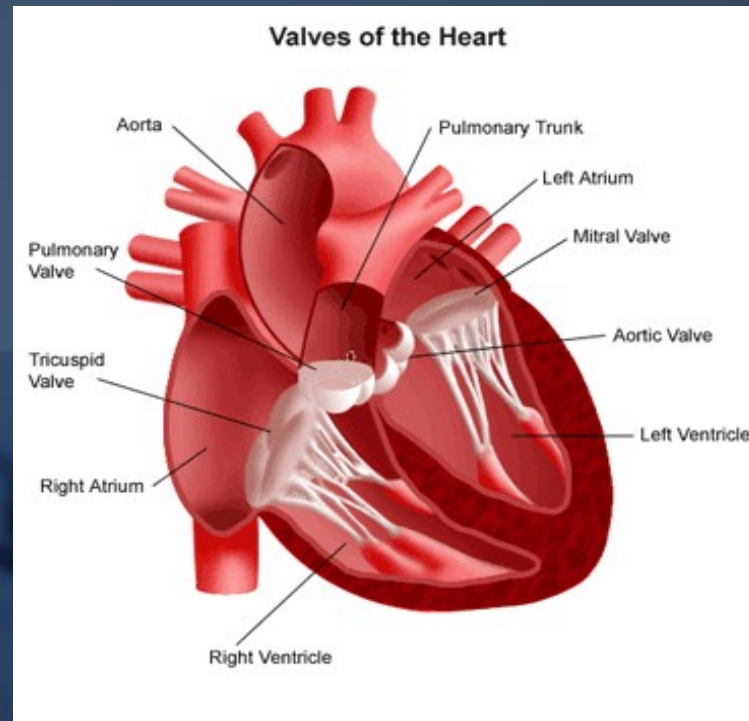
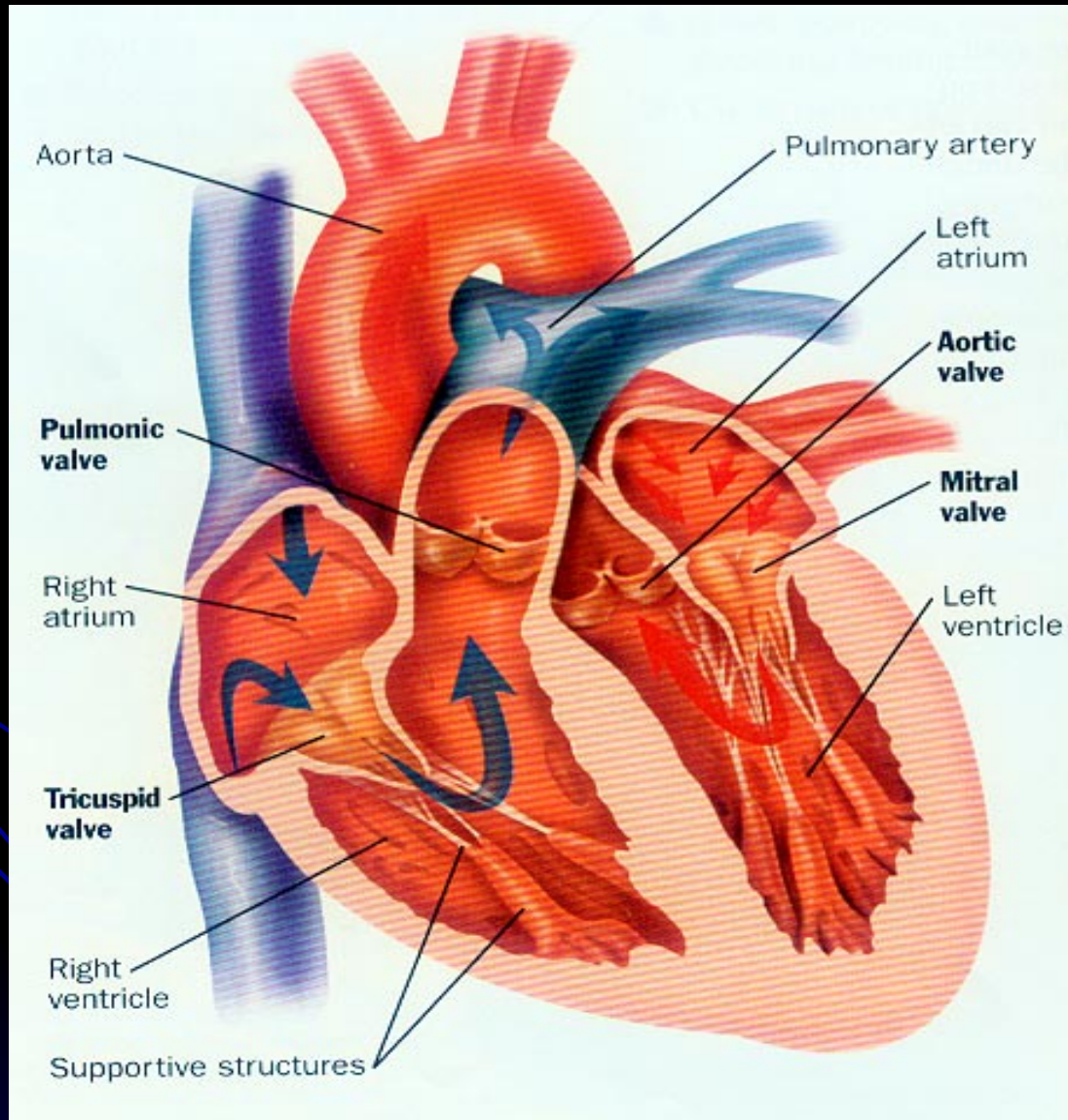


Valvular Heart Diseases

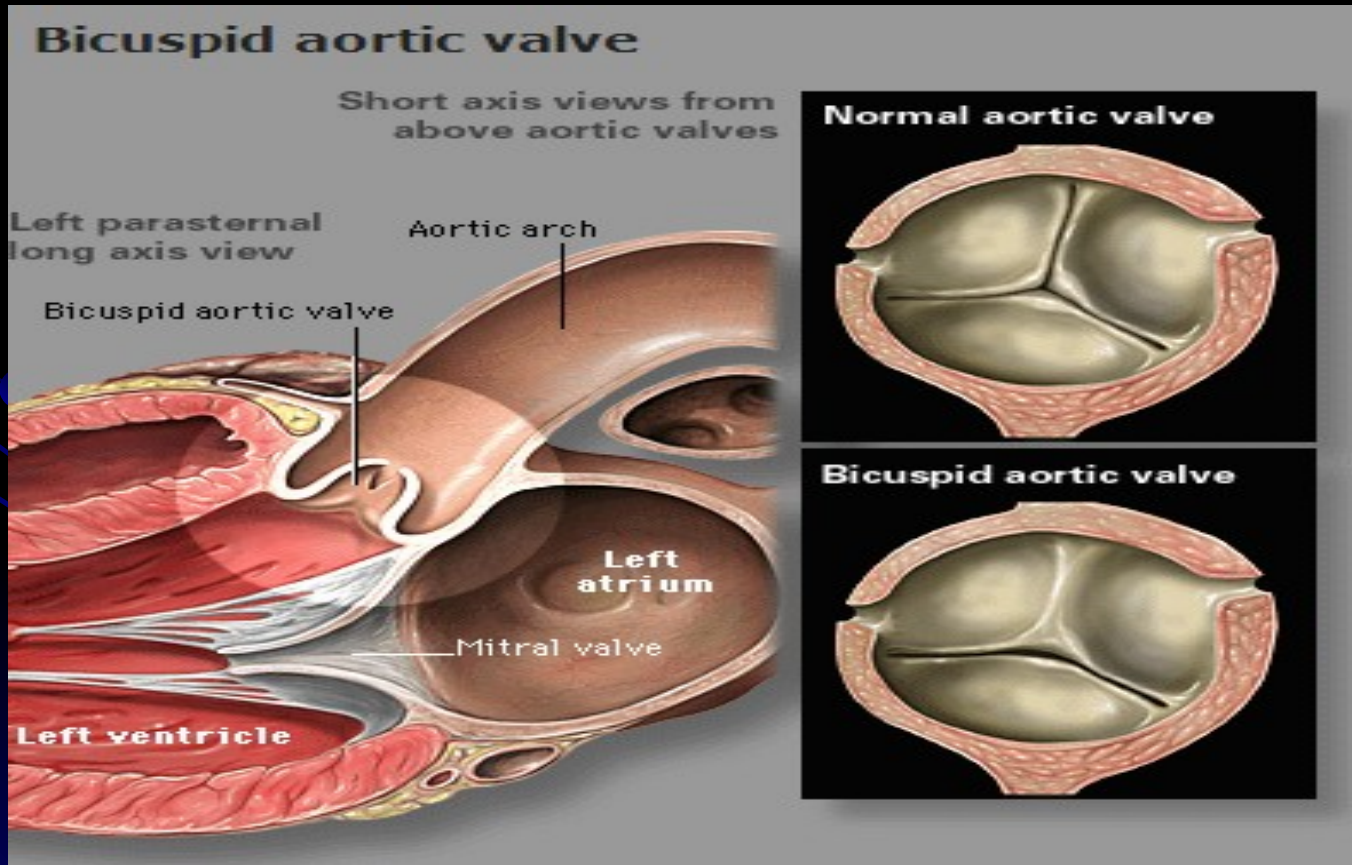


ALL cardiac valves can be involved in pathological processes



Etiology

- **Congenital :**
 - Bicuspid or unicuspid .
 - Subvalvular or supra-valvular .



Etiology - continue

- **Acquired :**

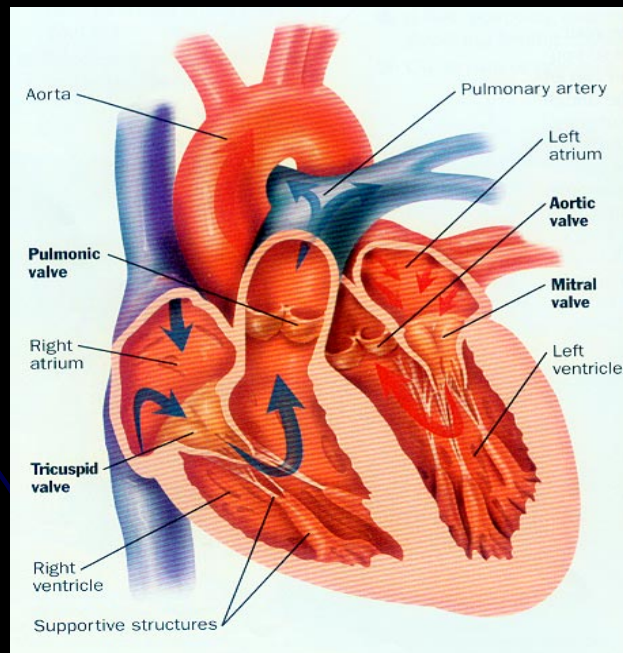
- Rheumatic .
- Degeneration .
 - myxomatous
 - calcification
- Ischaemic .
- Infective Endocarditis .
- Valve ring dilatation .

TYPES of Presentations

- **Acute Presentation :**

- Acute mitral regurgitation due to
eg acute myocardial infarction

- acute chordae tendineae rupture



TYPES of Presentations

- **Chronic Presentation :**

- Chronic mitral regurgitation due to
eg RHRUMATIC fever .

- Mitral valve Prolapse .

- Chronic aortic regurgitation due to
eg Bicuspid Aortic valve .

HEAMODYNAMICS Consequences

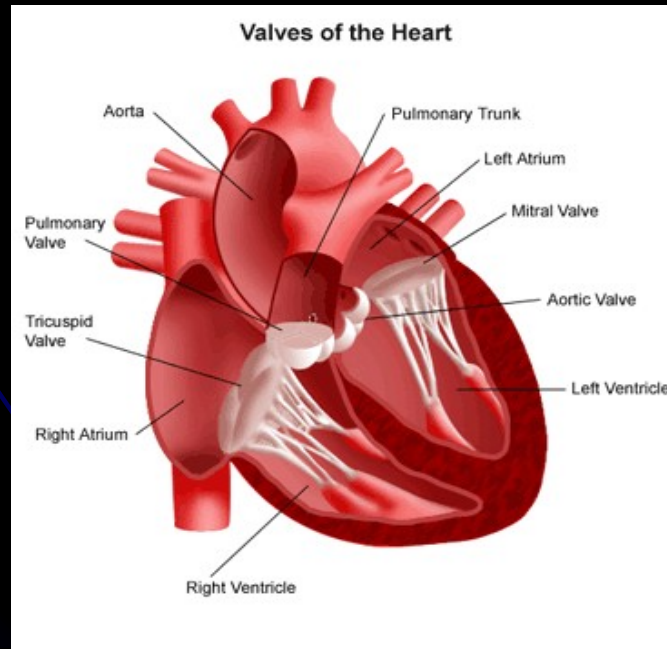
- Pressure Overload :

- Aortic stenosis

- Left Ventricular hypertrophy

- Mitral stenosis

- Left Atrial hypertrophy & dilatation



HEAMODYNAMICS Consequences

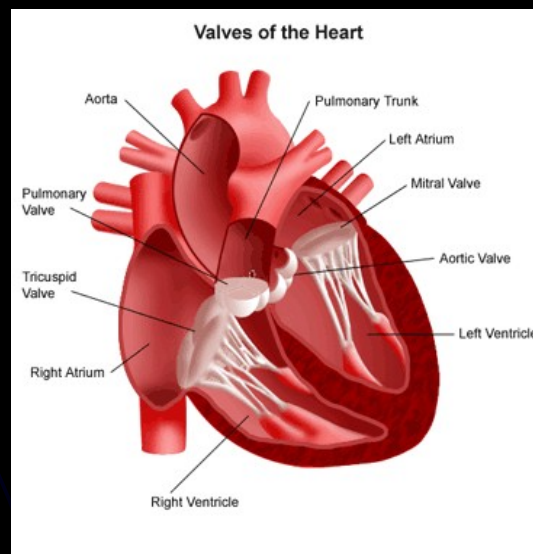
- **Volume Overload :**

- chronic mitral regurgitation

- dilated left ventricle & left atria

- chronic tricuspid regurgitation

- dilated right ventricle & right atria

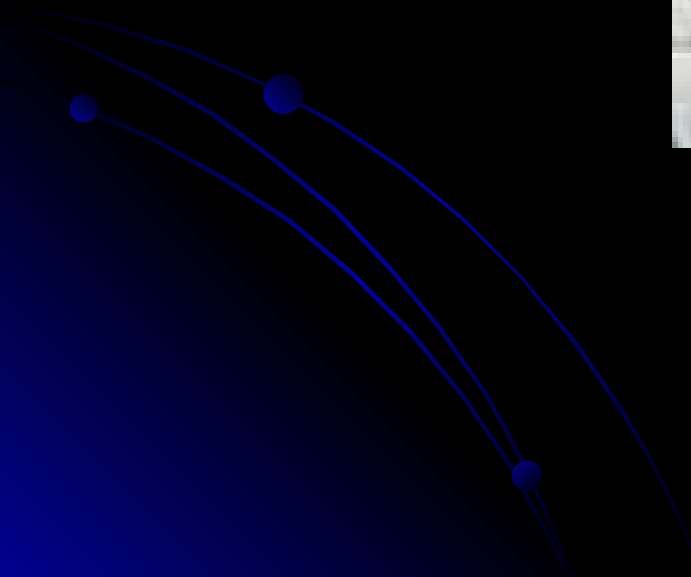


SYMPTOMS

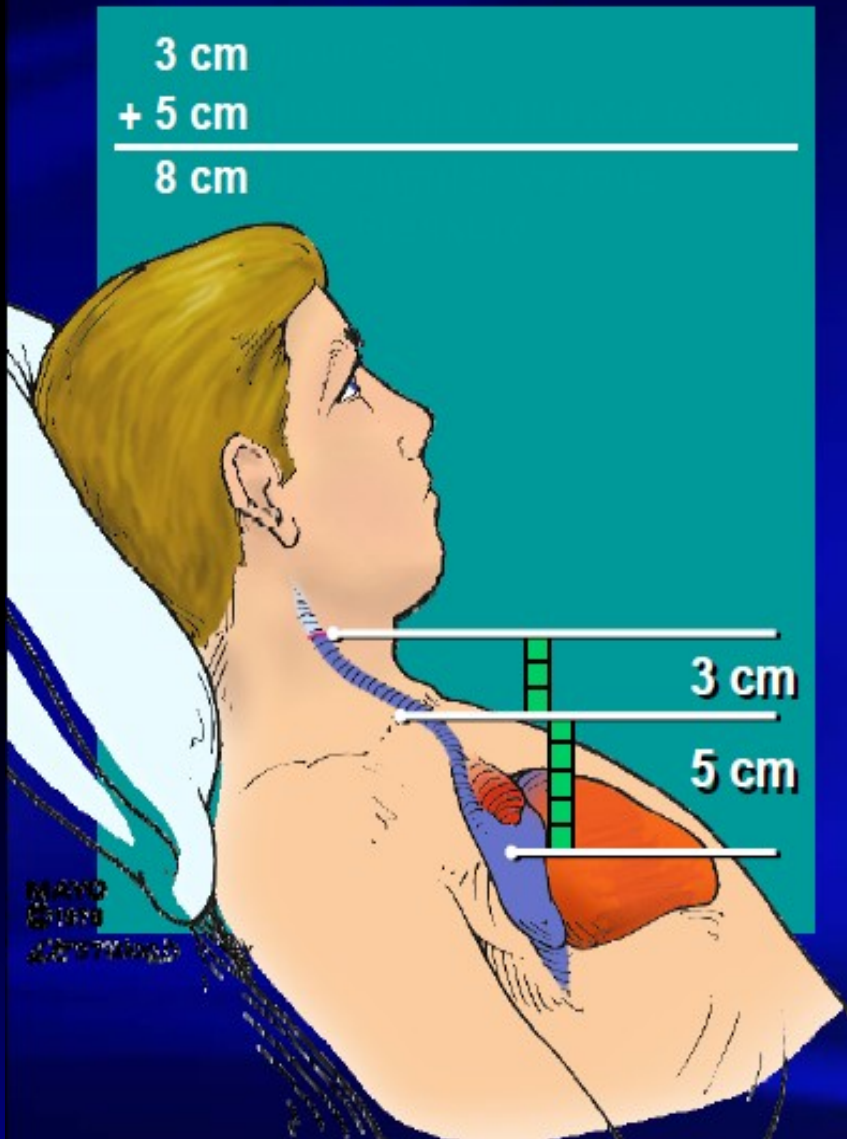
- Dyspnea , paroxysmal nocturnal dyspnea orthopnea .
- Palpitation .
- Chest pain .
- Dizziness , prefainting ,syncope .
- Oedema , Ascites
- Cough .
- Fatigue
- Hemoptysis
- Symptoms of thromboembolic complication .

Signs of Valvular Diseases

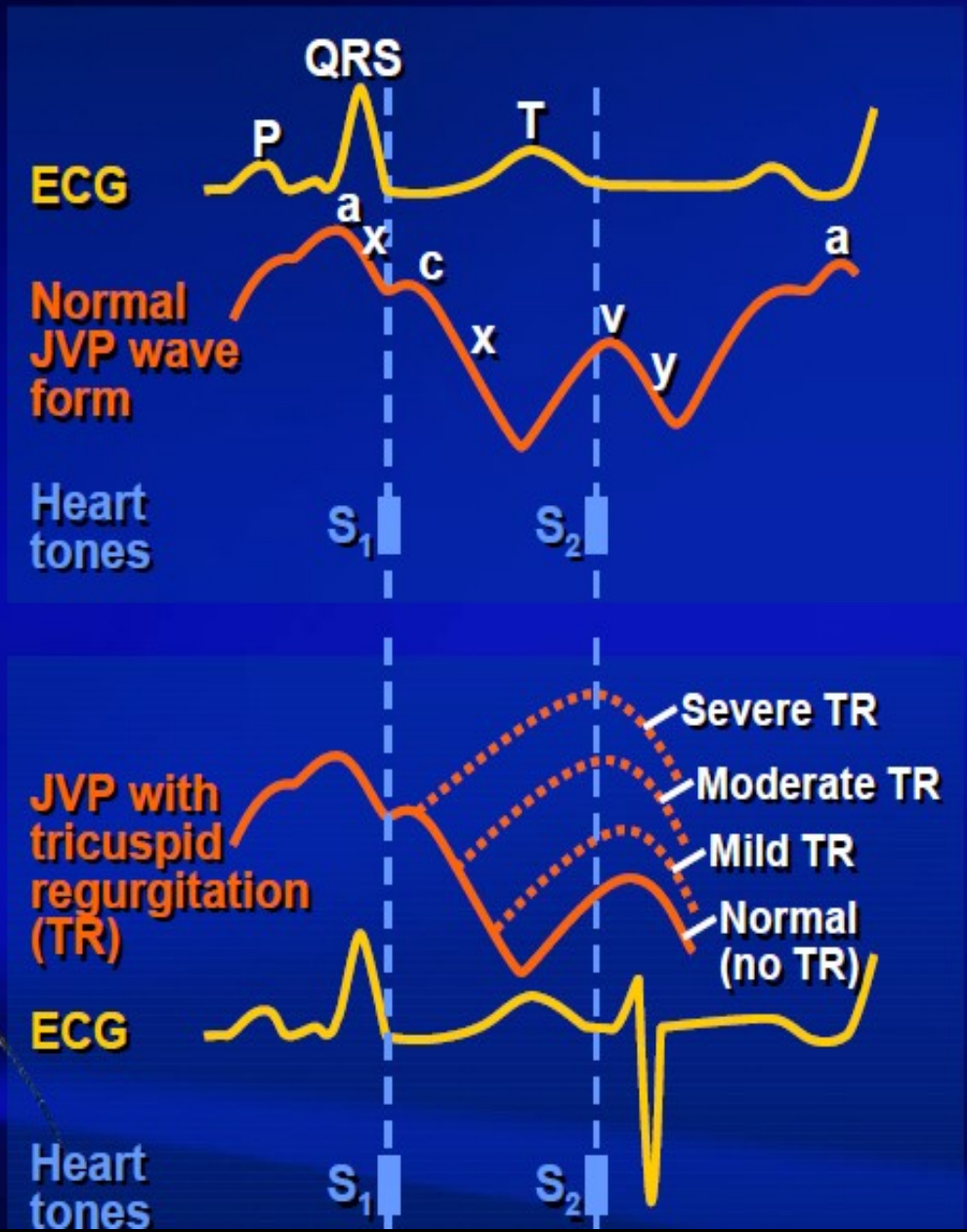
- Abnormal look (mitral facies) .
- Abnormal pulse (Atrial fibrillation) .
- Abnormal JVP
- Apex beat abnormality .
- Sternal or parasternal heave .
- Thrill .
- Abnormal heart sound .
- MURMURS .
Systolic or Diastolic .



Jugular Venous Pulsation Evaluation



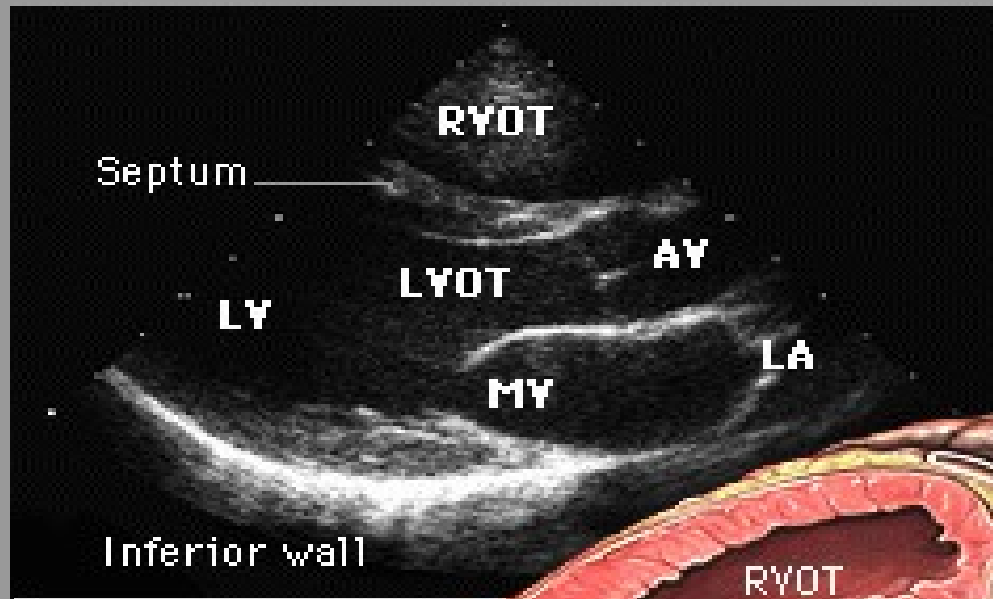
Adapted from
Constant: Bedside Cardiology 4th ed. 1994



INVESTIGATION

- ECG .
- CXR .
- Echo cardiology .
M mode , 2D ,3D . 4 D . TEE .
Doppler .
- 24 hours monitor for heart rhythm .
- MRI .
- Cardiac catheterization .

Left parasternal long axis view



Septum

LY

LYOT

MY

AY

LA

Inferior wall

Septum

Apex

Papillary muscles

Inferior wall

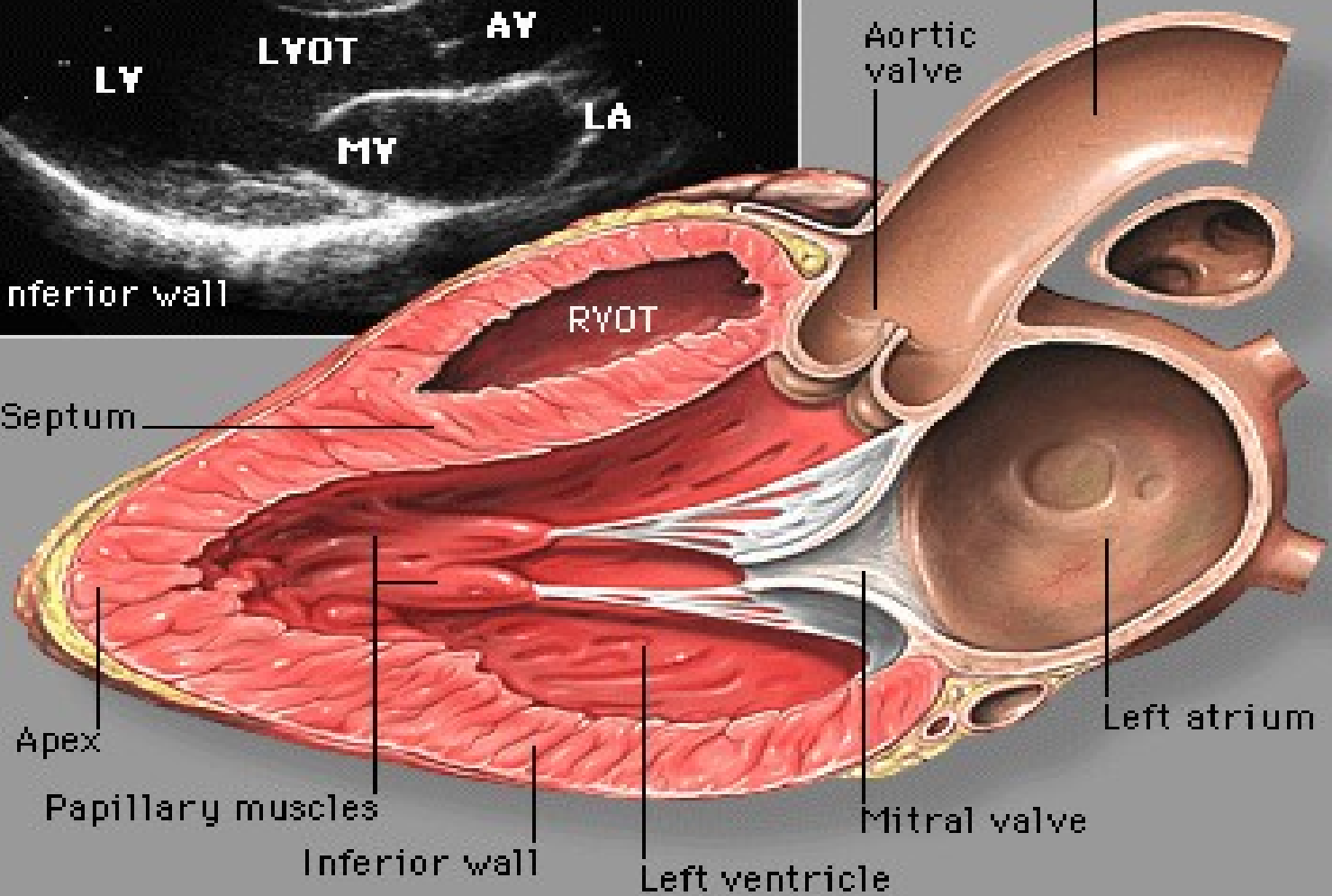
Left ventricle

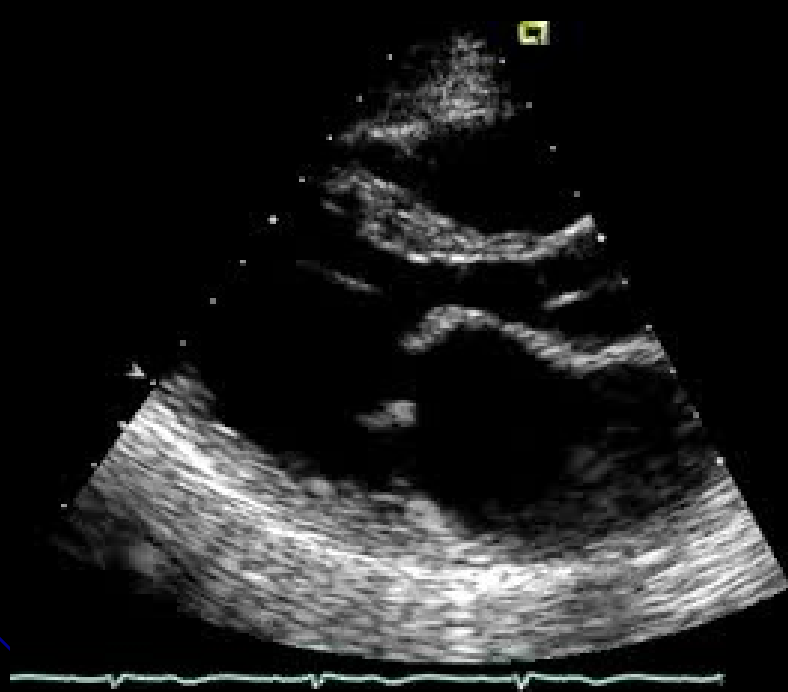
Aortic valve

Aortic arch

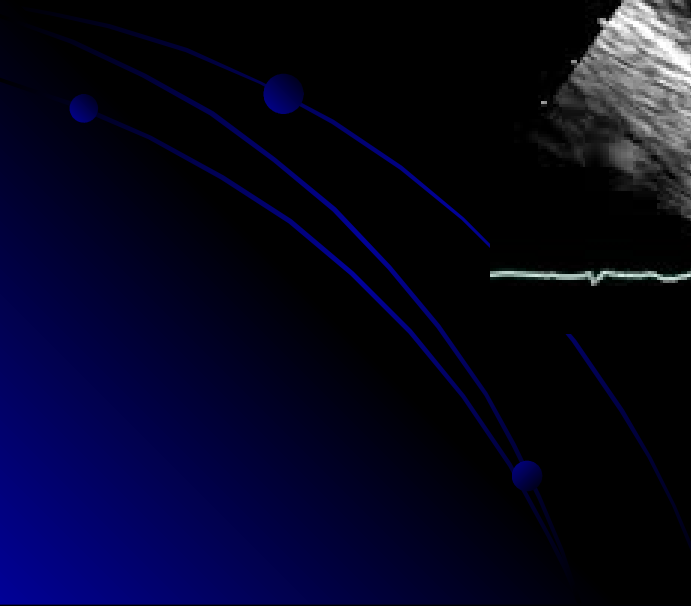
Left atrium

Mitral valve





3V2c
H3.5MHz
ECHO
General
55dB 51/
Gain= 8dB
Store in prog
HR= 70bpm

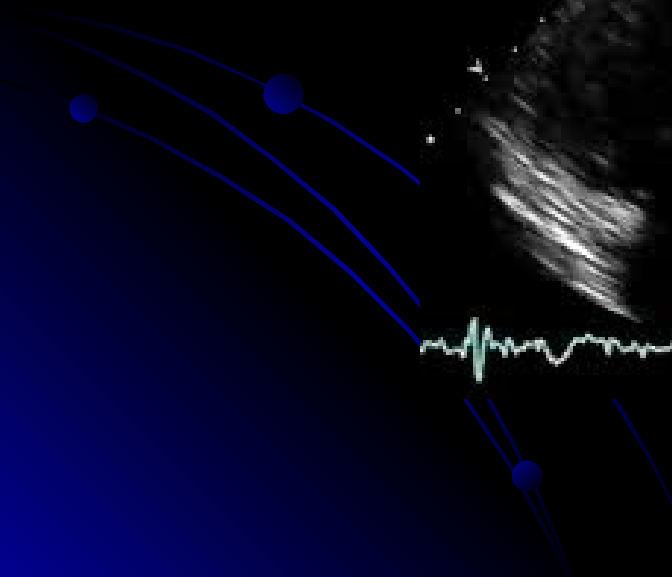




2.5MHz
ECHO

50dB S1/+
Gain= 18dB

Store in prog
1
HR= 40bpm



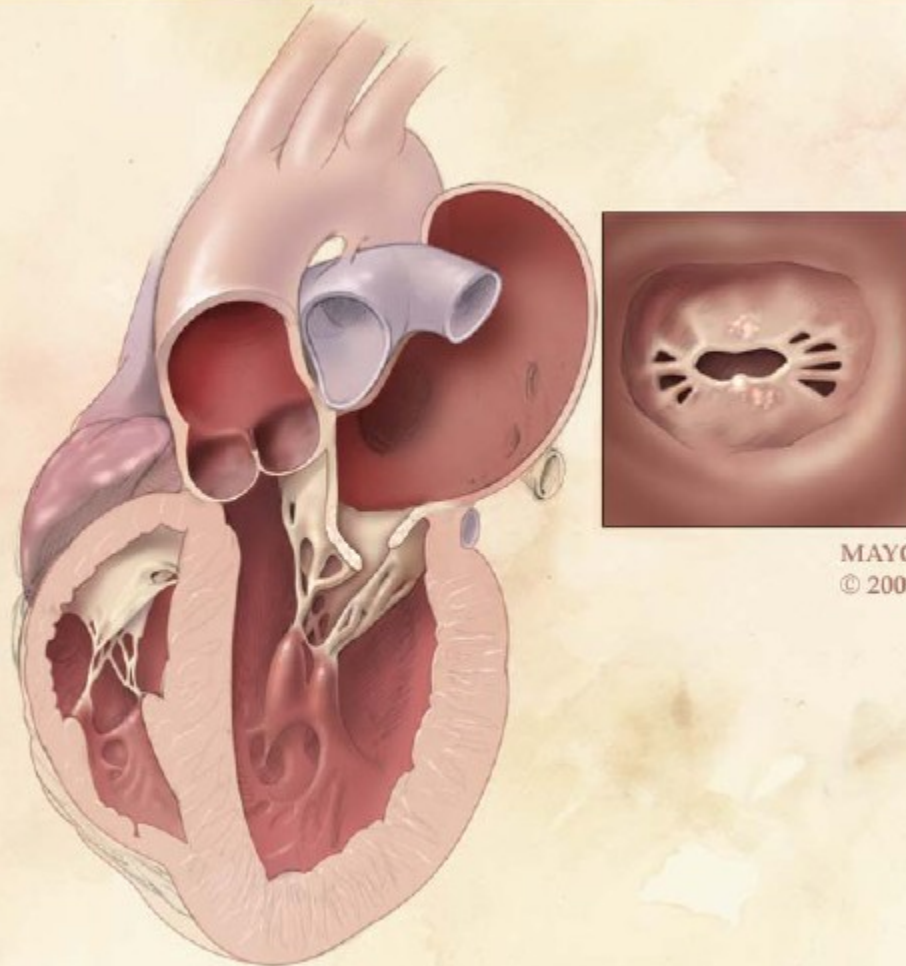


3V2c
3.5MHz
ECHO

T1/-1/ 0/V
1/2 80
CD Gain = 50

Store in prog
80
HR: 68bpm


MITRAL STENOSIS



MAYO
© 2002

ETIOLOGY

Rheumatic Fever which is related to streptococcus infections, causing damage to the mitral valve and leading to mitral stenosis later in life.



OTHER LESS COMMON CAUSES OF MITRAL STENOSIS

Congenital Mitral Stenosis

Systemic Lupus Erythematosus

Rheumatoid Arthritis

Atrial Myxoma

Malignant Carcinoid

Bacterial Endocarditis



MITRAL STENOSIS results in several changes to the integrity of the valves:

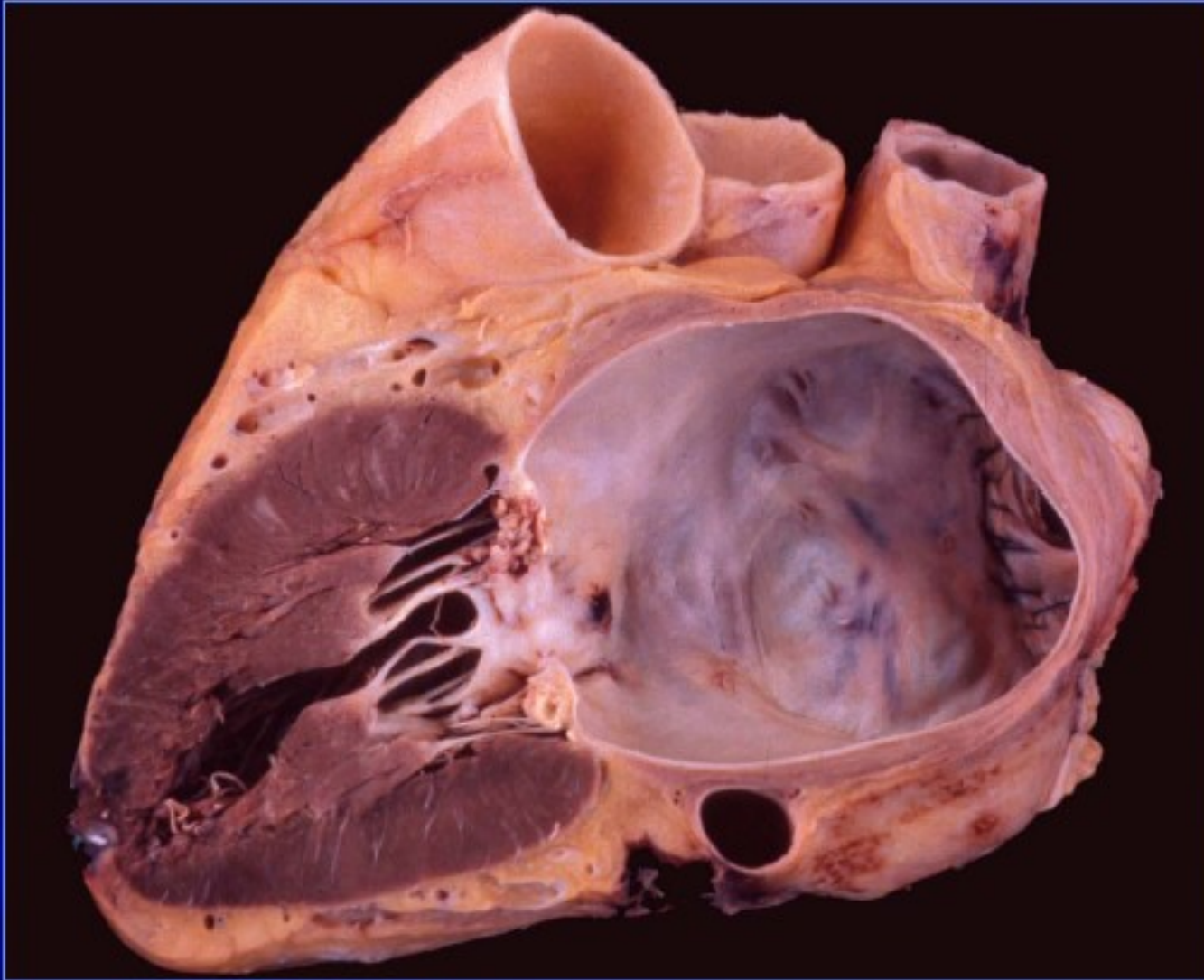
CUSPS THICKEN

COMMISSURES FUSED TOGETHER

**CHORDAE TENDINAE BECOMES
THICKENED & SHORTENED**

CALCIUM DEPOSITS FORM

Mitral Stenosis



**Pressure overload: LA, RV, RA & pulmonary tree
LV protected**

Mitral Stenosis

Symptoms

- **Increased LA pressure**

Hallmark of MS

Atrial Fibrillation

Pulmonary Hypertension

- **Dyspnea on exertion**
- **Fatigue**

SIGNS & SYMPTOMS

- ✱ Symptoms of mitral stenosis usually begin with the hallmark signs of **DYSPNEA ON EXERTION!**
- ✱ The first bouts of dyspnea in patients with mitral stenosis are usually precipitated by exercise, emotional stress, infection, or atrial fibrillation, all of which increase the rate of blood flow across the mitral orifice & result in further elevation of Left atrial pressure.

OTHER PRINCIPAL SIGNS AND SYMPTOMS INCLUDES:

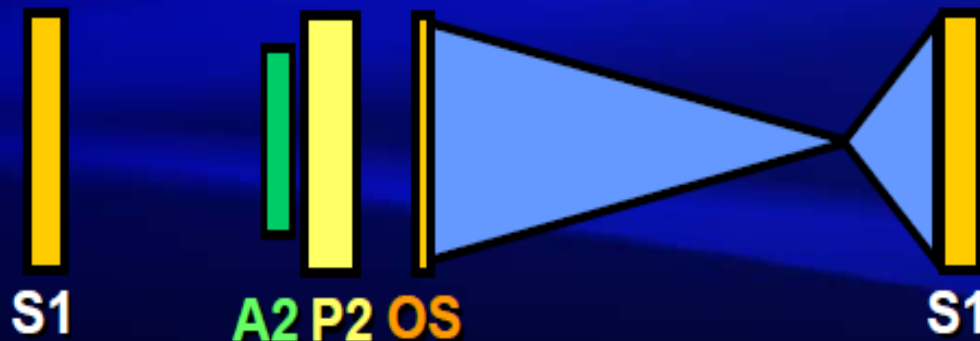
- **Fatigue**
- **Orthopnea**
- **Paroxysmal nocturnal dyspnea**
- **Pulmonary edema – develops when there's a sudden \uparrow in flow rate across a markedly narrowed mitral orifice.**
- **Palpitations – owing to presence of arrhythmias**
- **Hemoptysis – due to rupture of thin dilated bronchial veins.**
- **Peripheral edema .**

Mitral Stenosis Examination

- Palpation RV lift
 - Loud P2
 - Loud S1
 - Opening snap
 - Diastolic rumble
- } Pliable MV

What heart sound can't you get with significant MS?

S₃



**The Diagnostic testing used to evaluate
the presence & severity of Mitral
Stenosis includes:**

ECG

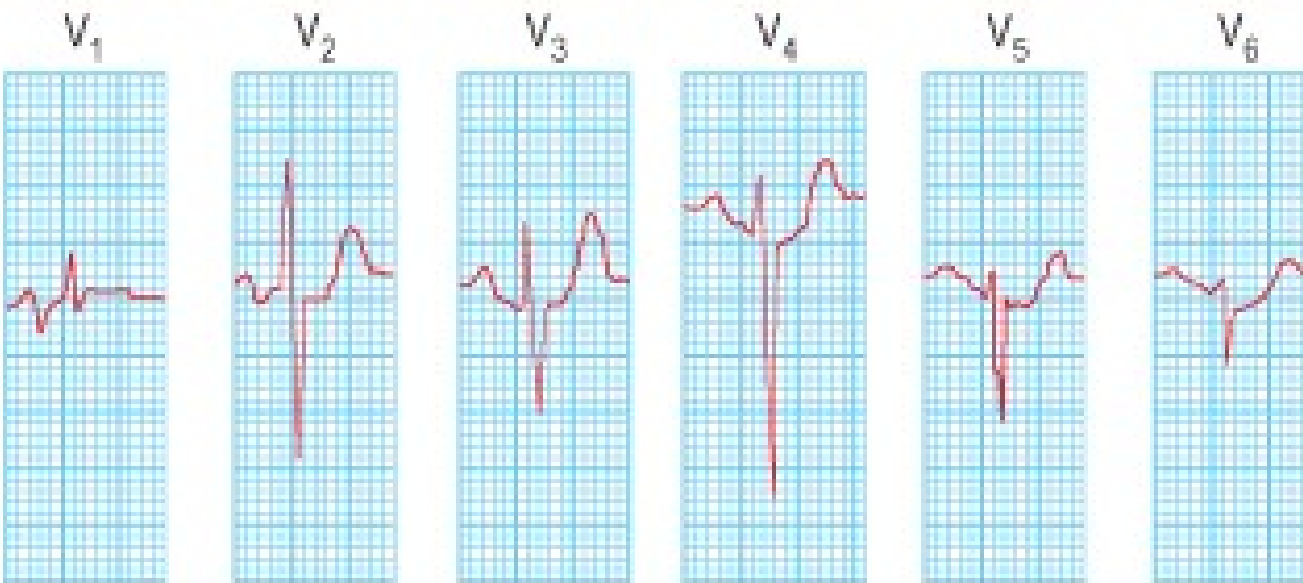
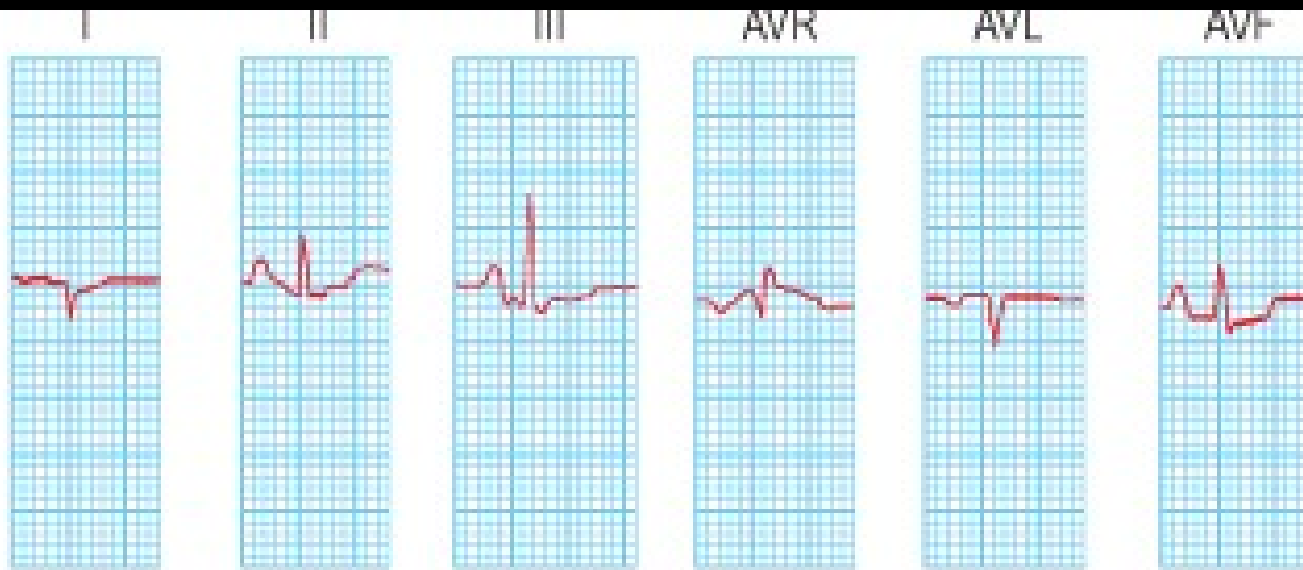
Chest Radiograph

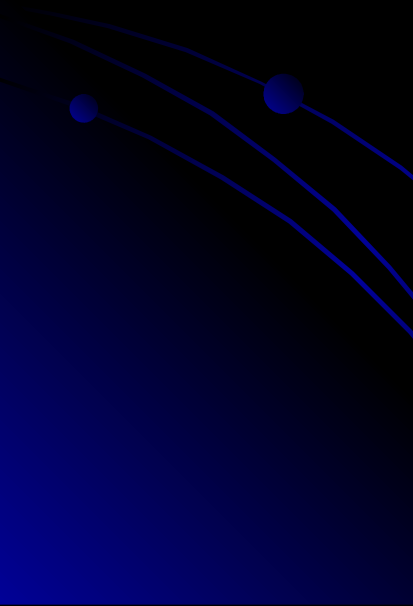
2D Echocardiogram

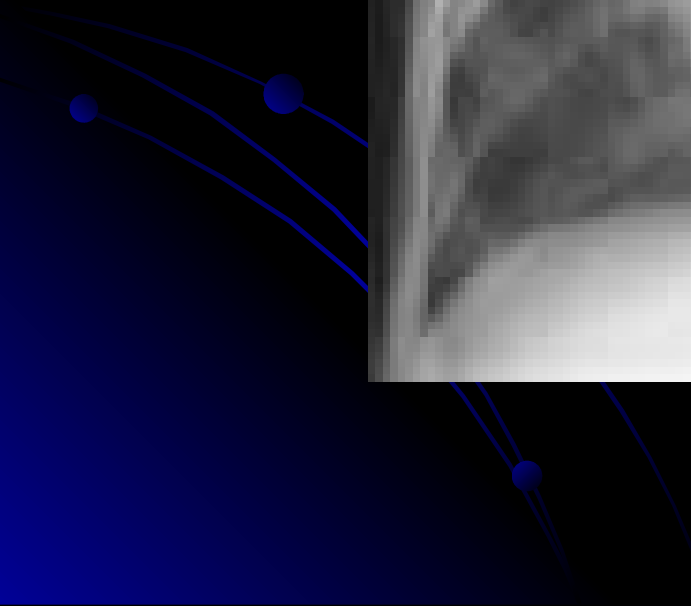
Doppler Study

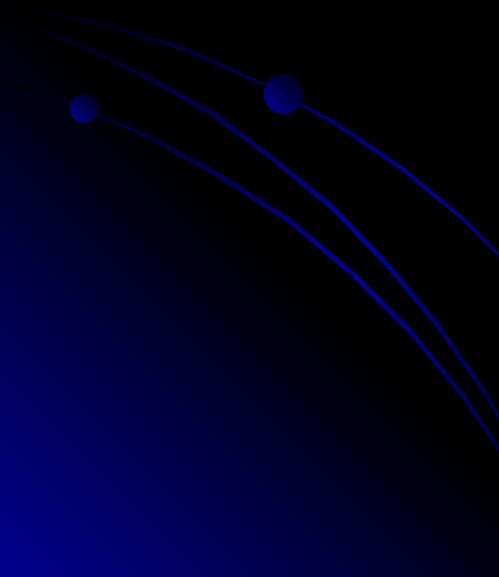
TransEsophageal Echocardiography



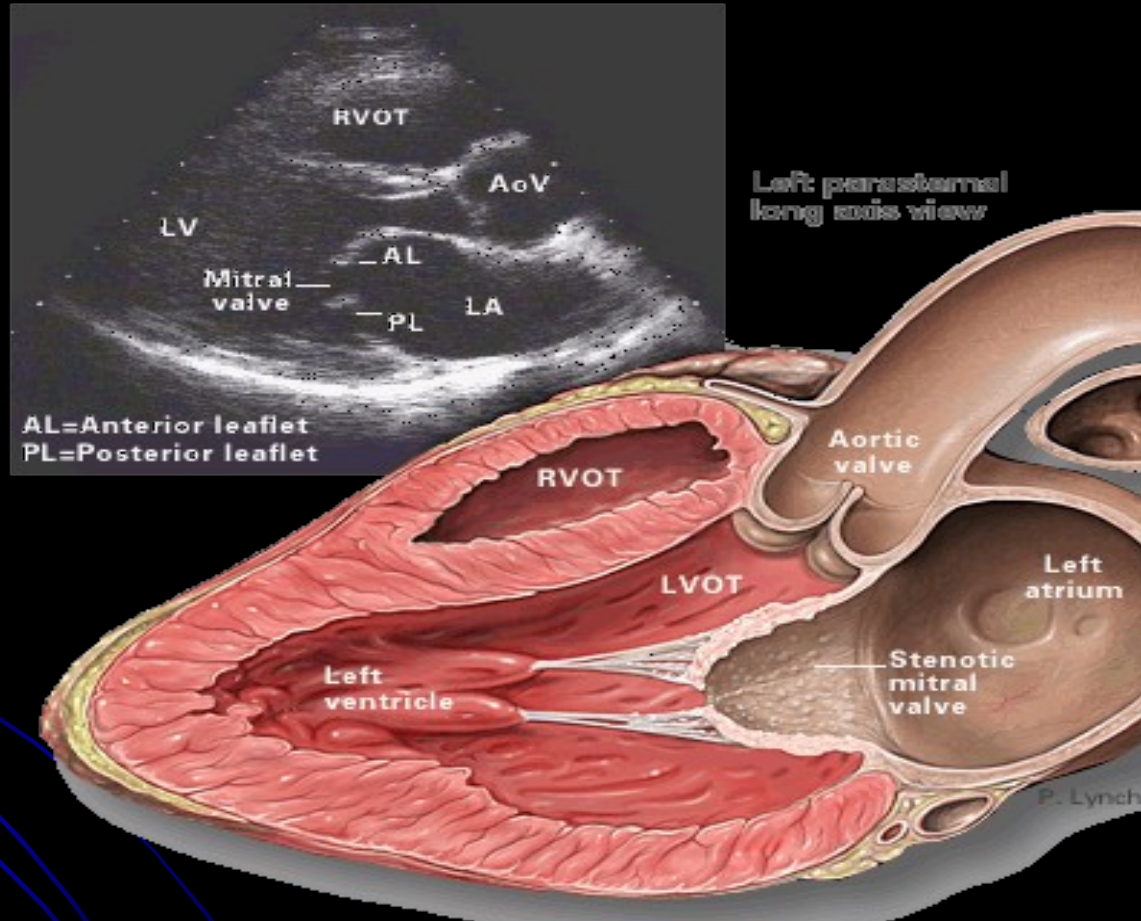








LEFT PARASTERNAL, LONG AXIS VIEW



STENOTIC MITRAL VALVE



3V2c

43.5MHz

Echo

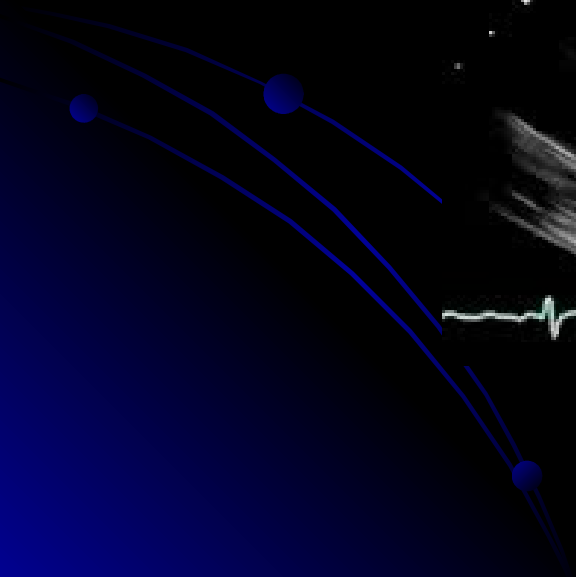
55dB T1/

Gain= 0dB

Store in prog

00

HR= 76bpm



COMPLICATIONS OF MITRAL STENOSIS

ATRIAL FIBRILLATION

LUNG CONGESTION

BLOOD CLOTS with SYSTEMIC EMBOLIZATION

PULMOARY HYPERTENSION

CONGESTIVE HEART FAILURE



MEDICAL MANAGEMENT

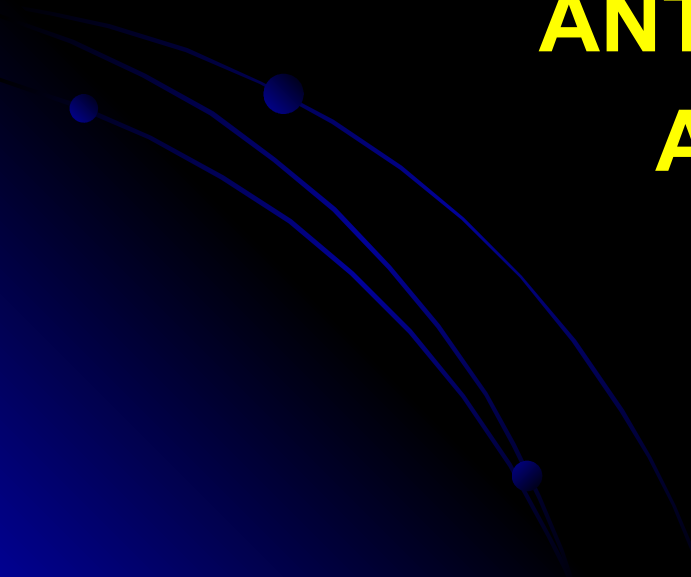
DIURETICS

DIGITALIS

ANTI-ARRHYTHMICS

ANTICOAGULANTS

ANTIBIOTICS

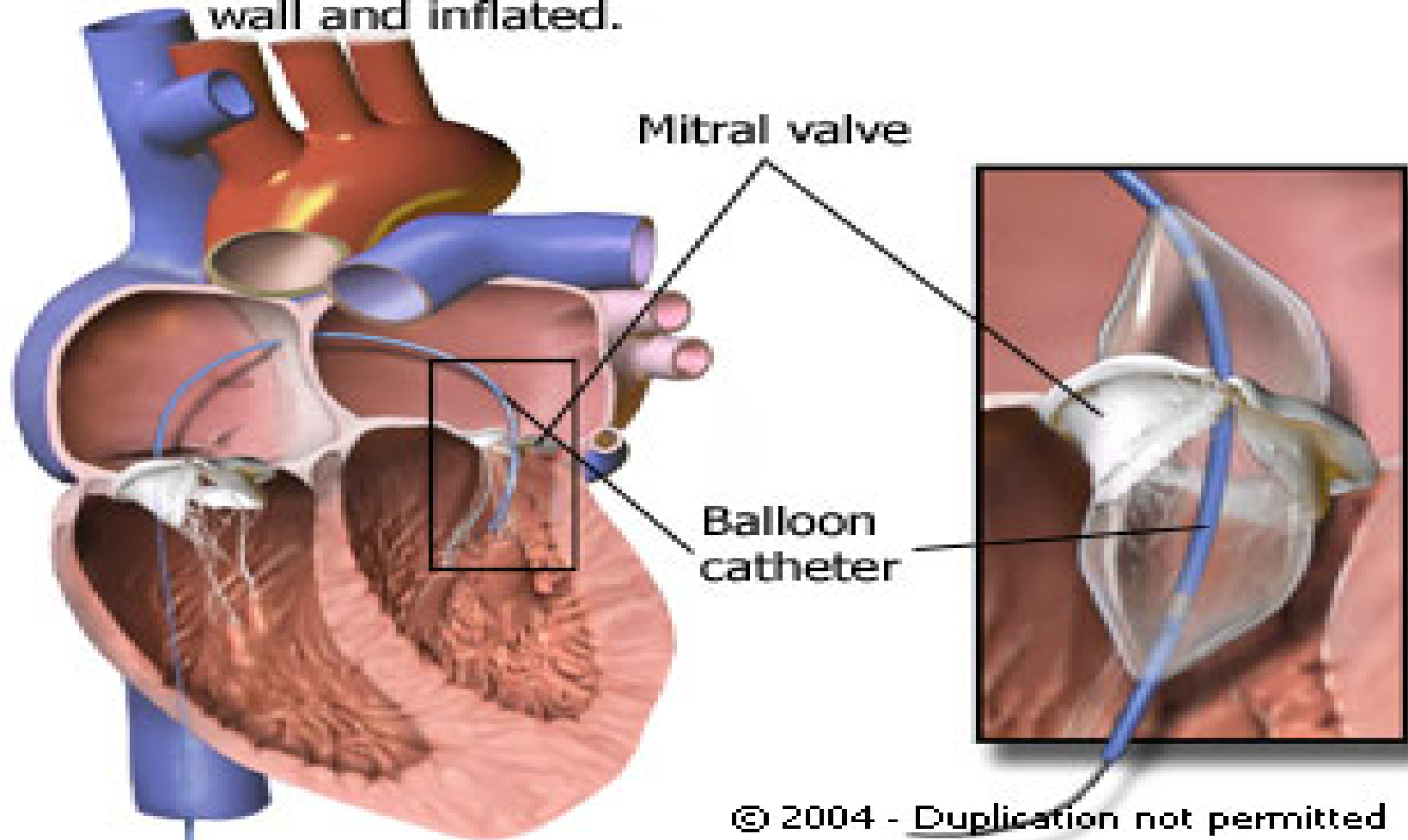


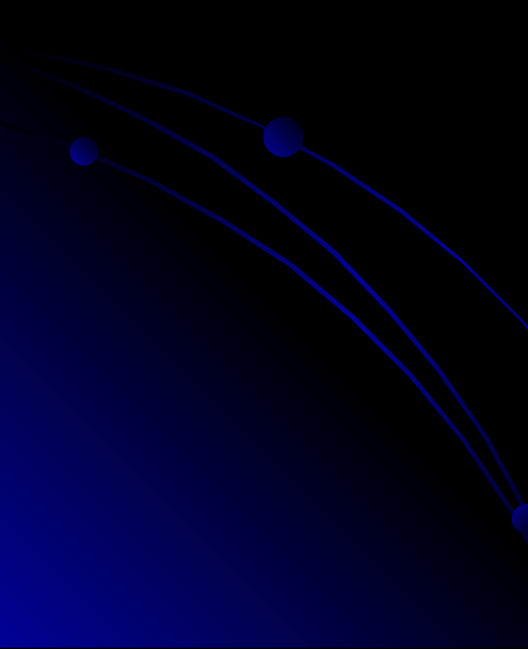
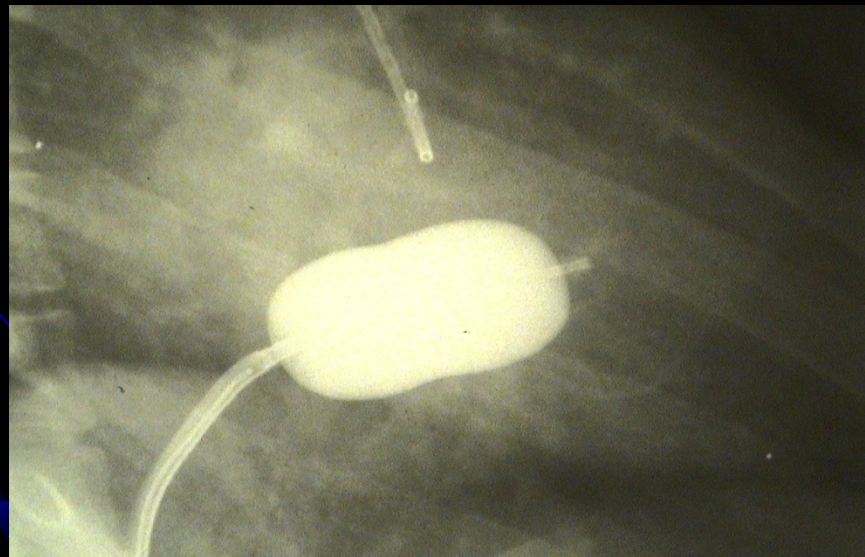
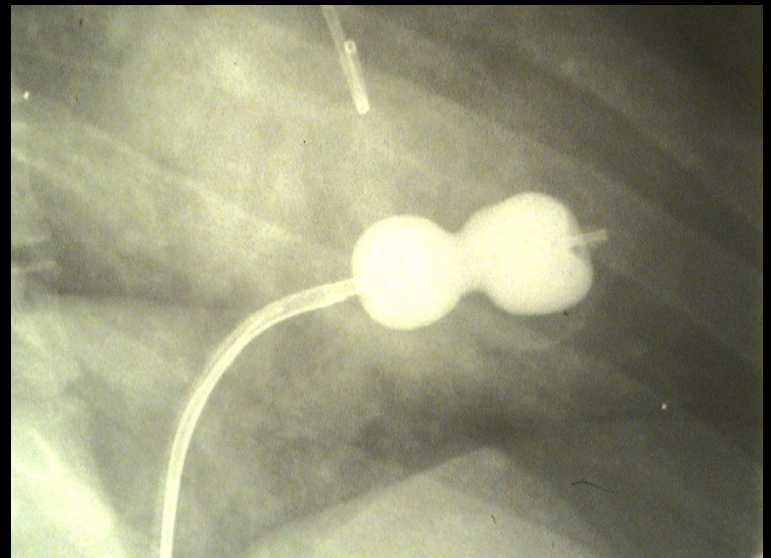
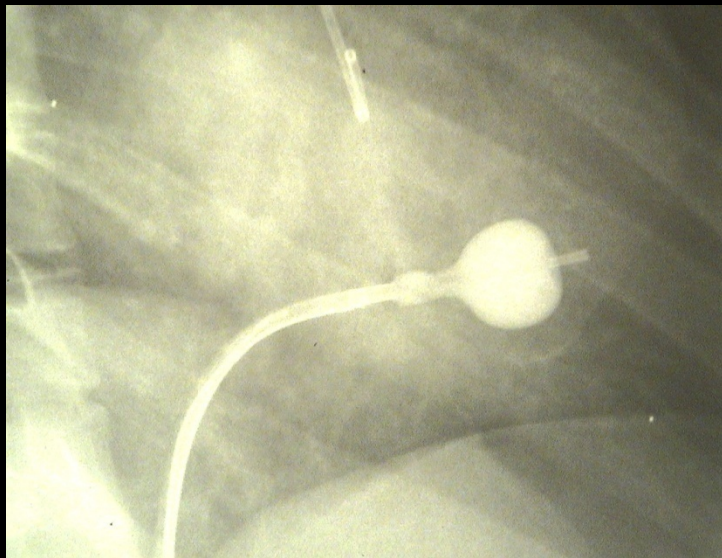
Intervention

- **PERCUTANEOUS
TRANSVENOUS MITRAL
COMMISSUROTOMY (PTMC)**
 - **SURGICAL COMMISSUROTOMY**
 - **MITRAL VALVE Replacement .**
- 

Valvuloplasty

A procedure to improve blood flow through a narrow valve. A catheter is threaded to the valve through a hole temporarily created in the septal wall and inflated.







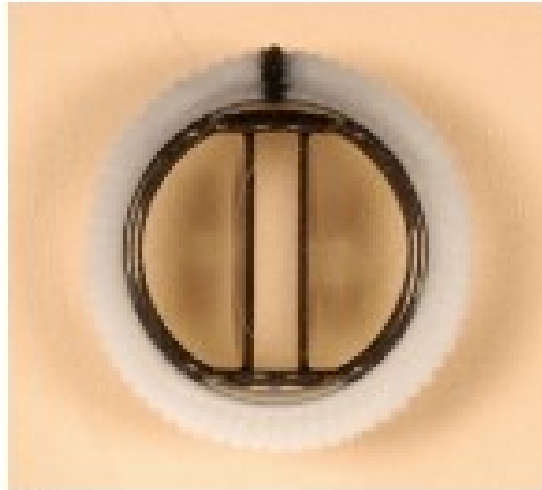
$MVA = .982 \text{ cm}^2$

PRE-
PROCEDURE



$MVA = 1.84 \text{ cm}^2$

POST-PROCEDURE

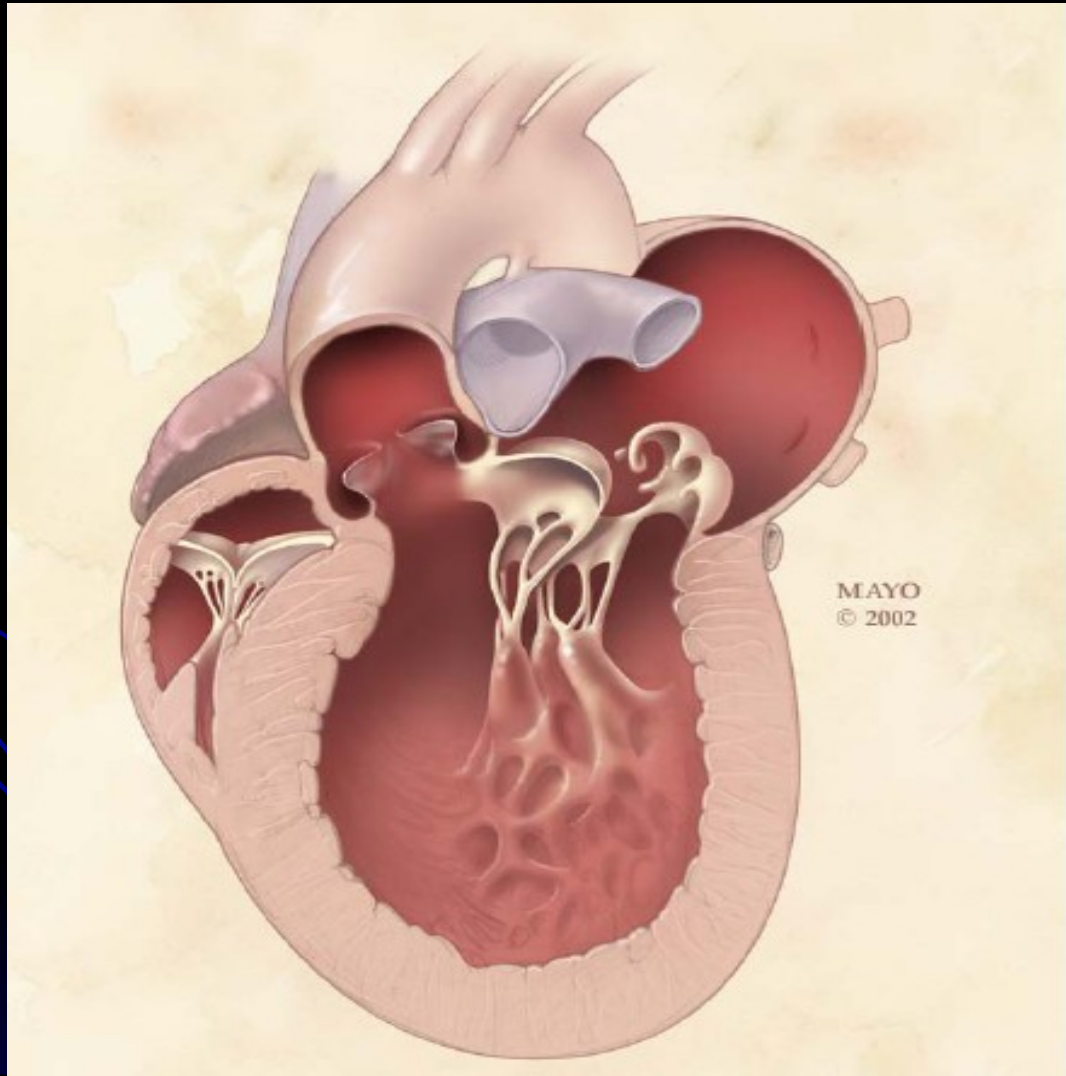


(b)



(c)

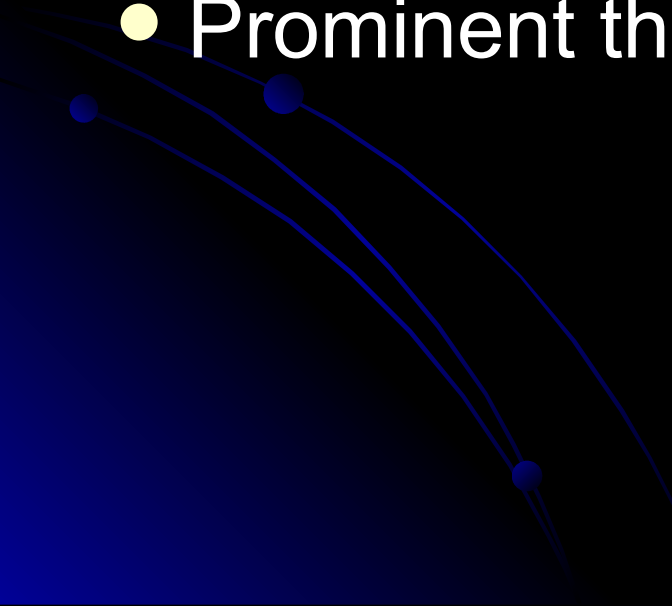
MITRAL REGURGITATION



ETIOLOGY

- RHEUMATIC HEART disease .
- MITRAL Valve Prolapse .
- Others
 - IHD
 - Cardiomyopathy (dilated , hypertrophic)
 - Hypertensive heart disease
 - infective endocarditis
 - Myocarditis
 - connective tissue disorders - (SLE)
 - collagen abnormalities - Marfan's syndrome

SIGNS

- Laterally displaced (forceful) diffuse apex beat and a systolic thrill .
 - Soft first heart sound .
 - Pansystolic murmur .
 - Prominent third heart sound .
- 

Mitral Regurgitation

Examination

Acute

- **Sitting upright**
- **Rales**
- **Murmur**

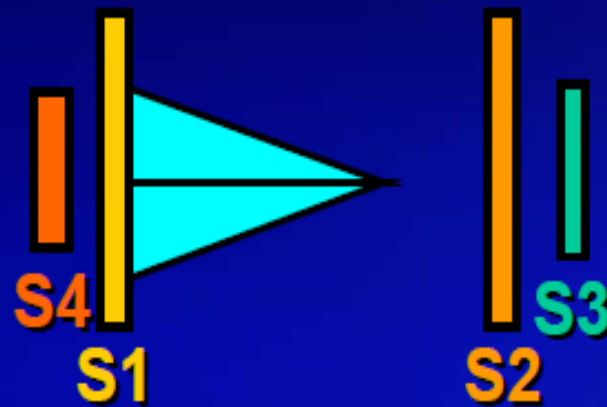
May be subtle

Chronic

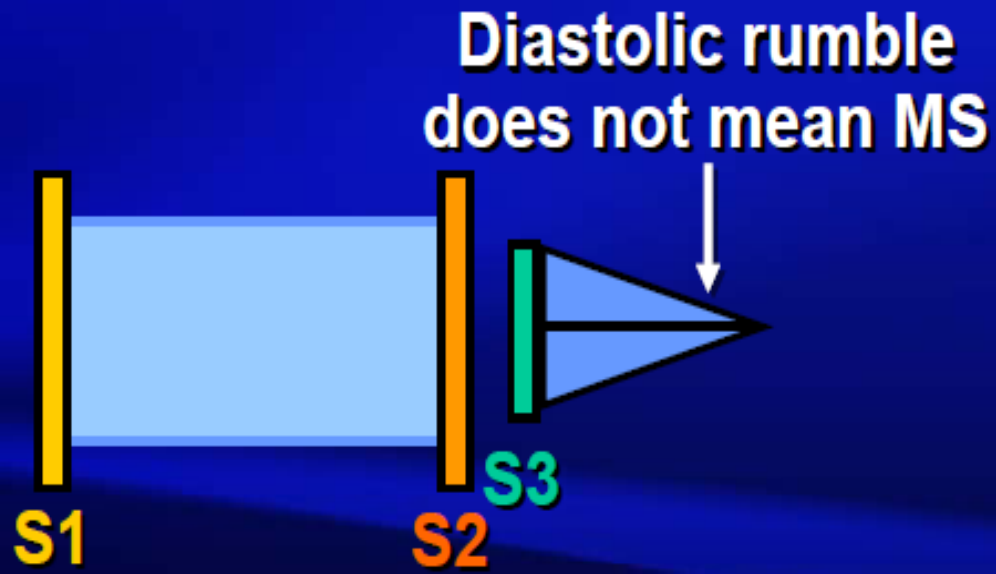
- **Apical impulse**
Diffuse, tapping
- **May have**
pulmonary findings
- **S3 ± Palpable**

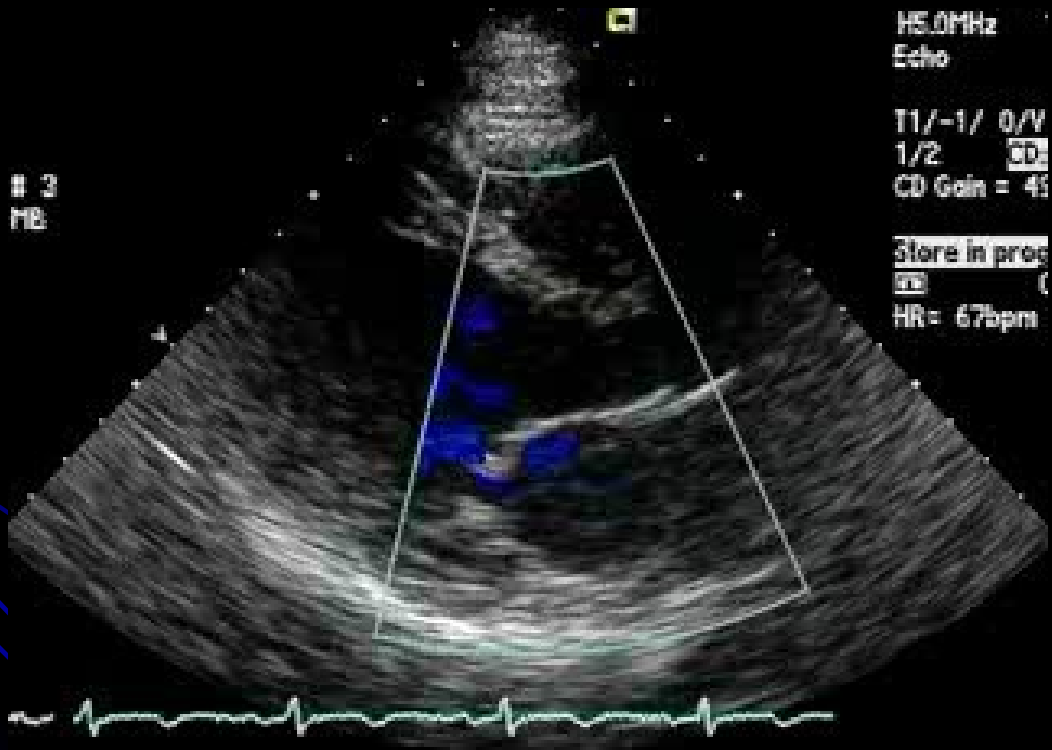
Mitral Regurgitation Examination

Acute MR

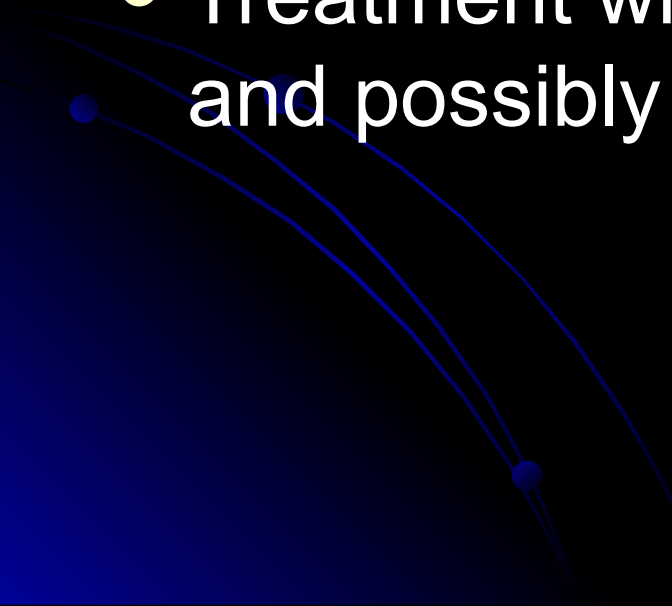


Chronic Severe MR

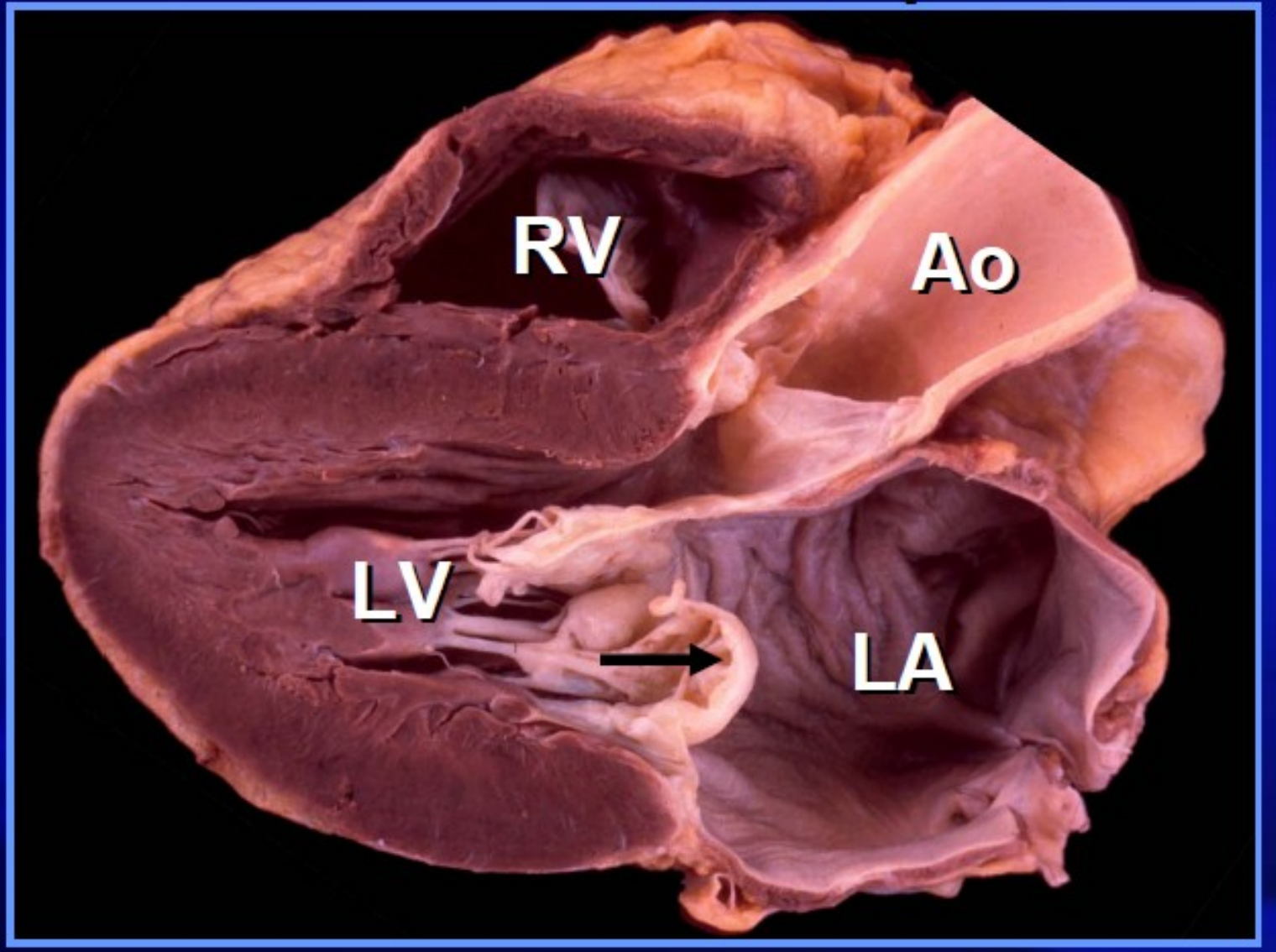




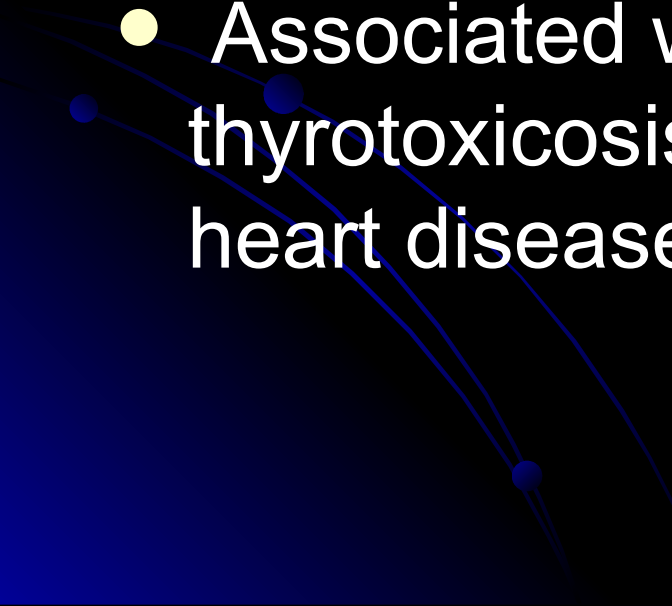
Management of mitral regurgitation

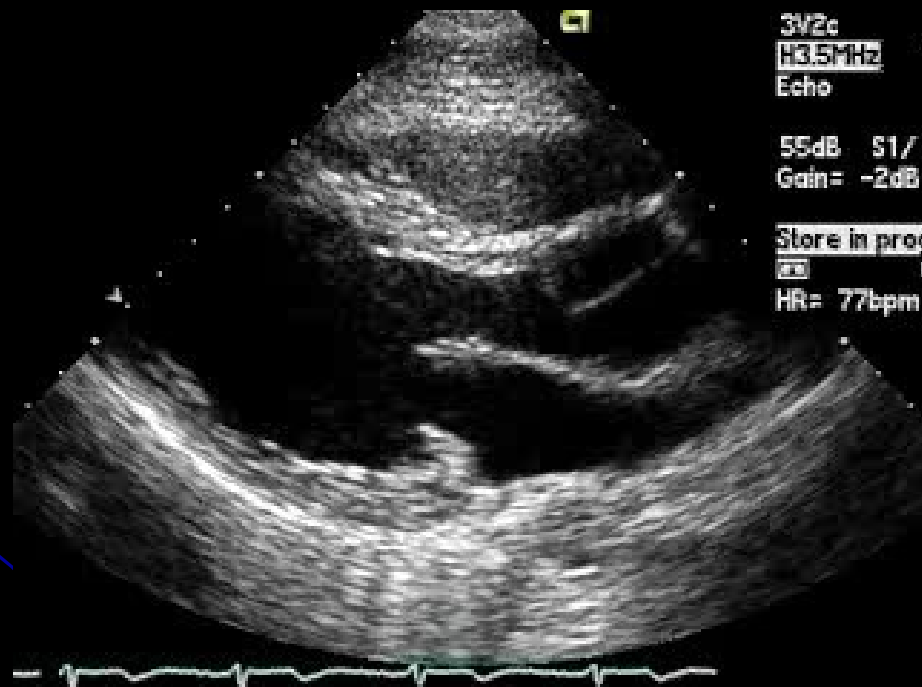
- Evidence of progressive cardiac enlargement generally warrants early surgical intervention by either mitral valve repair or replacement .
 - Treatment with ACE inhibitors, diuretics and possibly anticoagulants .
- 

Mitral Valve Prolapse



Pathology

- Large mitral valve leaflets, an enlarged mitral annulus, abnormally long chordae or disordered papillary muscle contraction .
 - Demonstrate myxomatous degeneration of the mitral valve leaflets .
 - Associated with Marfan's syndrome, thyrotoxicosis, rheumatic or ischaemic heart disease .
- 



3V2c

13.5MHz

Echo

55dB S1/
Gain: -2dB

Store in prog

re

HR= 77bpm

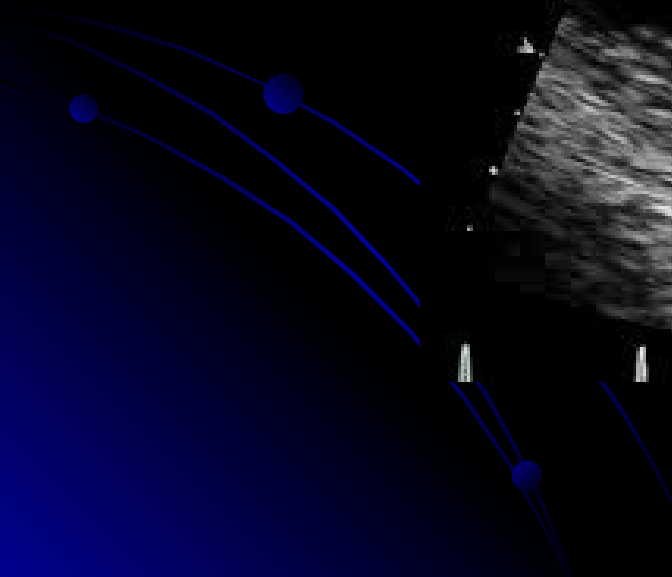
CS 7



3V2c
F3.5MHz
ECHO

50dB S1/
Gain= 10dB

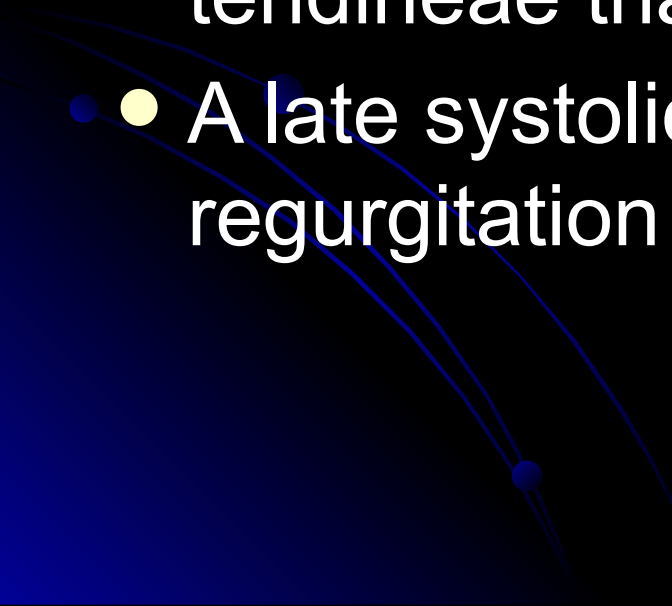
Store in prog
[F5] [F6]
HR= 75bpm



Symptoms

- *Atypical chest pain* is the most common symptom .
- *Palpitations* may be experienced because of the abnormal ventricular contraction or because of the atrial and ventricular arrhythmias .
- Sudden cardiac death due to fatal *ventricular arrhythmias* is a very rare but recognized complication.

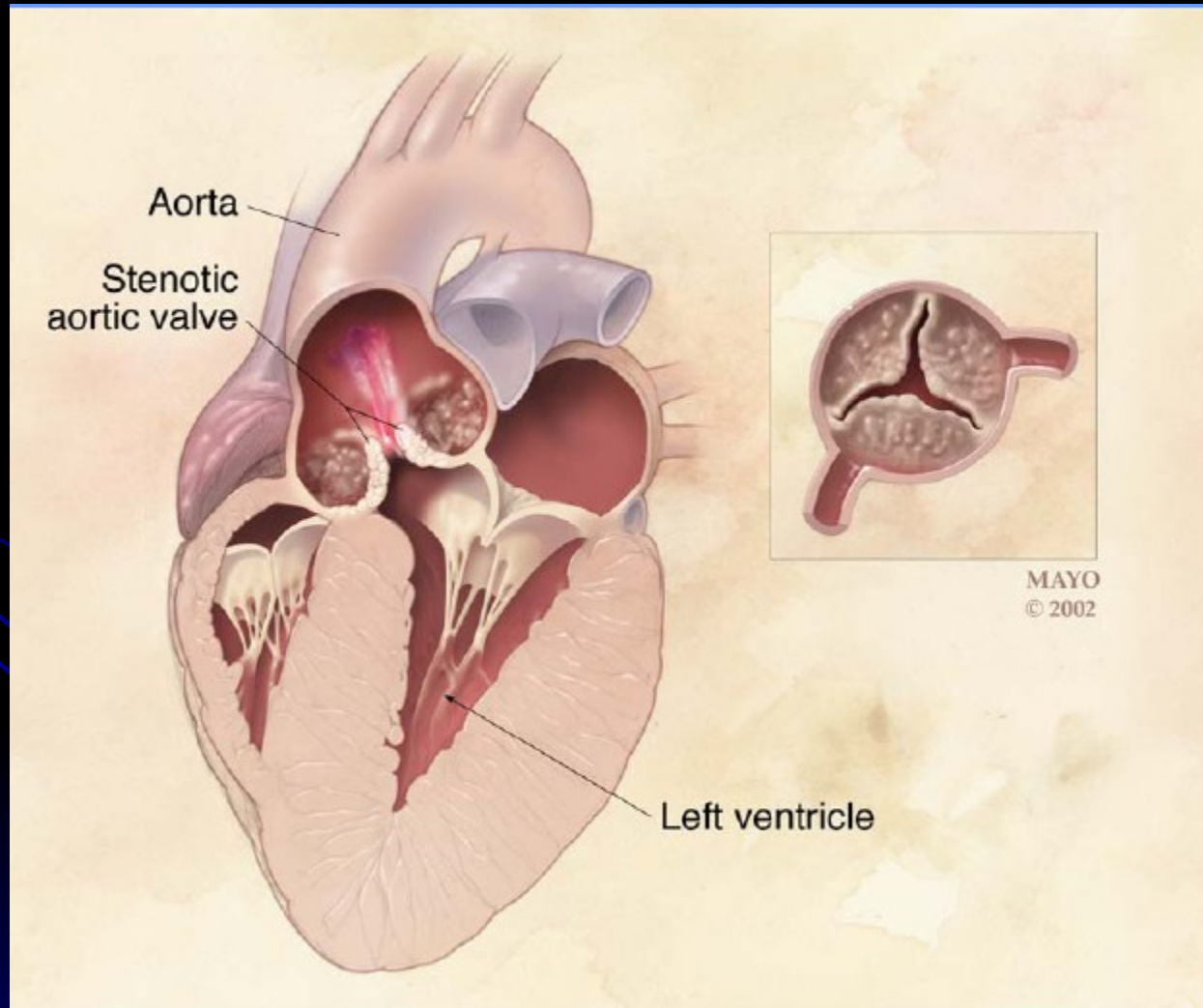
SIGNS

- The most common sign is a mid-systolic click .
 - Produced by the sudden prolapse of the valve and the tensing of the chordae tendineae that occurs during systole .
 - A late systolic murmur owing to some regurgitation
- 

Treatment

- Beta-blockade is effective for the treatment of the atypical chest pain and palpitations .
- Mitral valve prolapse associated with significant mitral regurgitation and atrial fibrillation, anticoagulation is advised to prevent thromboembolism .
- Mitral valve prolapse associated with severe mitral regurgitation has a risk of sudden cardiac death.

AORTIC STENOSIS



Aortic Stenosis

Etiology

Degenerative-calcific

- Most common
- >70 years

Bicuspid

- 1.8% population
- Sx present \leq 60 years

Rheumatic

Differential diagnosis

Supravalvular – murmur R carotid, \uparrow A₂

Subvalvular – often leads to AR

HCM

**Survival
Percent**

**Onset
severe
symptoms**

100

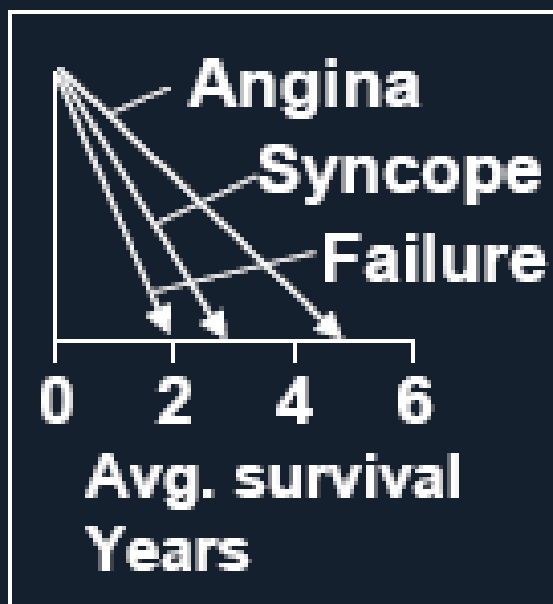
80

60

40

20

**Latent Period
(Increasing
Obstruction,
Myocardial
Overload)**



0

40

50

60

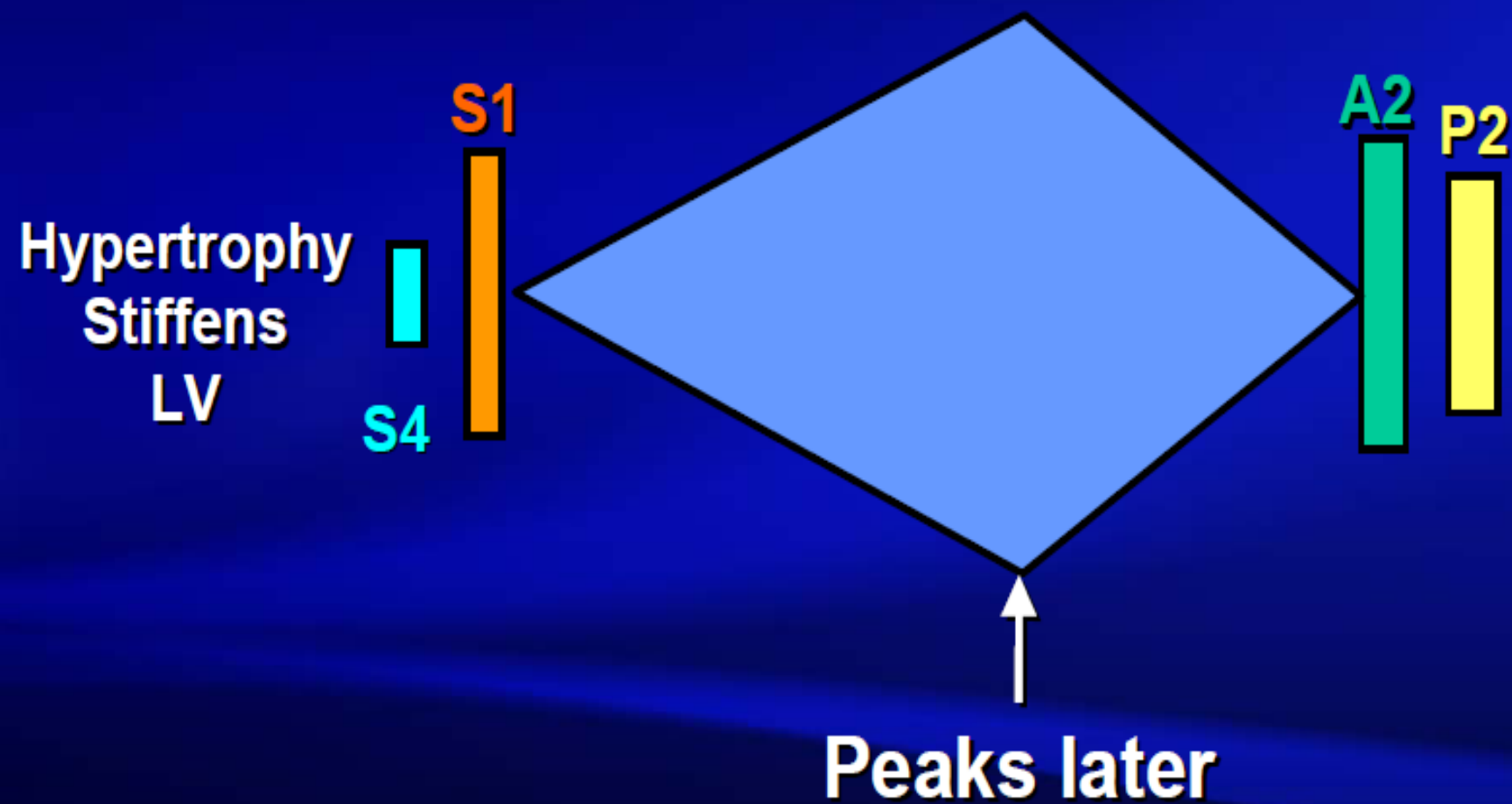
70

80

**Age
Years**

Moderate Aortic Valve Stenosis

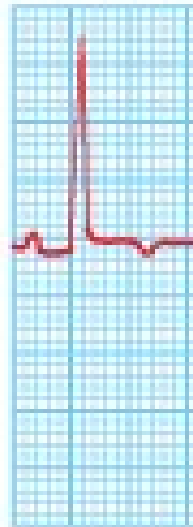
Crescendo Decrescendo
Murmur



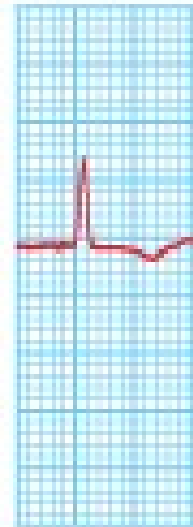
I



II



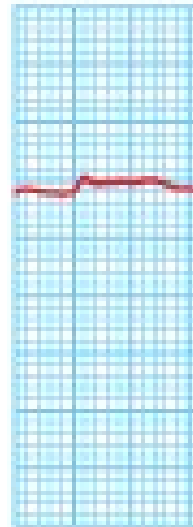
III



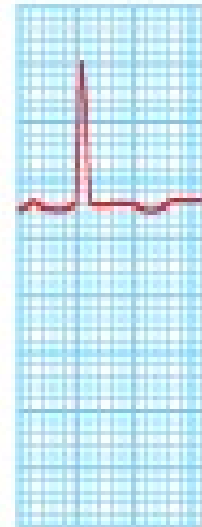
AVR



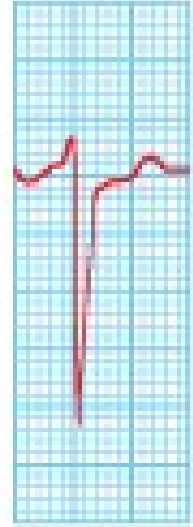
AVL



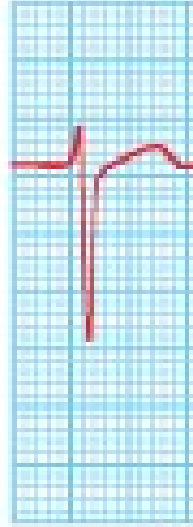
AVF



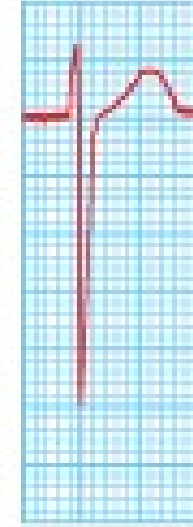
V₁



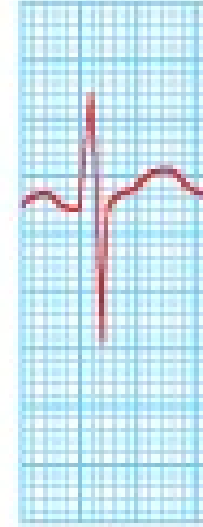
V₂ × 1/2



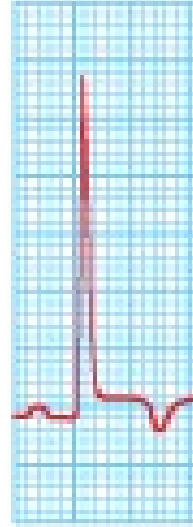
V₃



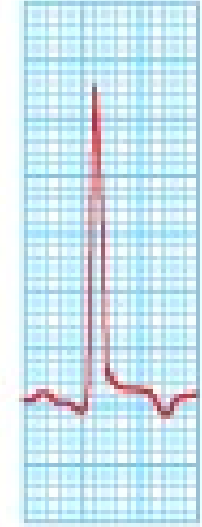
V₄



V₅



V₆



00:00:00
JKA/MB



3V2c

18.57Hz

Echo

55dB S1/

Gain= 5dB

Store in prog

11

HR= 56bpm





25.0MHz

Echo

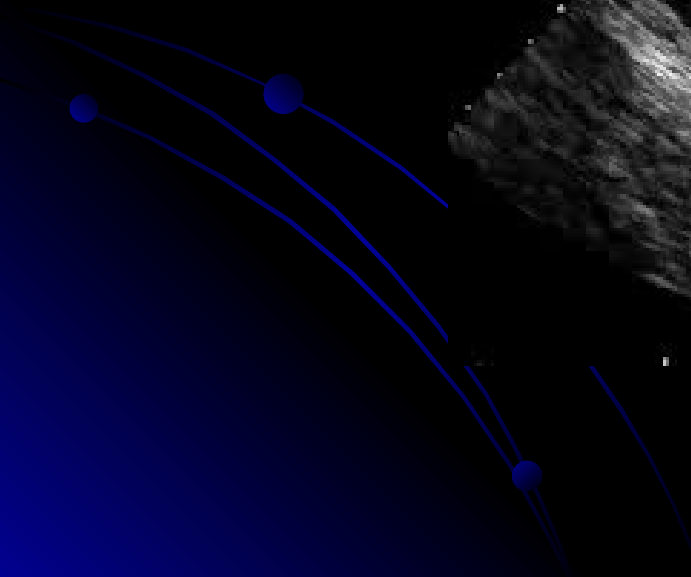
53dB 51/

Gain= 6dB

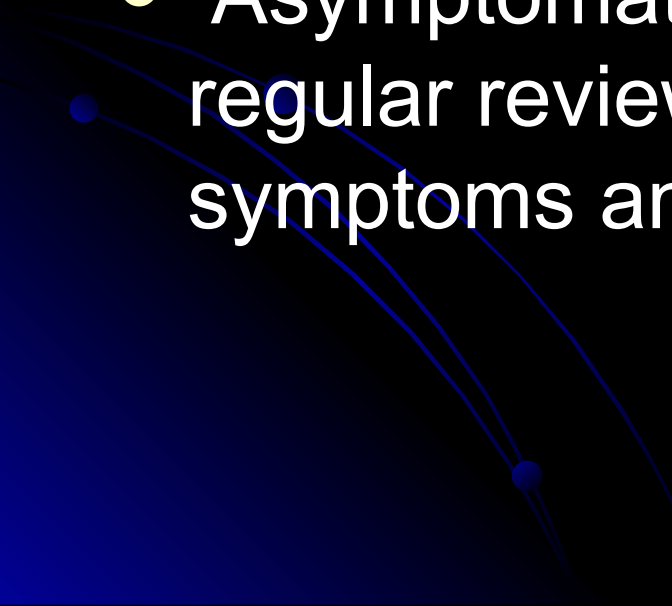
Store in prog

00

HR= 66bpm

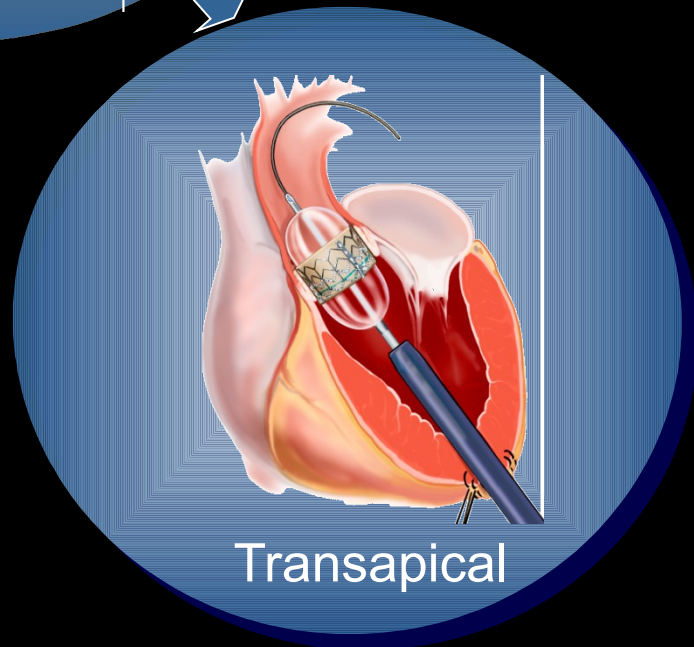
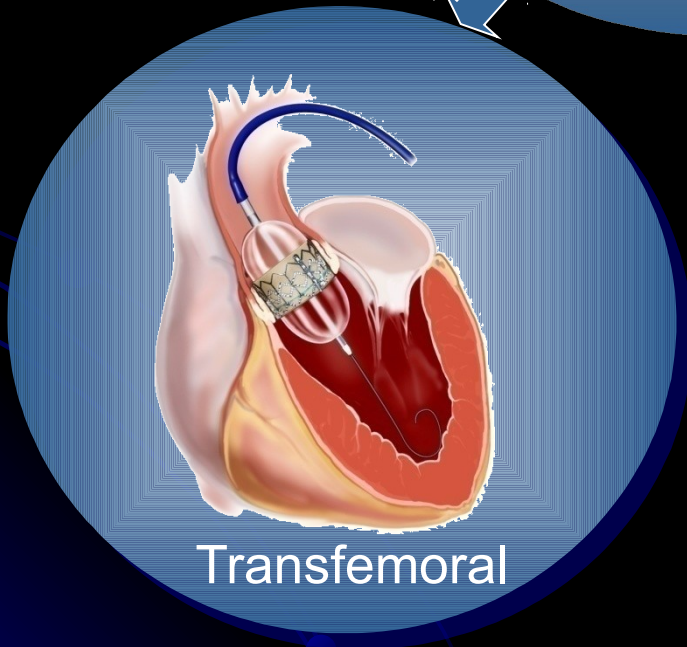
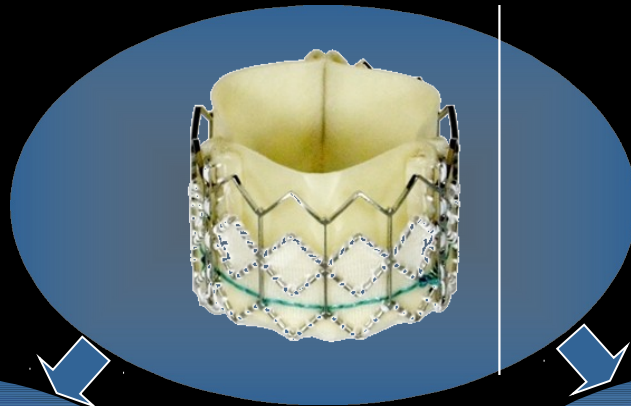


Treatment

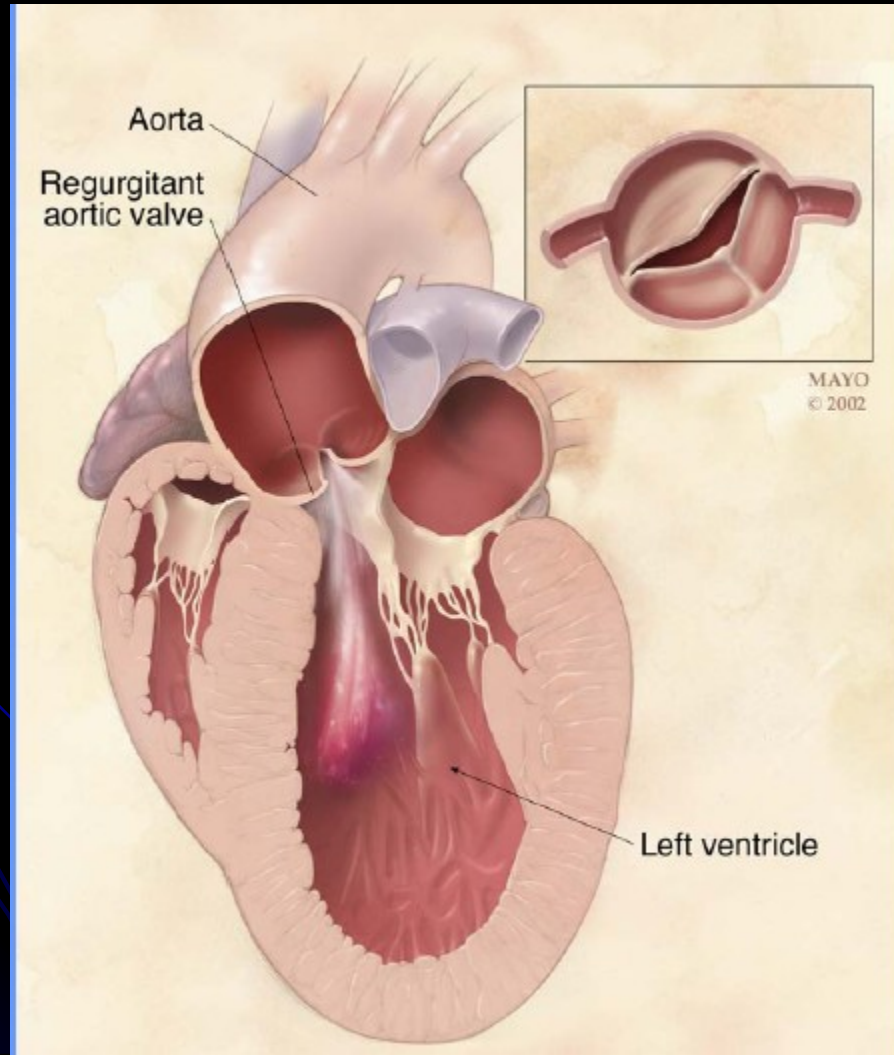
- In patients with aortic stenosis, symptoms are a good index of severity and all symptomatic patients should have aortic valve replacement.
 - Asymptomatic patients should be under regular review for assessment of symptoms and echocardiography .
- 

TAVR

Transfemoral (TF) and Transapical (TA)



AORTIC REGURGITATION



Aortic Regurgitation

Etiology

Valvular

- Chronic
 - Rheumatic
 - Bicuspid
- Acute
 - Endocarditis

Aortic root

- Chronic
 - HTN
 - Marfan
 - Aortitis
- Acute
 - Dissection

Aortic Regurgitation

Examination

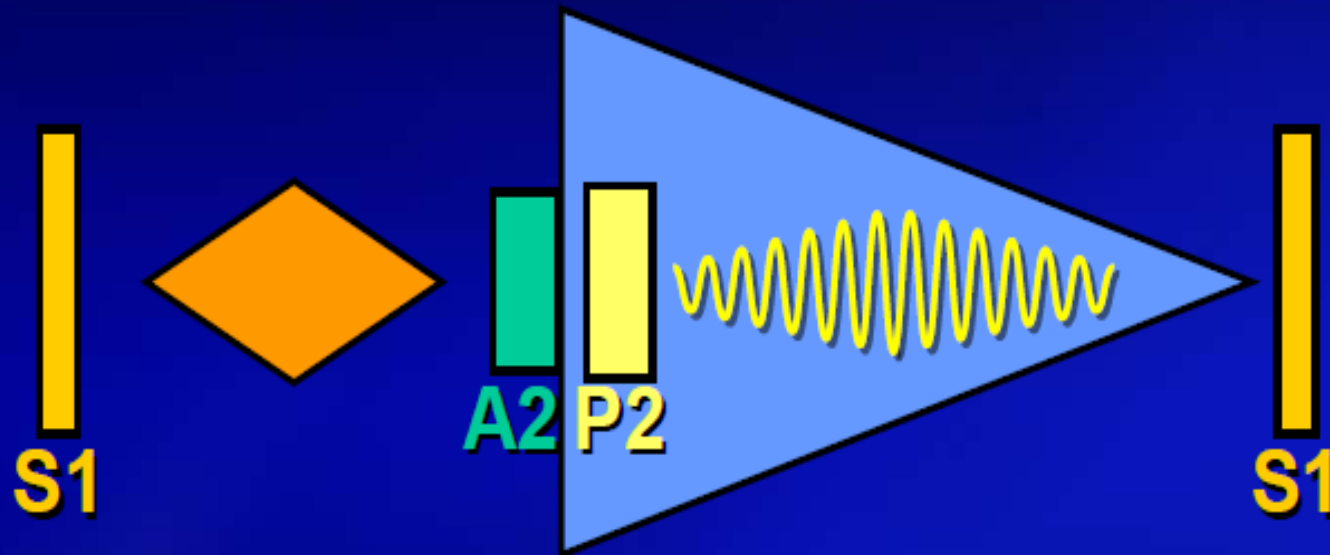
Acute

- May have few signs
- Murmur underwhelming
- Very faint, short, non-compliant LV

Chronic

- Bisferiens pulse
- Wide pulse pressure
Quinke, Duroziez',
Pistol shot, Head bob
- Diffuse, hyperdynamic LV
- Diastolic murmur

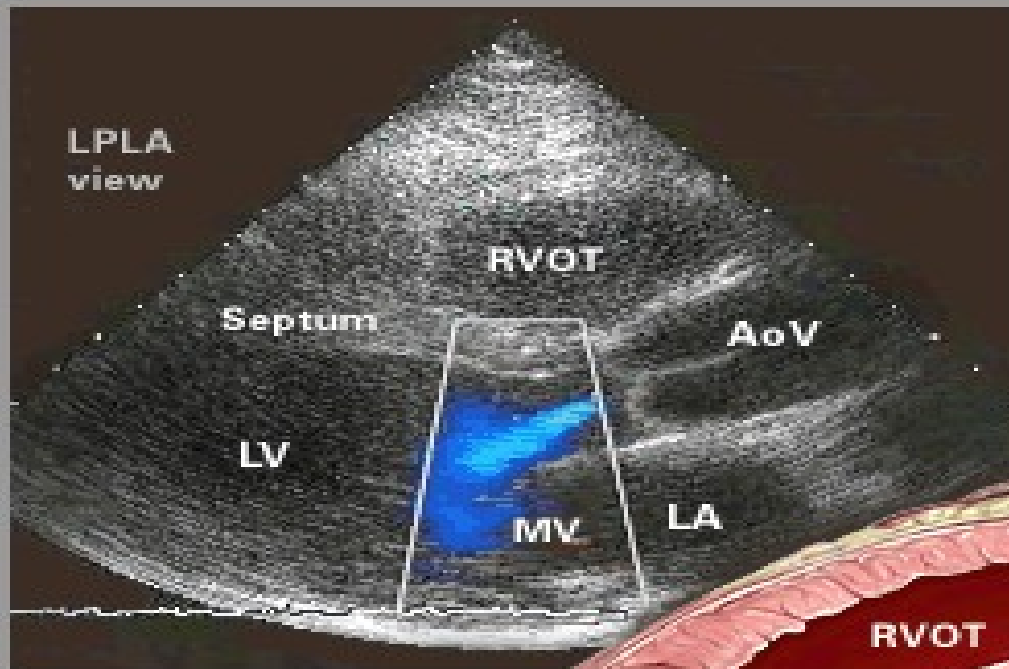
Aortic Regurgitation Murmur



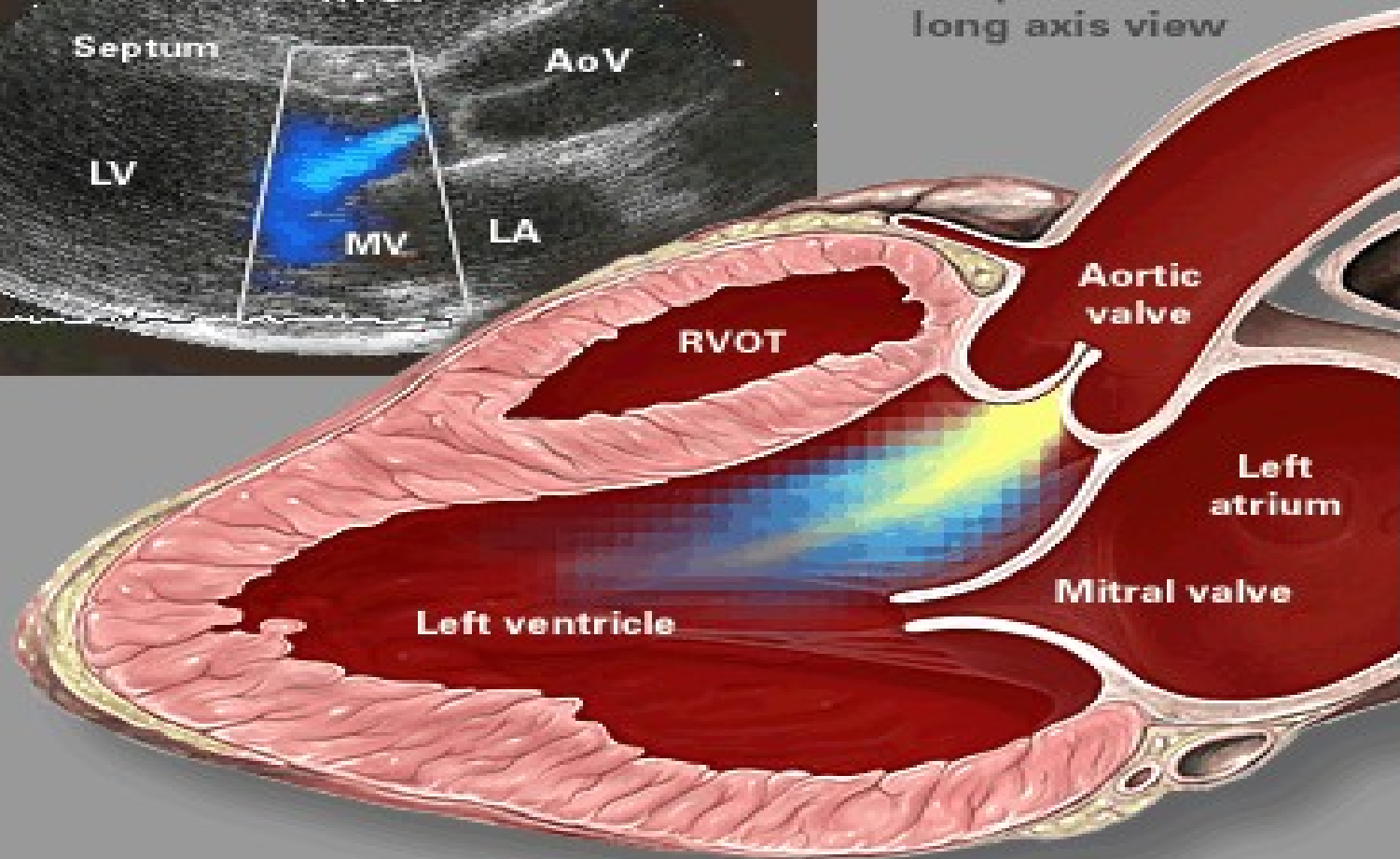
BP = ↑ PP

Austin flint murmur

Aortic regurgitation



Left parasternal long axis view



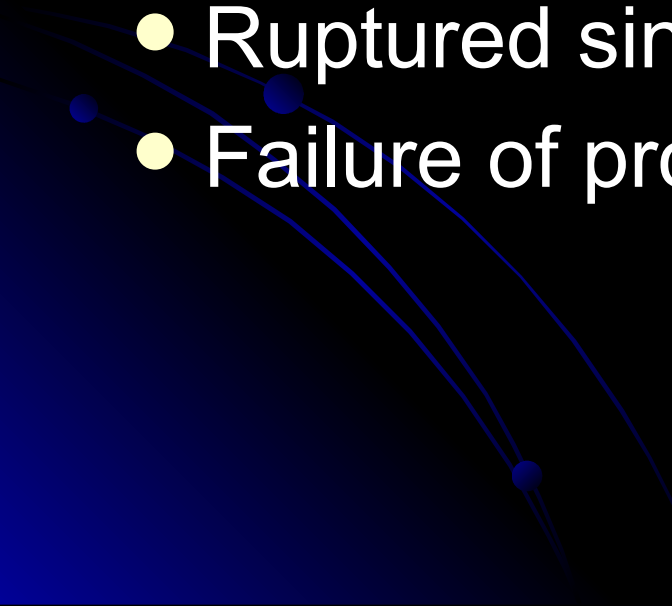


3V2c
3.5MHz
ECHO

T1/-1/ 0/V
1/2 80
CD Gain = 50

Store in prog
80
HR: 68bpm

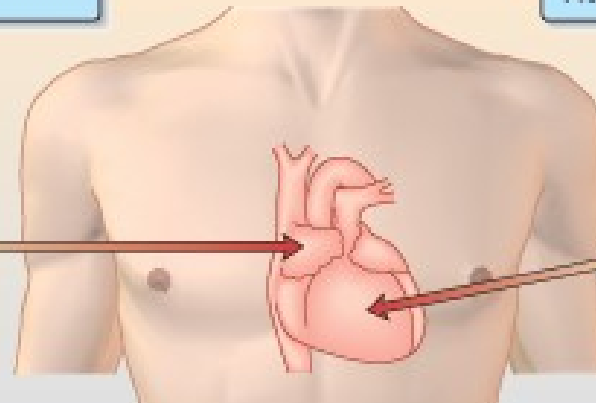
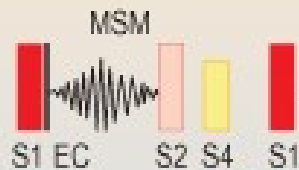
Acute aortic regurgitation

- Acute rheumatic fever
 - Infective endocarditis
 - Dissection of the aorta
 - Ruptured sinus of Valsalva aneurysm
 - Failure of prosthetic heart valve
- 

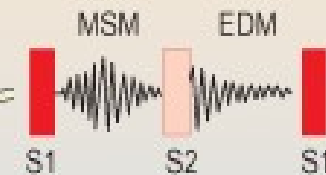
Chronic aortic regurgitation

- Rheumatic heart disease
- Syphilis Arthritides:
 - Reiter's syndrome
 - Ankylosing spondylitis
 - Rheumatoid arthritis
- Hypertension (severe)
- Bicuspid aortic valve
- Aortic endocarditis
- Marfan's syndrome
- Osteogenesis imperfecta

Aortic stenosis



Aortic regurgitation



Clinical memo

Aortic stenosis

Pulse: Sinus rhythm, low volume, slow rising
Aortic area: Systolic thrill
Apex: Not displaced, sustained
Sounds: Ejection click, soft A2, S4
Murmurs: Systolic, low pitched, ejection, radiating to carotids

Murmurs heard best with patient leaning forwards and breath held in expiration

Clinical memo

Aortic regurgitation

Pulse: Sinus rhythm, large volume, collapsing
Blood pressure: Wide pulse pressure
Apex: Displaced, diffuse, forceful
Murmurs: (1) High pitched, early diastolic at LSE
(2) Ejection systolic at base and into neck (high flow)
(3) Mid-diastolic rumble at apex (Austin Flint) not shown

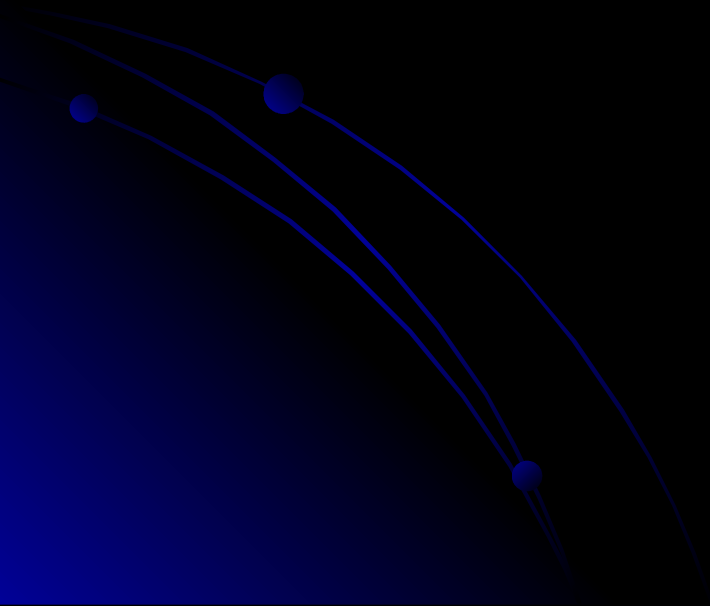
Treatment :

Aortic valve replacement

- Because symptoms do not develop until the myocardium fails and because the myocardium does not recover fully after surgery, operation is performed before significant symptoms occur.
- The timing of the operation is best determined according to haemodynamic, echocardiographic or angiographic criteria

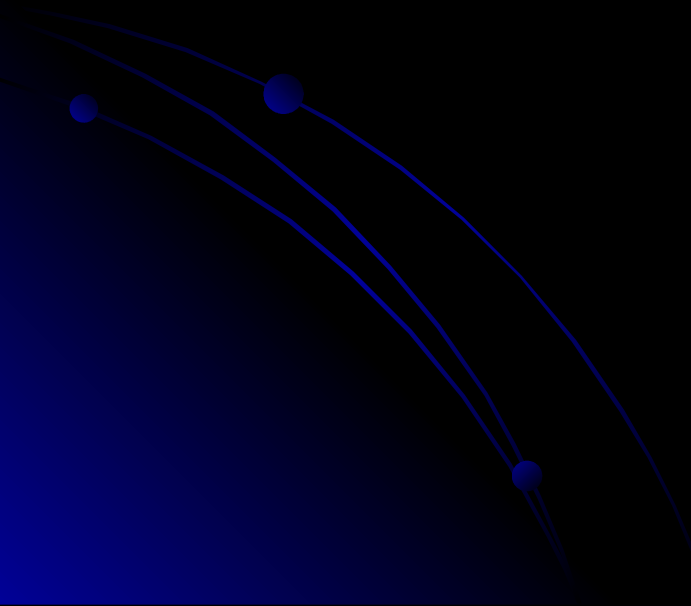
PULMONIC Valve Diseases

- ***PULMONIC Valve stenosis***
- ***PULMONIC Valve Rergurgitation***



TRICUSPID Valve Diseases

- ***TRICUSPID Valve Regurgitation***
- ***TRICUSPID Valve stenosis***



Thank You 😊

