

Mitral Stenosis



Mitral Stenosis



- **Epidemiology**
- **Etiology**
- **Symptoms**
- **Physical Exam**
- **Severity**
- **Natural history**
- **Timing of Surgery**

Epidemiology



- 4 times more common in females
- fully developed cases usually present >20 yrs

Etiology



- **Rheumatic heart disease-** 99% of cases
- **congenital:** frequently associated with other lesions causing LV outflow obstruction including AS, sub aortic stenosis, coarctation
- other rare causes:
calcified mitral valve ring, infective endocarditis (bulky vegetations may cause obstruction to flow), granulomatous infiltration in association with eosinophilia, SLE (treatment of Libman-Sachs endocarditis with steroids may lead to significant fibrosis with development of MS)

Pathophysiology

- Normal valve area:
4-6 cm².
- Mild mitral stenosis:
 - MVA 1.5-2.5 cm²
 - Minimal symptoms
- Mod mitral stenosis
 - MVA 1.0-1.5 cm² usually does not produce symptoms at rest
- Severe mitral stenosis
 - MVA < 1.0 cm²

Mitral Valve Stenosis

Looking Down on a Mitral Valve
with a Small Oval Aperture



The stenosis here is due to fusion of the commissures

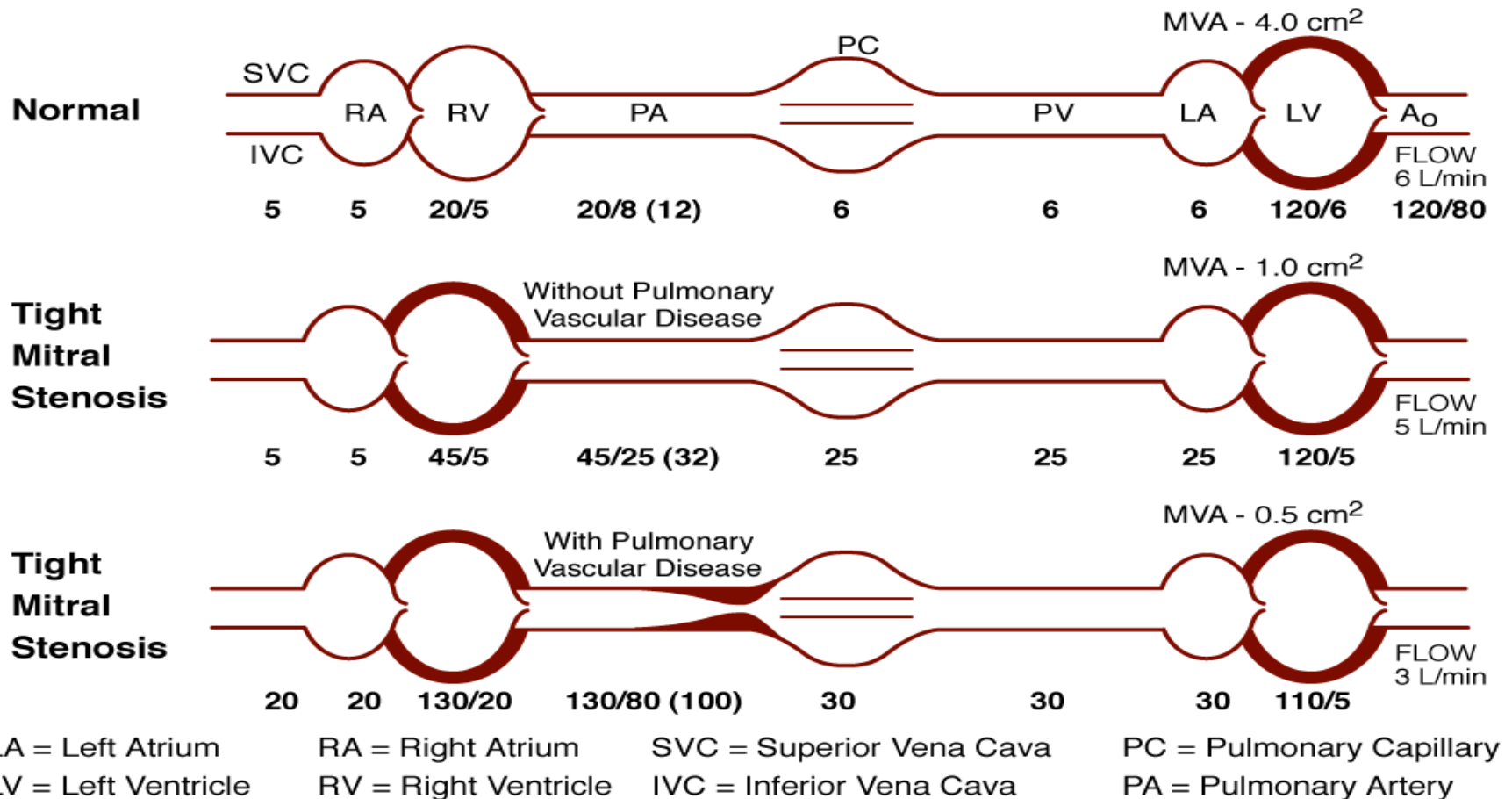
Hemodynamic



- **Raised LAP** and hence **PCP** results in decreased pulmonary compliance, pulmonary edema and haemoptysis .
- **Persistently raised LAP** leads to reactive **pulmonary hypertension**. in late stages **RVF** occurs. Further reduces forward flow. Also LV distorted by bulging RV.
- **Raised LAP** results in **LA dilatation** and **AF**.
- Development of AF and loss of atrial contraction results in a marked deterioration of hemodynamic function and may lead to an exacerbation of **pulmonary oedema**.
(Pregnancy and infection may also precipitate decompensation)
- LV dysfunction occurs in 1/4 of patients with severe MS. May be result of extension of scarring into myocardium and chronic reduction of preload.
- low cardiac output in severe cases .

Hemodynamic

Hemodynamic Changes in Mitral Stenosis With and Without Pulmonary Vascular Disease



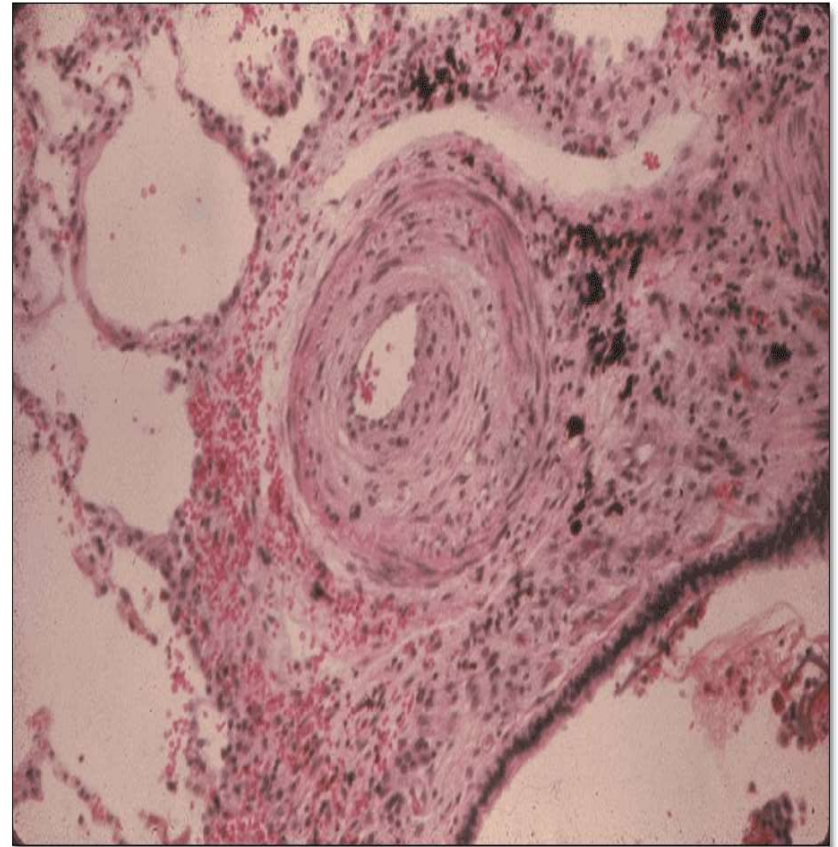
Hemodynamic



- With long-standing elevation of the pulmonary venous pressure, **anatomical** changes in the pulmonary arterioles consisting of medial hypertrophy, intimal proliferation, and fibrosis lead to a significant decrease in the cross-sectional area of the pulmonary vascular bed.

This, in turn, leads to a **significant increase in pulmonary vascular resistance**, markedly **increasing RV and pulmonary artery pressure**.

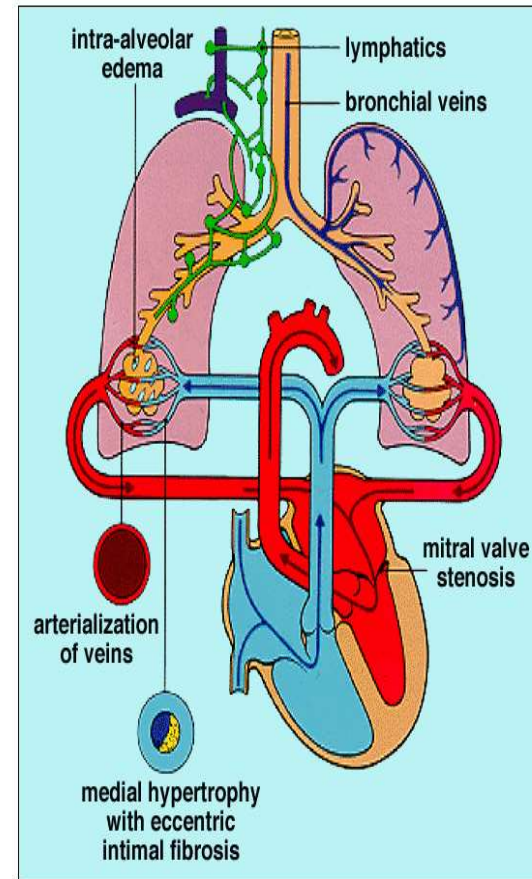
Pulmonary Vascular Changes in Severe Mitral Stenosis



Hemodynamic.....

- Note the significant increase in both lymphatic drainage as well as the development of an engorged systemic bronchial venous circulation.
- Brisk hemoptysis may occur when these engorged bronchial veins rupture.

Hemodynamic Consequences of Elevated Pulmonary Venous Pressure in Mitral Stenosis



Symptoms

- Fatigue
- Palpitations
- Cough
- SOB
- Palpitation

- A fib
- Systemic embolism
- Pulmonary infection
- Hemoptysis
- Right sided failure
 - Hepatic Congestion
 - Edema
- Worsened by conditions that ↑ cardiac output.
 - Exertion, fever, anemia, tachycardia, Afib, intercourse, pregnancy, thyrotoxicosis

Signs

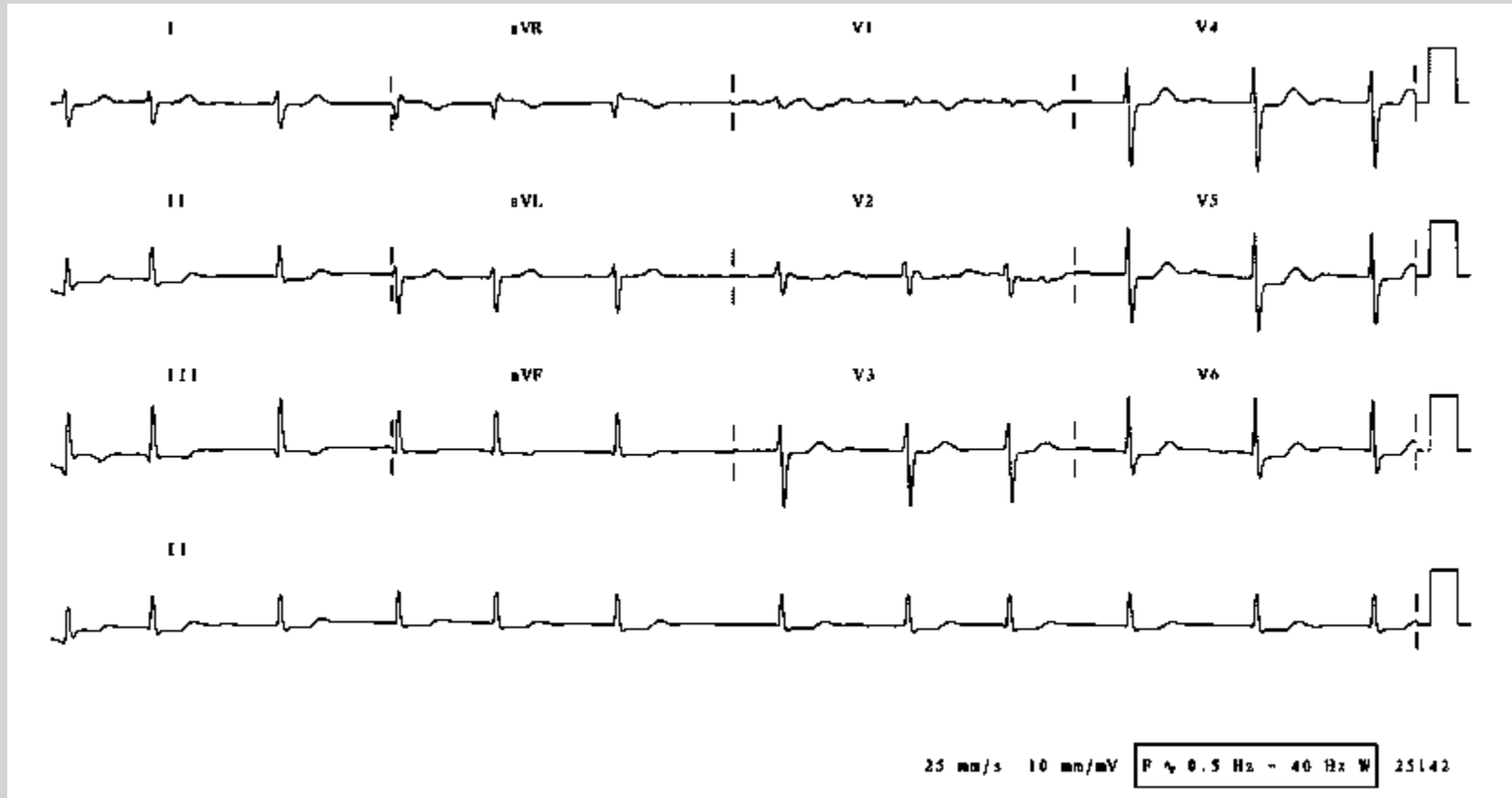
Palpation:

- Small volume pulse
- Tapping apex-palpable S1
- +/- palpable opening snap (OS)
- RV lift
- Palpable S2

Auscultation:

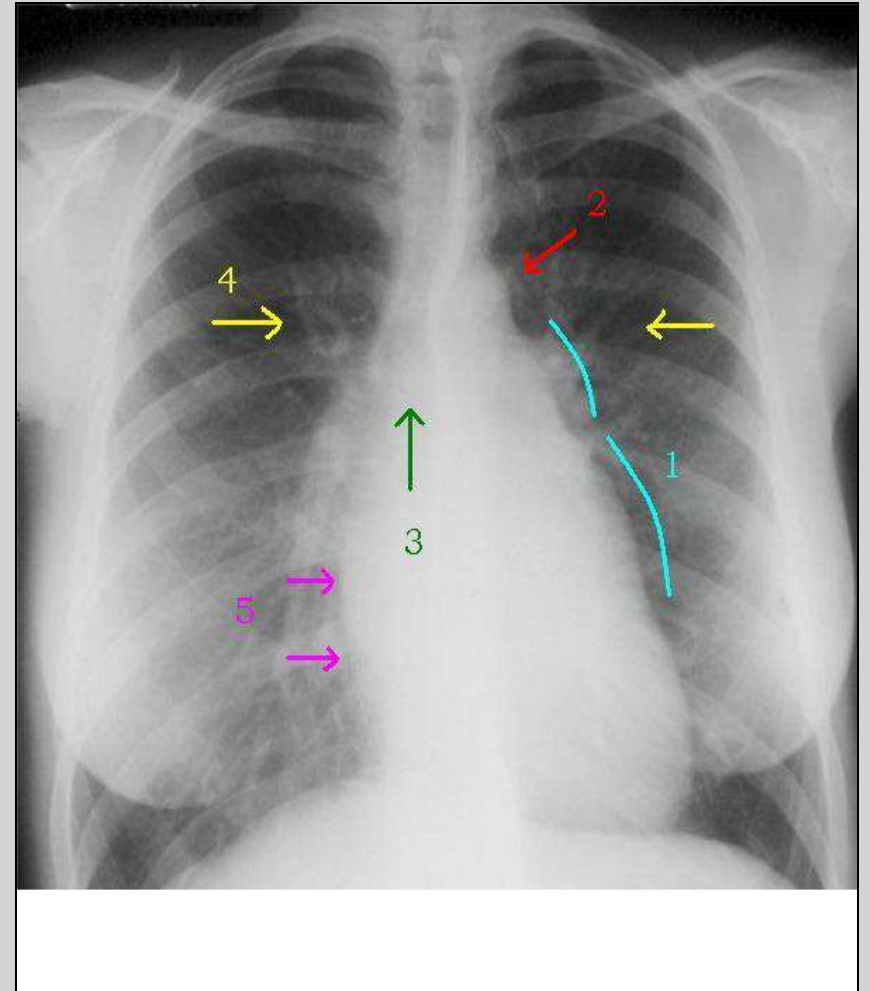
- Loud S1- as loud as S2 in aortic area
- A2 to OS interval inversely proportional to severity
- Diastolic rumble: length proportional to severity
- In severe MS with low flow- S1, OS & rumble may be inaudible

ECG: LAE, AFIB, RVH, RAD



CXR:-

- Enlarged LA and LA appendage
- upper lobe blood diversion
- \pm pulmonary edema



Timing of A2 to OS Interval



- Width of A2-OS inversely correlates with severity.
- The more severe the MS the higher the LAP the earlier the LV pressure falls below LAP and the MV opens.

- First heart sound (**S1**) is accentuated and snapping
- Opening snap (**OS**) after aortic valve closure
- Low pitch **diastolic** rumble at the apex
- Pre-systolic accentuation (esp. if in sinus rhythm)

Natural History



- Progressive, lifelong disease,
- Usually slow & stable in the early years.
- Progressive acceleration in the later years
- 20-40 year latency from rheumatic fever to symptom onset.
- Additional 10 years before disabling symptoms

Complications



- Atrial dysrrhythmias
- Systemic embolization (10-25%)
 - Risk of embolization is related to, age, presence of atrial fibrillation, previous embolic events
- Congestive heart failure
- Pulmonary infarcts (result of severe CHF)
- Hemoptysis
 - Massive: 2^o to ruptured bronchial veins (pulm HTN)
 - Streaking/pink froth: pulmonary edema, or infection
- Endocarditis
- Pulmonary infections

Role of Echocardiography



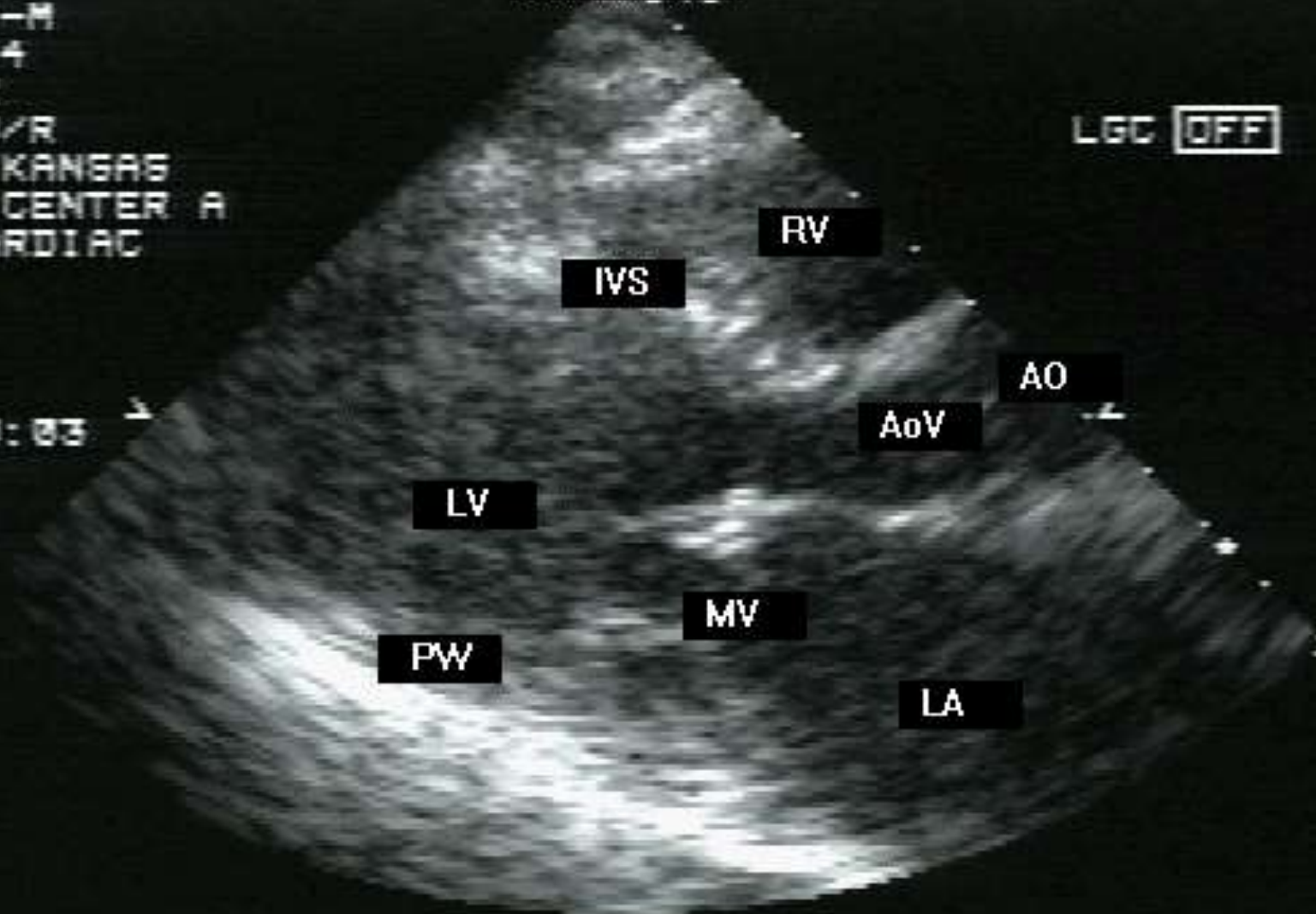
- Diagnosis of Mitral Stenosis
- Assessment of hemodynamic severity
 - mean gradient, mitral valve area, pulmonary artery pressure
- Assessment of right ventricular size and function.
- Assessment of valve morphology to determine suitability for percutaneous mitral balloon valvuloplasty
- Diagnosis and assessment of concomitant valvular lesions
- Reevaluation of patients with known MS with changing symptoms or signs.
- F/U of asymptomatic patients with mod-severe MS

ANTERIOR

2.0-M
28 SEP 94
14:32:22
PROC 2/0/R
UNIV OF KANSAS
MEDICAL CENTER A
ADULT CARDIAC

LGC OFF

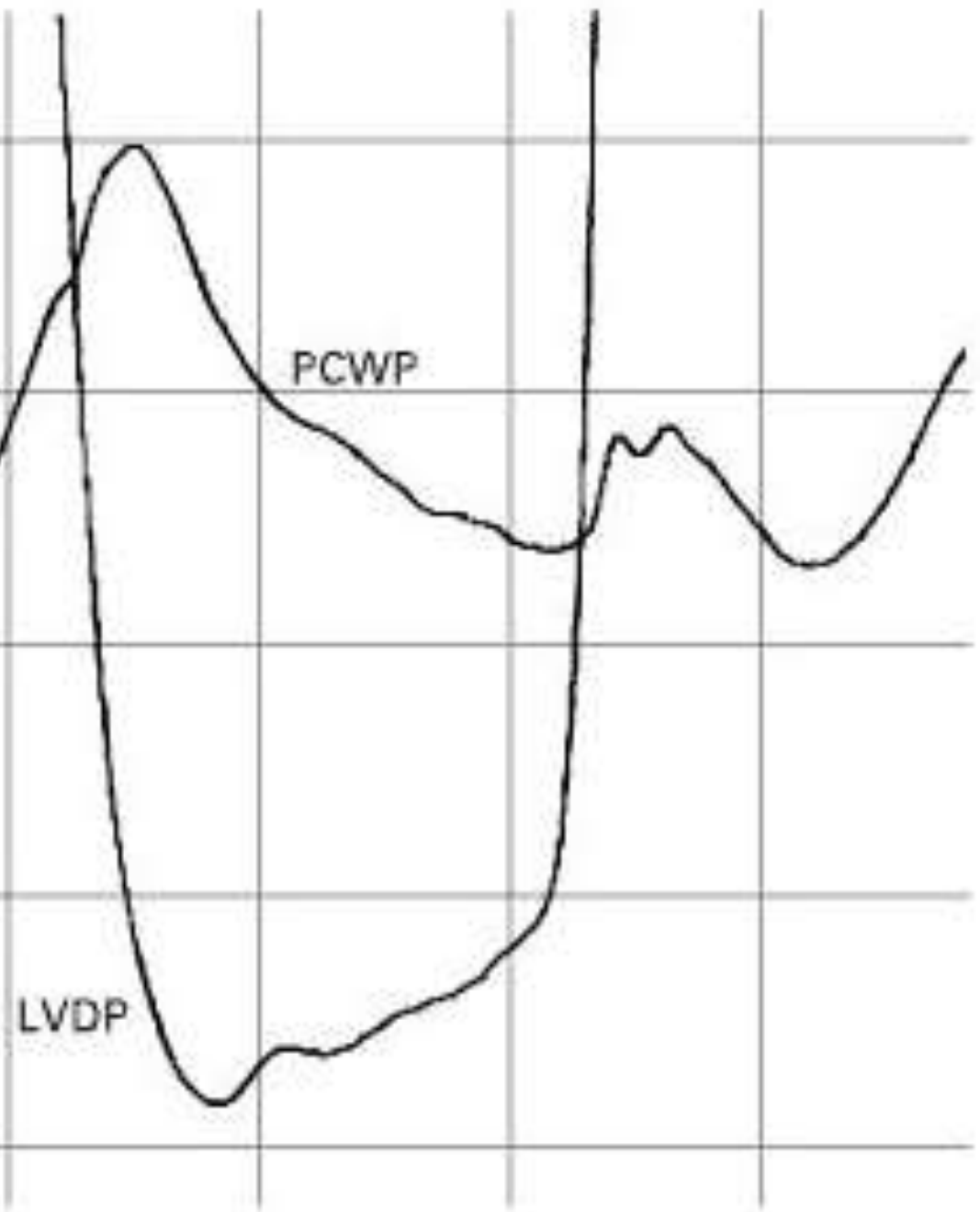
09158:03
50MM/S
XMIT:A
68BPM
12CM
34HZ



C

Pressure (mm Hg)

48
36
24
12
0



PCWP

LVDP

Therapy

Medical

Diuretics for LHF/RHF

Digitalis/Beta
blockers/CCB: Rate
control in A Fib

Anticoagulation: In A Fib

Endocarditis prophylaxis

Balloon valvuloplasty

Effective long term
improvement

• Surgical

○ Mitral commissurotomy

○ Mitral Valve
Replacement

✦ Mechanical

✦ Bioprosthetic

Indications for surgery



- significant symptoms which limit normal activity
- pulmonary oedema without precipitating cause
- recurrent emboli
- pulmonary oedema in pregnancy (emergency valvotomy)
- deterioration due to AF which does not respond to medical treatment
- valve cross-sectional area $<1.3 \text{ cm}^2$ (valvotomy) or $<1 \text{ cm}^2$ if there is a possibility that valve replacement may be required