College of Pharmacy
Fourth year. Clinical Pharmacy
Cardiovascular disorders

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Ischemic Heart Disease

Introduction

1-Ischemic heart disease (IHD) is defined **as lack of oxygen and decreased or no blood flow to the myocardium resulting from coronary artery narrowing or obstruction**.

2-It may present as acute coronary syndrome (**ACS**), which includes unstable angina and non–ST-segment elevation (**NSTE**) or ST-segment elevation (**STE**) myocardial infarction (MI), **chronic stable exertional angina**, **ischemia without symptoms**, **microvascular angina**, or **ischemia due to coronary artery vasospasm** (**variant or Prinzmetal angina**).

Pathophysiology

1-Angina pectoris usually results **from increased myocardial oxygen demand** (MVo_2) in the setting of a **fixed decrease in myocardial oxygen supply because of atherosclerotic plaque.**

2-Major determinants of MVo_2 are heart rate (HR), myocardial contractility, and intramyocardial wall tension during systole. **A doubling in any of these individual parameters requires a 50% increase in coronary flow to maintain myocardial supply.**

3-Coronary plaques that occupy less than 50%–70% of the vessel luminal diameter rarely produce ischemia or angina. However, smaller plaques have a lipid-rich core and thin fibrous cap and are more prone to rupture and cause acute thrombosis.

4-When the luminal diameter of epicardial vessels is reduced by 70% or more, minimal physical exertion may result in a flow deficit with myocardial ischemia and often angina.

5-Inflammation also plays a role in IHD; macrophages and T-lymphocytes produce growth factors that cause proliferation of vascular smooth muscle cells. C-reactive protein may be elevated and correlates with adverse cardiovascular events.

6-Some patients have plaque that causes a fixed decrease in supply but also have reduced myocardial oxygen supply transiently **due to vasospasm at the site of the plaque**. The pattern of ischemic symptoms can change due to a variable amount of vasospasm under certain conditions (referred to as **variable threshold angina**). Ischemic episodes may be **more common in the morning hours** (due to circadian release of vasoconstrictors) and be precipitated by cold exposure and emotional or mental stress.

7-Patients **with variant (Prinzmetal) angina usually do not have a coronary flow-obstructing plaque** but instead have significant reduction in myocardial oxygen supply due to **vasospasm in epicardial vessels**.

Clinical presentation

1-Patients typically complain of **chest pain precipitated by exertion** or activities of daily living that is described as squeezing, crushing, heaviness, or chest tightness. It can also be more **vague and described as a numbness or burning in the chest**.

2-The location is often **substernal and may radiate to the right or left shoulder or arm** (left more commonly), **neck**, **back**, or **abdomen**. Ischemic symptoms may be associated with **diaphoresis, nausea, vomiting, and dyspnea**.

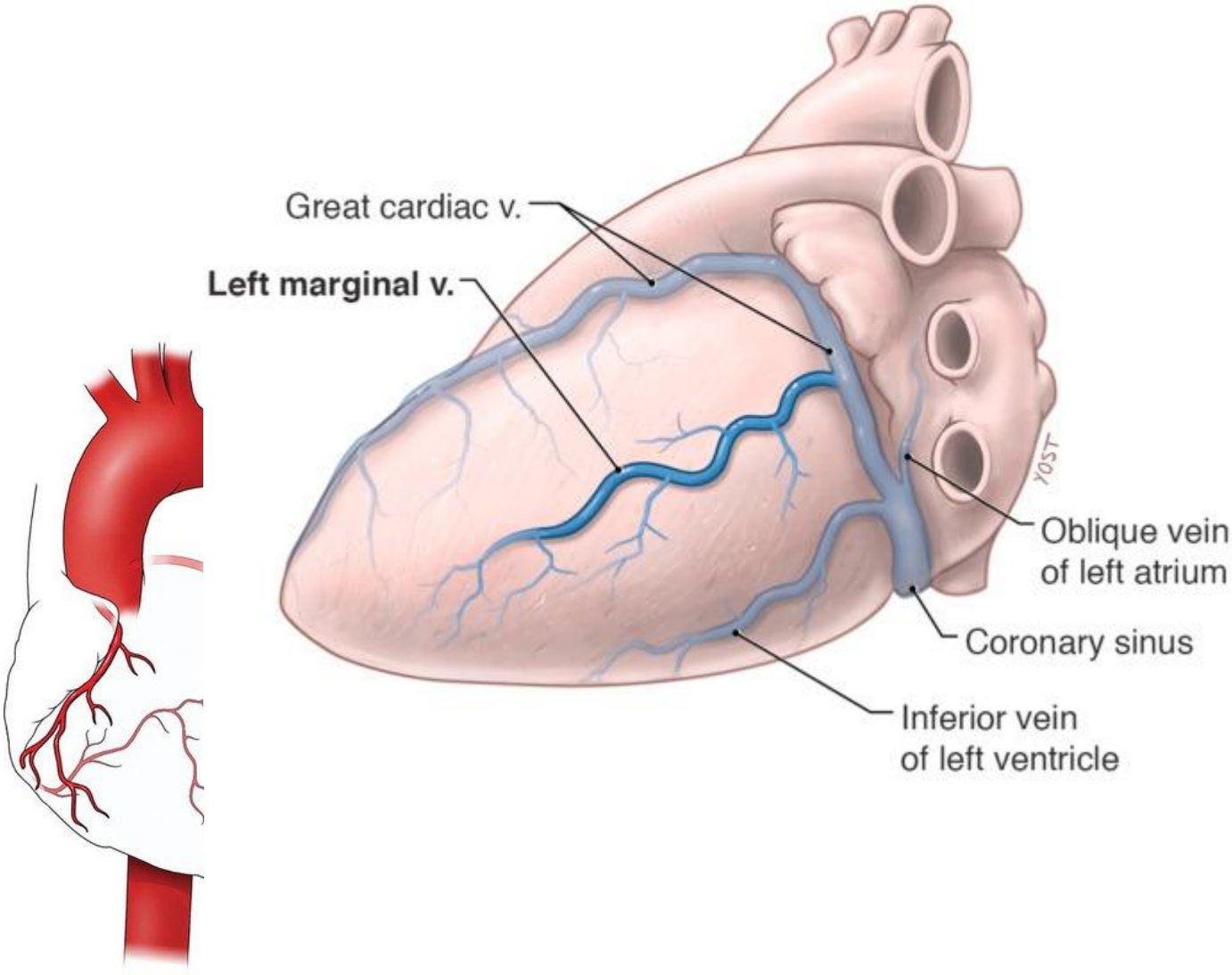
3-Chest pain generally **lasts from 5 to 20 minutes** and is usually **relieved by rest or sublingual nitroglycerin (SL NTG).**

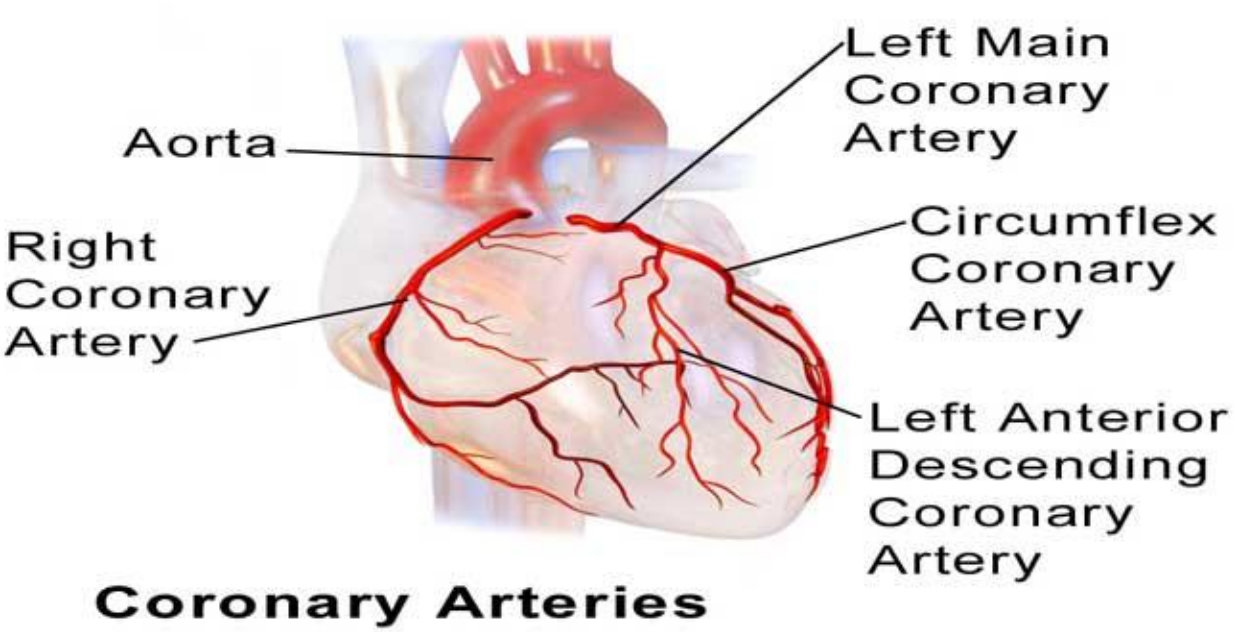
4-Some patients (especially **women and older individuals**) present with **atypical chest pain,** characterized by midepigastric discomfort, effort intolerance, dyspnea, and excessive fatigue. **Patients with diabetes mellitus may have decreased pain sensation due to neuropathy**.

5-Patients with **variant (Prinzmetal)** angina are typically **younger** and may present with **chest pain at rest**, often early in the **morning**, and may have transient ST-segment elevation on the ECG.

Reference

Joseph T. DiPiro, Robert L. Pharmacotherapy: A Pathophysiologic Approach, 11th Edition. 2021.





Coronary Arteries

Coronary Blood Supply