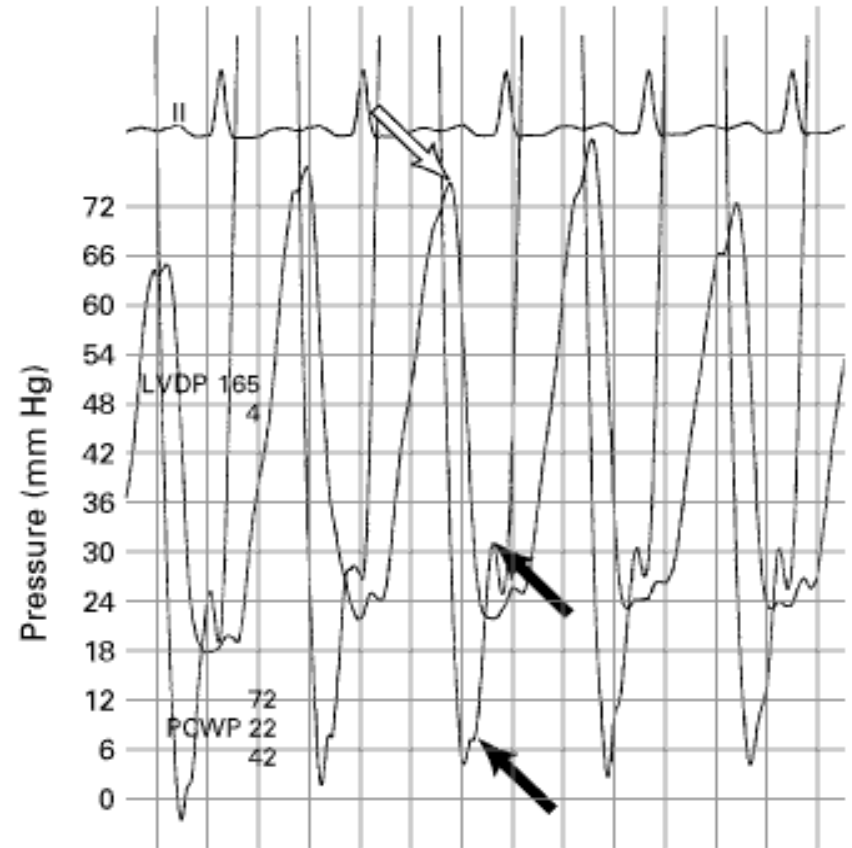


MR Pressure Tracing



RR interval, 556 msec
Timing, 0.04 sec
Paper speed, 50 mm/sec

A



RR interval, 560 msec
Timing, 0.04 sec
Paper speed, 50 mm/sec

B

Complications



- LVF (volume overload)
- systemic embolism (atrial clot) 40%
- subacute bacterial endocarditis
(mild MR associated with sinus rhythm
most susceptible of all lesions to
endocarditis)
- pulmonary hypertension

Treatment



MEDICAL & SURGICAL

Medical



- Treat LVF along conventional lines. ACE inhibitors particularly useful.
- nitrates can be used to treat angina but are less effective than in ischemic heart diseases
- prophylaxis against SBE
- Anticoagulate if in AF

Symptoms



- Class III or IV symptoms (even if transient) always indicate **need for surgery**
- Class II symptoms indicate **need for surgery** in patients with repairable valves
- **ETT** may reveal concealed symptoms

Mitral Valve Surgery



- Only effective treatment is valve repair/replacement
- Optimal timing determined:
 - Presence/absence of symptoms
 - Functional state of ventricle
 - Feasability of valve repair
 - Presence of Afib/PHTN
 - Preference/expectations of patient

Echo Indicators for Valve Replacement in Asymptomatic MR



- LVEDD mm > 45mm
- EF < 60 %
- FS < 0.32

Mitral Regurgitation

ACC/AHA recommendations



Surgery Recommended in patients who are

- Symptomatic
- Asymptomatic with
 - Any LV dysfunction
 - Atrial fibrillation
 - Pulmonary hypertension
 - Repairable valves
 - Recurrent VT

Post surgical follow –up care



- After reconstructive valve surgery, follow-up echocardiography studies have shown that more than 90% were free of significant MR.
- Overall results of reconstructive surgery were better in patients with FMV-MVP compared with rheumatic mitral disease.
- At follow-up, 95% of survivors had improved from NYHA functional class III or IV to functional class I or II.
-

Post surgical follow –up care



- At five years, 95% were free of thromboembolic complications in spite of the absence of long-term warfarin therapy.
- These factors may justify earlier operative intervention in patients with MR before permanent myocardial damage occurs.¹