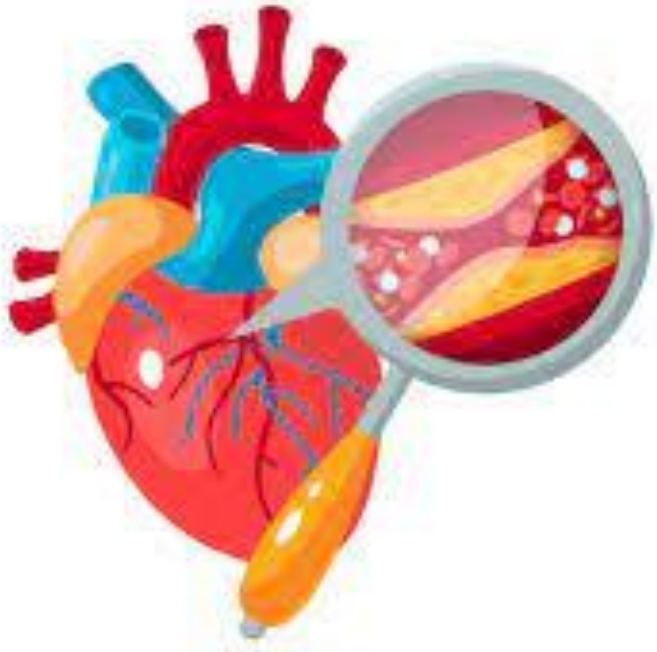
Pharmacotherapy of Angina

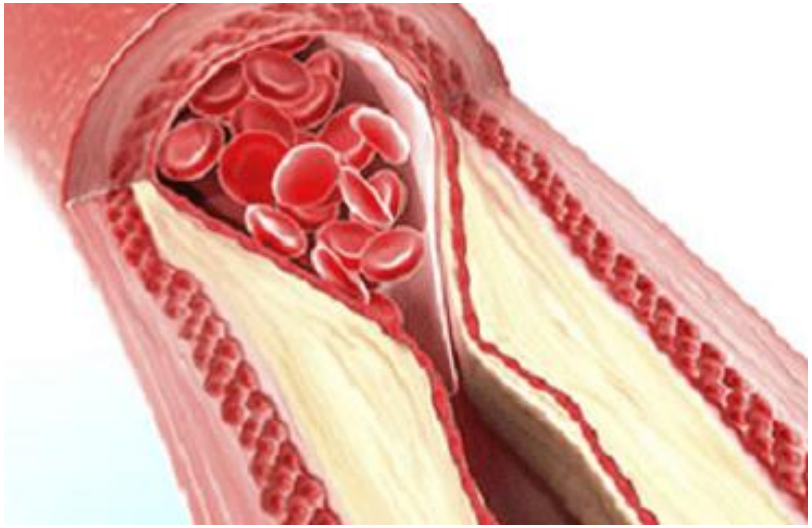


Learning Objectives

1. What is Angina?
2. Pathophysiology of angina
3. Risk factors for developing angina
4. Features of angina
5. Types of angina
6. Classes of angina
7. Drugs used in angina

What is angina Pectoris?

- Angina pectoris is the symptom complex caused by transient myocardial ischaemia and constitutes a clinical syndrome rather than a disease.



Pathophysiology of angina

- Anginal pain occurs due to **imbalance between the supply of oxygen and the myocardial demand.**
- Coronary blood flow to a region of the myocardium may be reduced by a mechanical obstruction that is **due to: atheroma, thrombosis, spasm, embolus etc.**
- An increased demand for oxygen may occur owing to an increase in cardiac work load.

Risk factors for developing angina

Fixed

- Age

- Male sex
- Positive family history
- Deletion polymorphism in the angiotensin-converting enzyme (*ACE*) gene (DD)

Potentially changeable

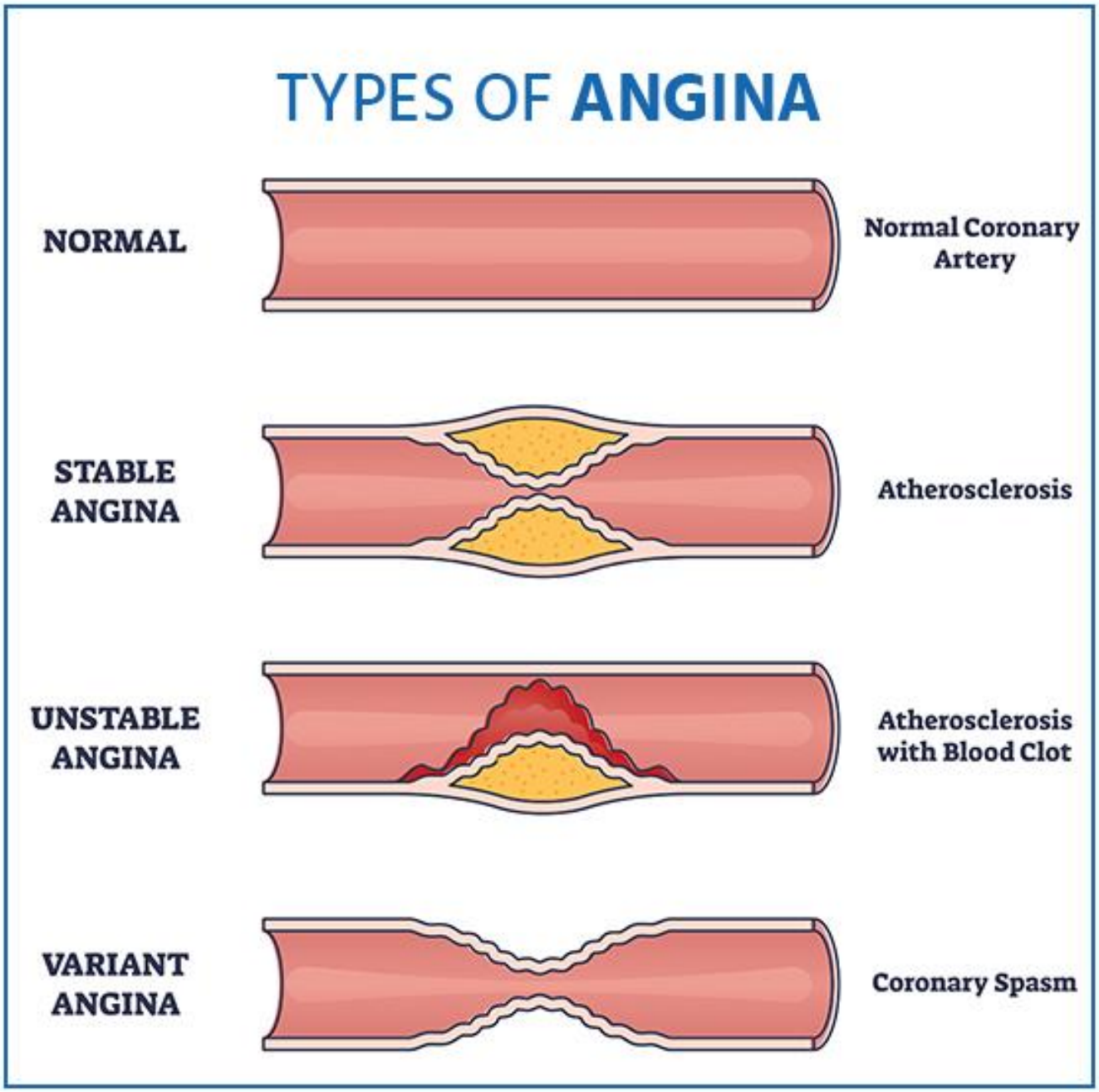
- Hyperlipidaemia
- Cigarette smoking
- Hypertension
- Diabetes mellitus
- Lack of exercise
- Blood coagulation factors – high fibrinogen, factor VII
- Elevated C-reactive protein
- Homocysteinaemia
- Obesity
- Gout
- Soft water
- Drugs, e.g. contraceptive pill, nucleoside analogues, COX-2 inhibitors, rosiglitazone
- Heavy alcohol consumption

Features of angina

- Angina is characterized by chest pain that is described as **'heavy', 'tight' or 'gripping'.**
- Typically, the pain is **central/retrosternal and may radiate to the jaw and/or arms.**
- The pain tends to occur with exercise or emotional stress, or when walking up slopes in cold weather, and eases rapidly with rest.

Types of angina

- **1. Stable angina**
- **2. unstable angina**
- **3. Vasospastic or variant (Prinzmetal's) angina**
- 4. Refractory angina
- 5. Microvascular angina.


TYPES OF ANGINA
NORMAL
Normal Coronary Artery
STABLE ANGINA
Atherosclerosis
UNSTABLE ANGINA
Atherosclerosis with Blood Clot
VARIANT ANGINA
Coronary Spasm

Classes of angina

Class	Description
Class I	No angina with ordinary activity. Angina with strenuous activity
Class II	Angina during ordinary activity, e.g. walking up hills, walking rapidly upstairs, with mild limitation of activities
Class III	Angina with low levels of activity, e.g. walking 50–100 metres on the flat, walking up one flight of stairs, with marked restriction of activities
Class IV	Angina at rest or with any level of exercise

Drugs used in angina

1. Organic nitrates:
   - Glyceryl trinitrate (GTN)
   - Isosorbide mononitrate
   - Isosorbide dinitrate
   - Amyl nitrite
2. Ca ++ Channel Blocker:
   - Amlodipine
   - Verapamil
   - Diltiazem
3. β Blocker:
   - Bisoprolol
   - Atenolol
   - Metoprolol

Drugs used in angina Cont…

4. Other anti-anginal drugs/Newer agents:

   Ivabradine

   Nicorandil

   Ranolazine

   Trimetazidine

5. Event-reducing drugs/Anti anginal adjuvent:

Drugs used in angina Cont…

- Event-reducing drugs/Anti anginal adjuvent:

  Antiplatelet:

  Aspirin 75 mg

  Clopidogrel

  ACE inhibitor or ARB:

  Enalapril

  Statins:

  Atorvastatin

Organic nitrates

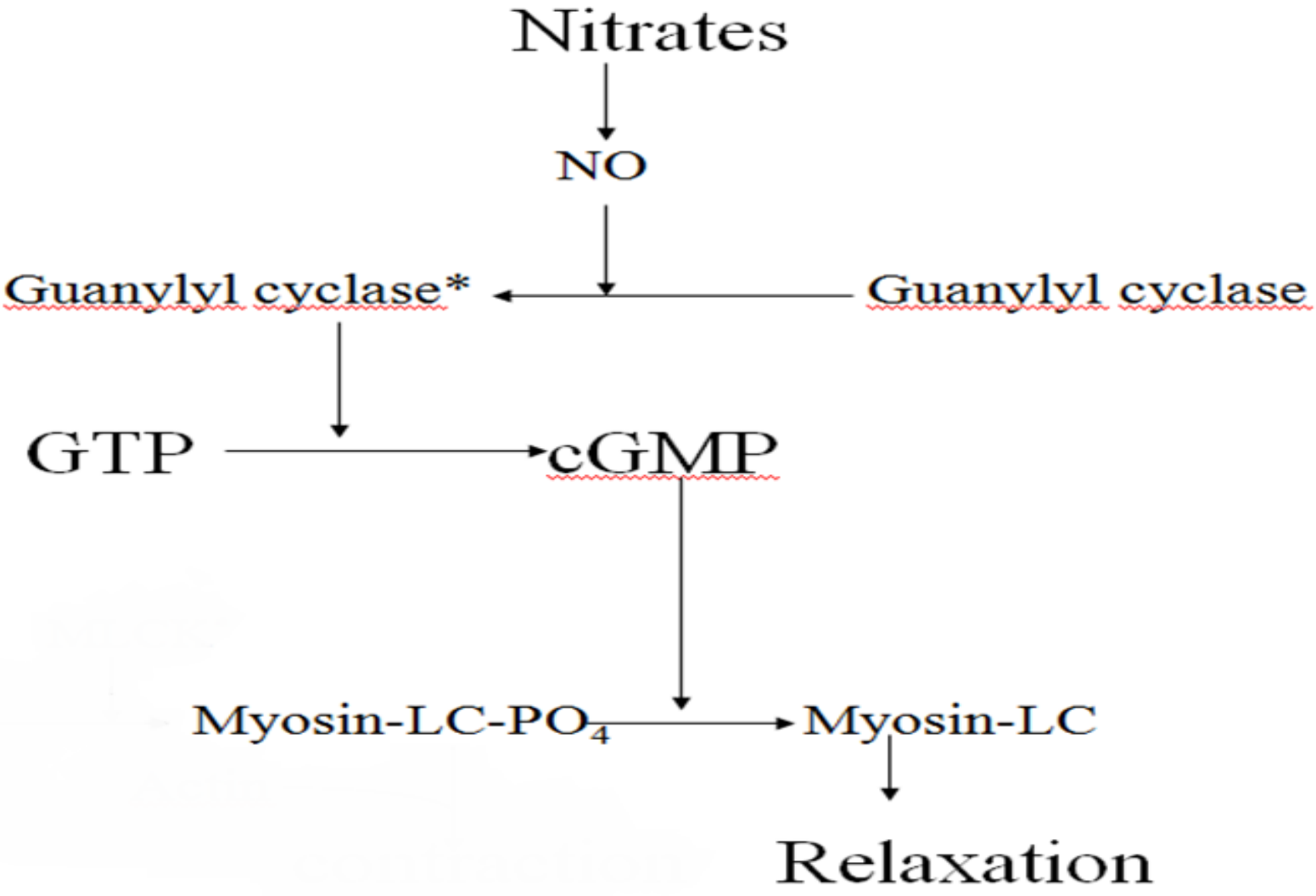
Names and Routes of Organic nitrates/GTN:

Names:

Routes/formulations:

- Oral (tablet)
- Sub-lingual
- sublingual spray
- Intravenous

Mechanism of Action of GTN



Mechanism of Action of GTN Cont..

Which results:

- Vanodilatation**:

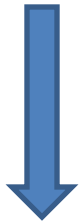
  Reduce venus return which results decrease preload…….> decrease O_2 consumption……> Relieve anginal pain

- Arterial dilatation:

  Decrease PVR……..>Decrease Afterload……..>decrease O_2 consumption…….> Relieve anginal pain

Beneficial Role of GTN

1. Reduce myocardial O2 comsumption



Preload &

Afterload

2. Increase coronary collateral circulation
3. Decrease coronary spasm
4. Increase subendocardial perfusion

Adverse effects of GTN

1. Throbbing headache
2. Flushing
3. Tachycardia
4. Postural hypotension
5. Tolerance

    true tolerance

    pseudo tolerance

Nitrate tolerance

Prevention:

Tolerance can be prevented by providing daily nitrate free period to restore the sensitivity to the drug. The period is 8-10 hours at night as the demand of heart is low during that period.

Role of β blocker in Angina

β blocker……> block the β1 receptors in heart……> decrease heart rate and force of contraction……> decrease cardiac load…….> decrease O2 demand……..> improve anginal pain.

Justify GTN not β blocker is the drug of choice in angina

Role of β blocker:

β blocker……> block the β1 receptors in heart……> decrease heart rate and force of contraction……> decrease cardiac load…….> decrease O2 demand……..> improve anginal pain.

Role of GTN:

Justify GTN not β blocker is the drug of choice in angina Cont…

- Vanodilatation**:

  Reduce venus return which results decrease preload……..> decrease O_2 consumption……> Relief anginal pain

- Arterial dilatation:

  Decrease PVR……..>DecreaseAfterload……..>decrease O_2 consumption…….> Relief anginal pain

Justify GTN not β blocker is the drug of choice in angina Cont…

Justification:

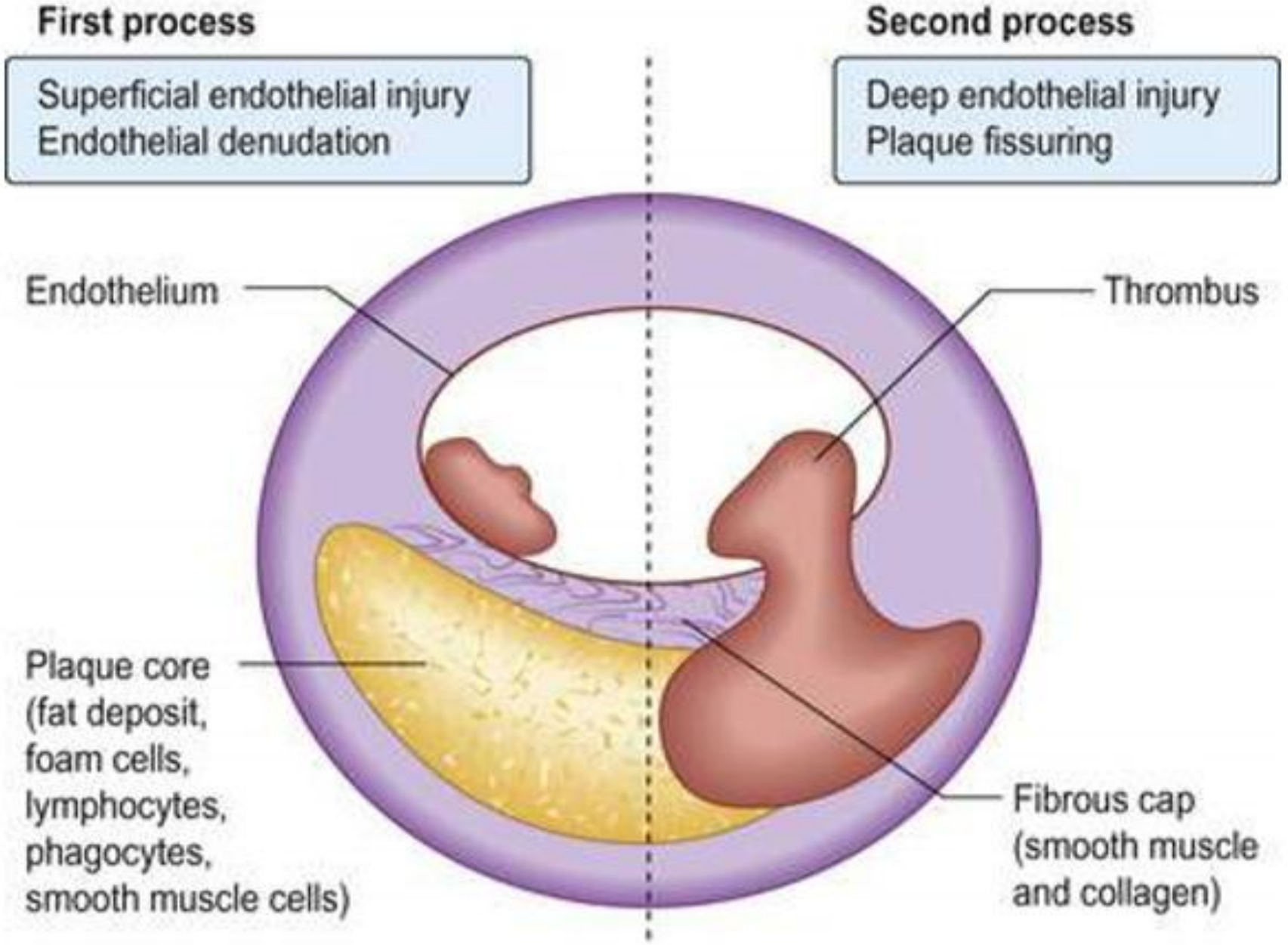
- GTN decrease O2 consumption as well as improve coronary perfusion which is not possible by β blocker.
- On the other hand quick acting preparations (s/l, spray) of GTN are available.

Role of Ca++ Channel blocker in angina

1. Coronary vasodilatation
2. Decrease cardiac work load by reducing PVR
3. Decrease force of contraction which ultimately reduce O2 requirement in cardiac muscles.

Treatment of Acute Myocardial Infarction (AMI)/Unstable Angina

1. Hospitalization without any delay and admission under CCU
2. Propped up position
3. O2 inhalation
4. Continuous vital signs and ECG monitoring
5. GTN spray
6. Inj. Streptokinase: in acute ST elevation MI or within 12 hours of pain
7. Inj. Enoxaparin: in acute ST depression MI or ST elevation MI after 12 hours of pain
8. Tab. Aspirin 75mg. 4 tab stat
9. Inj. Morphine
10. Inj. Ondensetrone
11. Arrange for PCI in needed



The mechanisms for the development of thrombosis on plaques.

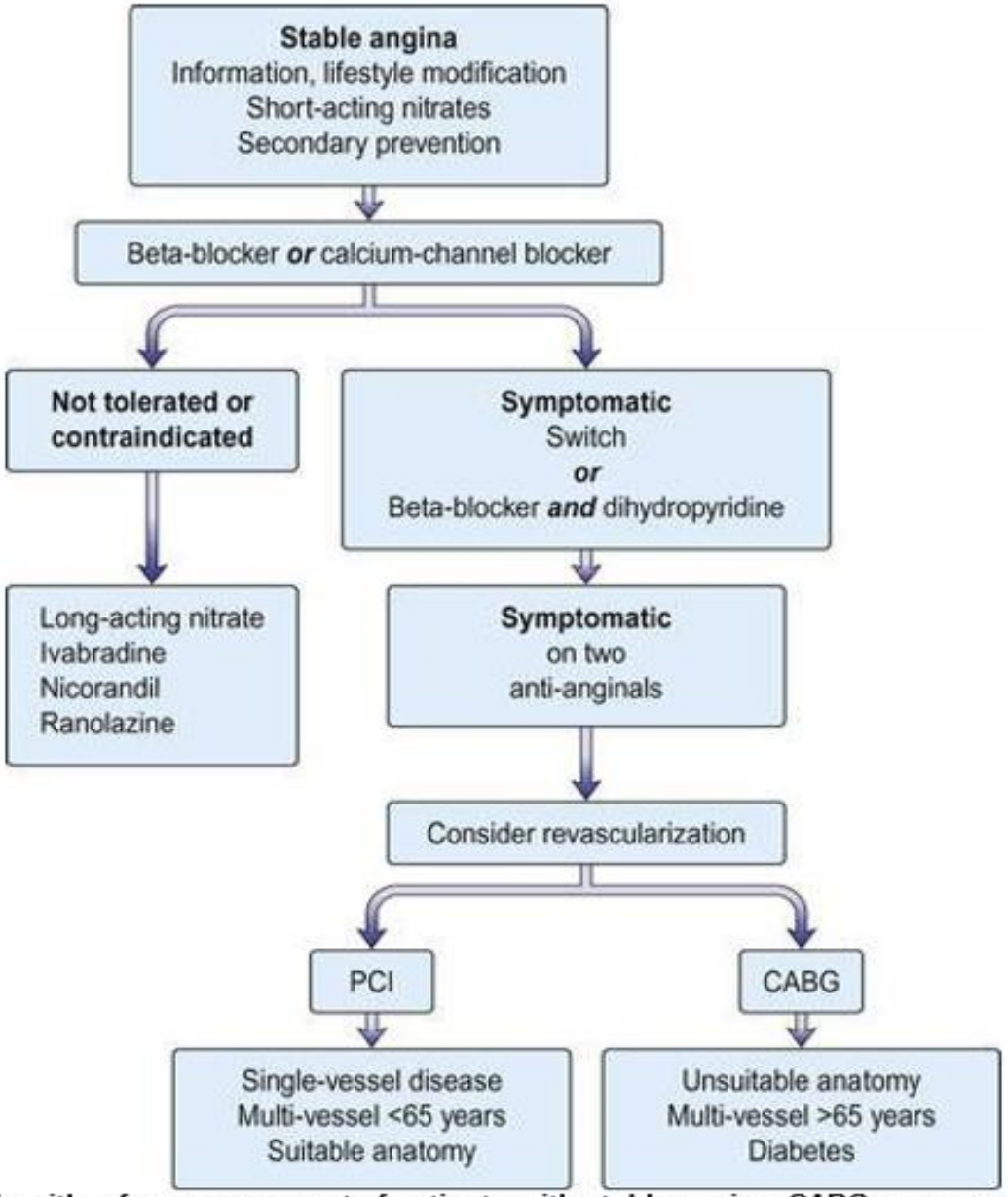


FIGURE 23.64 **Algorithm for management of patients with stable angina. CABG, coronary artery bypass grafting; PCI, percutaneous coronary intervention.** (From NICE Guideline CG126. *Management of Stable Angina*. July 2011 (guidance under review), with permission.)

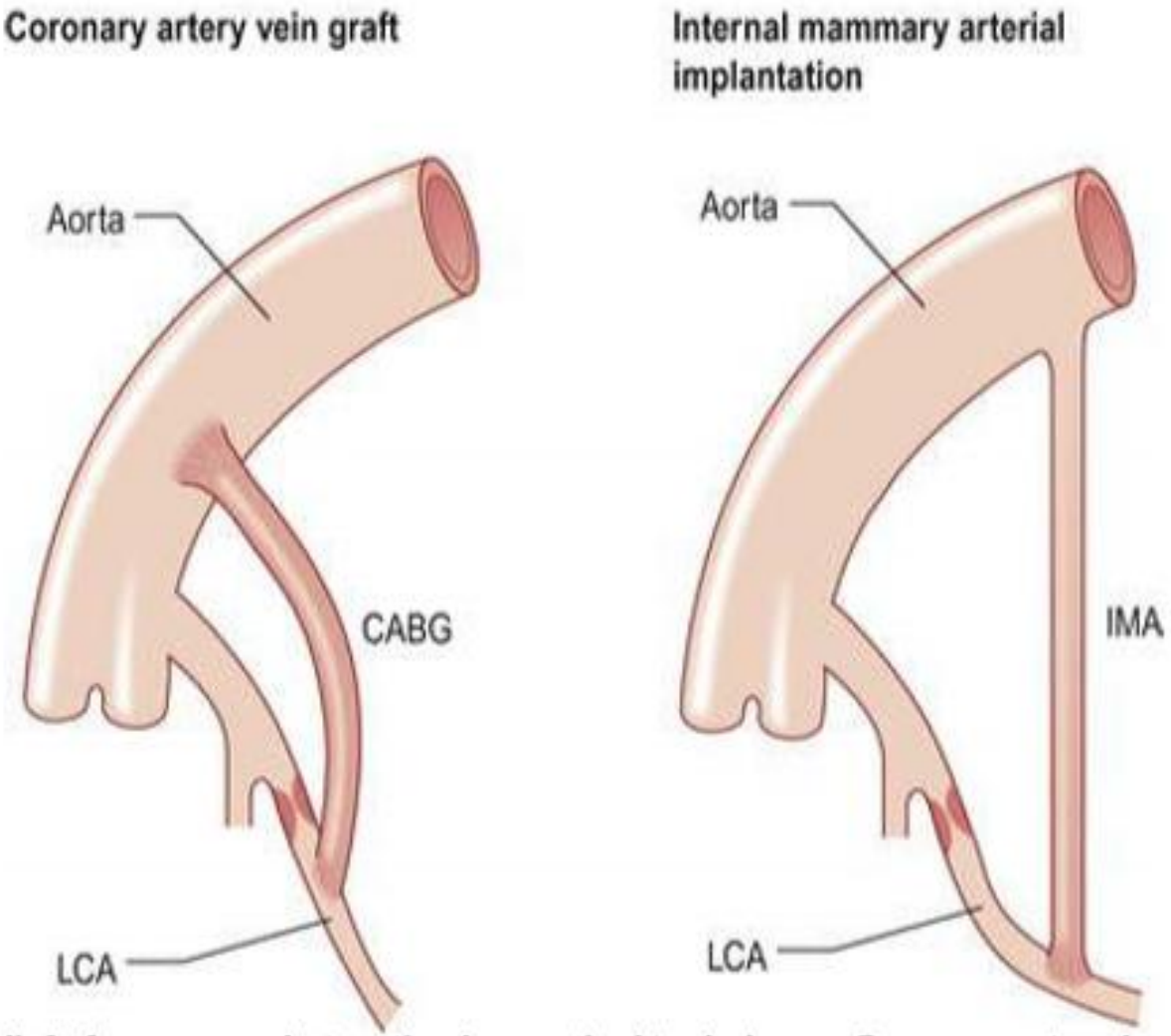
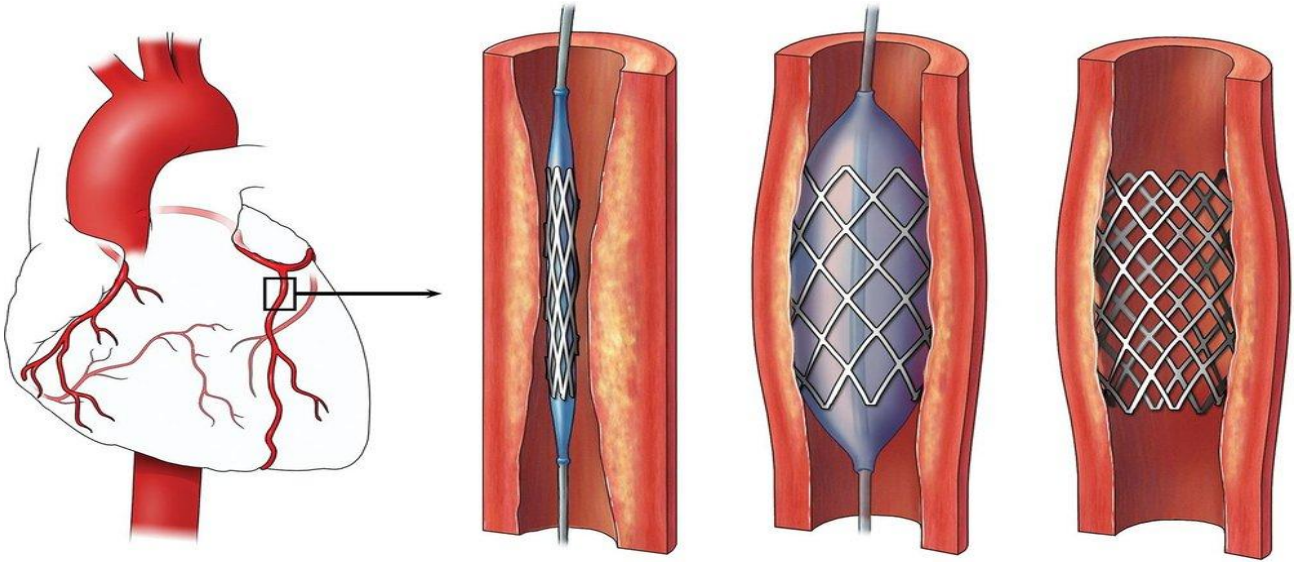
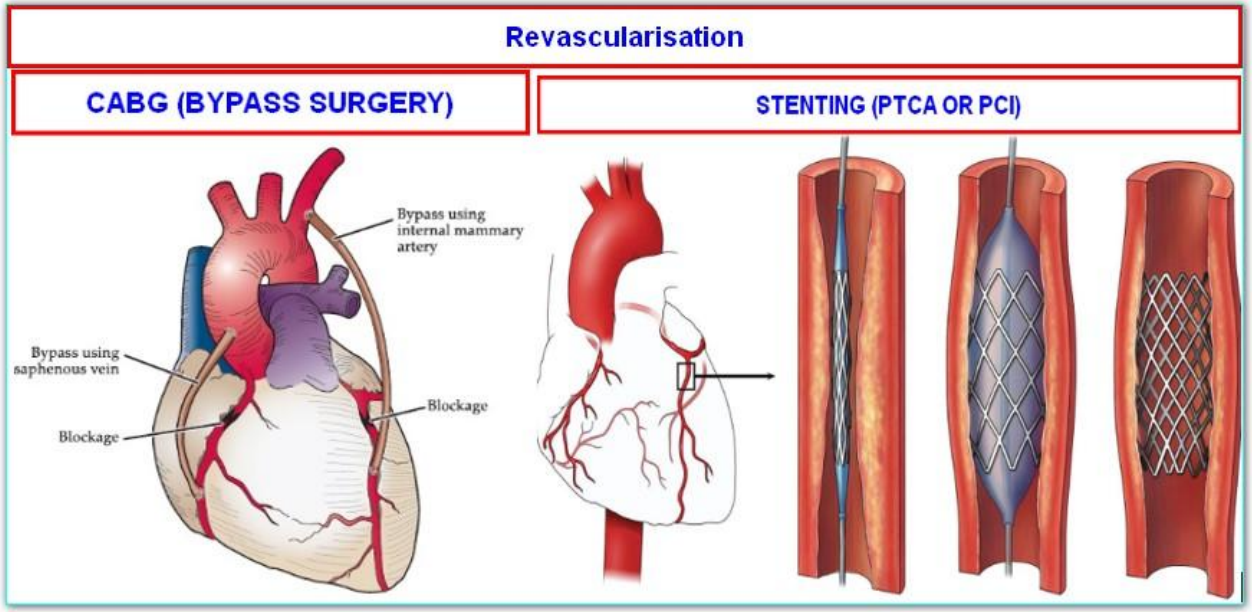


FIGURE 23.67 Relief of coronary obstruction by surgical techniques. Coronary artery bypass grafting (CABG) and internal mammary arterial implantation (IMA) are shown. In both of these examples, the graft bypasses a coronary obstruction in the left coronary artery (LCA).




Revascularisation
CABG (BYPASS SURGERY)
STENTING (PTCA OR PCI)
Bypass using internal mammary artery
Bypass using saphenous vein
Blockage
Blockage

Thank You