

CHEST PAIN



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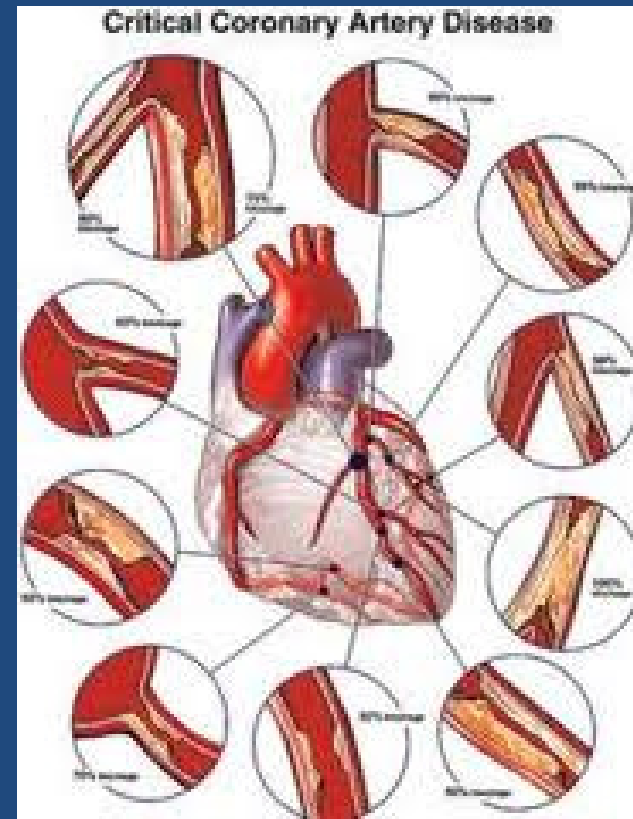
- Chest pain is recognised by health care practitioners as the hallmark symptom of coronary artery disease.
- Although chest pain is the most common symptom during an ischemic event it forms part of a cluster of symptoms.
- Myocardial ischemia occurs when there is a mismatch between myocardial oxygen supply and demand.

Diagnosis and Management of Myocardial Ischemia

- Ischemia results from an **imbalance** between the flow of blood to the myocardium (**SUPPLY**) and the metabolic needs of the myocardium (**DEMAND**)
- Myocardial ischemia is reversible and presents as ***angina pectoris***.
- Severe and prolonged myocardial ischemia results in irreversible injury or infarction of the myocardial tissue.

Main cause – narrowing of the Coronary arteries

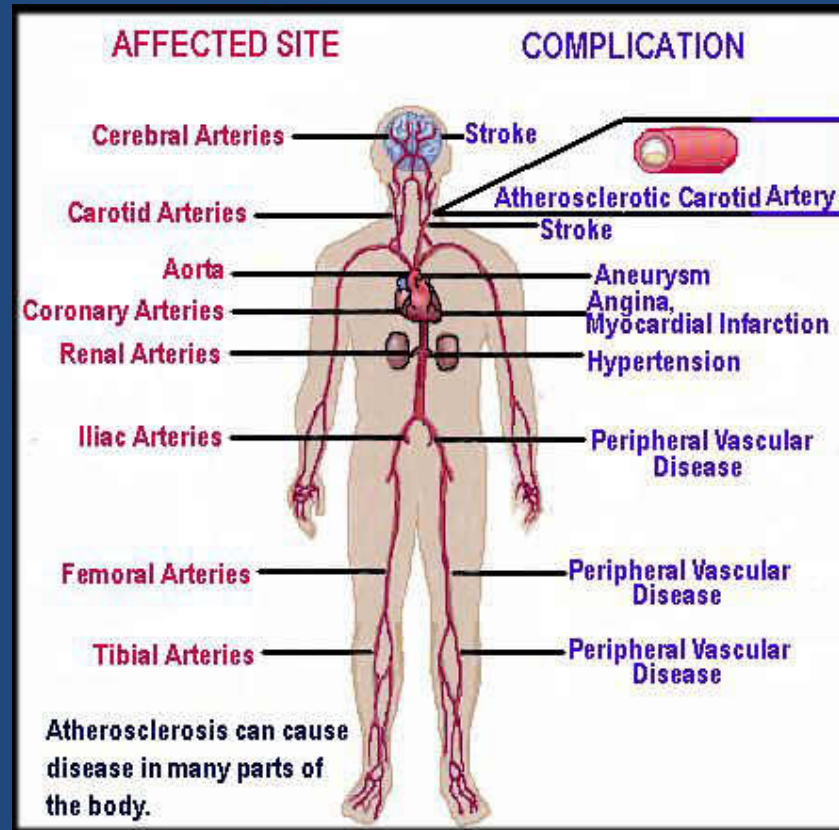
- Atherosclerotic plaques and thrombosis can contribute to the reduction of blood flow in the coronary vessels and a reduction in myocardial perfusion.



Some definitions...

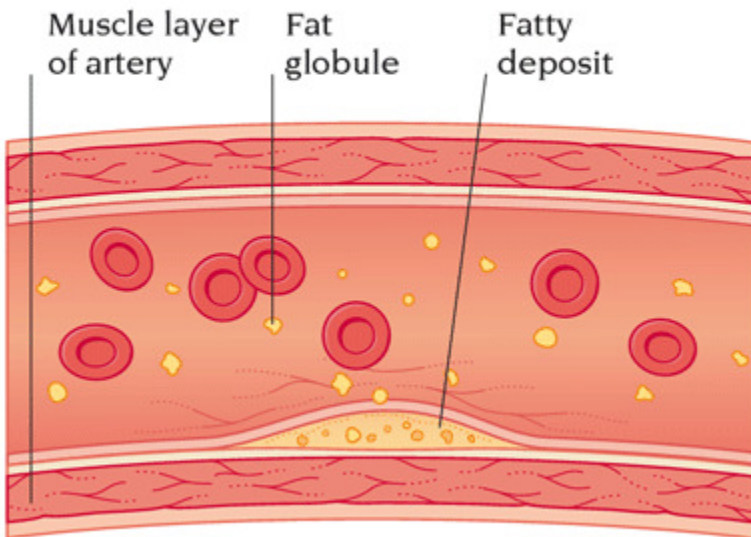
- **Arteriosclerosis** is the process of the hardening of the arteries. **Atherosclerosis** is a specific type of arteriosclerosis. Atherosclerosis is the accumulation of lipids in the walls of the arteries. This process leads to a hardening of the arteries.
- The primary arteries for atherosclerosis are the coronary arteries, cerebral arteries, and femoral artery

Complications of atherosclerosis

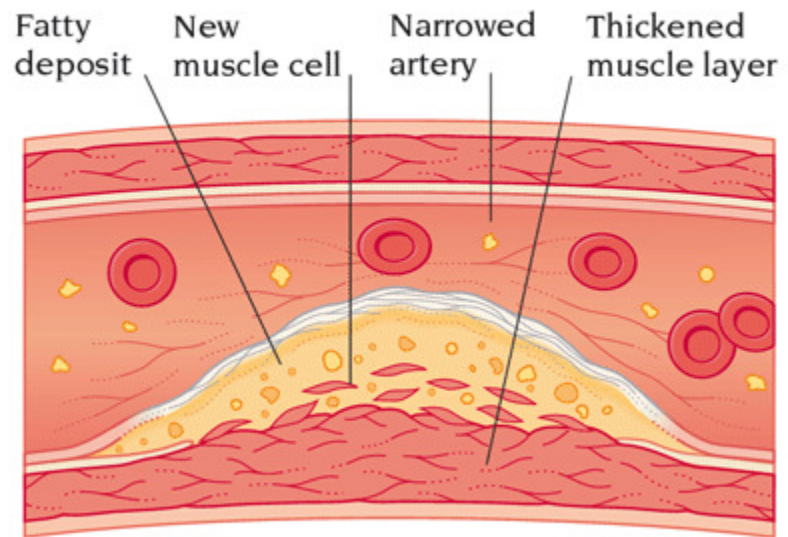


- Atherosclerosis begins when the injured arterial wall creates chemical signals that cause certain types of white blood cells to attach to the wall of the artery (endothelium)
- These cells move into the endothelium. There, they are transformed into foam cells, which collect cholesterol and other fatty materials, and trigger growth of smooth muscle cells in the artery wall.

ATHEROSCLEROSIS



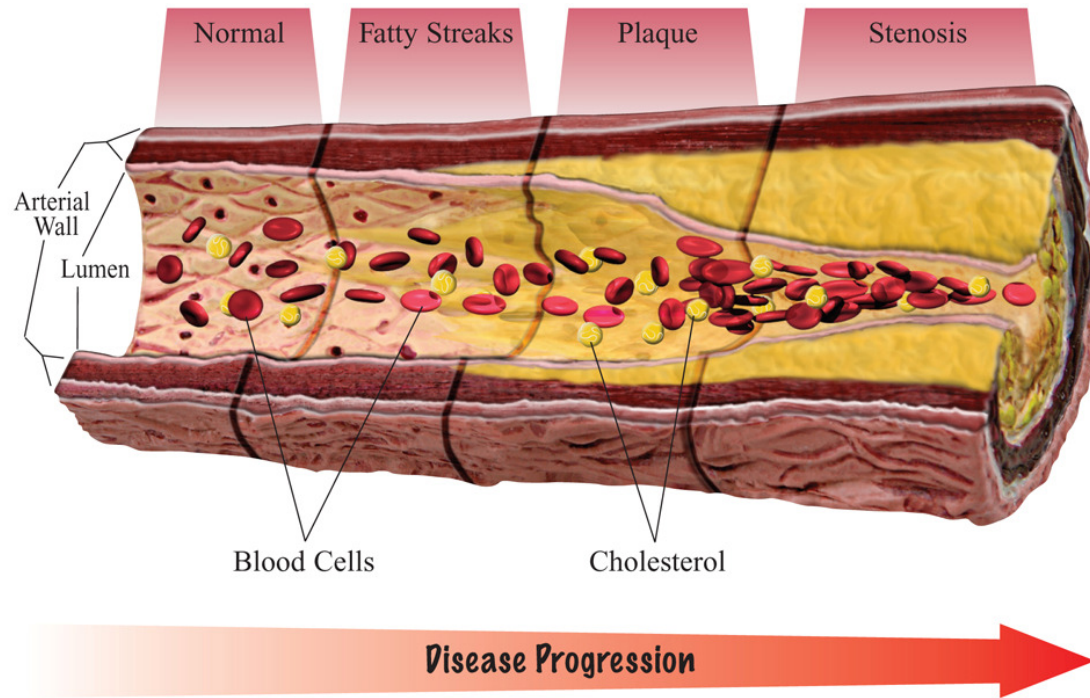
EARLY ATHEROSCLEROSIS



ADVANCED ATHEROSCLEROSIS

- In time, these fat-laden foam cells accumulate. They form patchy deposits (atheromas, also called plaques) covered with a fibrous cap in the lining of the artery wall. With time, calcium accumulates in the plaques. Plaques may be scattered throughout medium-sized and large arteries.

Artery with Atherosclerosis



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Manifestations of Atherosclerosis

Atherosclerosis manifests at different ages in different populations. The onset of symptoms is associated with risk factors. Some of these risk factors are controllable and some are not.

Associated Risk factors

- Risk factors contributing to atherosclerosis are divided into modifiable and non-modifiable risk factors.
- Some factors can be controlled by lifestyle changes and medications whilst others cannot

Non-modifiable risk factors

- Family History of CVD
- Age
 - Men >45 year
 - Women >55 years
- Sex – men present with problems associated with myocardial ischemia earlier than women. The hormone estrogen has a protective effect on the endothelium

Modifiable Risk Factors

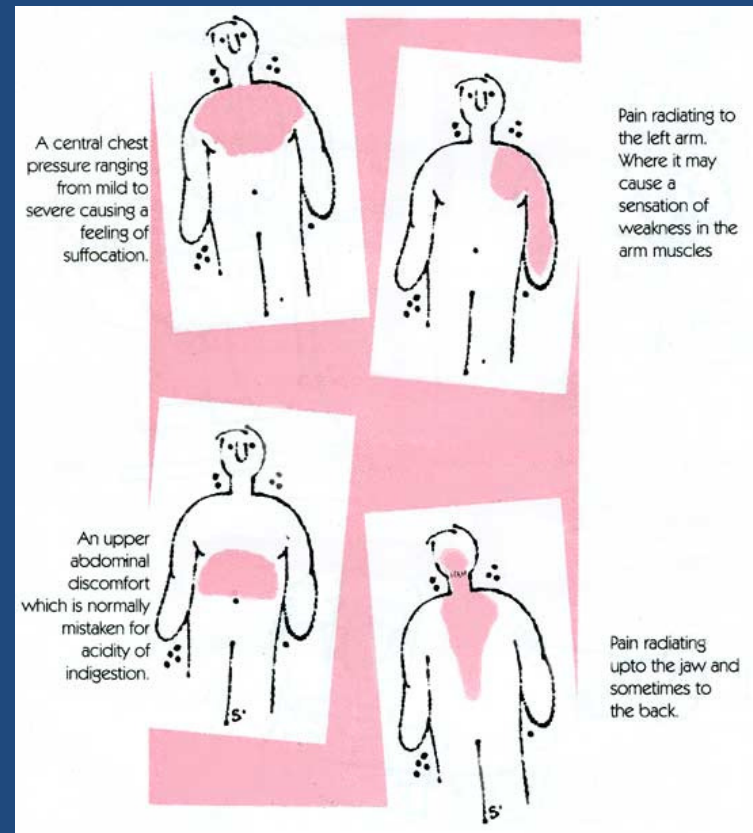
- High Blood Pressure – by lowering BP less than 140/90
- High Cholesterol – by keeping serum cholesterol at 5mmol/l
- Smoking – smoking cessation
- Obesity – weight reduction BMI 25 or less
- Diabetes - needs to be controlled
- Physical Inactivity – exercise 20 minutes 3 times per week

Classification of Chest pain – Angina

- Stable Angina
- Variant Angina (Prinzmetal's Angina)
- Unstable angina

Stable Angina

- Chest pain or discomfort (may be accompanied by arm or jaw pain) related to activities that increase the myocardial oxygen demand
- Its patterns are usually predictable.
- Rest or sublingual nitroglycerine usually relieves the pain within a few minutes.

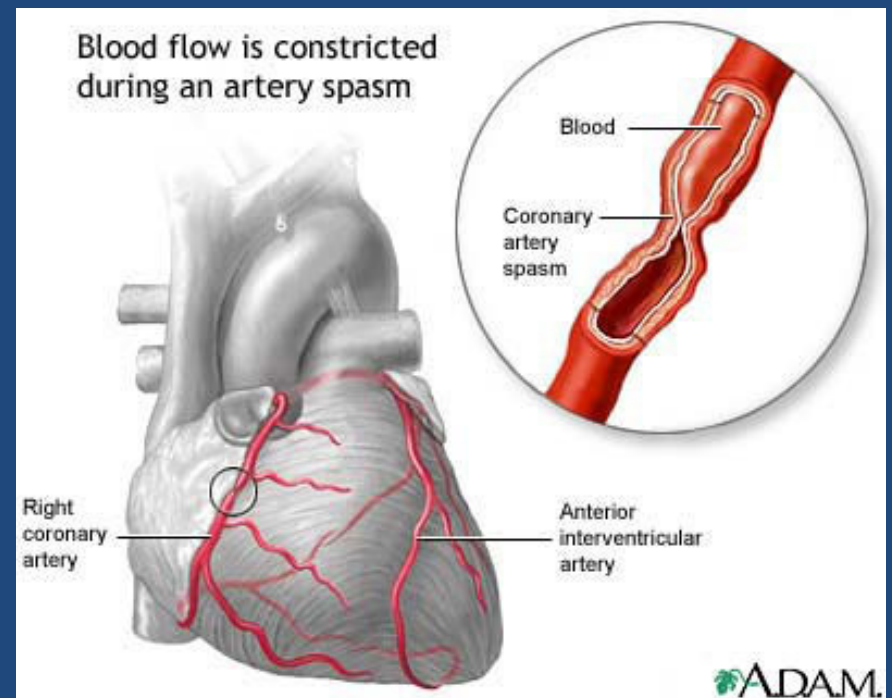


Precipitating Factors

- Occurs during physical exertion
- Eating a heavy meal – increased intestinal Oxygen demand.
- Smoking – as tobacco increases the release of catecholamines or by causing coronary artery spasm.
- Emotional tension – release of catecholamines increases heart rate and systemic blood pressure which in turn increase the work load on the heart.

Variant Angina (Prinzmetal's Angina)

- A less common form of angina and characterised by episodes of chest pain that occur at rest
- The discomfort tends to be prolonged severe and not readily relieved by nitroglycerine
- Caused by spasm of the coronary arteries



Unstable Angina

- Angina that has unpredictable patterns and prolonged angina at rest
- Believed to be caused from the rupture of an atherosclerotic plaque with partially thromboses of the coronary artery
- Suggested of significant coronary artery disease.

- Short film – chest pain

Diagnosis

- Patient history
- ECG
- Tests such as : Stress test, coronary angiogram

History

- Duration and quality of the reported chest pain- was the patient at rest when s/he got the pain? Was it relieved when he stopped (usually lasts a few minutes if the precipitating factor is relieved).
- Patients can report - chest heaviness, squeezing, tightness, pressing, burning and indigestion
- Risk factors – has the patient any risk factors for CAD?

Physical Assessment

- Systemic hypertension known to accelerate the development of atherosclerosis
- Carotid and femoral bruits can indicate diffuse arterial disease
- During an angina event the patient may exhibit pallor clammy skin and increased heart rate

Further tests to diagnose coronary artery disease

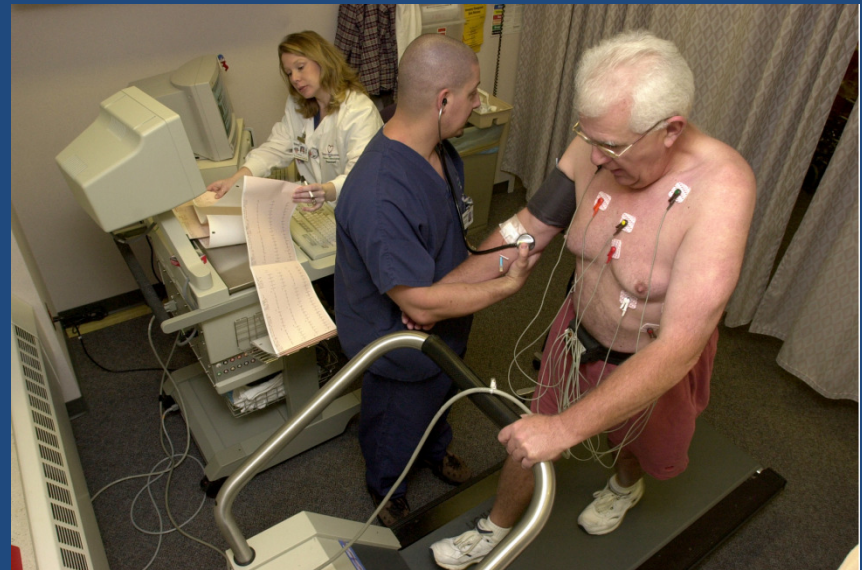
Non invasive:

- Stress test
- Cardiac imaging: Cardiac CT for Calcium Scoring, Thallium and MIBI scans

Invasive:

- Coronary artery Angiography

- **Stress Testing** – the workload of the heart is increased under observation and controlled conditions and the patient is assessed by continuous ECG monitoring during a period of graded exercise
- Observations include: ECG wave changes, heart rate and blood pressure response, and the presence of anginal symptoms.



Cardiac imaging

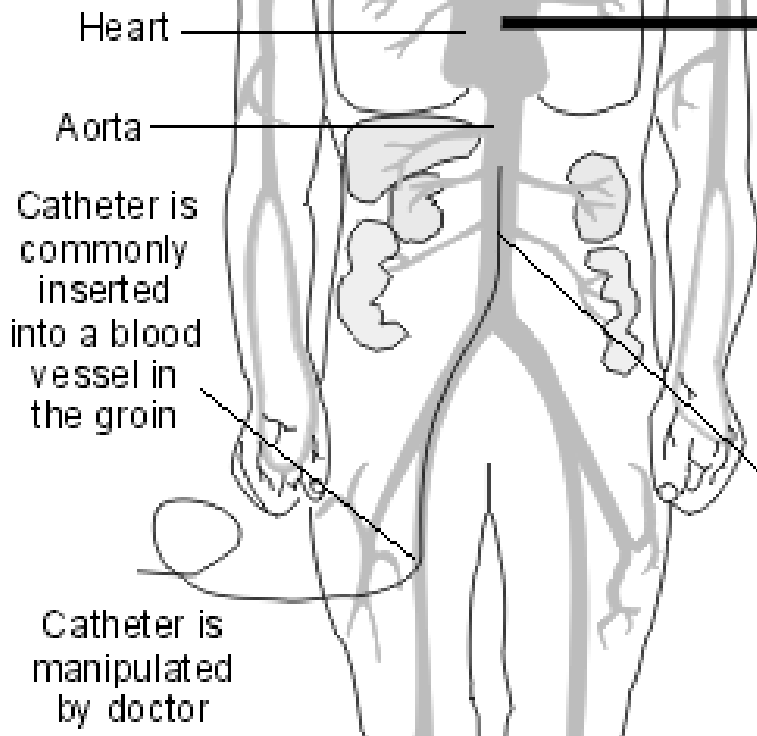
- Chest X-Ray excludes other causes of chest pain e.g. Pneumonia, pneumothorax, Chronic Heart Failure
- A cardiac CT scan for coronary calcium gives information about the presence, location and extent of calcified plaque in the coronary arteries
- Thallium-201 and Technetium-99m sestamibi (MIBI) scans – these radionuclides are injected intravenously during maximal stress and their distribution in the myocardium is proportional to myocardial flow. This may reveal stress induced ischemia

Cardiac Catheterisation and Coronary Angiogram

- Most reliable as well as the most invasive
- It is indicated to confirm or exclude CAD
- Shows the extent and severity of CAD and LV function
- Whether patients are managed medically or surgically depends on the angiographic findings

Coronary Angiography

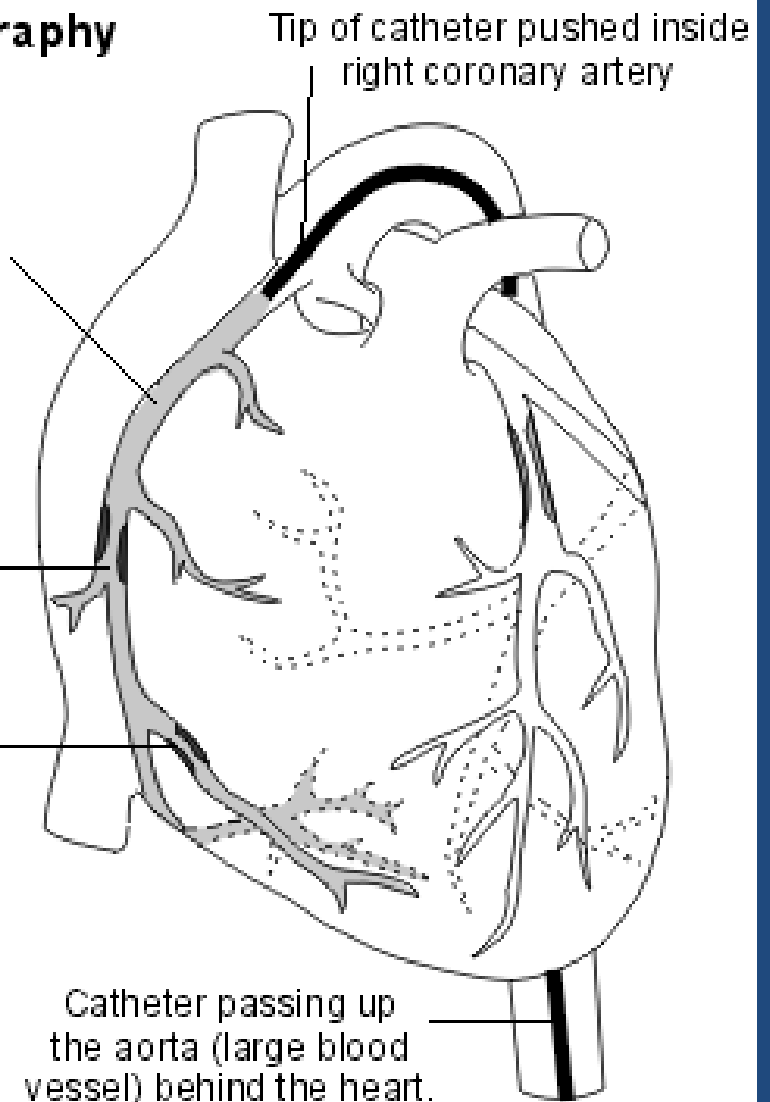
Diagram shows the heart, main arteries (blood vessels) and catheterisation



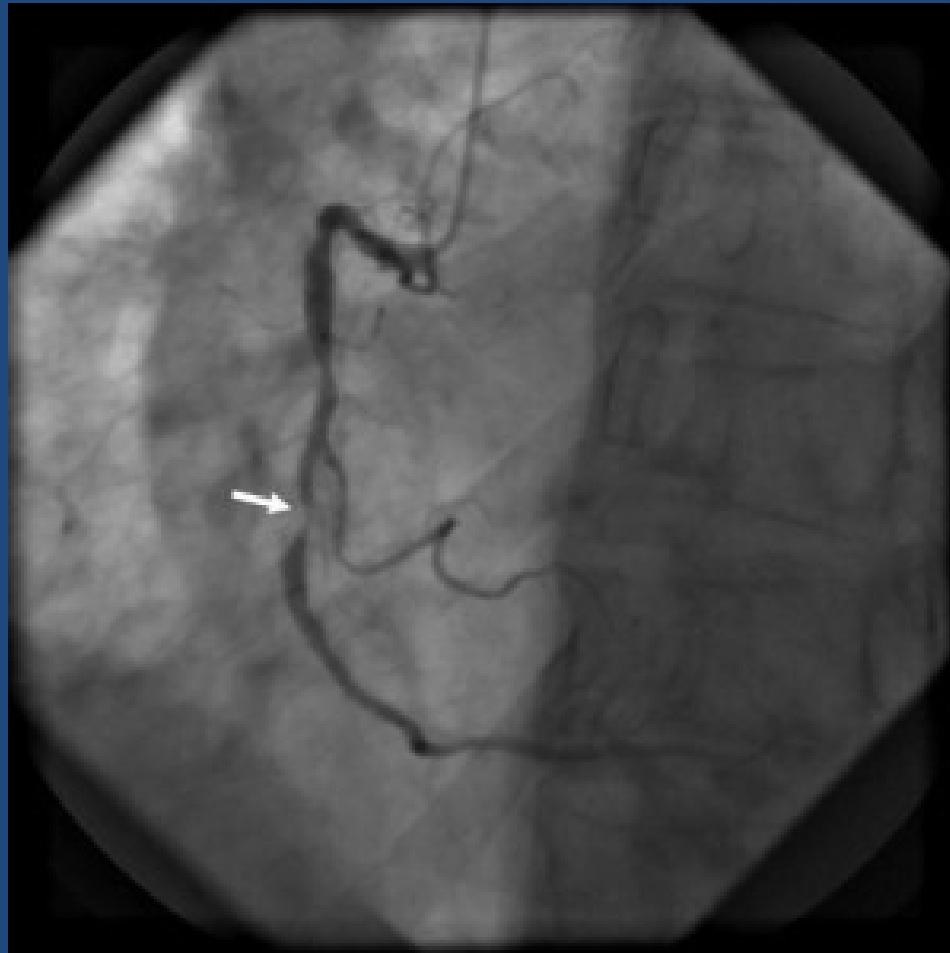
Dye is injected into artery. The artery and its branches then show up clearly on x-ray pictures

Narrowing of the artery by atheroma shows on the x-ray pictures

Catheter is pushed up the large blood vessels to the heart



Images as seen in the lab – arrow pointing to
the narrowing



There are several treatment options for people with stable angina. These options are classified as:

- Medical treatment which include medications and lifestyle modifications
- Interventional Treatment - surgical treatment with percutaneous coronary intervention, with or without a stent, or coronary artery bypass graft surgery

The choice among these treatment options depends upon many individual factors, including a person's age, the severity of the coronary heart disease, the relative risks and benefits of various treatments, the presence of other medical conditions, and personal preferences

Medical Management – Stable Angina

- Aim: to relieve the symptoms and to decrease the risk of MI
- Treatment is based on increasing myocardial oxygen supply or decreasing myocardial oxygen demand
- Pharmacological treatment includes:
Nitrates, beta blockers, calcium antagonists

Myocardial revascularisation

- Percutaneous trans-luminal angioplasty and stenting
- Coronary artery bypass grafts

- Short animation showing cardiac angiography and STENT

Treatment for Unstable Angina

- These patients require hospitalisation
- Cardiac monitoring
- Bed rest
- Patient receives IVI nitroglycerine and heparin
- Angiography - ? Stent or other treatment as indicated by the result

Variant Angina

- Require hospitalisation
- Intense medical therapy
- Medications such as Calcium channel blockers and beta blocker are used to control the symptoms
- Surgery and PTCA are not recommended as in isolated coronary spasm

Nursing care



Nursing care for patients admitted with unstable angina

- Monitor patient
- Control pain
- Administer medications as prescribed
- Oxygen therapy if prescribed
- Bed rest as and if indicated
- Explanation of treatment and procedure
- Care of the patient following angiography +/- stenting
- Support family

LATER

- Promote lifestyle modification
- Cardiac rehabilitation sessions if available at the hospital