

Acute Biventricular Failure and Cardiopulmonary Arrest due to Acute Fulminant Myocarditis in Young Patient

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Abstract

A 41-year-old Afro-Caribbean woman presented to the emergency department with three days history of worsening chest pain, electrocardiography revealed mild diffuse ST - segment elevation with poor R wave progression, urgent transthoracic echocardiogram (TTE) has shown severe biventricular global systolic dysfunction and a small pericardial effusion, high-sensitivity troponin T level was 564 ng/ml (TNT), a diagnosis of myocarditis was established and the patient treated with intravenous opiates and glucocorticoids, an hour later, the patient had a cardiopulmonary arrest with pulseless electrical activity. She was received advanced cardiopulmonary life support for 5 minutes, spontaneous circulation returned, while preparing the extracorporeal membrane oxygenation (ECMO), patient had another cardiopulmonary arrest second time around with ventricular fibrillation, although despite prolonged advanced cardiopulmonary life support, unfortunately the patient has passed away. An autopsy Study revealed microscopically subtle interstitial inflammatory infiltrate and oedema throughout the myocardium with a small amount of straw-coloured fluid in the pericardial space. The diagnosis of fulminant myocarditis was reached.

Keywords: Fulminant Myocarditis; Heart Failure; Biventricular Failure

Abbreviations

ECMO: Extracorporeal Membrane Oxygenation; TNT: Troponin T; FM: Fulminant Myocarditis; TTE: Transthoracic Echocardiogram

Introduction

FM is an inflammatory process involving the myocardium and can present in form of acute heart failure. Ventricular systolic dysfunction secondary to acute myocarditis may represent up to 10% of patients with acute-onset of heart failure. Acute fulminant myocarditis can occur as result of several factors like, systemic inflammatory disease, infections, exposure to variety of chemicals and drugs. The clinical course of the disease may present with fulminant or non-fulminant disease. If the patients with FM is intensively treated appropriately in short instance, they can have good outcome and achieve a full recovery, however poor prognosis despite excellent intervention still can be a challenge, these types of patients can rapidly deteriorate, that it is the reason as to why an early recognition and ECMO setting is a cornerstone in management of acute fulminant myocarditis.

The purpose and significance of this study to highlight that high clinical suspicion needed to differentiate between the conditions that may present similar to acute myocarditis in order to achieve effective therapeutic approach.

Case Presentation

A 41-year-old Afro-Caribbean woman presented to the emergency department with three days history of worsening non-exertional chest pain, following an acute respiratory infection and flu-like symptoms. She had no significant past medical or family history of note. Vital signs, heart rate of 145 beats per minute, blood pressure was 120/75 mm Hg, respiratory rate 20, oxygen saturation of 90% on 15L. Other clinical examinations findings were unremarkable. Electrocardiography revealed mild diffuse ST - segment elevation with poor R wave progression with depression of the PR - segments (leads II and a VF).

Urgent TTE showed severe biventricular global systolic dysfunction and a small pericardial effusion. TNT 564 ng/ml (reference range, 0 to 0.014 ng/ml). Based on the above history and Echocardiography findings, a diagnosis of myocarditis was established. The patient was treated with non-steroidal and intravenous opiates. The off-site ECMO (extracorporeal membrane oxygenation) team alerted for advanced circulatory support, an hour later, the patient deteriorated and had a cardiopulmonary arrest with pulseless electrical activity. After she has received advanced cardiopulmonary life support for 5 minutes, spontaneous circulation returned, however, as the team were preparing the ECMO console, patient had another cardiopulmonary arrest with ventricular fibrillation, despite the team effort and prolonged advanced cardiopulmonary life support, patient passed away. An autopsy Study revealed microscopically subtle interstitial inflammatory infiltrate and oedema throughout the myocardium with a small amount of straw-coloured fluid in the pericardial space. There was no evidence of coronary atherosclerosis and no other abnormalities were detected and the diagnosis of acute fulminant, myocarditis has been conformed.

Discussion

Myocarditis is an inflammatory disease of the myocardium caused by various infectious and non - infectious ethology, which can occur as result of several factors like, systemic inflammatory disease, infection, exposure to variety of chemicals and drugs.

Acute FM is rare condition which characterised by specific clinical and cross-sectional pictures that would differentiate it from non-fulminant myocarditis. FM essentially is primary insult whereby microscopic organism or chemicals occupy the myocardium and result in stimulation of myocyte damage, the autoantigens are then released as part of the autoimmune reaction [1].

This immunological responsive has provoked to the account of immunosuppressive therapy to treat FM and to help heart failure treatment [2].

Diagnosis can be difficult due to wide range of manifestation. Viral infections were considered to be main causes in majority of patient with acute myocarditis, but viral genome is detected in the myocardium in about 10 - 20% of patients with active disease however coxsackievirus and adenovirus represent the most common viral causes [3-6].

The true incidence of acute FM is not yet clear in the literature review, in US it's uncommon and according to a single-centre study illustrated the incidence acute fulminant myocarditis in the US is about one case per year [8]. Aggressive treatment upon abrupt recognition of acute fulminant myocarditis is necessary to make good outcome from the disease and approximately 90% can make full recovery with no long-term complications [7,8].

Ventricular systolic dysfunction secondary to acute myocarditis may represent up to 10% of patients with acute-onset heart failure [5,6]. About 6 - 10% of cases of acute dilated cardiomyopathy are due to myocarditis [7-9], and about 20% young adults and athletes present with sudden death as result of myocarditis [10,11].

The commonest presentation of acute FM is sudden-onset heart failure [9]. In contrast to patients with acute non-FM, in whom NYHA class III symptoms are often seen, where patients with fulminant myocarditis commonly present with NYHA class IV symptoms. A lot of patients have symptoms of arthralgia, general malaise and fevers (flu-like disease symptoms) in the first two to four weeks before the acute onset of the disease [12,13].

It's important to carefully differentiate between the conditions that may present similar to acute myocarditis to make effective therapeutic approach. hemodynamic instability specially in a previously healthy person is a distinct feature of acute FM, but the one should cautiously consider and recognise others important differential diagnosis of acute FM.

It's paramount important during the clinical assessment of such patients to recognise the picture of cardiogenic shock and significant hemodynamic instability that represent the first clinical course of the disease in majority of patients along e.g. hypotension, tachycardia, cool and clammy peripheries. In contrast multi-organs failure, intraventricular conduction delays (73% vs 25%), ventricular arrhythmias (27% vs 4%), and depressed left ventricular ejection fraction (41% vs 57%) [14-17].

The initial blood tests of patients with myocarditis may reveal leucocytes, eosinophilia, elevated erythrocyte sedimentation rate, and increased levels of cardiac troponin or of the creatinine kinase MB isoenzyme [18-20].

Cardiogenic shock due to other conditions can present indistinguishable to FM that includes acute myocardial infarction, giant cell myocarditis, sarcoidosis, peripartum and dilated cardiomyopathy [14-16]. Cardiogenic shock related to acute FM associated with chest pain, ST-segment elevation on electrocardiography, with or without increased levels of cardiac enzymes. Urgent revascularization may be necessary to achieve the therapeutic goals and improve outcomes [21].

Radiological investigation is gold standard to aid the clinical diagnosis and management of FM. Echocardiography is considered one of the essential imaging tools to evaluate left ventricular function. It's accessible and first bedside imaging modality to offer valuable information [12].

In current practice, cardiac MRI regarded as the most meticulous non-invasive imaging modality to diagnose myocarditis and to differentiate between fulminant and non-fulminant myocarditis [22-25]. The delay in obtaining cardiac MRI may be due to clinical instability of patients with FM. In patients with risk factors for coronary atherosclerosis, angiography play an important role in ruling out coronary artery disease. Endomyocardial biopsy is the key in reaching the diagnosis of acute FM.

Conclusions

The initial treatment to this condition is supportive care measurements which ideally should be delivered in high dependency or intensive care setting with inotropes, ventricular assist device and mechanical ventilation were available to help stabilising the patient.

The immunosuppressive drugs are still widely used in current practice, but their exact role remain unclear.

Conflict of Interest

I would like to declare that there is no financial interest, or any conflict related to this manuscript.

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