VALVULAR HEART DISEASE

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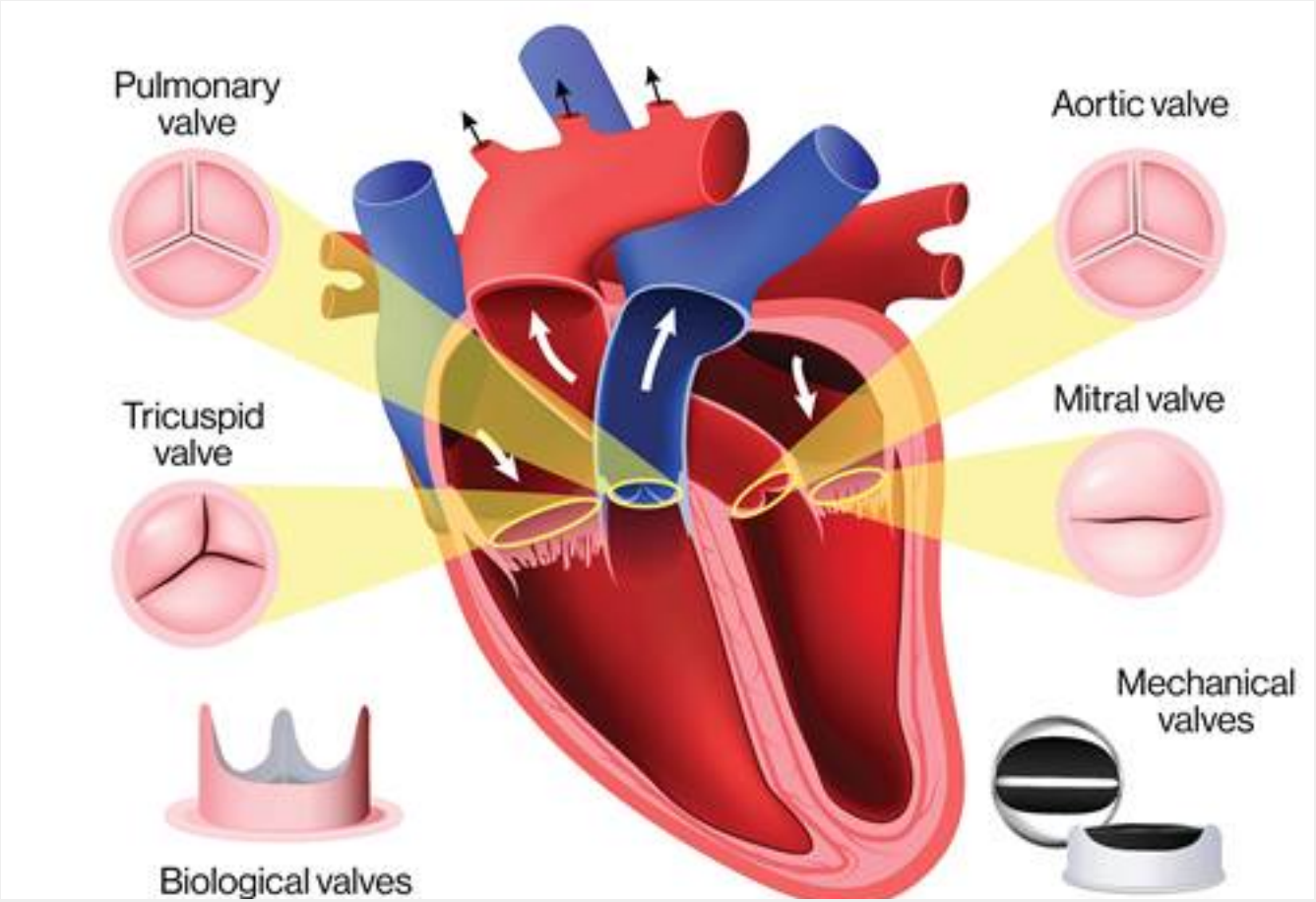
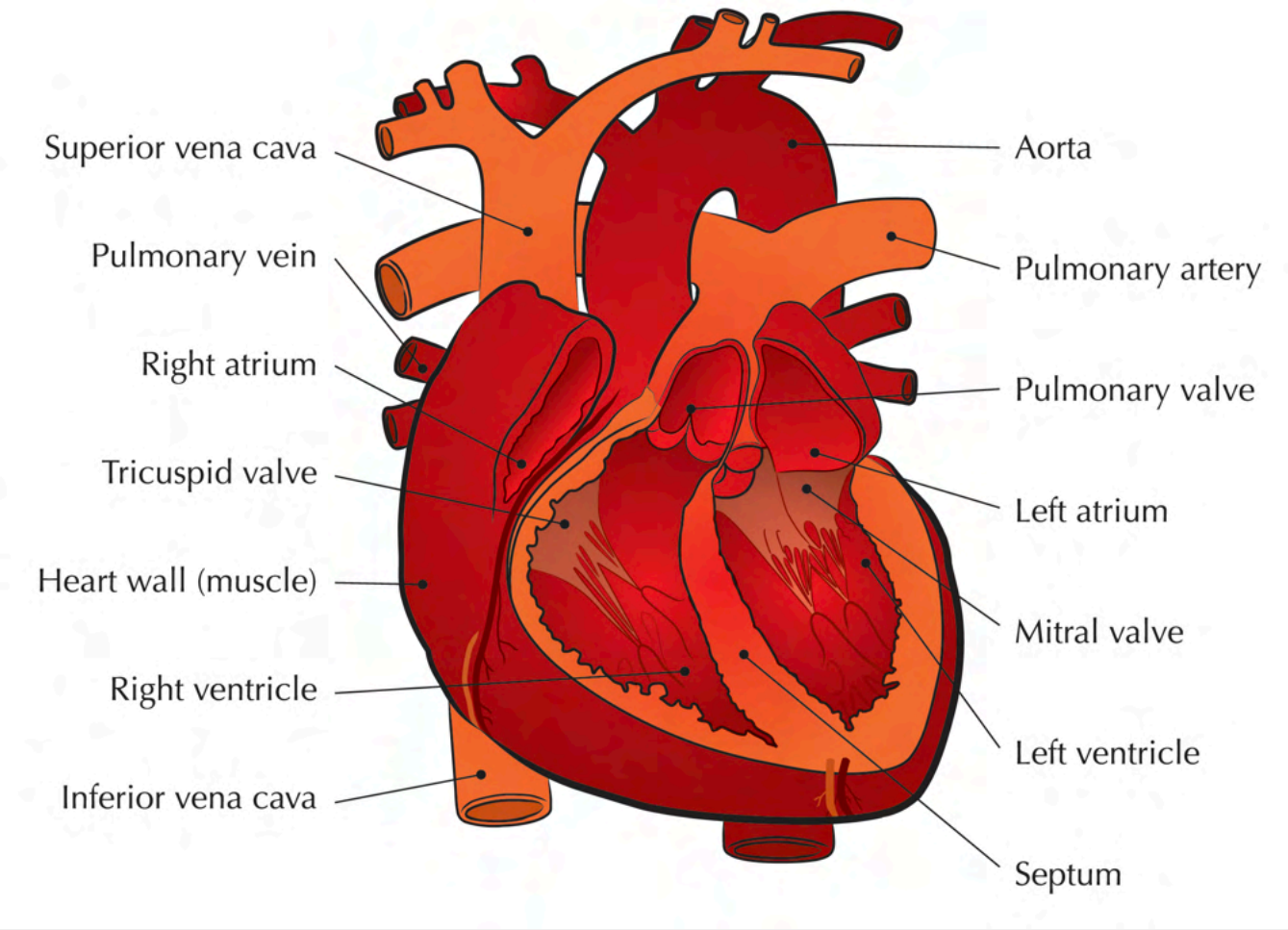
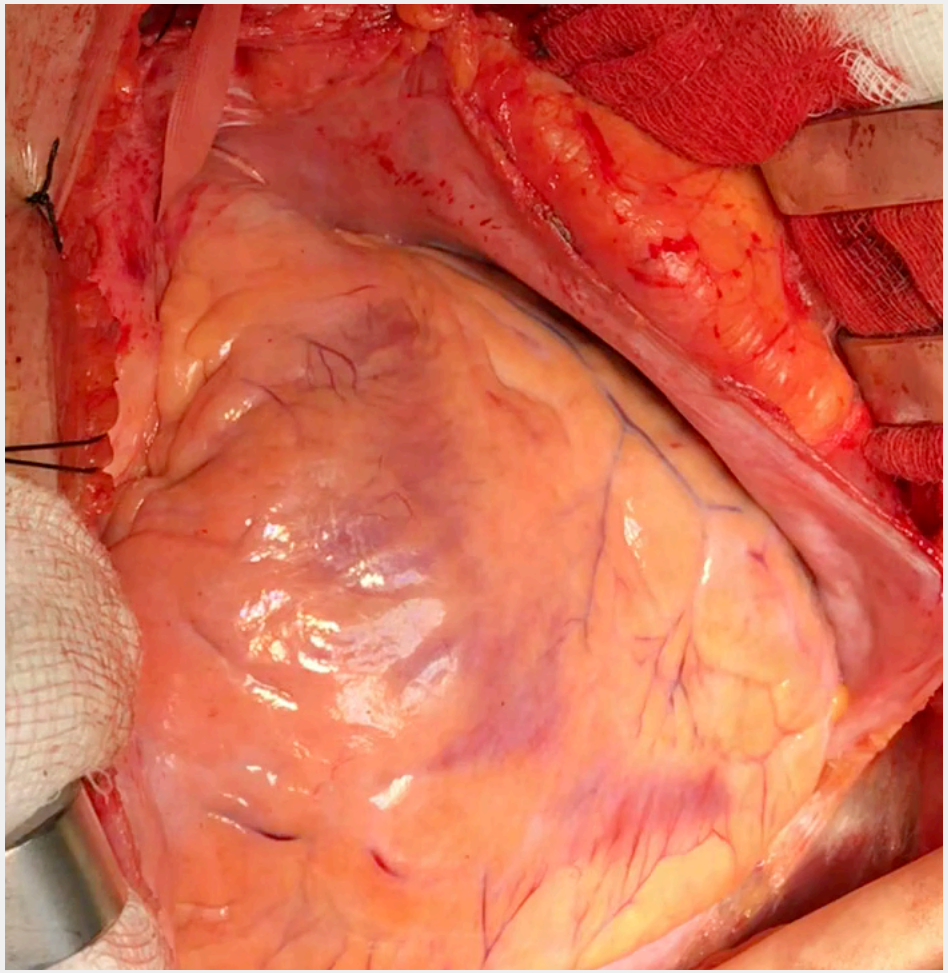
OUTLINE

- Cardiac anatomy and physiology
- Common valve diseases
- Managment options
- Infective endocarditis

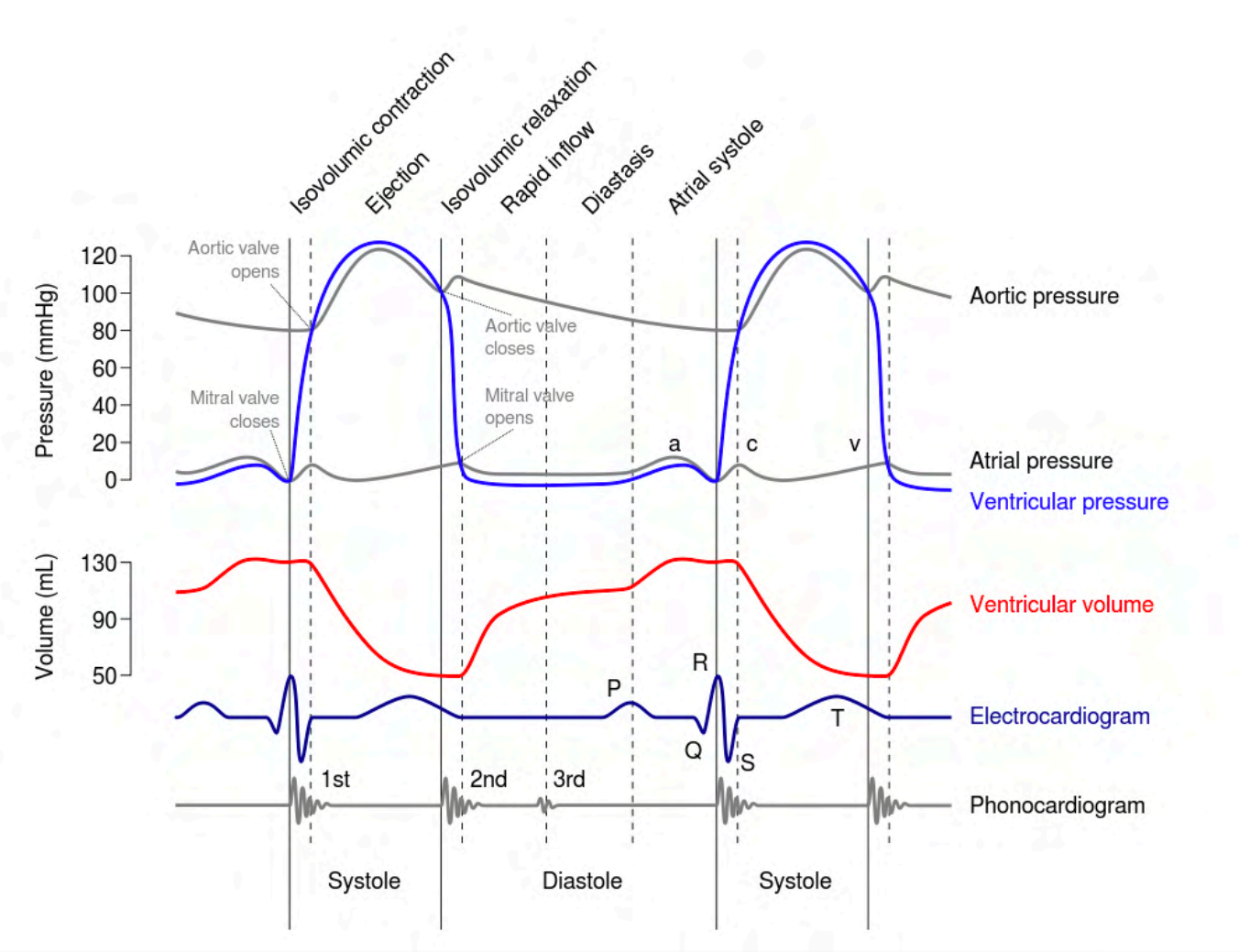


HEART STRUCTURE





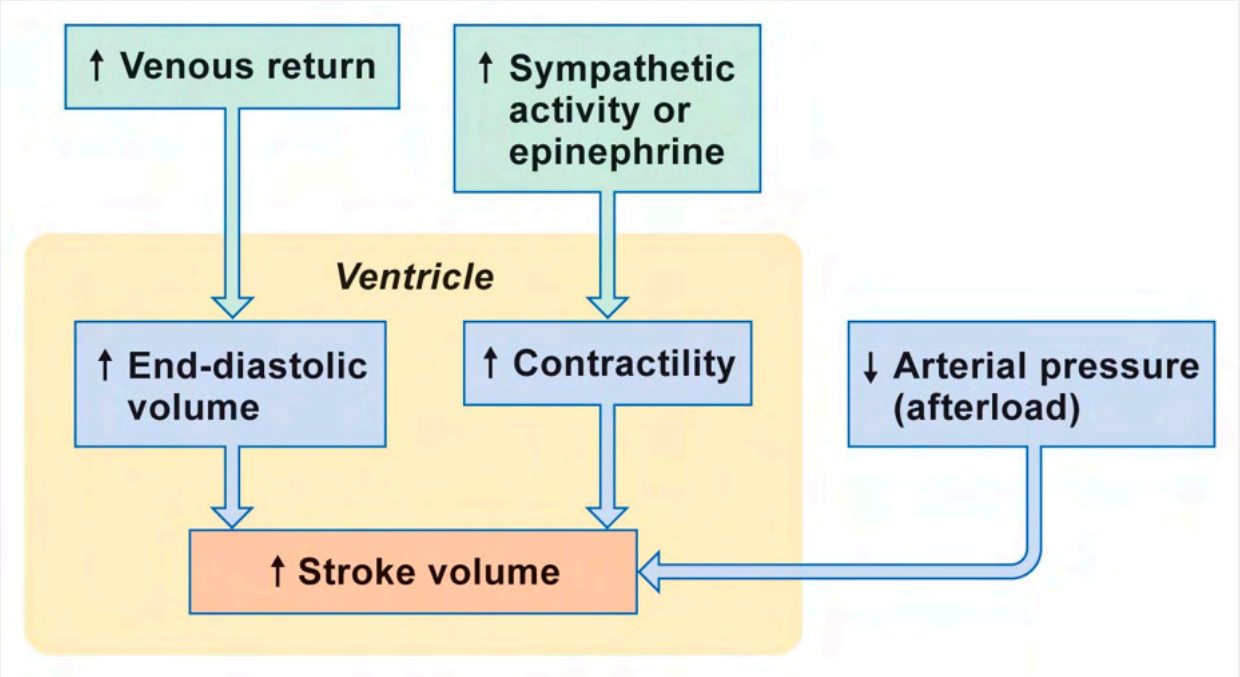
CARDIAC CYCLE



CARDIAC OUTPUT

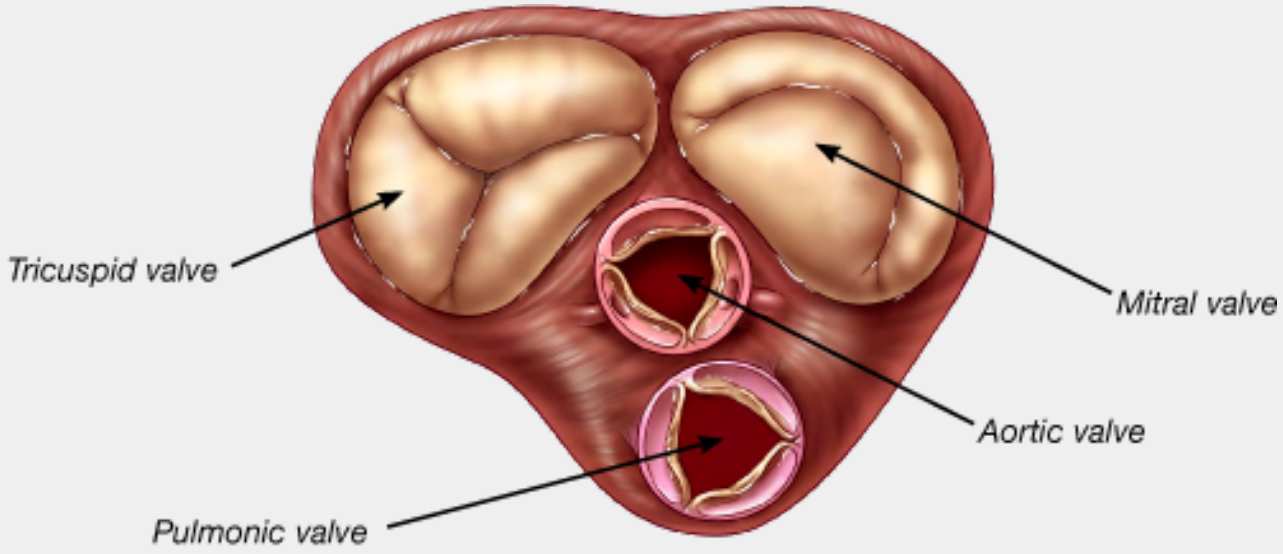
- Stroke volume = End diastolic volume – End systolic volume

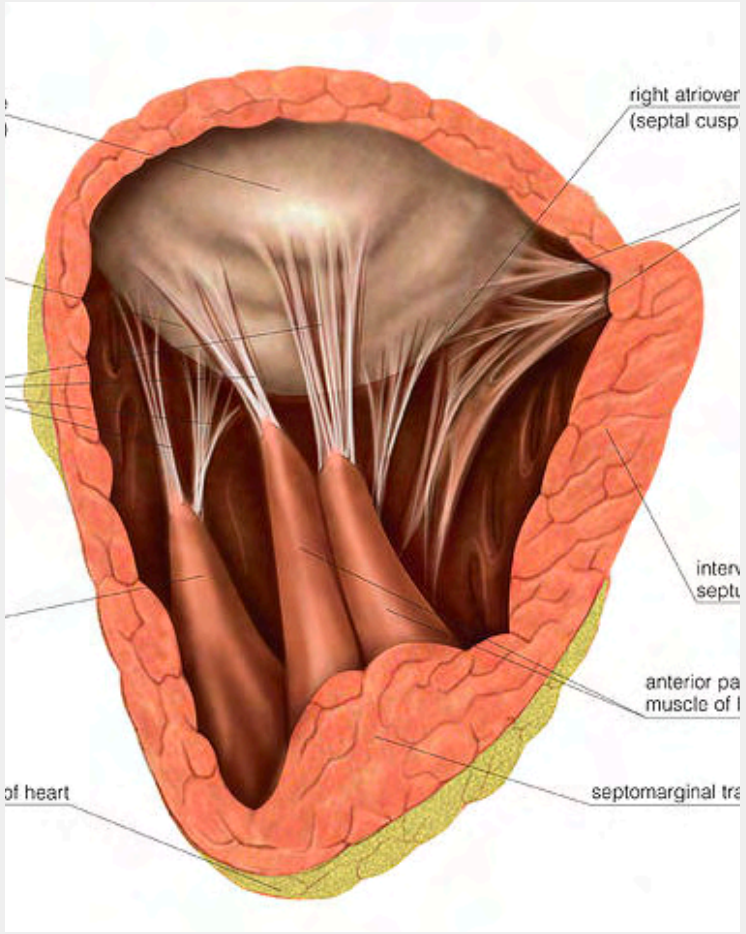
- Dependent on three variables:
  - **Preload** – how much blood is returning to the heart
  - **Myocardial contractility** – strength of myocardial contraction
  - **Afterload** – resistance against which the heart needs to pump



HEART VALVES

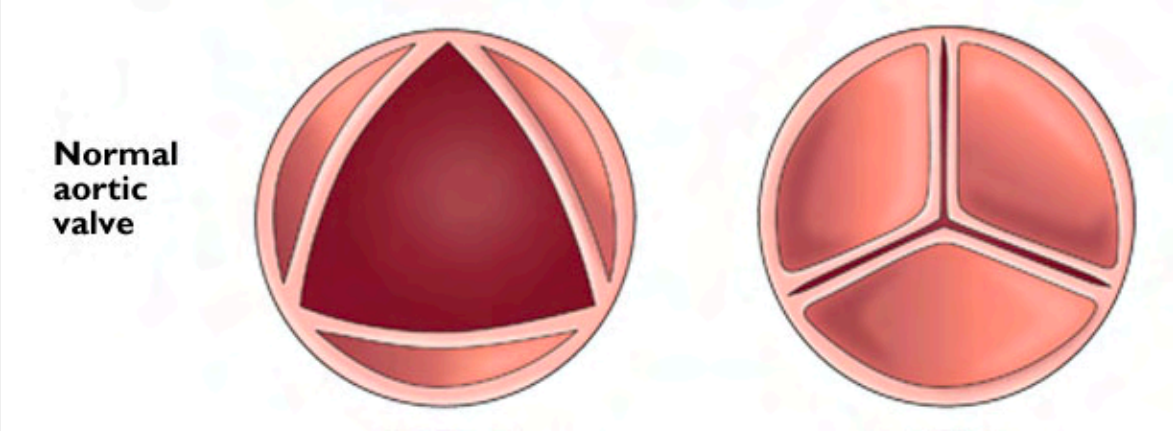
- Atrioventricular valves – Mitral and Tricuspid
  - Papillary muscles and chordae tendinae prevent leaflet prolapse

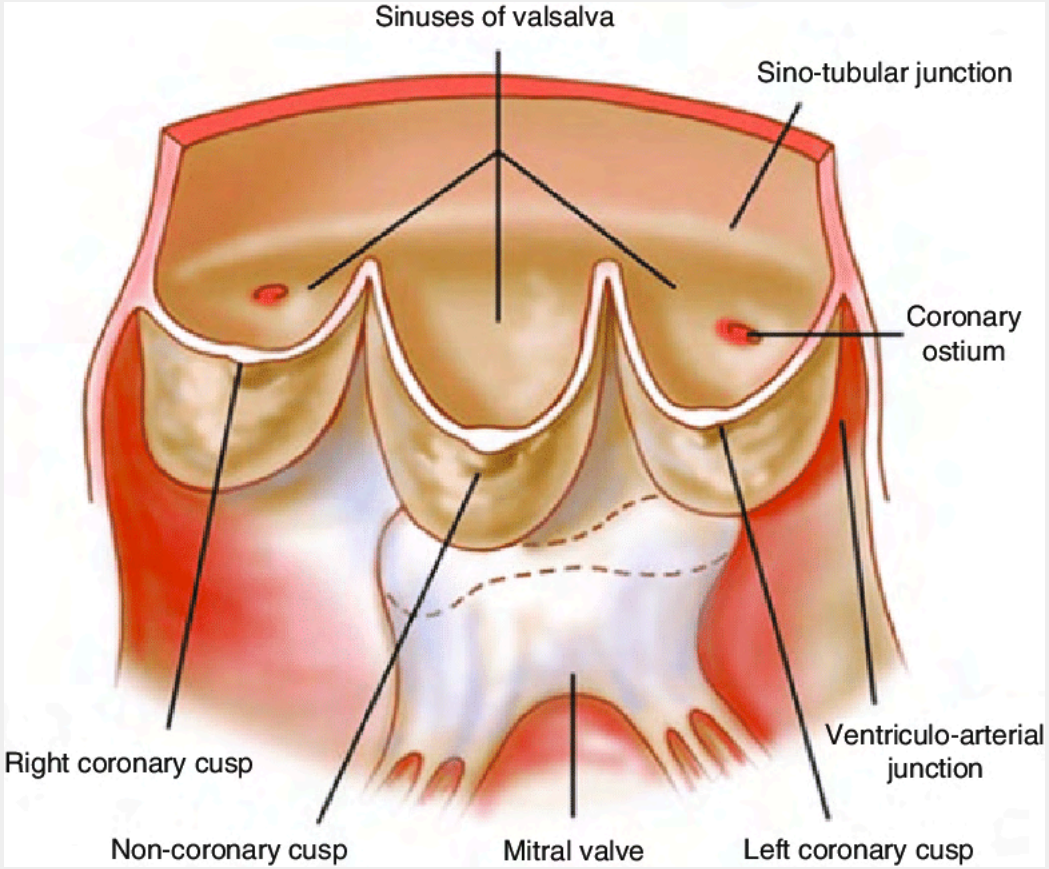




HEART VALVES

- Pulmonary artery and aortic valves are semilunar
  - Embedded in the artery wall
  - Significant pressure differences



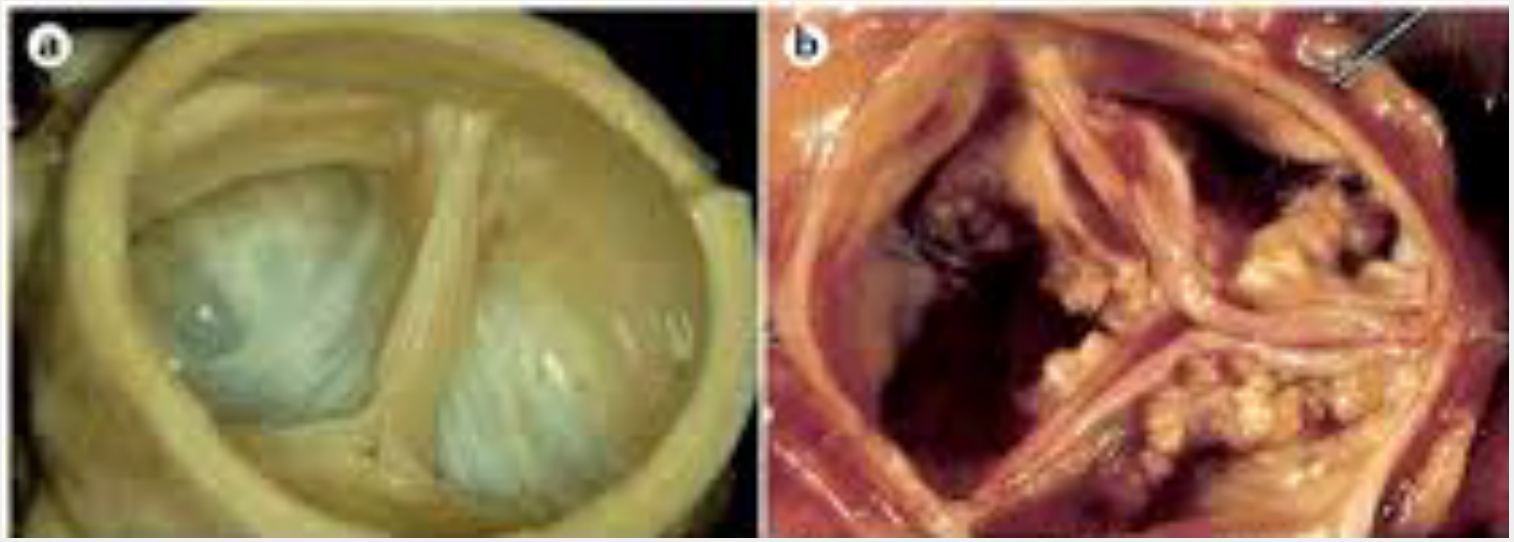


AORTIC VALVE DISEASE

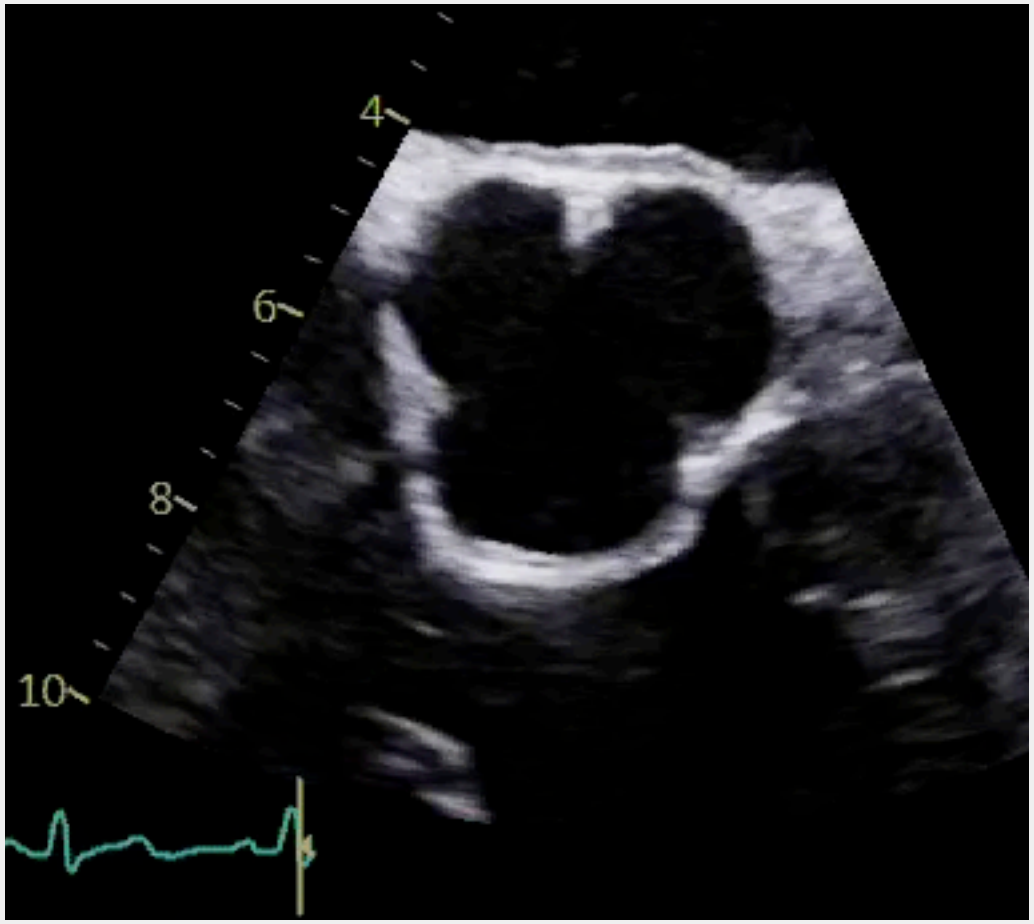
AORTIC STENOSIS

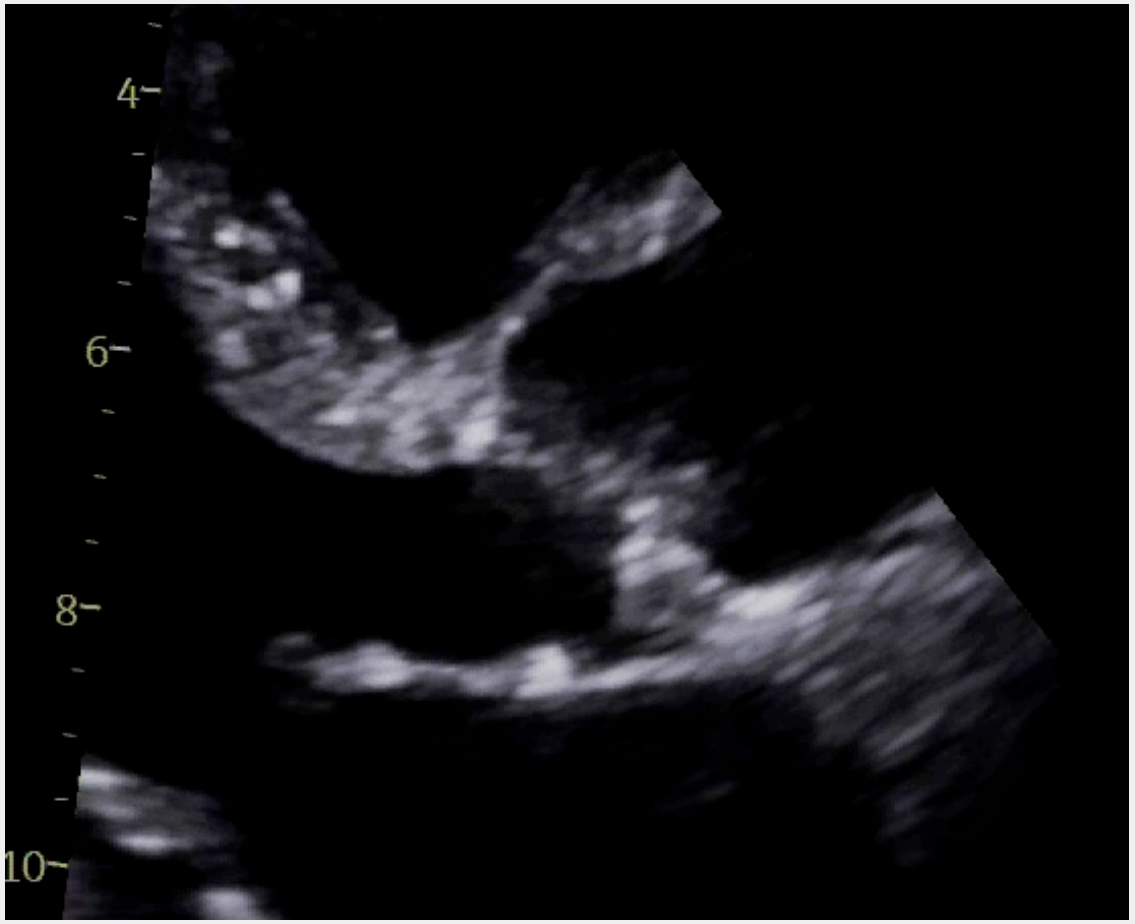
- Commonest valve disease

- Causes
  - Degenerative
  - Bicuspid aortic valve
  - Rheumatic disease



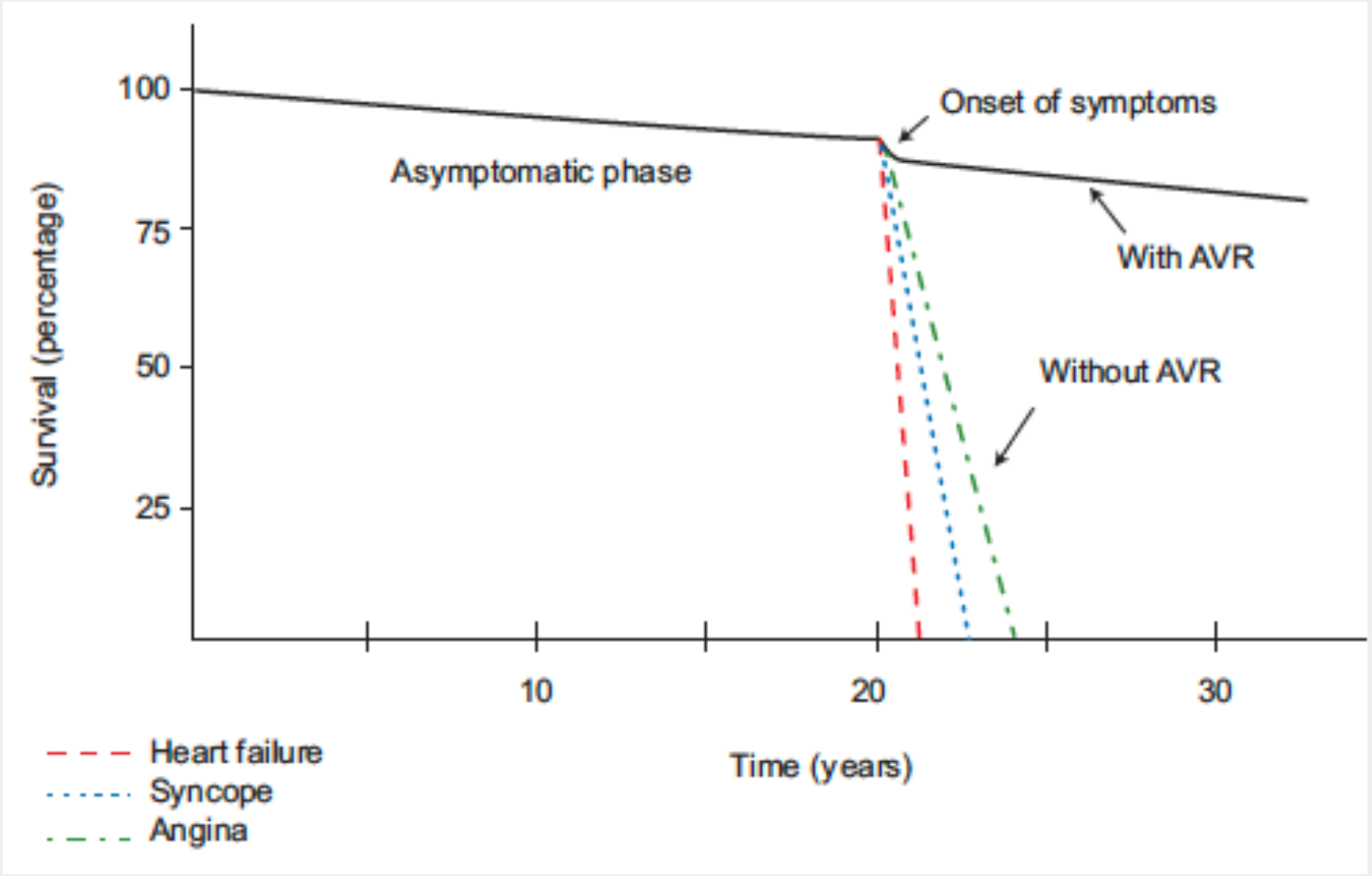
AORTIC STENOSIS





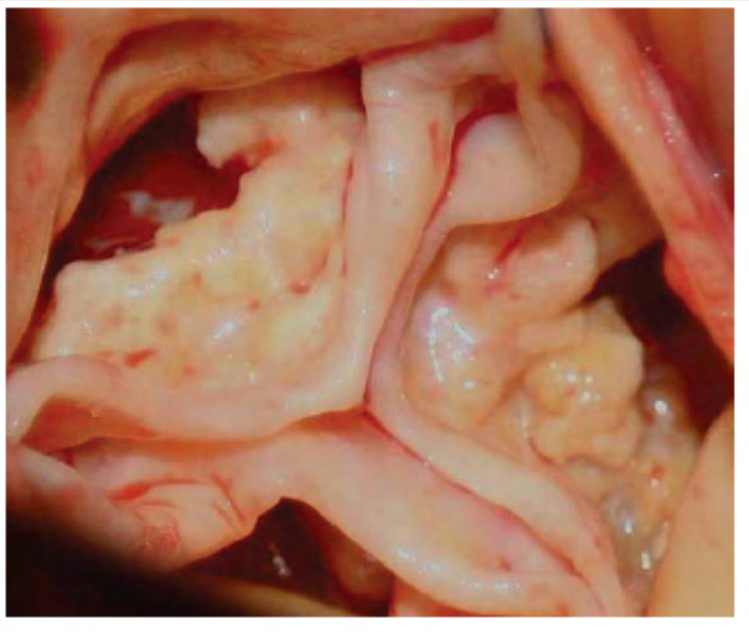
AORTIC STENOSIS

- Symptoms
  - Angina
  - Syncope
  - Cardiac failure



AORTIC STENOSIS

- Signs
  - Slow rising pulse
  - Crescendo-decrescendo murmur radiating to the carotids



AORTIC STENOSIS

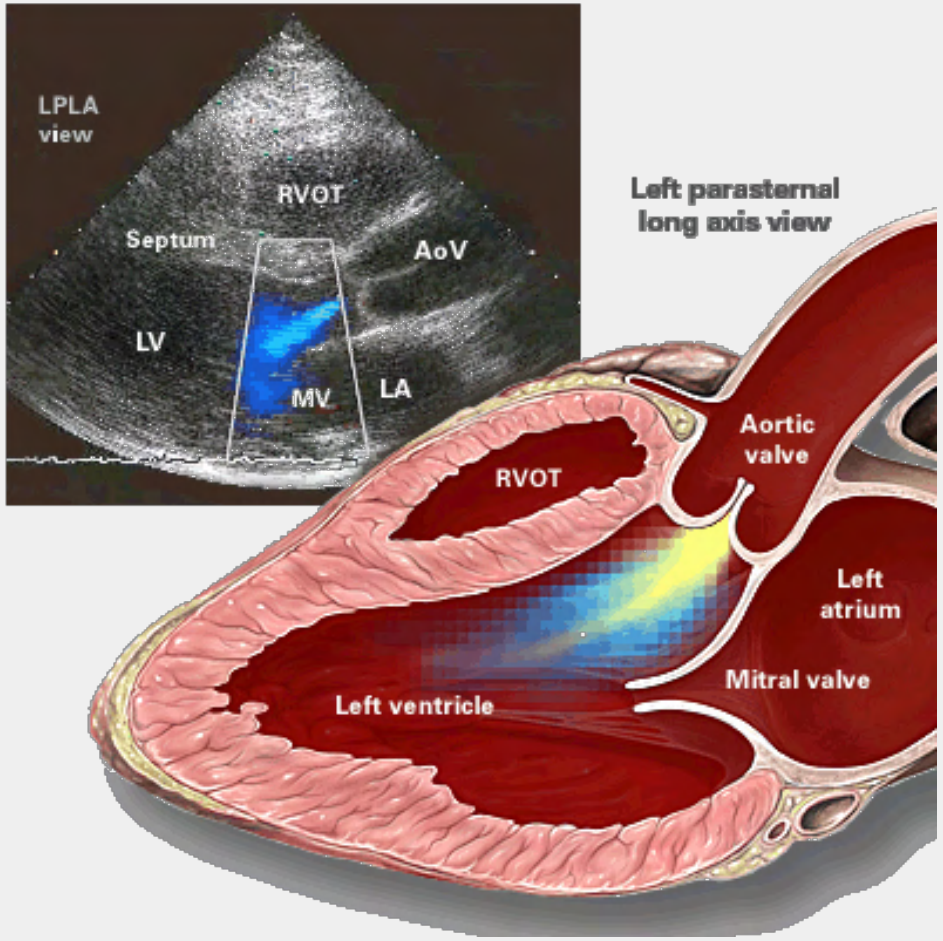
- Assessment of severity

Table 1. AHA guidelines for the severity of aortic stenosis.

	Mild	Moderate	Severe
Aortic valve area (cm^2)	1.5-2.5	1.0-1.5	<1.0
Mean pressure gradient (mmHg)	15-25	25-40	>40
Peak velocity (m/s)	<3.0	3.0-4.0	>4.0

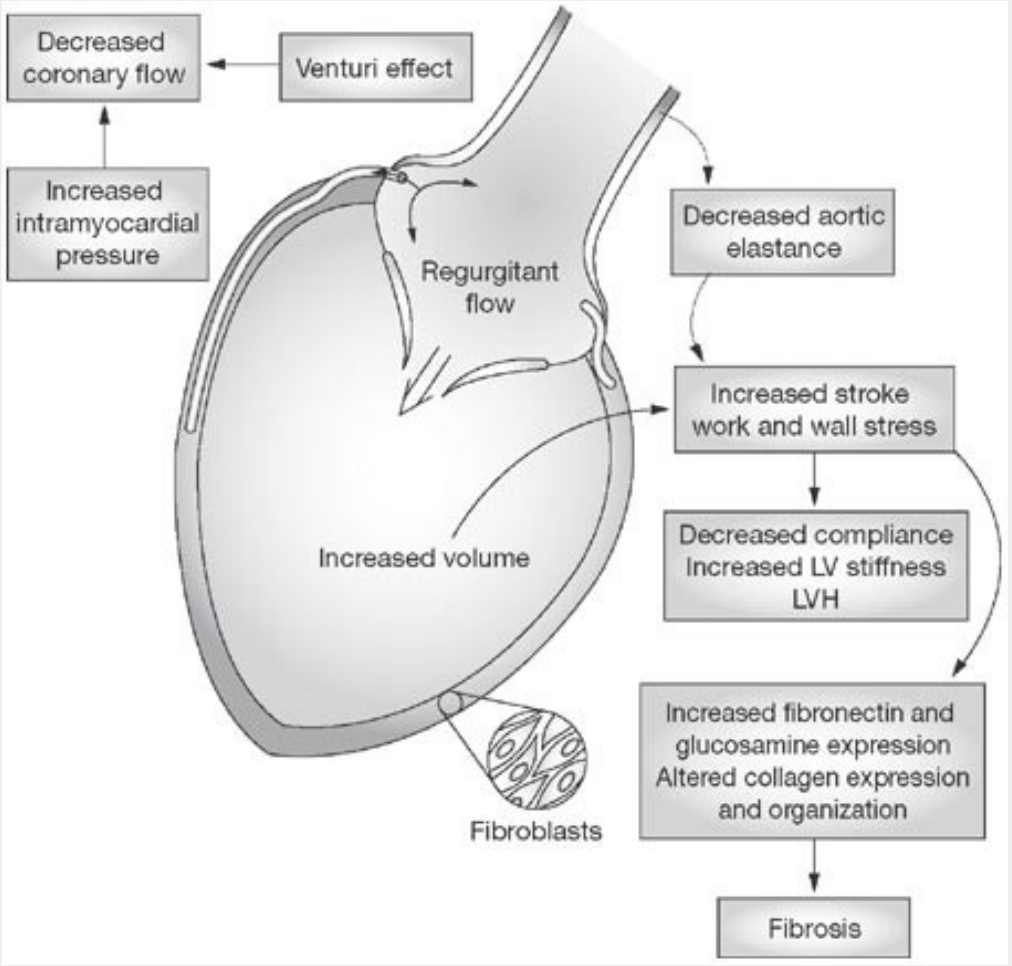
AORTIC REGURGITATION

- Causes
  - Degenerative
  - Infective endocarditis
  - Rheumatic disease
  - Aortic root aneurysm
  - Aortic dissection



AORTIC REGURGITATION

- Symptoms
  - Can be asymptomatic for many years
  - Dyspnoea
  - Fatigue
  - Congestive cardiac failure

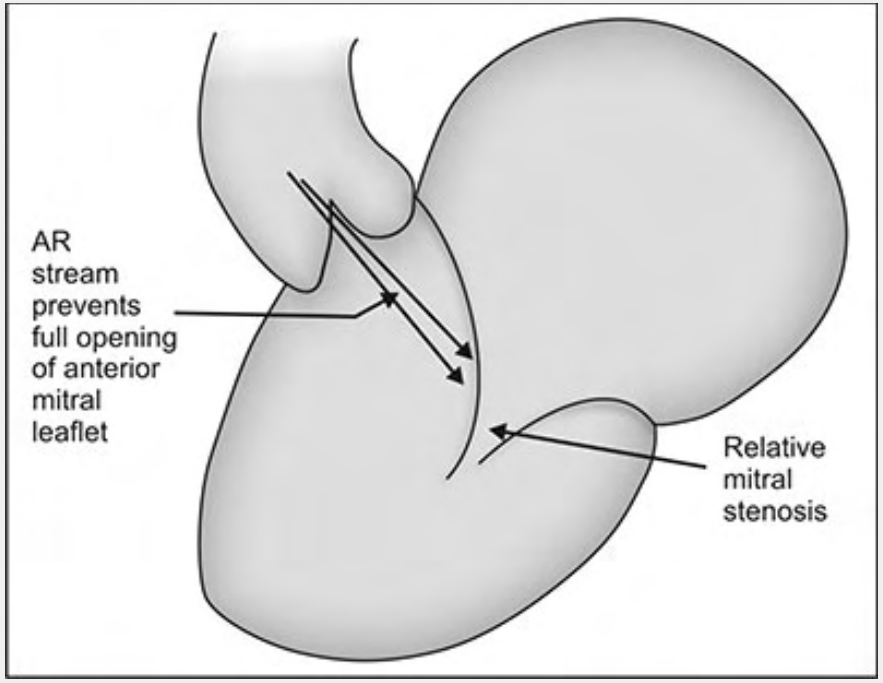


AORTIC REGURGITATION

- Signs
  - Wide pulse pressure
- a) Duroziez's sign - to-and-fro (systolic and diastolic) murmur audible over the femoral artery with a stethoscope;
- b) Quinke's sign - pulsation in the capillary membranes of the fingertips;
- c) Traube's sign - pistol-shot sound audible over the femoral artery;
- d) De Musset's sign - head bobbing with a collapsing pulse;
- e) Corrigan's pulse - water-hammer collapsing pulse;
- f) Mueller's sign - pulsation of the uvula;
- g) Hill's sign - systolic blood pressure in the leg greater than the systolic pressure in the arm by at least 20mmHg.

AORTIC REGURGITATION

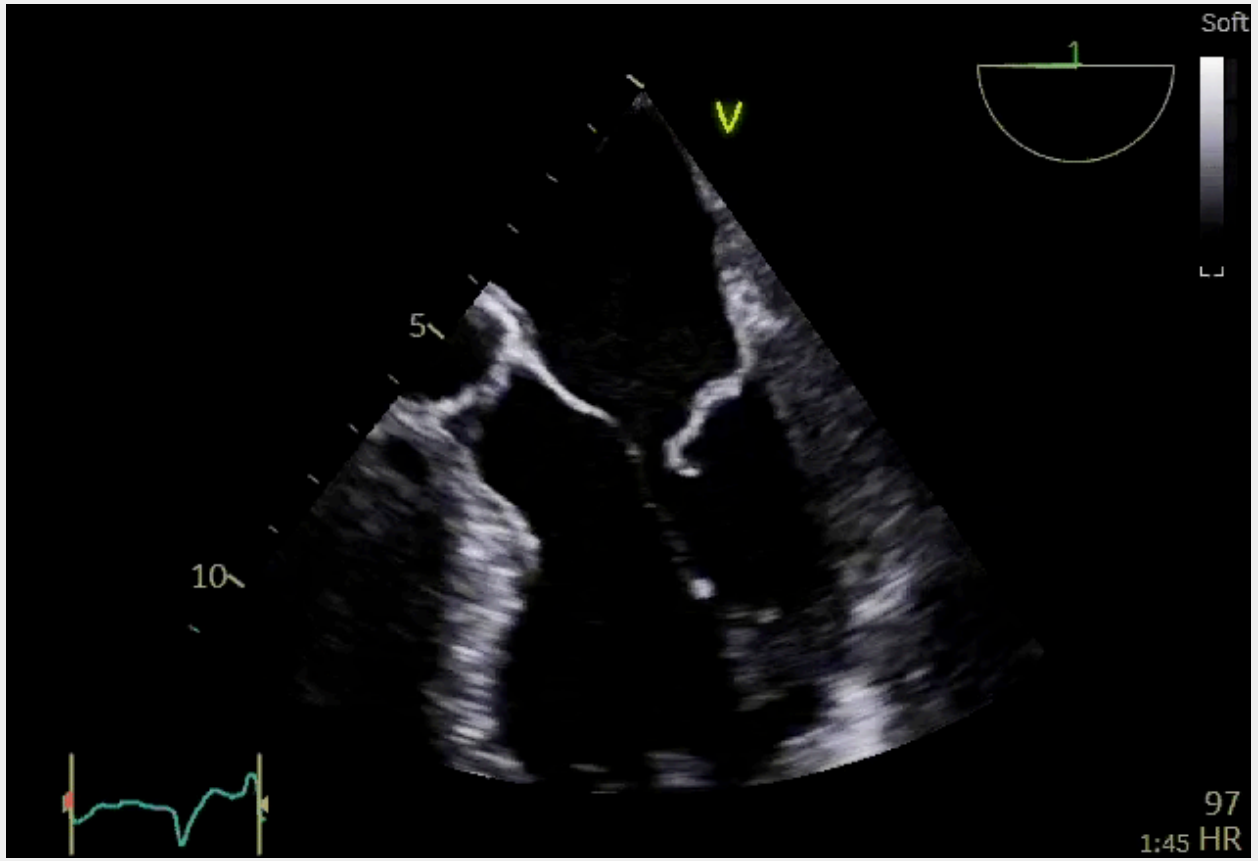
- Signs
  - Decrescendo diastolic murmur heard in left sternal edge with patient in expiration
  - Systolic flow murmur
  - Austin flint murmur



MITRAL VALVE DISEASE

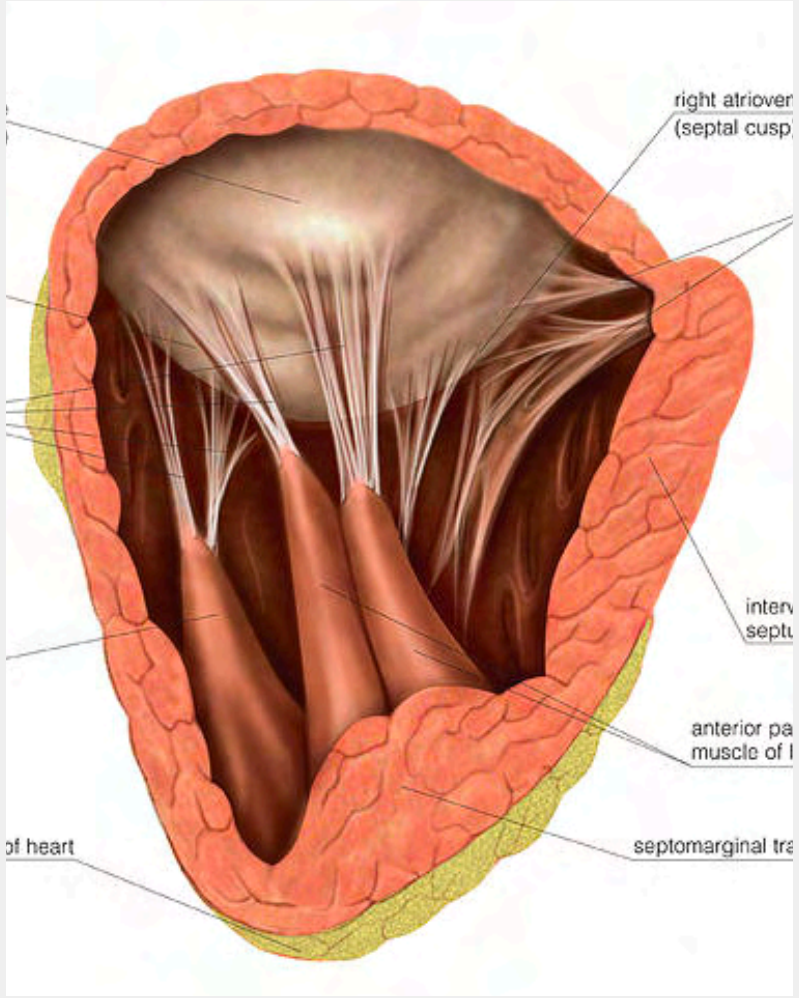
MITRAL REGURGITATION

- Second commonest valve disease



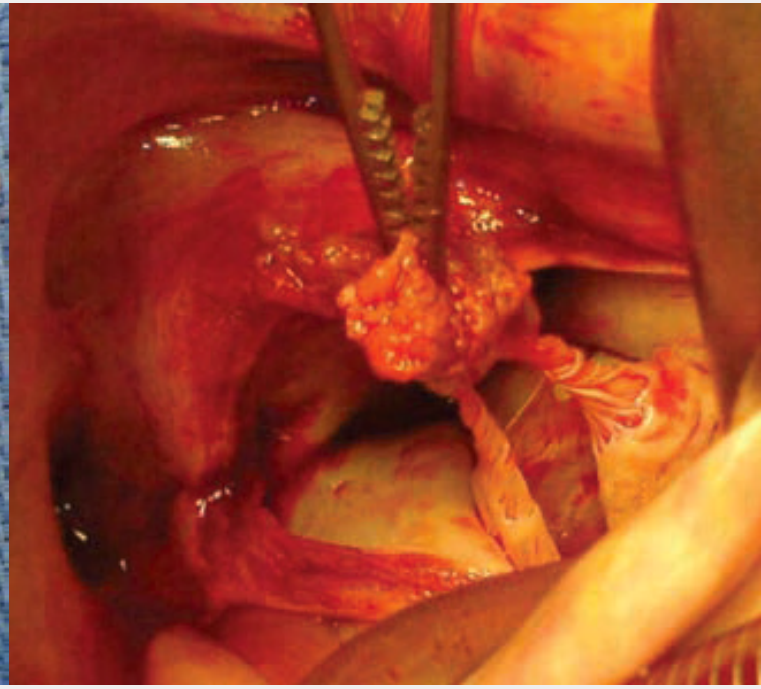
MITRAL REGURGITATION

- Mitral valve disease can be related to:
  - Valve leaflets
  - Chordae tendinae
  - Papillary muscles
  - Ventricle



MITRAL REGURGITATION

- Causes
- Chronic MR
  - Myxomatous leaflet degeneration
  - Rheumatic fever
  - Ischaemic cardiomyopathy
- Acute MR
  - Chordal rupture
  - Papillary muscle rupture
  - Infective endocarditis

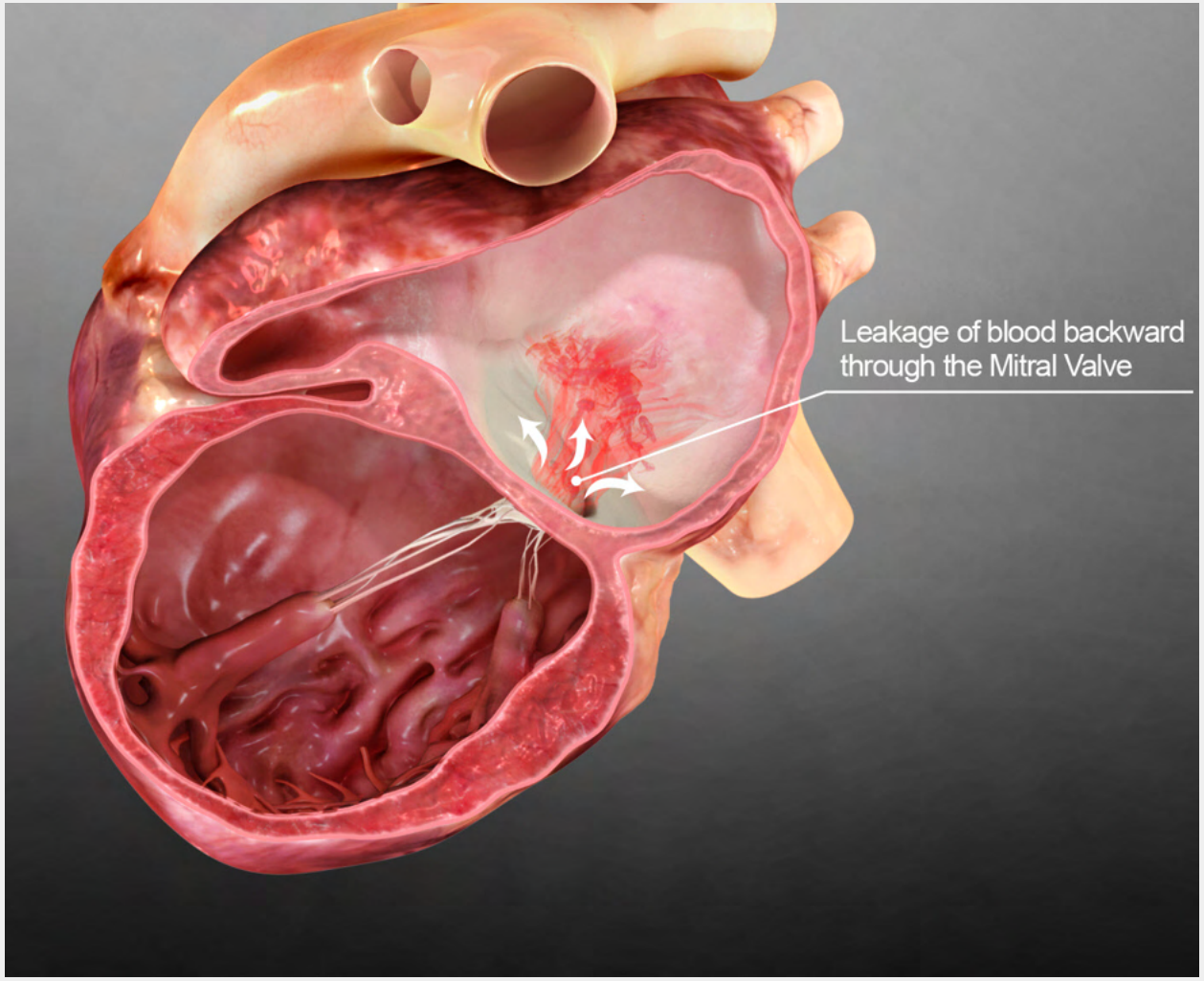


MITRAL REGURGITATION

- Symptoms
  - Typically a slowly progressive disease
  - Fatigue and weakness
  - Dyspnoea, orthopnoea and paroxysmal nocturnal dyspnoea.
  - Pulmonary hypertension and right heart failure
  - Palpitations - Atrial fibrillation

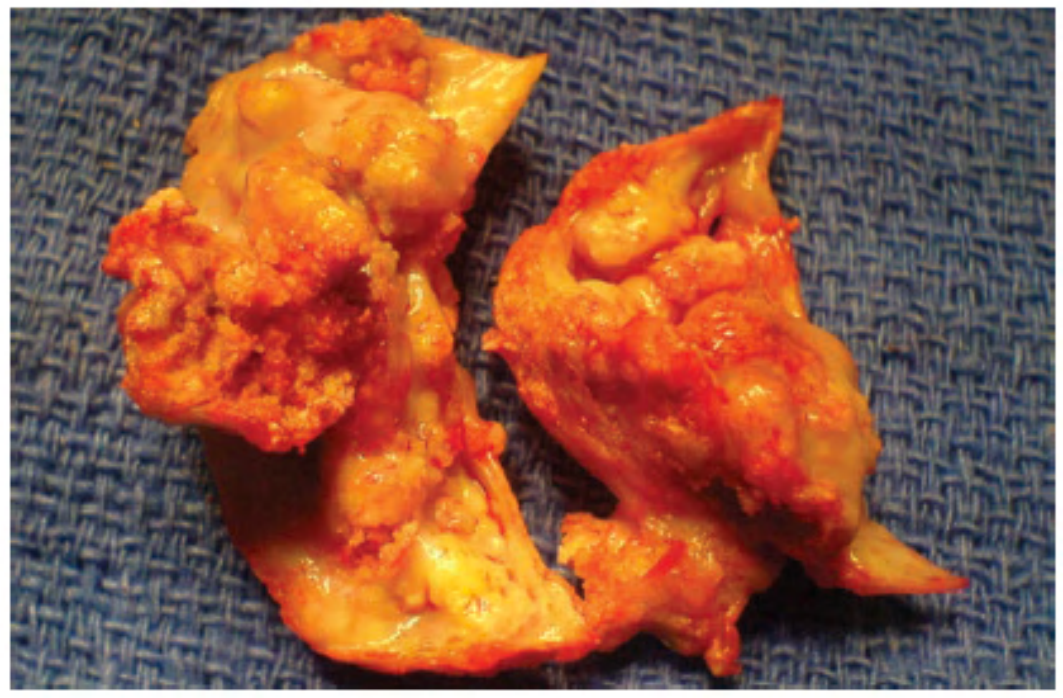
MITRAL REGURGITATION

- Signs
  - Displaced volume-loaded apex beat.
  - Apical thrill.
  - 3rd heart sound.
  - Apical pansystolic murmur



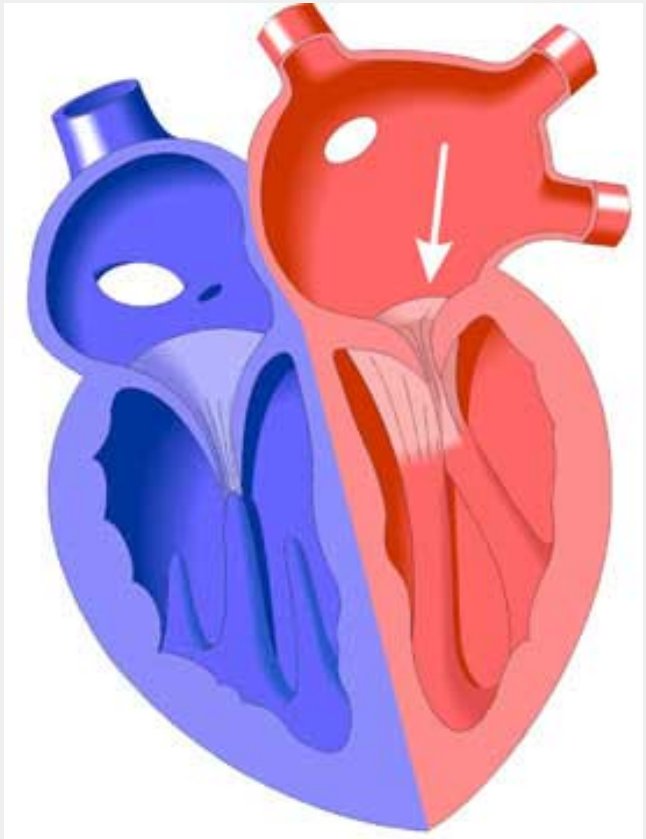
MITRAL STENOSIS

- Causes
  - Rheumatic heart disease (group A beta-haemolytic streptococci)
  - Degenerative calcification



MITRAL STENOSIS

- Symptoms
  - Dyspnoea, orthopnoea and paroxysmal nocturnal dyspnoea.
  - Left atrial distension resulting in:
    - a) atrial fibrillation
    - b) left recurrent laryngeal nerve compression
    - c) oesophageal compression
    - d) left main bronchus compression
  - Pulmonary hypertension and right heart failure
    - a) peripheral oedema and ascites;
    - b) haemoptysis due to distension and rupture of bronchial veins.

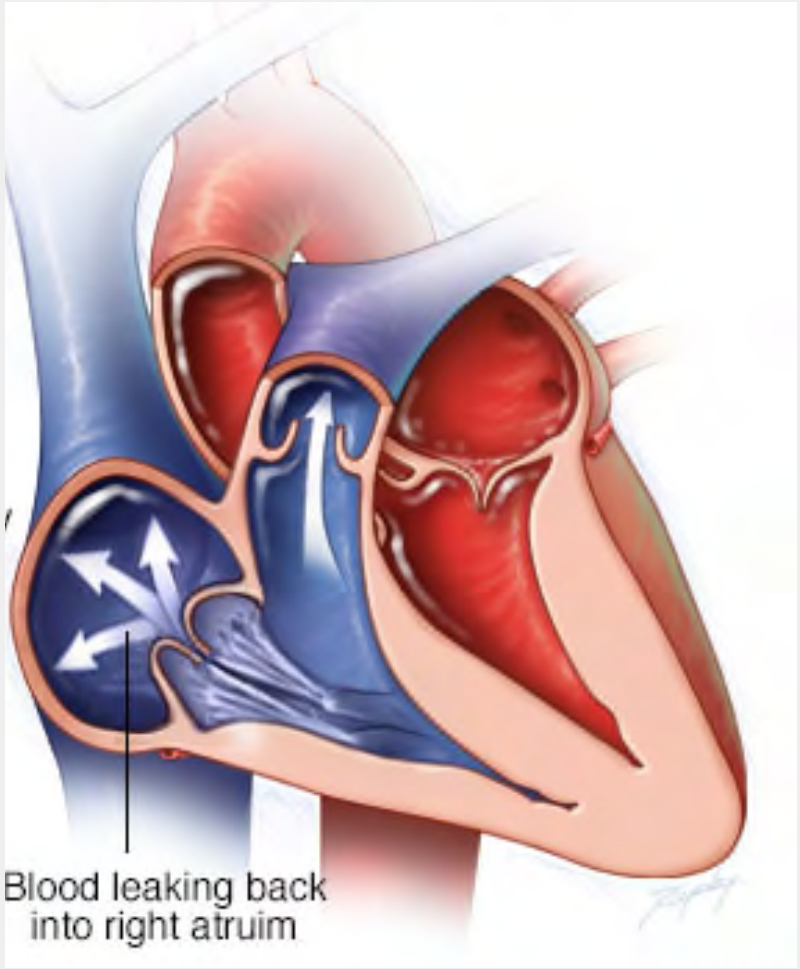


MITRAL STENOSIS

- Signs
  - Atrial fibrillation
  - Loud S1
  - Opening snap
  - Mid-diastolic rumbling murmur at the apex
  - Mitral facies

TRICUSPID REGURGITATION

- Tricuspid valve disease
  - Degenerative
  - Functional
  - Infective endocarditis
  - Carcinoid
  - Rheumatic

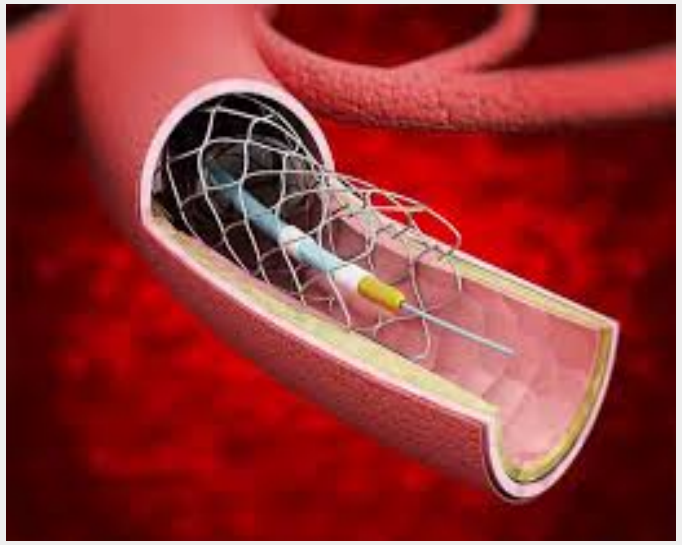


MANAGEMENT OPTIONS

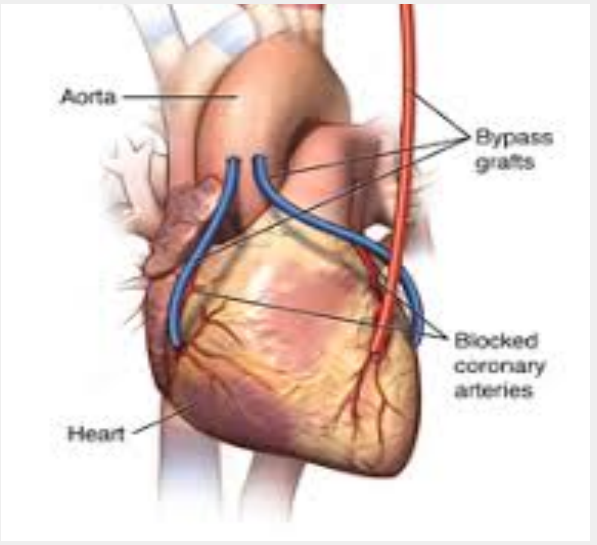
MANAGEMENT OPTIONS

Conservative

Medical



Surgical

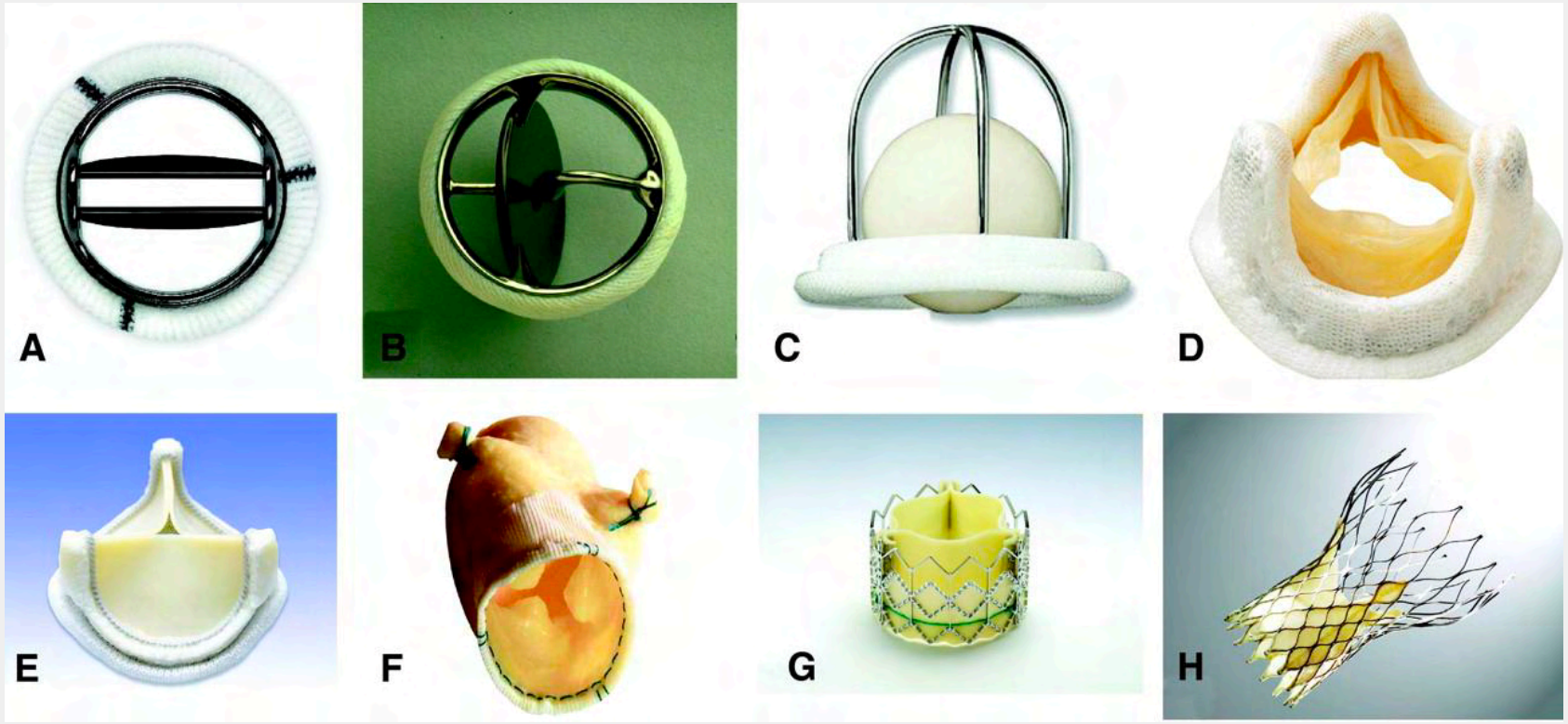


CONSERVATIVE

- Medical management of symptoms and heart failure
- BUT the problem is mechanical
- Surgery is the mainstay of treatment for severe valve disease

VALVE SURGERY

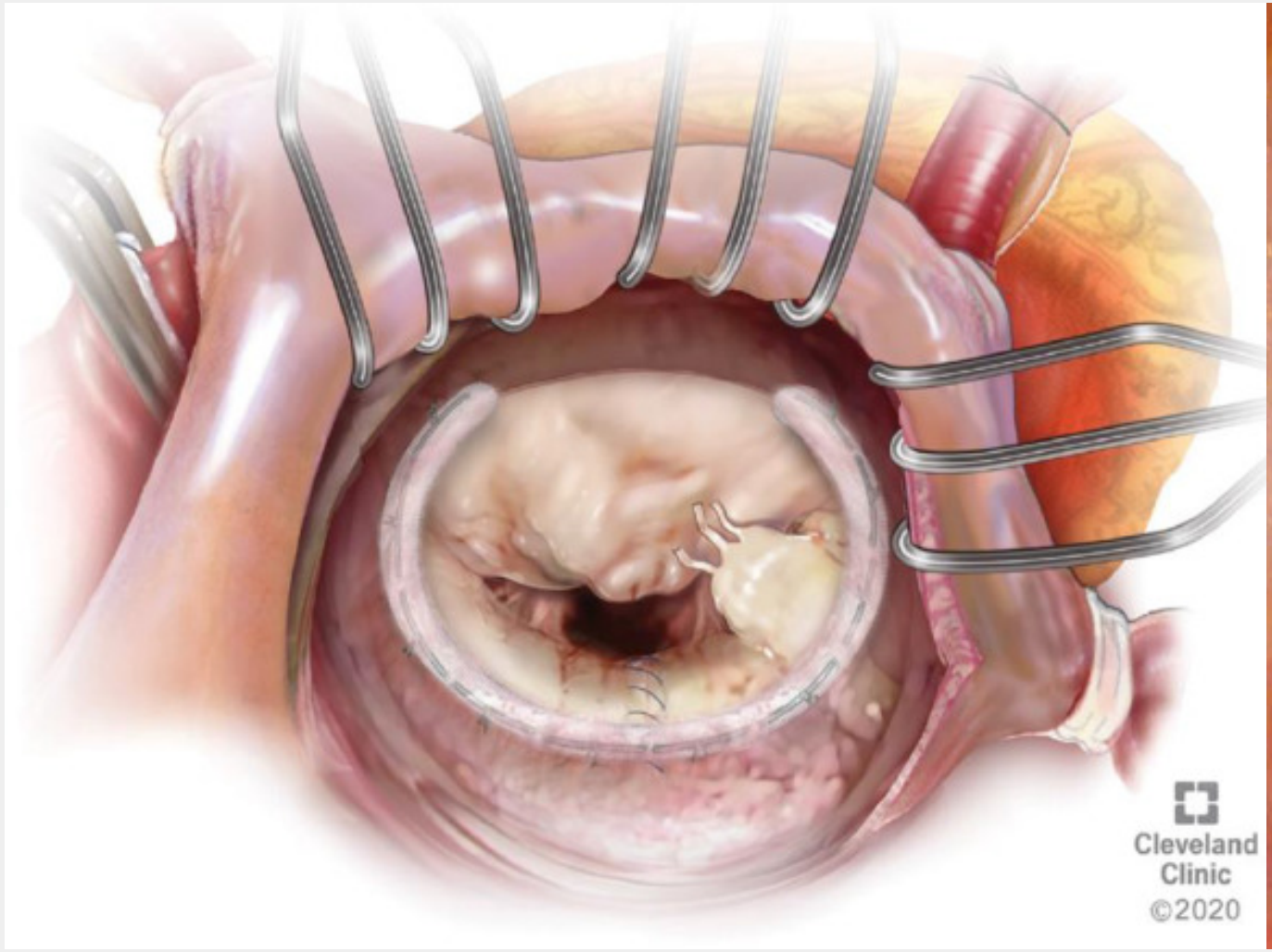
- Valve replacement

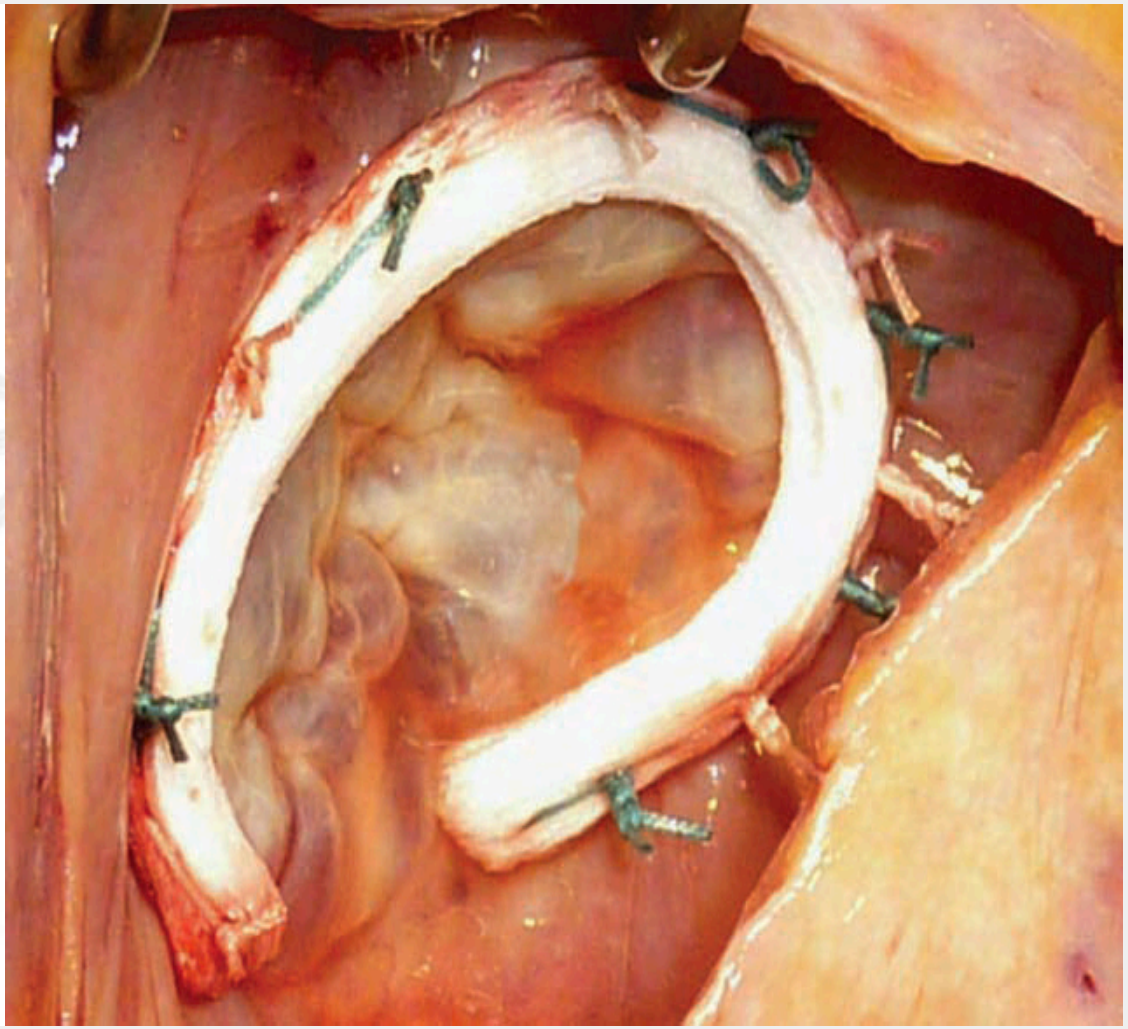


VALVE REPLACEMENT

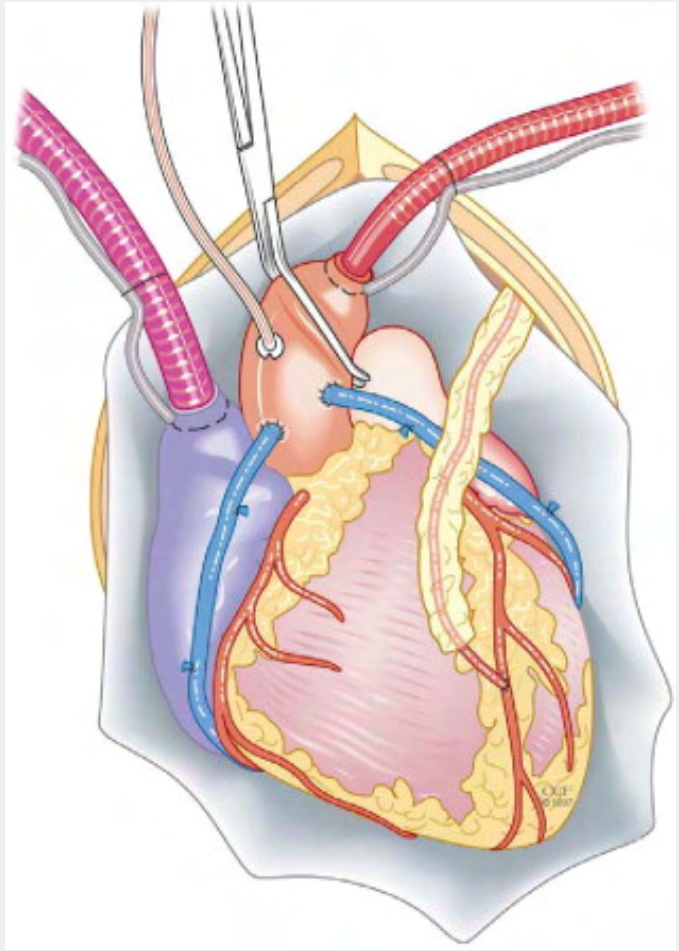
	Mechanical	Bioprosthesis
Durability	Life-long	Degenerates
Anticoagulation	Warfarin	Nil long term
Complications	Valve thrombosis	Structural valve degeneration

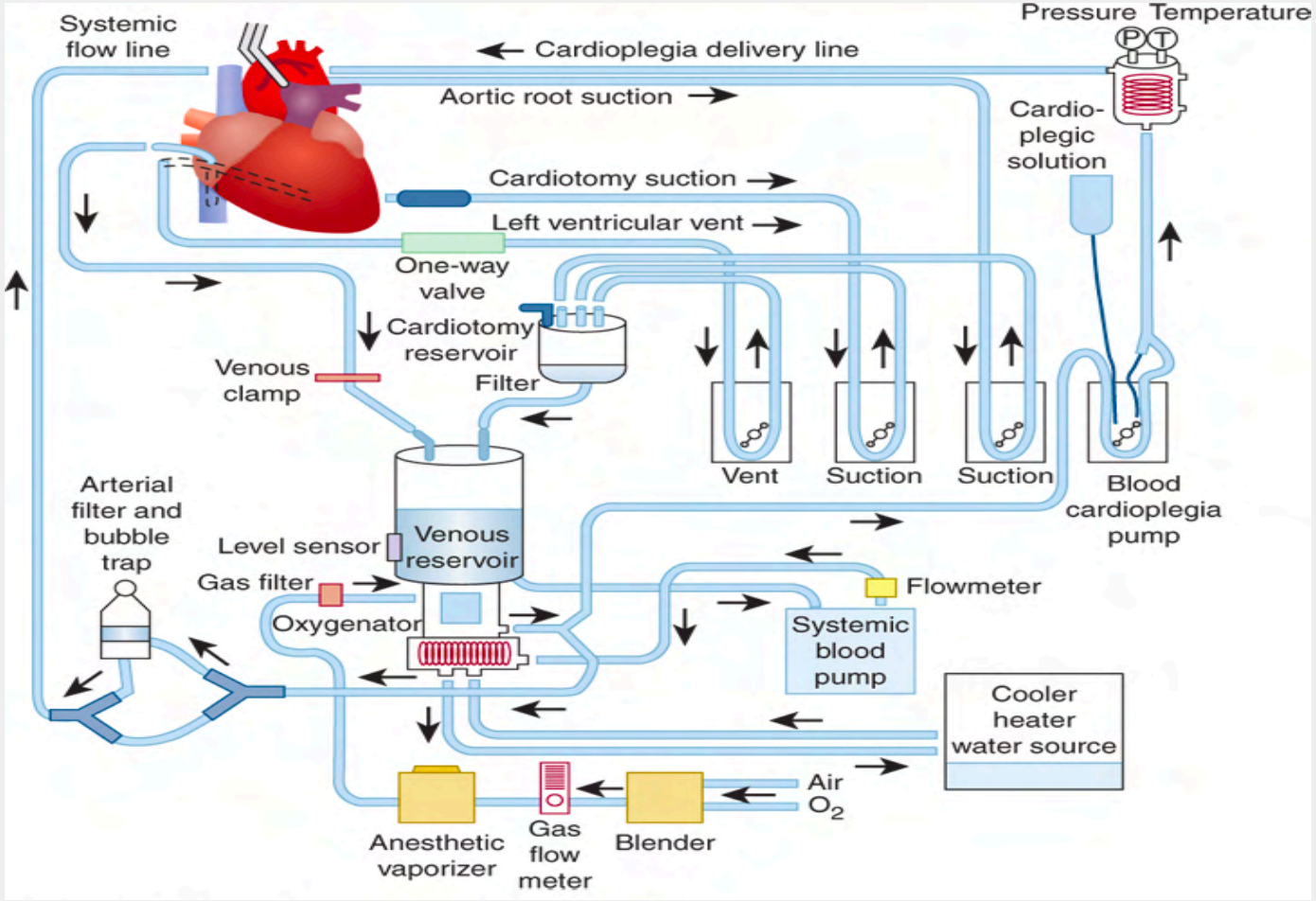
VALVE REPAIR



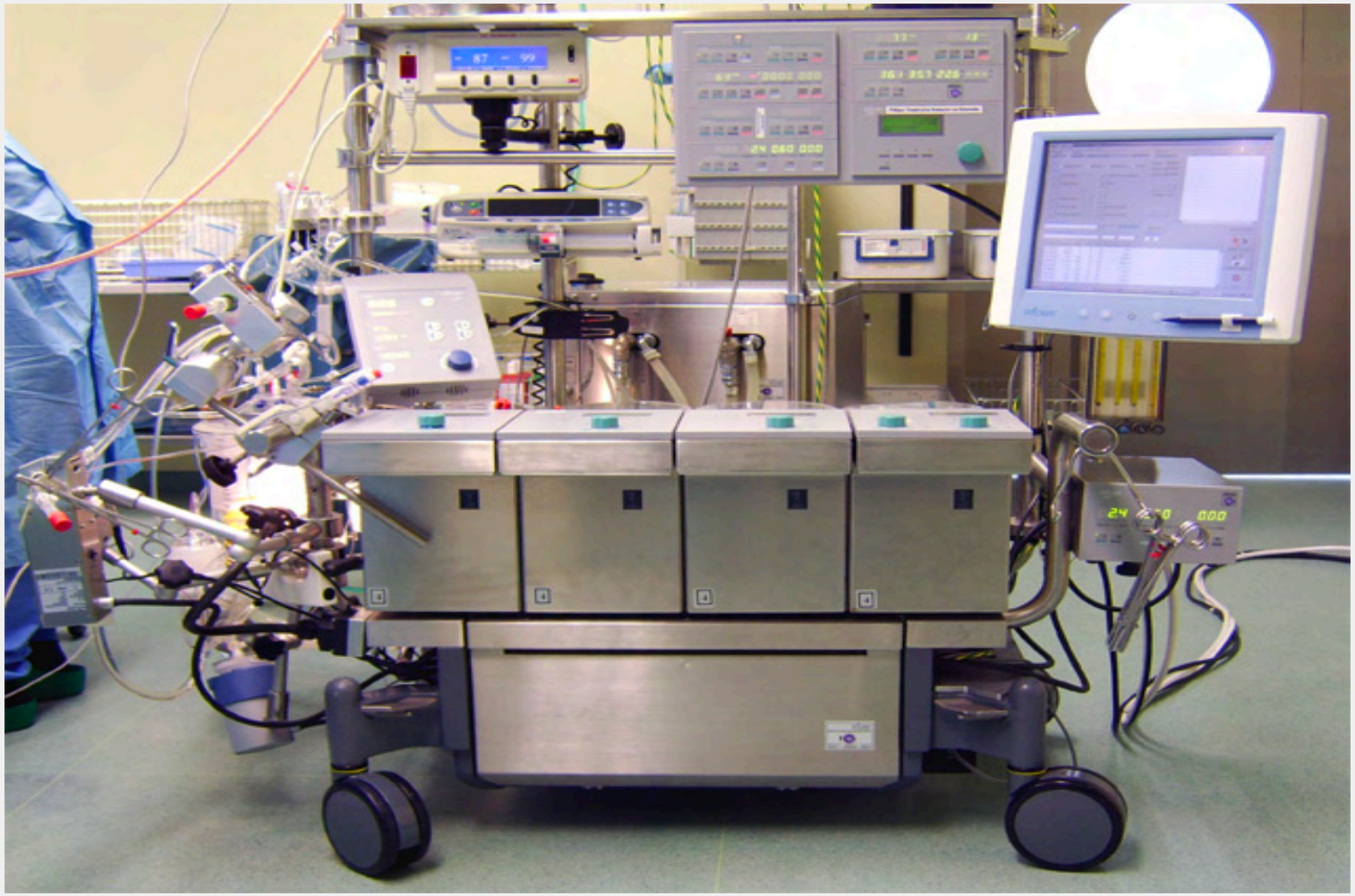


CARDIOPULMONARY BYPASS





CARDIOPULMONARY BYPASS



COMPLICATIONS OF SURGERY

Mortality

Stroke

Bleeding

Infection – including endocarditis

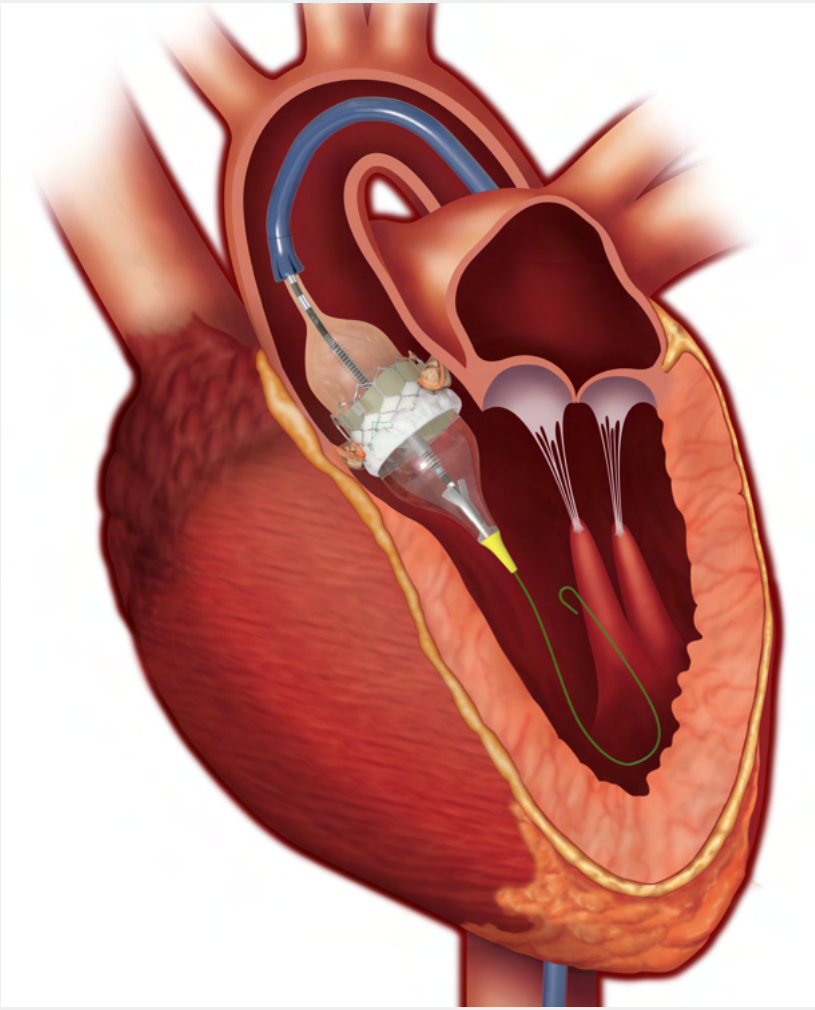
Arrhythmia

Permanent pacemaker

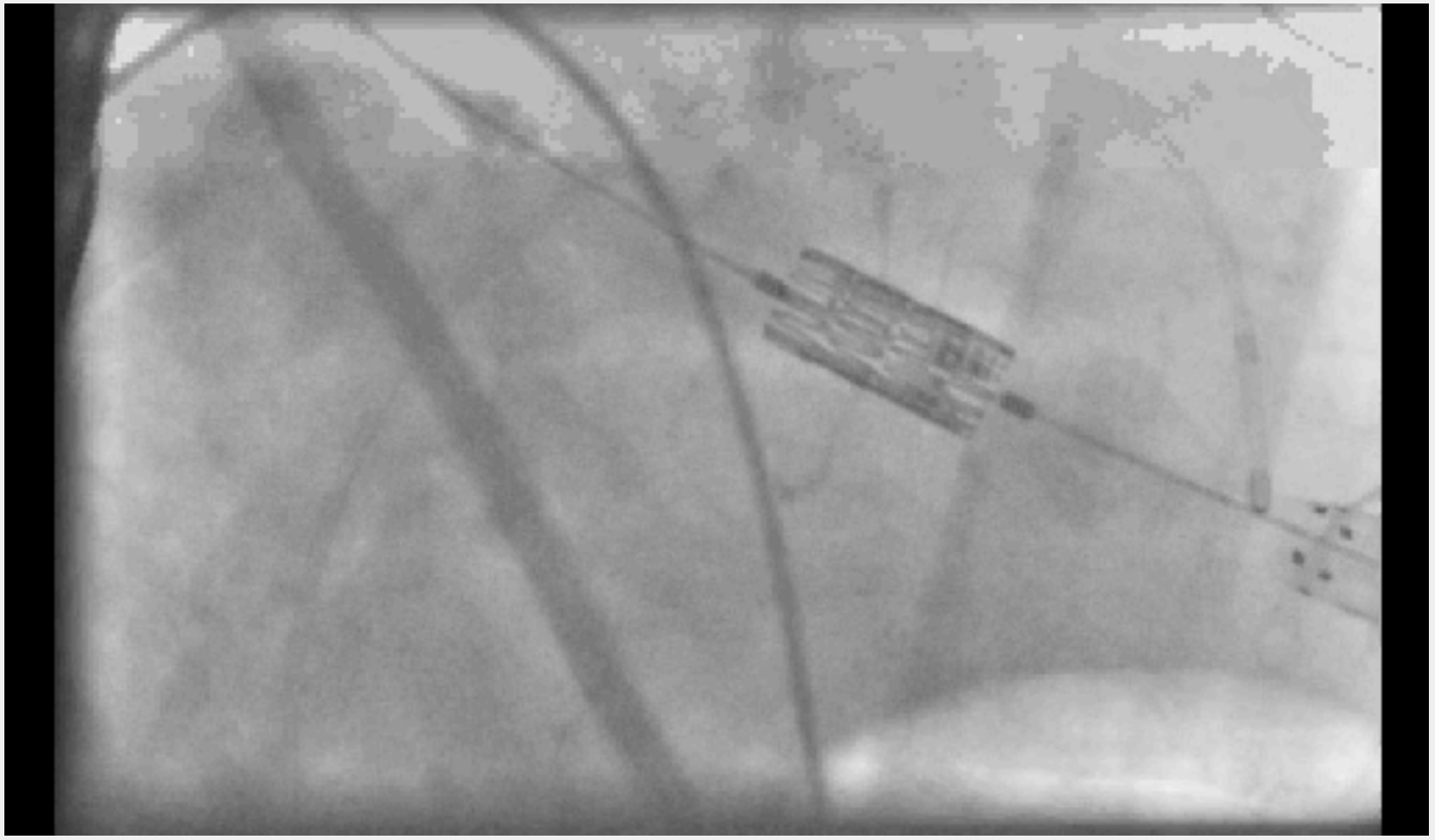
INTERVENTIONAL THERAPIES

- Emerging treatment options
- Currently limited by data on durability

TAVI



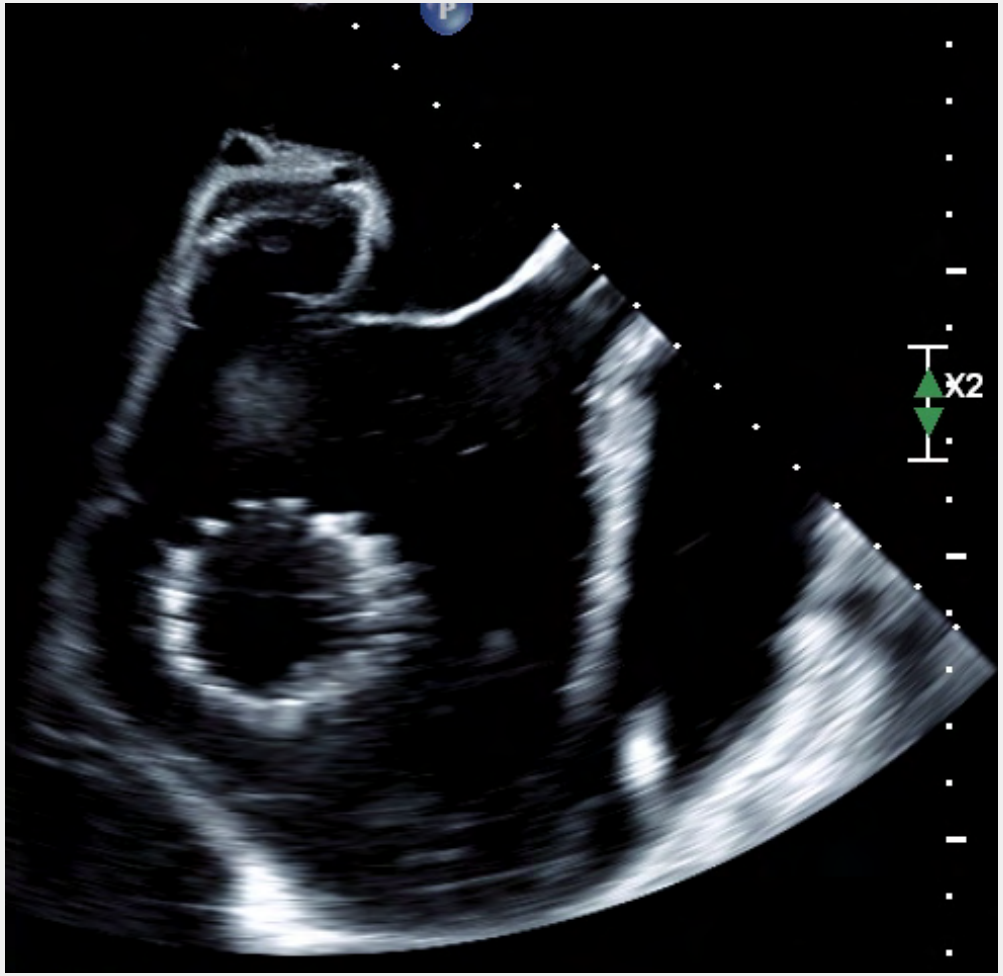
DEPLOYMENT



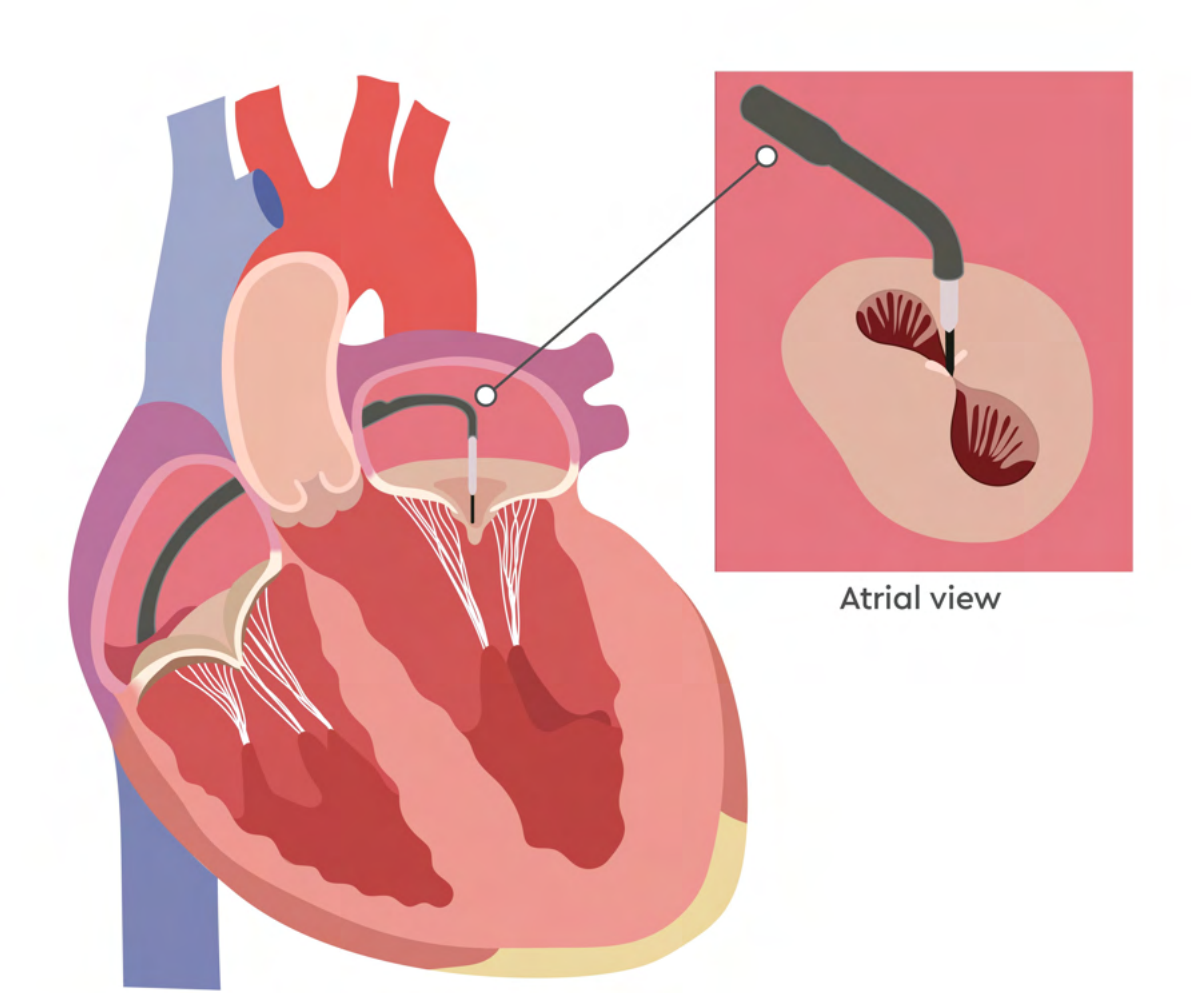
COMPLICATIONS

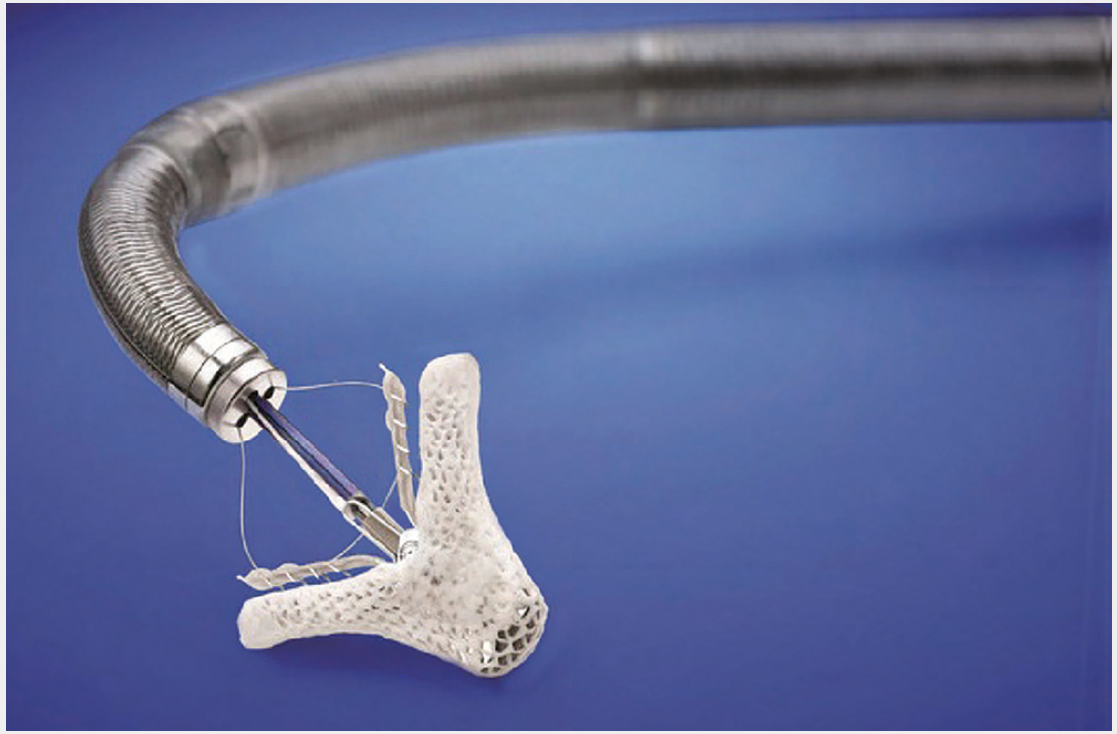
- Migration of the prosthesis
- Paravalvular leak
- Permanent pacemaker
- Need for re-intervention

- ? durability



MITRACLIP

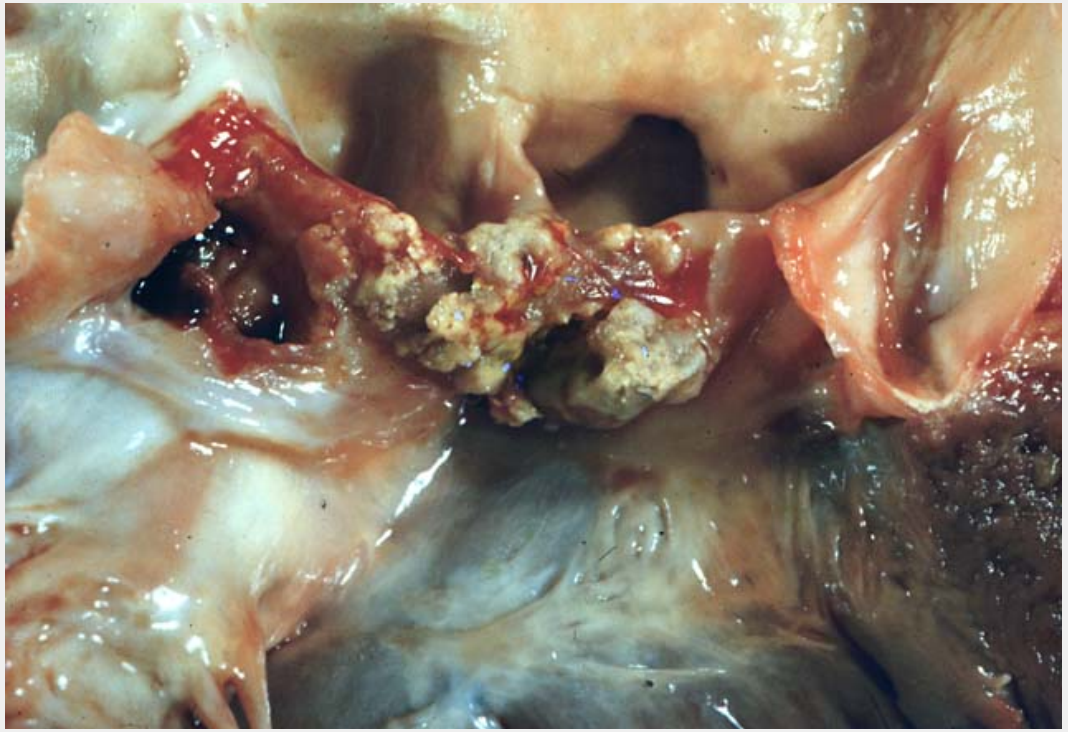




INFECTIVE ENDOCARDITIS

INFECTIVE ENDOCARDITIS

- Microbial infection of *endocardium*
- Vegetation
  - Platelets
  - Fibrin
  - Microorganisms
  - Inflammatory cells



INFECTIVE ENDOCARDITIS

CLINICAL SIGNS

- Fever — 90%
- Heart murmur — 85%
  - Changing murmur (5-10%)
  - New murmur (3-5%)
- Peripheral manifestations — 50%
  - Petechiae (20-40%)
  - Splinter hemorrhages (15%)
  - Osler nodes (10-20%)
  - Janeway lesions (< 10%)
- Splenomegaly — 20-50%
- Septic complications — 20%
- Clubbing — 10-50%

CLINICAL SIGNS

- Splinter hemorrhages
  - Under fingernails
  - Usually linear & red
- Conjunctival petechiae
- Osler's nodes
  - Tender nodules
  - Pulp of digits/thenar eminence
- Janeway lesions
  - Nontender, erythematous, hemorrhagic, or pustular, often on the palms/soles

MICROBIOLOGY

- Common organisms
  - Streptococcus (45%) - viridans (including milleri, oralis, mitis,mutans, salivarius) or bovis.
  - Staphylococcus aureus or epidermidis (35%).
  - Enterococcus faecalis (10%).
  - HACEK organisms
  - Fungal - Candida, Aspergillus, Histoplasma.

DIAGNOSIS

Diagnosis of Infective Endocarditis
Modified Duke's Criteria

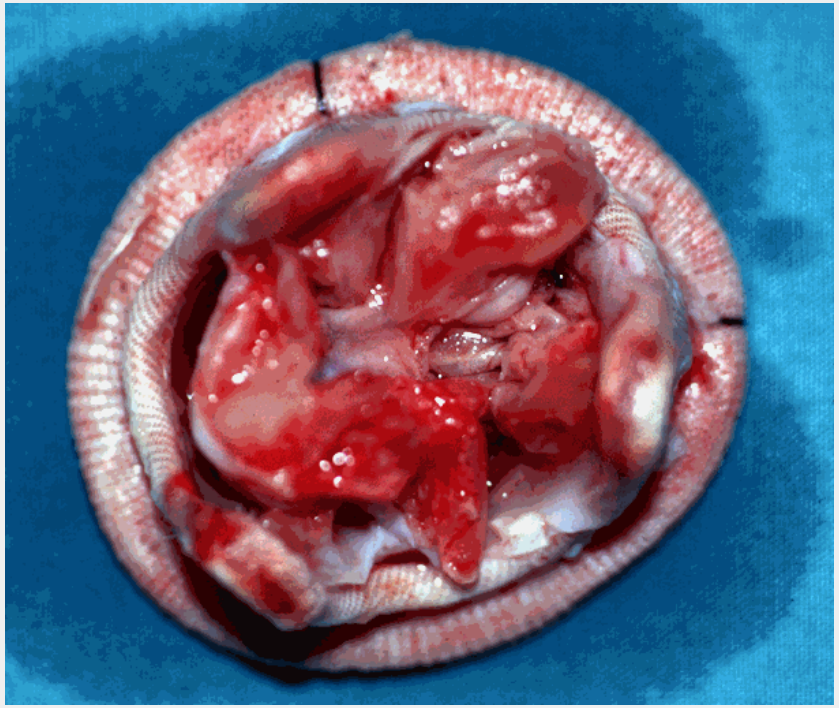
Major Criteria	Minor Criteria
1. Bactaremia by typical organism[a]	1. Predisposition: abnormal valve[b] or IVDU
2. Positive echo OR new regurgitant murmur	2. Fever
	3. Vascular phenomenon[c]
	4. Immune phenomena[d]
	5. Bactaremia from atypical organism

Definite Diagnosis = 2 major / 1 major + 3 minor / 5 minor

MANAGEMENT

- Antibiotics → guided by microbiology

- Surgery
  - Heart failure
  - Uncontrolled infection
  - Embolism



SUMMARY

- Valve disease is common
- It is predominantly a mechanical problem
- Most patients with severe disease will benefit from surgery
- Interventional procedures are improving but not all patients are suitable