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Acute Coronary Syndrome Diagnosis & Management Approach in Emergency Department: Literature Review

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ABSTRACT

Acute coronary syndromes are brought on by a sudden occlusion of a coronary artery. Depending on the severity and location of the obstruction, the effects can range from unstable angina to non-ST-segment elevation myocardial infarction (NSTEMI), ST-segment elevation myocardial infarction (STEMI), and sudden cardiac death. Except for sudden death, each syndrome shares similar symptoms, such as nausea, diaphoresis, and discomfort in the chest with or without dyspnea. Electrocardiography and serologic markers are used to make the diagnosis (ECG). Antiplatelet drugs, anticoagulants, nitrates, beta-blockers, and fibrinolytic drugs for emergency reperfusion, percutaneous intervention, or, in extremely rare cases, coronary artery bypass graft surgery are used to treat STEMI. Studies involving people who had non-alcoholic fatty liver disease were sought after in the Medline, Pubmed, Embase, NCBI, and Cochrane databases. Analysis of incidence, etiology, and available management strategies . Patients with suspected or confirmed acute myocardial ischemia or infarction are referred to as having the acute coronary syndrome (ACS). The three types of ACS that are typically diagnosed are unstable angina, ST-elevation myocardial infarction, and non-ST-elevation myocardial infarction. However, due to the widespread use of the high-sensitivity troponin test, nearly all patients who previously had unstable angina had their diagnosis changed to NSTEMI. This occurred as a result of abnormally high levels of high-sensitivity troponin in the patients who had previously been diagnosed with unstable angina.

Keywords: *Acute coronary syndromes, Cardiovascular disease, Unstable angına, Acute myocardial ischemia, Acute myocardial infarction*

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INTRODUCTION

Cardiovascular disease (CVD), which claims the lives of 49% of women and 40% of men in Europe, is still the number one cause of morbidity and mortality (Townsend *et al*., 2016; Nguyen *et al*., 2021; Sinuraya *et al*., 2021). Age-adjusted mortality for CVD has decreased steadily over the past 40 years, albeit more slowly in females than in males (Gupta *et al*., 2014). The most intriguing finding is that younger men have experienced a decline in mortality from Coronary Artery Disease (CAD). The case fatality rates of acute coronary syndromes (ACS) have, however, increased significantly in younger women (Smilowitz *et al*., 2018). Despite growing evidence showing that baseline risk factors, coronary anatomy and function, symptom presentation, comorbidities, treatment effectiveness, and outcomes of ACS differ depending on sex and gender (Vaccarino, 2019). Due to persistently disproven concerns that including women will increase variability, double sample size, and increase costs, women continue to be underrepresented in cardiovascular clinical trials, and there is a dearth of primary science data derived from female animals and cells (Buch *et al*., 2019). This review provides a concise summary of recent research highlighting differences in the clinical manifestations of ACS as well as the diagnostic accuracy of tests, invasive procedures, medications, and results between the sexes and

genders.

Epidemiology

Despite major advancements in the identification and treatment of acute coronary syndromes, cardiovascular disease remains the largest cause of mortality in the world, with ischemic heart disease accounting for around half of these deaths (GBD 2017 Causes of Death Collaborators, 2018). Ischemic heart disease is responsible for 12% of all disability-adjusted life years lost globally each year (GBD 2019 Diseases and Injuries Collaborators, 2020). Long-term mortality rates after acute coronary syndromes vary significantly by area (panel) (Dagenais *et al*., 2020). The proportion of acute coronary syndromes that are ST-segment elevation myocardial infarction (STEMI) is decreasing in high-income countries (HIC), which is probably connected to long-term trends in patient risk profiles, such as declining smoking rates in western Europe and North America and the expanding use of high-sensitivity troponin (hsTn) assays to diagnose non-STEMI (NSTEMI). However, there is still a substantial percentage of in-hospital death in STEMI patients who experience shock, especially when cardiac arrest is involved (Omer *et al*., 2020).

Diagnosis

Clinical symptoms, aberrant ECG findings, and biochemical evidence of myocardial injury are used to diagnose acute coronary syndrome (Thygesen *et al*., 2018). The presence or absence of diagnostic ST-segment abnormalities on the 12-lead ECG is the critical initial branchpoint for a patient who may have an acute coronary syndrome. High-sensitivity troponin (hsTn) assays have significantly improved NSTEACS diagnosis, which includes unstable angina and NSTEMI. This is covered in the section that follows. Using adjunctive diagnostic methods like an ECG or cardiac MRI, individuals with suspected ACS can be identified as having regional wall motion anomalies and other symptoms of myocardial ischemia (Thygesen *et al*., 2018; Alshehri *et al.,* 2022). A comprehensive patient evaluation is required for early risk assessment, the diagnosis of impending hemodynamic collapse, and the mechanical consequences of myocardial infarction, even though physical examination results are often not diagnostic for acute coronary syndromes. Tachycardia, a narrow pulse pressure, hypotension, and other symptoms of blockage (such pulmonary edema) or inadequate perfusion that pose a high clinical risk (cold extremities, for example). The Killip classification divides Acute Coronary Syndrome patients into groups based on the degree of clinical heart failure, from no signs of congestion (Class I) to cardiogenic shock (Class IV), and it strongly predicts mortality (Killip *et al*., 1967). In the event of acute ventricular septal rupture, there will be a loud holosystolic murmur in the left parasternal region; in the event of acute mitral regurgitation, there will be an often quiet systolic murmur; and in the event of acute free wall rupture, there will be symptoms of tamponade (Zeymer *et al*., 2020).

Differential diagnosis

Acute pericarditis, anxiety disorders, aortic stenosis, asthma, dilated cardiomyopathy, esophagitis, hypertensive emergencies in emergency medicine, myocardial infarction, and myocarditis

Evaluation

An ECG is performed as the initial evaluation step to distinguish between STEMI and NSTEMI unstable angina. According to American Heart Association recommendations, an ECG should be taken within 10 minutes of the patient's arrival for any complaints that might indicate an ACS. As soon as STEMI in a center for Percutaneous Coronary Intervention (PCI) is verified, the cath lab should be opened (Luciano *et al*., 2019). Cardiovascular enzymes, particularly troponin and the CK-MB/CK ratio, are crucial for determining if a patient has an NSTEMI or myocardial ischemia without tissue damage (Luciano *et al*., 2019). A chest x-ray can help diagnose conditions like pneumonia and pneumothorax, which are causes other than MI that manifest with chest pain. The same is true for blood tests such as the complete blood count (CBC), chemistry, liver function test, and lipase that can help distinguish between intraabdominal pathology and chest discomfort. Keep pulmonary emboli and aortic dissection in the differential and conduct further testing as necessary.

Treatment

Aspirin (300 mg), heparin bolus, and intravenous (IV) heparin infusion are used as the initial treatments for all ACS if there are no contraindications. Using ticagrelor or clopidogrel as an antiplatelet medication is also advised. The local cardiologist makes the choice. Ticagrelor is not administered to patients receiving thrombolysis. Supportive measures are administered as needed, such as morphine or fentanyl for pain management and oxygen in the case of hypoxia (Duarte *et al*., 2019; Aloufi *et al.,* 2022). You can also use nitroglycerin sublingually or intravenously to relieve discomfort. Nitroglycerine should only be cautiously administered in inferior wall ischemia since it can lead to severe hypotension. It is necessary to monitor the heart continuously for arrhythmias. Whether an ACS is a STEMI, NSTEMI, or unstable angina determines the next course of treatment. A STEMI emergency catheterization and percutaneous intervention (PCI) with a door-to-procedure start time of fewer than 90 minutes is advised by the American Heart Association (AHA) (Gilutz *et al*., 2019). If there is no PCI available and the patient cannot be brought to the catheterization lab in less than 120 minutes, Tenecteplase or another thrombolytic is advised. According to AHA standards, the door-to-needle (TNK/other thrombolytics) time must be under 30 minutes.

NSTEMI/ Controlling unstable angina symptoms is attempted in addition to the initial aspirin and heparin therapy. Urgent catheterization is advised if the patient's pain persists (Gilutz *et al*., 2019). If symptoms are successfully managed, the timing of catheterization and other evaluation procedures, such as a myocardial perfusion study, can be decided on a case-by-case basis based on comorbidities. Admission and an urgent cardiac examination are always required for ACS. Depending on availability and the cardiologist's desire, computerized tomography angiography may also be used for additional workups (Gilutz *et al*., 2019). If there are no contraindications, beta-blockers, statins, and ACE inhibitors should be started as soon as feasible in all ACS cases. Cases that are not amenable to PCI are either taken for CABG (coronary artery bypass graft) or treated medically, depending on the patient's comorbidities and preferences (Gilutz *et al*., 2019; Ahmed *et al.,* 2022).

Risk factors

Worldwide, there are significant differences in acute coronary syndrome incidence, risk factor prevalence, treatment accessibility, and long-term outcomes. Globally, the exposure to all risk factors seems to have remained relatively consistent from 2010 to 2019; however, in LMIC, hyperlipid emia, hyperglycemia, high body mass index, hypertension, and air pollution exposure have all significantly increased during this time (GBD 2019 Risk Factors Collaborators, 2020). Smoking, which contributed to roughly 36% of the population-attributable risks of acute coronary syndrome globally, was one of the most significant modifiable risk factors for acute myocardial infarction, according to the INTERHEART study (Yusuf *et al*., 2004). There are considerable regional differences in the use of tobacco, with some countries in Asia and Eastern Europe accounting for more than 15% of lost disability-adjusted life years (DALYs) and sub-Saharan Africa for a very minor part of lost DALYs (GBD 2019 Risk Factors Collaborators, 2020). Additionally, there is significant regional variation in the association between the risk of cardiovascular disease in LMICs and factors that affect social determinants of health, such as levels of education, socioeconomic position, dietary habits, alcohol use, and physical activity (Dagenais *et al*., 2020). Despite the fact that cardiovascular disease now makes up a smaller portion of the relative disease burden in LMICs than in HICs, the disease burden in these nations is still significant. People who are younger are more susceptible to being affected. It is anticipated to develop quickly and, alarmingly, is associated with significantly higher rates of morbidity and mortality given the rising incidence of risk factors (Dagenais *et al*., 2020).

CONCLUSION

Acute coronary syndrome diagnosis and treatment are constantly evolving. Research is being done to improve risk assessment and diagnostic algorithms, incorporate intracoronary imaging results into treatment plans, develop new lipid-lowering and secondary preventive targets, and remove structural obstacles to healthy living. Disparities in its recognition, administration, and outcomes according to gender, race, and ethnicity must be addressed. Improvements in its detection and treatment in LMIC are also crucial. There is still much to learn about the diagnosis and treatment of the acute coronary syndrome.

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