

A stylized, semi-transparent blue heart graphic is positioned on the left side of the slide. It shows the major vessels of the heart, including the aorta and coronary arteries, in a lighter blue shade against the darker blue background.

# **VALVULAR HEART DISEASE**

## **AORTIC VALVE DISEASE**

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# **Aortic Valve**

**Aortic Stenosis**

**Aortic Regurgitation**

# Aortic Stenosis: Narrowing of aortic valve

## Types of Aortic Stenosis

- **Valvular** (Most common)
- **Sub-valvular**: Fibrous ridge or diaphragm is situated immediately below aortic valve
- **Supravalvular**: congenital fibrous diaphragm above the aortic valve often associated with mental retardation and hypercalcemia ( Williams syndrome)

# Aortic Stenosis

## Physiologic Principles-Natural History

Normal aortic valve area is 3.0 - 4.0 cm<sup>2</sup>

Circulation affected when valve area is reduced by ~ 75% (i.e. 0.75 - 1.0 cm<sup>2</sup>)

	<u>Valve area (cm sq)</u>	<u>Gradient (mm Hg)*</u>
Mild	> 1.5	< 50
Moderate	1.0 - 1.5	50 - 75
Severe	< 1	> 75

### Onset of symptoms

0.9 cm<sup>2</sup> with CAD

0.7 cm<sup>2</sup> without CAD

\* assumes normal cardiac output

# Aortic Stenosis

## PATHOPHYSIOLOGY:

Pressure over load---- LV hypertrophy -----  
decrease LV compliance--- diastolic  
dysfunction--- increase left atrial pressure—  
AF + LV dilatation---Decrease cardiac  
output

# Aortic Stenosis – Etiology

## Young patient :congenital

- Bicuspid
  - 2% population
  - 3:1 male:female distribution
  - Co-existing coarctation 6% of patients

## Rarely

- Unicuspid valve
- Sub-aortic stenosis
  - Discrete
  - Diffuse (Tunnel)

## Middle aged patient(4&5<sup>th</sup> decades) :

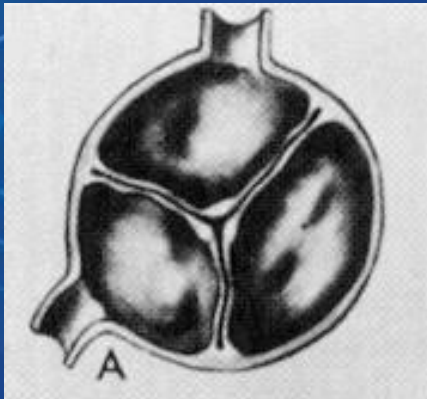
Bicuspid or  
Rheumatic disease

## Old patient: (6,7,8<sup>th</sup> decades)

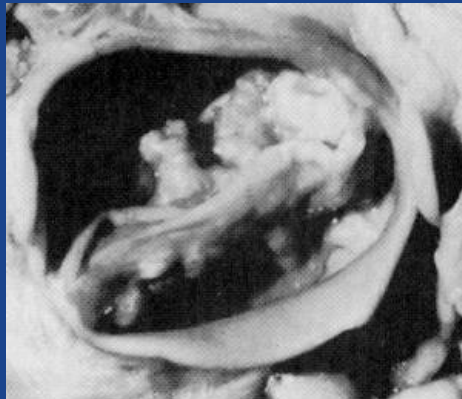
Degenerative

# Aortic Stenosis: Etiology

Congenital bicuspid valve is the most common abnormality  
Rheumatic heart disease and degeneration with calcification are found as well



Normal



Bicuspid Ao V

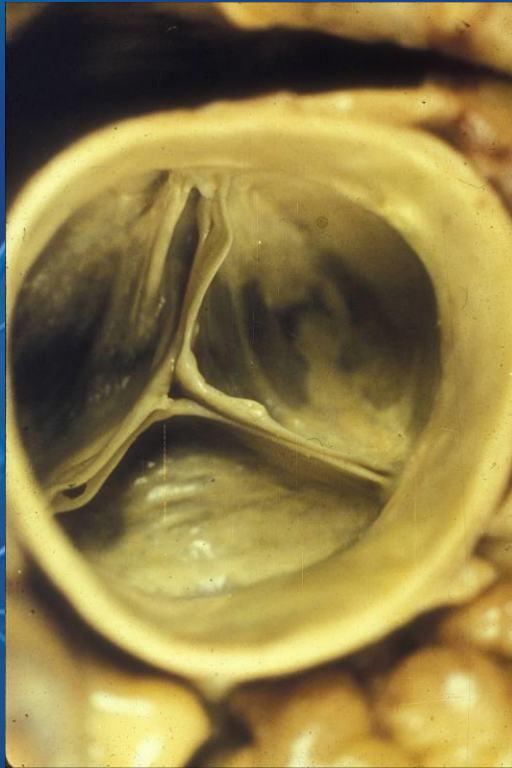


“Normal” geriatric  
calcific valve

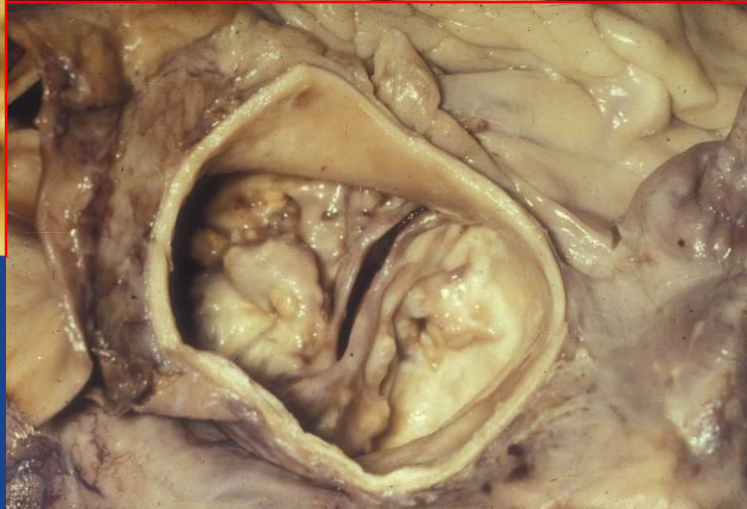


# ***Aortic Stenosis: Pathology***

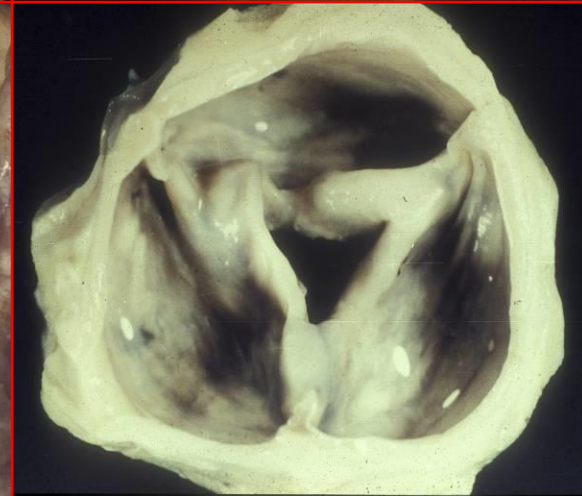
*Normal*



*Congenital*



*Acquired*

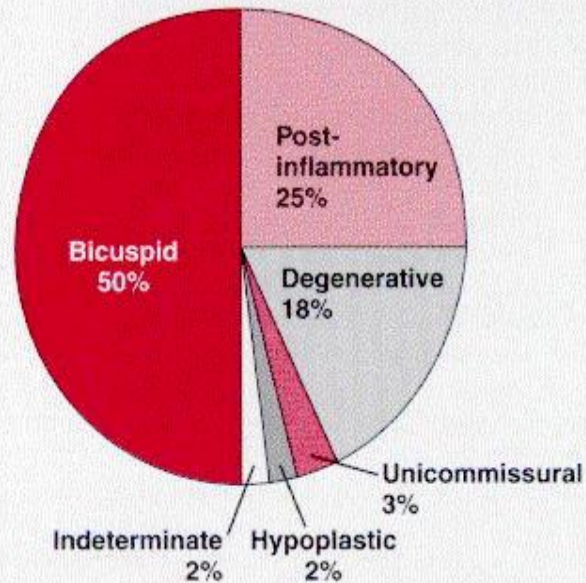




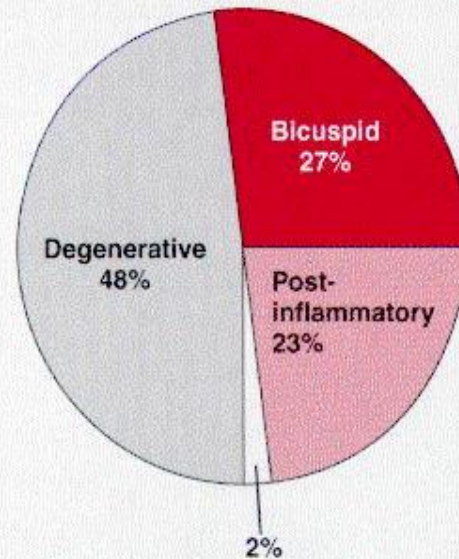
**AGE < 70**

*Etiology of  
Stenosis*  
**AGE > 70**

<70 YR OLD (n=324)



≥70 YR OLD (n=322)



*Aortic*

# Natural History

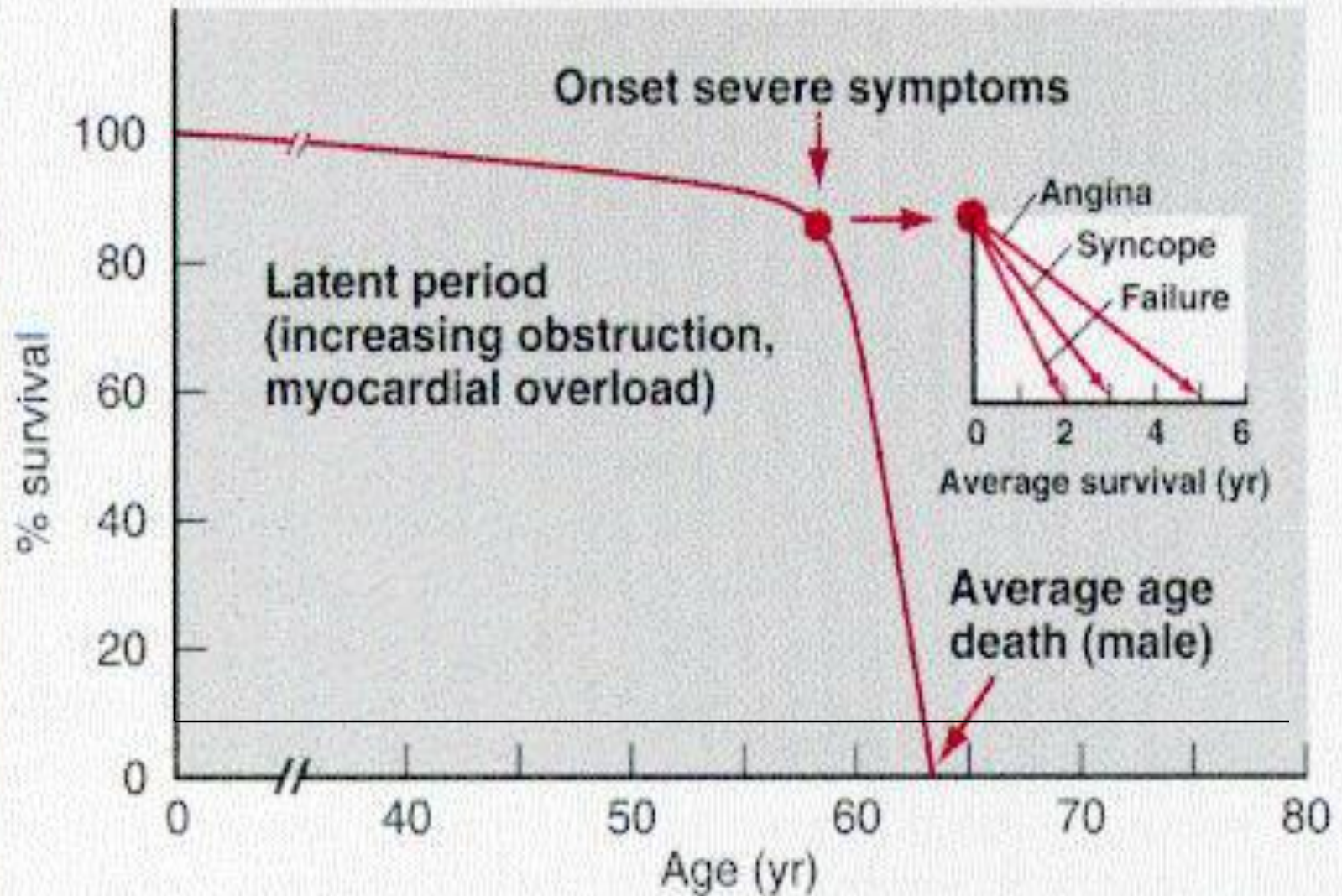
## Asymptomatic

- For many years

## SYMPTOMATIC:

Duration of symptoms until death

	<b>presentation</b>	<b>survival</b>
■ Angina -	35%,	3-5 years
■ Syncope -	15%	2 -3 years
■ CHF –	50%	1-2 years
■ Sudden death		



Ross J Jr, Braunwald E: Aortic stenosis. Circulation 38[Suppl V]:61, 1968

# Aortic Stenosis

## Vital Signs

- **Narrow pulse pressure**
- **Carotid pulse:** slow rising, small volume, delay

**Carotid area:** Systolic thrill

## Apex beat

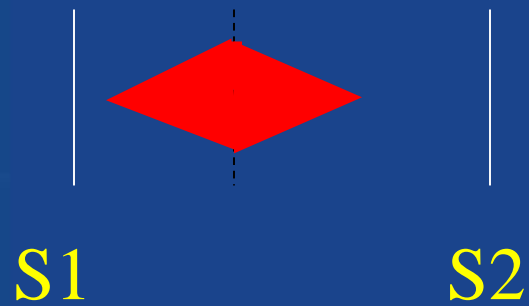
- **Normal or Displaced, Sustained**
- **Double impulse: sometimes**

## Ascultation

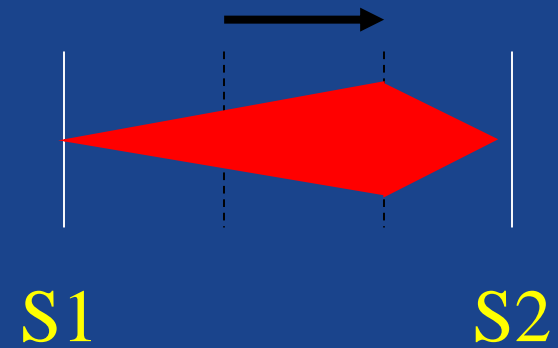
- **Soft A2, S4, reverse splitting of S2**
- **Murmur- Ejection Systolic, low pitch, radiated to carotid**



# Aortic Stenosis: Physical Findings



Mild-Moderate



Severe



# Aortic Stenosis

## Management Guidelines

### Initial Diagnostic Testing

- CXR, ECG,
- Echocardiography
- Lipids, renal function, Ca, P---
- Cardiac catheterization with angiography
  - If clinical and echo data are discordant
  - To assess coronary circulation prior to surgery

# Aortic Stenosis-Investigation

## EKG

- Hypertrophy, Left atrial enlargement.

## CXR

- Cardiomegaly <50%, post-stenotic dilatation, calcification of aortic valve

## ECHO

- Confirm, Severity
- LVH, LV function

## LHC

- Severity, Coronary Artery Disease



# Doppler info



# Aortic Stenosis

## Management Guidelines

Avoid strenuous exercise

Avoid vasodilators (ACEI

Medical treatment for HF

### Scheduled Follow-up

	<u>office interval</u>	<u>echo interval</u>
Mild AS	12 months	5 yrs
Moderate AS	6 months	2 yrs
Severe AS	6 months	1 yr

# **Aortic Stenosis**

## **Management Guidelines**

### **Recommendations for Aortic Valve Replacement (AVR)**

#### **Class I**

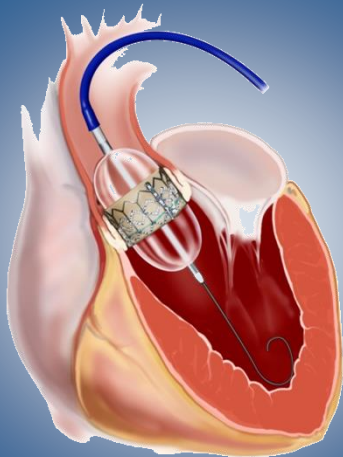
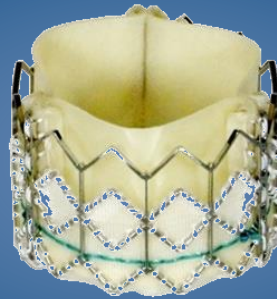
- Severe AS and symptoms
- Severe AS (with or without sx) and need for CABG, other valve replacement or aortic surgery

#### **Class IIa**

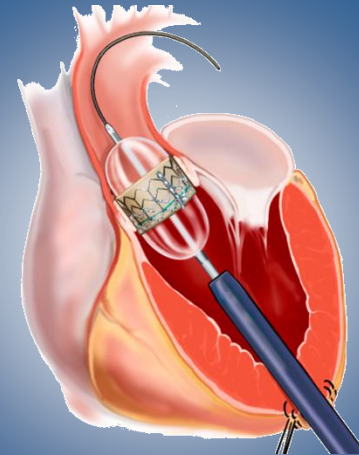
- Moderate AS and need for other cardiac surgery
- Asymptomatic severe AS and diminished LVEF or hypotensive response to exercise

# TAVR

## Transfemoral and Transapical



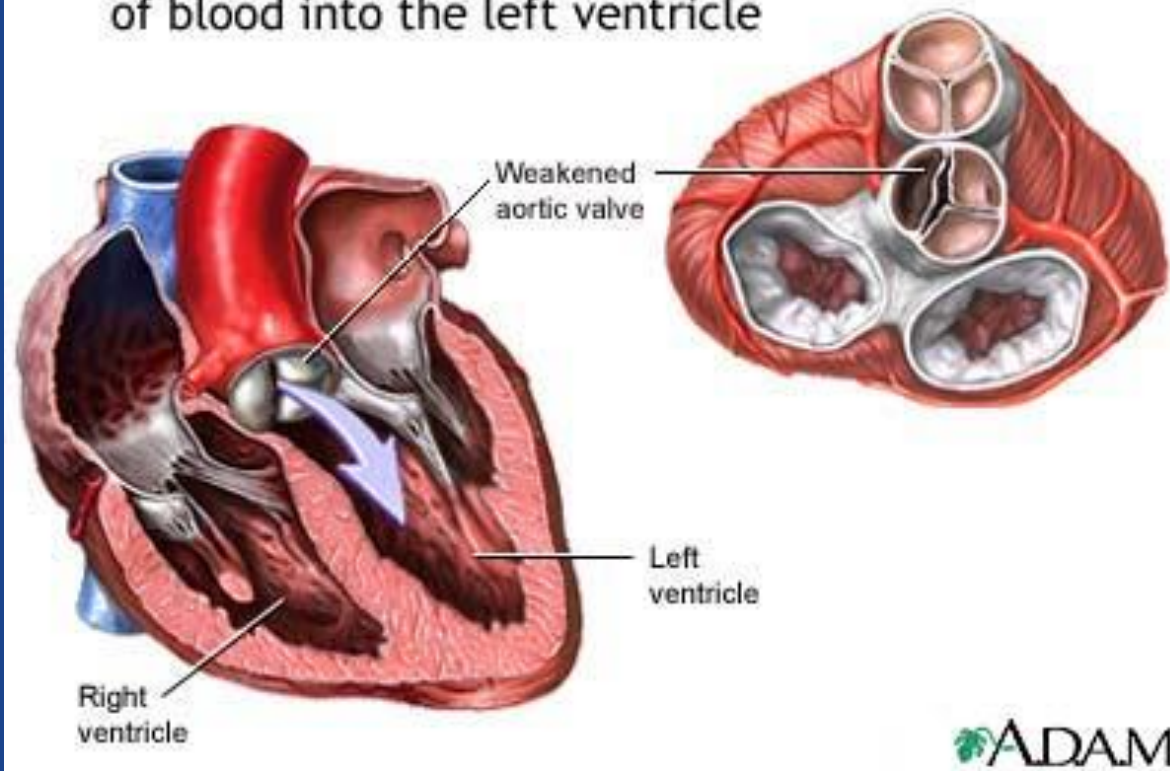
Transfemoral



Transapical

# Aortic Insufficiency

Failure of the aortic valve to close tightly causes back flow of blood into the left ventricle



# **Etiology of Acute Aortic Insufficiency:**

**1- Infective Endocarditis**

**2-Aortic Dissection**

**3- Trauma**

## **Etiology of Aortic Insufficiency:**

**1- Valvular disease**

**2- Aortic root disease**

### **1-Valvular Disease**

- **Rheumatic Heart Disease**
- **Infective Endocarditis**
- **Bicuspid valve**
- **Degenerative**
- **Trauma**
  - **Tear of the ascending aorta**



# Etiology of Aortic Insufficiency

## 2-Aortic root disease Dilatation(1/3 of patients)

- Systemic Hypertension
- Marfan's syndrome
- Ankylosing spondylitis, Rheumatoid arthritis
- Aortic root dissection, aneurysm
- Behcets syndrome
- Reiter's syndrome
- Cystic medial necrosis
- Decelerating injury
- Syphilitic aortitis: very rare

# Aortic Insufficiency

## Symptoms

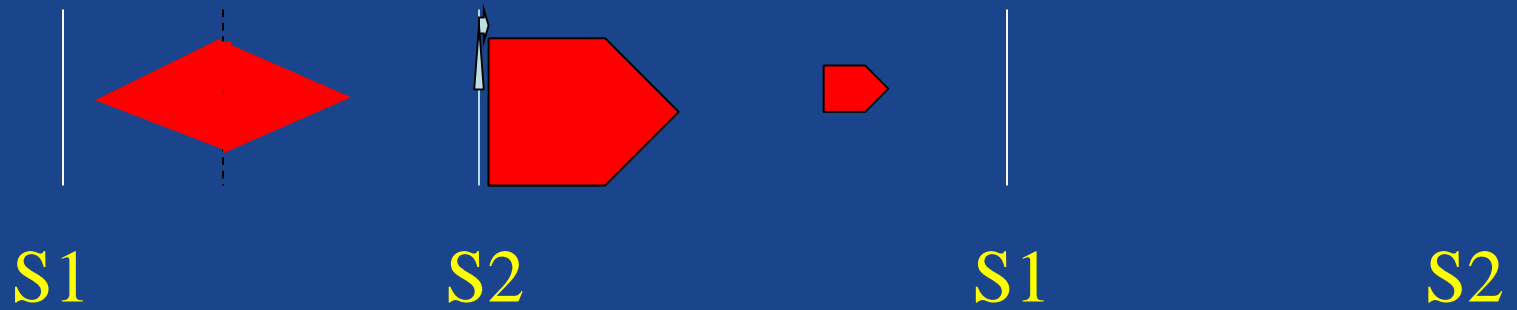
- Angina
- Palpitations
- CHF symptoms

# Signs of Aortic Insufficiency

## Pulses:

- Collapsing or water-hammer (Abrupt distension and quick collapse) : Corrigan's pulse
- Bisferiens pulse: two systolic peaks
- Traube's sign: pistol shot over the femoral artery
- Muller's sign: pulsation of the uvula
- Quincke's sign: capillary pulsation in the nail beds
- De Mussets Sign: rhythmical nodding of the head synchronous with the heart beat
- Duroziez's sign: a to-and fro murmur over femoral artery when pressure applied distally
- Pistol shot femoral: a sharp bang heard over femoral artery

# Aortic Regurgitation: Auscultatory Findings



# Chronic Aortic Regurgitation: Physical Findings

Widened Pulse Pressure > 70mmHg (170/60)

Low diastolic pressure <60mmHg

Hyperdynamic LV –

- DeMusset's signs
- Corrigan's pulse
- Quincke's pulsations,
- Durozier's murmur

Auscultation:

- Diminished A<sub>2</sub>
- Descrescendo diastolic blowing murmur @ LSB
- Austin-Flint murmur – diastolic flow rumble @ apex
  - Due to interference with trans-mitral filling by impingement from aortic regurgitant jet.
  - DDx - mitral stenosis(increases intensity with amyl nitrite)



## **Complication of AR**

**Endocarditis**

**LV dilatation and irreversible contractile dysfunction**

# AI- Investigations

## EKG

- LVH

## CXR

- Marked enlargement if AI is chronic

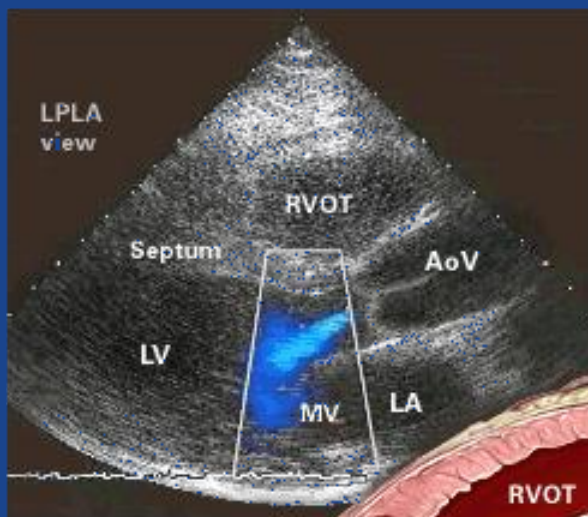
## ECHO

- Confirms/severity

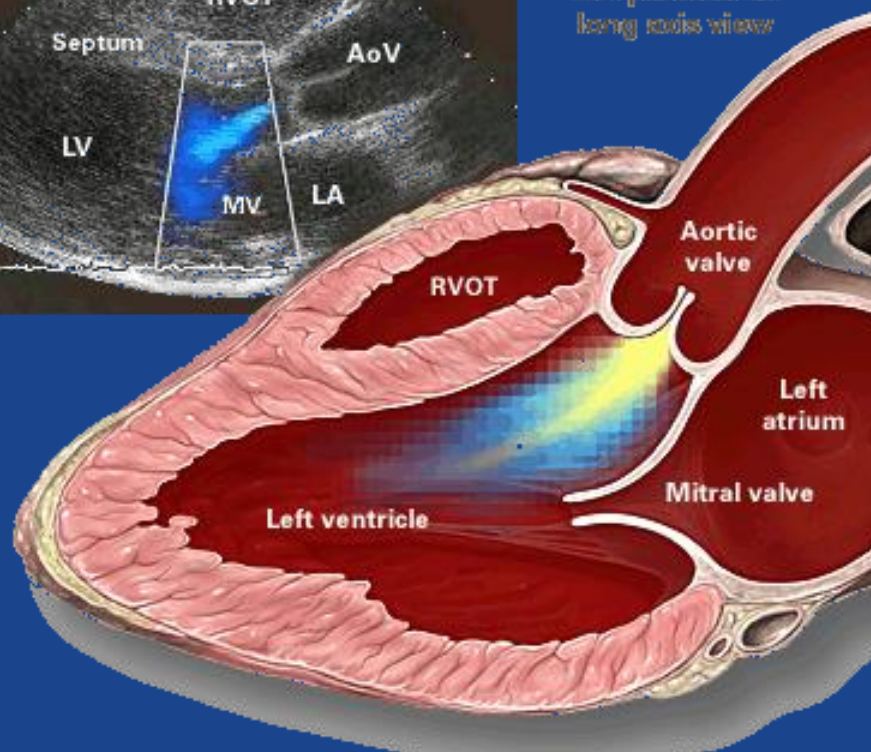
## LHC

- Severity/CAD





Left parasternal  
long axis view



# AI- Treatment

Follow clinically (q 6 mos)

- Asymptomatic with normal LV
- **SYMPTOMATIC**
- Digoxin: sever AR, LV dilatation
- Vasodilator, diuretics, digoxin : LV failure

**Surgical Treatement:**

**AVR: for valvular causes of aortic incompetence**

**AVR + root replacement: for aortic root dilatation of AI**

***THANK YOU***

