



SNS COLLEGE OF ALLIED HEALTH SCIENCES
SNS Kalvi Nagar, Coimbatore - 35
Affiliated to Dr MGR Medical University, Chennai



DEPARTMENT: ALLIED HEALTH SCIENCES
COURSE NAME: Pathology

Topic: Myocardial Infarction



CASE SCENARIO



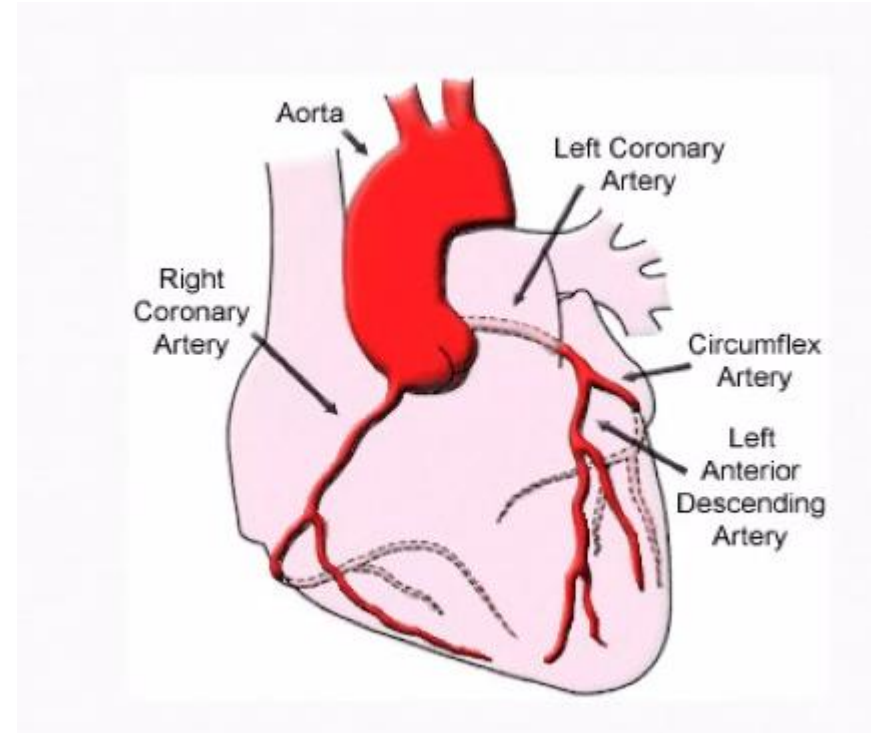
- A 57 year-old male lorry driver, presented to his local emergency department with a 20-minute episode of diaphoresis and chest pain. The chest pain was central, radiating to the left arm and crushing in nature. The pain settled promptly following 300 mg aspirin orally and 800 mcg glyceryl trinitrate (GTN) spray sublingually administered by paramedics in the community. He smoked 20 cigarettes daily (38 pack years) but was not aware of any other cardiovascular risk factors. On examination he appeared comfortable and was able to complete sentences fully. There were no heart murmurs present on cardiac auscultation. Blood pressure was 180/105 mmHg, heart rate was 83 bpm and regular, oxygen saturation was 97%.
- What is the most likely diagnosis?



Introduction



- Myocardial infarction (MI) refers to the process by which areas of myocardial cells in the heart are permanently destroyed. It occurs when myocardial tissues are abruptly and severely deprived of oxygen.





Definition



Definition

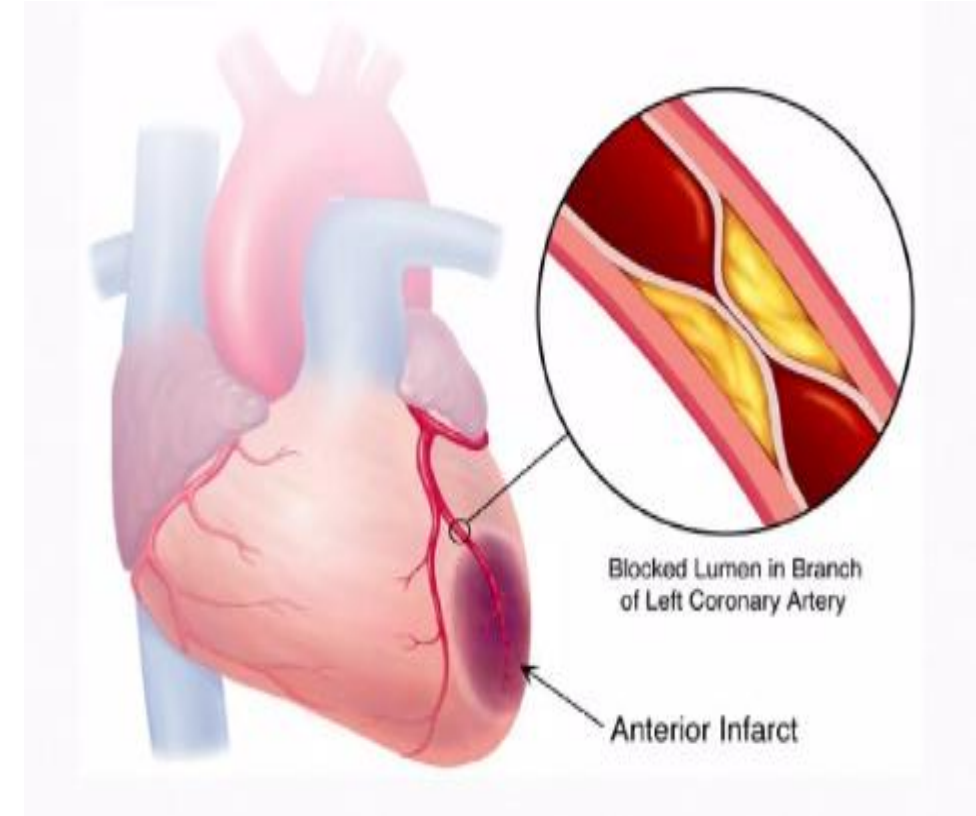
- Myocardial infarction is a diseased condition which is caused by reduced blood flow in a coronary artery due to atherosclerosis and occlusion of an artery by an embolus or thrombus.

Location /Types of MI

Obstruction of the left anterior descending artery (LAD) results in **anterior or septal wall MI**.

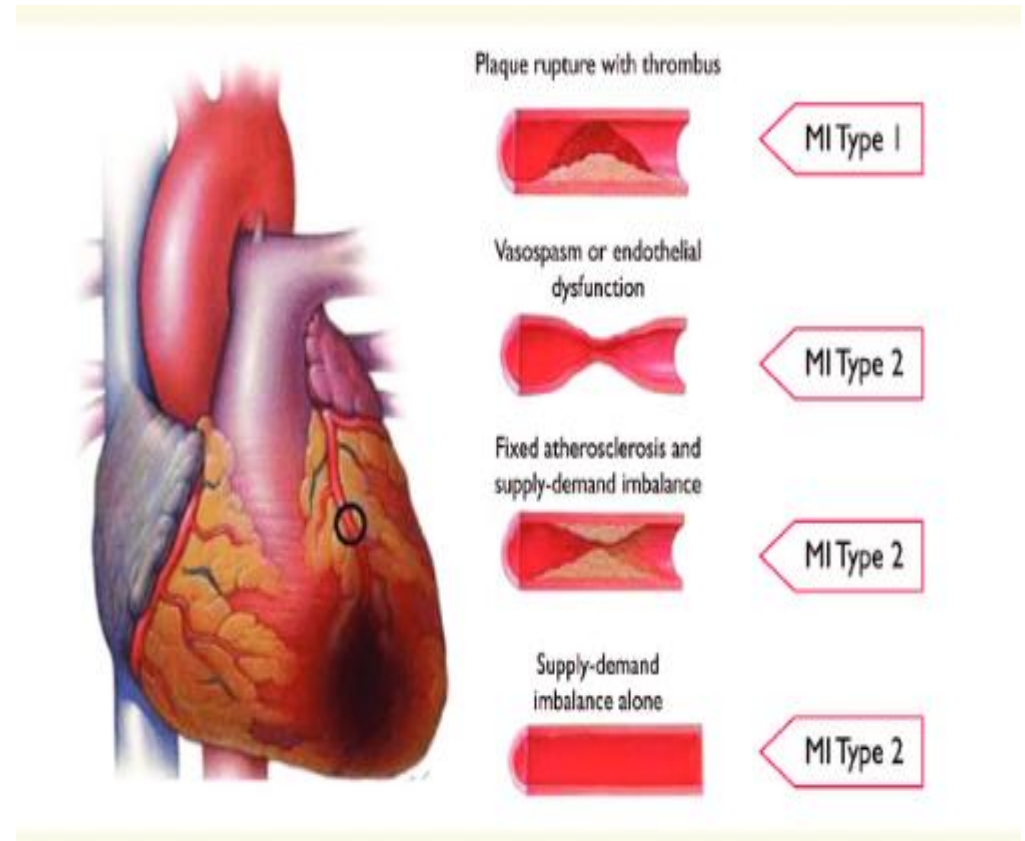
Obstruction of the circumflex artery results in **posterior wall MI or lateral wall MI**.

Obstruction of the right coronary artery results in **inferior wall MI**.



Types of Infarction

- The two main types of acute myocardial infarction, based on pathology, are
- **Transmural infarction**-Transmural infarcts extend through the whole thickness of the heart muscle and are usually a result of complete occlusion of the area's blood supply.
- **Subendocardial (nontransmural) infarction** - involves a small area in the subendocardial wall of the left ventricle, ventricular septum, or papillary muscles.
- A transmural infarct is sometimes referred to as an "ST elevation myocardial infarct" (STEMI) and a subendocardial infarct as a "non-ST elevation infarct" (NSTEMI).





Cardiovascular risk factors



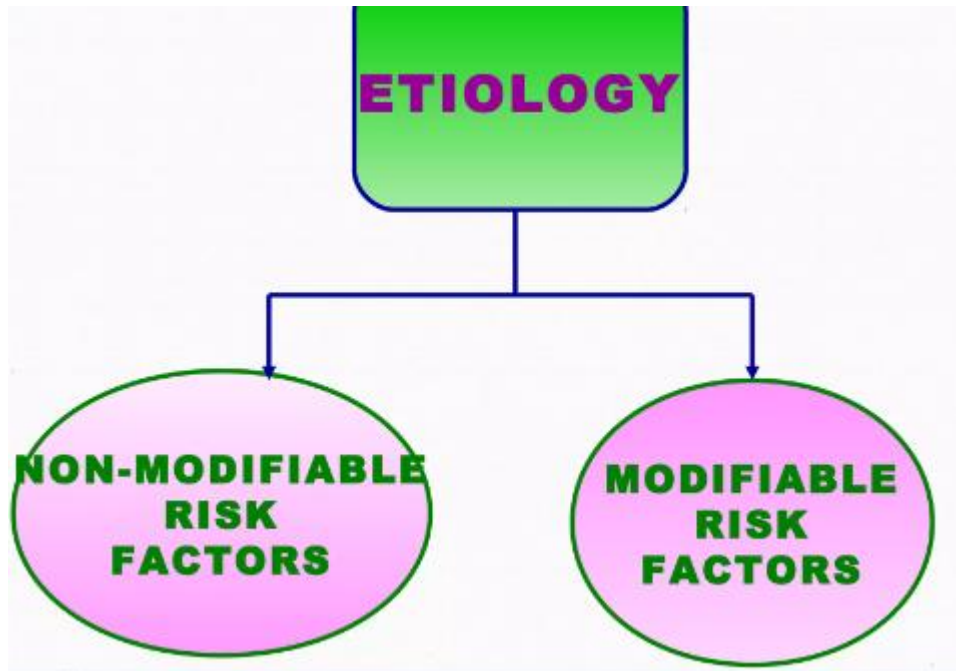


Etiology

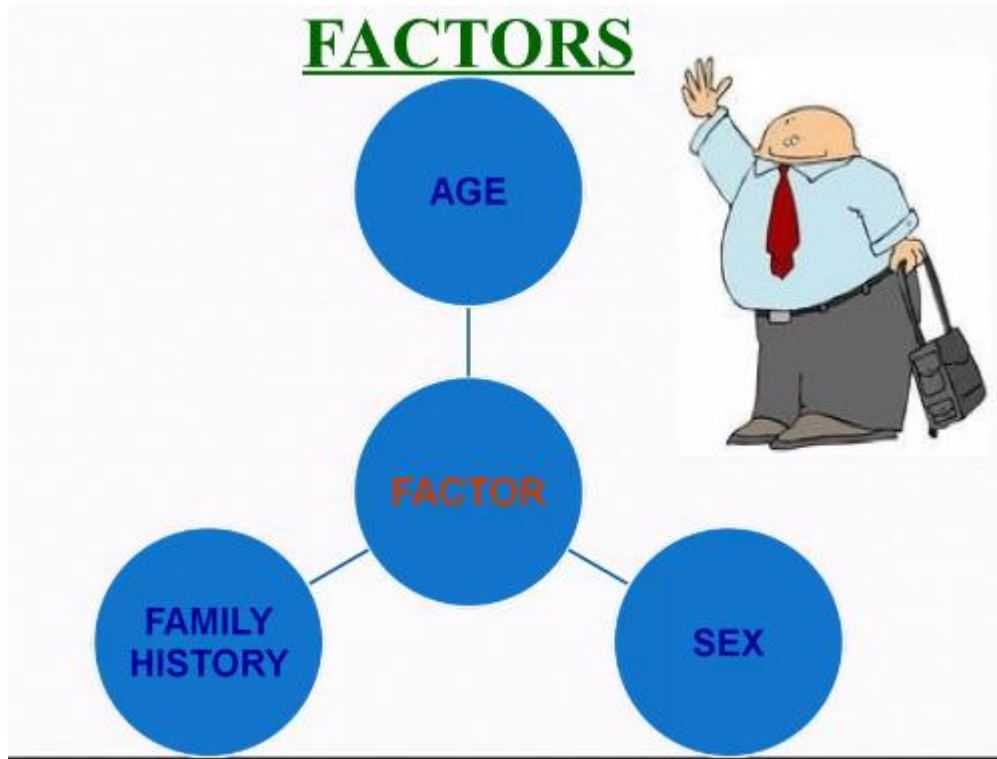


Causes based on 2 types of Risk factors

- Modifiable risk factors
- Non modifiable risk factors



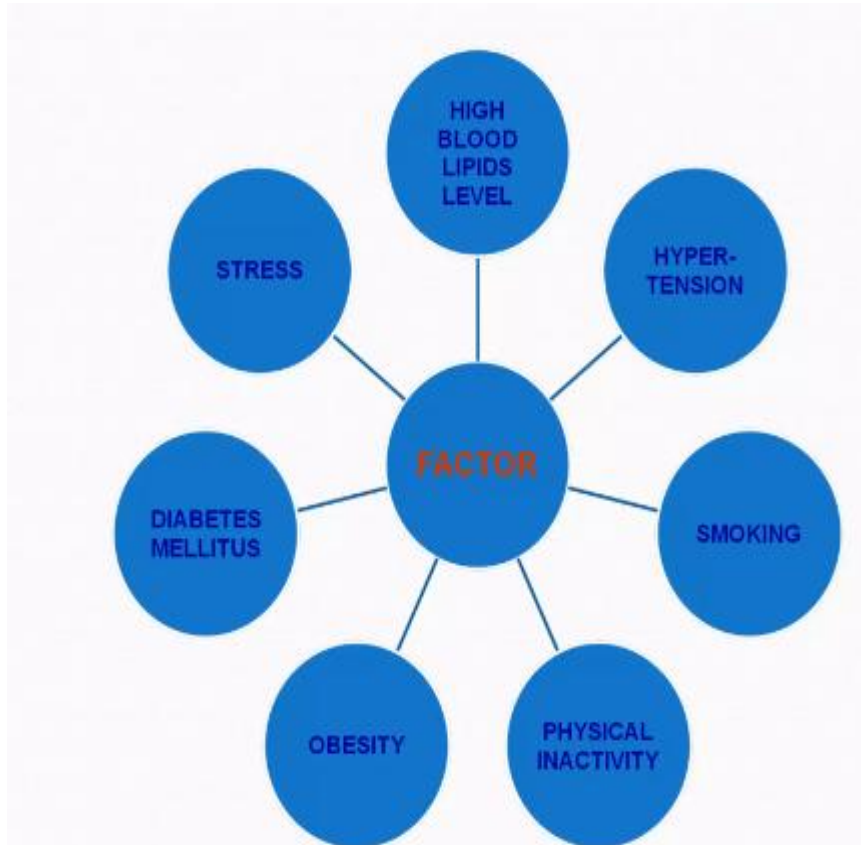
Non modifiable risk factors



- **AGE:** More than 40 years.
- **FAMILY HISTORY:** Myocardial infarction can be inherited from parents to children.
- **GENDER:** Myocardial infarction is 3 times more in men than women.



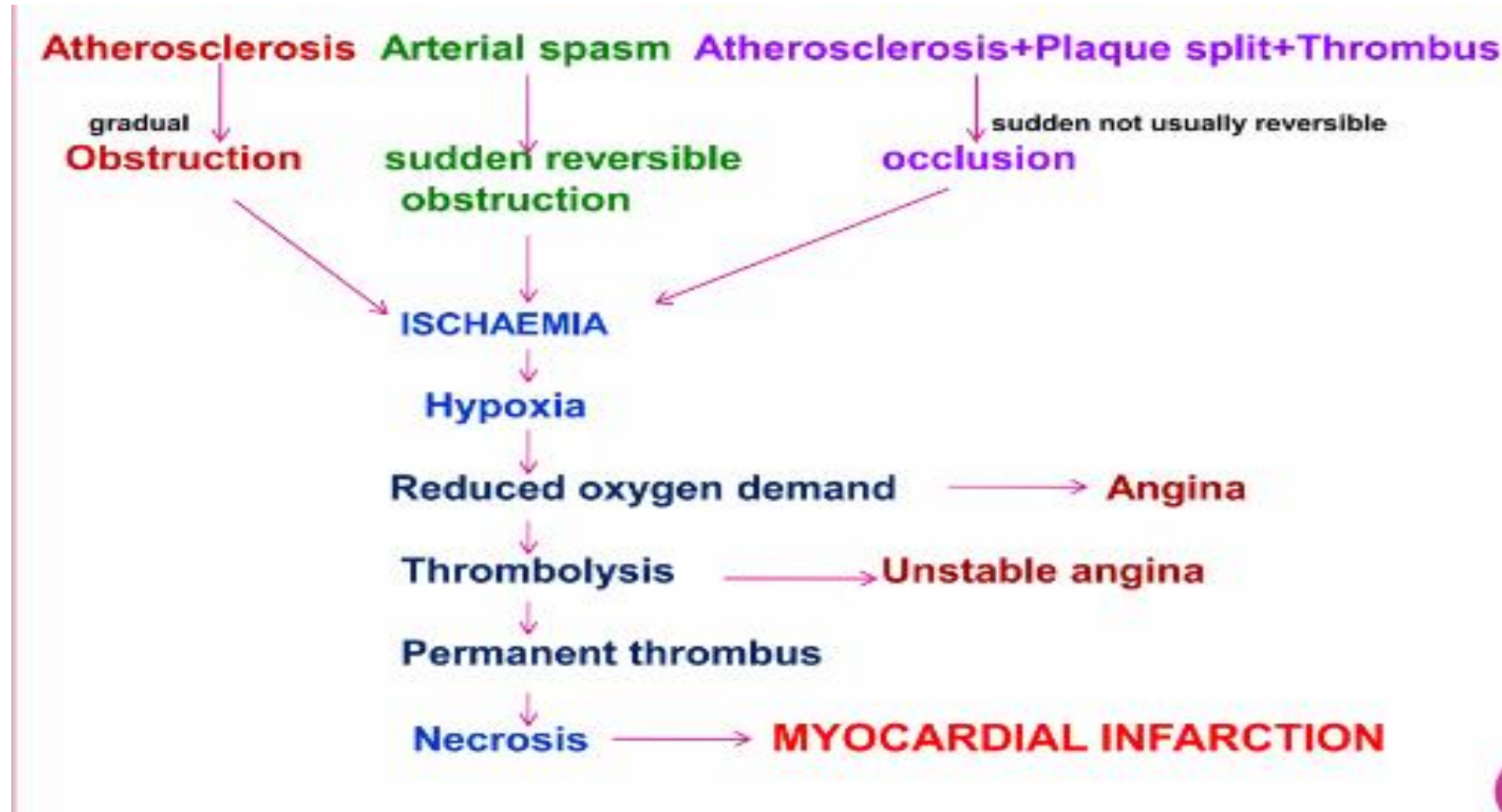
Modifiable risk factors



- high cholesterol
- high blood pressure
- smoking, diabetes
- Obesity
- physical inactivity and
- poor nutrition.



Pathophysiology of MI

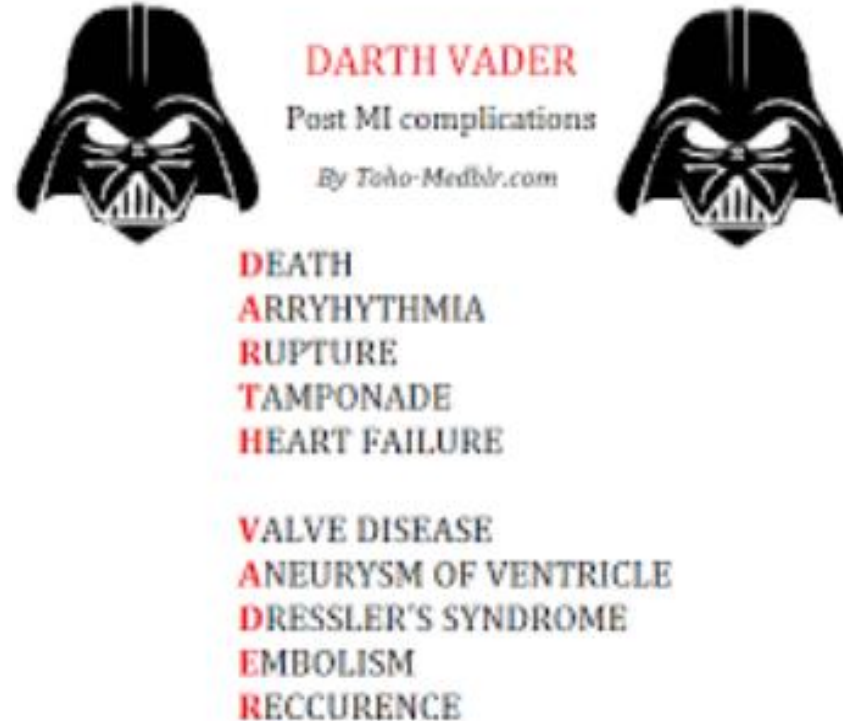




Complications

Complications include:

- Arrhythmia
- Cardiogenic shock (10%)
- Congestive heart failure
- Thromboembolism
- Rupture (5%)
- Cardiac aneurism (5%)
- Pericarditis





Assessment



- Assessment -1

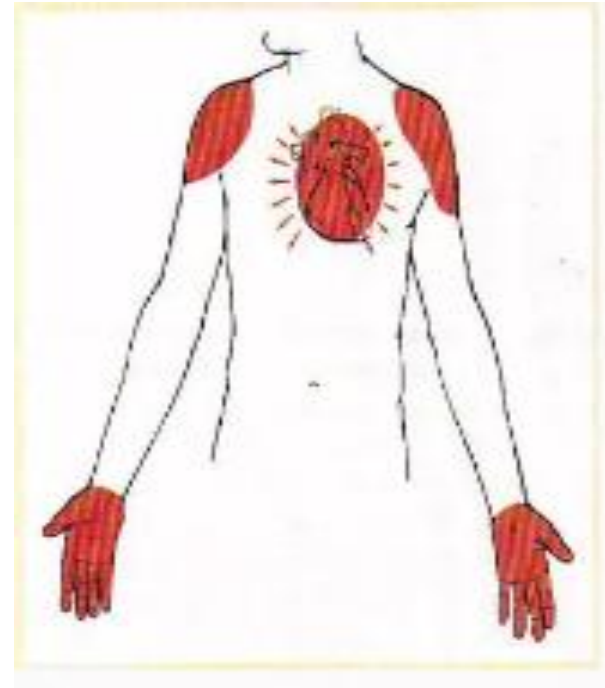
1. Definition of Myocardial Infarction
2. What are the risk factors of Myocardial Infarction
3. What are the Complications of Myocardial infarction



Clinical manifestation-Pain



- **Characteristics:** Severe, immobilizing chest pain. Usually described as heaviness, pressure, tightness, burning.
- **Location:** Substernal, Retrosternal or Epigastric.
- **Radiation:** It may radiate to neck, jaw, arm or back.
- **Duration:** Lasts for 20 minutes or more





Cont...



NAUSEA & VOMITING

- Stimulation of vomiting center by severe pain causes nausea & vomiting.

FEVER 100.4 to 102.2°F

- It is due to inflammatory process caused by Myocardial cell death.

CARDIOVASCULAR MANIFESTATIONS

- Hypotension Decrease



- cardiac output



- Shock
- Urine output (Oliguria): <30ml/day.
- Dyspnea

SYMPATHETIC NERVOUS SYSTEM STIMULATION

- Increased catecholamine releases.



- Diaphoresis (perfuse sweating).



- Cold & clammy skin ("cold sweat").



Diagnosis



- History Collection
- Physical Examination

Elevated Serum cardiac markers:

- Creatinine phosphokinase (CK)
- Lactic dehydrogenase (LDH)
- Cardiac specific troponins (cTn)

Electrocardiogram- ECG provides information that assists in diagnosing acute MI. The classic ECG changes are-

- T wave inversion
- ST segment elevation
- Abnormal Q wave

ANGIOGRAPHY To detect percentage of blockage & type of MI.

CHEST X-RAY To detect cardiomegaly.





Cont.....



Nuclear Stress Imaging

- scan and technetium scan shows areas of reduced uptake of radioactive isotope by the myocardium. Useful for assessing coronary perfusion
- A perfusion defect present during stress but not all rest indicates reversible myocardial ischemia, whereas a persistent perfusion defect on scan during both phases (rest and stress) usually indicates previous myocardial infarction.
- Thallium scanning is positive in 75-90% of patients with significant coronary disease. False positive test may occur in women due to breast tissue.

Isotope scanning

- Technetium-99m pyrophosphate accumulates in damaged myocardium whereas thallium-201 produces a deficient uptake in territories supplied by occluded or narrowed arteries. Thallium is most commonly used as a screening technique in patients with suspected coronary artery disease.



Conservative managements



- : ✓ Counselling and education of patients
- ✓ Life style measures
- ✓ Smoking cessation
- ✓ Avoid Alcohol intake
- ✓ Diet and nutrition
- ✓ Salt restriction





Medical Management



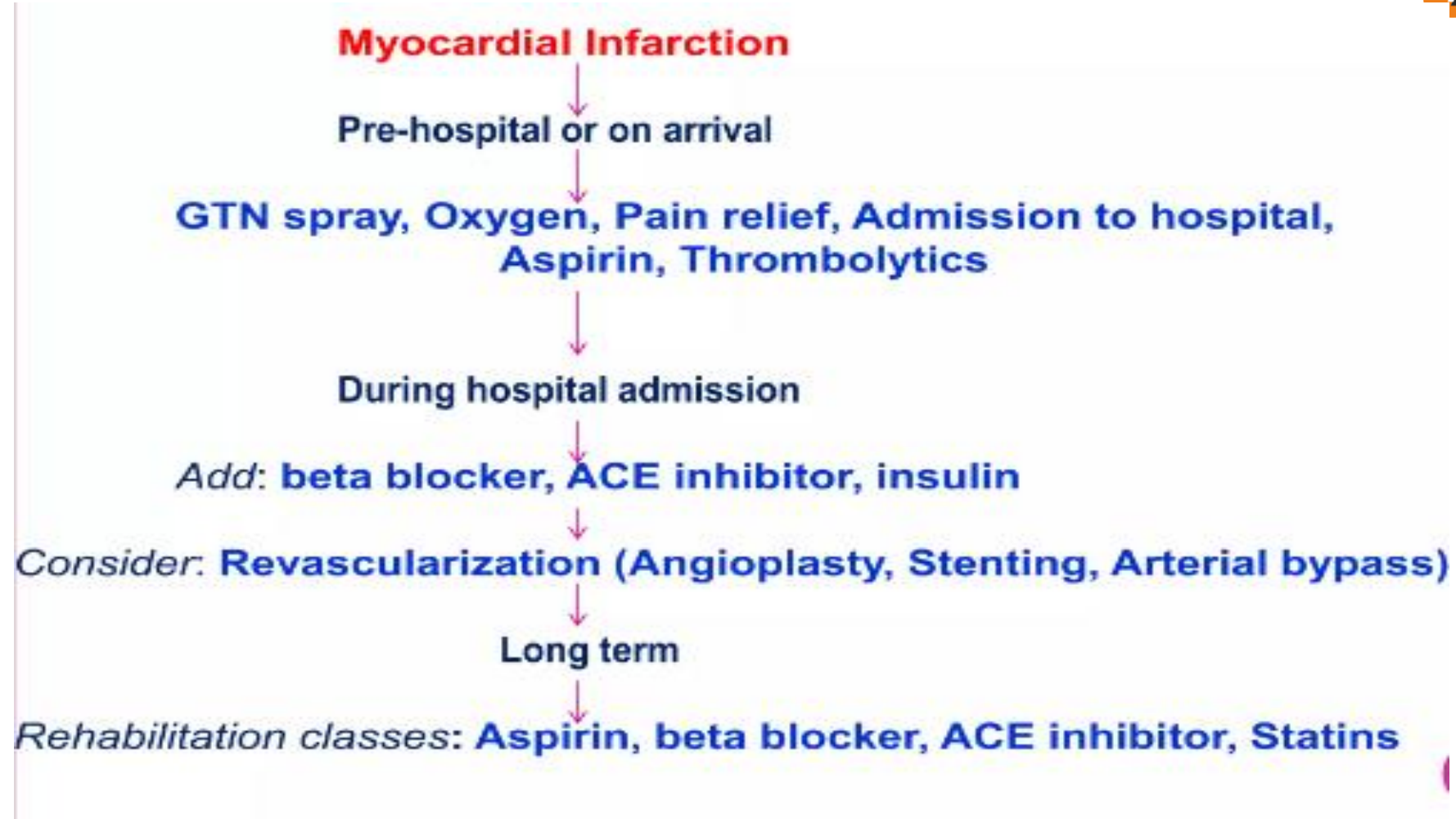
- ✓ Thrombolytic agents
- ✓ Anticoagulants
- ✓ Antiplatelet agents
- ✓ Antihypertensive agents
- ✓ Lipid lowering drugs
- ✓ Vasodilators
- ✓ Others
 - i) Analgesics
 - ii) Antiulcer drugs
 - iii) Antidepressants

- **Initial treatment:**

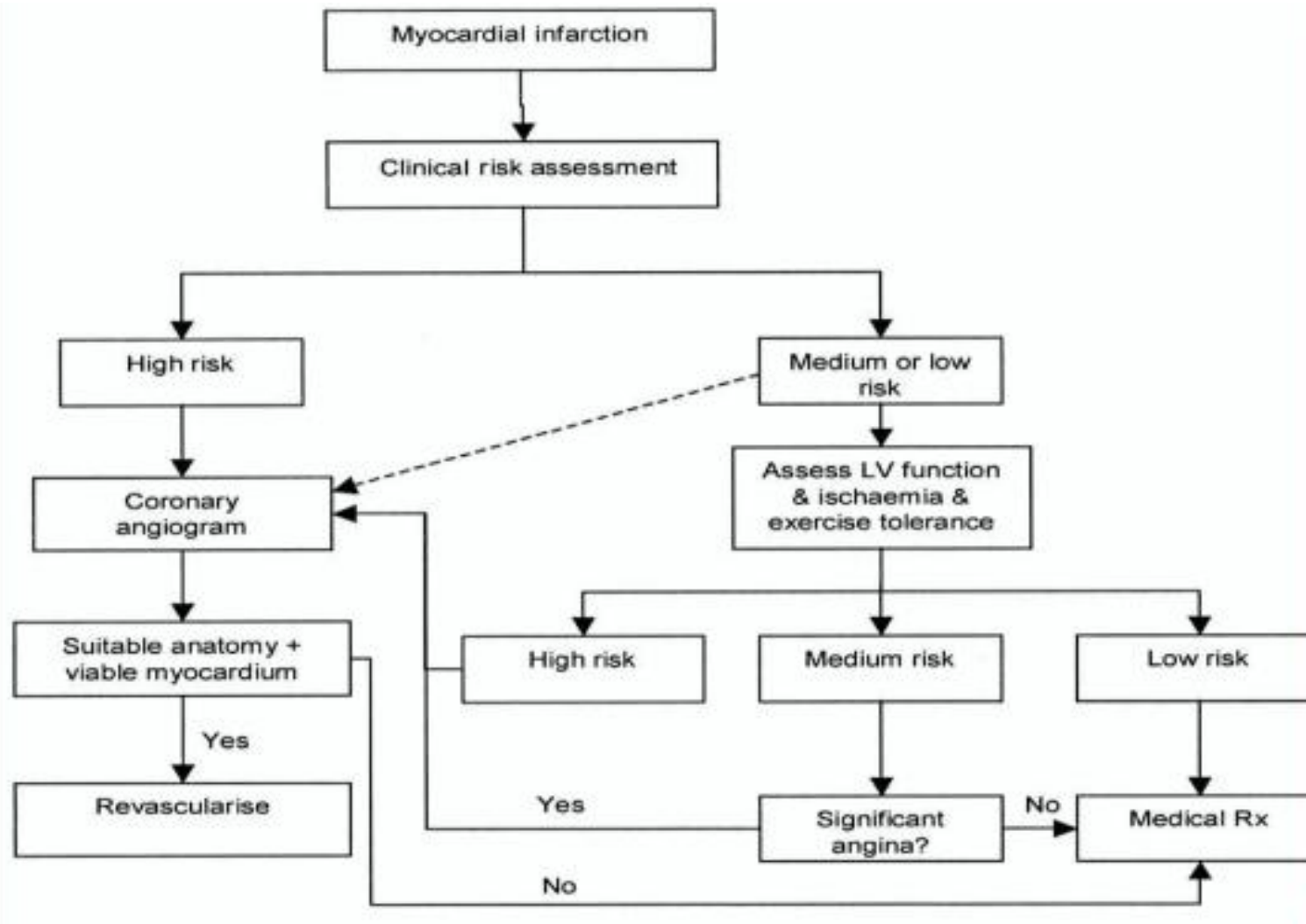
1. Morphine (2.5-5.0 mg i.v) - For sudden relief of pain & anxiety.
2. Aspirin (162-325 mg orally) - For prevention of thrombus extension, embolism, venous thrombosis.
3. Inhalation & assisted respiration, if needed.
4. I.V fluids - Maintain blood volume & perfusion



Treatment Algorithm for MI

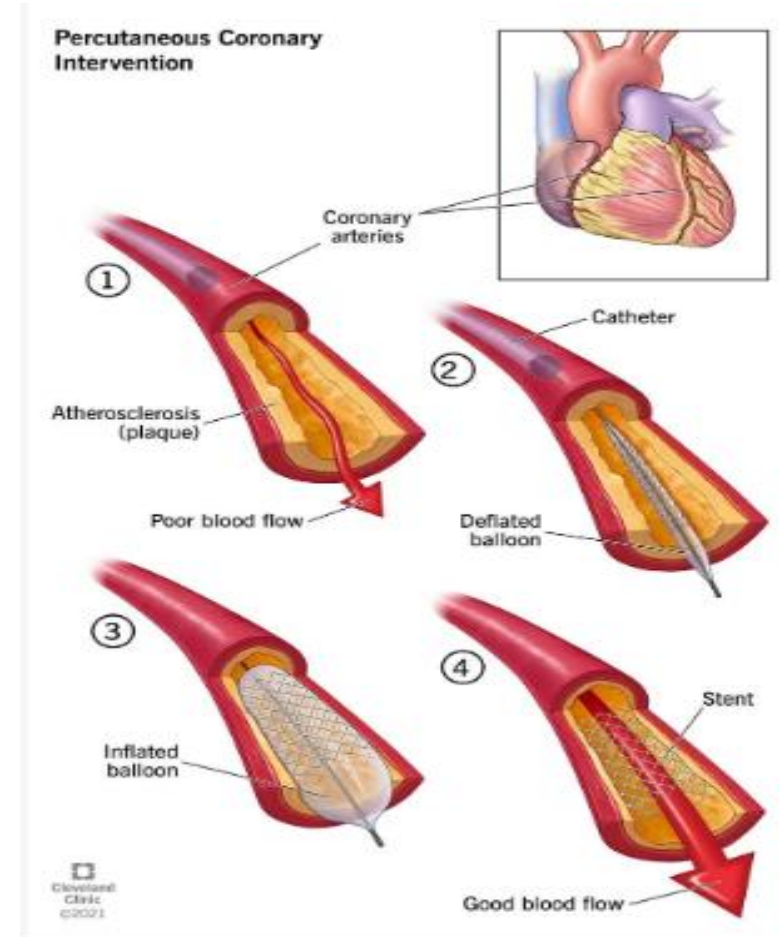


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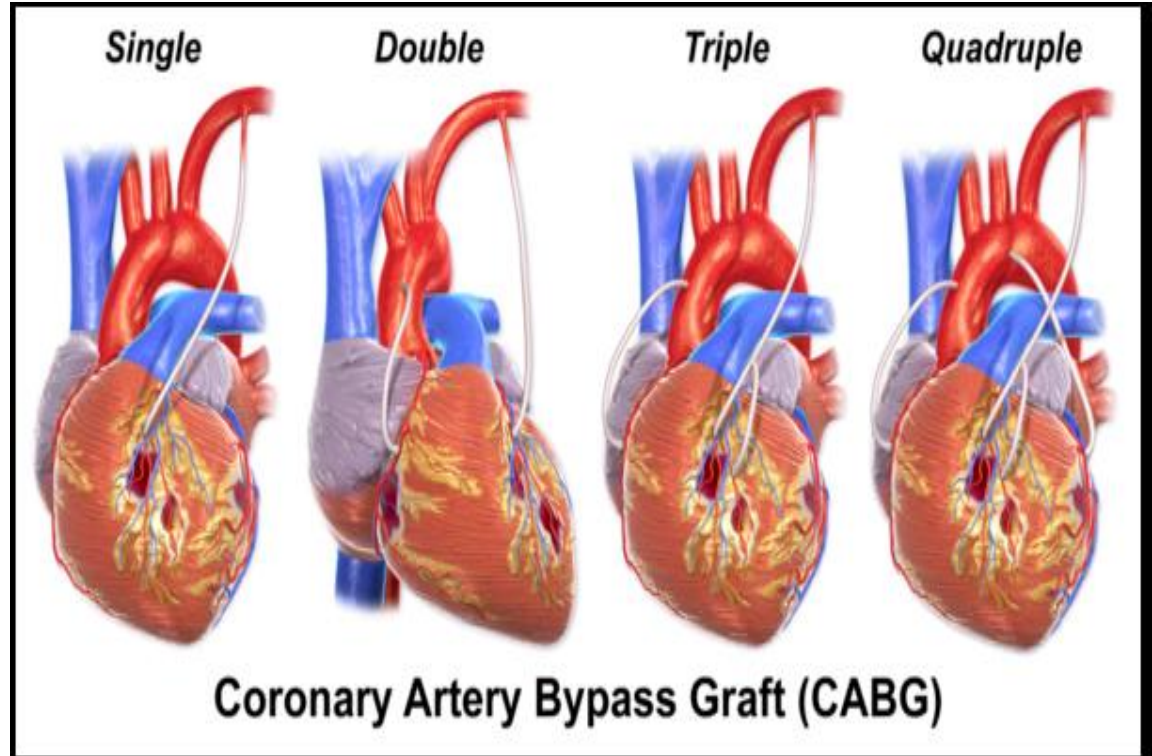
Percutaneous coronary intervention

- Percutaneous coronary intervention (PCI)** is a non-surgical procedure used to treat narrowing of the coronary arteries of the heart found in coronary artery disease. The process involves combining coronary angioplasty with stenting which is the insertion of a permanent wire-meshed tube that is either drug eluting (DES) or composed of bare metal (BMS). The stent delivery balloon from the angioplasty catheter is inflated with media to force contact between the struts of the stent and the vessel wall (stent apposition), thus widening the blood vessel diameter. After accessing the blood stream through the femoral or radial artery, the procedure uses coronary catheterization to visualise the blood vessels on X-ray imaging. After this, an interventional cardiologist can perform a coronary angioplasty, using a balloon catheter in which a deflated balloon is advanced into the obstructed artery and inflated to relieve the narrowing; certain devices such as stents can be deployed to keep the blood vessel open.



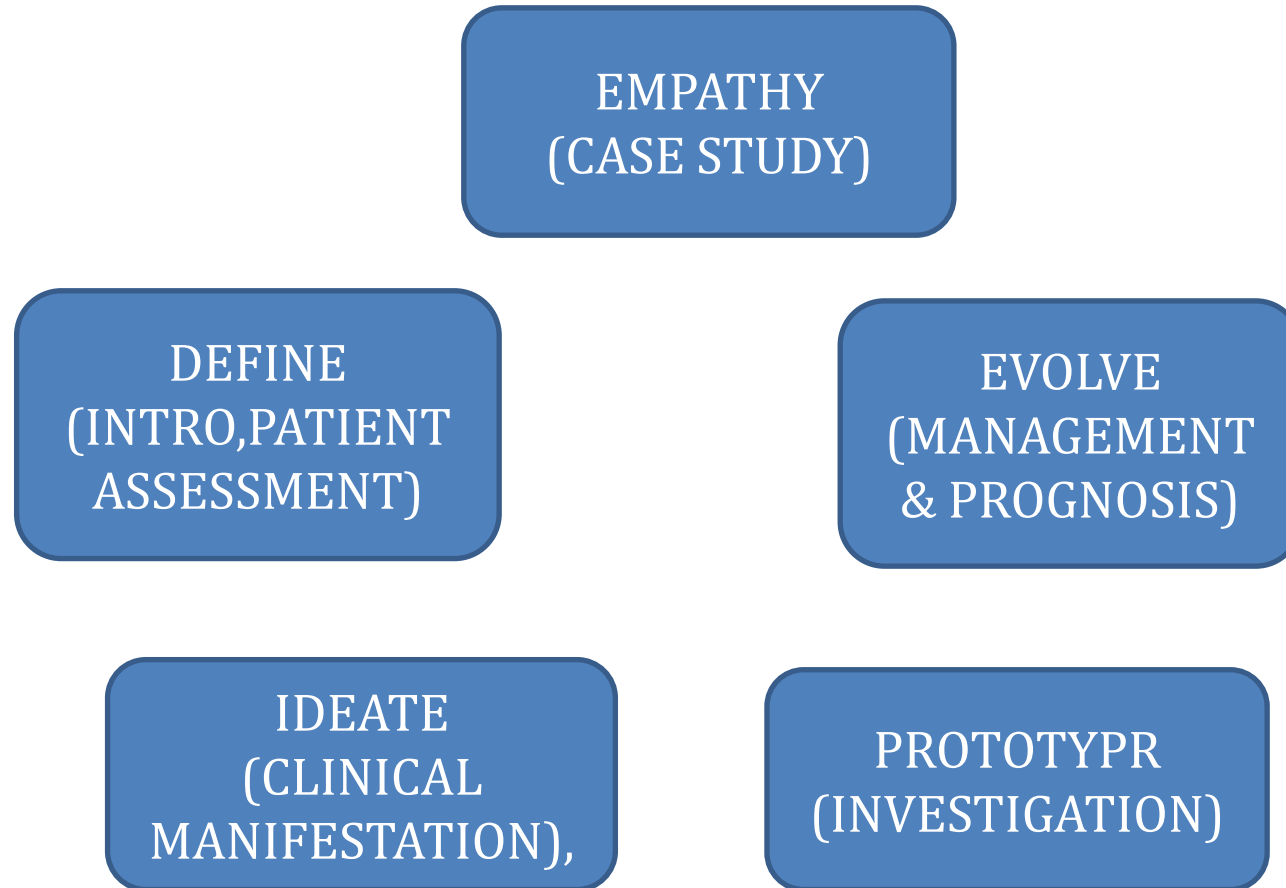
CORONARY ARTERY BYPASS GRAFT(CABG)

- CORONARY ARTERY BYPASS GRAFT(CABG)
Construction of new conduits between aorta or other major arteries with help of CPB machine
Indications
Triple vessel disease 60% occlusion of LAD Fails medical management
- Coronary artery bypass grafting (CABG) is a common surgical procedure for the treatment of myocardial ischemia. And uses an artery or vein of the patient to anastomose from the aorta to the distal end of the stenosis, so that blood flow can directly supply the distal myocardium through the graft, thereby achieving the purpose of treating myocardial ischemia





DESIGN THINKING FRAMEWORK





Preventive measure



- Assessment -2

Group Discussion – Conservative Management of Myocardial Infarction

Diet

Life style modification



THANK YOU



References:

- Text book of Myocardial Infarction: A Companion to Braunwald's Heart Disease Author David A.Morrow

https://youtu.be/TzQnHAKKgFg?si=BpyXrFlFtMK_tHbb

<https://youtu.be/44ez25Hp8lc?si=ckFPq6S2mQ54STCA>