

Review

Patterns and clinical manifestations of tuberculous myocarditis: a systematic review of cases

Brian Nyasani Michira^{1,*}, Faraj Omar Alkizim^{1,2}, Duncan Mwangangi Matheka^{1,2}

¹School of Medicine, University of Nairobi, Nairobi 00100, Kenya, ²Department of Medical Physiology, University of Nairobi, Nairobi 00100, Kenya

^{*}Corresponding author: Brian Nyasani Michira, School of Medicine, University of Nairobi, Nairobi 00100, Kenya

Key words: Tuberculosis, myocarditis, sudden cardiac death

Received: 01/04/2014 - Accepted: 03/02/2015 - Published: 12/06/2015

Abstract

Tuberculosis is a rare cause of myocarditis. It is however associated with a high mortality when it occurs and is often diagnosed at post-mortem. Tuberculous myocarditis prevalence in males is twice that in females. Most of the reported cases of tuberculous myocarditis are predominantly in immunocompetent patients. Out of the reported fatalities (sudden cardiac deaths), eighty one percent (81%) occur in the 'young' patients (below 45years). Antituberculosis drug therapy does not appear to offer mortality benefit against sudden cardiac deaths.

Pan African Medical Journal. 2015; 21:118 doi:10.11604/pamj.2015.21.118.4282

This article is available online at: <http://www.panafrican-med-journal.com/content/article/21/118/full/>

© Brian Nyasani Michira et al. The Pan African Medical Journal - ISSN 1937-8688. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/2.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Introduction

Tuberculosis is endemic in Kenya and is more commonly seen in immunosuppressive states such as HIV/AIDS. Tuberculous myocarditis is however an unusual sequelae, with its prevalence having been reported at 0.14%, 0.2% and 2% in various series [1-3]. Tuberculous myocarditis is mostly diagnosed in association with pericarditis and pericardial effusion. It is mostly asymptomatic but may present with ventricular fibrillation, long QT syndrome, congestive heart failure, dilated cardiomyopathy and even sudden cardiac arrest.

An anatomical predilection for the right-sided mediastinal lymph nodes has been described in this condition, making the right side of the heart the most vulnerable area of the myocardium owing to the potential for contiguous spread [4]. Three distinct forms of myocardial involvement are recognized: nodular tubercles of the myocardium (characterized by central caseation); miliary tubercles of the myocardium (resulting from hematogenous spread); and an uncommon diffuse infiltrative type associated with tuberculous pericarditis (characterized microscopically by giant cells and lymphocytes) [5, 6]. The myocardium may be involved by hematogenous spread, by retrograde lymphatic spread from mediastinal lymph nodes or by direct invasion from the pericardium [7, 8]. The diagnosis can be made by myocardial biopsy if clinical suspicion is strong and echocardiographic findings are suggestive.

Published reports of tuberculosis related sudden deaths between the years 1966 and 2000 showed that most of the cases were due to tuberculous bronchopneumonia (64%) and massive haemoptysis (30%), with a minority of cases due to tuberculous myocarditis [9]. Having a low incidence rate coupled with an insidious onset and progression, TB myocarditis is commonly undiagnosed ante mortem. Studies have shown that many such cases are thereby allowed to progress leading to death and late diagnosis at postmortem.

The low incidence, late diagnosis and under-reporting have with time created a knowledge gap among health care workers. This review therefore seeks to restore awareness among the practitioners, to promote a high index of suspicion for early diagnosis, and thereby timely management of tuberculous myocarditis.

Methods

A PubMed search using the keywords "Tuberculous myocarditis" and "Tuberculosis myocarditis" yielded one hundred and thirty six (136) articles; of which 23 were included as highly relevant to this review with no geographical focus. Articles published between the years 2000 and 2013 were included in the review, which was consistent with an era of revamped efforts and global policies to control and prevent tuberculosis in societies. Articles included were limited to cases of tuberculosis complicated with myocarditis or perimyocarditis. Attention was also given to whether the patients were free from preexisting cardiac comorbidities and to rule out primary tumors or metastases, idiopathic giant cell myocarditis and other granulomatous lesions. Articles without sufficient information to address these issues were excluded from this review. The variable clinical presentations, progression and prevalence of tuberculous myocarditis were reviewed.

Current status of knowledge

The tuberculous myocarditis cases reviewed are predominantly in immunocompetent patients (**Table 1**). Concomitant pulmonary infection was reported in 9 (56%) of the cases. Concomitant pericarditis was recorded in 7 (43%) of the cases. Involvement of other extrapulmonary sites apart from the heart was recorded in 9 (56%) of the cases. Isolated cases of tuberculous myocarditis without involvement of any other organs were 4 (25%) of all reviewed cases. Eleven (68%) of the patients responded well to antituberculosis treatment with 5 (31%) fatalities from sudden cardiac death recorded (**Table 1**).

Tuberculous myocarditis was predominantly reported in the 'young' (below 45yrs), accounting for 81% of the reports. Twice as many males were affected with tuberculous myocarditis as females. There was also a predilection to site of the heart involved, with the left ventricle commonly affected (68%). The right ventricle was affected in 43% of the cases; the right atrium in 37% of the cases; the left atrium in 18% of the cases (**Table 1**).

Of the reported fatalities (sudden cardiac deaths), 80% of the fatalities were females with left ventricular involvement seen in all of these cases. All of the four isolated cases of myocarditis with no other organ involvement were in 'young' (below 45yrs) patients, mainly among males (75%). The most commonly involved extrapulmonary site was the mediastinal lymph nodes followed by the liver (**Table 1**).

Electrical conduction abnormalities in the myocardium seem not to be entirely dependent on serum electrolyte levels. In the case report by Agarwal et al [8], S3 heart sound with sinus tachycardia were recorded with a high serum Ca⁺⁺ of 9.9 mEq/L, whereas in the case report by Jokhdar et al [9], S3 apical gallop with sinus tachycardia were recorded with a low serum Ca⁺⁺ of 6.3 mg/dL. Tuberculous myocarditis seems to only affect the mitral and tricuspid valves causing valvular incompetence. Valvular stenosis is however not observed. The semilunar valves are unaffected (**Table 2**). The antituberculosis regimen was effective for tuberculous myocarditis, improving clinical picture and reducing hospital stay but had no mortality benefit.

Conclusion

Myocarditis related to a recent tuberculosis infection has scarcely been reported in practice. This could be due to the insidious nature of majority of cases and thereby many cases are diagnosed at postmortem. Almost all cases are responsive to anti-tuberculosis drug therapy, but the risk of sudden cardiac death from this condition is not reduced by the treatment hence the need for close monitoring and symptomatic relief of cardiac abnormalities when reported. In tuberculosis endemic areas, a high index of suspicion is necessary in patients presenting with unexplained non-ischemic arrhythmias, congestive heart failure or cardiogenic shock.

Competing interests

The authors declare no competing interest.

Authors' contributions

All authors contributed equally in data review, data analysis and write-up. All authors have read and approved the final version of the manuscript.

Acknowledgments

The authors would like to acknowledge Centres for Health and Education Programmes (CHEPs) for a grant towards journal article processing charges.

Tables

Table 1: pattern and distribution of tuberculous myocarditis

Table 2: clinical manifestations of tuberculous myocarditis

References

1. Alan GR. Cardiac tuberculosis: a study of 19 patients. *Arch of Pathol Lab Med.* 1987; 111(5):422-6. **PubMed | Google Scholar**
2. Auerbach Oscar, Guggenheim A. Tuberculosis of the myocardium. *Quarterly Bulletin of Sea View Hospital.* 1937;2:264. **PubMed | Google Scholar**
3. Kairlej C, Ryan M, Wall P. The organism reported to cause infective myocarditis and pericarditis in England and Wales. *Journal of Infection.* 1996; 32(3):223. **PubMed | Google Scholar**
4. Maeder M, Ammann P, Rickli H, Schoch O. Fever and night sweats in a 22yr old with mediastinal mass involving the heart. *CHEST.* 2003;124(5):2006-9. **PubMed | Google Scholar**
5. Horn H, Saphir O. The involvement of the myocardium in tuberculosis: A review of the literature and report of three cases. *Am Rev Tuberc.* 1935; 32:492-506. **PubMed | Google Scholar**
6. Gautam MP, Sogunuru G, Subramanyam G, Viswanath RC. Tuberculous myocarditis presenting as a refractory ventricular tachycardia of biventricular origin. *Journal of College of Medical Sciences-Nepal.* 2011;7(2):60-6. **PubMed | Google Scholar**
7. Wallis PJ, Branfoot AC, Emerson PA. Sudden death due to myocardial tuberculosis. *Thorax.* 1984;39(2):155-6. **PubMed | Google Scholar**
8. Agarwal N, Sharma SK. Concomitant endobronchial tuberculosis, myocarditis and congestive heart failure. *Ind J Tub.* 2000;47(3):169-70. **PubMed | Google Scholar**
9. Alkhuja S, Miller A. Tuberculosis and sudden death: a case report and review. *Heart & Lung The Journal of Acute and Critical Care.* 2001;30(5):388-91. **PubMed | Google Scholar**
10. Jokhdar HA, Sayed SN, Omar SH. Case Report: tuberculosis presenting as myocarditis. *Med J Cairo Univ.* 2009;77(3):89-92. **PubMed | Google Scholar**
11. Marano L, Dario P, Torta D, Pompili G, Perolo P et al. Echocardiographic features in a case of tuberculous lymphadenitis. *Ital Heart J Suppl.* 2004;5(7):539-543. **PubMed | Google Scholar**
12. Gulati GS, Kothari SS. Diffuse infiltrative cardiac tuberculosis. *Ann Pediatr Cardiol.* 2011;4(1):87-9. **PubMed | Google Scholar**
13. Trilla A, Gonzalez J, Corachan M, Abad C. Clinico-microbiological case: cardiac failure and skin abscess in a young black male. *Clinical Microbiology and Infection.* 2000;6(10):557-8. **PubMed | Google Scholar**
14. Roubille F, Gahide G, Granier M, Cornillet L, Vernhet-Kovacsik H et al. Likely tuberculous myocarditis mimicking an acute coronary syndrome. *Internal Medicine (Tokyo, Japan).* 2007;47(19):1699-1701. **PubMed | Google Scholar**
15. Khurana R, Shalhoub J, Verma A, Assomull R, Prasad SK et al. Tubercular myocarditis presenting with ventricular tachycardia. *Nature Clinical Practice Cardiovascular Medicine.* 2008;5(3):169-174. **PubMed | Google Scholar**
16. Dada MA, Lazarus NG, Kharsany AB, Sturm AW. Sudden death caused by myocardial tuberculosis: case report and review of the literature. *The American Journal of Forensic Medicine and Pathology.* 2000;21(4):385-8. **PubMed | Google Scholar**
17. Silingardi E, Rivasi F, Santunione AL, Garagnani L. Sudden death from tubercular myocarditis. *Journal of Forensic Sciences.* 2006;51(3):667-9. **PubMed | Google Scholar**
18. Amonkar G, Rupani A, Shah V, Parmar H. Sudden death in tuberculous myocarditis. *Cardiovascular Pathology.* 2009;18(4):247-8. **PubMed | Google Scholar**
19. Biedrzycki OJ, Baithun SI. TB-related sudden death (TBRSD) due to myocarditis complicating miliary TB: a case report and review of the literature. *The American Journal of Forensic Medicine & Pathology.* 2006;27(4):335-6. **PubMed | Google Scholar**
20. Desai N, Desai S, Chaddha U, Gable B. Tuberculous myopericarditis: a rare presentation in an immunocompetent host. *BMJ case reports.* 2013 Mar 1;2013. pii: bcr2012007749. **PubMed | Google Scholar**
21. Diaz-Peromingo JA, Mariño-Callejo AI, González-González C, García-Rodríguez JF, Ameneiros-Lago ME et al. Tuberculous myocarditis presenting as long QT syndrome. *European Journal of Internal Medicine.* 2000; 11(6):340-2. **PubMed | Google Scholar**
22. Afzal A, Keohane M, Keeley E, Borzak S, Callender CW et al. Myocarditis and pericarditis with tamponade associated with disseminated tuberculosis. *Can J Cardiol.* 2000;16(4):519-21. **PubMed | Google Scholar**
23. Rodriguez E, Soler R, Juffé A, Salgado L. CT and MR findings in a calcified myocardial tuberculoma of the left ventricle. *J Comput Assist Tomogr.* 2001;25(4):577-79. **PubMed | Google Scholar**

24. Jagia P, Gulati GS, Sharma S, Goyal NK, Gaikwad S et al. MRI features of tuberculoma of right atrial myocardium. *Pediatr Radiol.* 2004;34(11):904-7. **PubMed | Google Scholar**
25. Agarwal R, Malhotra P, Awasthi A, Kakkar N, Gupta D. Tuberculous dilated cardiomyopathy: an under-recognized entity? *BMC Infect Dis.* 2005;5(1):29. **PubMed | Google Scholar**
26. Akhulaifi AM, Carr CS. Right atrial tuberculoma: computed tomography and magnetic resonance imaging. *J Thorac Cardiovasc Surg.* 2007;133(3):808. **PubMed | Google Scholar**
27. Rahat Brar, Abhishek Prasad, Arun Kumar, Maneesh Bagai, Meenakshi Malhotra. Myocardial tuberculosis presenting with congestive heart failure and pulmonary venous occlusion. *European Journal of Radiology Extra.* 2010;74(3):e47-e50. **PubMed | Google Scholar**
28. Mteirek M, Beuret P, Convert G. Tubercular myocarditis: two case reports and review of the literature. *Ann Cardiol Angeiol (Paris).* 2011;60(2):105-108. **PubMed | Google Scholar**

| Table 1: pattern and distribution of tuberculous myocarditis | | | | | | | |
|---|------------------|------------|-----------------------------|------------------------------|---|-------------------------------|---------------------------|
| Author et al | Age (yrs) | Sex | Immunological status | Pulmonary involvement | Extrapulmonary site involved | Area of heart affected | Outcome of therapy |
| Maeder [4] | 22 | M | Competent | Yes | Mediastinal lymph nodes | R. Atrium | Responsive |
| Gautam [6] | 33 | M | Competent | Yes | Lymphadenitis | Biventricular | Responsive |
| Agarwal [7] | 25 | F | Competent | Yes | None | Global chamber enlargement | Fatal (SCD) |
| Agarwal [8] | 28 | M | Competent | Yes | None | Global chamber enlargement | Responsive |
| Jokhdar [10] | 28 | F | Competent | Yes | None | R. Atrium L. Ventricle | Responsive |
| Marano [11] | 65 | M | Competent | No | Lymphadenitis | L. Atrium R. Ventricle | Responsive |
| Gulati [12] | 12 | M | Competent | No | None | Biventricular | Responsive |
| Trilla [13] | 26 | M | Competent | Yes | Skin abscesses | R. Atrium | Responsive |
| Roubille [14] | 53 | M | Competent | Yes | Systemic spread | L. Ventricle | Responsive |
| Khurana [15] | 30 | M | Competent | No | None | R. Atrium R. Ventricle | Responsive |
| Dada [16] | 25 | M | Competent | No | None | L. Ventricle | Fatal (SCD) |
| Silingardi [17] | 33 | F | Competent | Yes | Spleen, liver, lymph nodes | L. Ventricle | Fatal (SCD) |
| Amonkar [18] | 65 | F | Competent | No | Liver | Biventricular | Fatal (SCD) |
| Biedrzycki [19] | 20 | F | Competent | No | None | L. Ventricle | Fatal (SCD) |
| Desai [20] | 28 | M | Competent | No | Ileocecal, mesenteric and mediastinal lymph nodes | L. Ventricle | Responsive |
| Diaz [21] | 32 | M | Compromised | Yes | Liver | Unreported | Responsive |

Legend: SCD= Sudden Cardiac Death, M= Male, F= Female, R= Right, L= Left

| Table 2: clinical manifestations of tuberculous myocarditis | |
|--|---|
| Author et al | Clinical Manifestations |
| Maeder [4] | Large mediastinal mass infiltrating the right atrium and adjacent vasculature, cardiomegaly, arrhythmias, right bundle branch block, sinus tachycardia. |
| Gautam [6] | Refractory ventricular tachycardia. |
| Agarwal [8] | Congestive cardiac failure, cardiomegaly. |
| Jokhdar [10] | Congestive cardiac failure. |
| Marano [11] | Left atrium and right ventricle infiltration by lesions, arrhythmias, *diagnosis reached ex juvantibus. |
| Gulati [12] | Infiltrative nodular masses in outer myocardium and pericardium involving both ventricles and right atrium. |
| Trilla [13] | Mass adherent to the right atrium. |
| Roubille [14] | Mimicking an acute coronary syndrome with elevated troponin Ic and negative T waves on ECG. |
| Khurana [15] | Cardiomegaly. |
| Dada [16] | Sudden cardiac death. |
| Silingardi [17] | Sudden cardiac death. |
| Biedrzycki [19] | Sudden cardiac death. |
| Desai [20] | Congestive cardiac failure. |
| Diaz-Peromingo [21] | Long QT syndrome. |
| Afzal [22] | Pericarditis, cardiac tamponade. |
| Rodriguez [23] | Calcified submitral mass in the free wall of left ventricle, normal sinus rhythm. |
| Jagia [24] | Myocardial tuberculoma of the right atrium with accompanying intracerebral tuberculoma. |
| Agarwal [25] | Cardiomegaly. |
| Akhulaifi [26] | Mass encroaching the right atrium (myxoma and malignancy were ruled out on biopsy). |
| Brar [27] | Congestive cardiac failure. |
| Mteirek [28] | (a) Case 1: Myopericarditis (b) Case 2: Pseudo-infarction complicated with cardiogenic shock. |