

Acute Stroke in a Patient with Heart Failure: A Case Report

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Abstract

Background: Dilated cardiomyopathy (DCM) is the most common type of cardiomyopathy, usually of multifactorial aetiology, characterised by ventricular dilation and impaired systolic function leading to congestive heart failure.

Aim: To present a case of idiopathic ischemic stroke in a young patient with dilated cardiomyopathy and to emphasise the importance of early recognition and prompt management of neurological complications in heart failure.

Case description: A 36-year-old male was admitted to the Coronary Unit with severe heart failure due to dilated cardiomyopathy (EF 25%) and elevated NT-proBNP levels. Major risk factors included obesity, hypertension, smoking, and dyslipidaemia. On the second day of hospitalisation, the patient developed acute neurological symptoms, and a brain CT confirmed ischemic stroke. Intravenous thrombolytic therapy was administered within the recommended time frame, resulting in complete neurological recovery. Coronary angiography and thrombophilia screening were unremarkable, and the patient was discharged hemodynamically stable on optimal medical therapy.

Conclusion: This case highlights the high morbidity of dilated cardiomyopathy and its potential neurological complications. Early recognition, prompt treatment, and effective risk factor management are essential for better outcomes.

Keywords: heart failure, dilated cardiomyopathy, risk factors

Introduction

Cardiomyopathy is defined as damage to the heart muscle, characterised by structural and functional changes, caused by either acquired or inherited factors (1). There are three types of cardiomyopathies: dilated, hypertrophic, and restrictive (2). Dilated cardiomyopathy is the most common form. It is characterised by ventricular dilatation and consequently, impaired systolic function, presenting as congestive heart failure (3). Decades of research have established the multifactorial aetiology of dilated cardiomyopathy. The most common causes include genetic mutations, autoimmune diseases, acquired infections, and exposure to toxins. Many cases of dilated cardiomyopathy could actually be classified as idiopathic due to the need for a complex array of invasive and non-invasive tests, whose global availability is inconsistent (4). The prognosis for heart failure has significantly improved in recent decades due to ongoing efforts in establishing early diagnosis (5). These advances have led to higher survival rates, improved preventive policies, and better monitoring of patients (6). In Croatia, cardiovascular diseases, as chronic non-communicable diseases, remain the leading cause of death in both genders (7). The burden of these diseases is a major public health issue, carrying consequences such as health costs, disability, and work incapacity (8). The following case presents a 36-year-old patient with idiopathic dilated cardiomyopathy who experienced a stroke during acute decompensation. This case highlights the importance of early recognition and prevention of serious complications in young patients with this condition.

Methods

Study design

This is a case report.

Ethics

The Ethics Committee of the Sibenik - Knin County General Hospital approved the case report in accordance with ethical guidelines, on September 18, 2023 (Class No.: 01-23006/1-23).

The patient provided written consent for the use of personal medical information and for the publication of this report, with anonymity fully ensured.

Data collection

Data were collected on a patient hospitalised at the Sibenik - Knin County General Hospital in September 2023. Information was obtained by reviewing the patient's medical records, clinical course, and outcome.

Case report

A 36-year-old patient was hospitalised in the Coronary Unit of the General Hospital of Sibenik - Knin County under a severe clinical condition of heart failure, with dilated cardiomyopathy as the underlying cause, elevated NTproBNP levels, and significantly impaired left ventricular systolic function (EF 25%). The patient experienced symptoms two weeks prior to hospitalisation, with significant progression immediately before admission. Symptoms included effort intolerance, dull chest pain worsened in a lying position, and nausea on the day of hospital admission. Interestingly, there was no remarkable medical history. An electrocardiogram showed a sinus rhythm at around 100 beats per minute. Chest X-ray revealed an enlarged heart, while laboratory tests showed elevated NTproBNP and D-dimer levels. Given the clinical condition and laboratory findings, the patient was admitted to the Coronary Unit, and targeted treatment and further diagnostic workup began. Echocardiography, the "gold standard" in diagnosing heart failure, revealed significant systolic dysfunction with an ejection fraction of only 25%. Risk factors for cardiovascular disease in this patient included obesity, physical inactivity, hypertension, and smoking. All these risk factors contributed to the deterioration of the existing condition and were predictors of a poor outcome. On the second day of hospitalisation, the patient was found disoriented and confused, conscious but unable to respond verbally. The patient understood commands but could not respond. The clinical picture suggested a new stroke, and a neurological consult led to an urgent brain MSCT, confirming the stroke.

Many studies have provided evidence that patients with heart failure have an increased risk of ischemic stroke compared with the general population, with a prevalence of between 8-11% (9). The most common cause is cardioembolic aetiology, in which thrombus formation occurs due to atrial fibrillation or left ventricular hypokinesia (10). In addition to the causal relationship between heart failure and ischemic stroke, both entities represent manifestations of similar underlying risk factors, such as hypertension and diabetes mellitus (11). A two-way brain-heart interaction is inherent in the pathophysiology of heart failure, where heart failure can be the cause of acute brain injury or acute brain injury can cause or worsen the cardiovascular system (9). Despite a comprehensive diagnostic workup, the acute stroke event in this patient was classified as idiopathic. The patient was successfully treated for stroke according to current guidelines with the aim of achieving reperfusion of the brain tissue. According to the AHA/ASA guidelines for the treatment of acute stroke, the patient received intravenous thrombolytic therapy within the recommended time frame from the onset of symptoms (12). Vital signs were continuously monitored during therapy: blood pressure, heart rate, and oxygenation. The patient was initially disoriented and unable to respond verbally, but after therapy, his orientation and ability to respond verbally gradually improved. Recognition of initial neurological symptoms and rapid response after the end of thrombolytic therapy left the patient without neurological deficits. Invasive cardiological testing showed normal coronary vessels. Tumour detection tests were negative, and thrombophilia tests did not reveal acquired or inherited thrombophilia. For the remainder of the hospital stay, the patient remained hemodynamically and arrhythmologically stable. He was discharged home on optimal medical therapy, which included an SGLT2 inhibitor, a beta-blocker, antiplatelet therapy and a combination of calcium channel blockers and diuretics. As part of further diagnostic workup, and with the goal of uncovering the aetiology of the advanced heart failure.

Discussion

According to the 2021 European Cardiology Society guidelines, acute heart failure (AHF) is described as the sudden or gradual onset of symptoms and/or signs of heart failure, severe enough to require urgent medical intervention, usually resulting in unannounced hospitalisations or emergency room visits (13). The most common cause of heart failure is dilated cardiomyopathy. Since the disease develops multifactorially, with an inherited predisposition combined with certain risk factors, it is often observed in the younger population. Prevalence increases in the thirties and forties but can occur at any age (14). The prognosis is poor and is characterised by heart failure, accompanied by an increased incidence of sudden death. Consequently, the treatment outcome for patients with dilated cardiomyopathy is unpredictable. Modifiable risk factors such as reduced physical activity, excessive body weight, smoking, dyslipidaemia, and hypertension represent an independent risk for worsening existing cardiovascular disease. Therefore, treatment should focus on modifiable risk factors as part of primary and secondary prevention. The focus should be on early recognition of heart failure symptoms such as fatigue, dyspnoea, and oedema so that timely intervention can be made, as symptoms become more pronounced as the disease progresses. Public health policies should aim to reduce the incidence of cardiovascular diseases, reduce hospitalisation rates, and provide more effective treatments that result in a better quality of life for patients (13).

In a pilot study by Pereira Sousa et al. (2021), it was shown that educating patients with chronic heart failure on symptom recognition and self-management (weight monitoring, fluid intake) can significantly improve their ability to self-care, reduce the number of emergency admissions, and improve quality of life. These findings highlight the importance of patients learning to recognise early signs of disease deterioration, as this directly impacts treatment outcomes and reduces the burden on the healthcare system (15).

Currently, 26 million people worldwide live with heart failure, and in the general population, it occurs in approximately 2.0% of people, and each year in Western countries, about 0.20% of new cases are recorded (16). Despite the burden it brings, awareness of the disease remains low. Timely detection of symptoms contributes to a positive treatment outcome even in advanced stages of the disease. Raising public awareness can improve treatment outcomes and save lives (17).

Patients with heart failure are at higher risk for thromboembolic incidents, with heart failure being the second most important risk factor for stroke. In heart failure, there is chronic activation of the sympathetic nervous system, which contributes to disease progression and increases the risk of complications (16). Reduced left ventricular ejection fraction is a strong predictor of stroke in these patients, as is the presence of atrial fibrillation. In contrast, the risk of death increases in proportion to the severity of heart failure.

Ying Hsuan and colleagues conducted a study assessing the long-term risk of stroke in patients with heart failure. They concluded that patients with heart failure are at an increased risk for both ischemic and haemorrhagic stroke. Furthermore, the association between stroke and heart failure was statistically significant and showed a higher incidence of stroke in the younger population (17).

Patients with chronic heart failure are treated according to the current guidelines of the European Society of Cardiology. Therapy includes ACE inhibitors to reduce cardiac workload, beta-blockers to regulate heart rhythm, mineralocorticoid receptor antagonists (MRAs) to prevent excess fluid accumulation, and SGLT2 inhibitors to improve cardiac function. Each therapy is individualised and adjusted to the patient's clinical status with the aim of reducing hospitalisations and prolonging the life expectancy of patients with heart failure (13).

Timely identification of the aetiology of cardiomyopathy is crucial for further

treatment and prognosis of the disease outcome. It can occur as a result of various factors, from genetics to various aetiological agents. Some of them are: myocarditis, most often of viral aetiology, but also of bacterial or autoimmune genesis, which leads to inflammatory damage to the myocardium, and toxic damage (alcohol, cocaine). In addition to the above, metabolic and endocrine disorders such as diabetes mellitus, thyroid dysfunction or nutritional deficiencies can also promote the development of the disease. Despite the above, in a certain number of cases the cause remains idiopathic, i.e. unrecognised (3).

Hereditary cardiomyopathies are heart muscle disorders that can significantly affect the health and quality of life of patients. Although we now know which genetic changes can cause the disease, the application of this knowledge in treatment is still limited. Clinical manifestations often depend not only on a single mutation, but also on a combination of different genetic variations, concomitant diseases and lifestyle habits. Advances in genetics allow the development of therapies tailored to specific genetic profiles, while precision medicine seeks to tailor treatment to each patient in order to make it as effective and safe as possible (18).

Conclusion

Cardiovascular diseases represent a growing public health problem. Heart failure is characterised by the complexity of its aetiology and pathophysiology. Timely detection of disease symptoms contributes to positive treatment outcomes, even in the advanced stages. Raising public awareness can improve treatment outcomes and save lives. The most commonly diagnosed dilated cardiomyopathy leads to a series of risk factors, with genetic predisposition playing a central role in the development of the disease. It can be concluded that the severity of symptoms does not correlate with the severity of the disease but correlates with survival rates.

Declarations

Authors' contributions: All the authors have contributed equally to this work and have read and approved the final version of the manuscript.

Ethics considerations: This study was approved by the Ethics Committee of the Sibenik - Knin County General Hospital (Class No.: 01-23006/1-23).

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Competing interests: The authors declare no conflicts of interest.

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