

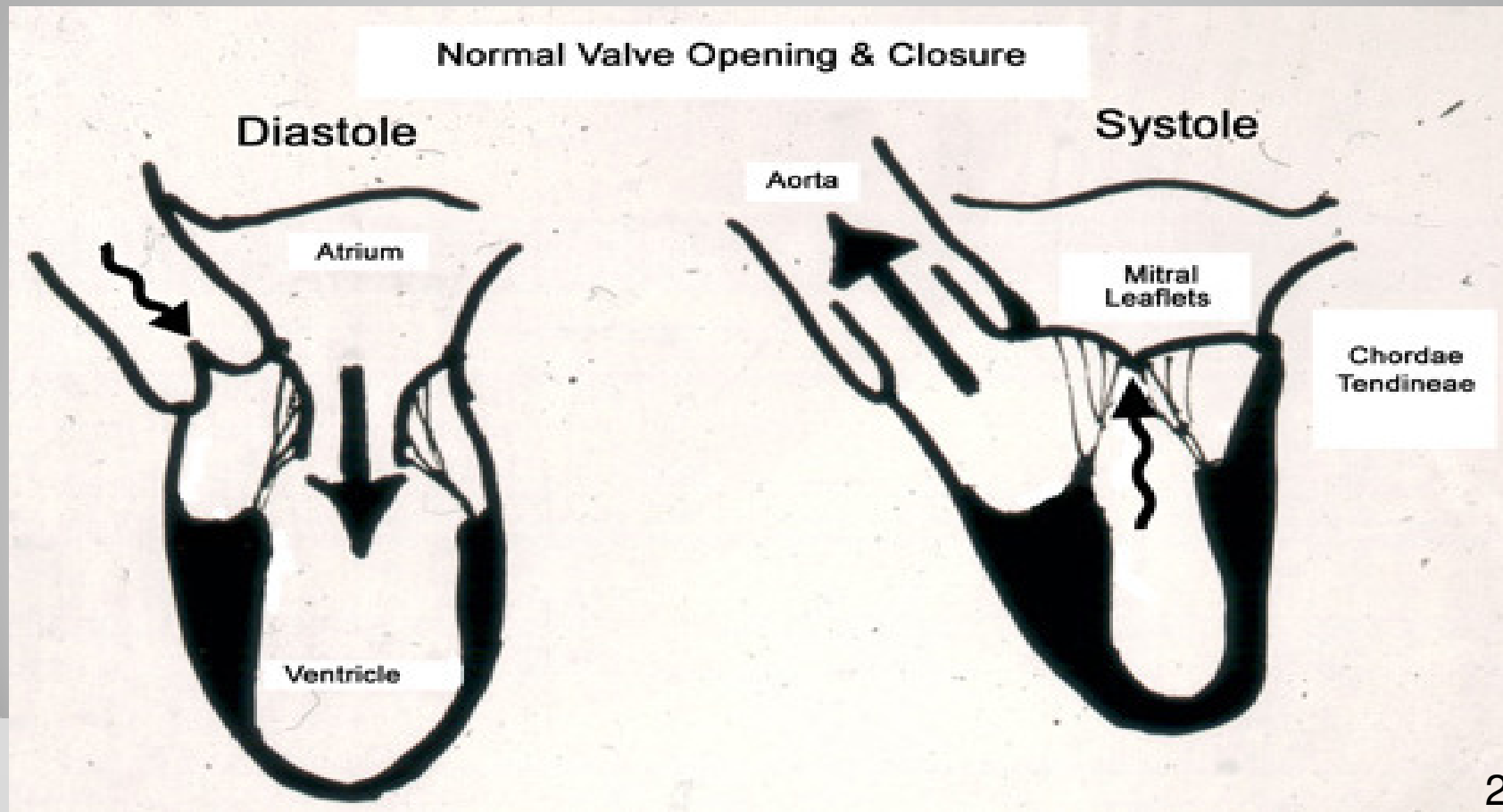
# Valvular Heart Disease

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Surat

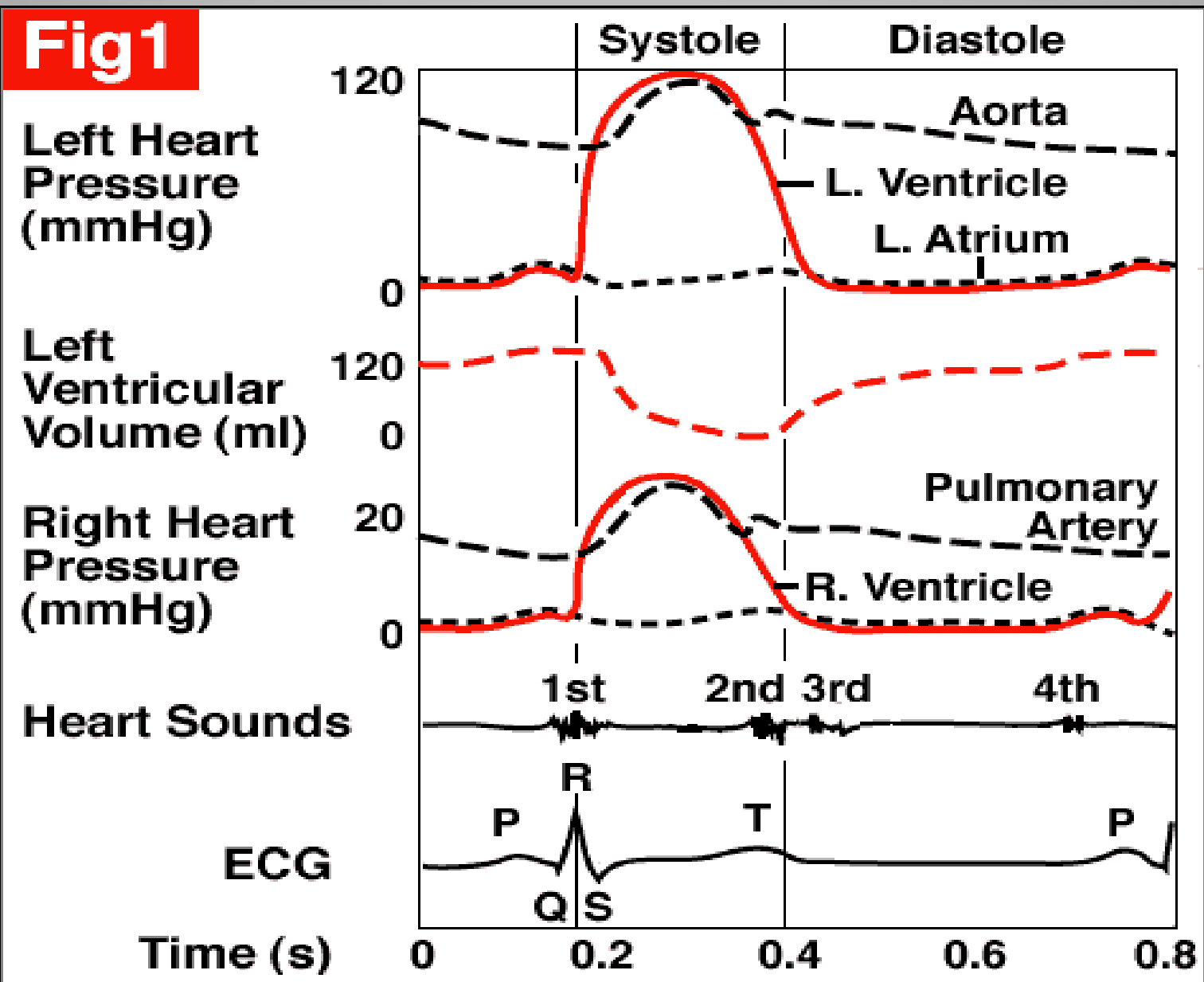
# ***Cardiac Physiology***

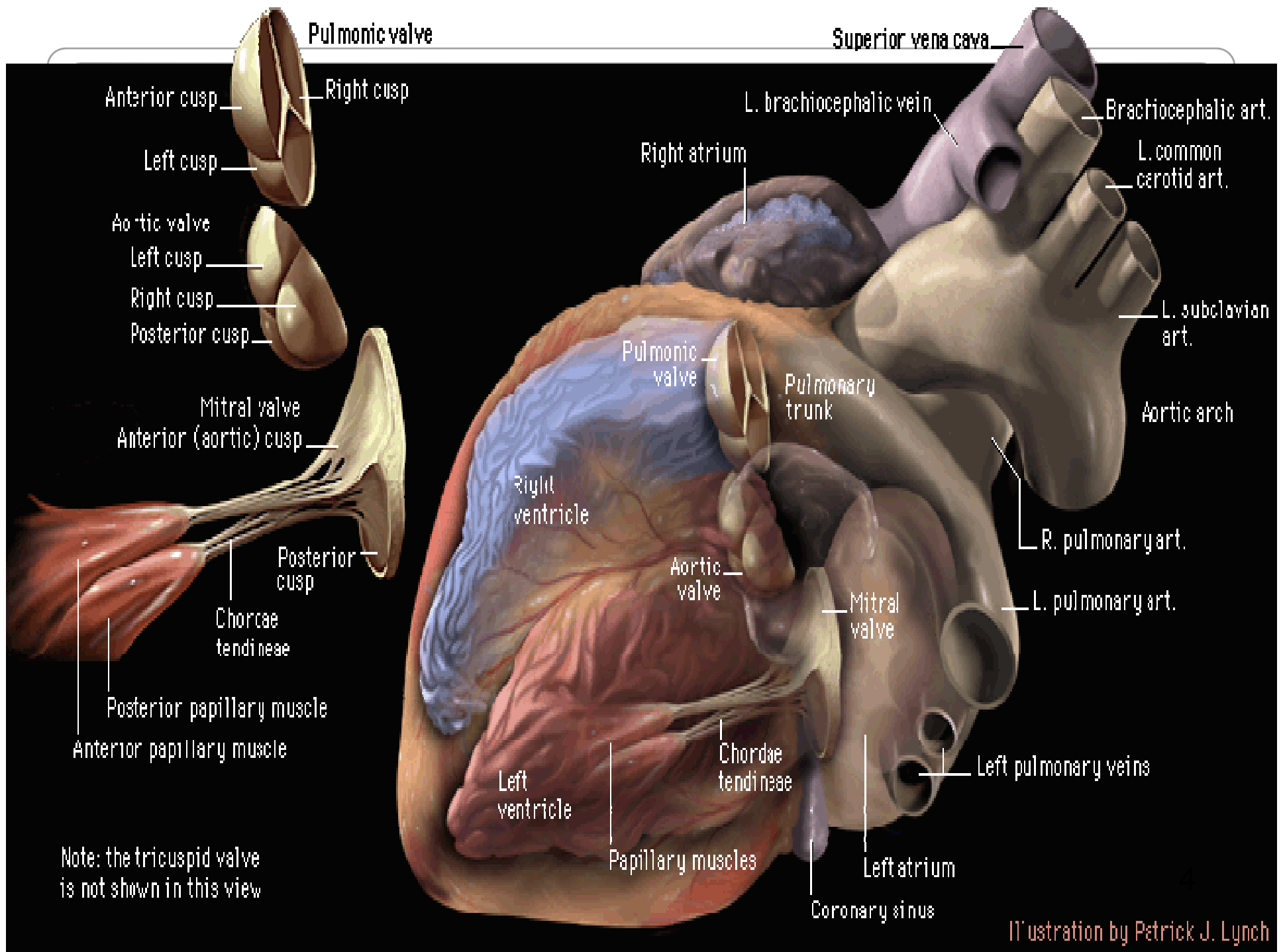
**Systole = Ventricular Contraction**

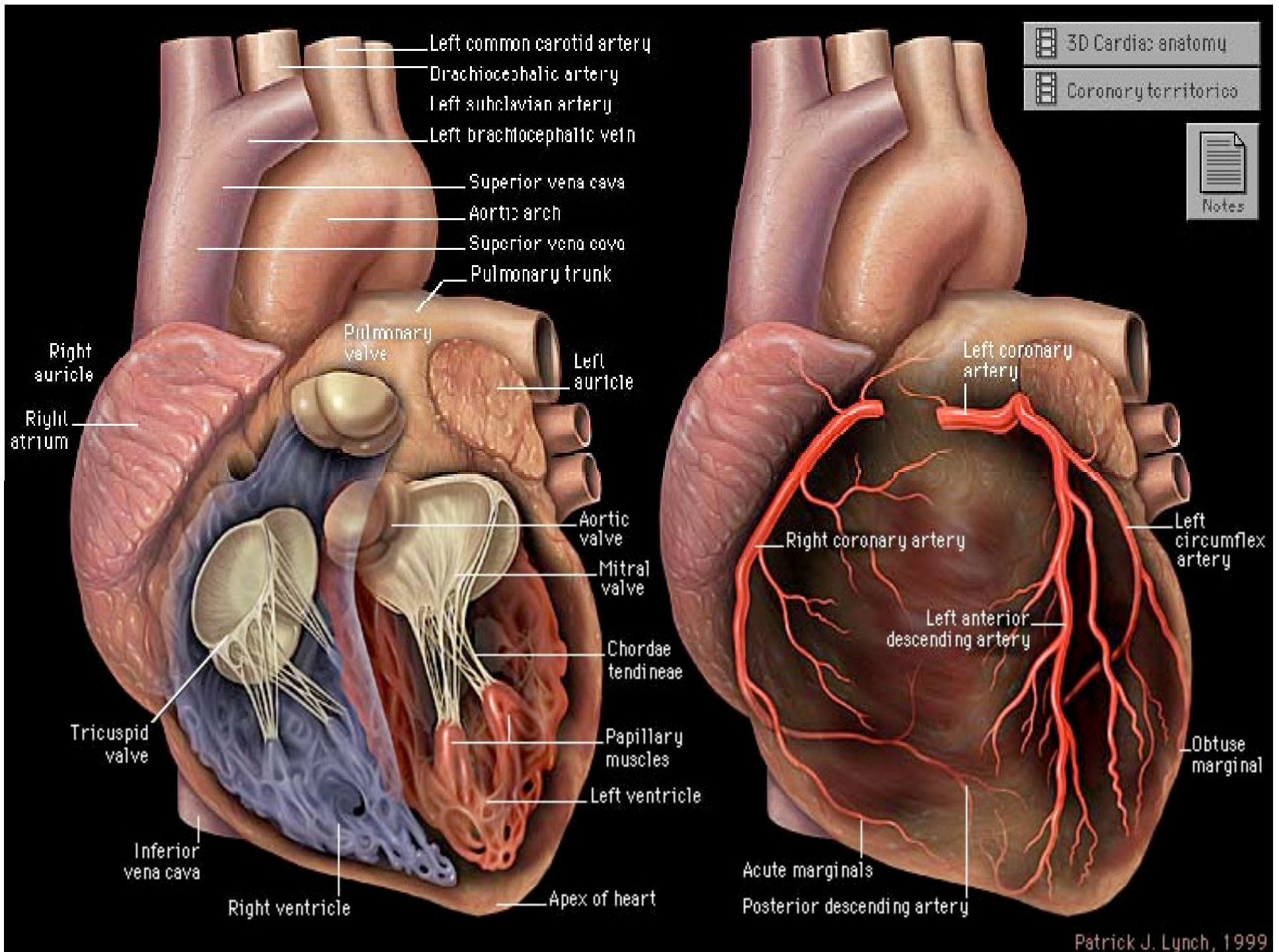
**Diastole = Atrial Filling**



# Cardiac Physiology







## Type of Valvular Defect

### Regurgitation

- Incomplete Closing of Valve
- leaking (*backflow*) of blood across a **closed** valve

### Stenosis

- Incomplete Opening of Valve
- Obstruction of (forward) flow across an **opened** valve

## Type of Murmur

- Systole Murmur

- Aortic Stenosis = Incomplete Opening of Aortic Valve
- Mitral Regurgitation = Incomplete closing of Mitral Valve

- Diastole Murmur

- Aortic Regurgitation = Incomplete closing of Aortic Valve
- Mitral Stenosis = Incomplete Opening of Mitral Valve

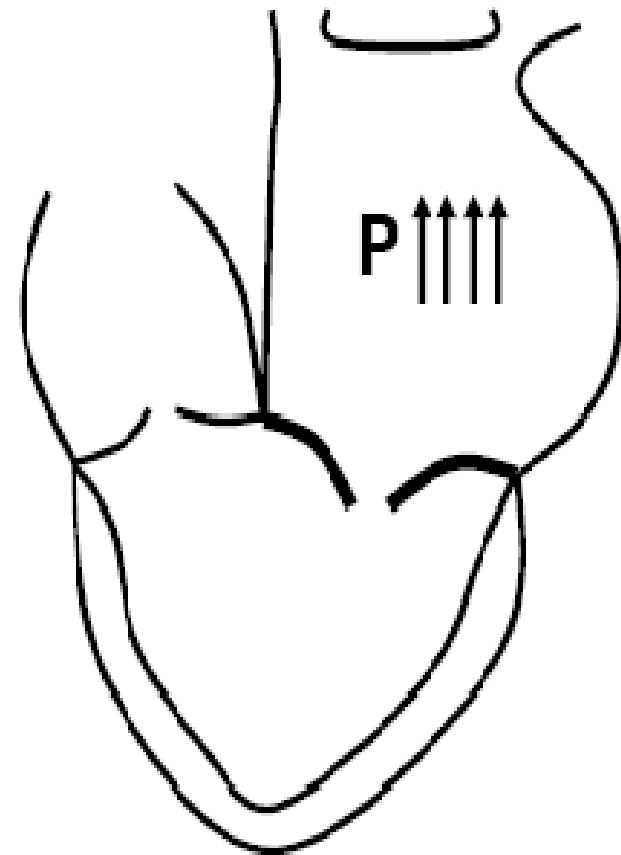
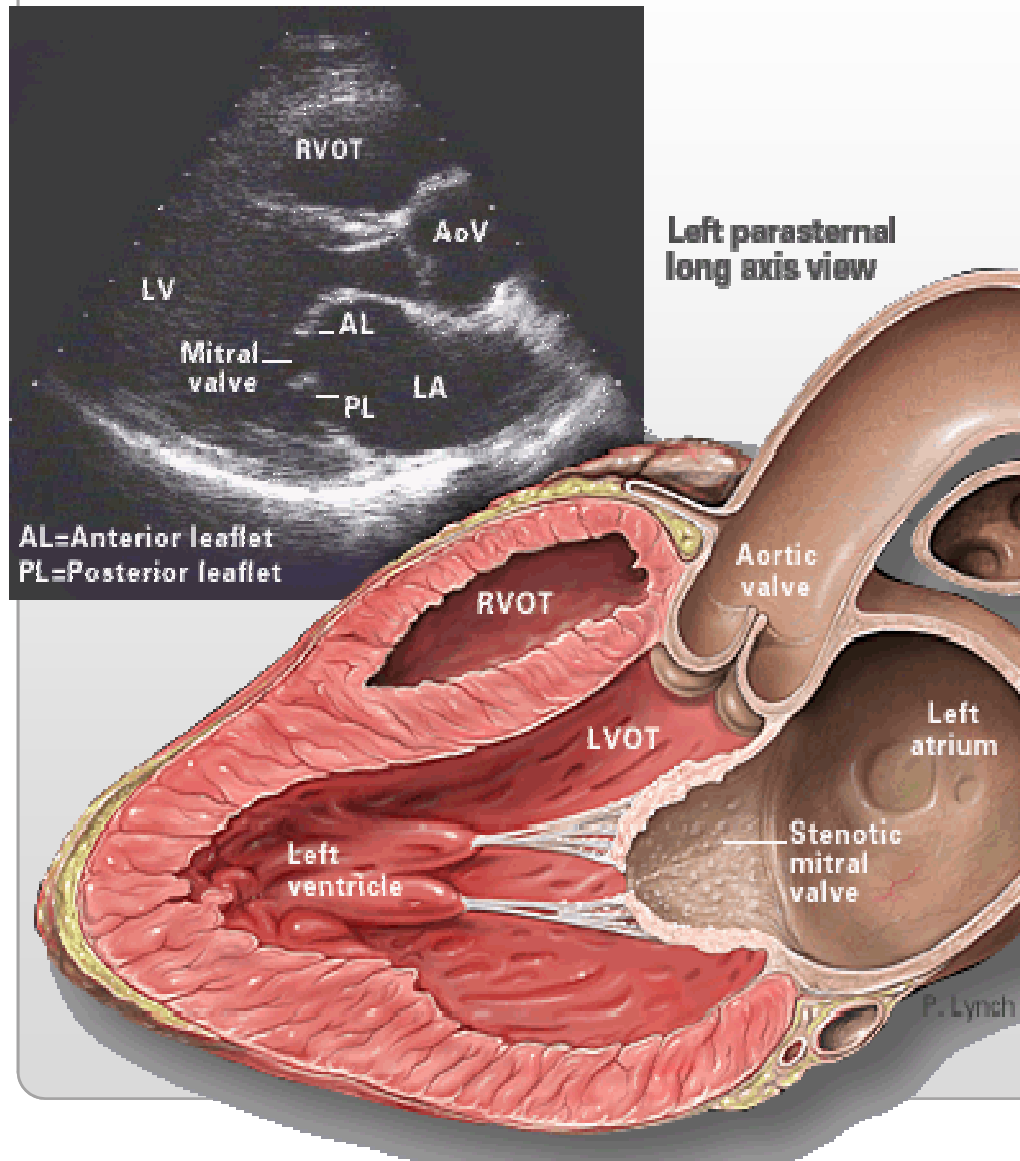
# Mitral Stenosis

## Etiology

- **Rheumatic disease**
- **Degenerative disease like Calcification**
- **Congenital valvular malformation**
- **Connective tissue disorders**
- **Post-inflammatory, metabolic syndromes**
- **Prosthetic valve – later after implant**



# Pathophysiology



Normal MV area = 4-6cm<sup>2</sup>  
Symptoms begin = < 2cm<sup>2</sup>  
Critical MS = < 1cm<sup>2</sup>

## **Pathophysiology**

- Increase in left atrial pressure
- Increase Pulmonary capillary
- Pulmonary venous congestion
- Decrease Diastolic filling
- Atrial contraction
- Left Atrial dilation
  - Atrial fibrillation
  - Thrombos formation

# Mitral Stenosis

## Clinical Presentations

### Symptom

- Asymptomatic
- Syncopal attack
- Palpitation
- Dyspnea
- Paroxysmal Nocturnal Dyspnea
- Orthopnea
- Hemoptysis

# Mitral Stenosis

## Sign

- Tachapnia
- Tachycardia
- Hypotension
- Peripheral edema
- Pulmonary edema
  - Bilateral Basal lungs Fine Crepitation
- Diastolic Murmur
-

# Mitral Stenosis

## Diagnosis

- Clinical
  - Loud S1 and P2 (pulmonary hypertension)
  - Mid diastolic murmur
  - Opening Snap indicating pliable leaflets
- ECG
  - P Mitrale: broad, notched P wave in II and V1
  - Right Ventricular Hypertrophy (RVH)
  - Rightward axis deviation
  - Significant Pulmonary H.T.

# Mitral Stenosis

## Investigation

- CXR
  - Left Atrial enlargement
  - increased Lower lobe vascularity
  - Kerley B and A lines
  - Dilated Pulmonary Arteries
  - Mitral Valve calcification
- 2D-ECHO & Doppler Study
- Cardiac catheterization

# Mitral Stenosis

- **Asymptomatic**
  - No specific therapy
  - Endocarditis prophylaxis & Rheumatic fever prophylaxis
    - Inj Benzathine Penicilline
    - Tab Erythromycin
- **Mild and Moderate MS**
  - Can do Normal Physical activity
  - Restrict Physical Activity
  - No specific therapy
  - Endocarditis prophylaxis & Rheumatic fever prophylaxis
  - If Atrial Fibrillation
    - Restoration of Normal Sinus Rhythm
      - Anti-arrhythmic drugs = ??????
    - Anticoagulation = ?????

## **Moderate to Severe Mitral Stenosis**

### **Medical Therapy**

#### **To Relieve Congestion**

- Diuretics
- Digoxin
- Dobutamin
- Beta and Calcium Channel
- Vaso-dilator
  - Arterial dilator
  - Venous dilator
  - Both dilator



# Mitral Stenosis

## Management Principles

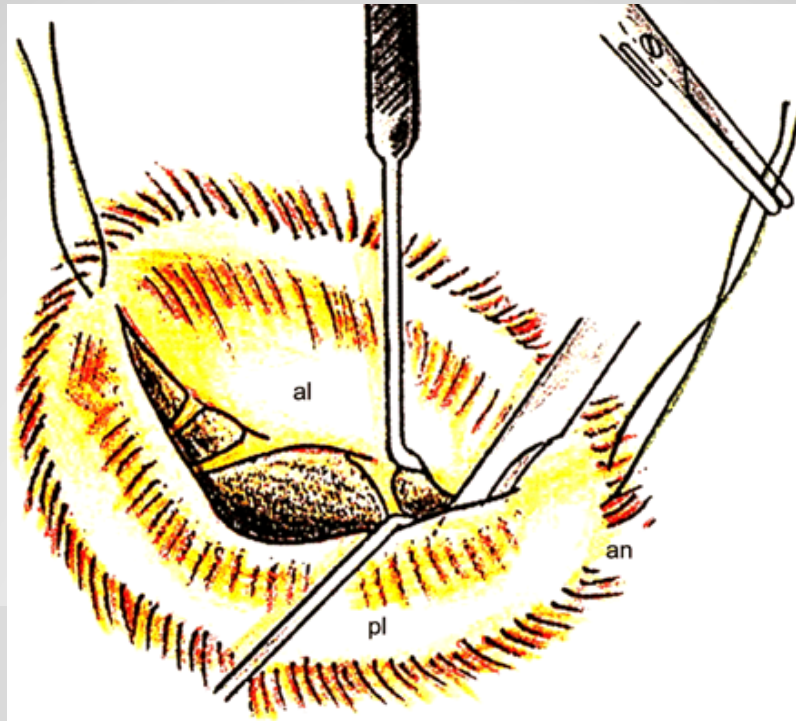
- Severe MS
  - is usually symptomatic
  - Percutaneous Ballon Valvuloplasty
  - Success of Ballon valvularplasty depends on the valve anatomy
  - Complications: severe MR, embolization and cardiac perforation



# Mitral Stenosis

## Surgical Therapy

- Open Commisurotomy – valve repair
- Mitral Valve Replacement



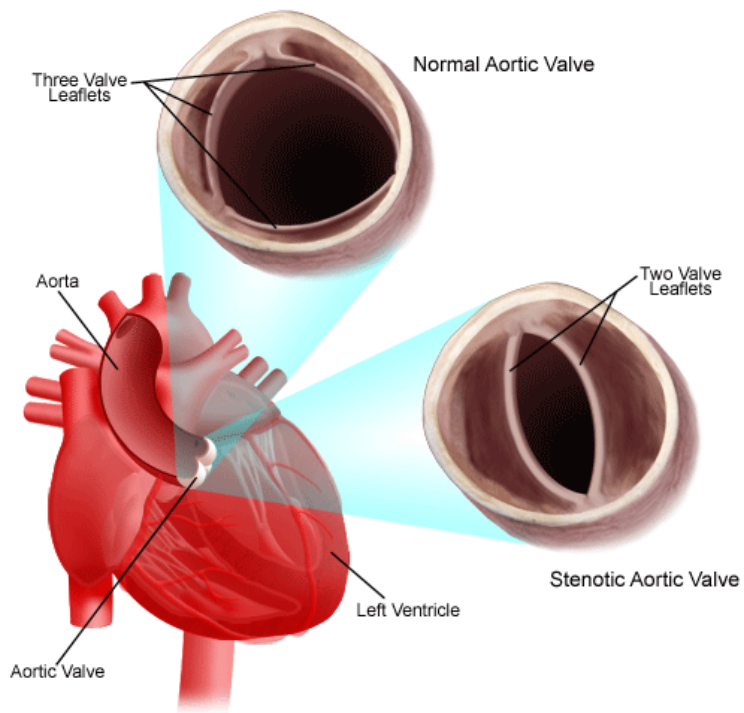
# Aortic Stenosis

## Etiology

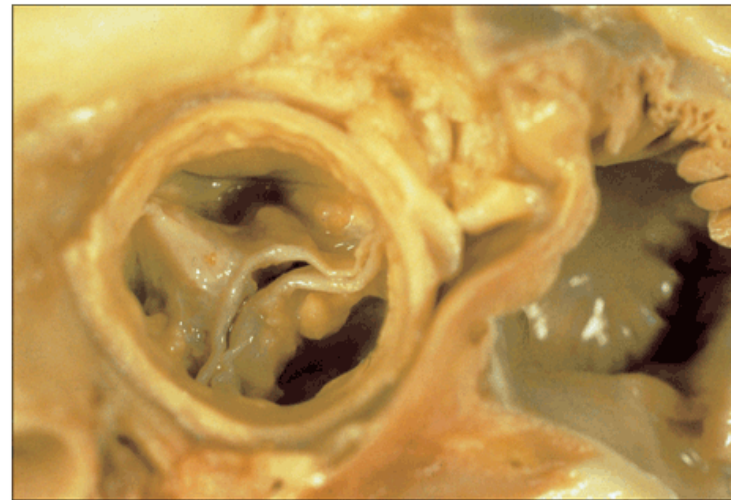
- **Degenerative / Calcification**
- **Rheumatic**
- **Co-arctation of Aorta**
- **Ventricular Septal Defect**
- **Congenital valvular malformation**
- **Connective tissue disorders**
- **Post-inflammatory, metabolic syndromes**

# Aortic Stenosis

An Example of Aortic Stenosis



## Bicuspid Aortic Valve Stenosis



# **Aortic Stenosis – pathophysiology**

- **Increase Preload**
  - **Left Ventricular Congestion**
  - **Left Ventricular Dilatation**
  - **Left Ventricular Hypertrophy**
  - **Left Atrial Congestion**
  - **Left Ventricular Failure**
  - **Pulmonary Hypertension**
  - **Right Heart Failure**
- **Decrease After-load**
  - **Decrease Cardiac output**
  - **Decrease Systolic blood pressure**
  - **Decrease peripheral – vital organ circulation**
  - **Low Perfusion & Hypoxia to Vital Organ**
    - **Brain , Kidney, Heart**

# Aortic Stenosis

## Symptoms

- *Angina*
- *Syncope*
- *Breathlessness*
- *Paroxymal Noctural Dyspnea (PND)*
- *Coughing*
- *Peripheral Limb Edema*
- *Fatigue*
- *Palpitation*

# Aortic Stenosis

## Prognosis with Symptomatic Aortic Stenosis

<b>Clinical Symptoms</b>	<b>Median Survival</b>
<b>Angina</b>	<b>5 years</b>
<b>Syncope</b>	<b>3 years</b>
<b>CHF</b>	<b>2 years</b>

# Aortic Stenosis

- **Sign :**

- Hypotension
- Tachypnia
- Bounding Apex beat
- Pulsus Parvus Et Tardus
  - Low Volume Pulse
  - Bounding pulse
- Systolic thrill – Vibration of Peripheral Pulsation
- Crepitation in Respiratory System
- Systolic murmur
- Limb Edema
- Positive Hepato-Jugular Reflex



# Aortic Stenosis

- ECG

- Sign of LVH with strain & Left Axis Deviation
  - Wide & High amplitude of QRS complex in V3 to V6

- CXR

- Dilated ascending aorta (post-stenotic dilatation)
- Congestion in Lungs Shadow
- Widen Left lower heart border.
- (Boot shape heart shadow)

- Echo (primary diagnostic modality)

- Left Ventricular Dilatation & Hypertrophy
- Aortic Valve anatomy – Decrease Aortic valvular opening
- Classified - Mild Vs Moderate Vs Severe AS
- Blood flow through Aortic valve decrease
- Increase Left ventricular Pressure

# Aortic Stenosis

- **Asymptomatic (Mild AS)**

- No specific therapy
- Endocarditis prophylaxis & Rheumatic fever prophylaxis
  - Inj Benzathine Penicilline
  - Tab Erythromycin

- **Mild and Moderate MS**

- Can do Normal Physical activity
- Restrict Physical Activity
- No specific therapy
- Endocarditis prophylaxis & Rheumatic fever prophylaxis
- If Atrial Fibrillation
  - Restoration of Normal Sinus Rhythm
    - Anti-arrhythmic drugs = Aminoderone , Beta Blocker
  - Anticoagulation
    - Aspirin , Clopidogrel, Warffarin

## **Moderate to Severe Aortic Stenosis**

### **Medical Therapy**

#### **To Relieve Congestion**

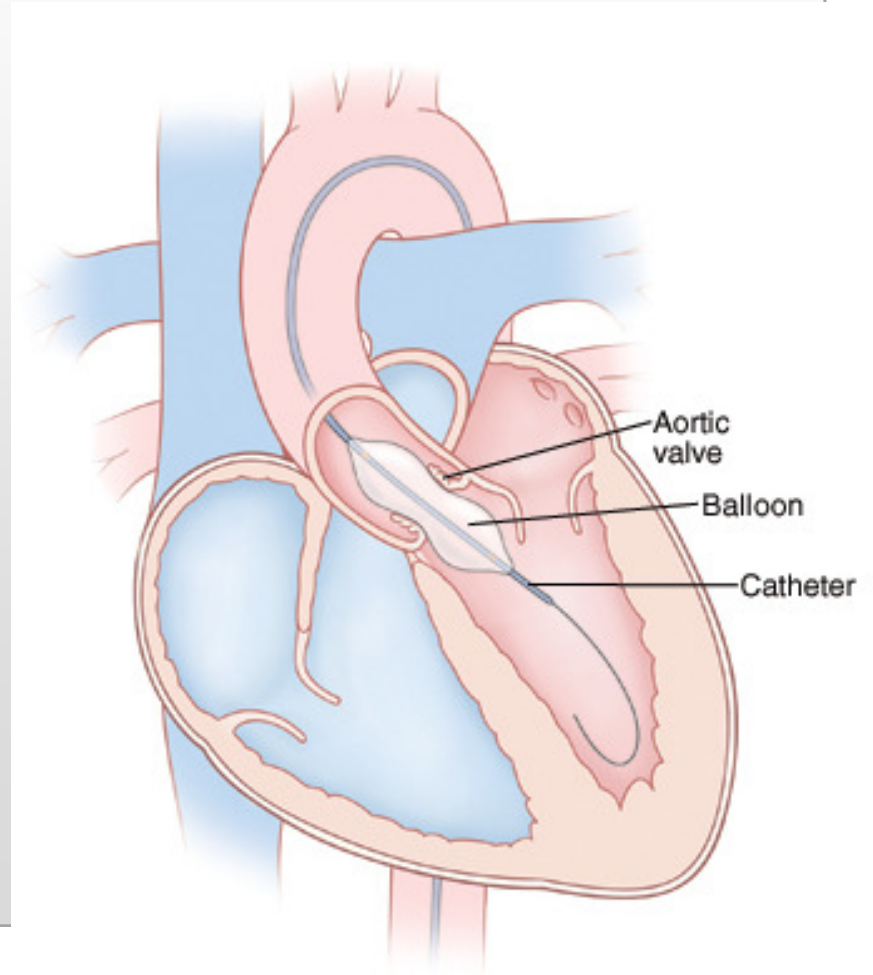
- Diuretics
  - Potassium Sparing - Spironolactone, Aldactone
  - Non Potassium Sparing – Furosemide
- Digoxin
- Dobutamin
- ACE Inhibitor – Enalapril , Remipril

# Aortic Stenosis

- **Interventional Management - Nonsurgical**

- **Balloon Valvuloplasty**

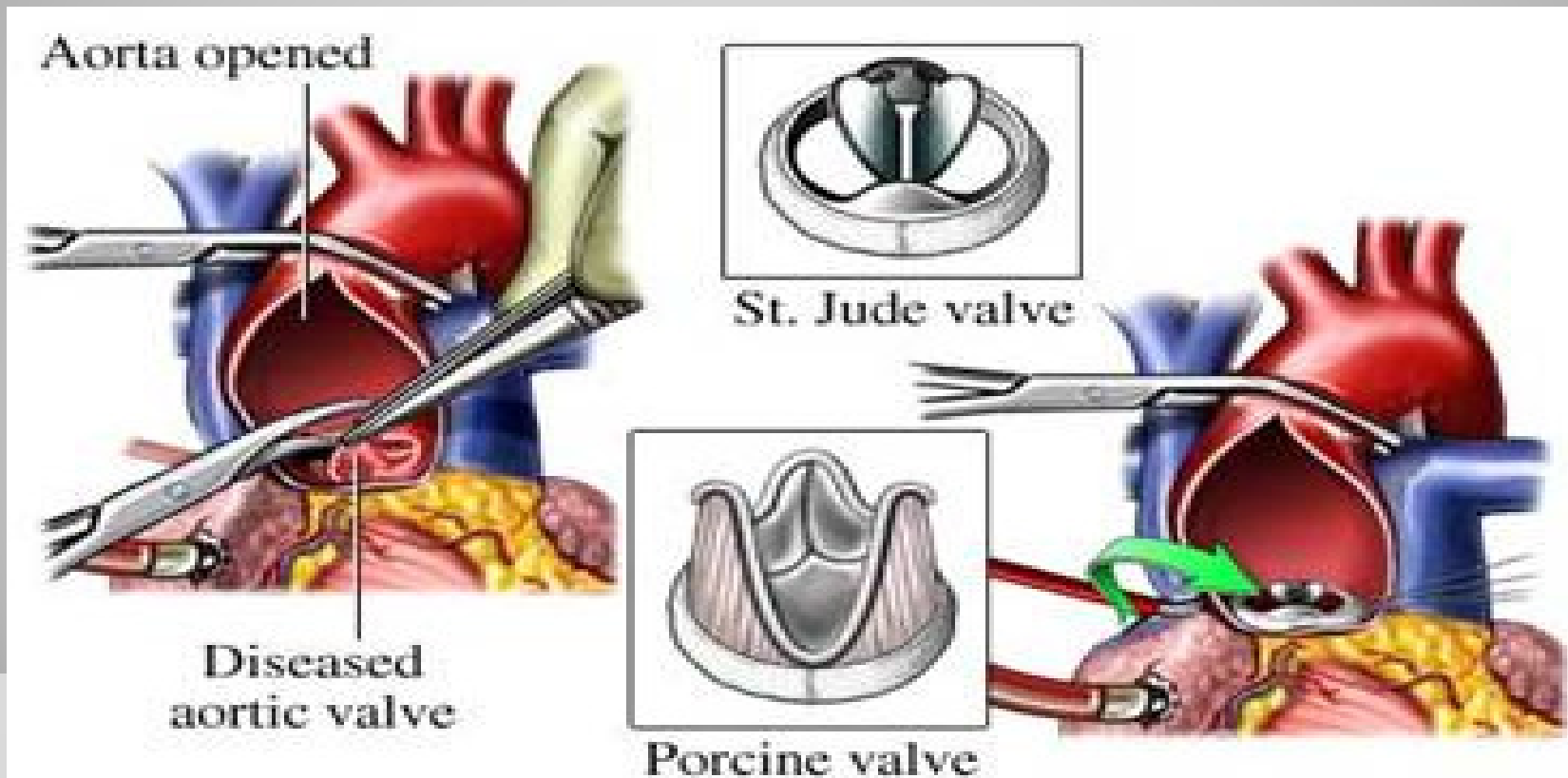
- Only a palliative treatment
- Complication
  - Valvular Rupture
  - Aortic Regurgitation
  - Embolism



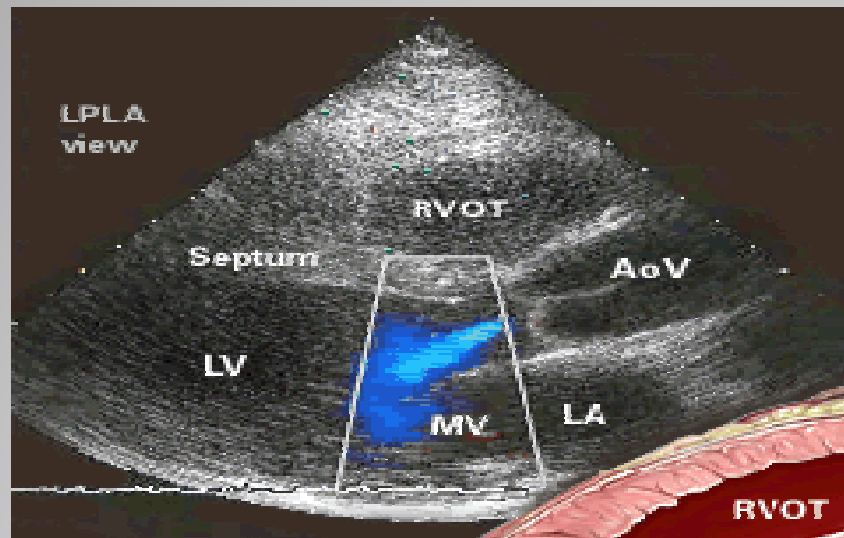
# Aortic Stenosis

## Treatment of Symptomatic Aortic Stenosis or Decreased LV Function

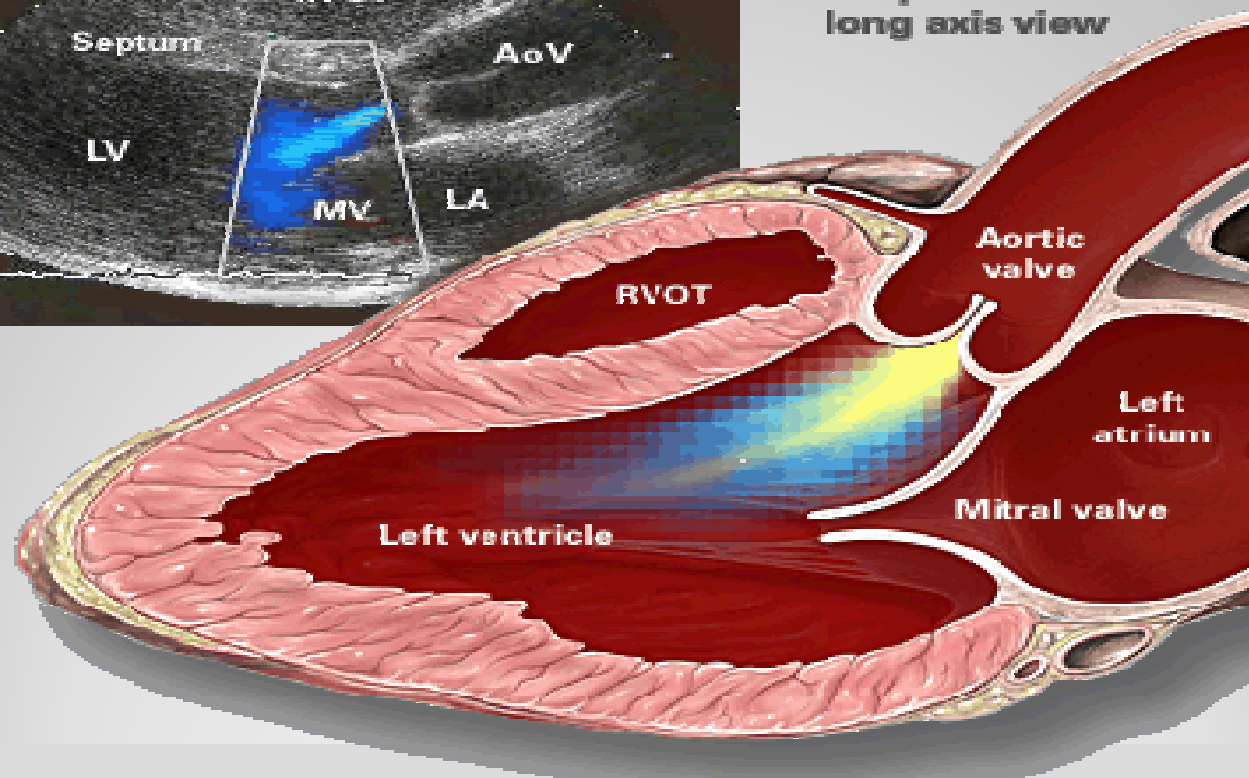
- Aortic Valve Replacement
  - Bioprosthetic vs Mechanical AVR



# Aortic Regurgitation



Left parasternal long axis view

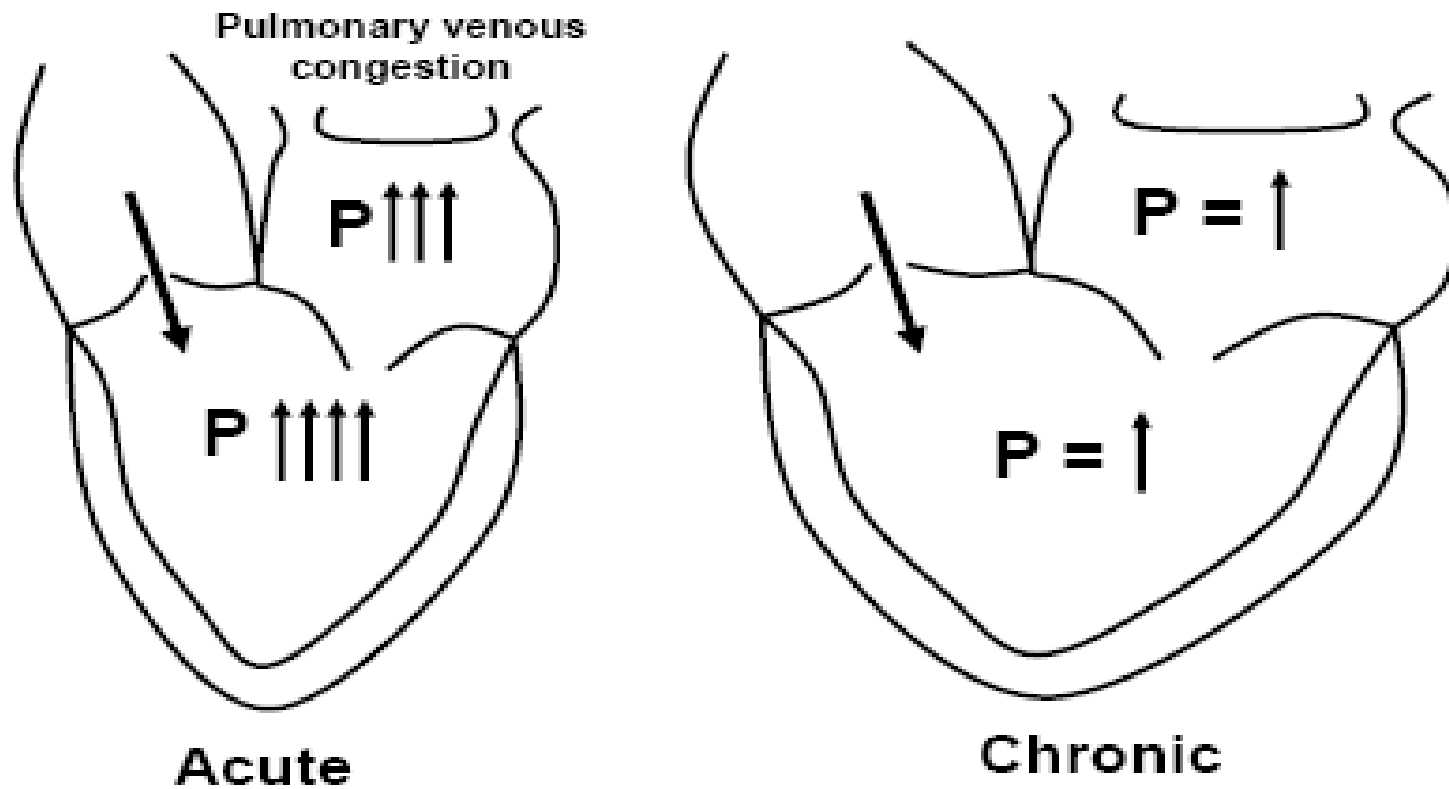


# Aortic Regurgitation

## Etiologies

- **Abnormalities of the Leaflets**
  - *Rheumatic disease*
  - *Degenerative*
  - *Endocarditis*
- **Dilation of the Aortic Annulus**
  - *Aortic Aneurysm / Dissection*
  - *Inflammatory* (Syphillis, Giant Cell Arteritis.)
  - *Inheritable* (Marfans syndrome, Osteogenesis Imperfecta)

## Pathophysiology of Aortic Regurgitation





# Aortic Regurgitation – pathophysiology

- Increase Pre-Load & After Load
- Dilatation of Left Ventricle & Atrium
- Pulmonary Hypertension
- Mitral regurgitation
- **Wide Pulse Pressure ( Increase Mean Pressure)**
  - Increase Stroke Volume – Increase Systolic BP
  - Increase Regurgitation volume – Low Diastolic BP
- Decrease Diastolic blood pressure
  - Decrease perfusion pressure in tissue

# Aortic Regurgitation

## Symptoms

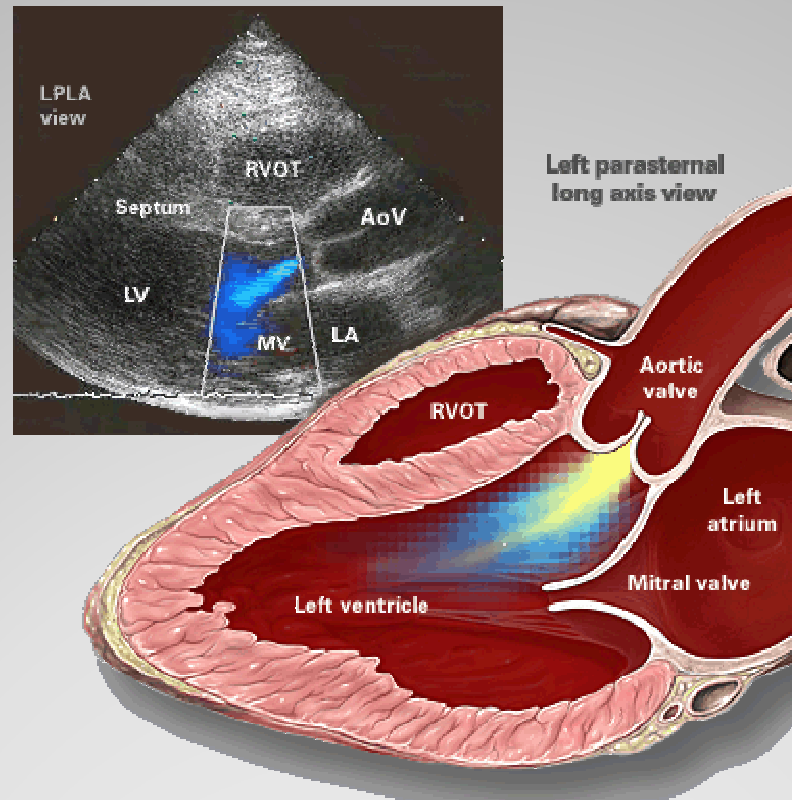
- Asymptomatic
- Breathlessness
- Fatigue
- Palpitation

# Aortic Regurgitation

## Sign in Systemic Examination

- Increase Systolic BP
- Decrease Diastolic BP
- Diastolic Blowing Murmur
- Hyperdynamic LV apical impulse
- Bounding Pulses
- Diastolic Murmur
- **"Austin Flint Murmur"**
  - A murmur due to aortic regurgitation, originating at the mitral valve when blood enters simultaneously from both the aorta and the left atrium
- Creapitation in Lower Zone of Lungs

# Austin Flint Murmur



**Due to the vibration of the anterior leaflet of the mitral valve as it is thrilled by the blood jets from the left atrium and the aorta.**

# Aortic Regurgitation

- **ECG**

- **LVH & Left Axis Deviation**
  - **Wide & High amplitude of QRS complex in V3 to V6**
- **Left Atrial Dilatation**
  - **p-Mitral = Wide p wave**

- **CXR**

- **Congestion in Lungs Shadow**
- **Widen & Straight Left heart border.**
- **Cardiomegaly**

- **Echo (primary diagnostic modality)**

- **Left Ventricular & Atrial Dilatation & Hypertrophy**
- **Aortic Valve anatomy – Defect in Aortic valvular closing**
  - **Reverse Blood flow through Aortic valve**

# **Aortic Regurgitation Management**

**Same Like Aortic Stenosis**

*If you're not confused,  
you're not paying  
attention.*

*Tom Peters*

# Mitral Regurgitation

## Etiologies

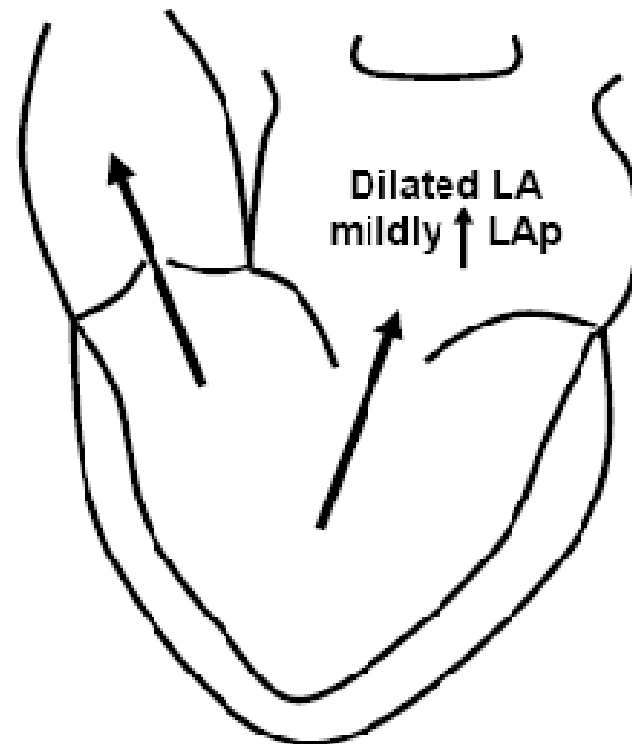
- ***Alterations of the Leaflets, Commissures, Annulus***
  - *Rheumatic disease*
  - *Mitral Valve Prolapse*
  - *Endocarditis*
- ***Alterations of LV or LA size and Function***
  - *Papillary Muscle (Ischemic, MI, Myocarditis, DCM)*
  - *LV Enlargement – Cardiomyopathies -*
  - *LA Enlargement from MS*



# Mitral Regurgitation – pathophysiology

## Pathophysiology

- **Eccentric hypertrophy**
  - Increased preload
  - Increased afterload
  - Increased total stroke volume AND forward stroke volume AND LVESV returns to normal
- **Increased LA size**
  - Increased LA compliance
  - Larger volume at lower pressure



**Chronic  
Compensated**

# Mitral Regurgitation

## Symptoms

- Fatigue and weakness
- Dyspnea and orthopnea
- Symptom of Right sided HF

## Sign

- Systolic Murmur
- Laterally displaced apical impulse
- Sign of Right Heart Failure