Ischemic Heart Disease

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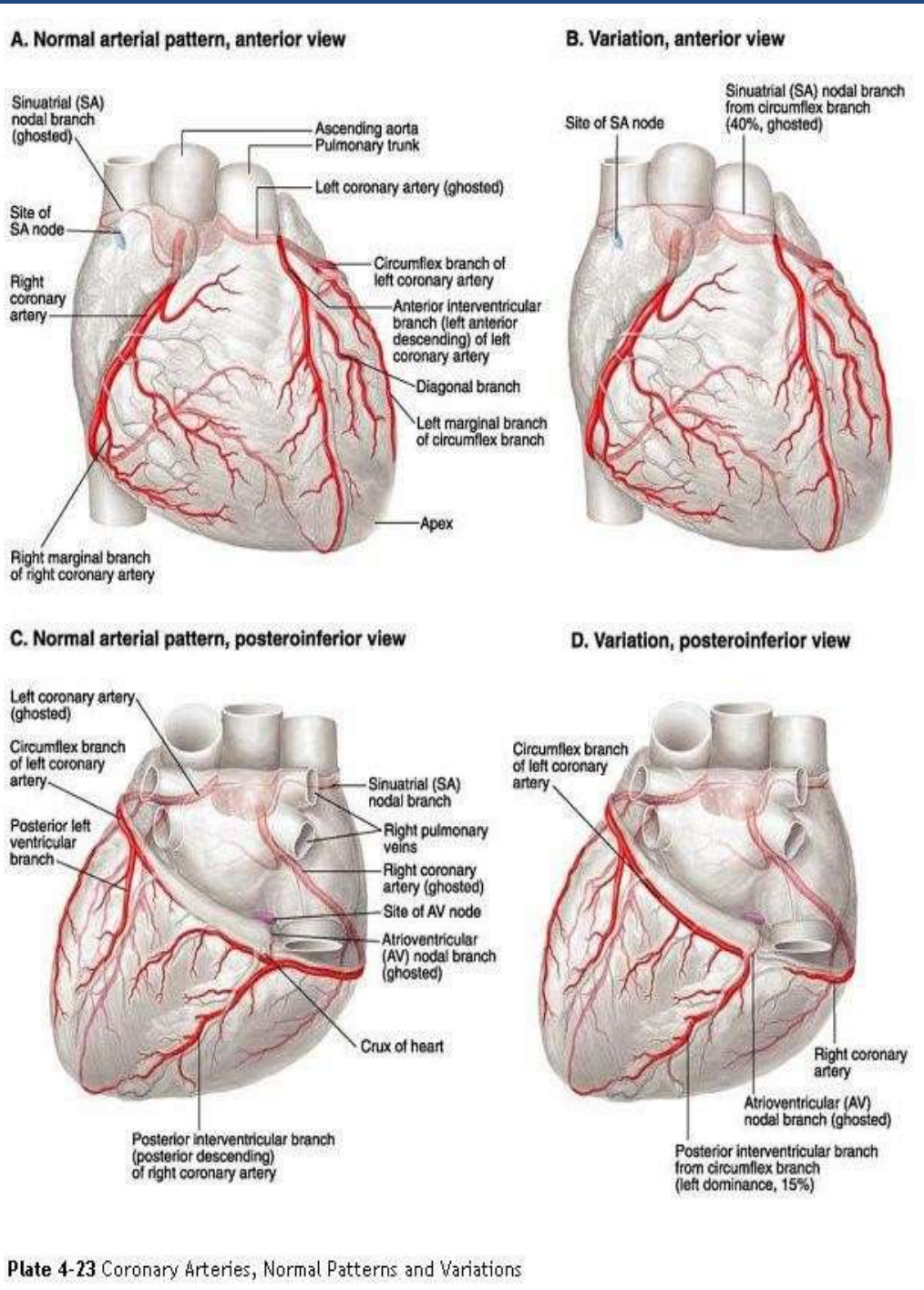
Coronary arteries

- Coronary blood flow mainly occurs during diastolic phase.
- Effect of Tachycardia on coronary blood flow: During increased heart rate, period of diastole is shorter therefore coronary blood
  flow is reduced to heart during tachycardia.
- At rest, the heart extracts 60-70% of oxygen from each unit of blood delivered to heart [other tissue extract

Coronary arterie

- Coronary arteries are the small arteries supply the myocardium with oxygen and Nutrients.



Ischemic Heart Disease

<u>A group</u> of related syndromes resulting from myocardial *ischemia*

- *Ischemia is* an imbalance between cardiac blood supply (perfusion) and myocardial oxygen demand

- ischemia can result from **increased demand** (e.g., increased heart rate or hypertension)
- **diminished oxygen-carrying**

capacity

Ischemic Heart Disease

- The vast majority of ischemic heart disease is due to **coronary artery atherosclerosis**
- Less frequent contributions of:
  - vasospasm
  - vasculitis
- Is it exactly the same as coronary artery disease (CAD)?
  - Frequently yes

IHD usually presents as one or more of the following clinical syndromes:

1. **Myocardial infarction,** the most important form of IHD, in which ischemia causes the death of heart muscle.
2. **Angina pectoris**, in which the ischemia is of insufficient severity to cause infarction, but may be a harbinger of MI.
3. **Chronic IHD** with heart failure.
4. **Sudden cardiac death.**

Ischemic Heart Disease

Angina Pectoris

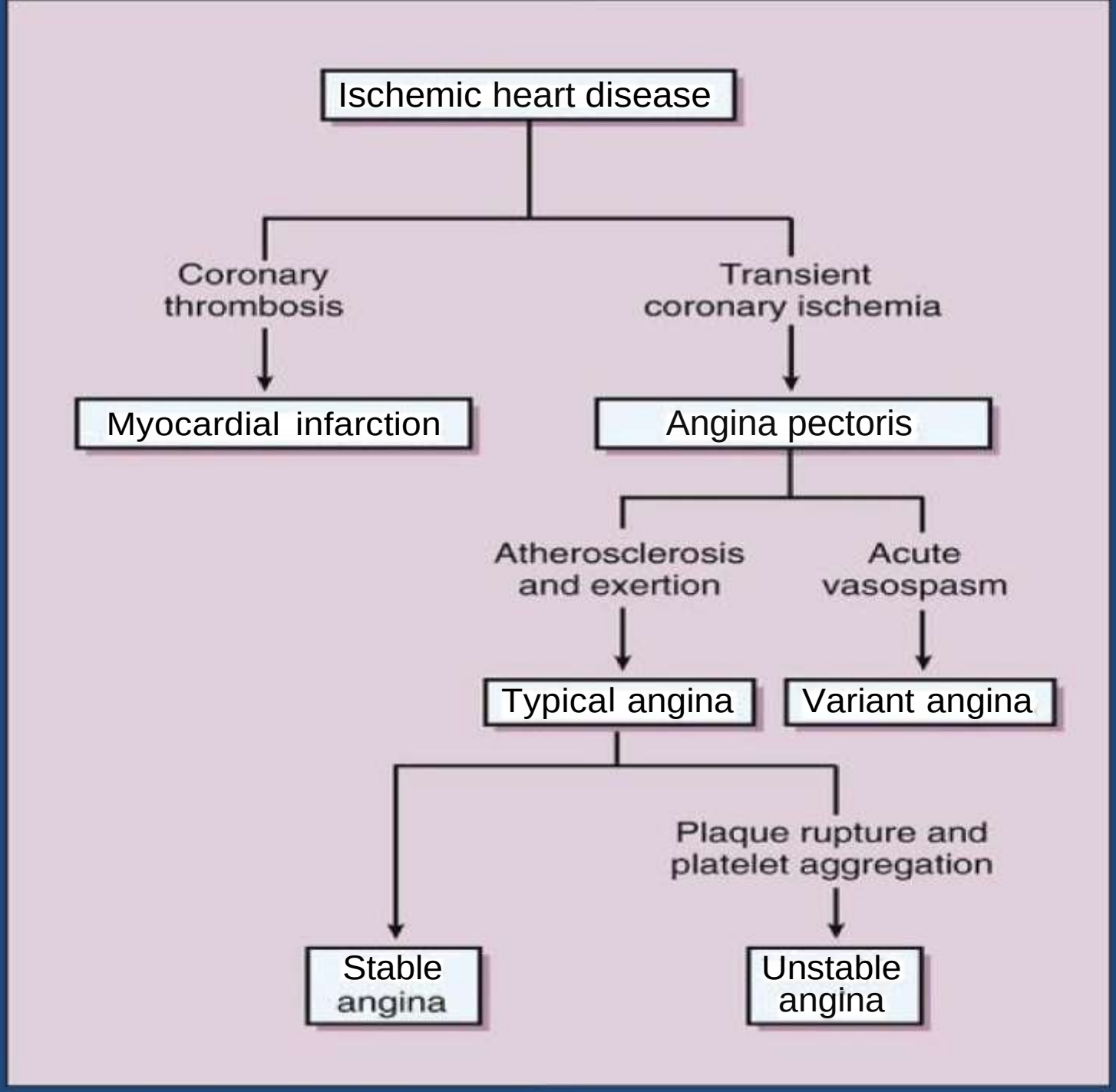
- **Chest discomfort** = **prolonged, recurrent, different qualities.** Can radiate down the left arm or to the left jaw *(referred pain)*
- **Cause** = **transient myocardial ischemia(seconds to minutes),** Due to inadequate perfusion
- **Patterns**
  - **Stable** = **75% vessel block, transient (<15 minutes), aggravated by exertion, relived by rest & Nitroglycerin (VD)**
  - **Prinzmetal** = **Occur at rest, caused by coronary spasm, episodic, Typical EKG change – ST elevation, Relived by VD but not rest**
  - **Unstable** = **90% vessel block or Acute plaque change (superimposed thrombus), prolonged (>15 min.), not relived by rest, VD, Pre-infarction Angina**

Chest pain

Table 3

Traditional clinical classification of suspected anginal symptoms

Typical angina	**Meets the following three characteristics: (i) Constricting discomfort in the front of the chest or in the neck, jaw, shoulder, or arm; (ii) Precipitated by physical exertion; (iii) Relieved by rest or nitrates within 5 min.**
Atypical angina	**Meets two of these characteristics.**
Non-anginal chest pain	**Meets only one or none of these characteristics.**


Ischemic heart disease
Coronary thrombosis
Transient coronary ischemia
Myocardial infarction
Angina pectoris
Atherosclerosis and exertion
Acute vasospasm
Typical angina
Variant angina
Plaque rupture and platelet aggregation
Stable angina
Unstable angina


RESTAURANT

Ischemic Heart Disease .

Risk factors

- **Sex = M**ale > Female
- Age
- Major modifiable-

  SMOKING,

  Diabetes mellitus (DM)

  Hypertension (HTN)

  Hypercholesterolemia

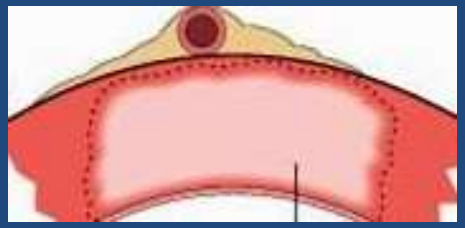
Ischemic Heart Disease
Myocardial infarction

- The **severity** or **duration** of ischemia is enough to cause cardiac muscle death.

- Typically results from acute thrombosis that follow plaque disruption

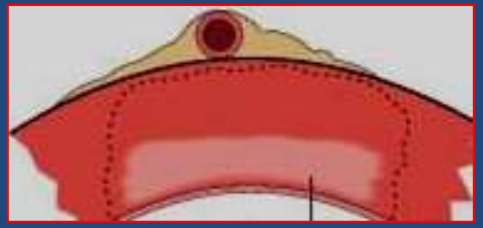
Transmural

- Full thickness
- Superimposed thrombus in atherosclerosis



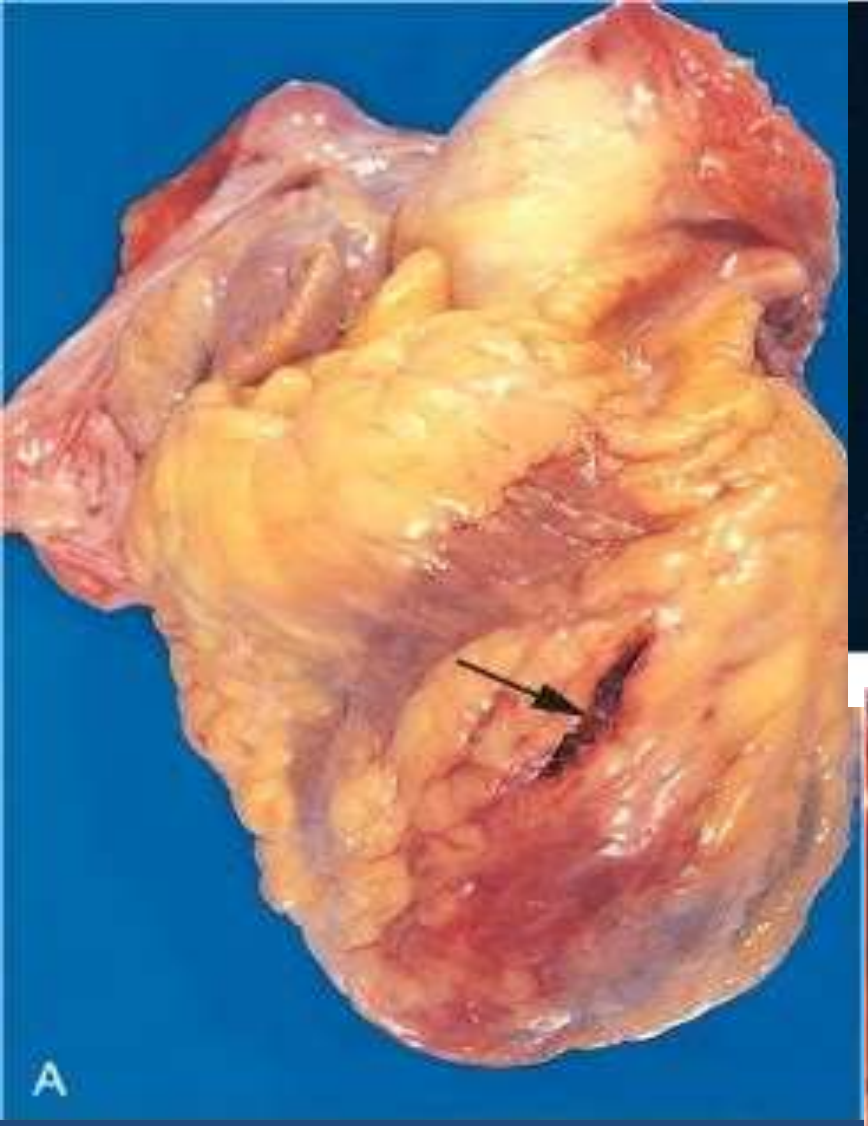
Sub-endocardial

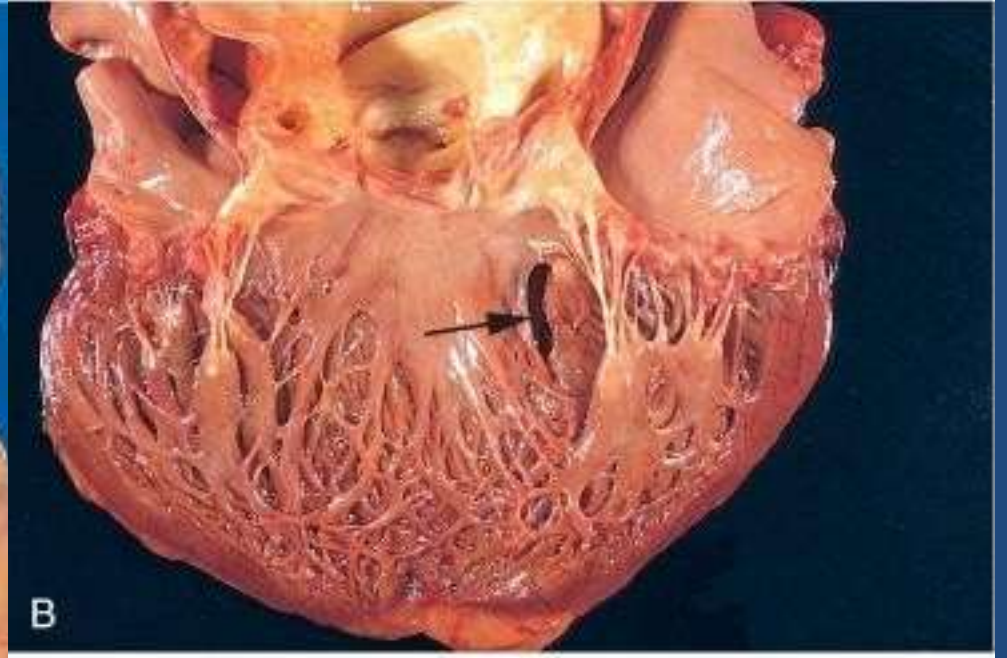
- Inner 1/3 to half of ventricular wall
- Decreased circulating blood volume(shock, Hypotension, Lysed thrombus)

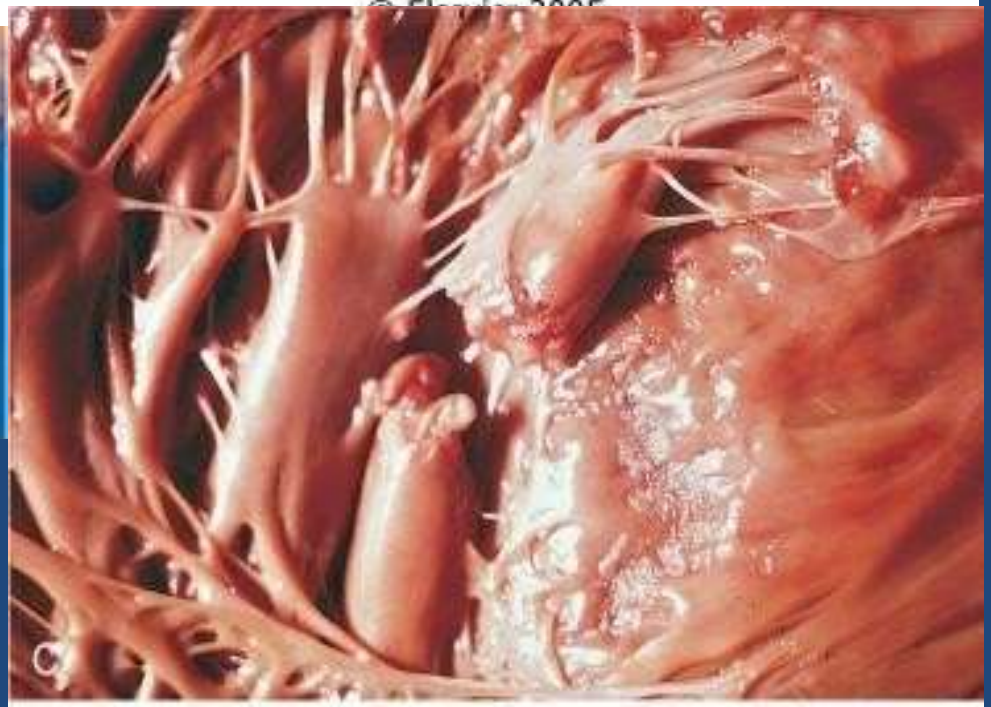


Ischemic Heart Disease (MI)–Complications

- Arrhythmia
  - Ventricular aneurysm
  - Acute mitral valve regurgitation.
  - Heart Pump failure
- Ventricular rupture
  - Pericarditis
  - Recurrence
  - *Sudden cardiac death*







Cardiac rupture syndromes : Anterior myocardial rupture in an acute infarct *(arrow).* **B,** Rupture of the ventricular septum *(arrow)*. **C,** Complete rupture of a necrotic papillary muscle.

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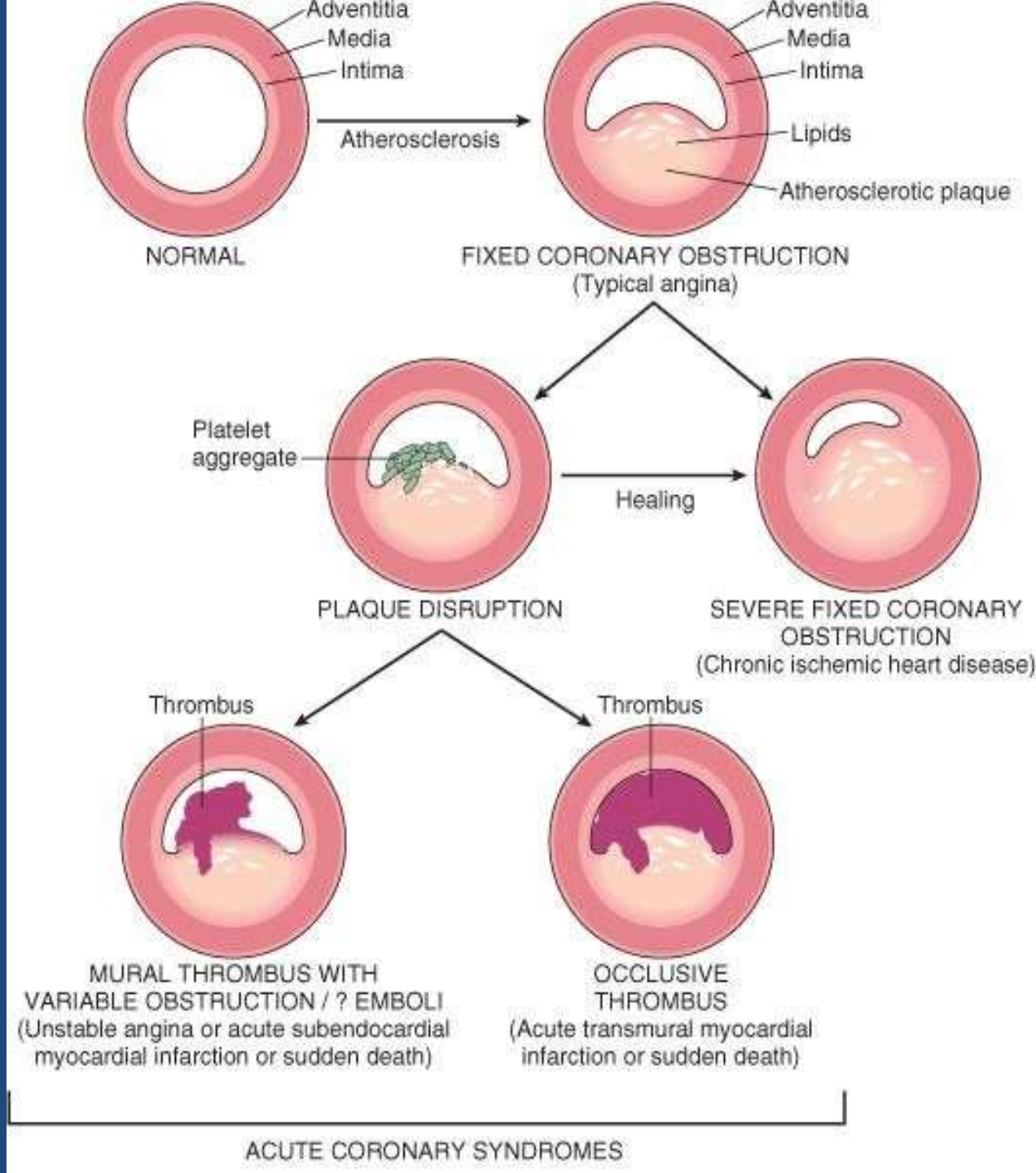
Acute Coronary syndromes

- Frequently initiated by an unpredictable and abrupt conversion of stable atherosclerotic plaque to unstable plaque followed by thrombosis.



Magement:

- Good history tacking is very important
- Examination of Vital signs especially in emergency room
  - Blood pressure
  - Pulse rate and regularity
  - Oxygen saturation
  - Mental status

ECG

- Changes such as:
  - Q waves (indicating transmural infarcts)
  - ST-segment abnormalities, elevation or depression
  - T-wave inversion
- Arrhythmias , tachyarrhythmias, Bradyarrhythmias including heart block.

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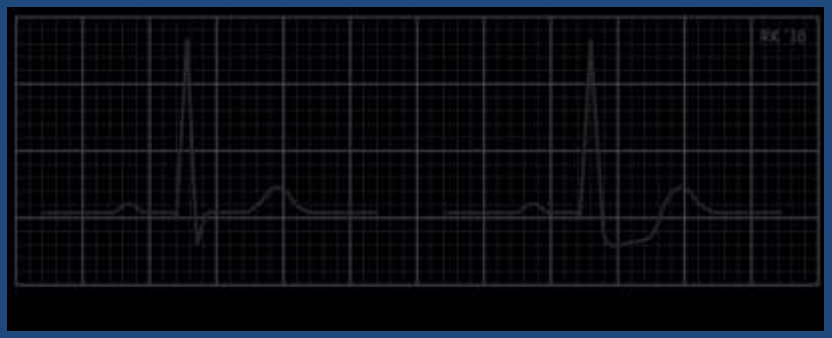
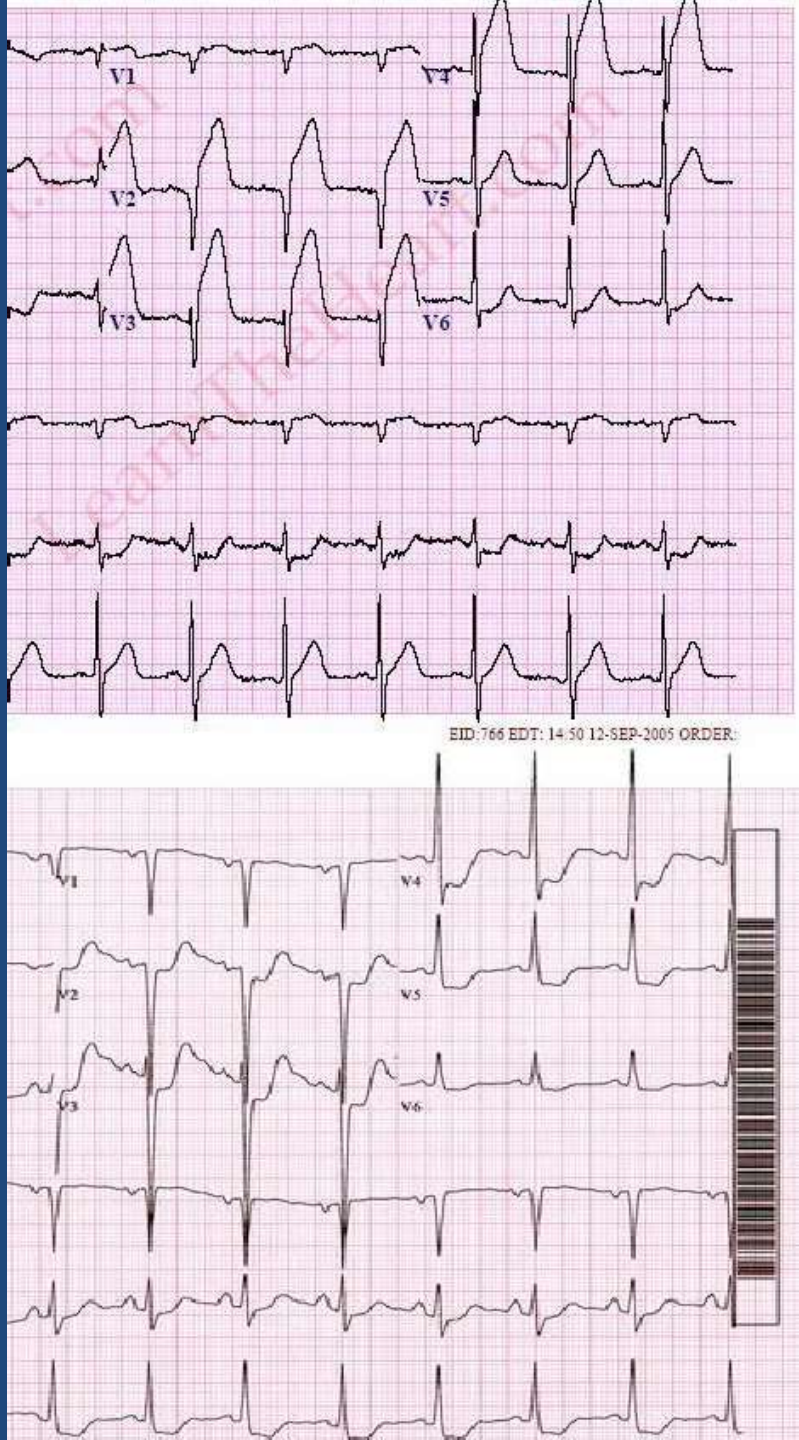
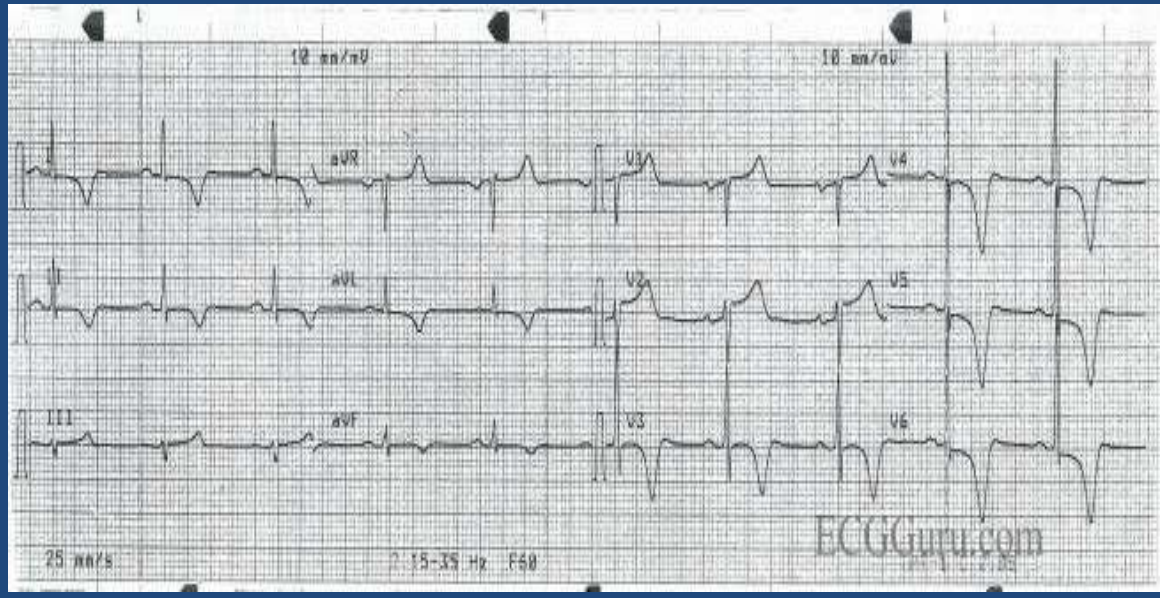
ST segment elevation



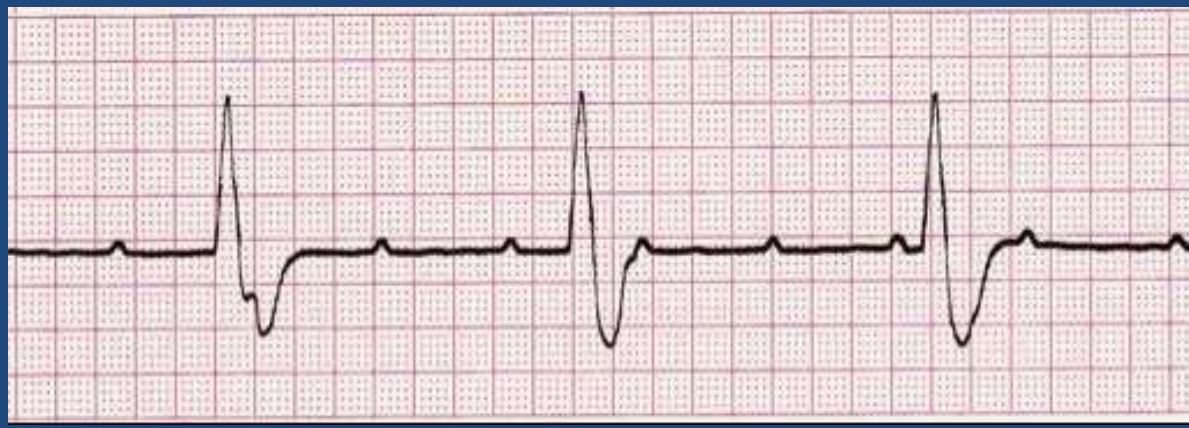
ST segment depression



T wave inversion



Heart block



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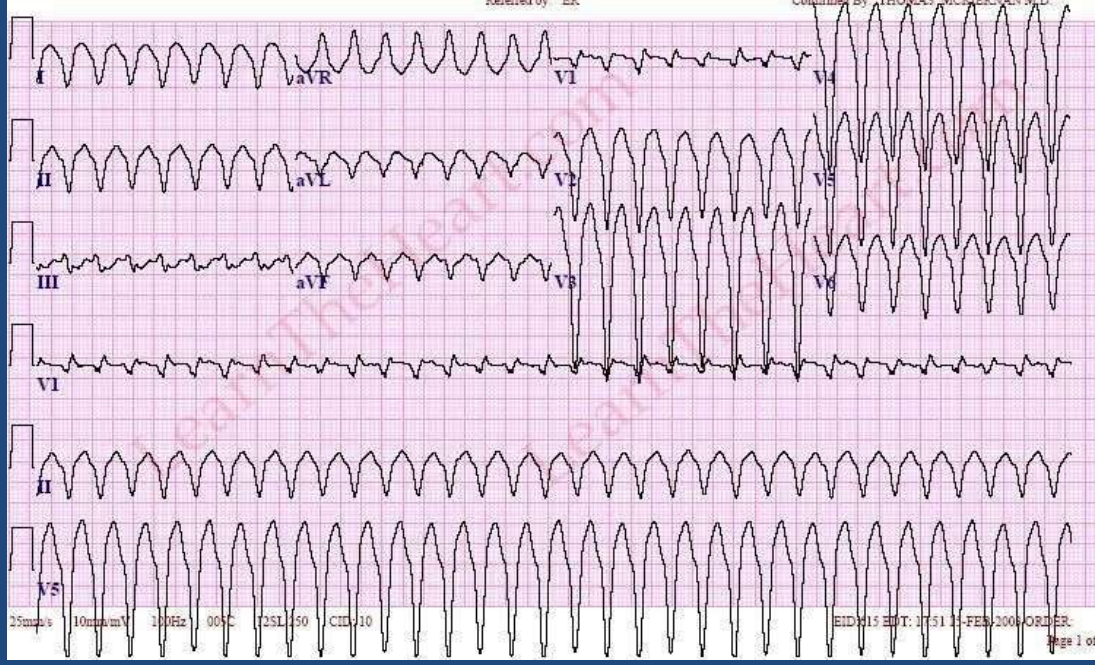
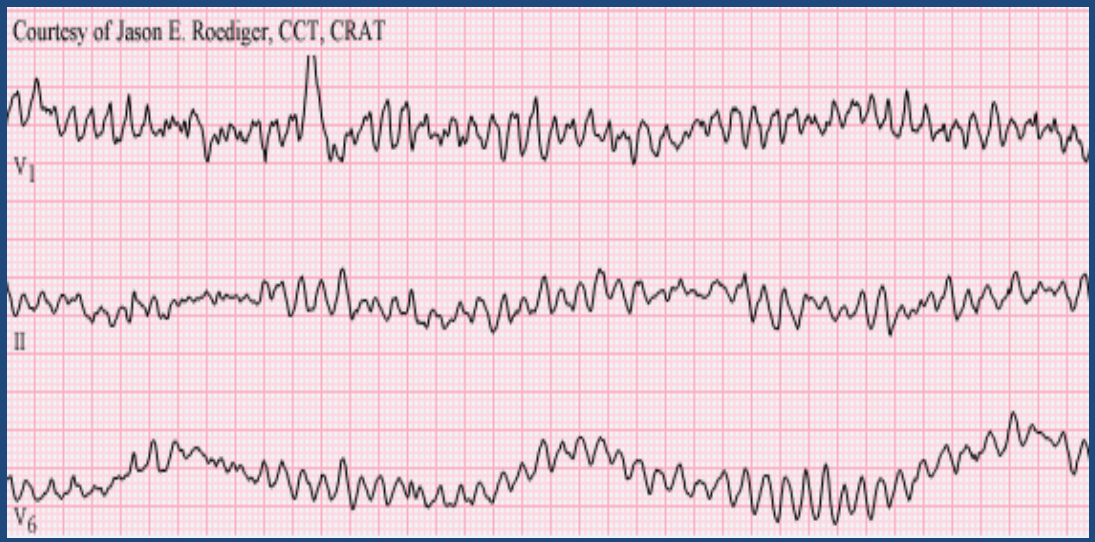
Ventricular tachycardia



Ventricular Fiberellation



Ischemic Heart Disease Laboratory evaluation

- Cardiac biomarkers CKMB, Troponin T and I are elevated in the circulation

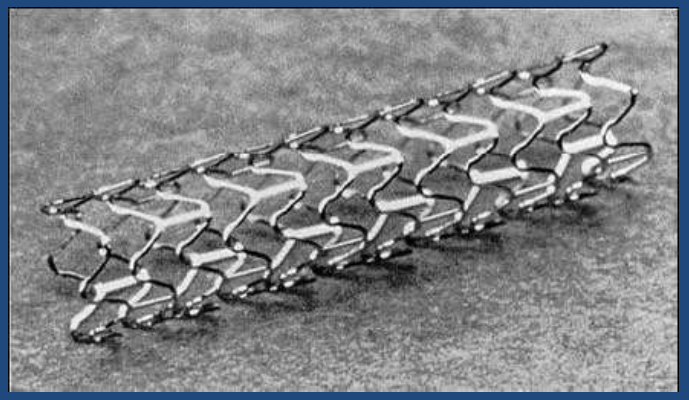
TREATMENT:

THE MAIN ANTIISCHEMIC DRUGS ARE,

- CORONARY DILATORS E.g. NITRATES
- BETA-BLOCKERS (calcium channel blocker when there are contraindications for beta blockers, or if there is coronary artery spasm)
- Antidyslipidemia: STATINS.
- Antiplatelests: ASPERIN, clopidogrel….etc
- HEPARIN only in acute coronary syndrome.
- Thrombolytic therapy as streptokinase only in case of ST segment elevation Myocardial infarct

INTERVENTIONAL TREATMENT

– ANGIOPLASTY and STENT



– Coronary artery BYPASS SURGE

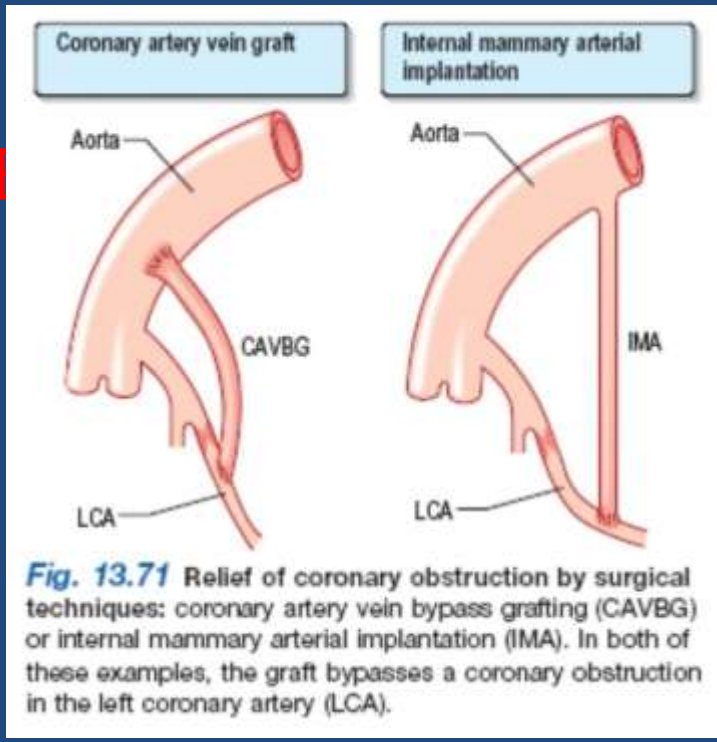


Fig. 13.71 **Relief of coronary obstruction by surgical techniques:** coronary artery vein bypass grafting (CAVBG) or internal mammary arterial implantation (IMA). In both of these examples, the graft bypasses a coronary obstruction in the left coronary artery (LCA).

Other investigations for CAD

- Conventional Echocardiography
- Stress echocardiography
- Stress ECG
- Myocardial perfusion scan
- C.T. coronary angiography
- Coronary angiography

Thank You