



# #MADEEASY

ISCHEMIC HEART DISEASE: PART 2





## Myocardial Infarction

### *Pathogenesis*

- ***In MI, there is complete blockage of the coronary arteries.***
- ***This blockage is irreversible.***
- ***The blood supply to the heart is completely compromised leading to infarction of the tissue.***
- ***The infarcted area undergoes necrosis resulting in the signs and symptoms.***



# Classification



## **Flame cell**

### **Based on thickness of wall**

- **Transmural MI**
- **Subendocardial MI**

### **Based on coronary artery involved**

- **Anterior wall MI (Left Anterior Descending artery)**
- **Inferior wall MI (Right Coronary Artery)**
- **Extensive wall MI (Left Coronary Artery)**
- **Septal wall MI (Septal branch of Left coronary artery)**

### **Based on ECG Changes**

- **Non-ST elevation MI**
- **ST elevation MI**



# Clinical Presentation



## *Chest pain*

- **Radiating to arm, jaw, neck, shoulder.**
- **Pain can be squeezing, burning, stabbing or associated with tightness.**
- **Levine sign positive: bringing clenched fist to the chest**

1. **Dyspnea**
2. **Diaphoresis**
3. **Nausea and vomiting**

- **Myocardial infarction is when the garbage completely obstructs the pipeline and now the pressure in the pump is so high that it stops working completely and its parts start disintegrating (enzyme).**



# ECG Changes



## **STEMI**

- **ST elevation**
- **Hyperacute T waves**
- **Q wave may signify Old MI**

## **NSTEMI**

- **ST depression**
- **T wave flattening or inversion**
  
- **Cardiac biomarkers: Cardiac enzymes can be found in serum due to the necrotic change in MI.**
  
- **Myoglobin and Heart Fatty Acid Binding Protein (HFABP) are first to rise in MI**





## Creatine kinase

- **Three isoforms: CK MM(Muscle), CK MB(Myocardium), CK BB(Brain).**
- **CK MB rises within few hours**

### **Troponin**

- **Most specific and most sensitive enzyme for diagnosis of MI.**
- **Rises in 24-48 hours, remain elevated for around 7 days.**
- **Doubles or triples in MI**
- **Two isoforms: Troponin-T and Troponin-I**

### **LDH (lactate dehydrogenase)**

- **Five isoforms: LDH1 & LDH2 are specific to the heart.**
- **Rise in LDH1 (more cardiac specific) more than LDH2 is seen in MI.**
- **In post-mortem studies, heart is stained with Triphenyl Tetrazolium Chloride (TTC) which usually gives brick red color to the heart, but leaking of LDH causes a pale-yellow discoloration.**
- **Pale as there is no blood.**





# Microscopic Changes

- **Microscopic changes**

	Macroscopic changes	Microscopic changes
<4 hours	No change	No change
4-24 hours	Dark mottling, pale yellow on TTC stain	Waviness of <u>fibres</u>
1-3 days	Mottling with yellow center and hemorrhagic border	Coagulative necrosis with neutrophilic infiltration
3-7 days	Pale and thin infarcted area	Phagocytosis by macrophages and neutrophils
7-10 days	Red-tan margins	Granulation tissue at margins
2-8 weeks	Grey white scar	Dense collagenous scar

## Complications

### Early: Arrhythmia

- **MC tachyarrhythmia: Ventricular fibrillation**
- **Occurs within 1 hour of MI**
- **This is called "Golden period" as if the patient doesn't develop arrhythmia, his chances of survival are drastically improved.**

- **MC bradyarrhythmia: Mobitz type 2 heart block**
- **These can cause sudden cardiac death.**
- **Ventricular tachycardia may occur 12 hours Post MI.**

- **Cardiogenic shock: MCC of in-hospital mortality post MI.**

- **Cardiac rupture**
- **Ventricular aneurysm**

### Late: Dressler syndrome

- **Occurs in 2-4 weeks after MI.**
- **Autoimmune pericarditis**
- **Management: aspirin**

**Complications are important aspect of MI. It starts with abnormal beating of heart which is the most dangerous to immune attack which is not dangerous and occurs at a later stage.**





# Pathogenesis

- ***Prolonged and repetitive episodes of myocardial ischemia over a long period of time bring about changes in the structure of the heart like left ventricular hypertrophy.***
- ***It can also result in heart failure.***

## ***Microscopically***

- ***Heart failure cells seen in pulmonary tissue.***
- ***These are macrophages with accumulated hemosiderin.***

## ***Clinical presentation***

- ***Presents with features of heart failure.***
- ***Left ventricular failure***
- ***Dyspnea on exertion***
- ***Orthopnea Right ventricular failure***
- ***Pedal edema***
- ***Hepatomegaly***

***Chronic ischemic heart disease is when the pipelines have been obstructed over the years, and now the pump has changed its structure to adapt to the flow. In the end, the pump will fail.***

