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Clinical Case Report

"Death at the wheel" due to tuberculosis of the myocardium: a case report

Lorraine du Toit-Prinsloo *, Gert Saayman

University of Pretoria Department of Forensic Medicine, Private Bag X323, Arcadia, 0007, South Africa

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ABSTRACT

According to the World Health Organization, an estimated 9 million people contracted tuberculosis (TB) with approximately 25% of TB cases being from Africa. TB was reported as the number one cause of natural death for the period 2011–2013 in South Africa. The first reported case of myocardial TB was in 1664 by Maurocordat and the first reported case of sudden cardiac death due to TB was made in 1977. We present a case report of myocardial TB in an apparently healthy, 35-year-old male who died suddenly while driving his car. The problems associated with the diagnosis of TB of the myocardium and an overview of the relevant literature is provided.

1. Introduction

According to the World Health Organization, an estimated 9 million people contracted tuberculosis (TB) in 2013, and 1.5 million died from it and approximately 25% of TB cases were from Africa [1]. TB was reported as the number one cause of natural death in South Africa for the period 2011–2013, accounting for 8.8–10.7% of all registered deaths [2].

Generally, the pancreas, thyroid, heart, and skeletal muscle are not afflicted by TB [3]. The first reported case of myocardial TB was by Maurocordat in 1664, followed almost a century later in 1761 in a report from Morgagni [4]. In South Africa, Rose (1987) reported on 19 cases of TB of the myocardium, diagnosed at autopsy over a period of 27 years (representing 0.14% of autopsied deaths) [5]. The first reported case of sudden cardiac death (SCD) due to TB was in 1977 by Behr et al. [6]. In 2012, Liu et al. referred to 7 reported cases in the literature of SCD and TB and proposed criteria for the diagnosis of cardiac TB [7]. We present a case report of myocardial TB in an apparently healthy, 35-year-old male who died suddenly while driving his car. The problems associated with the diagnosis of TB of the myocardium and an overview of the relevant literature are provided.

2. Case report

The body of a 35-year-old adult African male was admitted to our medicolegal mortuary, the deceased having been the driver of a motor vehicle that had apparently inexplicably veered off the road and collided with a tree at relatively low speed. No specific history of prior cardiac problems or other underlying medical conditions could be established.

At autopsy, the deceased was well-nourished, measuring 1.8 m in length and with a body mass of 108 kg. There were no external injuries. Internal examination revealed a grossly enlarged heart with a mass of 540 g, but with only modestly increased epicardial fat deposits. Further dissection revealed extensive, partially confluent yellow to white nodular infiltrates involving the walls of all cardiac chambers. The nodules varied from 5 to 15 mm in diameter and had a firm, rubbery consistency (Fig. 1). Macroscopically, the lungs and kidneys showed no overt signs of disease, but sectioning of the spleen revealed multiple small white parenchymal nodules measuring 1–2 mm in diameter, in keeping with miliary TB.

Histological examination of the heart showed well-formed granulomas that were present in the full thickness of the myocardium on some of the sections. These granulomas consisted of epithelioid histiocytes, lymphocytes and Langhans type as well as multinucleated giant cells with central areas of caseous necrosis. No eosinophils, Aschoff cells or asteroid bodies noted (Fig. 2). Histological examination of the kidneys

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* Corresponding author. Tel.: +27-12-323-5298 (work), +27-83-406-4056 (mobile); fax: +27-12-323-0921.
E-mail address: lorraine.dutoit@up.ac.za (L. du Toit-Prinsloo).

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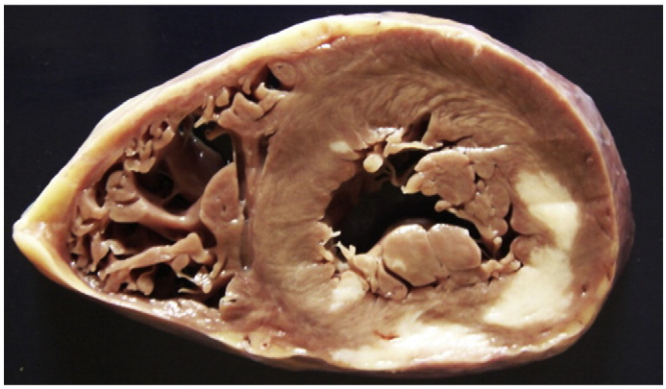

Fig. 1. Macroscopic appearance of the heart (after formalin fixation).

showed no abnormalities with no granulomas present but histology of the lungs and spleen revealed a similar granulomatous inflammatory process as seen in the heart. The histological examination of the lung and spleen is depicted in Figs. 3 and 4. However, multiple attempts at demonstrating acid-fast bacilli from several sites of the myocardium by using the Ziehl-Neelsen (ZN) stain were unsuccessful (Fig. 5). The PAS stain on the myocardial tissue was negative (Fig. 6). ZN staining of the lungs and spleen was also negative. A polymerase chain reaction (PCR) for *Mycobacterium tuberculosis* was further performed on formalin-fixed paraffin-embedded (FFPE) tissue but again a negative result ensued. Despite the negative outcome of the special investigations and based primarily on the macroscopic and histological findings, a final diagnosis of TB with involvement of the myocardium was made.

3. Discussion

The incidence of myocardial TB has not been reliably established. Reasons for relative sparing of the myocardium include reference to the statement by Raviart regarding the protective effect of lactic acid produced by muscular activity of the myocardium [3,8]. According to Wallis et al., TB spreads to the myocardium by one of three methods: direct extension, retrograde spread via lymphatics from the mediastinal lymph nodes, or by hematogenous route (from miliary disease) [9]. In 1935, Horn and Shaphir described three histological types of myocardial TB: a diffuse infiltrative type with numerous lymphocytes and giant cells, a miliary type due to hematogenous spread, and lastly a nodular type (tuberculoma) with a central area of caseous necrosis [4]. Momtahen et al. and Kapoor et al. reported that tuberculomas tend to

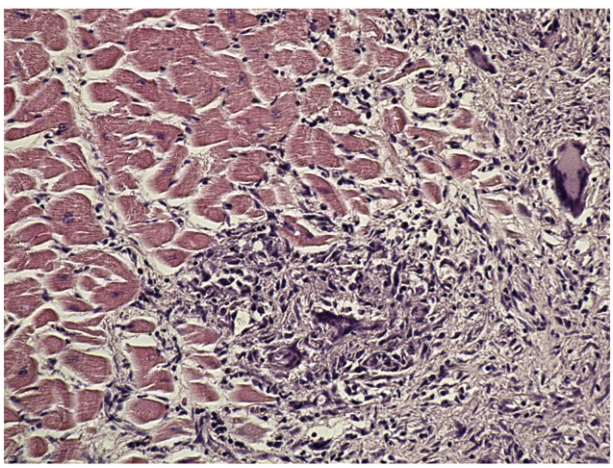

Fig. 2. Histology of the heart.

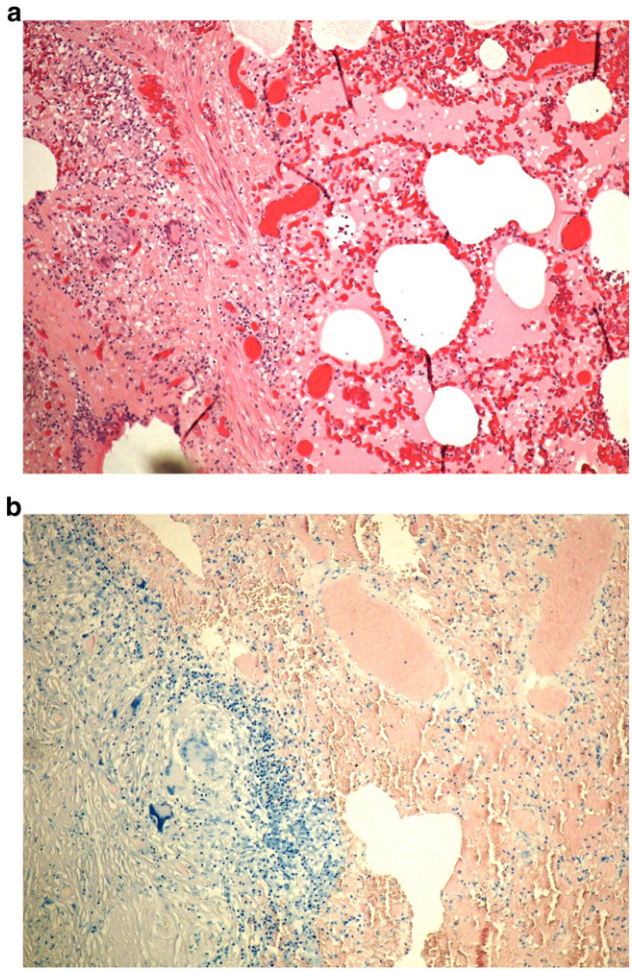

Fig. 3. (a) Histological examination of the lungs. (b) ZN stain of the lungs.

occur more in the right side of the heart, especially involving the atrium [10,11]. Despite the extremely high prevalence of TB in the South African population, TB of the myocardium remains a rarely reported entity. Dada et al. (2000) described a case of sudden death in a 25-year-old who died while playing soccer [12], while Njovane described two further cases in 2009 [13].

Despite the typical histological appearance of TB with granulomata, caseating necrosis and Langhans type giant cells, the confirmatory tests — including ZN staining and PCR — often appear to be inconclusive. Other infective disease processes that could result in granulomata within the myocardium include viral, fungal, and bacterial infections, as well as parasitic infestations and Whipple's disease [14]. Sarcoidosis is more prevalent among females than males. Only 5% of patients with cardiac sarcoidosis have clinical symptoms and, in 40–50% of cases where autopsy will reveal the entity, the diagnosis was made during life [15]. The lesions seen in sarcoidosis consist of a discrete noncaseous granulomata with numerous lymphocytes at the border [15,16]. In cases of idiopathic granulomatous myocarditis, the giant cells seen in the granulomas may be of Langhans or Touton type [14]. Idiopathic giant cell/giant cell myocarditis implies that the lesions are restricted to the heart only [14]. The histological findings consist of poorly formed granulomas with lymphocytes, histiocytes, plasma cells, eosinophils, and multinucleated giant cells. A review by Cooper et al. stated that a mixed inflammatory infiltrate with lymphocytes and histiocytes are deemed diagnostic and that the majority of cases in their review had eosinophils [14,17–20] — no eosinophils were present in the case we describe. The characteristic feature of rheumatic myocarditis includes Aschoff's nodules/bodies that consist of spindle or diamond-shaped