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A Case Study: Atypical Cardiac Arrest as a Silent Killer

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A B S T R A C T

Introduction. Cardiovascular diseases, particularly acute coronary syndrome (ACS) and cardiac arrest, are significant health challenges, with diabetes mellitus markedly altering their clinical presentation, management, and outcomes. Diabetic patients often present with atypical symptoms, complicating diagnosis and delaying treatment. This case report highlights an atypical presentation of cardiac arrest in a diabetic patient, underscoring the need for heightened clinical vigilance and tailored management strategies.

Case Presentation. A 55-year-old male with a history of type 2 diabetes mellitus, hypertension, and hyperlipidemia, presented to the emergency department with sudden onset of shortness of breath and epigastric discomfort. He denied experiencing chest pain. Initial assessment revealed tachycardia and elevated troponin levels, but no significant ST-segment changes on ECG. Despite these atypical symptoms, he suffered a sudden cardiac arrest characterized by ventricular fibrillation. Immediate resuscitation efforts, including CPR and defibrillation, were successful in achieving return of spontaneous circulation. Subsequent coronary angiography revealed significant stenosis in the left anterior descending artery, which was treated with percutaneous coronary intervention and stent placement.

Conclusion. This case underscores the importance of recognizing atypical presentations of ACS in diabetic patients. The absence of classic chest pain symptoms in diabetic individuals can delay diagnosis and treatment, increasing the risk of adverse outcomes such as cardiac arrest. Prompt recognition, immediate intervention, and comprehensive post-resuscitation care are crucial in managing such high-risk patients. Enhanced awareness and tailored management strategies are essential to improve outcomes for diabetic patients presenting with cardiovascular emergencies.

Keywords: Atypical, Cardiac Arrest, Diabetes Mellitus, Complication

Introduction

Cardiovascular diseases, including acute coronary syndrome (ACS) and cardiac arrest, are leading causes of morbidity and mortality globally. The presence of diabetes mellitus significantly modifies the presentation, management, and prognosis of these conditions. This review synthesizes current knowledge on the interplay between ACS, cardiac arrest, and diabetes mellitus, highlighting the pathophysiology, clinical presentation, and outcomes. Diabetes mellitus accelerates the development of atherosclerosis, which underpins most cases of ACS. Hyperglycemia, insulin resistance, and dyslipidemia contribute to endothelial dysfunction, inflammation, and plaque formation. These plaques are more likely to rupture in diabetic patients, leading to thrombus formation and subsequent myocardial infarction (MI). The American Diabetes Association (ADA) and the American Heart Association (AHA) have noted that diabetes doubles the risk of developing cardiovascular diseases, including ACS and sudden cardiac arrest (SCA).[1,2]

Diabetes modifies the clinical presentation of ACS. Diabetic patients are more likely to experience silent or atypical presentations, such as shortness of breath, fatigue, and gastrointestinal discomfort, rather than the classic chest pain. Studies have shown that silent ischemia is prevalent in up to 40% of diabetic patients with ACS . The presence of diabetic autonomic neuropathy is believed to contribute to this altered symptomatology. The prognosis of ACS in diabetic patients is generally poorer compared to non-diabetic patients. They have higher rates of complications, including heart failure, recurrent MI, and mortality. A meta-analysis by Donahoe et al. (2007) demonstrated that diabetic patients with ACS have a 50% higher risk of in-hospital mortality compared to non-diabetic patients. [3]

Cardiac arrest, particularly sudden cardiac arrest (SCA), is more common in diabetic patients. The mechanisms include increased atherosclerotic burden, left ventricular hypertrophy, autonomic neuropathy, and electrolyte imbalances. The Framingham Heart Study highlighted that diabetic individuals have a 2- to 4-fold increased risk of SCA compared to the general population. Survival outcomes post-cardiac arrest are worse in diabetic patients. A study by Reinier et al. (2015) found that the survival rate to hospital discharge for diabetic patients was significantly lower than that of non-diabetic patients (7.6% vs. 13.4%). This disparity is attributed to the higher incidence of comorbidities and more severe coronary artery disease in diabetic individuals.[4,5]

Management of ACS in diabetic patients requires a multifaceted approach. Tight glycemic control, antiplatelet therapy, statins, and ACE inhibitors are cornerstone treatments. Recent guidelines advocate for aggressive risk factor modification in diabetic patients to prevent ACS. The use of newer antidiabetic agents, such as SGLT2 inhibitors and GLP-1 receptor agonists, has shown cardiovascular benefits, including reduced rates of major adverse

cardiac events (MACE). During and after cardiac arrest, diabetic patients require tailored resuscitation and post-resuscitation care. Studies suggest that diabetic patients benefit from early coronary angiography and revascularization post-resuscitation. Hypothermia therapy and meticulous management of blood glucose levels are crucial to improving neurological outcomes and survival rates. [6,7]

The intersection of diabetes mellitus with acute coronary syndrome and cardiac arrest presents unique challenges in clinical management. Diabetic patients exhibit atypical presentations of ACS, have higher risks of SCA, and poorer outcomes compared to non-diabetic individuals. Aggressive management of cardiovascular risk factors, prompt recognition of atypical symptoms, and individualized post-resuscitation care are essential to improve outcomes in this high-risk population. Future research should continue to explore optimal therapeutic strategies and interventions tailored to the diabetic population.[8,9] This article aims to highlights an atypical presentation of cardiac arrest in a diabetic patient, underscoring the need for heightened clinical vigilance and tailored management strategies.

Case Presentation

A 55-year-old male with a history of type 2 diabetes mellitus (T2DM), hypertension, and hyperlipidemia, was brought to the emergency department (ED) by his wife after experiencing a sudden onset of shortness of breath and epigastric discomfort. These symptoms occurred while he was resting at home and were atypical for him, as he had not experienced such severe symptoms before. He denied any chest pain or angina.

Upon arrival at the ED, The patient was noted to be anxious and diaphoretic. His vital signs showed a blood pressure of 145/90 mmHg, a heart rate of 110 bpm, a respiratory rate of 22 breaths per minute, and an oxygen saturation of 94% on room air. Physical examination revealed no jugular venous distension, normal heart sounds without murmurs, clear lungs on auscultation, and no peripheral edema.

An electrocardiogram (ECG) revealed sinus tachycardia with no significant ST-segment changes. Blood tests showed an elevated troponin I level at 0.8 ng/mL (normal < 0.04 ng/mL), a blood glucose level of 250 mg/dL, and an HbA1c of 8.5%. His lipid profile indicated total cholesterol of 240 mg/dL, LDL of 160 mg/dL, HDL of 35 mg/dL, and triglycerides of 200 mg/dL. A chest X-ray showed no acute pulmonary findings. While in the ED, The patient suddenly lost consciousness and was found to be pulseless. Cardiopulmonary resuscitation (CPR) was initiated immediately. The initial rhythm on the monitor showed ventricular fibrillation (VF). High-quality CPR was provided continuously, and two shocks were delivered, resulting in the return of spontaneous circulation (ROSC). Medications administered included epinephrine 1 mg IV push during CPR and amiodarone 300 mg IV bolus post-ROSC. The patient was intubated and placed on mechanical ventilation, then transferred to the intensive care unit (ICU) for further management. Immediate coronary angiography revealed a significant stenosis in the left anterior descending (LAD) artery, which was treated with percutaneous coronary intervention (PCI) and stent placement.

Discussion

This case underscores several critical aspects of managing cardiovascular disease in patients with diabetes mellitus, emphasizing the complexities and challenges that healthcare providers face. Diabetes mellitus significantly alters the typical presentation of ACS. In non-diabetic individuals, ACS often manifests with classic symptoms of chest pain radiating to the left arm or jaw, accompanied by diaphoresis and a sense of impending doom.[10,11] However, in diabetic patients like The patient, the presentation can be markedly different. This atypical symptomatology can include:

1. Dyspnea (Shortness of Breath): This may be due to left ventricular dysfunction or pulmonary congestion secondary to heart failure.
2. Epigastric Discomfort: Often mistaken for gastrointestinal issues, this symptom can be due to ischemia affecting the inferior wall of the heart.
3. Fatigue and Weakness: General malaise without chest pain can be a sign of significant cardiac ischemia.
4. Silent Ischemia: Some diabetic patients may have significant myocardial ischemia without any perceptible symptoms, leading to delayed diagnosis.[12]

These atypical presentations occur due to diabetic autonomic neuropathy, which impairs pain perception, leading to a lack of typical anginal symptoms. This neuropathy can blunt the typical sympathetic response to myocardial ischemia, making the clinical picture less clear. Diabetes mellitus contributes to cardiovascular disease through multiple pathways:

1. Hyperglycemia: Chronic high blood glucose levels cause endothelial damage, promoting atherosclerosis. Advanced glycation end products (AGEs) formed in hyperglycemia contribute to vascular stiffness and dysfunction.
2. Insulin Resistance: This condition is associated with atherogenic dyslipidemia (high triglycerides, low HDL, and small dense LDL particles), which accelerates plaque formation.
3. Inflammation: Diabetes is a pro-inflammatory state, with elevated levels of inflammatory markers such as C-reactive protein (CRP). Inflammation is a key player in the initiation and progression of atherosclerosis.
4. Oxidative Stress: Increased oxidative stress in diabetes contributes to endothelial dysfunction and plaque instability.
5. Autonomic Neuropathy: This results in altered pain perception, delayed gastric emptying, and impaired cardiovascular reflexes, leading to atypical presentations and silent myocardial ischemia.[13,14]

The patient's initial presentation with shortness of breath and epigastric discomfort, combined with the absence of chest pain, illustrates the diagnostic challenge. This atypical presentation delayed the recognition of an acute coronary event, highlighting the need for a high index of suspicion in diabetic patients presenting with non-specific symptoms. Key Diagnostic Considerations of the patient :

1. ECG Findings: Diabetic patients may not exhibit classic ECG changes associated with ischemia. In The patient's case, sinus tachycardia without significant ST-segment changes necessitated reliance on clinical judgment and other diagnostic tools.
2. Biomarkers: Elevated troponin levels, as seen in The patient, indicate myocardial injury and should prompt further investigation even in the absence of typical symptoms. Serial measurements can help confirm the diagnosis of ACS.
3. Imaging: Although The patient's chest X-ray showed no acute pulmonary findings, advanced imaging techniques like echocardiography or cardiac MRI can be beneficial in assessing cardiac function and detecting wall motion abnormalities indicative of ischemia.[15,16]

Emergency Management and Post-Resuscitation Care. The sudden cardiac arrest experienced by the patient required immediate intervention. The rapid initiation of CPR and defibrillation was crucial in achieving ROSC. The use of epinephrine and amiodarone aligns with current ACLS guidelines for the management of ventricular fibrillation.[17] Post-Resuscitation Interventions for the patient include :

1. Coronary Angiography: Immediate coronary angiography revealed significant LAD stenosis, which was promptly treated with PCI and stent placement. This intervention is critical in restoring coronary perfusion and preventing further myocardial damage.
2. Mechanical Ventilation: Given the need for airway protection and oxygenation post-ROSC, intubation and mechanical ventilation were appropriately initiated.[17]

Long-term management of diabetic patients post-ACS involves aggressive risk factor modification and comprehensive care[18]:

1. Glycemic Control: Optimizing blood glucose levels is paramount. The patient's HbA1c of 8.5% indicates suboptimal control. Intensive insulin therapy or the addition of newer antidiabetic agents like SGLT2 inhibitors or GLP-1 receptor agonists may be considered.
2. Lipid Management: The patient's dyslipidemia requires stringent control. Statin therapy should be maximized, and adjunctive therapies like ezetimibe or PCSK9 inhibitors may be considered for LDL reduction.
3. Hypertension Management: Tight control of blood pressure is necessary. ACE inhibitors or ARBs, along with beta-blockers and diuretics, should be optimized.
4. Lifestyle Modifications: Dietary changes, regular physical activity, and smoking cessation are critical components of care. A multidisciplinary approach involving dietitians, exercise physiologists, and smoking cessation programs can enhance adherence.
5. Pharmacotherapy: Antiplatelet agents (aspirin and possibly P2Y12 inhibitors), beta-blockers, ACE inhibitors or ARBs, and possibly aldosterone antagonists should be part of the regimen to prevent recurrence of cardiovascular events.

Education on recognizing atypical symptoms of ACS is vital. Diabetic patients and their families should be aware of the potential for atypical presentations and the importance of seeking prompt medical attention. Regular follow-up with a cardiologist and endocrinologist is essential for ongoing management and monitoring of cardiovascular and metabolic health. This case highlights the complexities in the diagnosis and management of cardiovascular disease in diabetic patients. Atypical presentations necessitate a high degree of clinical vigilance and comprehensive diagnostic approaches. Immediate and appropriate emergency interventions, coupled with long-term risk factor management, are essential in improving outcomes. This case emphasizes the need for multidisciplinary care and patient education to address the unique challenges posed by diabetes in the context of cardiovascular disease.[19]

This case highlights the need for vigilance in recognizing atypical presentations of cardiac events in patients with diabetes mellitus. Early recognition and intervention are key to improving outcomes in this high-risk population. Comprehensive management, including tight glycemic control and aggressive cardiovascular risk factor modification, is essential to prevent such events. This includes regular monitoring of blood glucose levels, blood pressure, and lipid profiles, as well as lifestyle modifications such as diet, exercise, and smoking cessation. Additionally, the use of cardioprotective medications, such as statins, ACE inhibitors, and aspirin, should be optimized in this patient population to reduce the risk of cardiovascular events.[20]

Furthermore, this case underscores the importance of patient education. Diabetic patients should be made aware of the potential for atypical cardiac symptoms and encouraged to seek medical attention promptly if they experience unusual symptoms. Healthcare providers should also be trained to recognize and manage atypical presentations of ACS in diabetic patients to ensure timely and appropriate care.[21]

Conclusion

In conclusion, the successful management of atypical cardiac arrest in a patient with diabetes mellitus requires a multidisciplinary approach, encompassing prompt recognition, immediate intervention, and long-term risk factor modification. By maintaining a high level of clinical suspicion and employing comprehensive management strategies, healthcare providers can improve outcomes for diabetic patients with cardiovascular diseases.

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