Cardiovascular Pathology 23 (2014) 17–20

Contents lists available at ScienceDirect

Cardiovascular Pathology

Original Article

Granulomatous myocarditis in severe heart failure patients undergoing implantation of a left ventricular assist device

Ana Maria Segura [a,*], Rajko Radovancevic [b], Zumrut T. Demirozu [c], O.H. Frazier [c], L. Maximilian Buja [a]

[a] Department of Cardiovascular Pathology Research, Texas Heart Institute at St. Luke's Episcopal Hospital, Houston, TX
[b] Center for Advanced Heart Failure, The University of Texas Health Science Center at Houston, TX
[c] Department of Cardiopulmonary Transplantation, Texas Heart Institute at St. Luke's Episcopal Hospital, Houston, TX

ARTICLE INFO

Article history:
Received 25 October 2012
Received in revised form 13 May 2013
Accepted 27 June 2013

Keywords:
Granulomatous myocarditis
Heart failure
Sarcoidosis
LVAD

ABSTRACT

Background: Granulomatous myocarditis may develop into cardiomyopathy and severe congestive heart failure that requires implantation of a left ventricular assist device (LVAD).
Methods: Left ventricular (LV) core samples were collected from 177 patients with severe heart failure at the time of LVAD implantation, and samples were histologically examined and graded for severity of hypertrophy and fibrosis. Granulomatous myocarditis incidentally seen in a subset of samples was characterized by staining and culturing for mycobacteria and fungi. Various clinical parameters in these patients were analyzed.
Results: Of the 177 LV core samples examined, 6 (3.4%) showed nonnecrotizing granulomatous inflammation in the myocardial wall. Stains and cultures for mycobacteria and fungi were negative. All six patients [three women, three men; five African American, one Asian; mean age, 52±9 years (range, 41–61 years)] had arrhythmias and required an automatic implantable cardioverter defibrillator. Before LVAD implantation, the patients' mean cardiac index was 1.8±0.4 l/min/m^2; cardiac output, 2.9±0.6 l/min; and ejection fraction, 20±2%. One year after LVAD implantation, one patient had undergone heart transplantation. At 2 years, a second patient was transplanted, and one died. At 3 years, a third patient was transplanted and died postoperatively; two patients remained on support. No clinical evidence indicated involvement of other organs or recurrence in the transplanted patients.
Conclusion: The incidental diagnosis of granulomatous myocarditis in our patients indicates that histological study of LV core samples in patients who undergo LVAD implantation may contribute to the diagnosis and be a consideration in the management of the underlying cause of heart failure.
© 2014 Elsevier Inc. All rights reserved.

1. Introduction

Granulomatous myocarditis, characterized by the presence of granulomas in the myocardial wall, frequently progresses to an infiltrative cardiomyopathy. Causes of granulomatous myocarditis include giant cell myocarditis, sarcoidosis, infectious organisms (mycobacteria, fungi, Chagas disease, and syphilis), rheumatic fever, rheumatoid arthritis, and foreign-body giant cell reaction. Differentiating between giant cell myocarditis and sarcoidosis is difficult and requires a detailed clinicopathologic correlation. Giant cell myocarditis is characterized by the presence of multinucleated giant cells and lymphocytes in the myocardium in the absence of well-formed granulomas. On the other hand, cardiac sarcoidosis is pathologically distinguished by nonnecrotizing granulomas. Systemic sarcoidosis usually involves the lungs and lymph nodes; isolated extrapulmonary disease is seen in less than 10% of affected patients [1]. In the United States, only 5% of patients with systemic sarcoidosis have clinical indications of cardiac sarcoidosis [2,3], but autopsy findings show that 25% of patients with systemic sarcoidosis have myocardial involvement [4]. Though it is frequently undiagnosed, cardiac involvement in sarcoidosis is an important prognostic factor that can lead to progressive heart failure or sudden death. About 13% to 50% of deaths caused by sarcoidosis are attributed to cardiac sarcoidosis [5], and the severity of heart failure is one of the strongest prognostic factors in these patients [6,7].

In this study, we describe the unexpected histopathologic diagnosis of granulomatous myocarditis in six patients with severe heart failure who underwent implantation of a left ventricular assist device (LVAD). We also describe the clinical manifestations and severity of the morphologic changes seen in cardiac granulomatous myocarditis, and we review the literature on this topic.

2. Methods

Our study protocol was approved by the institutional review board at St. Luke's Episcopal Hospital. Between October 2003 and October 2010, 177 consecutive patients with severe heart failure underwent

Disclosures: None.
* Corresponding author. Texas Heart Institute, MC 1–283, Houston, TX 77225–0345. Tel.: +1-832-355-7202; fax: +1-832-355-6812.
E-mail address: asegura@heart.thi.tmc.edu (A.M. Segura).

1054-8807/$ – see front matter © 2014 Elsevier Inc. All rights reserved.
http://dx.doi.org/10.1016/j.carpath.2013.06.005

the implantation of a nonpulsatile HeartMate II LVAD (HeartMate II, Thoratec Corp., Pleasanton, CA, USA). Left ventricular (LV) core samples from these patients were collected at the time of LVAD implantation and were evaluated for the extent and severity of remodeling changes. Using our previously established grading system [8], we histologically examined and graded each LV core sample according to the severity of hypertrophy and fibrosis (i.e., perivascular, interstitial, and replacement). For samples in which the presence of granulomatous inflammation was observed as an incidental finding, sections were stained with Grocott's methenamine silver stain for fungal infection and Kinyoun stain for acid-fast bacilli, and cultures for mycobacteria were performed. For the subset of patients with granulomatous inflammation, clinical parameters at the time of implantation were studied, including hemodynamic parameters, arrhythmias, and automatic implantable cardioverter defibrillator (AICD) implantation. None of the patients had an endomyocardial biopsy taken before LVAD implantation.

3. Results

In LV core samples from 6 of the 177 (3.4%) patients, granulomatous myocarditis was seen as an incidental finding on histopathologic examination. This subset of patients comprised equal numbers of men and women who were 52±9 years of age (range, 41–61 years) and primarily African American (AA) (Table 1). All of these patients were originally listed as bridge to transplant. LV core samples from these patients showed nonnecrotizing, noncaseating, granulomatous inflammation in the ventricular wall that was characterized by ill-defined granulomas containing multinucleated giant cells, histiocytes, and adjacent chronic inflammatory infiltrate. This infiltrate was composed mainly of lymphocytes and had very few eosinophils (Fig. 1). For all 6 samples, Kinyoun staining was negative for acid-fast bacilli, and Grocott's methenamine silver stain was negative for fungi. The myocardium surrounding the granulomatous inflammation showed reactive moderate cardiomyocyte hypertrophy and mild interstitial and perivascular fibrosis. Based on the finding of noncaseating granulomas with multinucleated giant cells surrounded by a mononuclear infiltrate in the absence of microorganism involvement, we diagnosed these patients as having granulomatous myocarditis consistent with sarcoidosis. All LV core samples showed remodeling changes similar to those found in other terminal heart failure patients on LVAD support: moderate to severe hypertrophy and interstitial/perivascular fibrosis, with variable replacement fibrosis (Table 2). The explanted hearts and LV core samples showed similar hypertrophic changes, but the explanted hearts showed more total fibrosis. After a patient was diagnosed with sarcoidosis, acid-fast bacilli and fungi cultures were performed on sputum, blood, pleural liquid, central spinal fluid, and a sample from the LVAD pocket or driveline; all tests were negative.

At the time of LVAD implantation, the mean cardiac index in these patients was 1.8±0.4 l/min/m^2; cardiac output, 2.9±0.6 l/min; LV ejection fraction, 20±2%; creatinine, 1.9±1.6 mg/dl; and total bilirubin, 1.3±0.8 mg/dl. The hemodynamic parameters of these patients were similar to those of other heart failure patients undergoing LVAD implantation. All six patients had arrhythmias and required an AICD before LVAD implantation (Table 1). One year after LVAD implantation, one patient had undergone heart transplantation, and five remained on support. At 2 years, a second patient had received a transplant, and one patient had died (after 17 months on LVAD support) of an intracerebral hemorrhage and bilateral subarachnoid hemorrhages. At 3 years, a third patient had received a transplant (after 27 months on LVAD support) but died immediately afterwards after developing a coagulopathy with massive bleeding in the chest and acute circulatory collapse, and two remained on support. No clinical evidence indicated the involvement of other organs or recurrence in the transplanted patients.

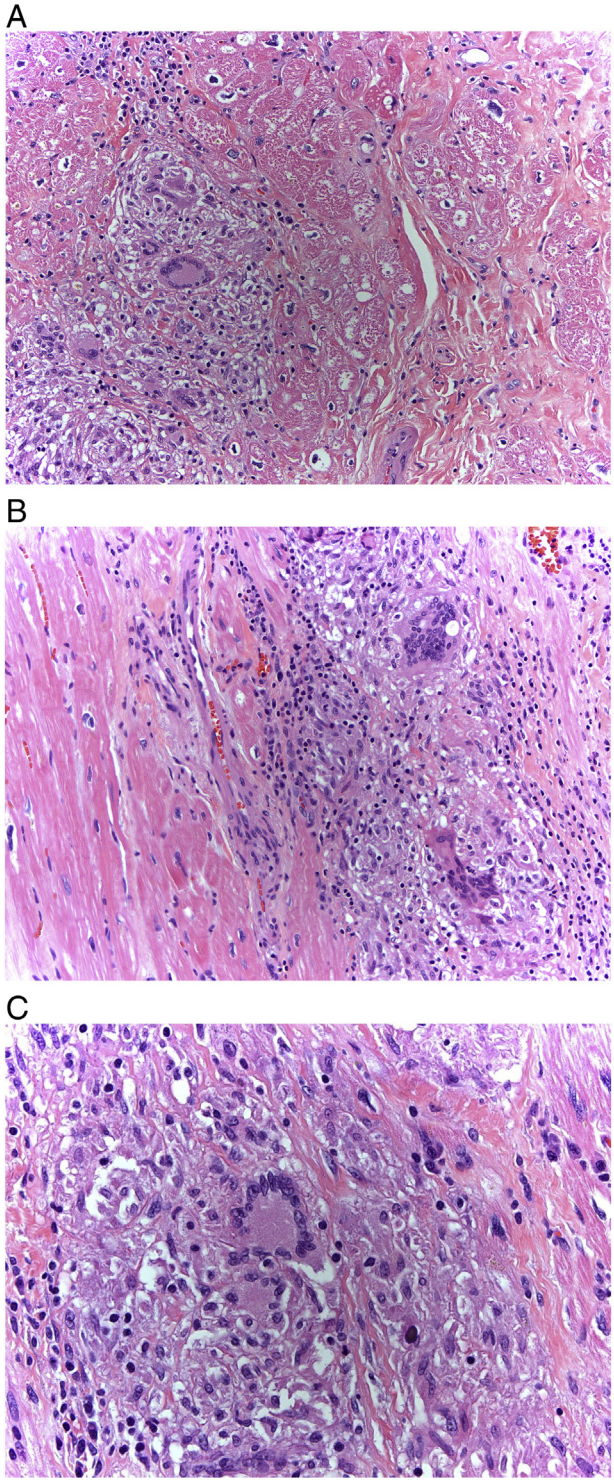

Fig. 1. Hematoxylin and eosin–stained microscopic sections of left ventricular core showing (A, B) nonnecrotizing granulomatous inflammation in the myocardial wall surrounded by reactive cardiomyocytes (10x) and (C) nonnecrotizing granuloma with multinucleated giant cells, histiocytes, and plasma cells (20x).

4. Discussion

We have described the incidental diagnosis of granulomatous myocarditis consistent with sarcoidosis in six patients with severe heart failure who required LVAD implantation. The initial diagnosis of cardiac sarcoidosis is generally only made from an endomyocardial biopsy or at autopsy. Thus, our incidental findings highlight the importance of histologically examining LV core samples from patients

Download English Version:

https://daneshyari.com/en/article/2898717

Download Persian Version:

https://daneshyari.com/article/2898717

Daneshyari.com