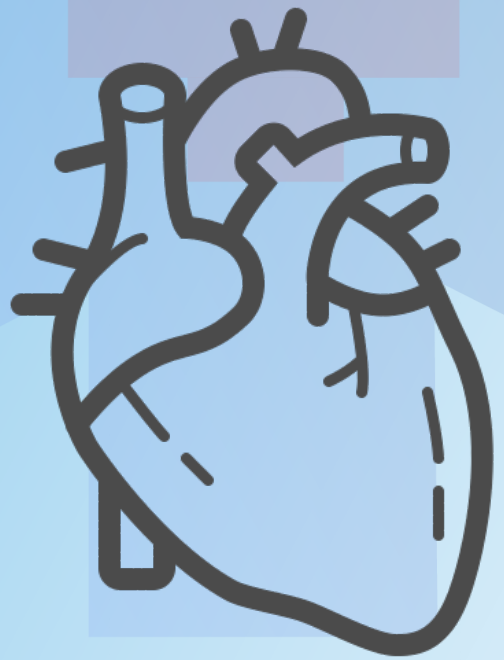
VALVULAR HEART DISEASE



REAL LIFE AUSCULTATION

1) SYSTOLIC OR DIASTOLIC MURMUR?
2) POINT OF HIGHEST INTENSITY
3) GRADING
4) RADIATION?

What we will cover

- **Heart valves**
- Location
- Anatomy
- Auscultation areas

- **Cardiac cycle**

- **Murmurs**
- Definition
- Grading

- **Valvular Disorders**
- Overview
- Aortic stenosis
- Aortic regurgitation
- Mitral stenosis
- Mitral regurgitation

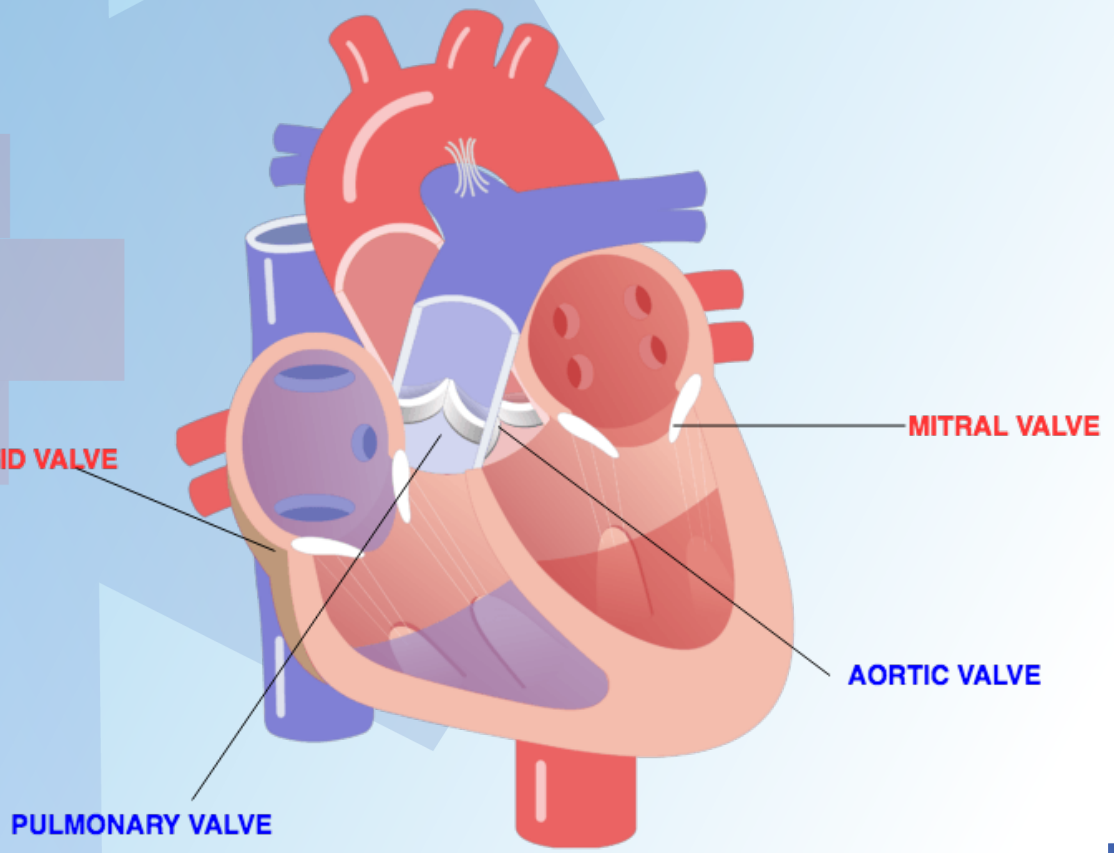
LOCATION

Atrio-Ventricular (AV valves):

- Mitral Valve
- Tricuspid Valve

Semilunar Valves:

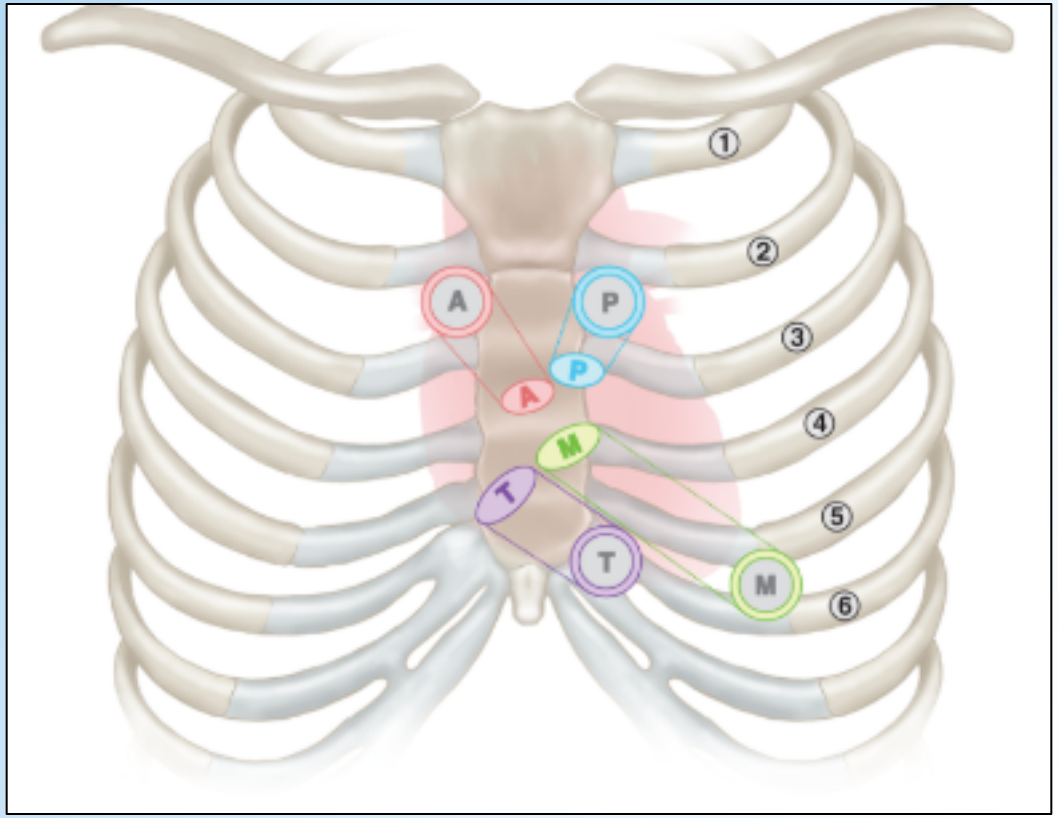
- Aortic Valve
- Pulmonary Valve



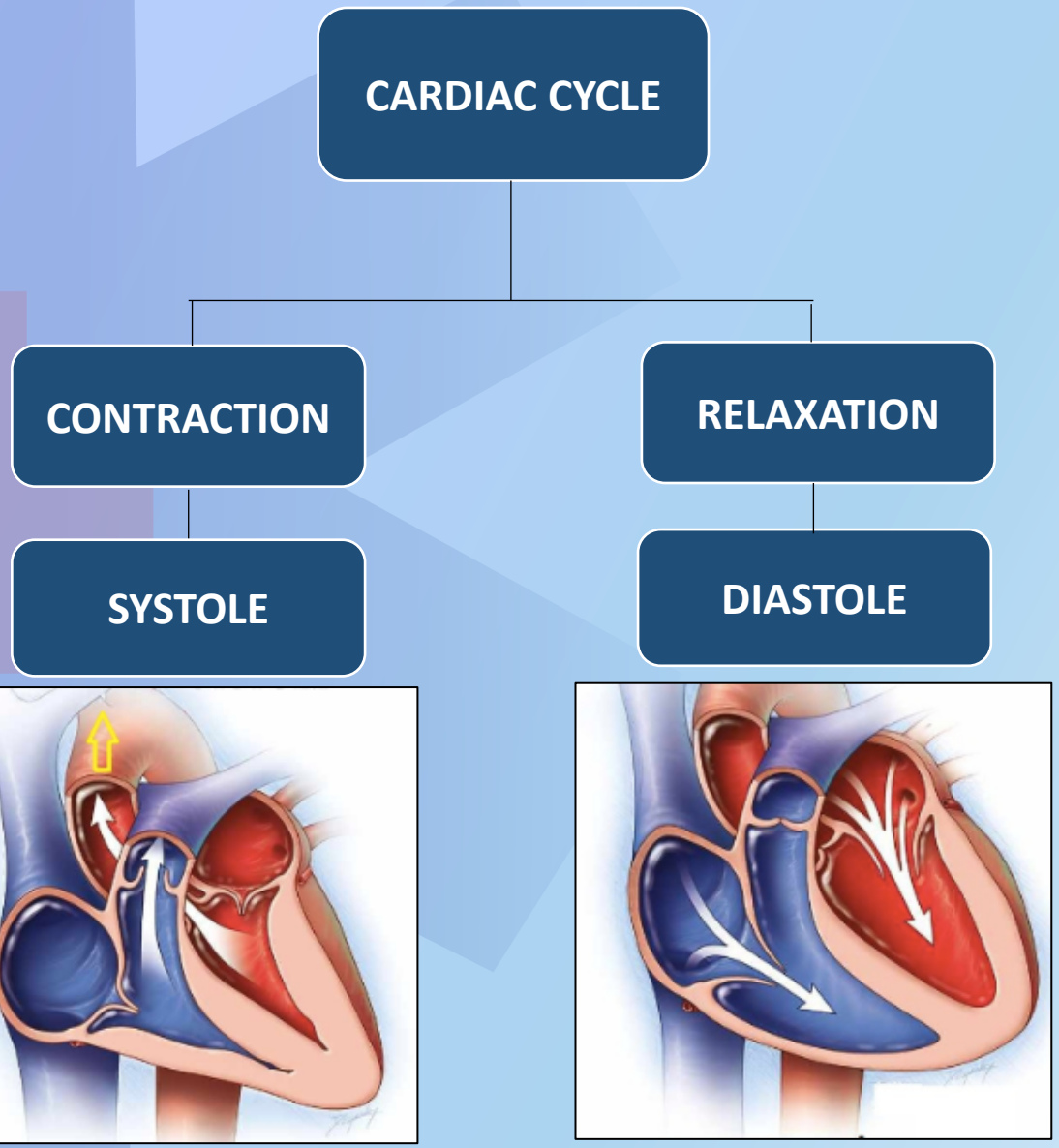
ANATOMY OF THE HEART VALVES

AUSCULTATION AREAS

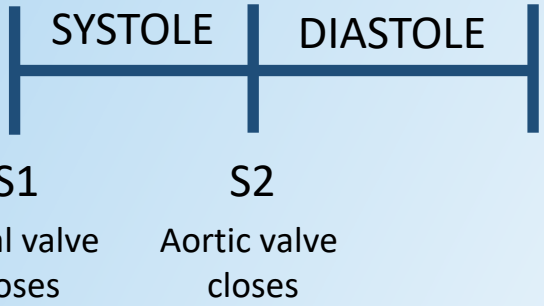
- **Aortic area**
  - 2nd right intercostal space
- **Pulmonary area**
  - 2nd left intercostal space
- **Tricuspid area**
  - 4th left intercostal space
- **Mitral area**
  - 5th left intercostal space – midclavicular line



CARDIAC CYCLE



HEART SOUNDS:

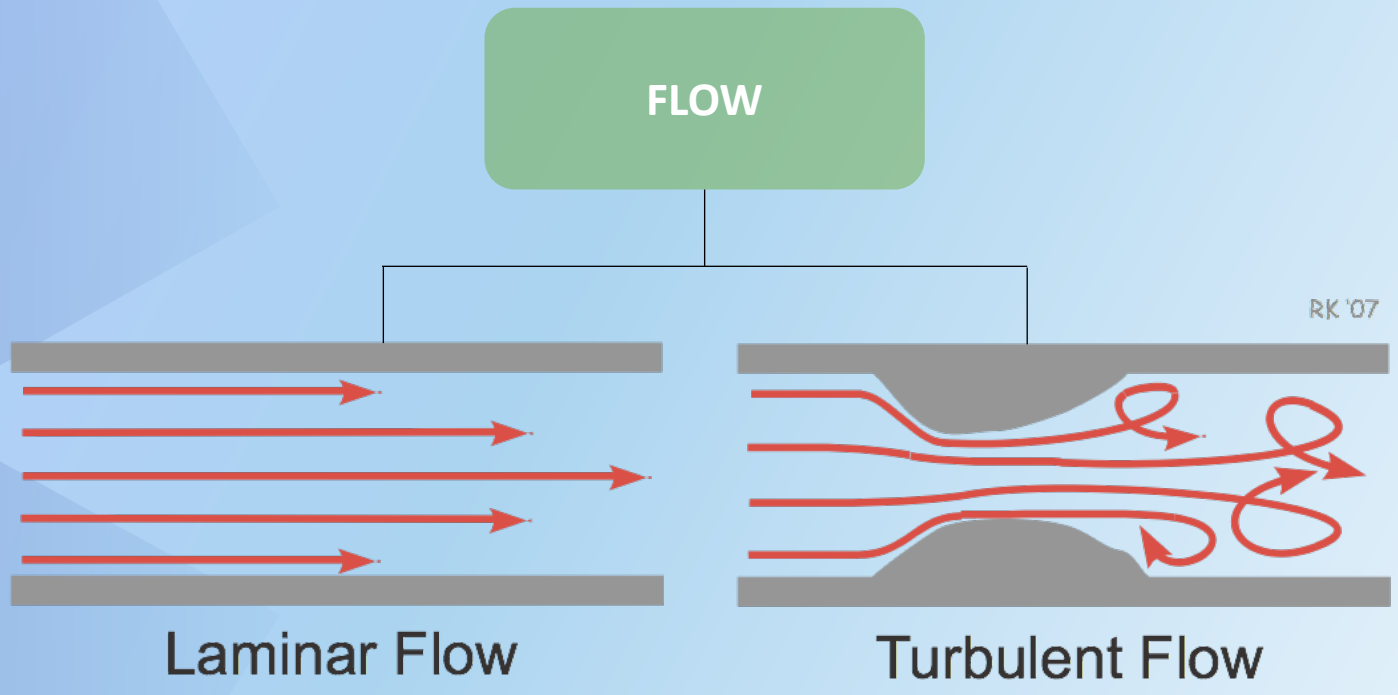


STATE OF VALVES:

	SYSTOLE	DIASTOLE
AORTIC VALVE	OPEN	CLOSED
MITRAL VALVE	CLOSED	OPEN

MURMURS - DEFINITION

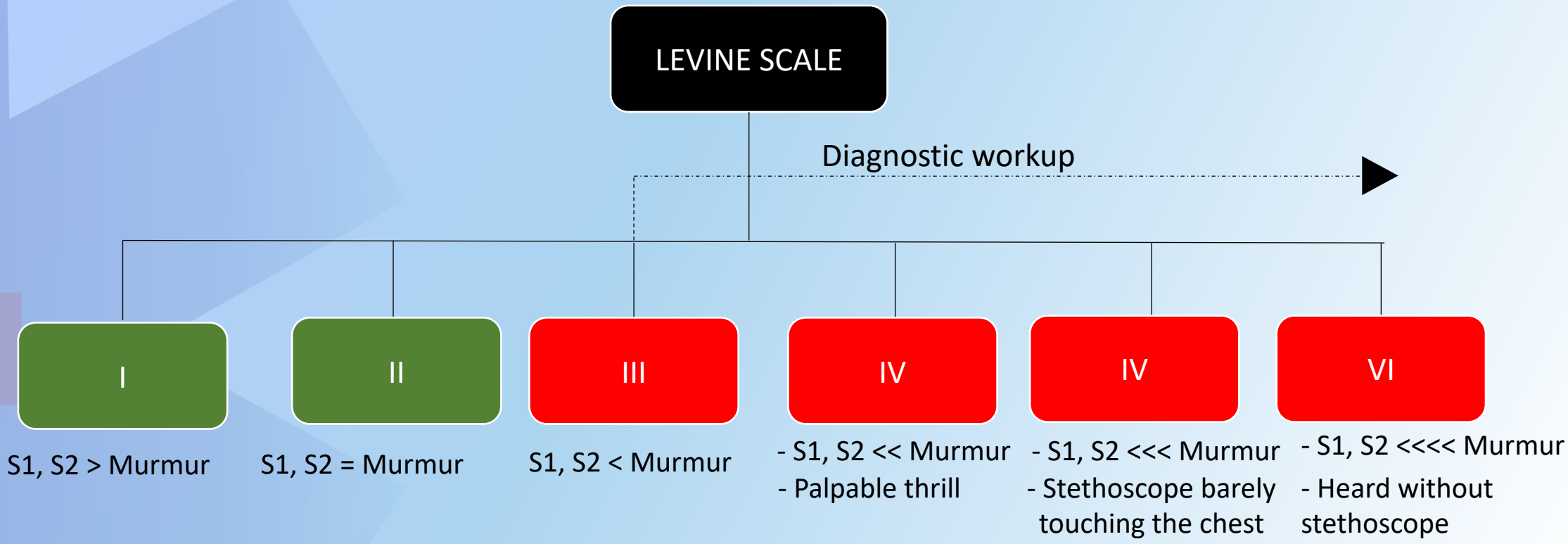
- Murmurs are **audible vibrations** caused by turbulent flow



- Flow in layers
- Non-audible

- Chaotic flow
- Created by narrowing of vessels or damaged valves
- Audible vibrations
- Radiates

MURMURS - GRADING



VALVULAR DISORDERS - OVERVIEW

STENOSIS

- Stiff valve
- Problems w/ opening → turbulent flow → murmur

Murmur will be heard when the valve opens

REGURGITATION

- Floppy valve
- Problems w/ closing (remains open) → turbulent flow → murmur

Murmur will be heard when the valve is closes

Exam-tip

- Question:

a) Mitral Stenosis
b) Aortic Stenosis
c) Mitral regurgitation

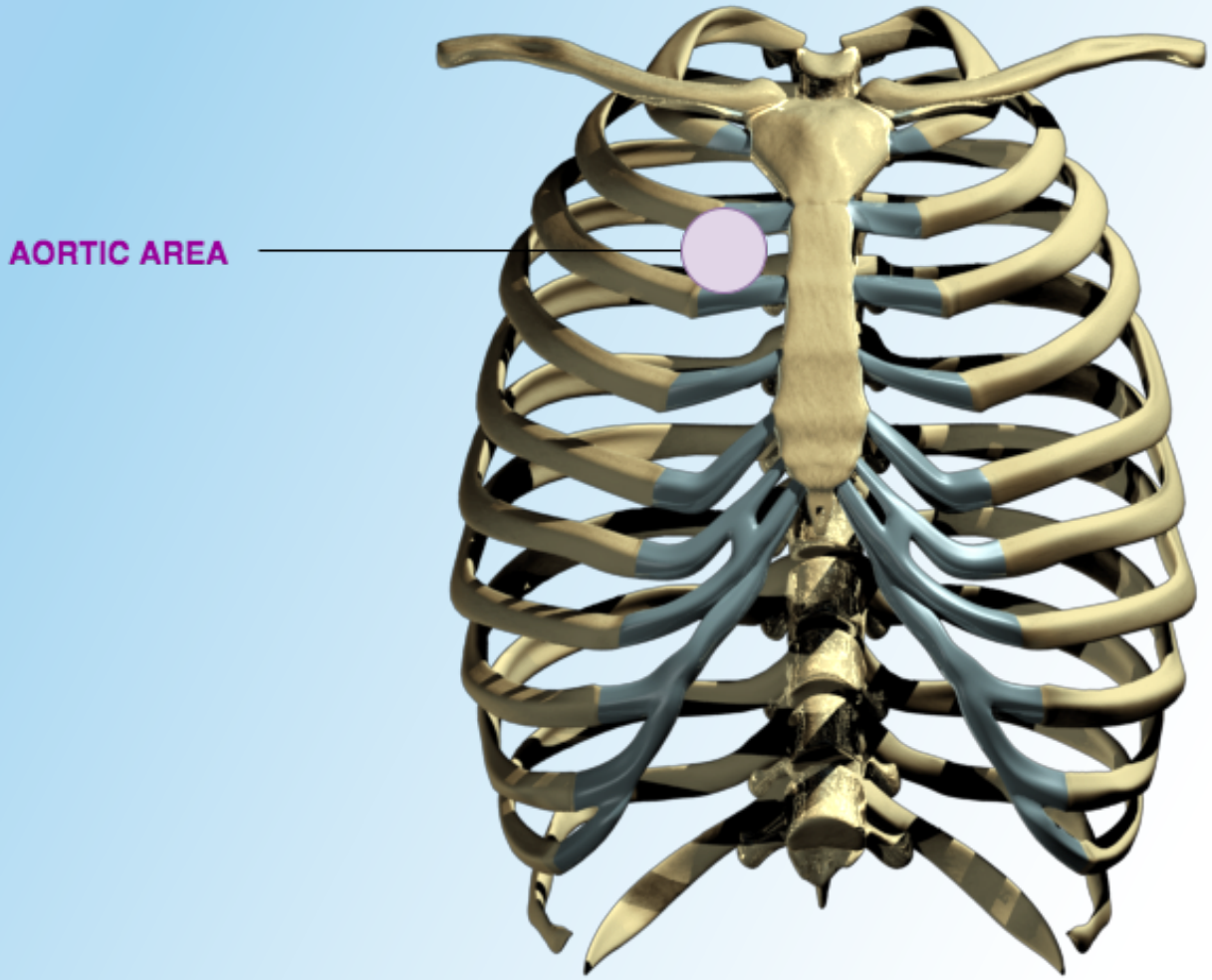
Don´t remember if the murmur is diastolic or systolic?

AORTIC AREA

- 2nd right intercostal space

Murmurs

- Aortic stenosis

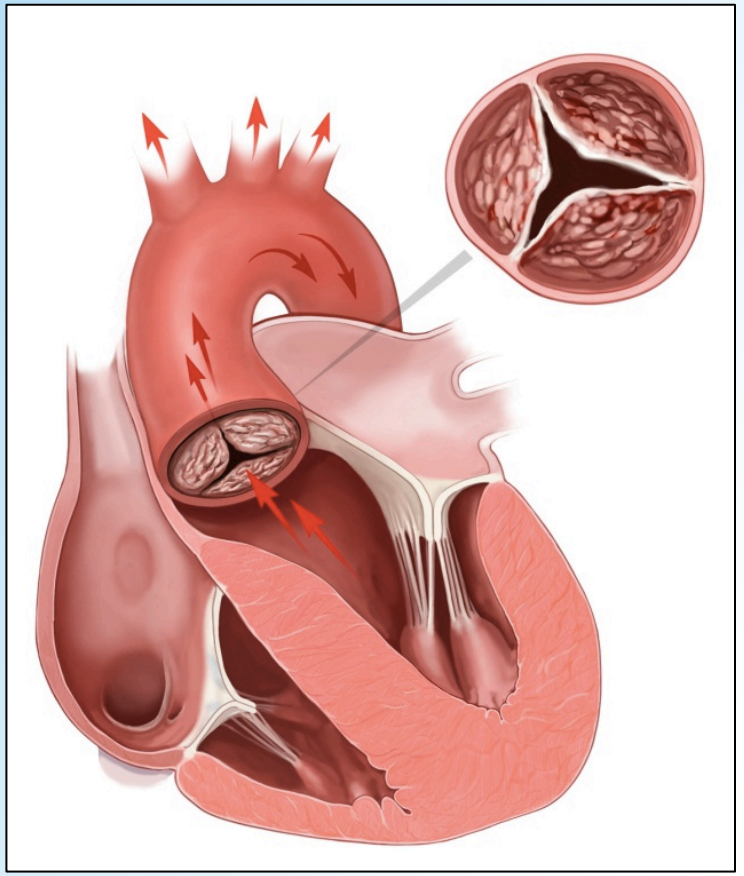


AORTIC STENOSIS

Overview and Etiology

OVERVIEW

- Stenotic valve → problems with valve opening
- Left ventricle has to generate more pressure to open the aortic valve



ETIOLOGY

- **Senile Aortic Stenosis**
  - Age-related degeneration
  - Fibrosis → calcification
- **Bicuspid aortic valve**
  - Most common congenital valve abnormality
  - Prone to damage → fibrosis

AORTIC STENOSIS

PATHOPHYSIOLOGY

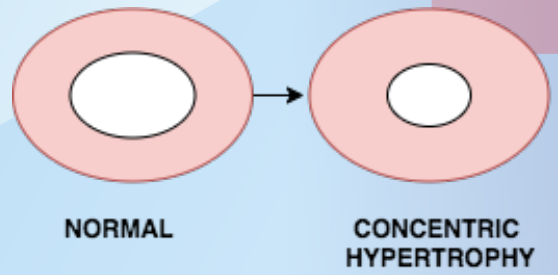
AORTIC STENOSIS

LV OUTFLOW OBSTRUCTION

PRESSURE OVERLOAD

↓ CO

CONCENTRIC HYPERTROPHY



↑ Wall thickness
↓ Chamber size

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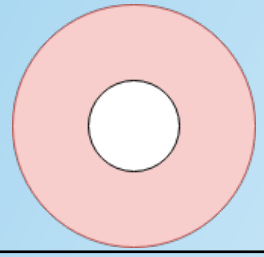
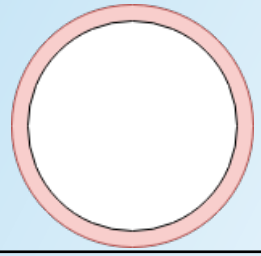
Concentric vs. Eccentric Hypertrophy

	Concentric	Eccentric
Chamber size	↓	↑
Wall thickness	↑	Normal
Pathophysiology	Pressure overload	Volume overload
Consequence	Imparied filling – Diastole	Impared contraction – Systole
Etiology - Example	Aortic Stenosis	Aortic regurgitation
Illustration		

AORTIC STENOSIS
SYMPTOMS

MNEMONIC
S - Syncope
A - Angina
D - Dyspnea

AORTIC STENOSIS

LV OUTFLOW OBSTRUCTION

PRESSURE OVERLOAD

PRESSURE TRANSMITTED TO PULMONARY CIRCULATION

↓ CO

CONCENTRIC HYPERTROPHY

SIGNS AND SYMPTOMS OF LEFT HEART FAILURE

EXERTIONAL SYNCOPE

FATIGUE

↑ O2 DEMAND

DYSPNEA

ANGINA ON EXERTION

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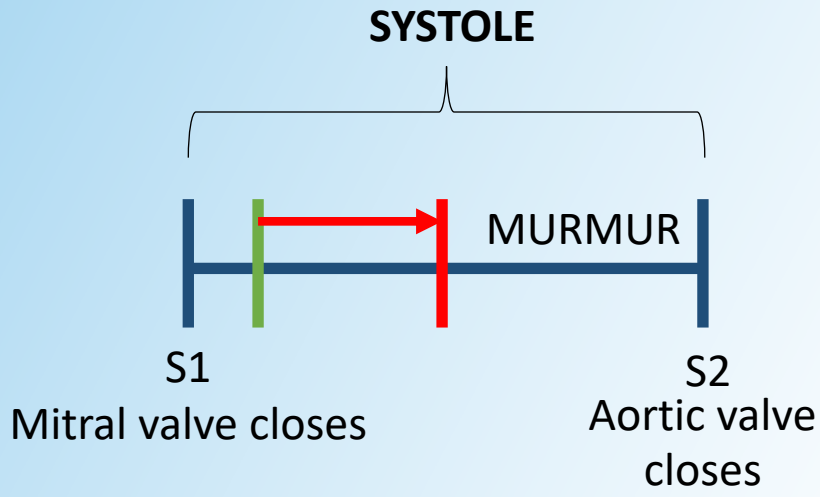
AORTIC STENOSIS

SIGNS



AUSCULTATION

- **Midsystolic murmur**
  - Prolonged opening time
- **Crescendo-decrescendo (rising-falling)**
  - Blood flow through the aorta rapidly escalates, then decline
- **Ejection click**
  - Originating from the aortic valve (NOT turbulent blood flow)
  - Stiff valve
- **Radiates to the neck**

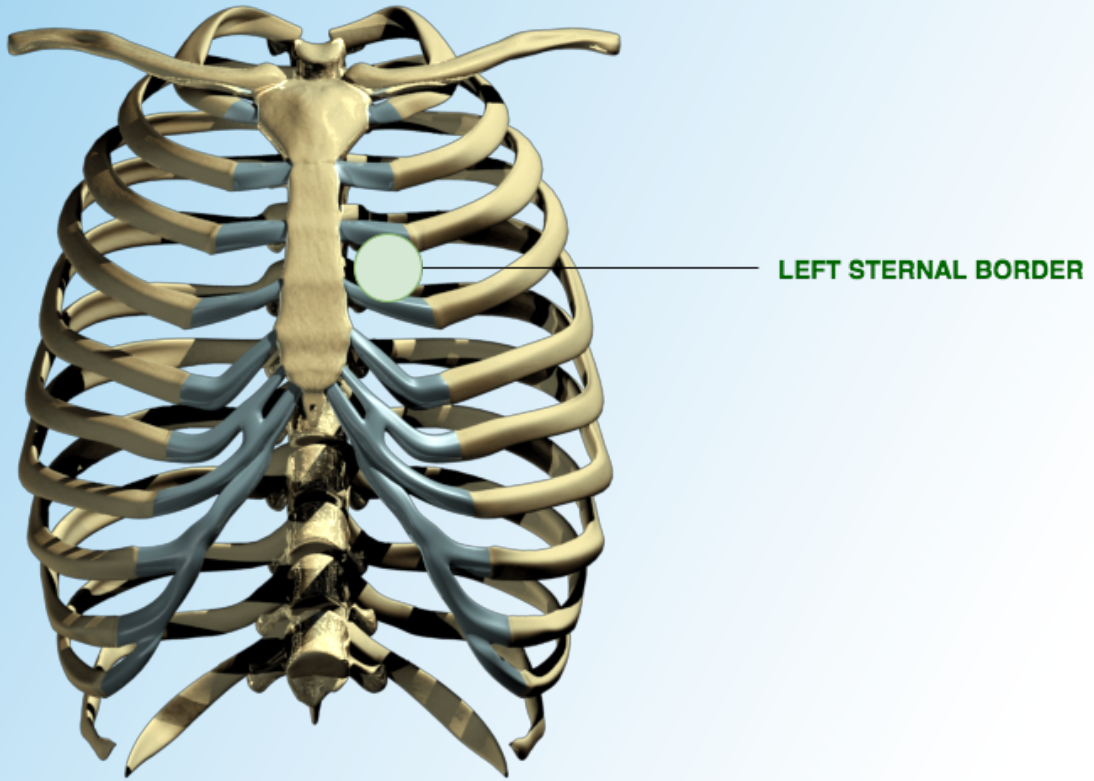
OTHER

- **Displaced apical impulse**
  - Hypertrophy
- Decreased and delayed carotid pulse (parvus et tardus)
- HF signs

LEFT STERNAL BORDER

Murmurs

- Aortic regurgitation

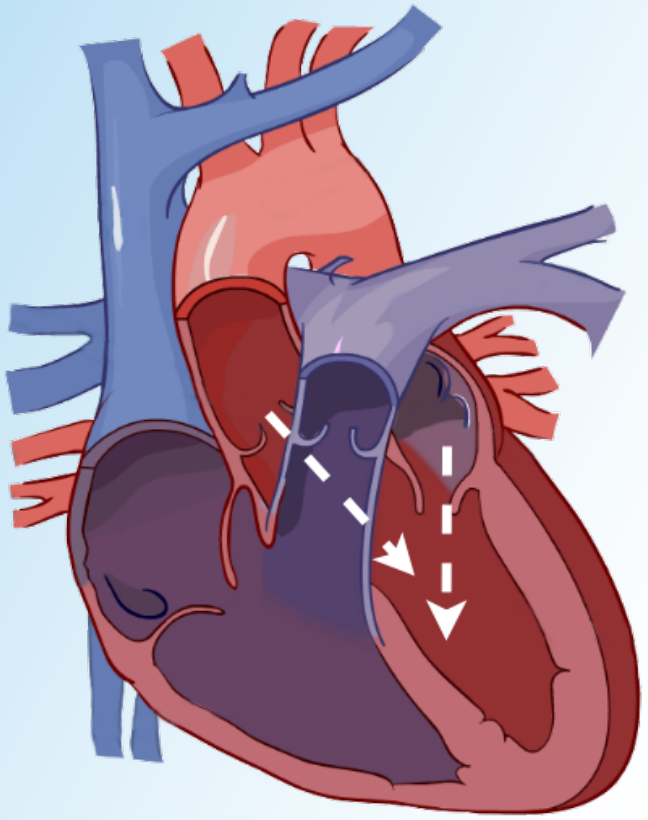


AORTIC REGURGITATION

OVERVIEW AND ETIOLOGY

OVERVIEW

- Floppy valve
- Remains open during diastole
- Blood regurgitates back into the left ventricle



ETIOLOGY

- **Acute**
- Infective endocarditis

- **Chronic**
- Rheumatic heart disease
- Congenital anomalies
- Connective tissue disease

AORTIC REGURGITATION

PATHOPHYSIOLOGY

AORTIC REGURGITATION

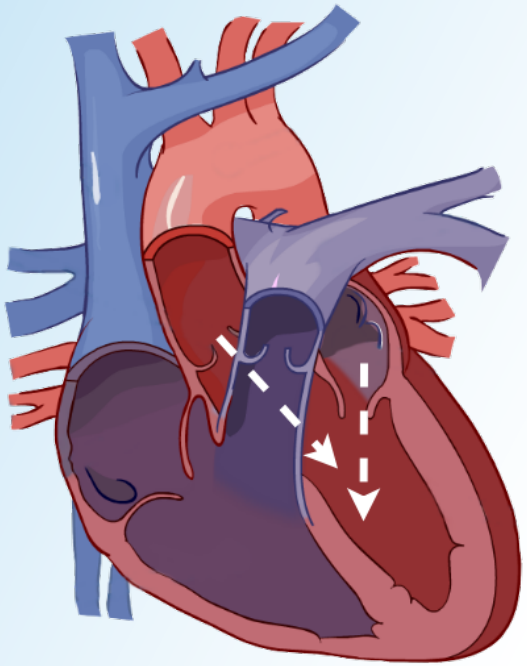
BACKFLOW OF BLOOD INTO LV

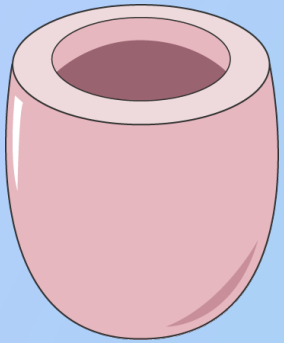
↓ DBP

Less blood in arteries during diastole

↑ DIASTOLIC LV VOLUME

VOLUME OVERLOAD





Accomodates for ↑Volume
↑Chamber size
N wall thickness

ECCENTRIC HYPERTROPHY

↑ OXYGEN DEMAND

↑ STROKE VOLUME

↑ SBP

More blood in arteries during systole

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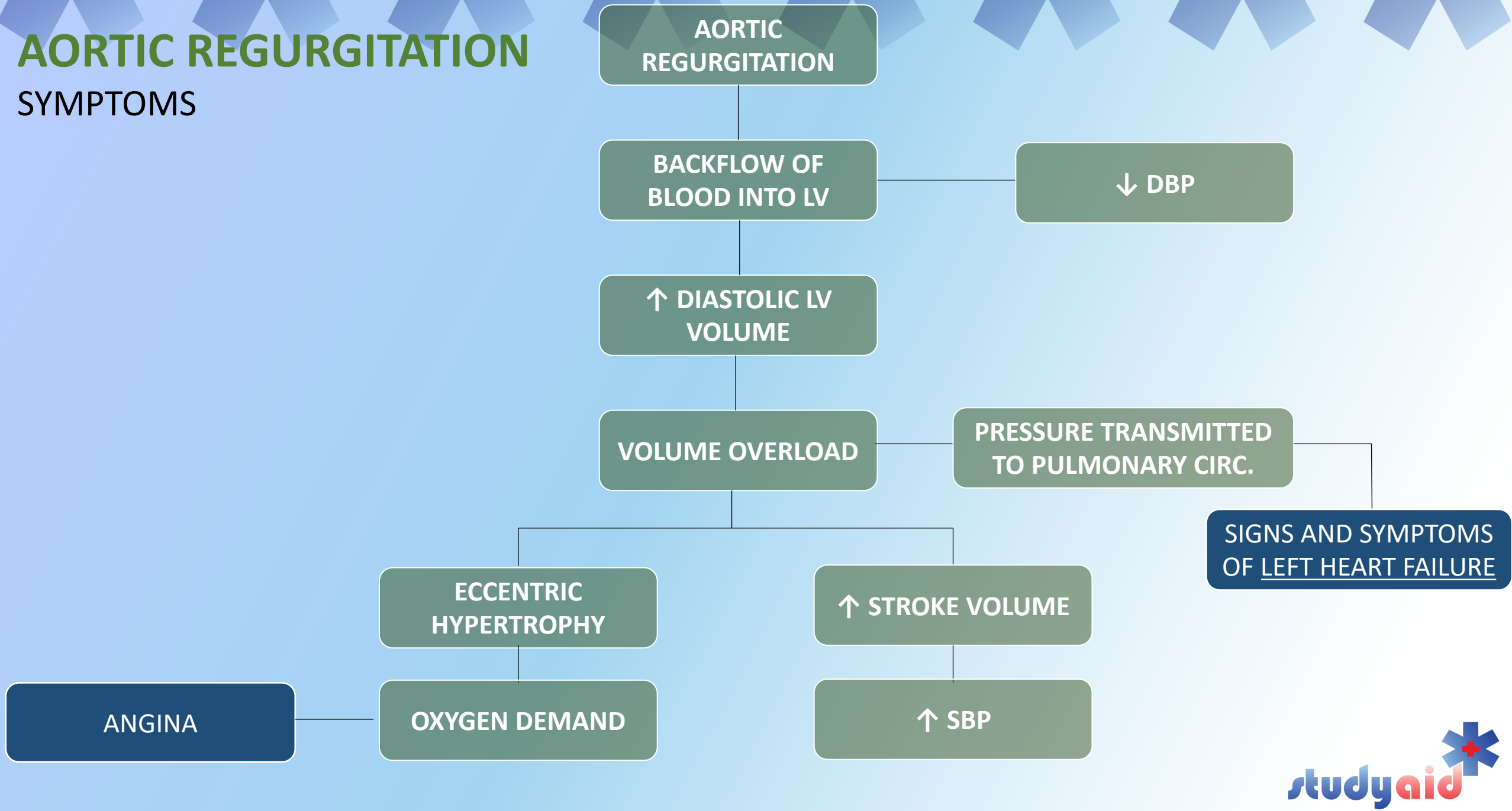
AORTIC REGURGITATION

SYMPTOMS



AORTIC REGURGITATION

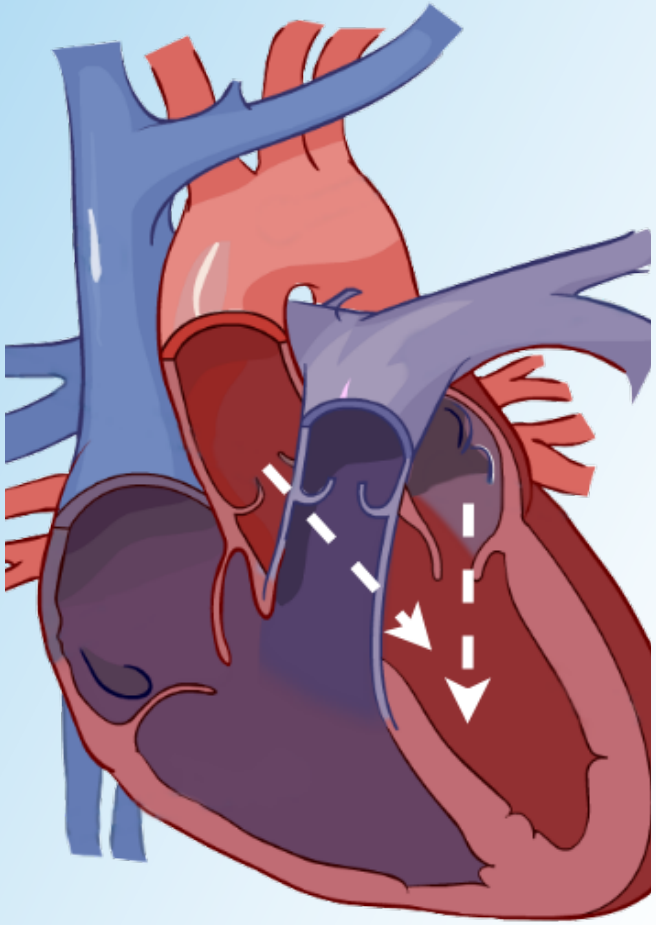
SIGNS

AUSCULTATION

- Early diastolic murmur

OTHER

- **Hyperdynamic pulses**
  - Corrigans pulse
  - Quincke sign
  - Muller sign
- **Other**
  - HF signs



AORTIC REGURGITATION

SIGNS

↑SBP

- Increased amount of blood in vessels during systole

↓DBP

- Less blood in vessels during diastole

Hyperdynamic pulses

Carotid arteries

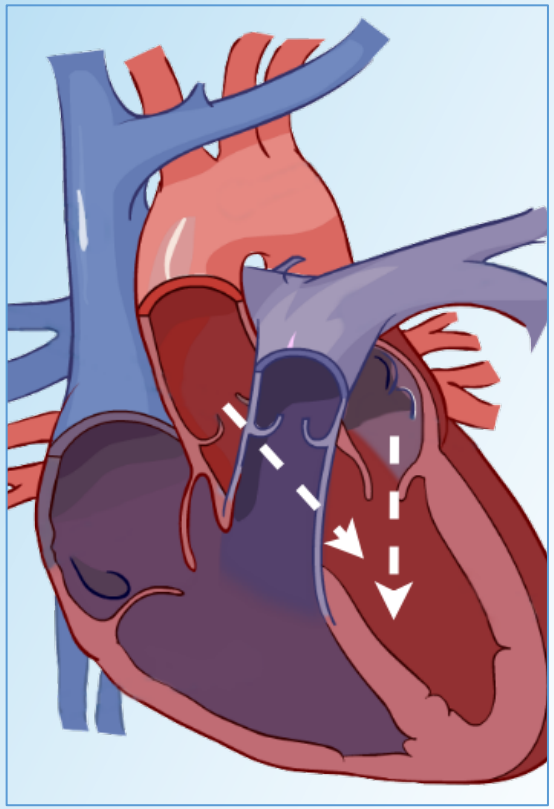
- Corrigans pulse

Nailbed capillaries

- Quincke sign

Uvula

- Muller sign



https://www.youtube.com/watch?v=5YQsd6di6B4

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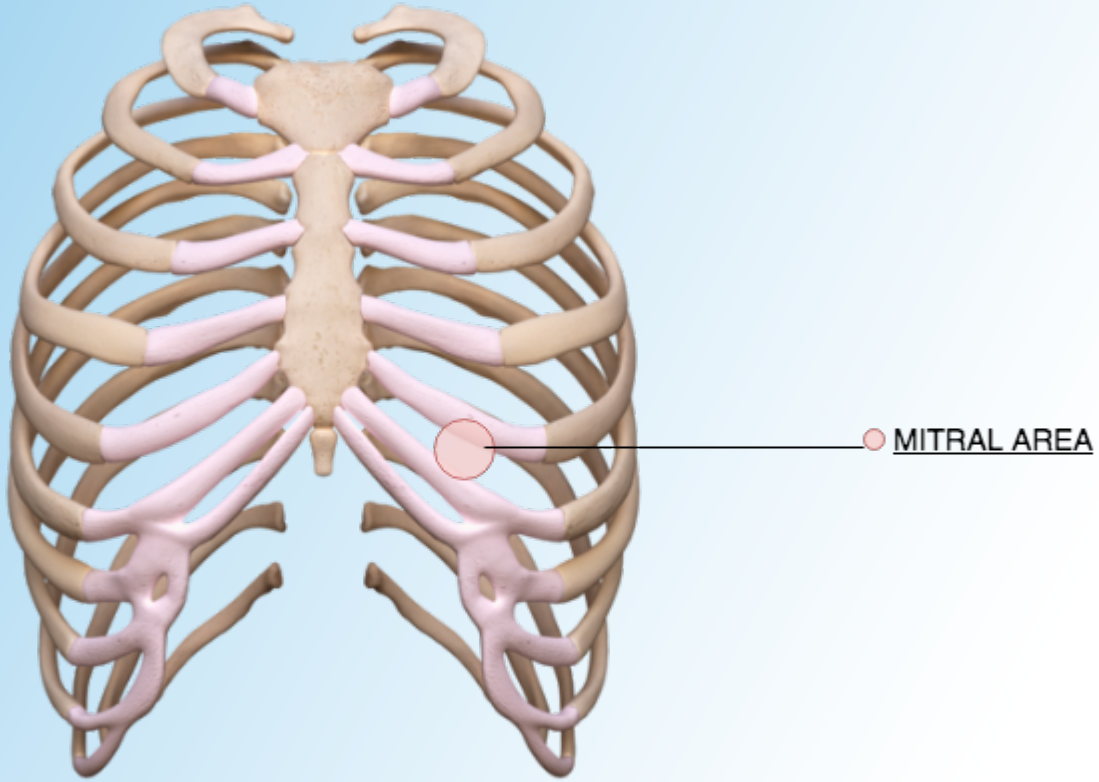
MITRAL VALVE AREA

- 5th left intercostal space – Midclavicular line

Murmurs

- Mitral Stenosis
- Mitral Regurgitation

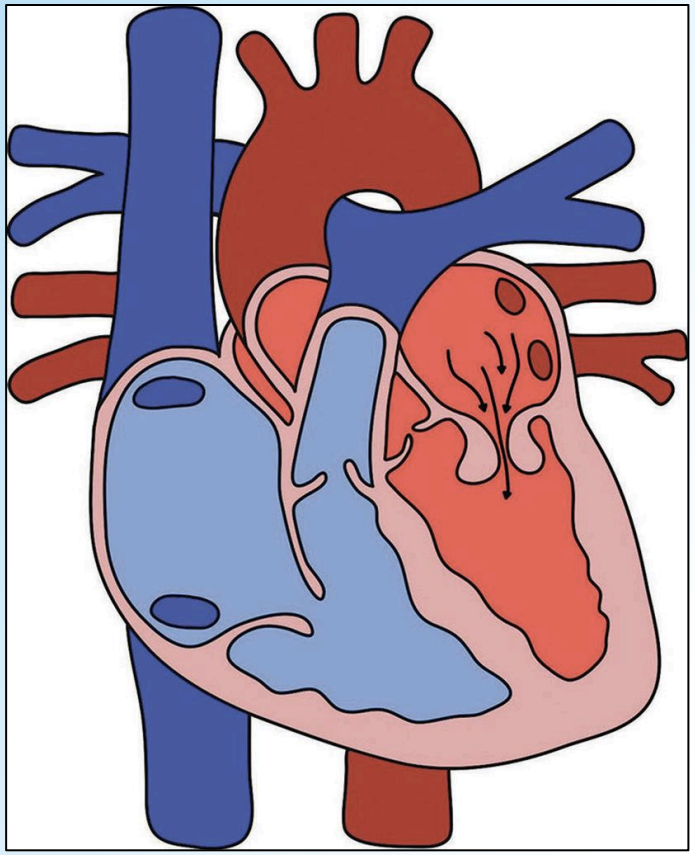


MITRAL STENOSIS

OVERVIEW AND ETIOLOGY

OVERVIEW

- Narrowing of the mitral valve
- Flow from LA to LV during **diastole** is obstructed



ETIOLOGY

1. Rheumatic Heart Disease (most common)
2. Senile calcification

MITRAL STENOSIS

PATHOPHYSIOLOGY

MITRAL STENOSIS

↑**BLOOD VOLUME IN LA**

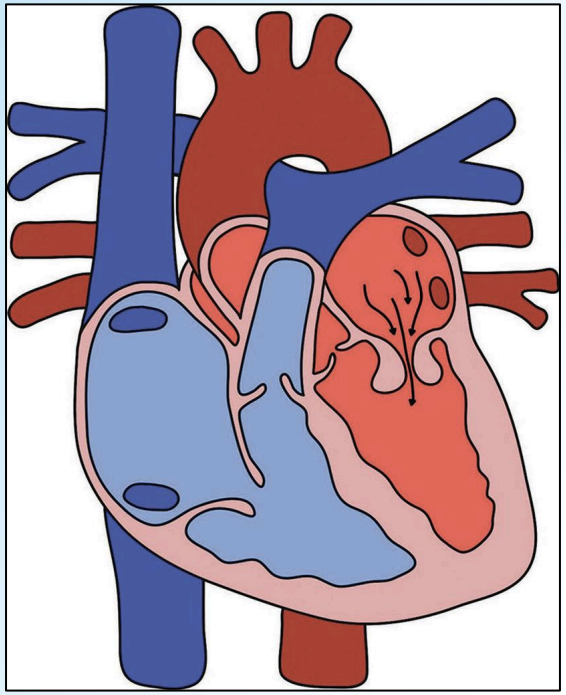
↑**LA PRESSURE**

LA ENLARGEMENT

STRETCHING OF MYOCARDICAL MUSCLE FIBERS

COMPRESSION AND RUPTURE OF BRONCHIAL VESSELS

COMPRESSION OF LARYNGEAL NERVE



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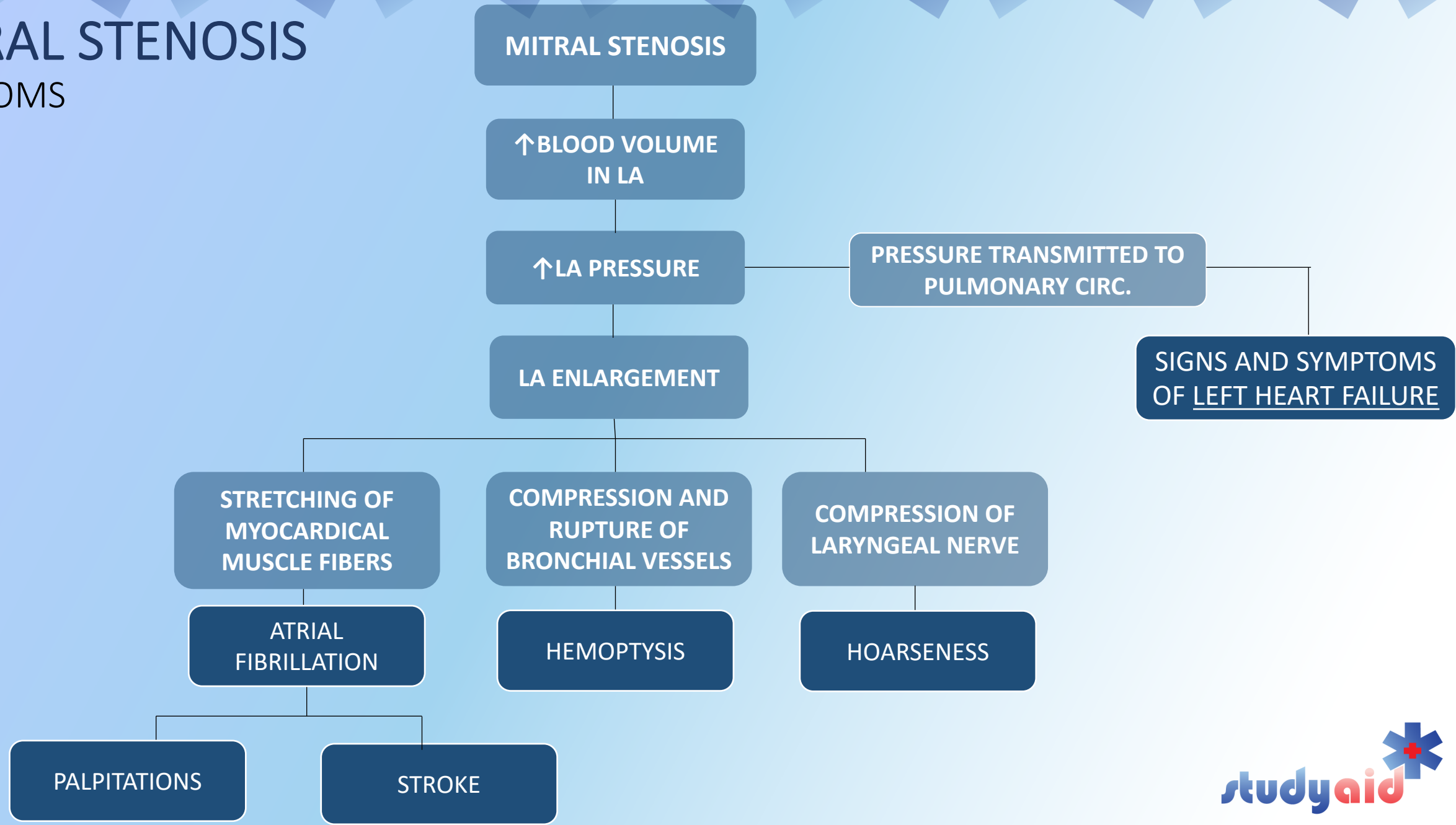
MITRAL STENOSIS

SYMPTOMS



MITRAL STENOSIS

SIGNS

AUSCULTATION

- **Rhumbling mid-diastolic murmur**
  - Takes longer time for the mitral valve to open

- **Opening snap**
  - Same as ejection click

OTHER

- HF signs

Ejection click
- Stiff semilunar valve/valve involved in ejection opens (pulmonary or aortic)

Opening snap
- Stiff atroventricular valve opens (mitral or tricuspid)

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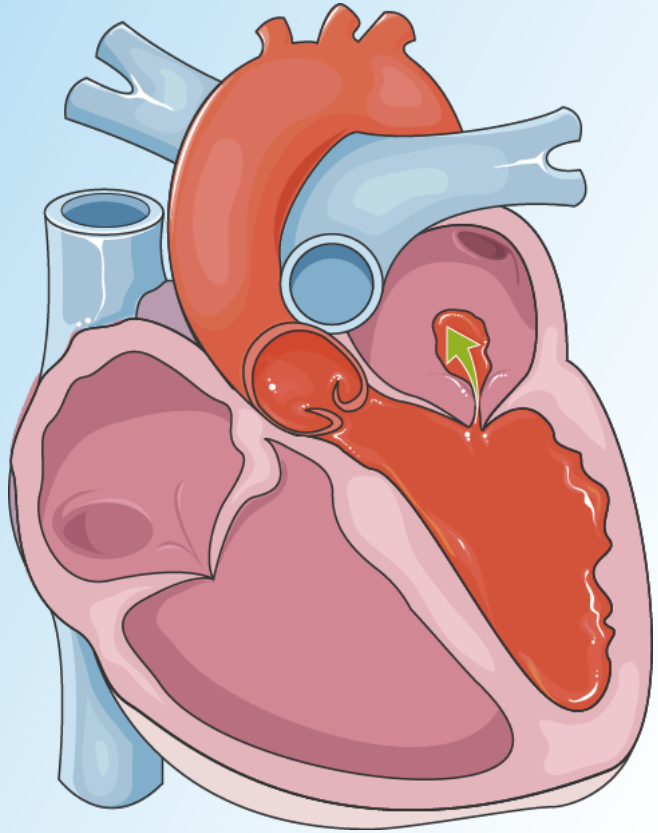
MITRAL REGURGITATION

OVERVIEW AND ETIOLOGY

OVERVIEW

- Mitral Valve remains open during systole
- Backflow of blood into LA



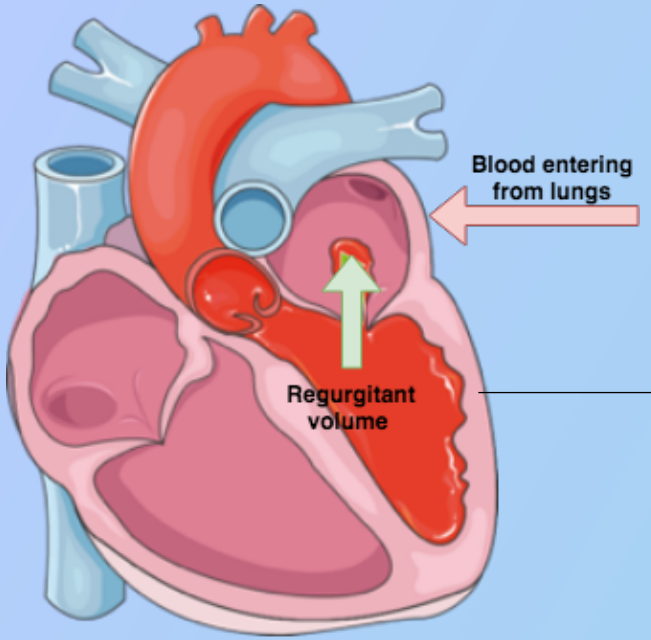
ETIOLOGY

1. ACUTE
   - Papillary muscle infarction
   - Ruptured chorda tendinae
   - Infective endocarditis

2. CHRONIC
   - Mitral valve prolapse
   - Rheumatic heart disease

MITRAL REGURGITATION

PATHOPHYSIOLOGY



The LA receives blood from the lungs AND the regurgitant blood from previous systole → delivered to LV

MITRAL REGURGITATION

BACKFLOW OF BLOOD INTO LA

↑ LV FILLING AND PRESSURE

↑ LA VOLUME AND PRESSURE

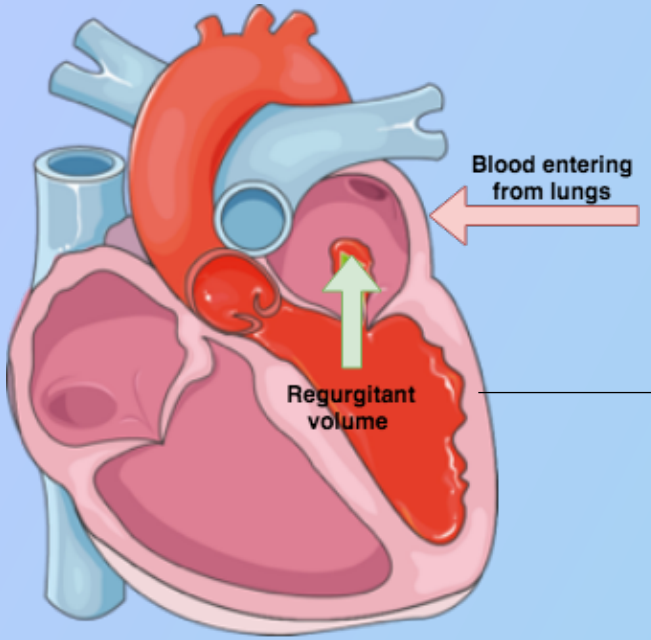
VOLUME OVERLOAD

ECCENTRIC HYPERTROPHY

↑ OXYGEN DEMAND

MITRAL REGURGITATION

SYMPTOMS



MITRAL REGURGITATION

BACKFLOW OF BLOOD INTO LA

↑ LV FILLING AND PRESSURE

↑ LA VOLUME AND PRESSURE

SIGNS AND SYMPTOMS OF LEFT HEART FAILURE

VOLUME OVERLOAD

ECCENTRIC HYPERTROPHY

↑ OXYGEN DEMAND

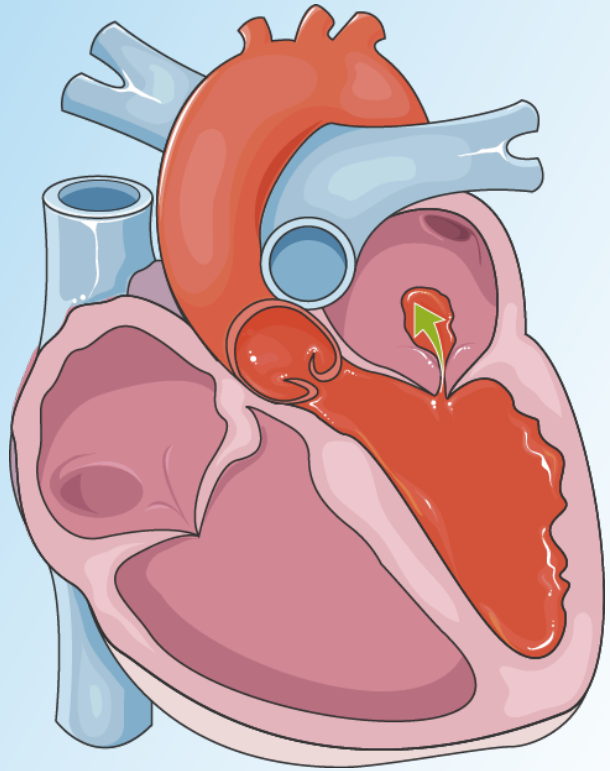
ANGINA

MITRAL REGURGITATION

SIGNS

AUSCULTATION

- Early Systolic Murmur
- Pansystolic/Holosystolic – lasts thorugh entire systole
- Radiation to axilla

OTHER

- Displaced apical impulse
  - Enlarged heart
- HF signs