Chapter 4

Management of Patients with Cardiovascular Disorders

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4.2. Management of patients with Coronary Artery Disease

CORONARY ARTERY DISEASE

A narrowing of the coronary arteries that prevents adequate blood supply to the heart muscle is called coronary artery disease. Usually caused by atherosclerosis, it may progress to the point where the heart muscle is damaged due to **lack of blood supply**. Such damage may result in infarction, arrhythmias, and heart failure.

CORONARY ARTERY DISEASE IS ALSO KNOWN AS;

- ATHEROSCLEROTIC HEART DISEASE
- CORONARY ATHEROSCLEROSIS
- CORONARY ARTERIOSCLEROSIS
- CORONARY HEART DISEASE

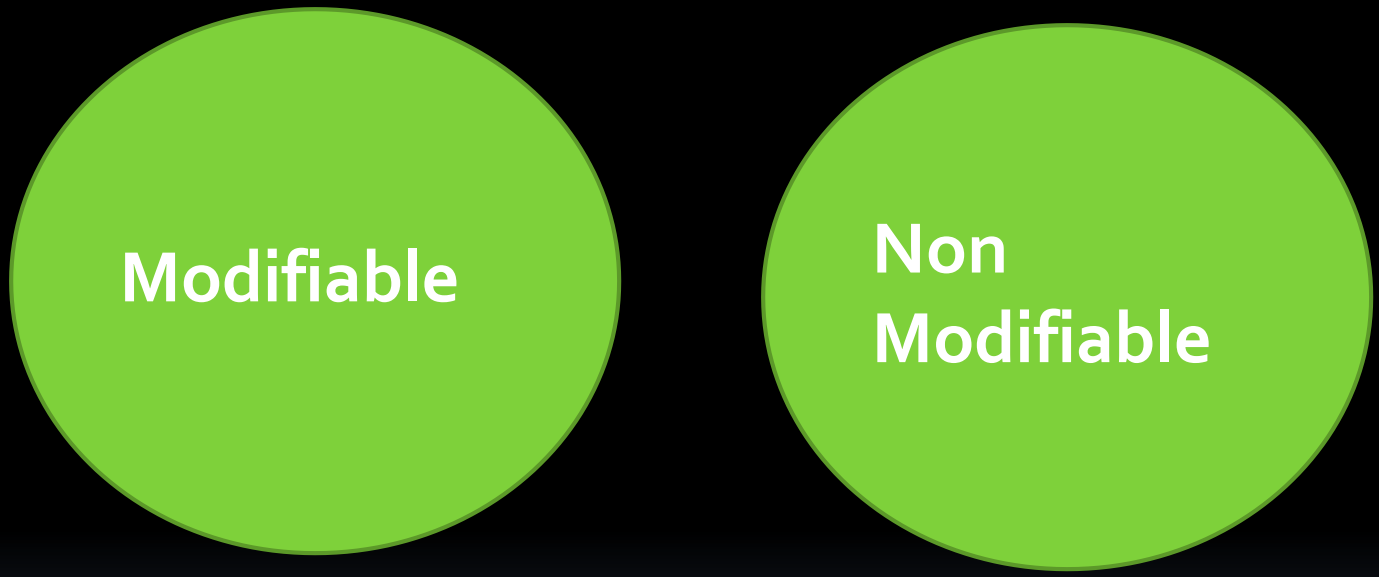
CORONARY ATHEROSCLEROSIS

- CORONARY ATHEROSCLEROSIS is the abnormal accumulation of lipid or fatty substances or fatty atheroma(plaque) in the lumen of coronary artery

ACUTE CORONARY SYNDROME(ACS)

- ACS is a term used to define potential complications of CAD.This syndrome includes;
- Unstable angina
- Myocardial infartion(ST segment elevation)
- Myocardial infarction(non ST segment elevation)

RISK FACTORS



MODIFIABLE

- High blood cholesterol level
- Cigarette smoking, tobacco use
- Hypertension
- Diabetes mellitus
- Lack of estrogen in women
- Physical activity
- obesity

NON MODIFIABLE

- Family history of CAD
- increasing age
- Gender(male)
- Race(non white populations)

PATHOPHYSIOLOGY

- DUE TO ETIOLOGICAL FACTORS

- INJURY TO THE ENDOTHELIAL CELL THAT LINING THE ARTERY

- INFLAMMATION AND IMMUNE REACTIONS

- ACCUMULATION OF LIPIDS IN THE INTIMA OF ARTERIAL WALL

- T LYMPHOCYTES AND MONOCYTESTHAT BECOMES AS MACROPHAGES INFILTRATE
- THE AREA TO INGEST THE LIPIDS AND DIE

- PROLIFERATION OF SMOOTH MUSCLECELLS WITH IN THEVESSEL

- FORMATION OF FIBROUS CAPOVER DEAD FATTY CORE (ATHEROMA)

- PROTRUSION OF ATHEROMA INTO THE LUMEN OFVESSEL

- NARROWING AND OBSTRUCTION

- IF CAP IS THIN THE LIPID CORE MAY GROW CAUSING IT TO RUPTURE

- HEMORRHAGE INTO PLAQUE ALLOWING THROMBUS TO DEVOLOP

- THROMBUS AND OBSTRUCT THE BLOOD FLOW LEADING TO SUDDEN CARDIAC DEATH OF MYOCARDIAL INFARCTION

- ANGINA AND OTHER SYMPTOMS

SIGNS & SYMPTOMS

- Chest pain (Angina pectoris)
- Myocardial infarction
- Diaphoresis
- Ecg changes
- Dysarrithmias
- Chest heaviness
- Dyspnea
- Fatigue

DIAGNOSIS

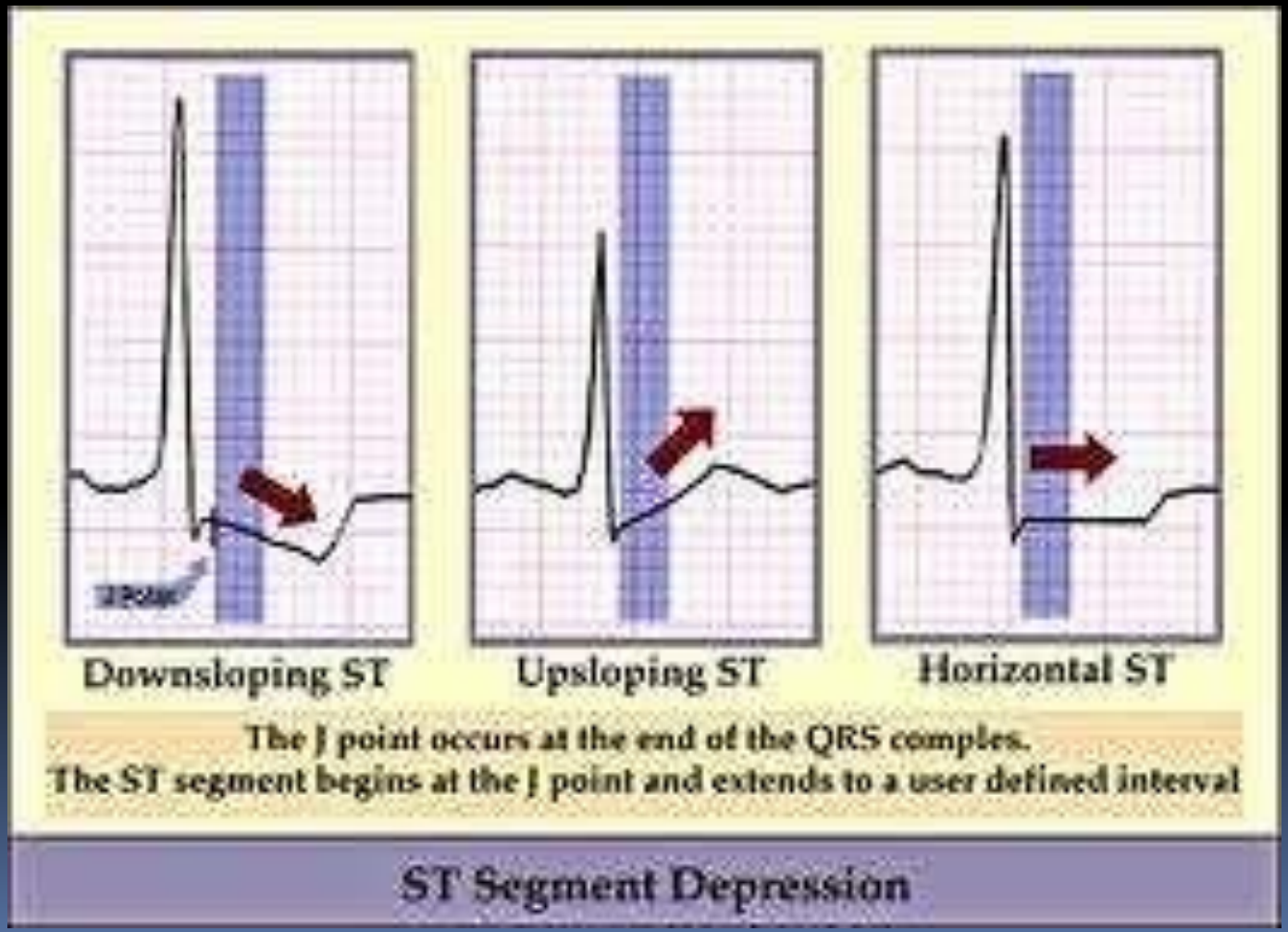
- History collection
- Physical examination
- Cardiac enzymes
- Electrocardiograms
- Echocardiograms
- Stress Tests
- Nuclear Imaging
- Angiography

ELECTROCARDIOGRAMS (ECGS OR EKGS)

- Provide a record of the heart's electrical activity.

- This simple test records any abnormal findings in the heart's electrical impulses. Electrodes are placed on the arms and chest to monitor electrical activity.

ECG CHANGES


Downsloping ST
Upsloping ST
Horizontal ST
The J point occurs at the end of the QRS complex.
The ST segment begins at the J point and extends to a user defined interval
ST Segment Depression

ECHOCARDIOGRAMS

It is may be ordered if doctor suspects a problem with the heart muscle or one of the valves that channel blood through the heart.

STRESS TESTS

They are used to show how the heart reacts to physical exertion. Exercise stress tests are usually performed on a treadmill or exercise bicycle.


ECG monitor
Electrodes
Treadmill

NUCLEAR CARDIAC IMAGING

- Involves the use of small amounts of short-lived radioactive material, which is injected into the bloodstream.
- A special camera (live-motion x-ray) detects the radioactivity of these materials, and the images displayed show how heart pumps blood.
- This is useful in identifying any areas of abnormal motion or for assessing the blood supply to the heart muscle.

ANGIOGRAPHY

- Is the most accurate means by which to examine the coronary arteries

- It requires a surgical procedure called cardiac catheterization. During the procedure, catheters (small thin plastic tubes) are placed in the artery of the leg or arm, and directed using an x-ray machine to the opening of each of the coronary arteries

COMPLICATIONS

- Chest pain (angina)
- Heart attack
- Heart failure
- Abnormal heart rhythm (arrhythmia).

MANAGEMENT

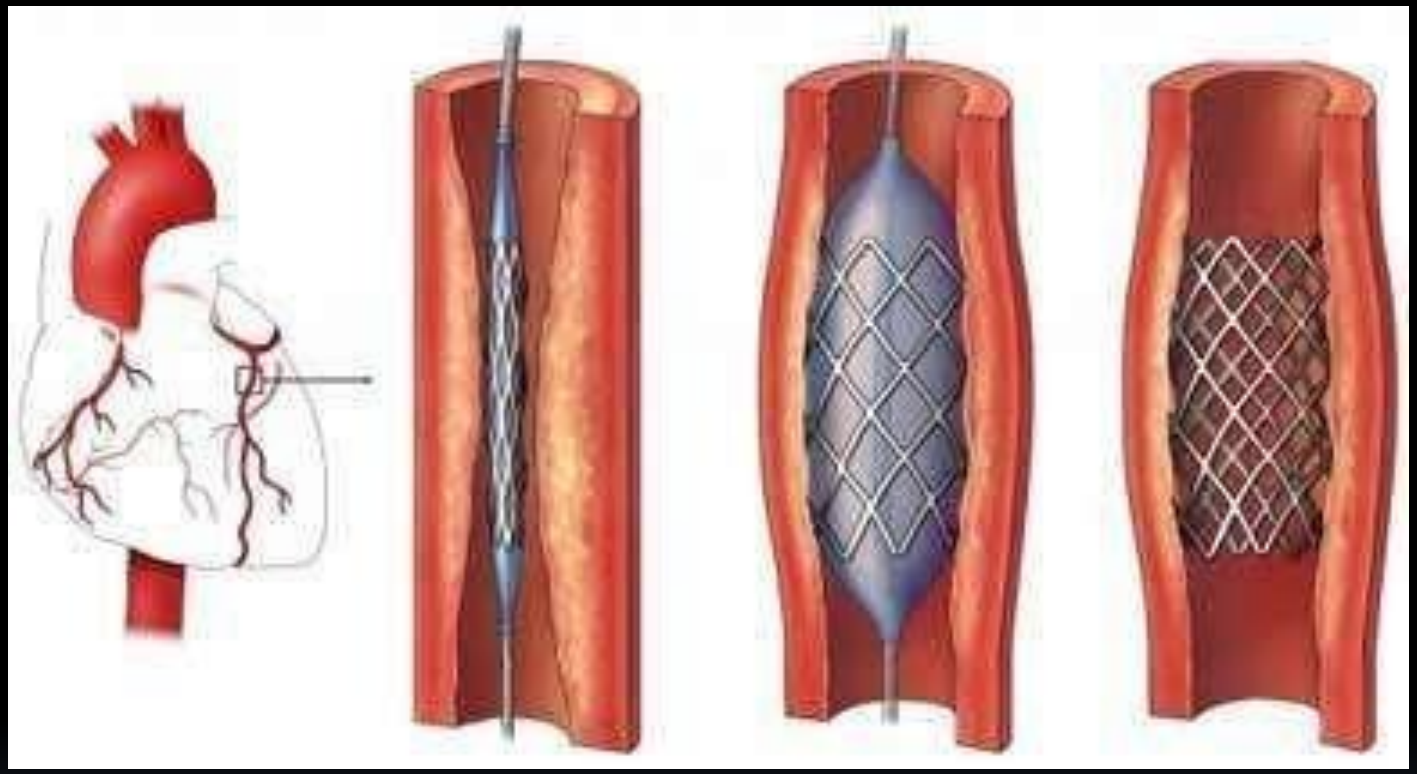
PHARMACOLOGICAL THERAPY

- **ANTI ANGINAL MEDICATIONS like**
  - Nitrates(ISD,)
  - Beta adrenergic blockers(ATENOLOL)
  - Calcium channel blockers(NEFIDIPINE)
  - Ace inhibitors(CAPTOPRIL)
  - Statins
  - Imipramine for analgesia

SURGICAL INTERVENTION

- ANGIOPLASTY
- STENTS
- CORONARY ARTERY BYPASS GRAFTING (CABG)
- PTCA

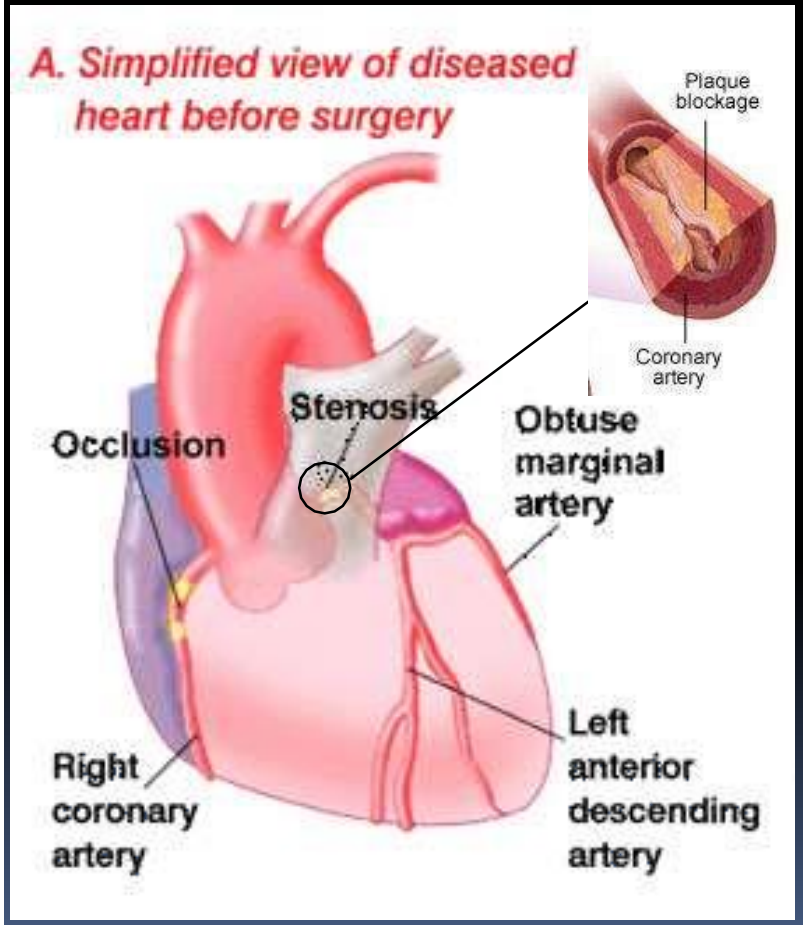
PCI PROCEDURAL REFINEMENTS: STENTS

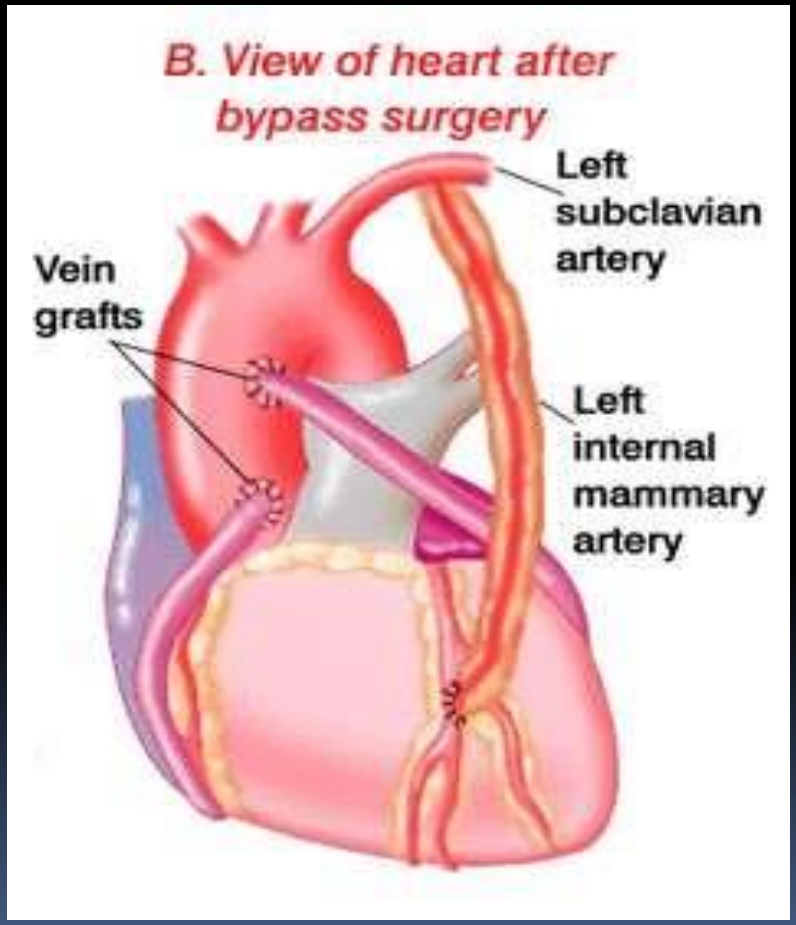


Expandable metal mesh tubes that buttresses the dilated segment, limit restenosis.

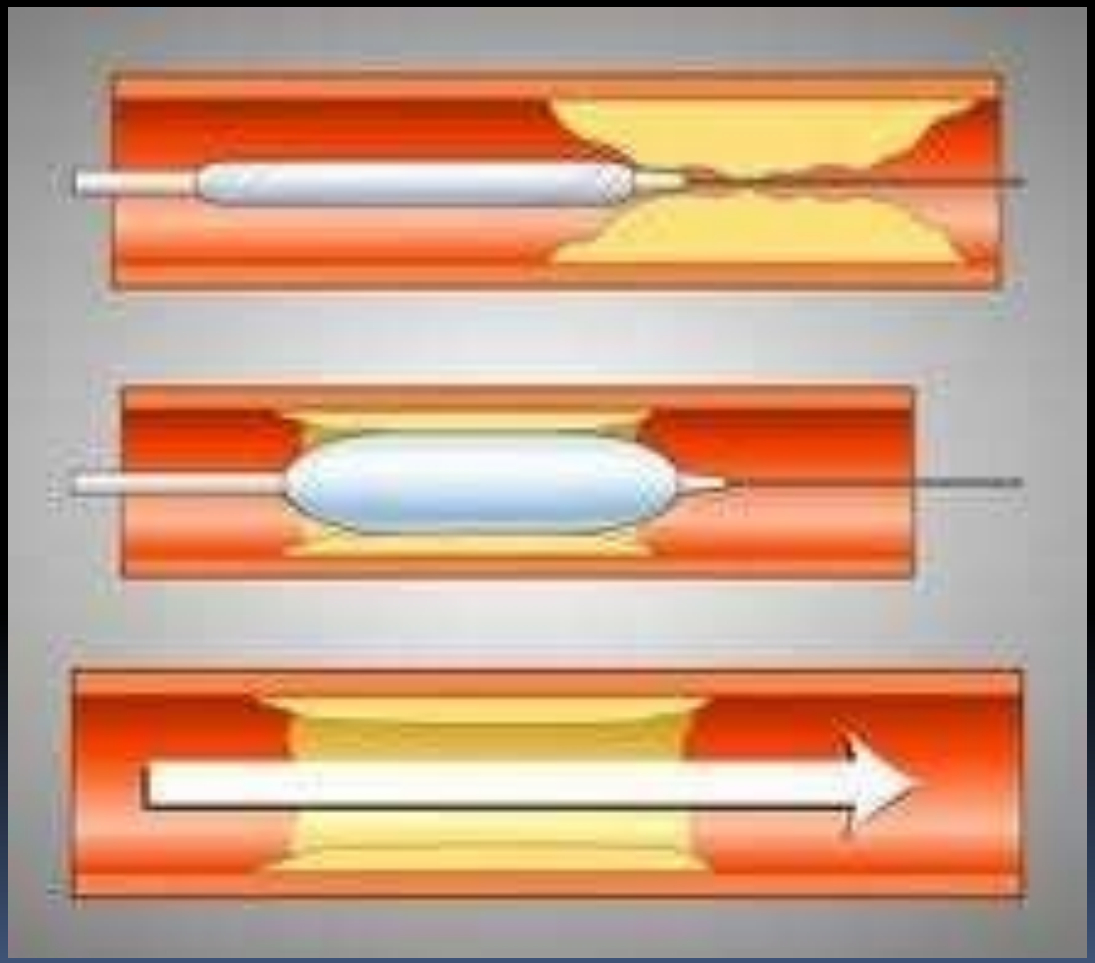
Drug eluting stents: further reduce cellular proliferation in response to the injury of dilatation.

CORONARY ARTERY BYPASS GRAFTING (CABG)





PTCA



- **Lifestyle changes:**

Lifestyle changes that may be useful in coronary disease include:

- Weight control
- Smoking cessation
- Exercise
- Healthy diet

NURSING MANGEMENT

- ***ASSESSMENT***
- Gather information about patient symptoms and activities in PQRST format
- Assess patients risk factors for CAD
- Assess patients familys understanding about diagnosis
- Identify patients and familys level of anxiety and use of appropriate coping mechanisms

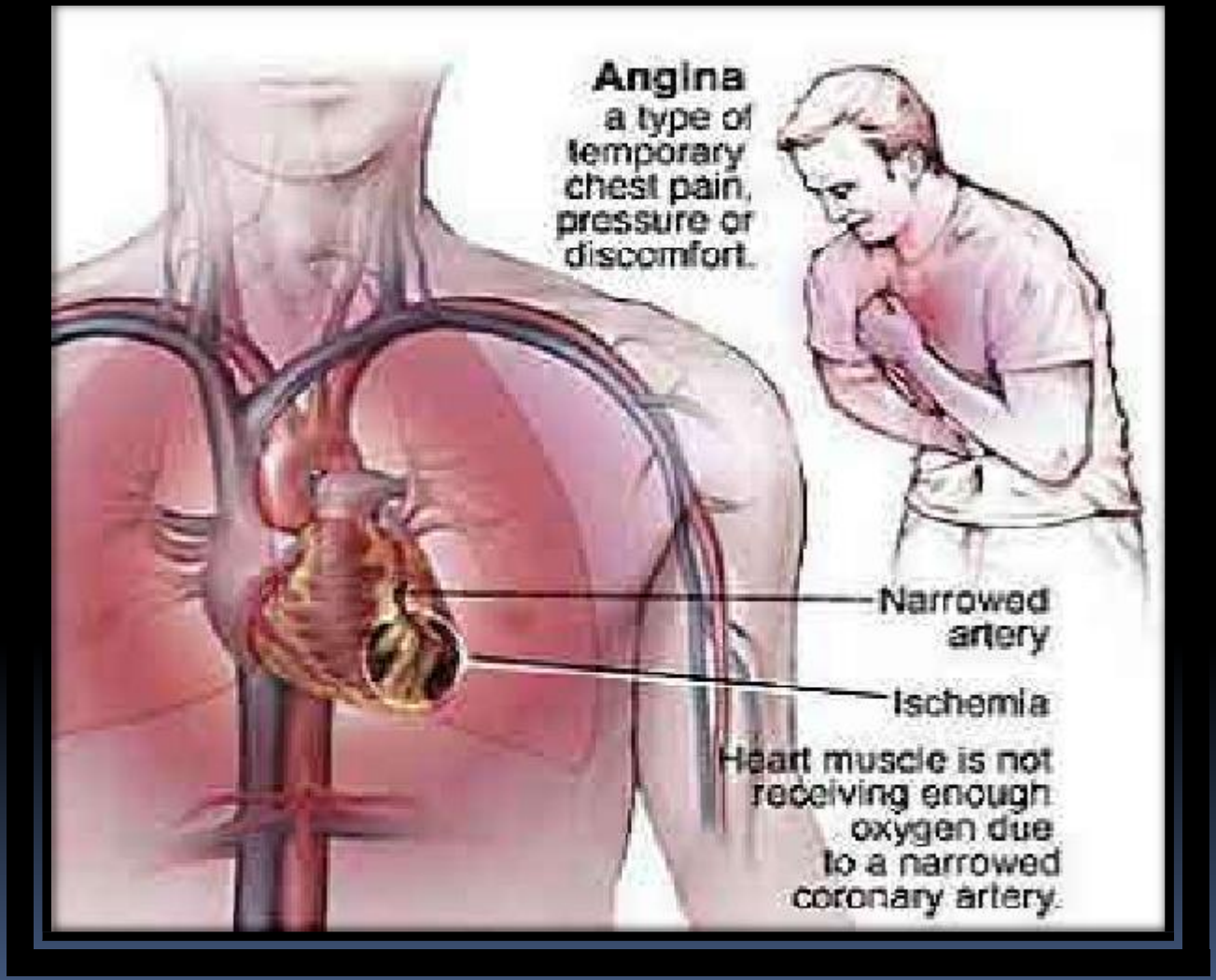
- Obtain and asess ECG
- Check vital sigs and report of LDL level
- Evaluate patients medical historyfor such conditions as diabetes,heart failure,previous MI,obstructive lung disease that may influence choice of drug therapy

NURSING DIAGNOSIS

- Acute pain related toimbalance to oxugen supply demand
- Decreased cardiac output related to reduced preload afterload contractility and heart rate secondary to hemodynamic effects of drug therapy
- Anxiety related to chest pain,uncertain prognosis, and threatening environment

ANGINA PECTORIS

- Angina pectoris is a clinical syndrome usually characterised by paroxysms of pain or pressure of anterior lobe.the cause is usually insufficient blood flow


Angina
a type of temporary chest pain, pressure or discomfort.
Narrowed artery
Ischemia
Heart muscle is not receiving enough oxygen due to a narrowed coronary artery.

TYPES

- Stable angina

- Predictable consistent pain that occurs in and is relieved by rest

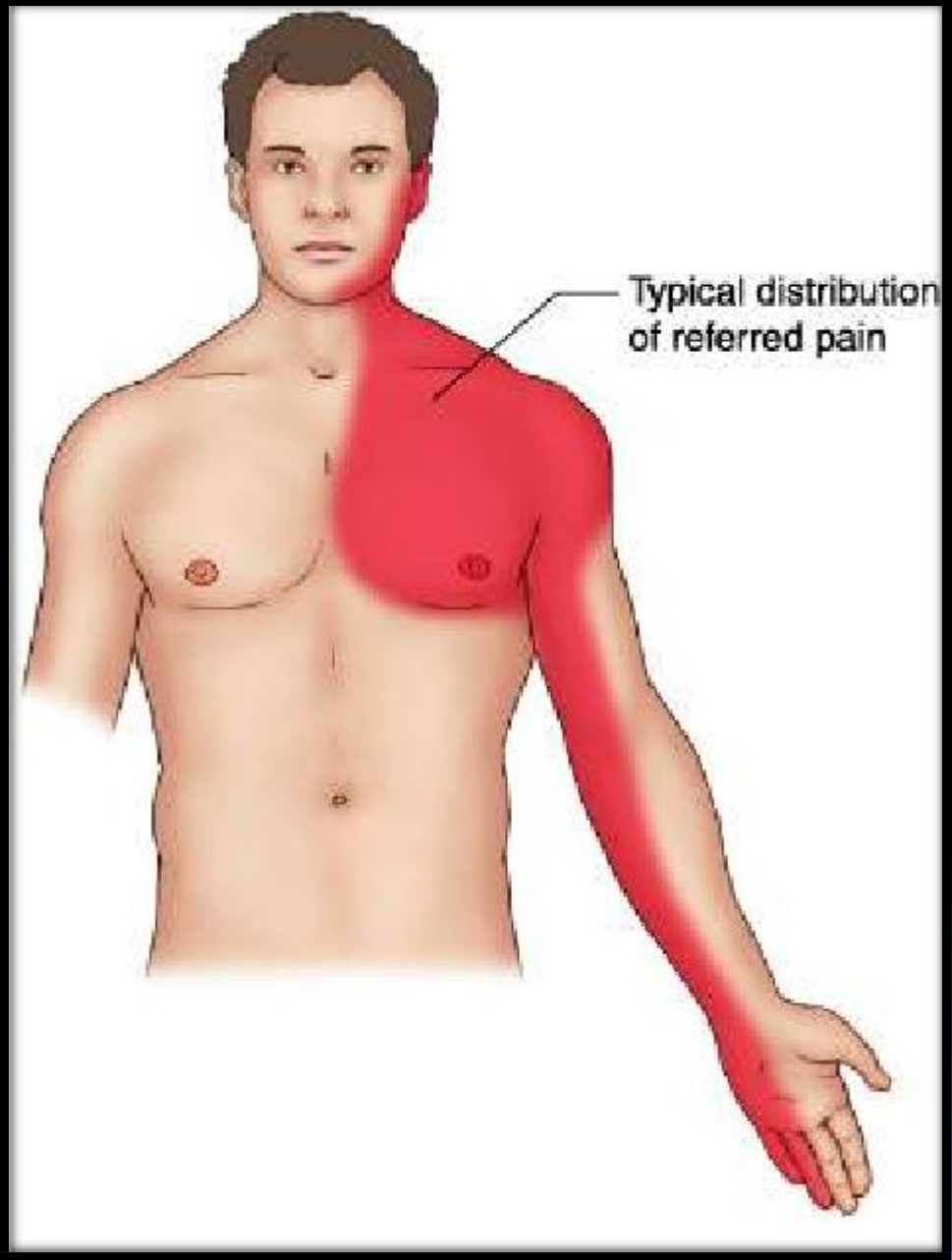
- Unstable angina
- Also called preinfarction angina
- Symptoms occur frequently and last longer than stable angina
- Pain may occur at rest

- Variant angina
- Also called prinzmentals angina.
- Pain at rest with reversible ST segment elevation thought to be caused by coronary artery vasospasm
- Microvascular angina
- Otherwise angina X syndrome
- Patient have chest pain but donot seem to have any blockage in coronary artery
- The pain may be due to tiny vessels that feed heart,arm and neck are not working properly

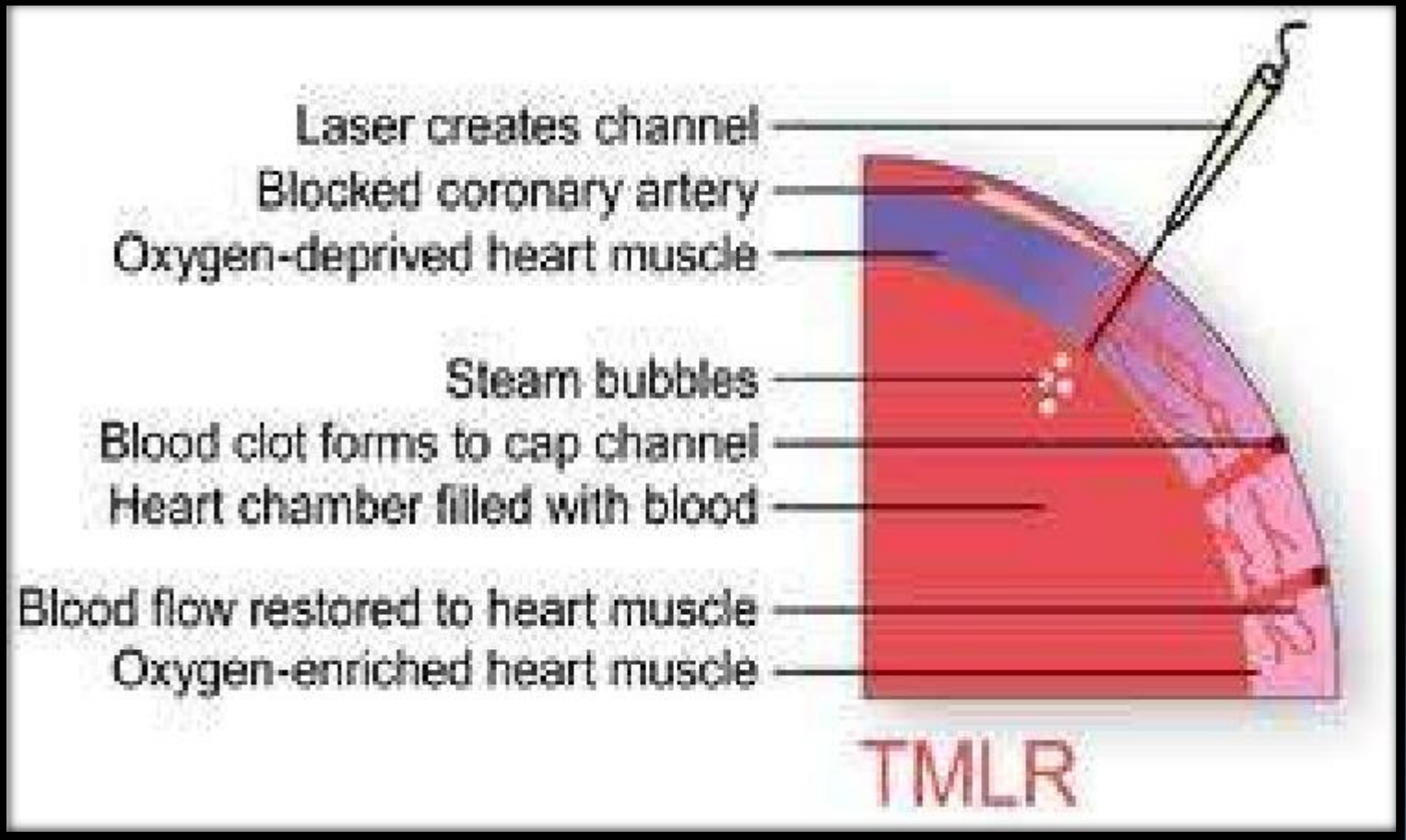
- Silent ischemia
- Objective evidence of ischemia (such as electrocardiographic changes with a stress test) but patient report no symptoms

ANGINA PAIN FEATURES

- Squeezing burning tightening aching across chest usually starting behing breast bone.
- The often spread to neck,jaw,arms,shoulders,throat,back,or even teeth
- Attack of stable angina last for 1 – 5 minutes

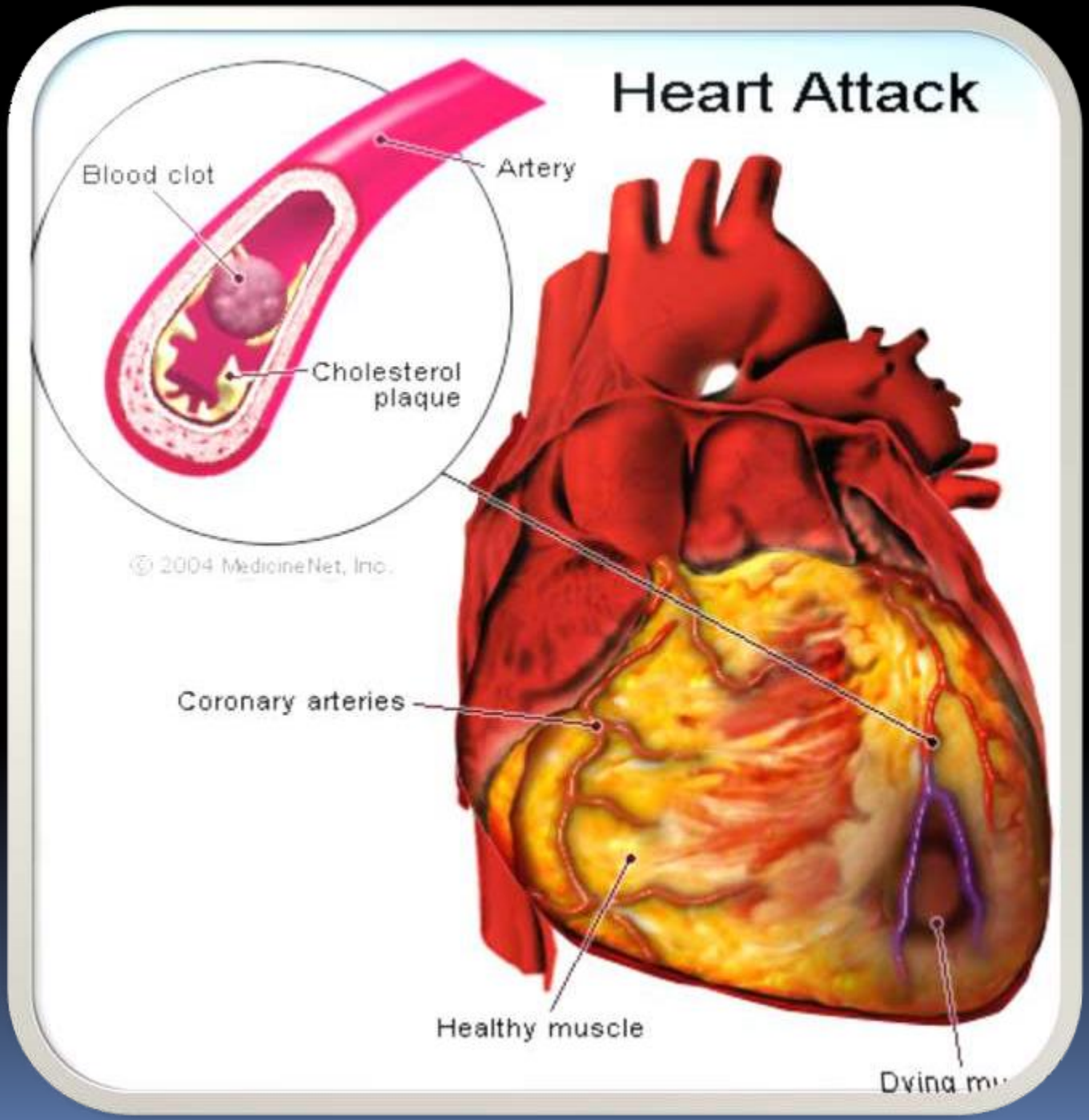

Typical distribution
of referred pain

TMLR(Transmyocardial laser revasculization)



MYOCARDIAL INFARCTION

- Myocardial infarction refers to the dynamic process in which one or more regions of the heart experience a severe prolonged decrease in oxygen supply because of insufficient coronary blood flow,subsequently necrosis or death to myocardial tissue.


Heart Attack
Blood clot
Artery
Cholesterol plaque
© 2004 MedicineNet, Inc.
Coronary arteries
Healthy muscle
Dying mu

CLASSIFICATION

BASED ON PATHOLOGY

Transmural

- associated with atherosclerosis involving a major coronary artery.
- It can be subclassified into anterior, posterior, inferior, lateral or septal.
- 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.In addition, on ECG, ST elevation and Q waves are seen.

Subendocardial:

- involving a small area in the subendocardial wall of the left ventricle, ventricular septum, or papillary muscles. The subendocardial area is particularly susceptible to ischemia].In addition, ST depression is seen on ECG.

TYPES

- ***Type 1*** – Spontaneous myocardial infarction related to ischemia due to a primary coronary event such as plaque erosion and/or rupture, fissuring, or dissection
- ***Type 2*** – Myocardial infarction secondary to ischemia due to either increased oxygen demand or decreased supply, e.g. coronary artery spasm, coronary embolism, anaemia, arrhythmias, hypertension, or hypotension

- *Type 3* – Sudden unexpected cardiac death, including cardiac arrest, often with symptoms suggestive of myocardial ischaemia, accompanied by new ST elevation,, or evidence of fresh thrombus in a coronary artery by angiography and/or at autopsy, but death occurring before blood samples could be obtained, or at a time before the appearance of cardiac biomarkers in the blood

- *Type 4* – Associated with coronary angioplasty or stents:
  - Type 4a – Myocardial infarction associated with PCI
  - Type 4b – Myocardial infarction associated with stent thrombosis as documented by angiography or at autopsy

- *Type 5* – Myocardial infarction associated with CABG

ETIOLOGY

- Reduced blood flow in the coronary artery due to atherosclerosis,increased oxygen demand and decreased oxygen supply
- Complete occlusion of artery by emboli or thrombus
- Sudden narrowing of coronary artery (vasospasm)
- Acute blood loss(Anemia)

Risk factors

- ***Nonmodifiable risk factors***

- Family history of premature coronary heart disease
- Male

✓ ***Modifiable risk factors***

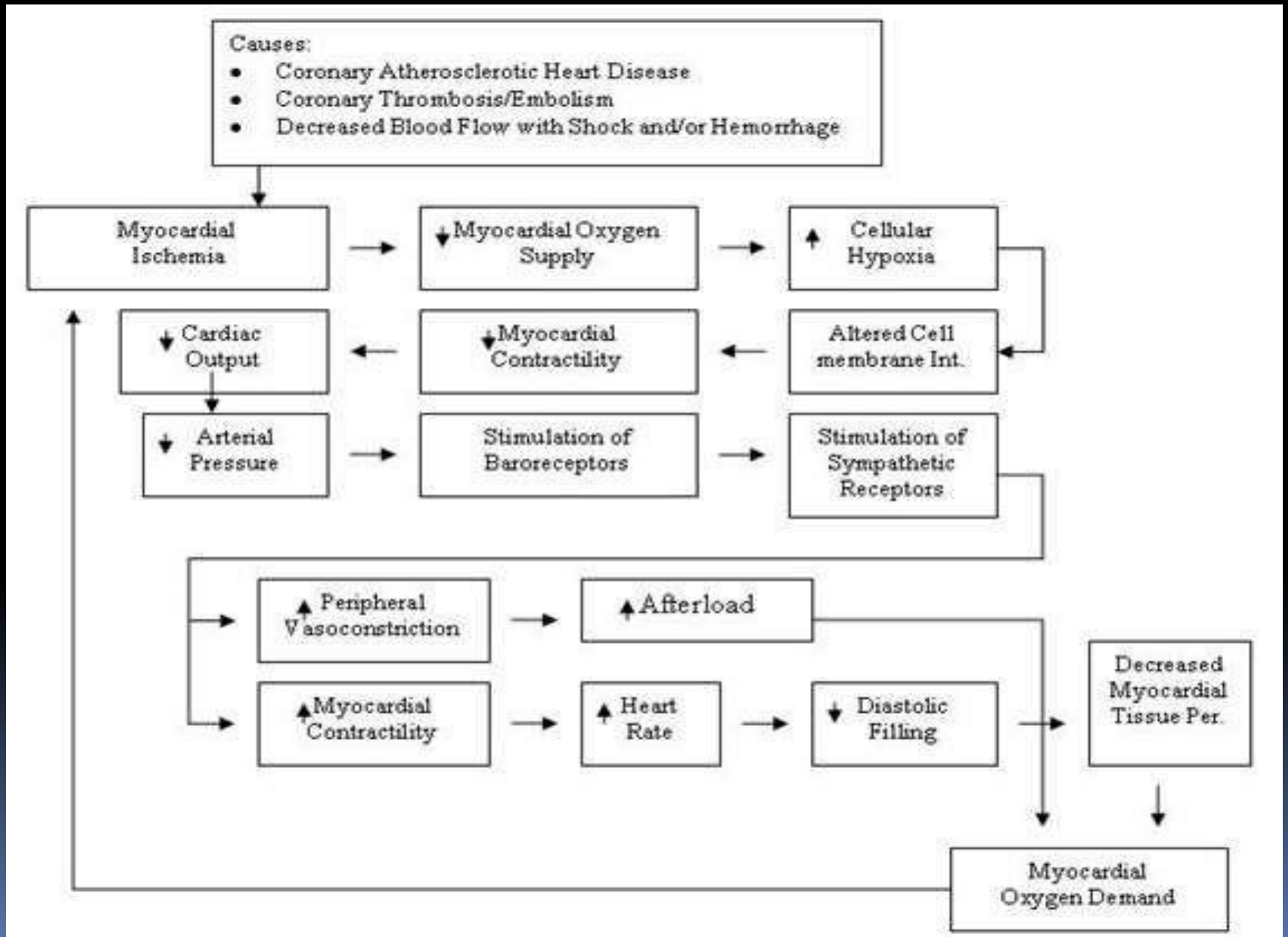
- Smoking or other tobacco use
- Diabetes mellitus
- Hypertension
- Hypercholesterolemia and hypertriglyceridemia, including inherited lipoprotein disorders

- Dyslipidemia
- Obesity
- Sedentary lifestyle and/or lack of exercise
- Psychosocial stress

DEGREE ‘S OF MI

-
- Death of heart muscle caused by extensive and complete oxygen deprivation,irreversible damage
-
- Region of muscle surrounding the area of necrosis,inflammed and injured but still visible if adequate oxygenation can be restored
- ZONE OF ISHCHEMIA
- Region of heart muscle surrounding the injurywhich is sischemic and viable not endaged until extension of infarction occurs

PATHOPHYSIOLOGY



CLINICAL FEATURES

- Chest pain

  Pain in only one part of body, or it may move from chest(SUBSTERNAL) to arms, shoulder, neck, teeth, jaw, belly area, or back.
- The pain can be severe or mild.
- It can feel like:
- A tight band around the chest
- Bad indigestion
- Something heavy sitting on chest
- Squeezing or heavy pressure
- The pain usually lasts longer than 20 minutes. Rest and a medicine called nitroglycerin may not completely relieve the pain of a heart attack. Symptoms may also go away and come back.

- Other symptoms of a heart attack can include:
- Anxiety
- Cough
- Fainting
- Light-headedness, dizziness
- Nausea or vomiting
- Palpitations (feeling like your heart is beating too fast or irregularly)
- Shortness of breath
- Sweating, which may be very heavy

DIAGNOSTIC TESTS

- A doctor or nurse will perform a physical exam and listen to your chest using a stethoscope.
- The doctor may hear abnormal sounds in lungs (called crackles), a heart murmur, or other abnormal sounds.
- a fast or uneven pulse.
- blood pressure may be normal, high, or low.

- Electrocardiogram (ECG) to look for heart damage.
- A troponin blood test can heart tissue damage. This test can confirmatory test
- Coronary angiography may be done right away or when if patient is more stable.
- (This test uses a special dye and x-rays to see how blood flows through heart)
- Echocardiography
- Exercise stress test
- Nuclear stress test

MANAGEMENT

- ***PHARMACOLOGICAL***

- Medications given to treat a heart attack include:
-

- Aspirin reduces blood clotting, thus helping maintain blood flow through a narrowed artery.

-
- These drugs, also called clotbusters, help dissolve a blood clot that's blocking blood flow to your heart.

- **Superaspirins**
- These include medications, such as clopidogrel (Plavix) and others, called platelet aggregation inhibitors.

- .such as heparin, to make blood less "sticky" and less likely to form more dangerous clots. Heparin is given intravenously or by an injection under your skin and is usually used during the first few days after a heart attack.

- If chest pain or associated pain is great, you may receive a pain reliever, such as morphine, to reduce discomfort.
- **Nitroglycerin**
- This medication, used to treat chest pain (angina), temporarily opens arterial blood vessels, improving blood flow to and from heart.

- These medications help relax heart muscle, slow your heartbeat and decrease blood pressure making heart's job easier. Beta blockers can limit the amount of heart muscle damage and prevent future heart attacks.

- Examples include statins, niacin, fibrates and bile acid sequestrants. These drugs help lower levels of unwanted blood cholesterol and may be helpful if given soon after a heart attack to improve survival.

SURGICAL MANAGEMENT

- ***Coronary angioplasty and stenting.***

- Emergency angioplasty opens blocked coronary arteries, letting blood flow more freely to your heart. Doctors insert a long, thin tube (catheter) that's passed through an artery, usually in your leg or groin, to a blocked artery in your heart. This catheter is equipped with a special balloon. Once in position, the balloon is briefly inflated to open up a blocked coronary artery. At the same time, a metal mesh stent may be inserted into the artery to keep it open long term, restoring blood flow to the heart. Depending on your condition, your doctor may opt to place a stent coated with a slow-releasing medication to help keep your artery open.

- ***Coronary artery bypass surgery*****.** In some cases, doctors may perform emergency bypass surgery at the time of a heart attack. Usually, your doctor may suggest that you have bypass surgery after your heart has had time to recover from your heart attack. Bypass surgery involves sewing veins or arteries in place at a site beyond a blocked or narrowed coronary artery (bypassing the narrowed section), restoring blood flow to the heart.

NURSING MANAGEMENT

- ***ASSESSMENT***
- Assess for cab
- Gather information on nature ,intensity,onset,duration and location of pain
- Precipitating and agravating factors of pain.
- Assess respiratory symptoms
- Assess ecg and laborotory findings
- Asess pat health history
- Past medication intake
- Identify patient support system

NURSING DIAGNOSIS

1. Decreased Cardiac Output related to changes in the frequency of heart rhythm.

2. Impaired Tissue Perfusion related to decrease in cardiac output.

3. Ineffective Airway Clearance related to accumulation of secretions.

4. Ineffective Breathing Pattern related to lung development is not optimal.

5. Impaired Gas Exchange related to pulmonary edema.

6. Acute Pain relate to increase in lactic acid.

7.Fluid Volume Excess related to retention of sodium and water.

8.Imbalanced Nutrition, Less Than Body Requirements related to Inadequate intake.

9.Activity Intolerance relate to imbalance between myocardial oxygen supply and needs.

10. Self-Care Deficit related to physical weakness.

11. Knowledge Deficit related to lack of information.

NURSING MANAGEMENT CAD

-
- Take immediate action if patient reports pain or if patients prodromal symptoms suggest anginal ischemia
- Direct patient to stop all activities and sit or rest in bed in semi fowlers position
- Measure vital signs and observe for signs of respiratory distress
- Administer nitroglycerin sublingually and assess patients response
- Administer 02 therapy if patients respiratory rate is increased

- Identify level of activity that causes patients pain
- If patient has pain frequantly or with minimal activity,alternate tha patients activities with rest periods
- Administer 02 in tandem with medications therapy to assist with relief of symptoms

Assess vital signs as long as patient experiences pain

Improving respiratory function

- Assess respiratory function to detect early signs of complications
- Moniter fluid volume status to prevent overloading the heart and lungs
- Encourage patient to breathe deeply
- Change position to prevent pooling of fluid in lung bases

Reducing anxiety

- Devolop trusting and caring relationship
- With patient patient
- Ensure a quite environment and prevent inturruptions that disturb sleep
- Provide frequent and private oppurtunities to share concerns and fears
- Provide an atmosphere of acceptance

Additionally;

- Moniter and manage complications
- Promote adequate tissue perfusion

PQRST FORMAT

- PROVOCATION,PALLIATION
- QUANTITY,QUALITY
- REGION ,RADIATION,
- SEVERITY
- TIMING

Thank You For Your Attention!