

CARDIO-VASCULAR SYSTEM

7



Pathology

Writer: Shahad Falah Alrawi

S.corrector: Laila Nazzal

F.corrector: Reema Ayman

Doctor: Nisreen Abu Shahin



Ischemic Heart Disease (Angina Pectoris)

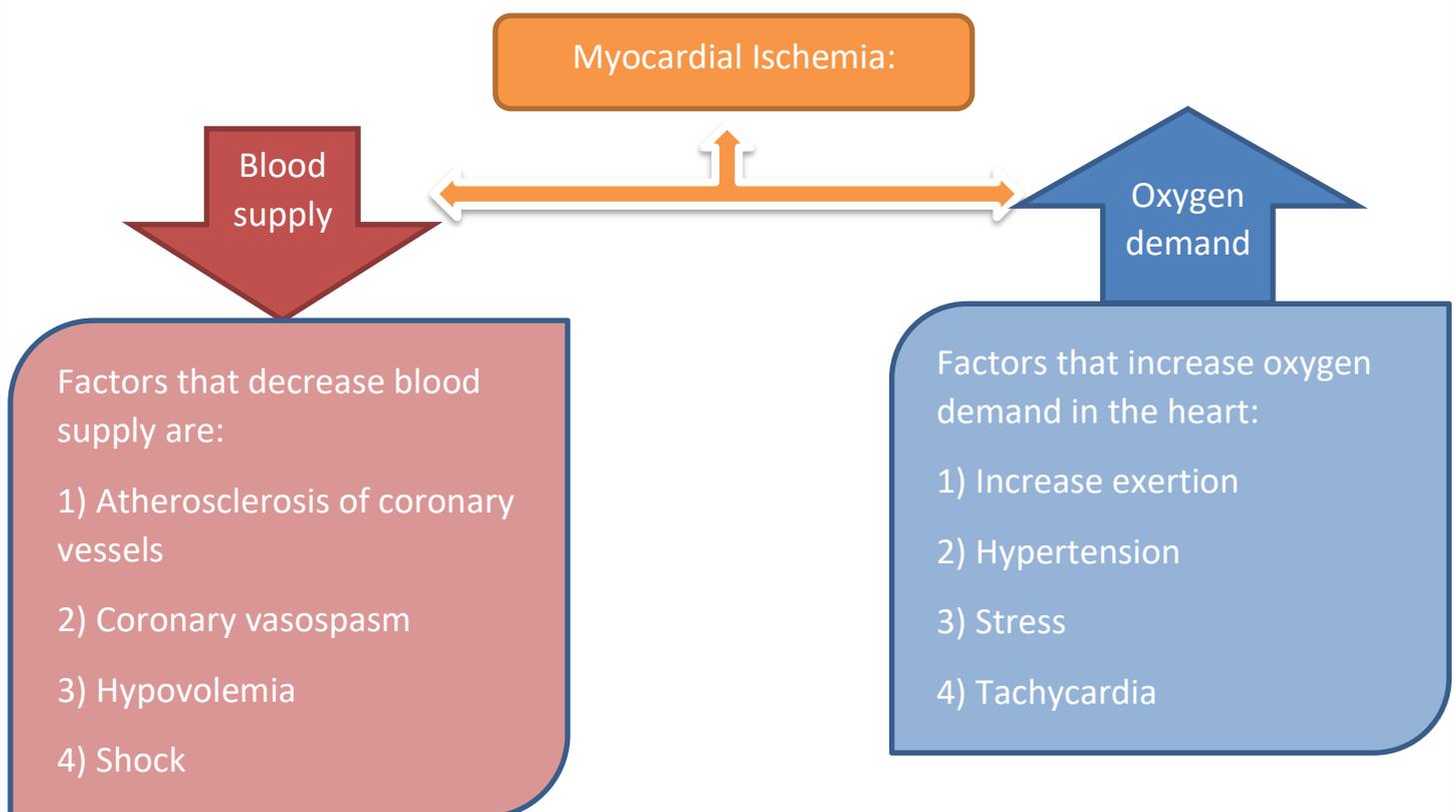
In this lecture we are going to talk about “Myocardial Ischemia”.

Note : Heart disease is the leading cause of morbidity and mortality worldwide

Normally in our body, there should be some sort of **balance** between myocardial blood supply and oxygen demand. **SO**, myocardial ischemia develops when:

- 1) **Blood supply** is **decreased** or
- 2) **Oxygen demand** is **increased**.

→ Meaning that the disease develops when some sort of **imbalance** between blood supply and oxygen demand occurs.



Ischemic heart disease: a **group** of related syndromes (conditions) resulting from **myocardial ischemia** (an imbalance between cardiac blood supply (perfusion) and myocardial oxygen demand).

In many cases we can use “**Coronary Artery Disease (CAD)**” as an interchangeable term with **Ischemic Heart Disease(IHD)** because of the great association between them .

Mechanisms of ischemia in the heart (causes):

- 1) **Reduction in coronary blood flow:** mainly due to atherosclerosis, (90% of all cases).
- 2) **Increased oxygen demand** like: Tachycardia, hypertension and other examples as we said **above**.
- 3) **Diminished oxygen-carrying capacity** (least common cause) ; it means that **blood supply is not really diminished and the myocardial oxygen demand is not greatly increased , but the imbalance is resulting from the insufficiency of oxygen supply inside the blood, and this may be caused by rare cases like: severe sudden anemia, OR carbon monoxide (co) poisoning .**

As we said, the IHD is not a single disease; it is actually a **group** of conditions that all are related to ischemia.

So, there are four basic clinical syndromes of IHD:

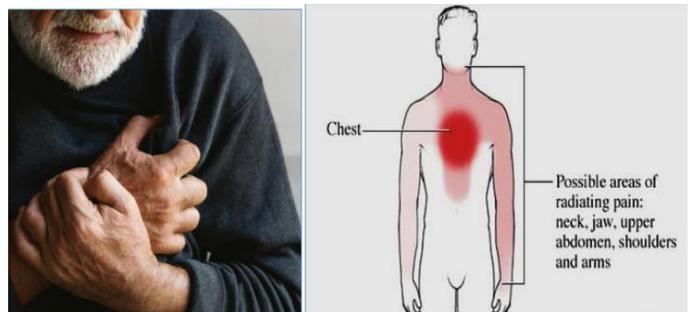
- 1) **Angina pectoris:** ischemia causes pain , but is insufficient to lead to death of myocardium
 - 2) **Acute myocardial infarction (MI):** the severity or duration of ischemia is enough (sufficient) to cause cardiac muscle death!
 - 3) **Chronic IHD:** form of progressive cardiac decompensation (congestive heart failure) following MI
 - 4) **Sudden cardiac death (SCD):** form of death that can result from a **lethal arrhythmia** following myocardial ischemia.
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Angina pectoris: means that there is an ischemic chest pain in a form of crushing or squeezing substernal chest pain.

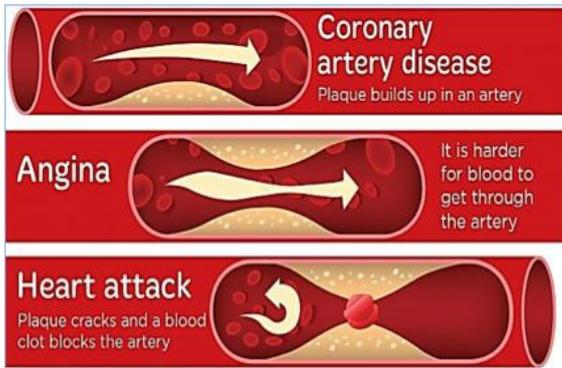
Sometimes, this pain radiates to: **neck, jaw, upper abdomen, left shoulder and left arm.**

NOW, both angina pectoris and acute myocardial infarction are related to ischemic chest pain, so how can we differentiate between them?

- **Angina:** causes **intermittent** chest pain caused by transient reversible myocardial ischemia (ischemia is sufficient to cause pain but is **insufficient to lead to death of myocardium**). Usually angina pectoris related **pain time < 20 minutes** and since it is caused by transient ischemia so it is **relieved by rest or some medications like nitroglycerin.**



- **MI:** pain is caused by **irreversible myocardial ischemia**, in this case ischemia had developed 20 minutes before pain appeared, so **pain lasts > 20 minutes to several hours and is not relieved by nitroglycerin or rest.**



EXRTA: The term myocardial infarction indicates the development of an area of MYOCARDIAL NECROSIS caused by ischemia. Myocardial necrosis begins within 20-30 minutes of coronary A. occlusion. The infarct usually reaches its full size within 3-6 hours; thus the disease pain is longer than that in angina.

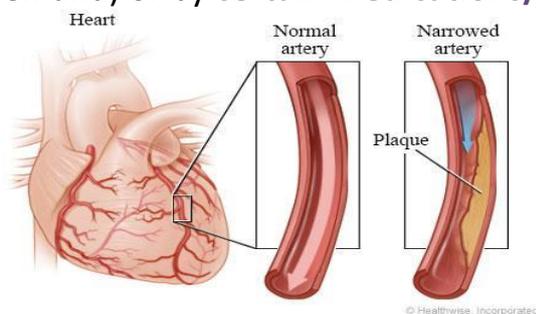
Types of Angina :

- 1) Stable angina /Classic angina/Effort angina/Typical angina
- 2) Unstable angina /Crescendo angina
- 3) Variant angina/ Prinzmetal angina

NOW: we will discuss these types

➤ “Stable Angina”:

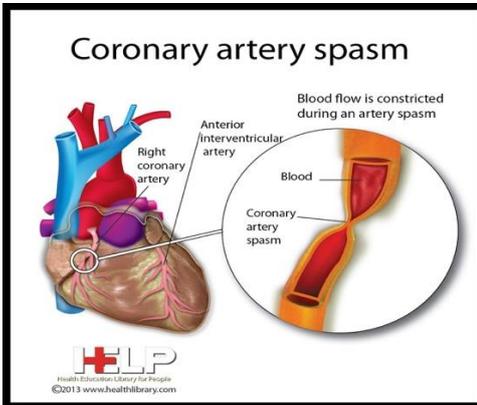
- The pathogenesis of stable angina is **critical coronary stenosis**: means that there is a narrowing in the coronary vessels by an atherosclerotic plaque.
- It’s associated with **episodic pain** only with increased oxygen demand.
- Examples that increase oxygen demand: **exertion**, tachycardia, hypertension, fever, anxiety and fear.
- So it should be associated with **critical** atherosclerotic narrowing.
- Because of the above factors, this angina could be **relieved by rest** (reducing o2 demand) or by **certain medications/drugs** (e.g. nitroglycerin).



➤ “Prinzmetal Angina”

- Pathogenesis of this type is **severe coronary vasospasm**.

- Because of that, it can occur at **rest or sleep**.
- Coronary vessels **without** atherosclerosis can be affected.
- **Etiology is not clear**.
- But because it is caused by vasospasm, so it could be treated with **vasodilators** (nitroglycerin or calcium channel blockers)



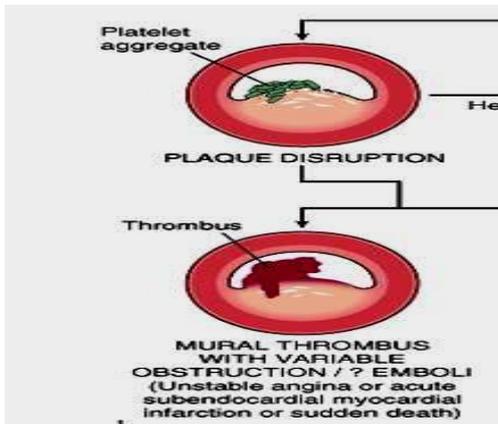
➤ “Unstable Angina”

- Pathogenesis is: presence of **critical stenosis with superimposed Acute Plaque Change**

*acute plaque change means development of certain acute changes that are superimposed on already stenotic vessels.

This includes:

- 1- Plaque disruption (or rupture).
 - 2- Partial thrombosis (non-occlusive).
 - 3- Distal embolization.
 - 4- Superimposed vasospasm over the atherosclerosis.
- Unstable angina (crescendo angina) is the **worst** type of angina because it is usually associated with:
 - **Increasing frequency of pain**, precipitated by **less exertion** and the pain is more **intense and longer** lasting than stable angina.
 - **Causes: plaque disruption; superimposed partial thrombosis; distal embolization; vasospasm. (important!!!!)**
 - Usually precedes more serious, potentially irreversible ischemia, thus it is called: **pre-infarction angina** .



Picture about types of angina , the doctor mentioned the names only .

Three types of angina

- **Stable angina/Classic angina/Effort angina**
- **Unstable angina/Crescendo angina**
- **Variant angina/Prinzmetal angina**

