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MYOCARDIAL INFARCTION

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Annotation: This article focuses on myocardial infarction, a critical cardiovascular condition characterized by the interruption of blood flow to the heart muscle, leading to tissue damage or necrosis. The study highlights the pathophysiology, risk factors, clinical presentation, and diagnostic methods for myocardial infarction. Additionally, it discusses current approaches to management and treatment, emphasizing the importance of early detection and intervention to improve patient outcomes. The article aims to provide medical students and young clinicians with a comprehensive overview of myocardial infarction within the framework of cardiology education and clinical practice.

Keywords: Myocardial infarction, cardiovascular disease, ischemia, heart attack, coronary artery, chest pain, diagnosis, treatment, risk factors, cardiac rehabilitation.

Introduction.

Myocardial infarction (MI), commonly known as a heart attack, remains one of the leading causes of morbidity and mortality worldwide. It occurs when blood flow to a part of the heart muscle is significantly reduced or completely blocked, usually due to atherosclerosis or the formation of a thrombus in the coronary arteries. This interruption in blood supply leads to ischemia and ultimately necrosis of the affected myocardial tissue if

not promptly treated. The increasing prevalence of myocardial infarction has become a major public health concern, especially in populations with high rates of risk factors such as hypertension, diabetes mellitus, smoking, obesity, and sedentary lifestyles. Early recognition of symptoms, accurate diagnosis, and immediate medical intervention are essential to minimize heart muscle damage and improve survival rates. This paper aims to provide a detailed overview of myocardial infarction, including its causes, clinical features, diagnostic methods, and current treatment strategies. It also emphasizes the importance of preventive measures and lifestyle modifications in reducing the incidence of this life-threatening condition.

Main Body.

1. Definition and Pathophysiology

Myocardial infarction (MI) refers to the irreversible necrosis of heart muscle tissue resulting from prolonged ischemia. This condition is most often caused by atherosclerotic plaque rupture in a coronary artery, which leads to thrombus formation and a sudden reduction in coronary blood flow. The loss of oxygenated blood supply to the myocardium initiates a cascade of cellular events, resulting in cell death and the loss of contractile function in the affected area. Within 20–30 minutes of complete occlusion, irreversible damage begins to occur. The extent of the infarction depends on the duration of ischemia and the presence of collateral circulation.

2. Risk Factors. There are several modifiable and non-modifiable risk factors associated with myocardial infarction. Modifiable risk factors include: Hypertension. Diabetes mellitus. Hyperlipidemia. Smoking. Obesity. Sedentary lifestyle. Poor dietary habits. Non-modifiable risk factors include: Age (men over 45, women over 55). Male gender. Family history of coronary artery disease

3. Clinical Presentation

Typical symptoms of myocardial infarction include: Chest pain or discomfort, often described as pressure, tightness, or squeezing. Pain radiating to the left arm, neck, jaw, or back. Shortness of breath. Nausea or vomiting. Diaphoresis (excessive sweating). Lightheadedness or syncope. In some cases, especially in diabetic or elderly patients, myocardial infarction may be silent or present with atypical symptoms.

4. Diagnosis. Accurate and timely diagnosis is essential in the management of MI. It includes: Electrocardiogram (ECG): ST-segment elevation or depression, T-wave inversions, or new pathological Q waves. Cardiac biomarkers: Elevated troponin I/T and

CK-MB levels indicate myocardial damage Imaging: Echocardiography to assess ventricular function; coronary angiography to identify blockages

5. Types of Myocardial Infarction

According to the universal definition, there are five types of myocardial infarction:

1: Spontaneous MI due to atherosclerotic plaque rupture

2: MI secondary to an imbalance in oxygen supply and demand

3: Sudden cardiac death with suggestive symptoms of MI

4: MI related to percutaneous coronary intervention (PCI)

5: MI associated with coronary artery bypass grafting (CABG)

6. Treatment. Early treatment greatly improves prognosis. Management involves: Initial therapy: Oxygen, nitrates, morphine, aspirin. Reperfusion therapy: Fibrinolytics or PCI to restore coronary blood flow. Medications: Antiplatelet agents (aspirin, clopidogrel), beta-blockers, ACE inhibitors, statins, and anticoagulants. Post-MI care: Cardiac rehabilitation, lifestyle modification, and long-term pharmacotherapy

7. Prevention. Preventive measures can significantly reduce the risk of myocardial infarction: Controlling blood pressure, glucose, and lipid levels. Smoking cessation. Regular physical exercise. Weight management. Heart-healthy diet rich in fruits, vegetables, whole grains, and low in saturated fats. Stress management and routine health check-ups

Conclusion: Myocardial infarction remains one of the most serious and life-threatening cardiovascular events worldwide. Early recognition of symptoms, prompt diagnosis, and immediate medical intervention are critical to minimizing myocardial damage and improving patient survival. Understanding the pathophysiology, risk factors, and clinical manifestations of myocardial infarction is essential for healthcare professionals to provide effective treatment and long-term care. Furthermore, emphasis on preventive strategies—including lifestyle modifications, risk factor control, and regular medical check-ups—plays a vital role in reducing the incidence and recurrence of myocardial infarction. Continued research, public education, and access to high-quality cardiac care are key to improving outcomes and reducing the global burden of heart disease.

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