VALVULAR HEART DISEASES & DEFORMITIES

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OBJECTIVES

- Definition
- Etiology
- Morphologic changes
- Effects

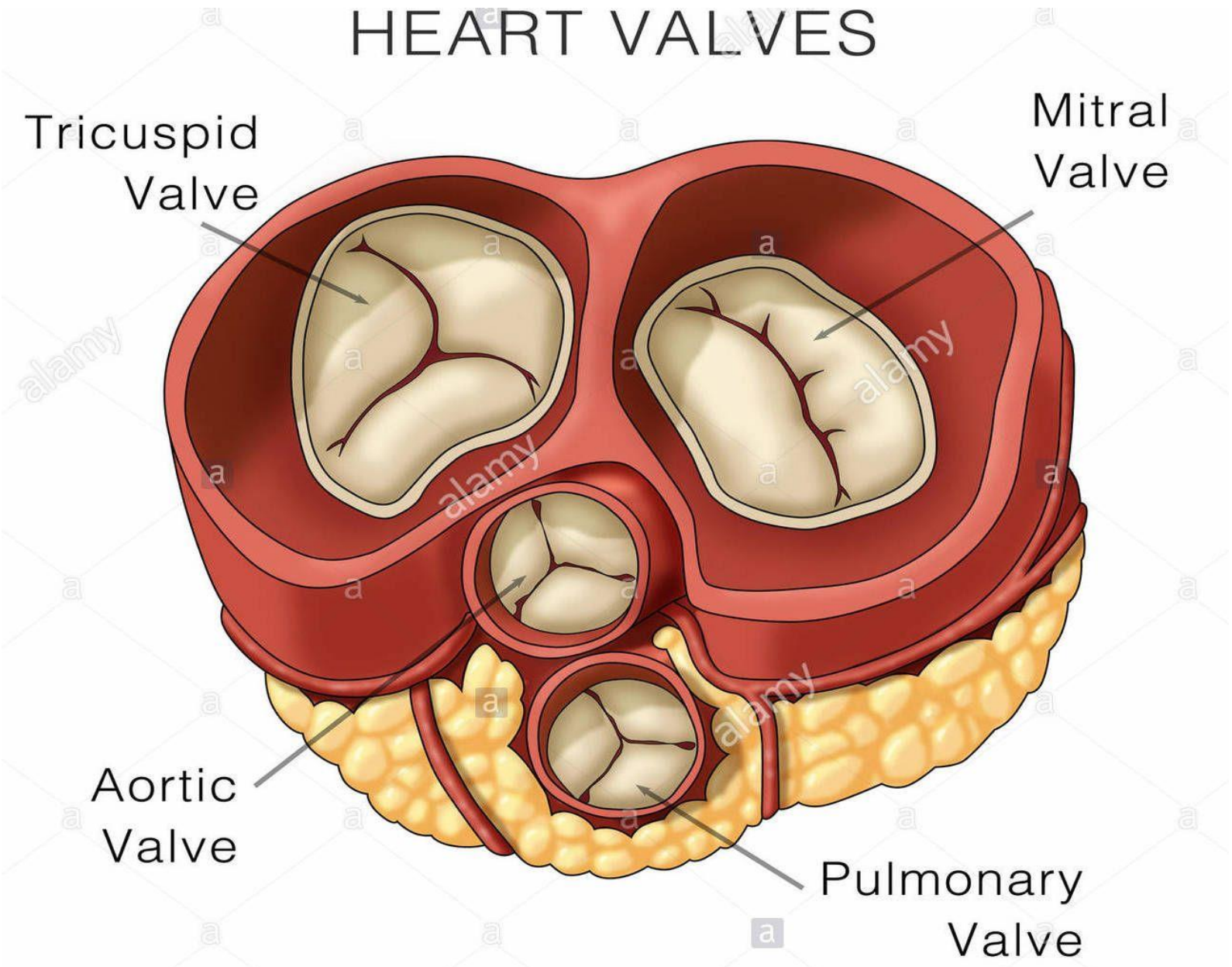
INTRODUCTION

- Valvular diseases are either congenital or acquired which causes valvular deformities.
- Many of them result in cardiac failure.
- Rheumatic heart disease is the most common form of acquired valvular disease

Introduction

- Valves of the **left side** of the heart are involved much more frequently than those of the **right side** of the heart.

- The order of most to least affect valves:
  1. the **mitral valve** is affected most often,
  2. the **aortic valve**,
  3. combined **mitral** and **aortic** valve


HEART VALVES
Tricuspid Valve
Mitral Valve
Aortic Valve
Pulmonary Valve

TYPES OF DEFORMITIES

- The valvular deformities may be of 2 types:

1. stenosis (narrow)
2. Insufficiency (Leaky)

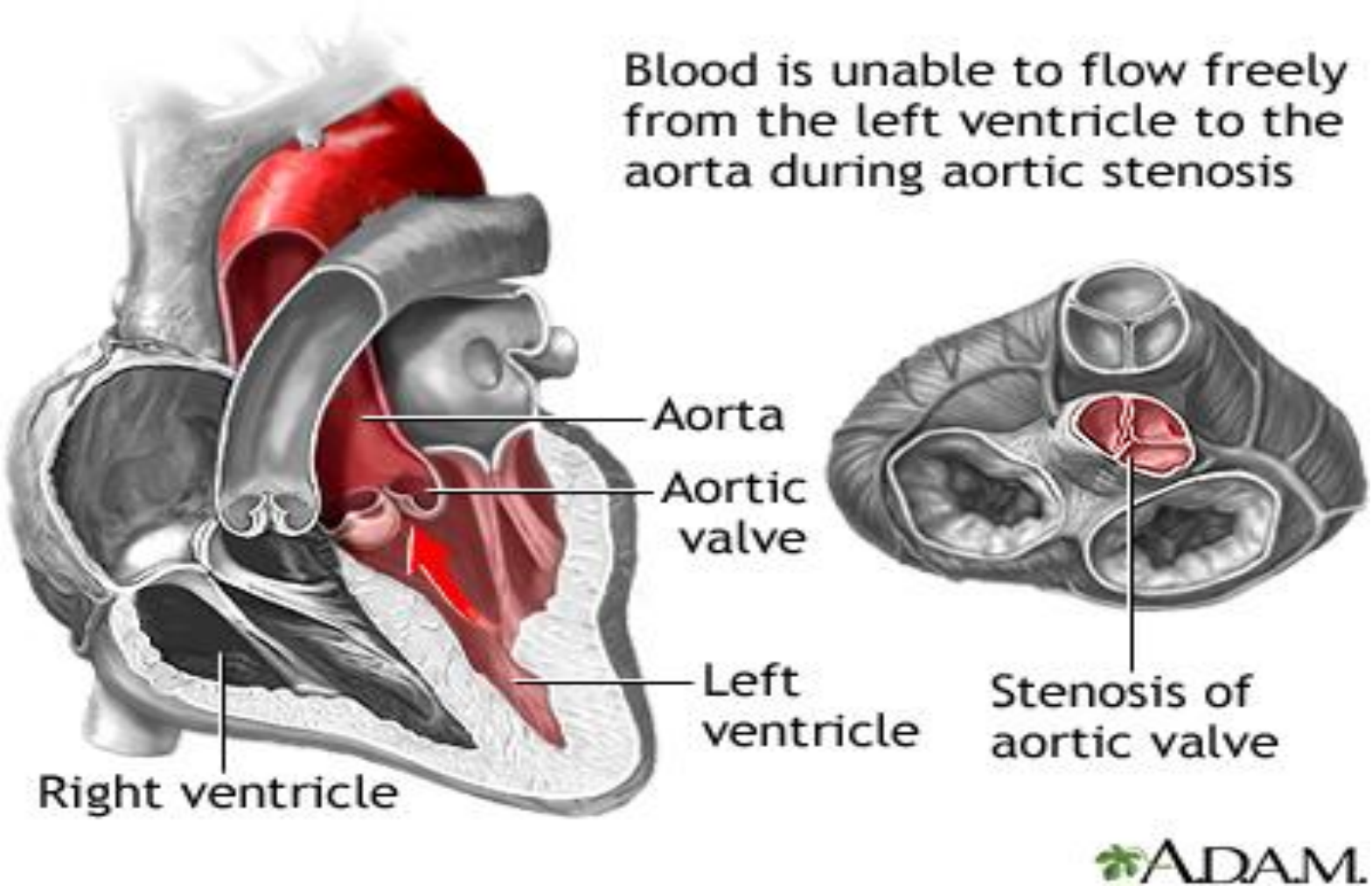
STENOSIS

- Stenosis is the term used for failure of a valve to open completely during diastole resulting in obstruction to the forward flow of the blood.
- Examples
  - MITRAL STENOSIS
  - AORTIC STENOSIS

INSUFFICIENCY OR INCOMPETENCE OR REGURGITATION

- This is the failure of a valve to close completely during **systole** resulting in back flow or regurgitation of the blood.
- Examples
  - MITRAL INSUFFICIENCY
  - AORTIC INSUFFICIENCY

AORTIC STENOSIS



AORTIC STENOSIS

- Aortic stenosis comprises about **one-fourth** of all patients with **chronic valvular heart disease**.
- About 80% patients of symptomatic aortic stenosis are males.
- It is of 2 main types:
  a. non-calcific
  b. calcific type (more common)

Non-calcific aortic stenosis

- The most common cause of non-calcific aortic stenosis is chronic RHD.
- Other causes are
  - congenital valvular
  - Sub-aortic stenosis
  - Congenitally bicuspid aortic valve.

Calcific aortic stenosis

- Calcific aortic stenosis is more common type.
- Various causes have been ascribed to it. These include
  1. healing by scarring followed by
  2. calcification of aortic valve such as in RHD,
  3. bacterial endocarditis,
  4. Brucella endocarditis,
  5. Monckeberg's calcific aortic stenosis
  6. healed congenital malformation and
  7. familial hypercholesterolaemic xanthomatosis

MORPHOLOGIC FEATURES

- The aortic cusps show characteristic **fibrous thickening** and **calcific nodularity** of the closing edges.
- Calcified nodules are often found in the sinuses of Valsalva.
- In rheumatic aortic stenosis, the **commissures are fused** and **calcified**, while in non-rheumatic aortic stenosis there is **no commissural fusion**

Characteristics of Aortic Stenosis

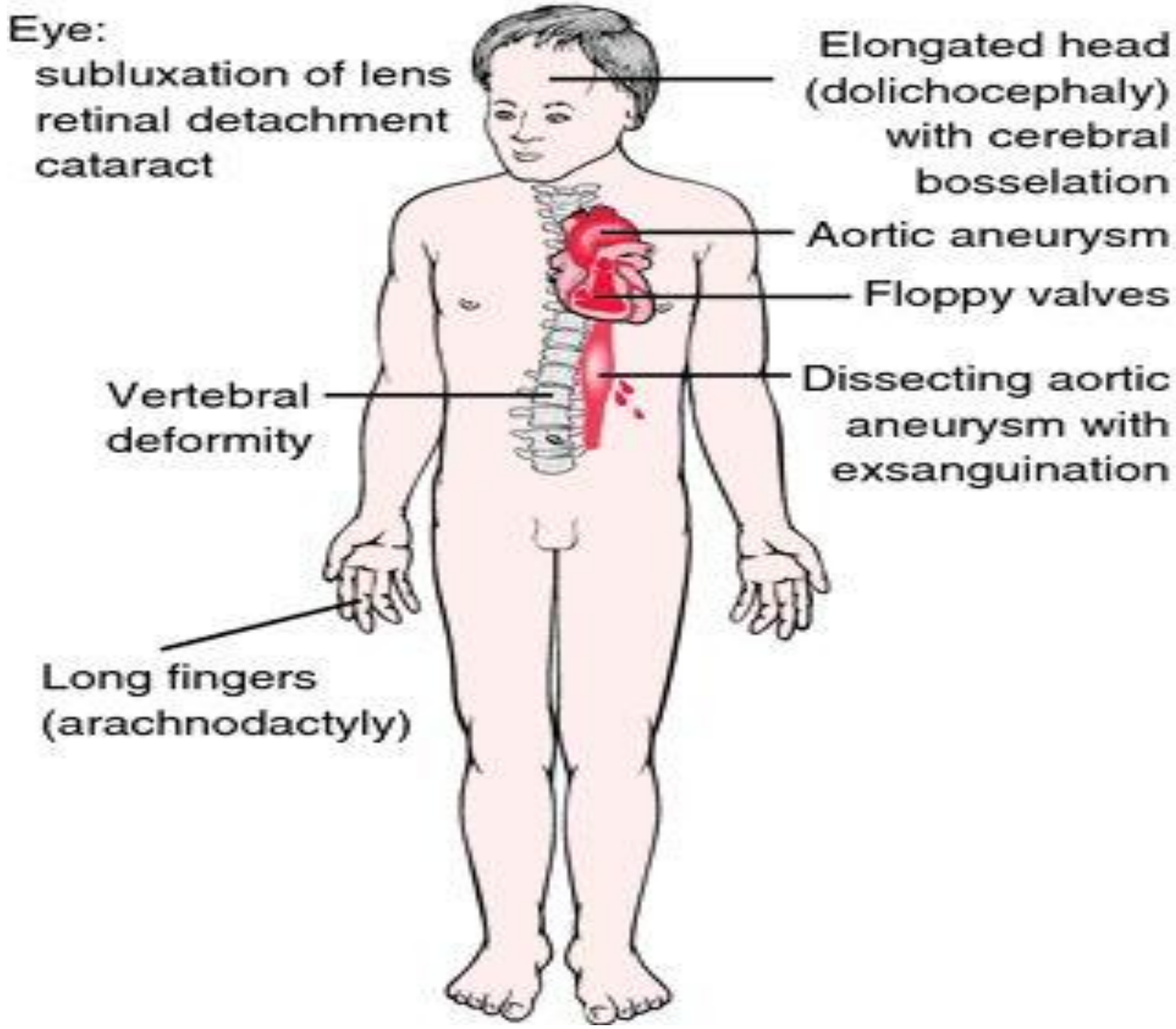
- In descending order of frequency, the characteristic symptoms of aortic stenosis are
  1. exertional dyspnoea
  2. chest pain (angina pectoris),
  3. syncope,
  4. heart failure

Causes of aortic stenosis

1. **Congenital**
   - The valve can be unicuspid, bicuspid, or tricuspid with partially fused leaflets.
   - Abnormal flow can lead to fibrosis and calcification of the leaflets.
2. **Rheumatic**
   - Tissue inflammation results in adhesion and fusing of the commissures. Fibrosis and calcification of the leaflet tips can occur because of continued turbulent flow
3. **Degenerative**
   - Leaflets become inflexible because of calcium deposition at the bases. The leaflet tips remain relatively normal

AORTIC INSUFFICIENCY

- About **three-fourth** of all patients with aortic insufficiency are males with some having family history of Marfan's syndrome.(Marfan syndrome is an inherited disorder that affects connective tissue — the fibers that support and anchor your organs and other structures in your body. Marfan syndrome most commonly affects the heart, eyes, blood vessels and skeleton. People with Marfan syndrome are usually tall and thin with disproportionately long arms, legs, fingers and toes. The damage caused by Marfan syndrome can be mild or severe)

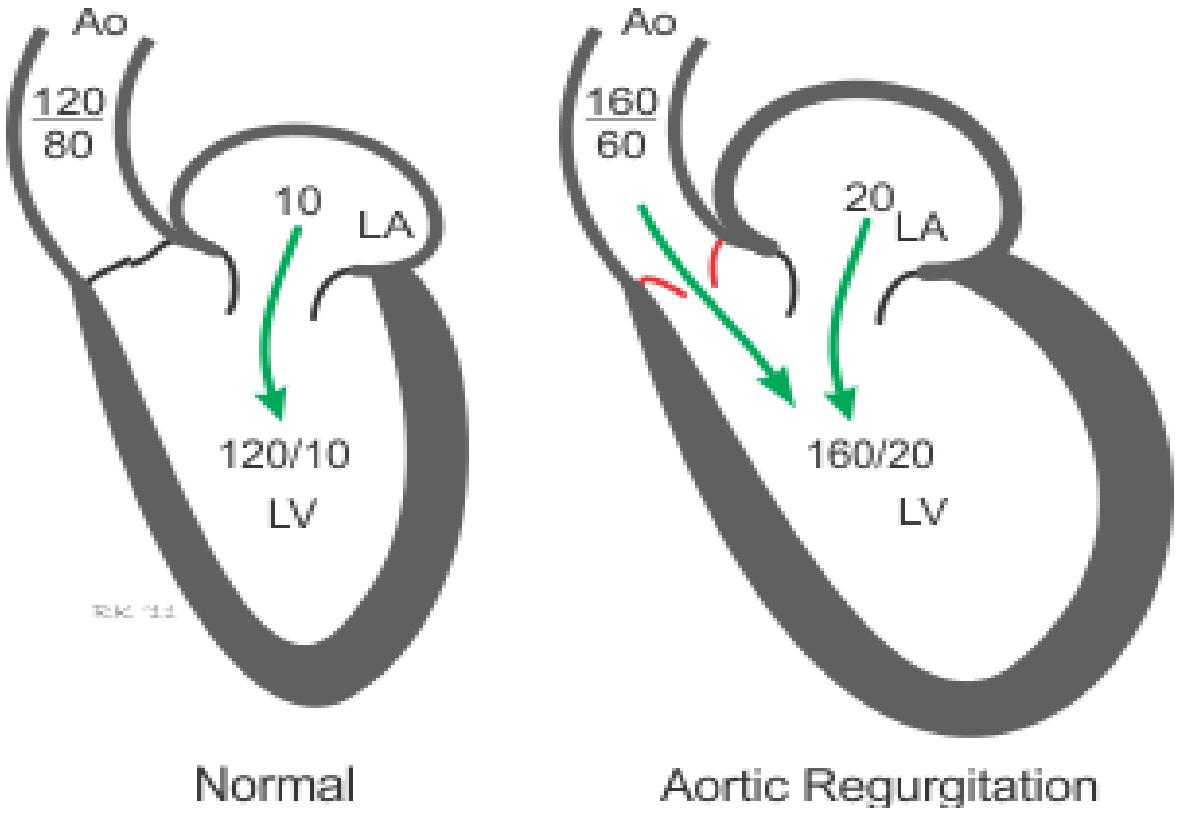

Eye:
subluxation of lens
retinal detachment
cataract
Elongated head
(dolichocephaly)
with cerebral
bosselation
Aortic aneurysm
Floppy valves
Vertebral
deformity
Dissecting aortic
aneurysm with
exsanguination
Long fingers
(arachnodactyly)

ETIOLOGY

- chronic RHD (75% of cases)
- Other causes
  - Syphilitic valvulitis,
  - infective endocarditis,
  - congenital subaortic stenosis (congenitally bicuspid aortic valve),
  - Myxomatous degeneration of aortic valve (floppy valve syndrome),
  - traumatic rupture of the valve cusps,
  - dissecting aneurysm,
  - Marfan's syndrome
  - ankylosing spondylitis

MORPHOLOGIC FEATURES

- The aortic valve cusps are **thickened**, **deformed**, **shortened** and **fail to close**.
- There is generally **distension and distortion** of the ring



EFFECTS

- As a result of regurgitant aortic orifice, there is increase of the left ventricular end-diastolic volume.

- This leads to hypertrophy and dilatation of the left ventricle producing massive cardiac enlargement so that the heart may weigh as much as 1000 gm.

- Failure of the left ventricle increases the pressure in the left atrium and eventually pulmonary hypertension and right heart failure occurs

MITRAL STENOSIS

- Mitral stenosis occurs in approximately 40% of all patients with RHD.
- About 70% of the patients are women.
- The latent period between the rheumatic carditis and development of symptomatic mitral stenosis is about **two decades**

ETIOLOGY

- Mitral stenosis is generally rheumatic in origin.
- Less common causes include
  - bacterial endocarditis,
  - LibmanSacks endocarditis,
  - endocardial fibroelastosis
  - Congenital parachute mitral valve

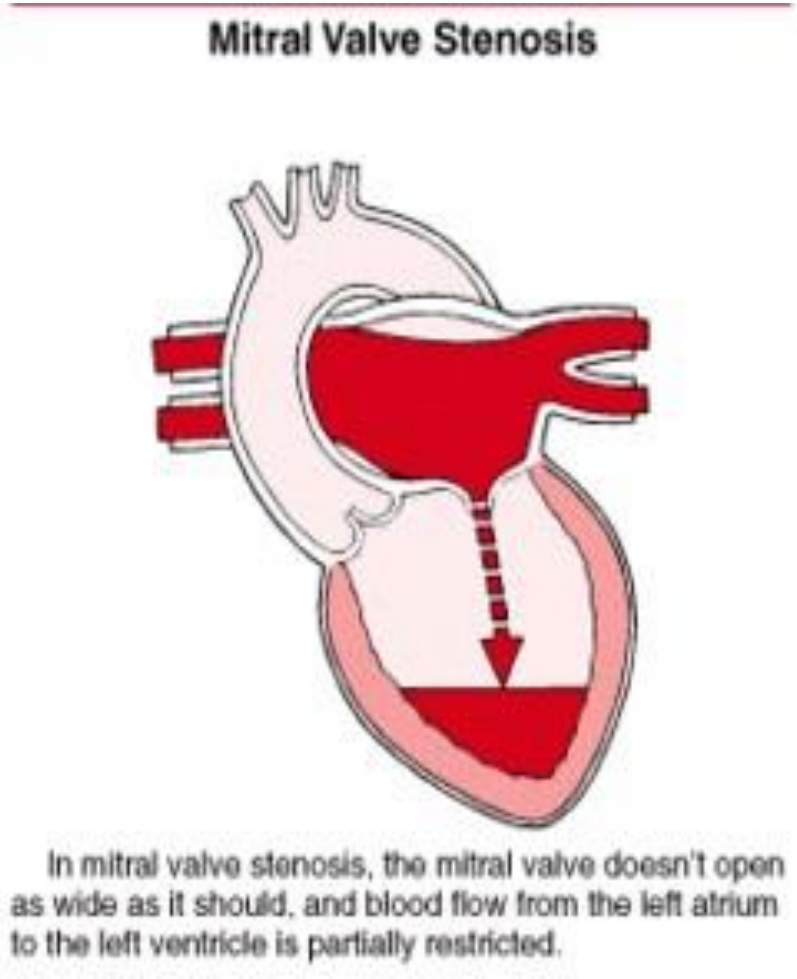
Morphologic Features

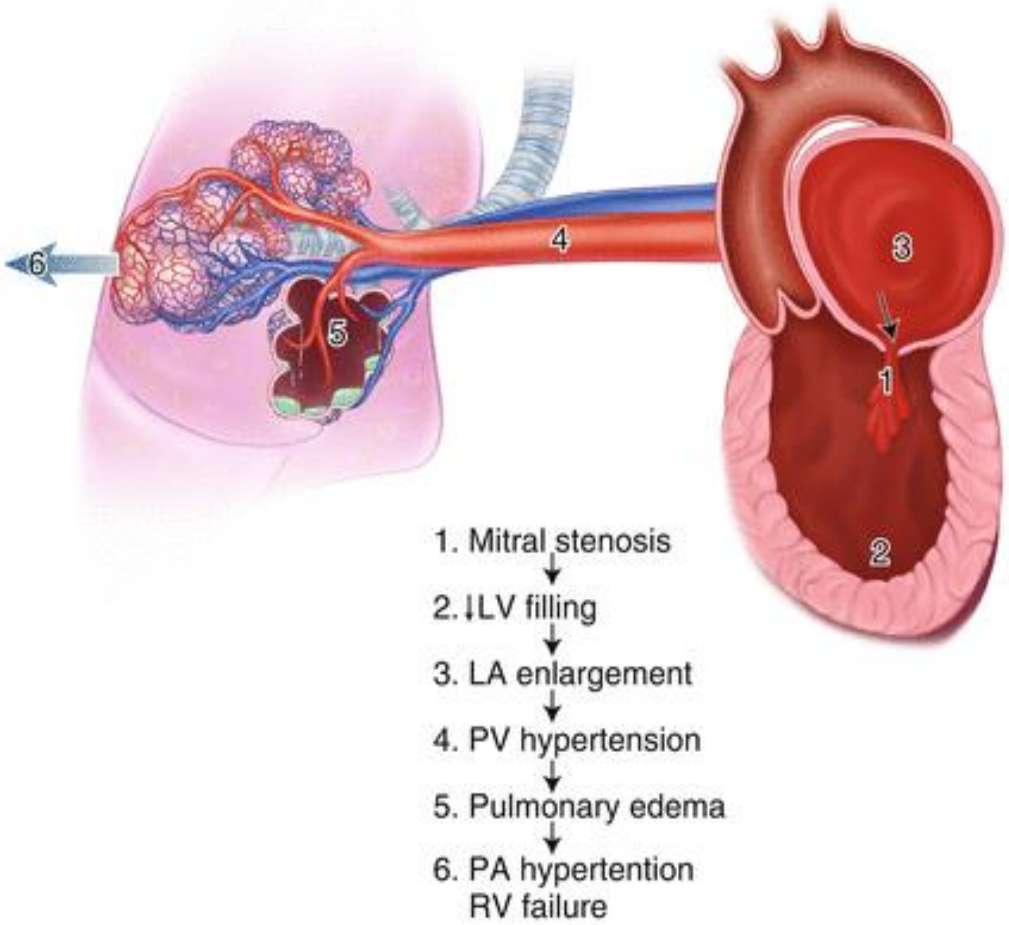
- The appearance of the mitral valve in stenosis varies according to the extent of involvement.
- The valve leaflets are **diffusely thickened** by fibrous tissue and/or **calcific deposits**, especially towards the closing margin.
- There are **fibrous adhesions** of mitral commissures and **fusion & shortening of chordae tendineae**

Morphologic Features

- Mild cases have narrowed orifice; called '**purse-string puckering'.**
- The more advanced cases have rigid, fixed and immobile diaphragm-like valve leaflets with narrow, slit-like or oval mitral opening, commonly referred to as **'button-hole**' or '**fish-mouth**' mitral orifice

IMAGE OF MITRAL STENOSIS





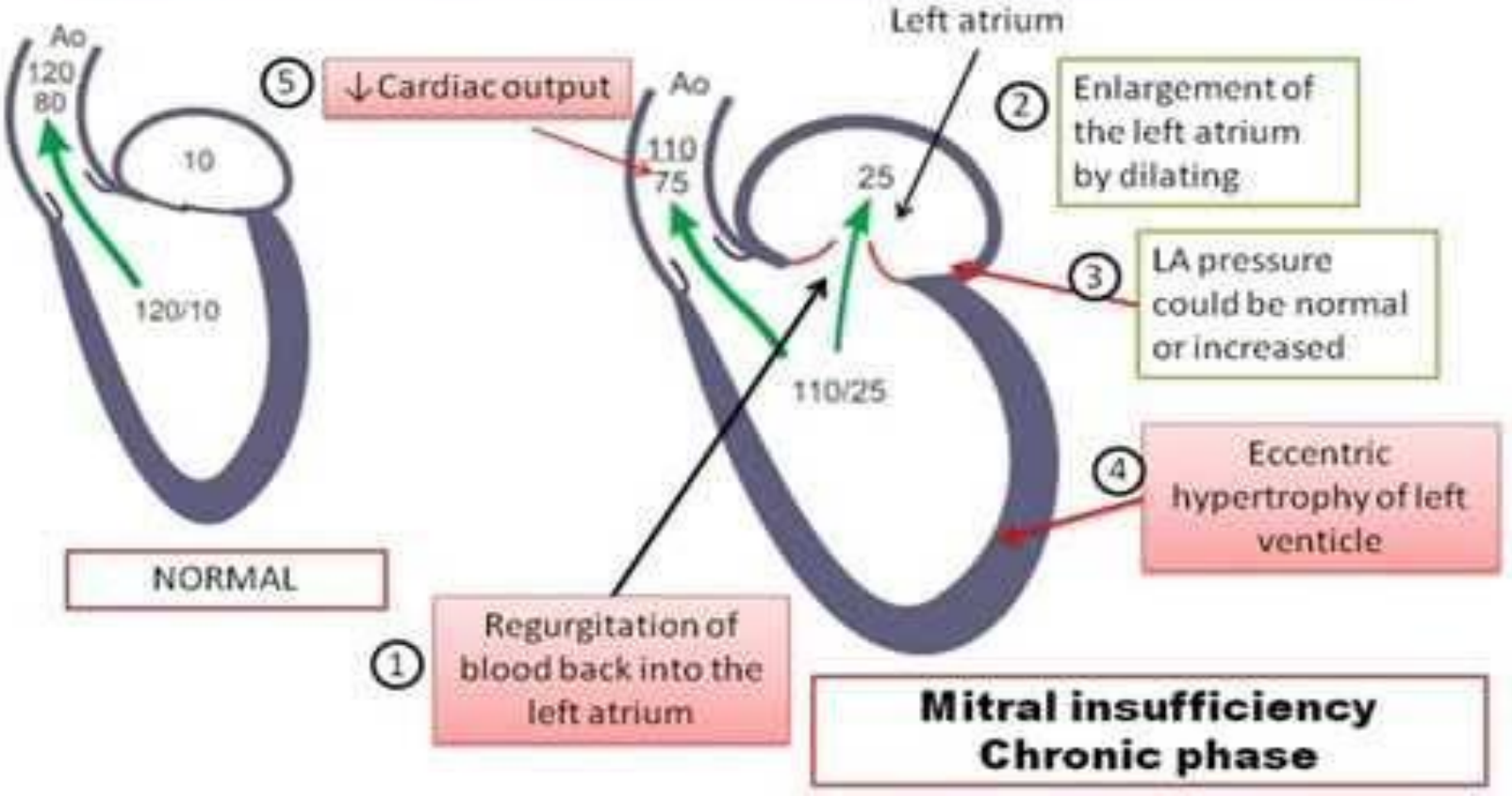
EFFECTS OF MITRAL STENOSIS

1. **Dilatation** and **hypertrophy** of the left atrium
2. Normal-sized or **atrophic left ventricle** due to reduced inflow of blood.
3. Pulmonary hypertension resulting from **passive backward** transmission of **elevated left artial pressure which causes:**
    i. chronic passive congestion of the lungs;
    ii. hypertrophy and dilatation of the right ventricle;
    iii. dilatation of the right atrium when right heart failure supervenes.

MITRAL INSUFFICIENCY

- Mitral insufficiency is caused by RHD in about 50% of patients but in contrast to mitral stenosis, pure mitral insufficiency occurs more often in men (75%).
- Subsequently, mitral insufficiency is associated with some degree of mitral stenosis

MITRAL INSUFFICIENCY



ETIOLOGY.

- All the causes of mitral stenosis may produce mitral insufficiency, RHD being the most common cause
- OTHERS
  - myocardial infarction,
  - myocarditis and
  - left ventricular failure in hypertension

MORPHOLOGIC FEATURES

- The appearance of the mitral valve in insufficiency varies according to the underlying cause.

- The rheumatic process produces **rigidity**, **deformity** and **retraction of the valve leaflets** and fusion of commissures as well as s**hortening** and fusion of chordae tendineae

Cont....

- In **myxomatous degeneration** of the mitral valve leaflets (floppy valve syndrome),there is prolapse of one or both leaflets into **the left atrium during systole**.

- In **non-inflammatory** calcification of mitral annulus seen in the aged, there is **irregular**, **stony-hard**, **bead-like thickening** in the region of mitral annulus without any associated inflammatory changes. It is thought to reflect degenerative changes of aging.

EFFECTS OF MITRAL INSUFFICIENCY

1. Dilatation and hypertrophy of the left ventricle.
2. Marked dilatation of the left atrium.
3. Features of pulmonary hypertension such as:
   - chronic passive congestion of the lungs;
   - hypertrophy and dilatation of the right ventricle; and
   - dilatation of the right atrium when right heart failure supervenes

END

QUESTIONS