Shri mallikarjun Vaidyavardhak Sangh's
Smt. Rajeshweari Karpurmath Memorial (RKM)
Ayurvedic Medical College, Hospital & PG Research Centre, Vijayapur.

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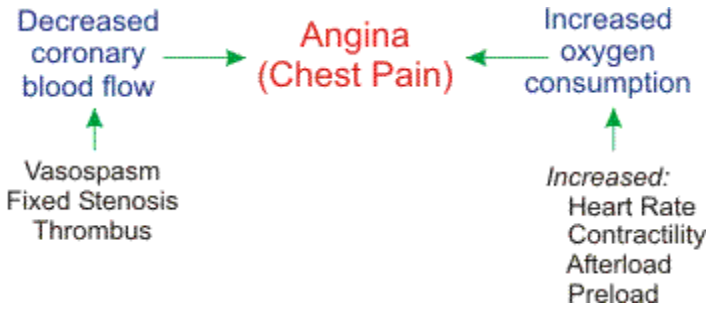
Chest pain/ Angina pectoris

By Dr Priyadarshini A.M MD(Ayu)
Department of kayachikitsa
9740422413
am.priyadarshini@gmail.com

Angina pectoris is the result of myocardial ischemia caused by an imbalance between myocardial blood supply and oxygen demand.

Angina pectoris is the hallmark of **ischemic heart disease**.

- Characterized by pain or discomfort in the chest, which often radiates through the upper extremities, face, and other areas of the body, and is due to the heart's inability to meet its metabolic needs.
- When coronary blood flow cannot deliver sufficient oxygen to support cardiac oxidative metabolism (reduced oxygen supply/demand ratio), the **myocardium** becomes **hypoxic.** This triggers pain receptors within the heart, which lead to the classical presentation of chest pain and the sensation of **substernal heaviness or pressure.**

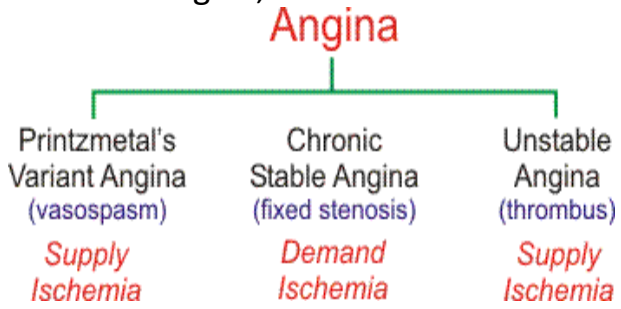


- As described below and in the above figure, coronary blood flow can be decreased by
  1) transient constriction of the coronar arteries (i.e., vasospasm),
  2) chronic narrowing of a coronary artery (i.e., fixed stenosis) caused by atherosclerosis, or
  3) the formation of a blood clot within the vessel lumen (i.e., coronary thrombosis).
  Angina can also be precipitated by increased oxygen consumption, especially if the coronary blood flow is already compromised. Increases in heart rate, contractility (inotropy), afterload (e.g., elevated arterial pressure, aortic valve

stenosis, ventricular dilation), and preload, the latter of which stimulates the Frank-Starling mechanism to increase the force of cardiac contraction. Decreasing either coronary flow or increasing oxygen demand, or a combination of the two, will decrease the oxygen supply/demand ratio and lead to myocardial hypoxia and the stimulation of pain receptors within the myocardium.

TYPES OF ANGINA

There are three types of angina: Printzmetal's variant angina, chronic stable angina, and unstable angina. All three forms are associated with a reduction in the oxygen supply/demand ratio.



- **Stable angina** is sometimes called "effort" angina because it is triggered by physical or mental exertion, such as climbing a flight of stairs or a psychologically stressful event.
  – This type of angina resolves with rest and/or nitrates.
- **Unstable angina** is defined as new onset or worsening angina that is unpredictable; it occurs spontaneously during activity or rest, and does not resolve with rest or medications.
  – Unstable angina is a form of **acute coronary syndrome**, and, as mentioned earlier, is a medical emergency that can lead to ***myocardial infarction.***

Although angina is often due to obstructive coronary artery disease, angina can also occur in the absence of clinically significant blockage.

- **Vasospastic angina**
  – Also known as ***variant and Prinzmetal angina***
- Occurs when vasospasm contracts the vessel and reduces blood flow.
- Occurs **spontaneously, and often at rest.**
  – A hallmark of vasospastic angina is occurrence at ***night or early morning*** – early morning exercise is a common trigger.
- Vasospastic angina is most common in women and cigarette smokers.

- Responds to nitrates, and can be suppressed by calcium-channel blockers (but not beta-blockers, which can exacerbate this type of angina).
- **Microvascular angina** is the result of coronary microvascular dysfunction or vasospasm.
- Microvascular angina accounts for chest pain in up to half of patients who do not have obstructive coronary artery disease.
- Occurs with **exertion and at rest,** but, may respond less well to nitrates.
- Difficult to distinguish from epicardial angina, and, that positron emission tomography (PET) or cardiac magnetic resonance (CMR) can be used to assess coronary microvascular blood flow.

Common symptoms of ischemic heart disease:

Sex, age, and race may influence which symptoms are present and how they are interpreted.

Angina

*Many patients experience ***chest discomfort or pain,*** which is variably described as: ***tightness, dull, sharp, or stabbing pain, squeezing, or pressure on the heart.***

- We show the patient displaying **Levine's sign,** a clenched fist held over the sternum, because many patients will describe their chest discomfort with this gesture or one similar to it.
- Patients also report ***discomfort in the shoulders, arms, neck, and jaw; pain is often described as "radiating".**
- Some patients, often experience **gastrointestinal discomfort** that may be interpreted as indigestion or heart burn, abdominal pain or burning.
  – Thus, always one should consider ischemic heart disease in patients who report such symptoms when gastrointestinal causes are ruled out.
- Some patients, especially women with ischemic heart disease, experience **light-headedness or dizziness, and persistent fatigue.**
- Other commonly-reported symptoms include **dyspnea** (difficulty breathing) and **excessive sweating.**

NEWYORK HEART ASSOCIATION FUNCTIONAL CLASSIFICATION

	FUNCTION CAPACITY	OBJECTIVE ASSESSMENT
CLASS 1	PATIENTS WITH CARDIAC DISEASES BUT WITHOUT RESULTING LIMITATION OF PHYSICAL ACTIVITY**.**ORDINARY PHYSICAL ACTIVITY DOES NOT CAUSE UNDEW FATIGUE, PALPITATION, ANGINA OR DYSPNOEA	NO OBJECTIVE EVIDENCE OF CARDIOVASCULAR DISEASE
CLASS 2	PATIENTS WITH CARDIAC DISEASES RESULTIG IN SLIGHT LIMITATION OF PHYSICAL ACTIVITY. THEY ARE COMFORTABLE AT REST. ORDINARY PHYSICAL ACTIVITY RESULTS IN FATIGUE CAUSES FATIGUE, PALPITATION, ANGINA OR DYSPNOEA.	OBJECTIVE EVIDENCE OF MINIMAL CARDIO VASCULAR DISEASES
CLASS 3	PATIENTS WITH CARDIAC DISEASES RESULTIG IN MARKED LIMITATION OF PHYSICAL ACTIVITY.THEY ARE COMFORTABLE AT REST. LESS THEN ORDINARY ACTIVITY CAUSES FATIGUE, PALPITATIONS, ANGINA OR DYSPNOEA.	OBJECTIVE EVIDECE OF MODERATELY SEVERE CARDIOVASCULAR DISEASE
CLASS 4	PATIENTS WITH CARDIAC DISEASES RESULTIG IN INABILITY OF PHYSICAL ACTIVITY WITHOUT MUCH DISCOMFORT. SYMPTOMS OF ANGINA SYMPTOMS OR CHEST PAIN MAY BE PRESENT AT REST IF ANY PHYSICAL ACTIVITY IS PERFORMED, DISCOMFORT IS ICREASED.	OBJECTIVE EVIDENCE OF SEVERE CARDIOVASCULAR DISEASES

Rationale for Treating Angina:

Increase Oxygen Delivery:

- **Coronary vasodilators**
- **Anti-thrombotic drugs**

Decrease Oxygen Demand:

- **Vasodilators *(reduce afterload and preload)***
- **Cardiac depressants**

(reduce heart rate and contractility)

Classes of Drugs Used to Treat Angina:

Classes of drugs used in the treatment of angina and myocardial infarction are given below.

- Vasodilators (dilate arteries and veins)
- calcium-channel blockers
- nitrodilators
- Cardioinhibitory drugs (reduce heart rate and contractility)
- beta-blockers
- calcium-channel blockers
- Ranolazine (FDA approved 1/06 - blocker of late sodium currents)
- Anti-thrombotic drugs (prevent thrombus formation)
- anticoagulants
- anti-platelet drugs

INVESTIGATIONS:

ECG –

- May show ST depression and T wave inversion as in any IHD, but may be normal upto 40%
- No ST elevation /Q wave seen
- Cardiac enzymes (CK, CK-MB, Trop)
- Complete blood count, serum creat, RBS for other confirmations.

TREATMENT:

1. ASPERIN 375MG oral stat and daily
   If not tolerated ticlopidine 250mg BD
   Monitor for neutropenia
2. HEPARIN- UFRACTIONATED

   1000IU per hour as an infusion or with monitoring APTT(ACTIVATED PARTIAL THROMBOPLASTIN TIME)

   LOW MOLECULAR WEIGHT HEPARIN given for 5 days (any of the following can be used)

   I. **ENOXOPARIN 1MG/KG SC TWICE A DAY**
   II. **DALTEPARIN 100IU/KG SC TWICE A DAY**
   III. **NANDROPARI N 50IU/KG SC TWICE A DAY**
   IV. **REVIPARIN 3500-6300 U SC TWICE A DAY**

3. **BETA BLOCKERS:**
   Atenalol 50-100mg, Metaprolol 50-100mg Q12H can be started but watch for hypotension and bradycardia.

4. **NITRATES:**

   Nitroglycerin infusion starting from 10-30micrograms per minute upto 200-400mu/min to be started and titrate the dose to relieve the pain.

   Note: watch for hypotension (>90mm/hg_). In case of hypertension do not lower the systolic pressure below 80mm/hg.

   If patient has mild chest pain then oral or sublingual glyceryl trinitrate 3mg every 3 min till the chest pain subsides.

5. **CALCIUM CHANEL BLOCKERS:**
   Use only when beta blockers are contraindicated and **avoid short acting drugs like nifedipine**.
   - Treat aggravated factors like Anemia, stress, fever or tachyaretcrythemias etc.
   - Detect and treat risk factors like diabetes, hypercholestremia, hypertension.Advice to avoid risk factors like smoking , alcohol drinking, tobacco chewing.
   - If pain subsides then go for TMT (THREAD MILL TEST) is adviced with ongoing drugs. Depending on the outcome, revascularization can be planned.