

Myocardial Infarction

Dr Piyush Tailor
Intensivist
Wockhardt Heart Hospital
Surat

Defination

- ▶ **Myocardial infarction (MI) or Acute Myocardial Infarction (AMI)** is decrease or complete stop of blood supply to part of myocardium, causing damage – ischemia to myocardium , consequence develop to infarction.

Dr Piyush Tailor

Angina Pectoris

- It is myocardial ischemia due to sudden & transient decrease blood supply to myocardium due transient coronary artery spasm.

Dr Piyush Tailor

Etiology & Risk Factor

- Diabetes Mellitus
- Hypertension
- Increase Cholesterol
- Increase Oxidized LDL
- Increase Lp (a)
- Increase Homocysteine
- Smoking
- Alcoholism
- Sedentary Life Style
- Obesity
- Psychosocial factor
- Family History

Pathogenesis of M.I.

- Most patients who had myocardial infarction, have coronary atherosclerosis.
- Atherosclerosis
 - does turbulent blood flow.
 - causes thrombus formation at the site of an atherosclerotic lesion.
 - thus obstructing blood flow to the myocardial tissues.
- Initially that atherosclerosis and plaque formation induce clinical feature of Angina Pectoris, due myocardial ischemia.
- Later in pathogenesis, when vessels completely get obstruct and causes myocardial infarction.

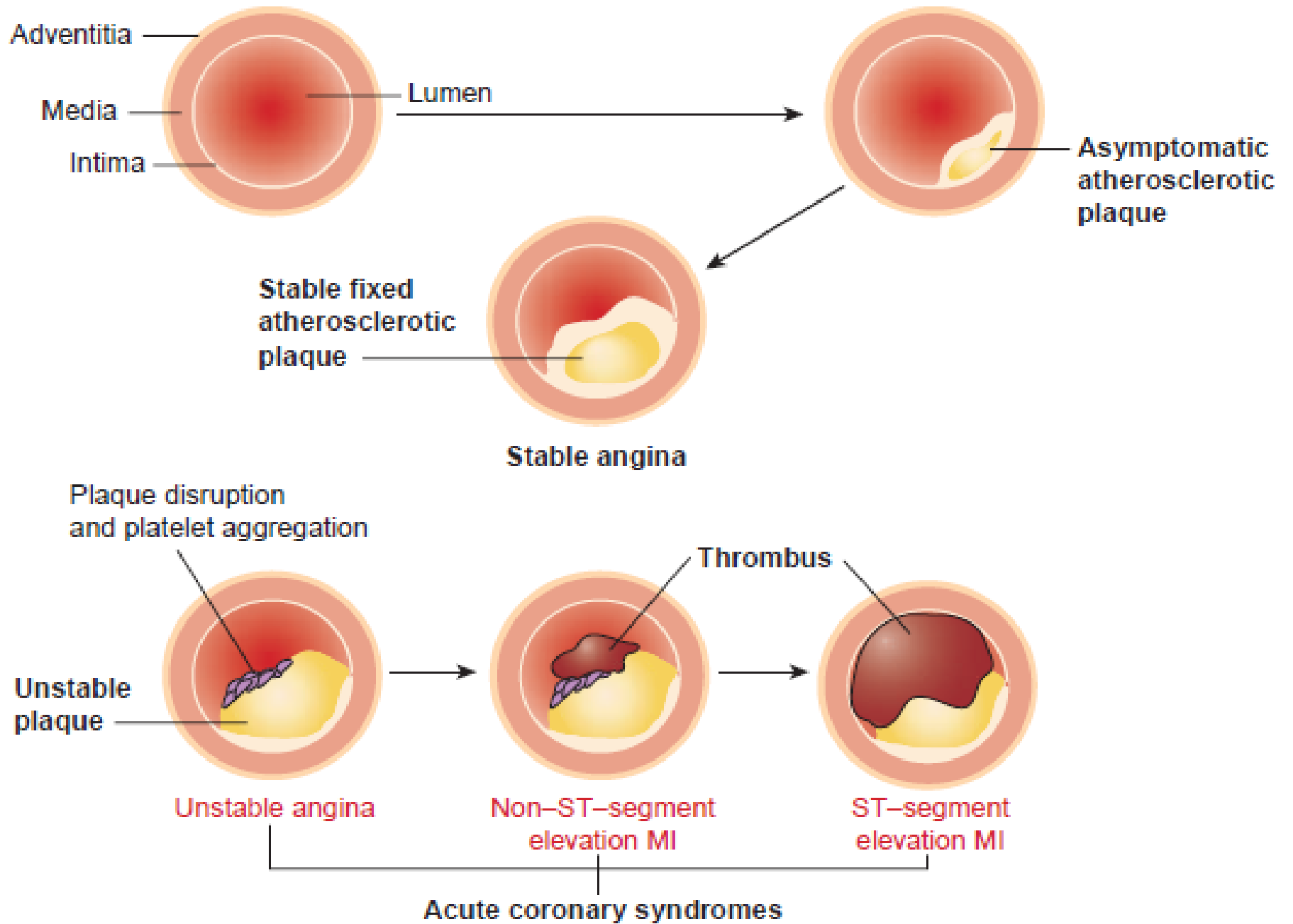
Consequences of Pathogenesis of M.I.

- If Myocardial infarction is treated
 - With recanalization & restoring coronary artery blood flow within 6 hours
 - Important part of Myocardium can be salvage.

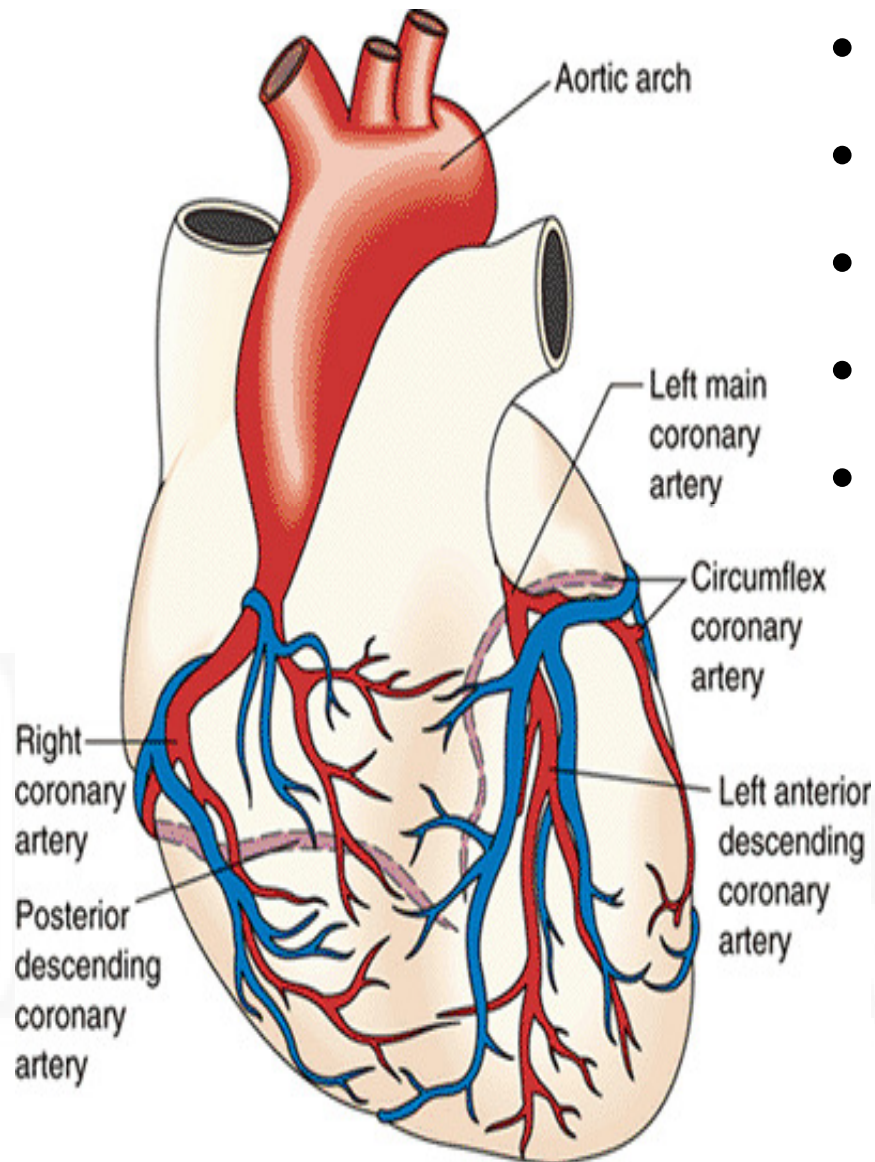
- If Myocardial infarction is not treated, than
 - Extended Myocardial Infarction
 - Myocardial - Papillary Muscle & Valvular Infarction
 - Infarction of S.A. – A.V. node & Nerve fibers

Consequences of Pathogenesis of M.I.

- Extended Myocardium Infarction
 - Decrease Myocardial Movement (Dyskinetic or Akinetic)
 - Decrease Contractility
 - Decrease Ejection Fraction
 - Congestive Cardiac Failure
- Myocardial - Papillary Muscle & Valvular Infarction
 - Affect Valvular Opening & Closing
 - Valvular Stenosis or Regurgitation
- Infarction of S.A. – A.V. node & Nerve fibers
 - M.I. may extended to Necrosis of S.A. – A.V. – Purkinje fiber
 - Cardiac Arrhythmia



Location of Infarction



- LAD = Anterior Wall M.I.
- LAD = Lateral wall M.I.
- LCX = Antero-Septal wall M.I.
- LCX / RCA = Posterior wall M.I.
- RCA = Inferior wall M.I.

Clinical Feature - Symptoms

- Chest Pain
 - Left Side or Retro-Sternal or Epigastric
 - Sharp pain
 - Stabbing Pain
 - Radiating to Left Arm and Shoulder
- Patients may describe a heaviness, choking.
- Unlike angina, Pain in MI is more prolonged and not relieved by rest or sublingual nitroglycerin.
- Breathlessness - Coughing
- Nausea – Vomiting
- Perspiration

Clinical Feature - Sign

- Tachycardia
- Increase B.P. – Because of Anxiety
- In Case Of Inferior wall M.I.
 - Vagus nerve is very near to Inferior Wall
 - Stimulation to Vagus nerve
 - Bradycardia & Hypotension
- Tachypnea – Increase Respiratory rate
- Bilateral Rhonchi
- Bilateral Crepitation
- Skin - Warm and Moist.

Complications of Myocardial Infarction

- Left ventricular free wall rupture
- Ventricular septal rupture
- Papillary muscle rupture with acute mitral regurgitation
- Diastolic dysfunction
- Systolic dysfunction
- Congestive heart failure
- Hypotension/cardiogenic shock
- Pericarditis
- Ventricular tachycardia
- Ventricular fibrillation
- Supraventricular tachydysrhythmias

Differential Diagnosis

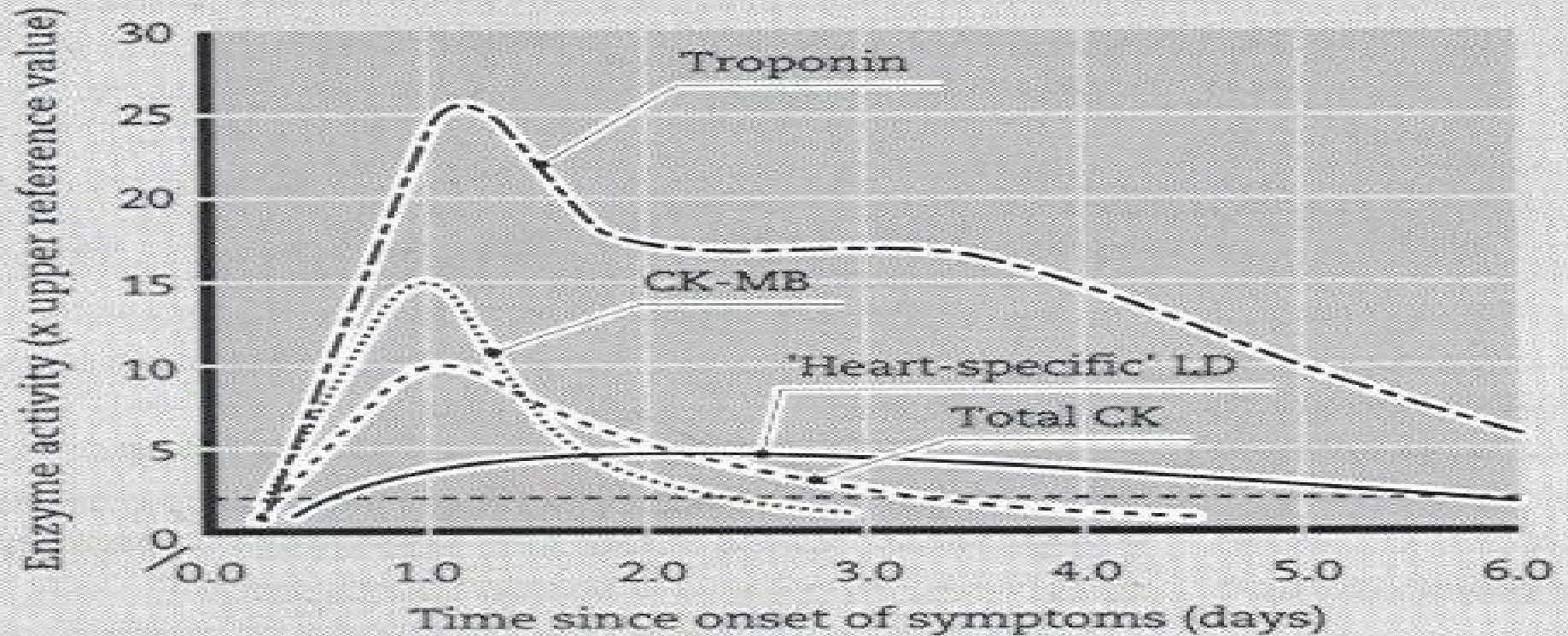
- Gastritis
- Peptic ulcer
- Pulmonary Embolism
- Pneumothorax
- Congestive cardiac failure
- Cholecystitis – Gall bladder Stone

Dr. Ayush Tailor

Diagnosis

- Clinical Feature
- Cardiac Markers
- ECG
- 2D-Echo
- Coronary Angiography
- TMT – TreadMill Test = For Angina

ENZYME ACTIVITY AFTER MYOCARDIAL INFARCTION

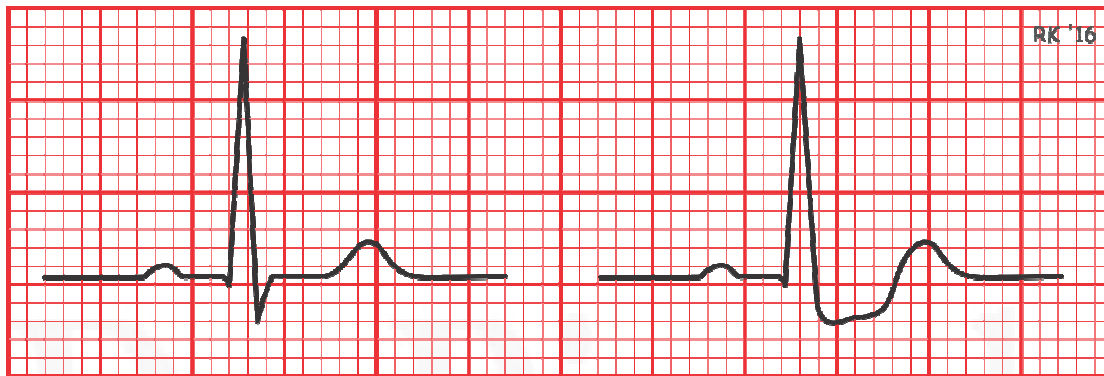


Enzyme	Detectable Rise	Peak value of abnormality	Total Duration of abnormality
Cardiac Troponin	4- 6 hours	12 - 24 hrs	7 - 10 days
CK-MB	4- 6 hours	12 - 24 hrs	2 - 3 days
GOT (AST)	6 - 12 hours	1 - 2 days	4 - 6 days
LDH	18 - 24 hours	2 - 3 days	6 - 10 days

The Electrocardiogram

Myocardial Ischemia – Angina

- T-wave inversion
- ST segment depression

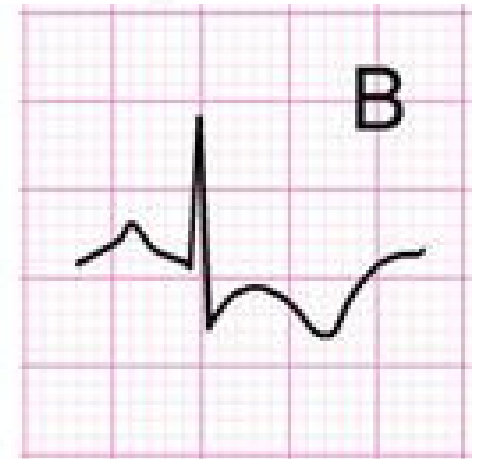


Normal

ST Depression



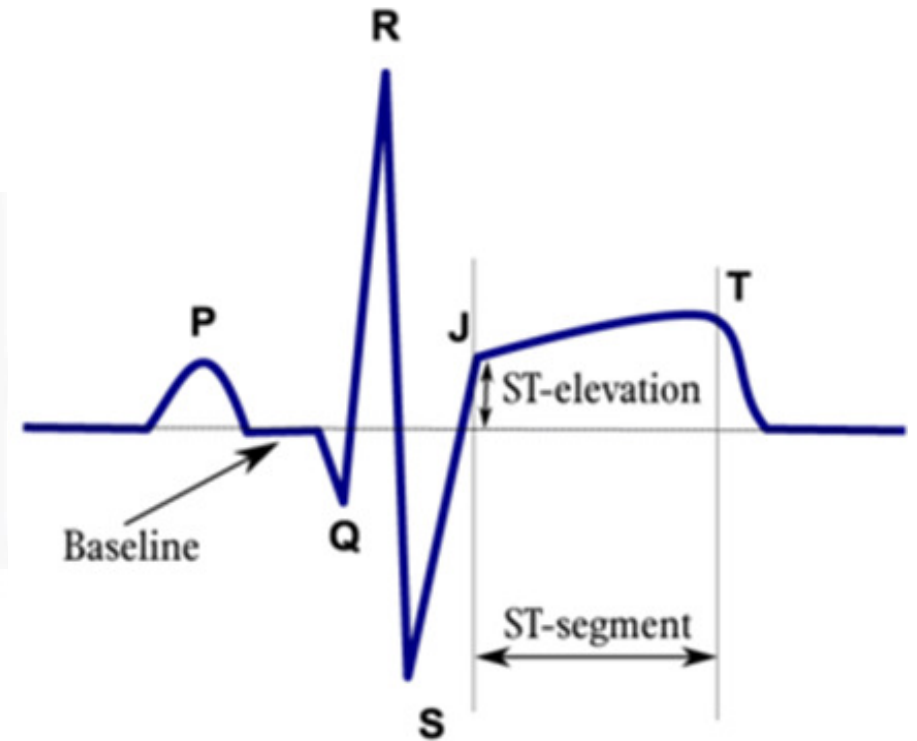
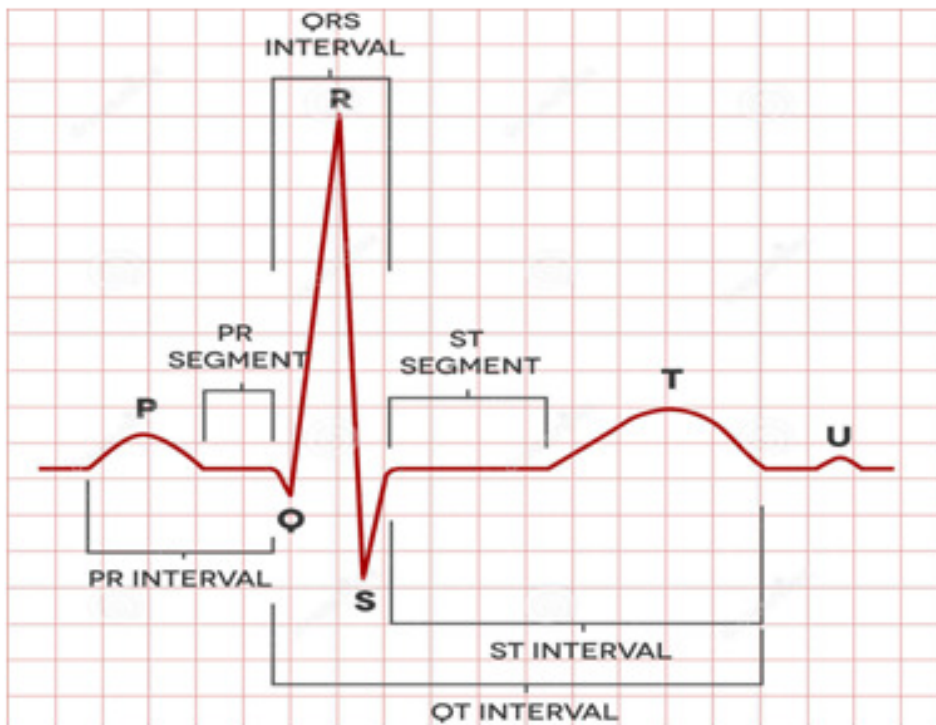
A



B

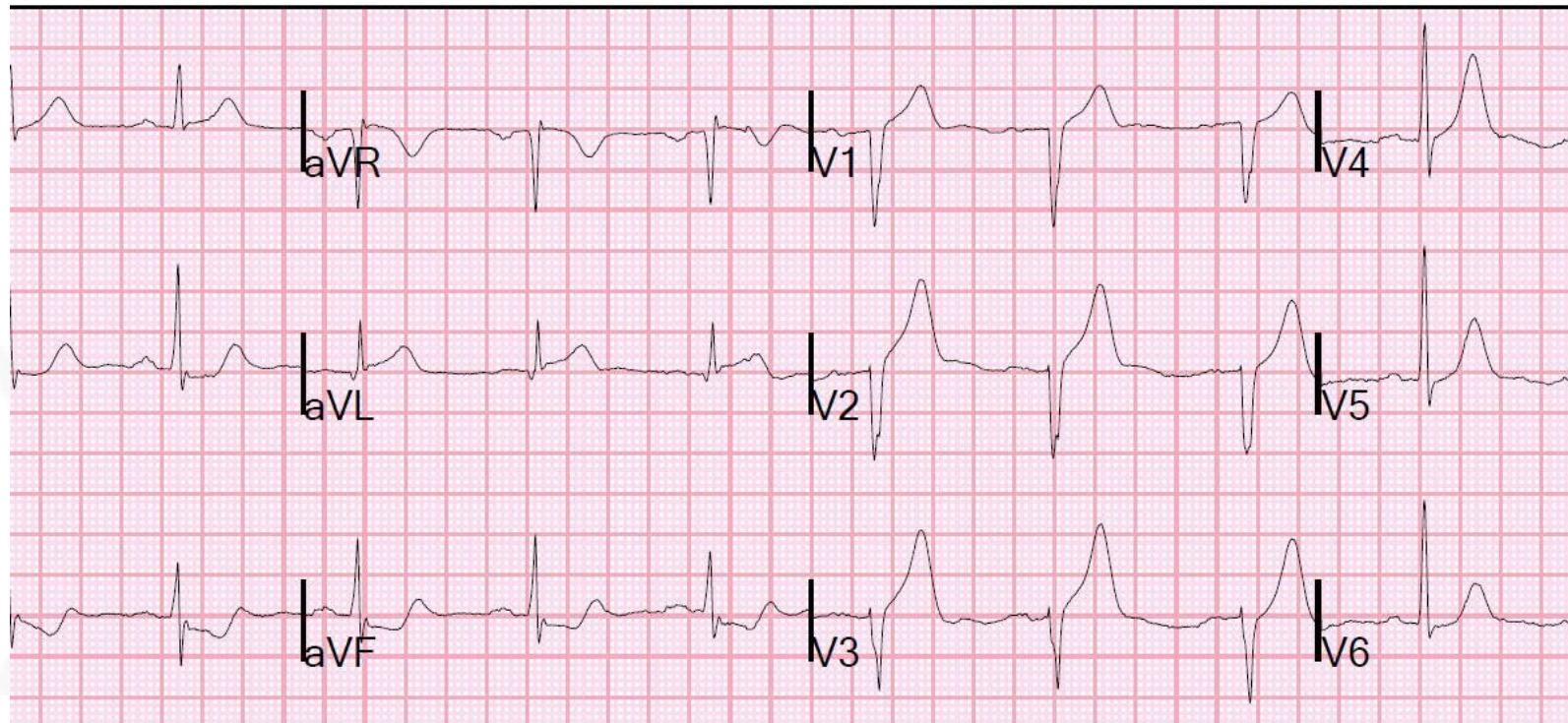
Myocardial Infarction

- ST segment elevations.
- Hyper-Acute T wave
- Reciprocal ST segment depression
- Q wave Develop – Sign of Old M.I. – Complete Necrosis



Hyper-Acute T - Wave

- T waves become tall and narrow



Location from ECG Lead

- Anterior Wall M.I. – $V_1 V_2$
- Anterior Septal Wall M.I. – $V_1 V_2 V_3 V_4$
- Lateral Wall M.I. – $V_3 V_4 V_5 V_6$
- Inferior Wall M.I. – II , III , Avf
- Posterior Wall M.I. – $V_7 V_8 V_9$

Dr Piyush Tailor

2D - Echo

- Decrease wall motion
- Dyskinetic or Akinetic Wall Movement
- Decrease ejection fraction
- Effect on valvular movement
- Dilatation of Chamber
 - If Congestion in chamber, due to decrease wall movement

Dr Piyush Tailor

Coronary Angiography

- Dye injected in Coronary artery
- Done through Radial artery or Femoral artery
- **Advantage**
 - Exact architecture of Coronary artery visible
 - Exact site of blockage can be detected
 - Extent of blockage can be detected
- **Disadvantage**
 - Dye may cause
 - Anaphylaxis
 - Acute renal failure
 - Intervention require
 - Costly

Management

Immediate Management

- Back Rest
- Oxygen inhalation
- Sublingual Nitroglycerine
- Loading Antiplatelet
 - Aspirin 300 mg
 - Clopidogrel 300 mg
- Loading Statin group of Drug
 - Atorvastatin 80 mg
- Analgesic
 - Morphine

Management

- Medical Management
- Interventional management
 - Percutaneous Transluminal Coronary Angioplasty (PTCA)
- Surgical management
 - Coronary Artery Bypass Grafting (CABG)

Medical Management

1. **Back Rest**
2. **Oxygen inhalation**
3. **Thrombolytic drugs**
4. **Nitroglycerine**
5. **Heparin**
 - LMWH (Low Molecular Weight Heparin)
6. **Beta Blocker**
 - Metoprolol
 - To decrease cardiac oxygen demand
7. **ACE Inhibitor**
 - Captopril
 - To decrease Pre-Load & After Load
8. **Antiplatelet**
 - Aspirin
 - Clopidogrel
9. **Statin**
 - Atorvastatin
10. **Analgesic**
 - Morphine
11. **Diuretic**
 - Frusemide
 - to relieve congestion
12. **Antacid**
 - Proton Pump Inhibitor
 - Pantoprazol
13. **Laxative**
 - Dulcolax , Duphalac
14. **Anxiolytic**
 - Alprazolam , Diazepam

Thrombolytic Therapy

- Lysis of coronary thrombus
- Recanalize Coronary Artery Blood Flow
- Provide maximal benefit if given within the first 4-6 hours after the onset of symptoms.

Drugs

- Streptokinase
- Urokinase
- Tissue Plasminogen Activator
- Alteplase

Thrombolytic Therapy

Complication

- Internal Haemorrhage
- Anaphylactic shock

Contraindications

- Previous hemorrhagic stroke
- Cerebro-Vascular events within 1 year
- Intracranial neoplasm
- Active internal bleeding
- Chronic Liver Disease
- Haemorrhoid - Piles

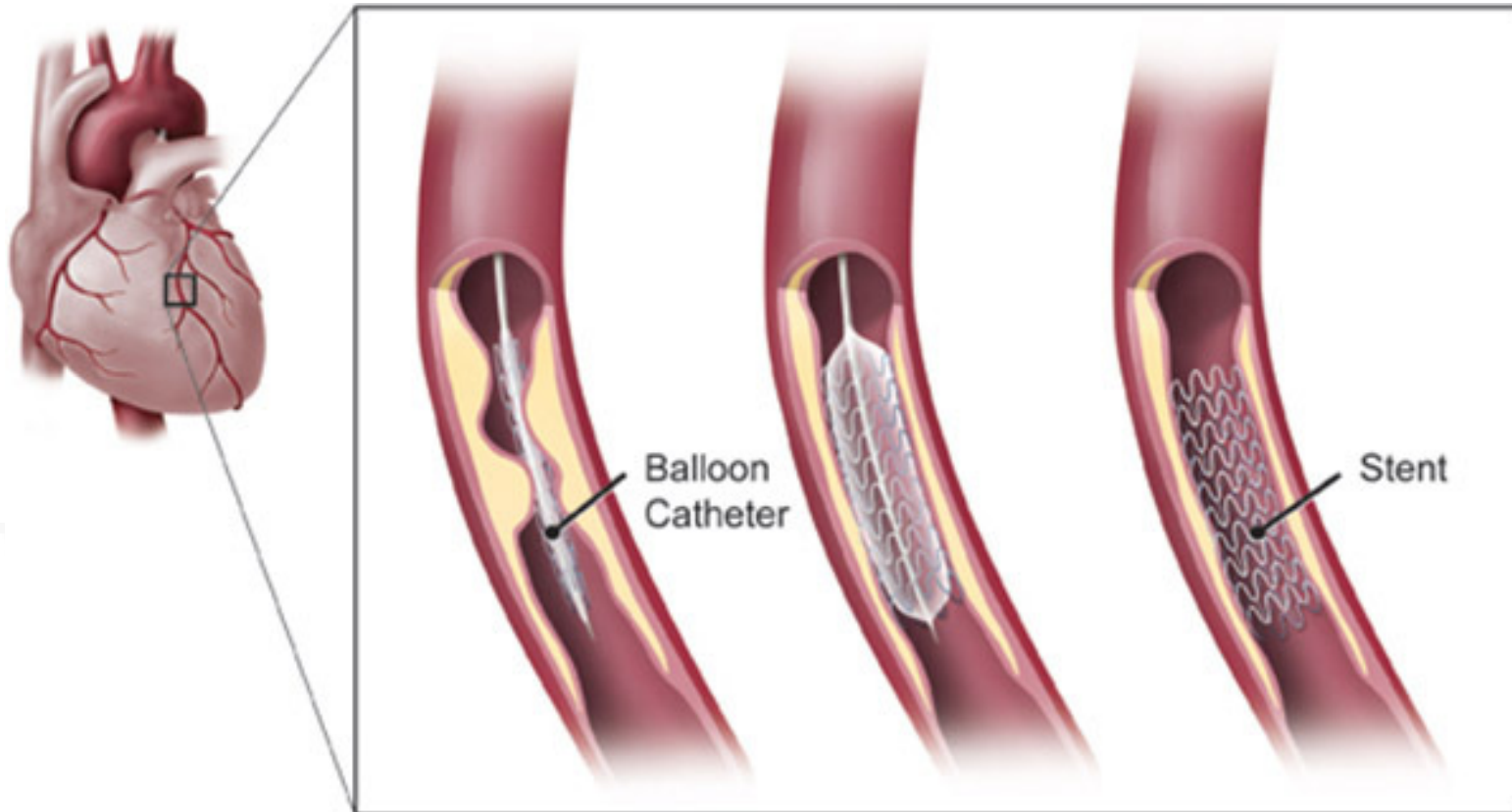
Percutaneous Transluminal Coronary Angioplasty (PTCA)

- Very effective to reestablish blood flow in Coronary Artery.
- Invasive procedure
- Guide wire as well as Stent is inserted from either from Radial or Femoral artery
- Stent will be deflated at site of plaque

Disadvantage :

- Very Costly
- Facility of Catheterization (Cath) Instrument & Laboratory is require at hospital.

Percutaneous Transluminal Coronary Angioplasty (PTCA)



Coronary Artery Bypass Grafting

- Artery use for Grafting
 - Left Internal Mammary Artery (LIMA)
 - Right Internal Mammary Artery (RIMA)
 - Radial Artery
 - Great Saphenous Vein

Dr Piyush Tailor

Life Style Modifiatio

Keep Your Heart Open To Get Open For Everyone

But

Never Left Your Heart Broken To Get Broken By Anyone

Dr Piyush Tailor

Life Style Modifiatiion

Do

- Aerobic Exercise
- Decrease Central obesity
- More Protein diet
- More amount of PUFA
 - Nuts , Fish
- Increase Fiber diet
 - Fruits & Salad

Do Not

- Avoid Smoking – Alcoholism
- Decrease intake of Carbohydrate Diet
- Decrease intake of Cholesterol

Dr Piyush Tailor