Tubercular granuloma in the myocardium: an autopsy report

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ABSTRACT

Granulomatous myocarditis is a rare disorder of the myocardium, and is usually associated with various inflammatory and autoimmune conditions. We report granulomatous myocarditis in an apparently healthy 58-year-old Indian man, who developed sudden chest pain and died while being escorted to the hospital. At the autopsy, no gross distinct cardiac lesions were observed. The histopathological sections from the left ventricular apex revealed a granuloma comprising a central area of caseous necrosis surrounded by lymphocytes, and epithelioid, plasma and Langhans giant cells. Myocardial tuberculosis was suspected as the underlying aetiology based on the histological features of the granuloma.

Keywords: myocarditis, granuloma, tuberculosis, autopsy

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INTRODUCTION

Sudden cardiac death is defined as death due to cardiac causes, and preceded by an abrupt loss of consciousness within one hour of the onset of acute symptoms, in an individual who may have known pre-existing heart disease, but in whom the time and mode of death are unexpected.[1] The mechanism is generally ventricular tachyarrhythmia. The underlying pathology is usually coronary heart disease in middle-aged and elderly persons. However, it can also be one of the familial well-defined cardiomyopathies, such as hypertrophic or dilated cardiomyopathy, arrhythmogenic right ventricular dysplasia or long QT syndrome.[2]

Myocarditis is an inflammatory disease of the myocardium caused by various infections, autoimmune disorders and toxic agents. It is a major cause of sudden unexpected death in young adults. Granulomatous myocarditis is a rare disease of the heart. Miller suggested the term "granulomatous myocarditis" in cases of sudden death with evidence of myocardial necrosis.[3] Granulomatous myocarditis is reported in tuberculosis, sarcoidosis, fungal infections, syphilis, tularemia, brucellosis, systemic lupus erythematosus, drug hypersensitivity, thyrotoxicosis, thymoma and inflammatory bowel disease. Granulomas are also seen in rheumatoid arthritis, rheumatic fever, and in metabolic disorders, such as Farber's disease and gout. Idiopathic (giant cell) myocarditis is another rare and often fatal disease of unknown aetiology.

We report a case of granulomatous myocarditis, where myocardial tuberculosis was suspected as the underlying pathology. To the best of our knowledge, this is the first reported autopsy case of tubercular granulomatous myocarditis in India.

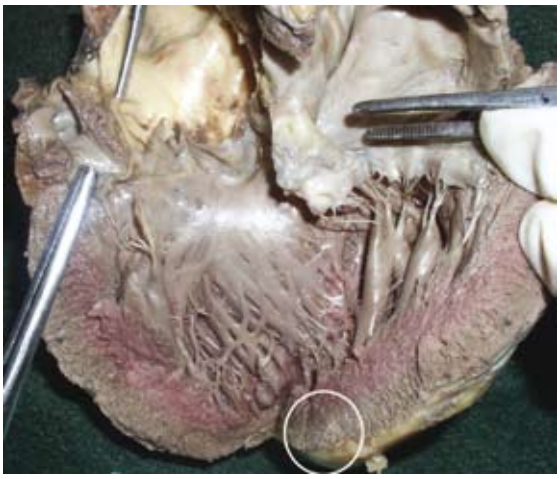

Fig. 1 Photograph shows the left side of the dissected heart which demonstrated tubercular granuloma histologically (circle).

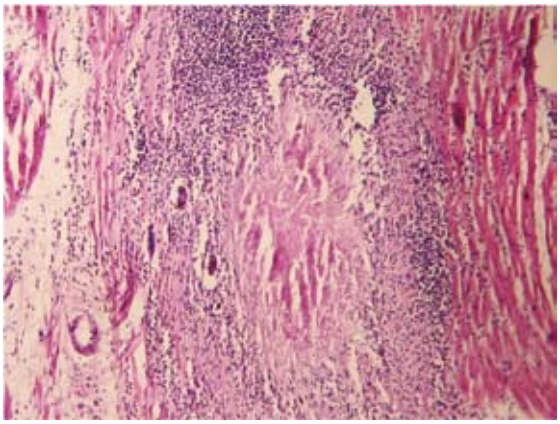

Fig. 2 Photomicrograph shows myocardium with a focus of central caseous necrosis surrounded by epithelioid cells, dense chronic inflammatory cells and Langhans giant cells (Haematoxylin eosin, ×100).

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Table I. Differential diagnosis of granulomatous lesions of the myocardium.

Cause	Diagnostic histological features
Tuberculosis	Caseating granulomatous inflammation, Langhans giant cells
Sarcoidosis	Non-caseating granulomatous inflammation, clustered epithelioid cells
Idiopathic	Non-caseating granulomatous inflammation, diffuse myocardial necrosis, multinucleated giant cells
Syphilis	Necrosis surrounded by granulation tissue, sparse epithelioid cells
Rheumatic fever	Aschoff bodies
Fungal infection	Granuloma with or without necrosis; hyphae and yeasts may be present
Rheumatoid	Rheumatoid nodules
Hodgkin's lymphoma	Reed-Sternberg cell and/or Hodgkin's cell variants

CASE REPORT

A 58-year-old Indian man developed sudden onset of chest pain and died on the way to the hospital. The deceased was a known diabetic who was on oral hypoglycaemics. There was no history of hypertension. The body was subjected to a medicolegal autopsy at the Department of Forensic Medicine, Kasturba Medical College, Mangalore, India.

The deceased measured 166 cm in length and weighed 80 kg. Pedal oedema was present. The internal examination revealed an oedematous brain, which weighed 1300 g. The right and left lungs, which weighed 550 g and 400 g, respectively, were congested and oedematous. The heart weighed 400 g with pericardial fatty infiltrations. The circumference of the tricuspid, pulmonary and mitral valves measured 10 cm, 8.5 cm and 9.5 cm, respectively. The right and left ventricular wall thickness was 0.6 cm and 2 cm, respectively. The papillary muscles in the left ventricle were hypertrophied and the valve cusps were thickened (Fig. 1). The left coronary artery ostium and surrounding aorta showed the presence of atheromatous plaques with narrowing of the ostium. Thoracic and abdominal aortic intimal atheromatous plaques were also present. The liver, weighing 2200 g, had a smooth outer surface and patchy areas of congestion. The spleen weighed 300 g and was enlarged, while the right and left kidneys weighed 200 g each. The cut section was unremarkable.

Histopathology of the heart showed an unremarkable atrial wall, hypertrophy of the left ventricular wall, mild fibrosis of the endocardium and fibromyxoid degeneration of the mitral valve. Sections from the left ventricular apex (Fig. 1) revealed a single granuloma in the myocardium. It comprised a central area of caseous necrosis surrounded by epithelioid cells, lymphocytes, plasma cells and Langhans giant cells (Fig. 2). Acid-fast bacilli (AFB) were not demonstrated. The surrounding myocardium and blood vessels were unremarkable. Sections from the ascending aorta showed Grade III atherosclerosis with narrowing of the coronary ostia. The lung parenchyma was congested and oedematous. Sections from the liver showed focal areas of congestion around the central vein, congested sinusoids, mild fatty change, mild mononuclear inflammatory infiltrates within the portal triads and focal areas of mild fibrosis around the bile ductules. The other organs did not show any significant histopathology, and no primary site of infection was demonstrated. The histopathological impression was tubercular granulomatous myocarditis. There was no evidence of myocardial infarction.

DISCUSSION

Granulomatous myocarditis is a rare disease of the heart characterised by the presence of epithelioid granulomas and varying degrees of chronic inflammation. Tuberculosis and sarcoidosis are the most commonly reported causes of granulomatous myocarditis. Cardiac involvement is usually seen in miliary tuberculosis secondary to lesions elsewhere in the body. Grossly, it appears as a firm, white nodular lesion with the appearance of an infiltrative tumour. Microscopically, it consists of massive caseation necrosis rimmed by epithelioid cells, lymphocytes and Langhans giant cells. Tubercular myocarditis, a form of granulomatous inflammation of the myocardium, can remain clinically asymptomatic with a diagnosis being made at only autopsy.[4] Although AFB are not demonstrable in all cases,[5,6] the presence of mycobacterium tuberculosis DNA complex can be confirmed by using the ligase chain reaction technique.[7,8] Sarcoidosis is a multisystemic inflammation of unknown aetiology commonly affecting the lungs, hilar lymph nodes, heart, liver and spleen.[9] Myocardial involvement occurs in 27% of those suffering from sarcoidosis, a majority of which are discovered during the autopsy.[10] Grossly, it appears as a grayish-white or grayish-yellow fibrous area at the left ventricular outflow tract and the proximal septum. Microscopically, it demonstrates granulomas without central caseation, few peripheral lymphocytes, epithelioid cells and multinucleated giant cells of the

Langhans. Foreign body-type multinucleated giant cells are usually demonstrated.[11] The histopathological findings of granulomas in various conditions are described in Table I.[7] Clinically, granulomatous myocarditis may manifest with atrial fibrillation, ventricular arrhythmia, heart block, congestive cardiac failure and sudden death, although in some cases, the initial symptoms resemble acute myocardial infarction.[12,13]

In the present case, no obvious gross lesions were observed in the heart. A single granuloma was observed during the routine histopathological examination. The possibility of cardiac sarcoidosis was excluded based on the absence of systemic involvement and a non-necrotic granuloma, which is a characteristic feature of sarcoidosis. Other conditions were excluded based on the medical history and the histopathological findings. Negative AFB staining is commonly observed in tuberculosis. Myocardial culture was not attempted as the specimens were already preserved in formalin, while the molecular biological technique for identifying mycobacterium DNA complex could not be done due to the lack of facilities. Although myocardial involvement alone is uncommon in tuberculosis, the absence of other significant lesions in the body and the presence of a granulomatous lesion in the myocardium with characteristic histological features, including massive central caseation necrosis surrounded by epithelioid cells and Langhans giant cells, were highly suggestive of tuberculosis. Marked congestion and oedema of the organs were evident. The presence of granuloma in the left ventricular apex is a rare phenomenon. The cause of death could be ventricular arrhythmia originating from either the apical granuloma or from the underlying coronary artery disease.

In conclusion, tubercular myocarditis could be underdiagnosed antemortem as it may be difficult to diagnose. It should be suspected in patients presenting with arrhythmias who could have been exposed to tuberculosis. If the clinical suspicion is strong and the adjunctive imaging, such as a serial late gadolinium-enhanced cardiac magnetic resonance imaging, is suggestive, an early endomyocardial biopsy is indicated, wherever possible.[14]

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