

Case Report

## Acute necrotizing eosinophilic myocarditis in a young woman

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Received January 21, 2011; accepted June 8, 2011

### Abstract

Eosinophilic myocarditis is recognized by severe heart failure and marked eosinophilia infiltration resulting from different etiologies. Acute necrotizing eosinophilic myocarditis, the initial presentation of the disease, is rare and often fatal, with unique echocardiographic pictures, and followed by endocardial thrombosis and chronic endomyocardial fibrosis. We report a young female with acute lymphoblastic leukemia who presented fever and acute heart failure syndrome. The echocardiography showed severe left ventricle diastolic dysfunction with preserved ejection fraction. Systemic eosinophilia and the unique echocardiographic images made the diagnosis of acute necrotizing eosinophilic myocarditis. The patient survived after intensive cytotoxic chemotherapy including high-dose steroid. Copyright © 2012 Elsevier Taiwan LLC and the Chinese Medical Association. All rights reserved.

**Keywords:** acute lymphoblastic leukemia; acute necrotizing eosinophilic myocarditis; eosinophilic myocarditis

### 1. Introduction

Eosinophilic myocarditis is a unique cause of myocarditis, usually presenting progressive heart deterioration and evidence of eosinophilia.<sup>1</sup> It may be secondary to leukemia, parasite infection, allergic disease, granulomatous disease, connective tissue disease, vasculitis such as Churg-Strauss syndrome, or primary hypereosinophilic syndrome.<sup>2</sup> The clinical picture ranges from asymptomatic endocardial infiltration and fulminate myocarditis to chronic restrictive cardiomyopathy with or without apical thrombus formation. Initially, the eosinophil infiltration produces endomyocardial necrosis, inflammation and arteritis, representing acute

necrotizing eosinophilic myocarditis. Then, the second thrombotic phase and chronic endomyocardial fibrosis subsequently follow.<sup>3</sup> Definite diagnosis is based on endomyocardial biopsy; however, unique echocardiographic picture with eosinophilia is essentially diagnostic.<sup>4</sup>

### 2. Case report

A 24-year-old Filipino woman was admitted due to fever and back soreness for several days. There was no symptom or sign related to heart failure at admission. Dry cough, orthopnea, and leg edema were first noted and progressing since the second day of admission. Acute pulmonary edema was also evident in the chest film and rapidly progressed to respiratory failure. She was intubated on the third day. New systolic murmur at apex was heard during auscultation. Blood tests showed leukocytosis of  $75.8 \times 10^9/L$  (normal range  $4-10 \times 10^9/L$ ), profound eosinophilia of  $60.64 \times 10^9/L$  (normal range  $50-350 \times 10^9/L$ ), elevated cardiac enzymes

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including creatine kinase (CK; 914 U/L, normal range <160 U/L), CK-MB (17 U/L, normal range <16 U/L), and troponin-I (10.3 ng/ml, normal range <0.034 U/L). The patient's electrocardiogram (ECG) revealed low voltage in limb leads and poor R-wave progression in precordial leads. Pulmonary artery wedge pressure was 39 mmHg, and the cardiac index was 4.42 L/min/m<sup>2</sup> under inotropic agent support. Transthoracic echocardiogram (TTE) showed an unusual thickening and high echogenicity of the endocardium, which was asymmetrically distributed at the basal part of the posterior wall and lateral wall of the left ventricle (LV). The anterior wall of the LV, the interventricular septum and the right ventricle (RV) were relatively spared. The posterior leaflet of the mitral valve was also involved, resulting in moderate eccentric mitral regurgitation. Pulse-wave Doppler imaging of mitral inflow demonstrated that the ratio of E wave to A wave was high and the deceleration time was short. The restrictive mitral inflow pattern suggested severe diastolic dysfunction (Fig. 1). The chamber sizes were normal, and the LV systolic function was preserved. There was no thrombus at the apex of the LV or RV. By profound eosinophilia and the unique echocardiographic picture, acute necrotizing eosinophilic myocarditis was diagnosed.

Intensive chemotherapy including high-dose steroid and antibiotics were prescribed soon after acute lymphoblastic leukemia was diagnosed by bone marrow biopsy.

Hemodynamics was supported by inotropic agent. The patient survived after neutropenic sepsis following chemotherapy, and was discharged in 2 months.

### 3. Discussion

Eosinophilia, which is caused by many diseases, can involve multiple organs,<sup>5</sup> including the heart, characterized as eosinophilic cardiomyopathy.<sup>6</sup> It was first discovered in 1936 by Löffler and called “fibroplastic parietal endocarditis with blood eosinophilia”. Heart involvement usually happens in eosinophil counts exceeding  $1.5 \times 10^9/L$  for at least 6 months.<sup>3</sup> As described by Löffler, the subacute and chronic forms of eosinophilic myocarditis, characterized by variable degree of fibrosis and thrombosis and chronically progressive heart failure, are more well-known. Cytotoxic agents and corticosteroid may improve outcome in these patients.<sup>7</sup> In contrast, acute necrotizing eosinophilic endocarditis, the initial presentation of eosinophilic myocarditis, is extremely rare and is always fatal as a medical emergency.<sup>8</sup> Eosinophil infiltration and degranulation causing profound necrosis and arteritis are the hallmarks in the disease.<sup>9</sup> No effective treatment is proven yet. Cardiac support and treating the underlying disease is generally considered.

The hallmarks of echocardiography of eosinophilic myocarditis are endocardial infiltration, apical thrombus

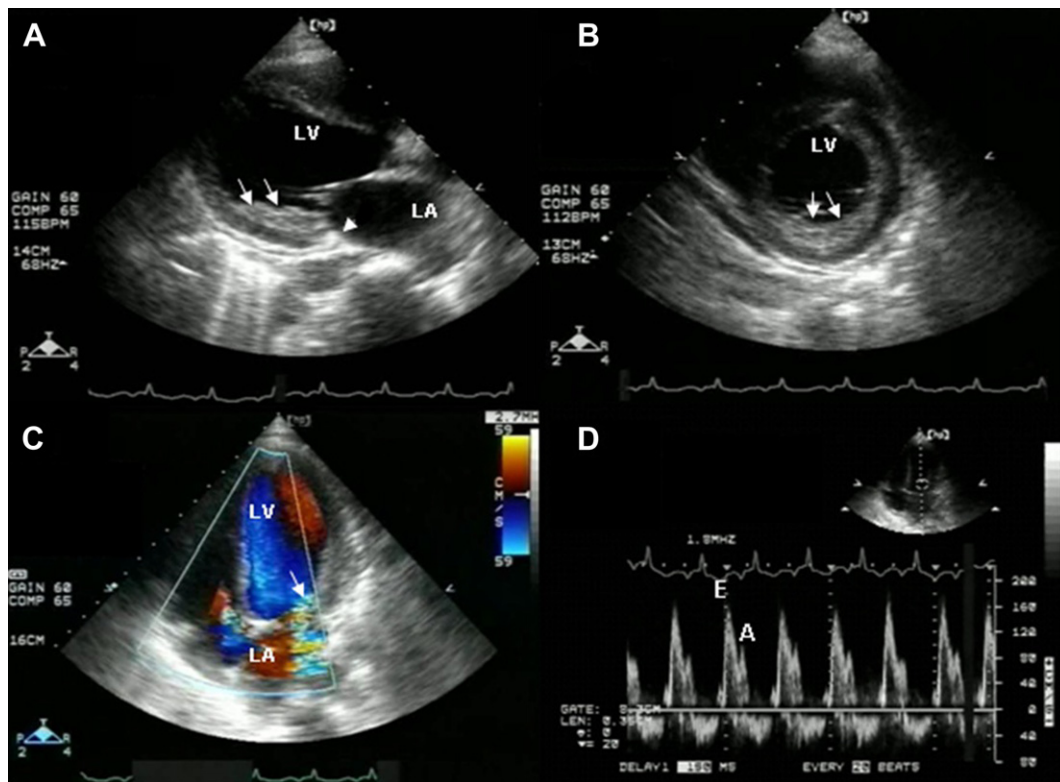


Fig. 1. Echocardiography of the patient. (A) Parasternal long-axis view showed a localized thickening endocardium with high echogenicity, mainly in the basal-posterior segment (arrow) and involved posterior leaflet of the mitral valve (arrowhead). (B) Parasternal short axis view showed the asymmetric endocardial infiltration (arrow), predominantly on the posterior wall, extending to inferior and lateral wall. (C) The color Doppler image of apical four-chamber view showed moderate eccentric mitral regurgitation (arrow). Note the endocardial infiltration of LV lateral wall also involved the posterior leaflet of the mitral valve. (D) Pulse-wave Doppler of mitral inflow. The E/A ratio was about 2 with short deceleration time, which suggested severe diastolic dysfunction.

formation and endocardial fibrosis as the disease progresses.<sup>10</sup> The geometrics of heart involvement is uniquely confined to the LV basal segment of the posterior wall, and further impairs the motion of the posterior mitral leaflet to cause eccentric mitral regurgitation. Diastolic dysfunction is always seen, and restrictive cardiomyopathy is evident in the chronic stage. The image of eosinophilic myocarditis in the chronic stage is well documented, characterized by the obliteration of the apex in RV or LV by thrombosis and fibrosis.<sup>2</sup> However, reports in the literature of acute necrotizing eosinophilic endocarditis are extremely rare. In our case, the endocardium of RV and interventricular septum were spared, and LV endocardial biopsy in the hemodynamically unstable patient was very risky. Noninvasive TTE showed a specific and typical picture without thrombus or fibrosis. Combined with the rapidly progressive cardiac course and systemic eosinophilia, the diagnosis of acute necrotizing eosinophilic cardiomyopathy is convincing without endomyocardial biopsy.

No randomized controlled trial has yet evaluated the treatment of eosinophilic myocarditis. Some observational trials reported that high-dose steroid and cytotoxic agents may be beneficial.<sup>11</sup> The experience of treating acute necrotizing eosinophilic cardiomyopathy is more limited. The therapy is usually focused on cardiac support and the underlying etiology of eosinophilia. Some literature reported dramatic improvement after steroid treatment.<sup>12</sup> However, due to the rapidly progressive course and diagnostic difficulty, many patients were diagnosed by autopsy without prompt treatment before their death. Quick and correct diagnosis is essential to treat the disease and prevent fatality, but is rarely achieved. Thus, endocardial biopsy should not be delayed if the imaging is not diagnostic with clinical suspicion.<sup>13</sup> In our patient, typical echocardiography provided precise diagnosis in a noninvasive manner, and made the strong link between clinical heart failure and acute lymphoblastic leukemia-related eosinophilia. It was also an important guide for the therapy in the initially fulminant course.

In conclusion, acute necrotizing eosinophilic myocarditis is extremely rare, with poor prognosis. It should be suspected in all patients with eosinophilia and unexplained heart failure, especially with a rapidly progressive course. To identify the unique echocardiographic picture helps produce the diagnosis early and may improve outcome. The case we have presented showed a typical clinical course and specific imaging.

Although rare, the echocardiographic image brought a strong clue to the diagnosis and lead to successful treatment in our case.

## Acknowledgments

This study was supported in part by the National Science Council Grants, 98-2314-B-075A-010-33-MY2, 98-2314-B-075A-011-MY2, Taipei, Taiwan, and by the Yen Tjing Ling Medical Foundation (CI-97-12), Taipei, Taiwan, ROC.

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