Int J Clin Exp Med 2020;13(9):6923-6926
www.ijcem.com /ISSN:1940-5901/IJCEM0110209

Original Article

Silent myocardial infarction in acute hypereosinophilic syndrome: can we rely on a small corticosteroid dose? A case report

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Received March 2, 2020; Accepted July 4, 2020; Epub September 15, 2020; Published September 30, 2020

Abstract: Hypereosinophilic syndrome (HES) is a complex and unpredictable disease in which early diagnosis is crucial to achieve good treatment results. We present a rare case of recovery from acute HES with myocardial infarction treated with low-dose corticosteroids and antiplatelets only. A 43-year-old man presented with acute HES and acute myocardial infarction which we diagnosed using thallium-201 myocardial perfusion imaging. Coronary angiography revealed a coronary vasospasm. The eosinophil count was effectively alleviated after corticosteroid and antiplatelet therapy was started. We used low-dose steroids to effectively improve the complications of myocardial infarction caused by HES. Myocardial infarction in the curse of acute HES is silent and needs to be accurately diagnosed and treated with low doses of corticosteroids and antiplatelets in the early stage.

Keywords: Corticosteroid therapy, hypereosinophilic syndrome, myocardial infarction, non-ST segment elevation, cardiac involvement

Introduction

Hypereosinophilic syndrome (HES) is a relatively complex and unpredictable disease in which early diagnosis is important to achieve good treatment results. HES is characterized by persistent eosinophil overgrowth and organ damage due to eosinophil infiltration, provided that another cause of the organ damage is ruled out. The criteria for HES are as follows: 1. Absolute eosinophil count ≥ 1500/μL in the peripheral blood on two examinations (measuring interval > 1 month) and/or nucleated cell count eosinophil ratio ≥ 20% in bone marrow aspiration and/or pathologically confirmed tissue addiction; 2. Significant infiltration of acid granulocytes and/or significant deposition of eosinophil granule proteins (with or without significant tissue eosinophil infiltration); 3. Signs of organ dysfunction attributable to eosinophilia [1].

HES associated with heart disease has highly variable clinical manifestations, such as cardiogenic shock, myocardial infarction, or other clinical manifestations [1, 2]. Three different stages of cardiac-related diseases associated with eosinophilia are currently known: the acute necrosis stage, the thrombotic stage, and the fibrotic stage. We present a case of acute myocardial infarction occurring in the course of HES and diagnosed using thallium-201 myocardial imaging and coronary angiography. Patient informed consent was obtained to publish this case report.

Case report

A 43-year-old male worker from Taiwan was transferred to our hospital in September 2017 because of longstanding bronchial asthma and peptic ulcers. The patient presented with intermittent shortness of breath and general weak-

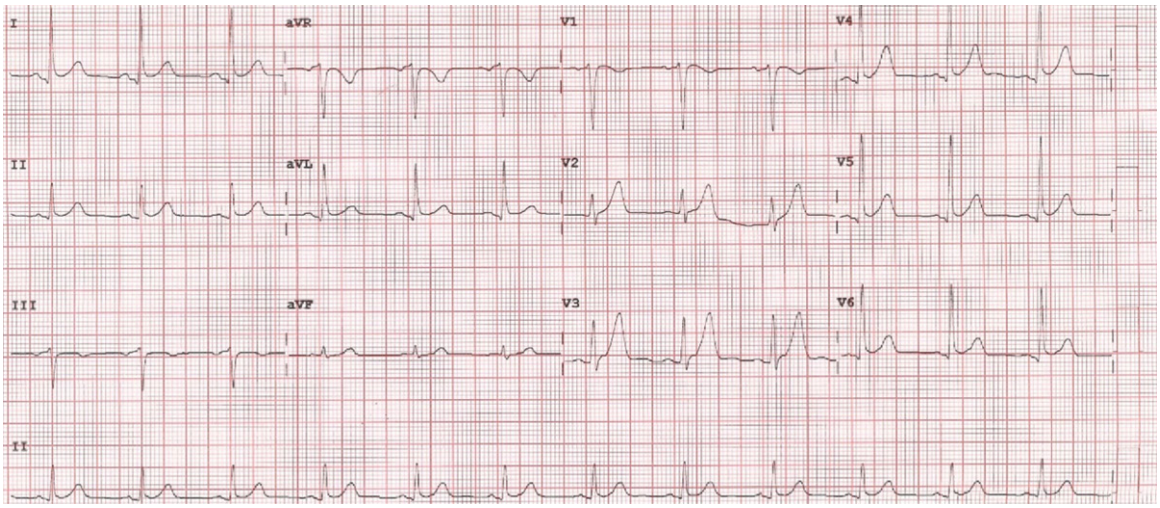

Figure 1. An electrocardiogram showing minor ST elevation in the V2-V3 lead associated with hyperacute T-waves.

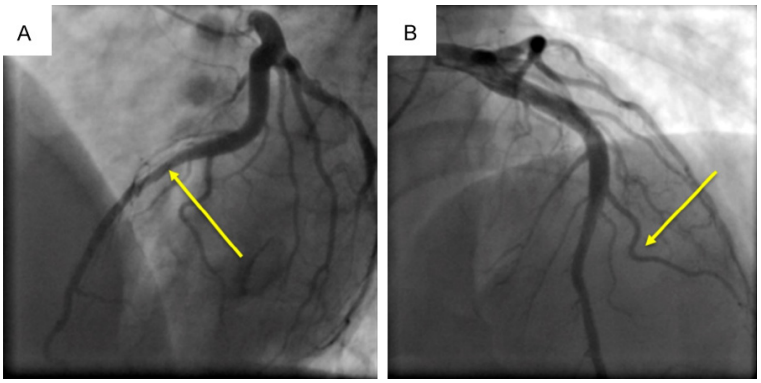

Figure 2. A coronary angiography showing 40% of the systolic stenosis (myocardial bridging) in the middle third of the left anterior descending artery (A), and dilatation with irregularities of the lumen of the diagonal branch of the left anterior descending artery (B).

ness for two weeks. He denied any previous surgery and his family history was unremarkable. His blood pressure was 121/82 mmHg, his pulse rate was 81 beats/min, and his body temperature was 36.4°C. The physical examination was unremarkable. Laboratory tests showed an increased white blood cell count (27.150/mL) with 13.0% neutrophils, 9.0% lymphocytes, and 76.0% eosinophils (absolute eosinophil count, 20.634/mL), and increased levels of creatine phosphokinase (CPK, 494 U/L, normal range 10-160 U/L) and high-sensible troponin-I (66.6 pg/mL, normal range < 26.2 pg/mL). Chest radiography revealed mild cardiomegaly, and an electrocardiogram (ECG) revealed sinus tachycardia and hyperacute T-waves in V2-V3 (**Figure 1**). Transthoracic echocardiography showed left atrial enlargement with normal systolic function (left ventricular ejection fraction: 85%). Thallium-201 myocardial perfusion imaging showed mild to moderate myocardial ischemia in the anterior wall and mild myocardial ischemia in the apical region and apical inferior wall. The patient was diagnosed with non-ST segment elevation myocardial infarction. Coronary angiography revealed a single-vessel-disease due to myocardial bridge and coronary ectasia (**Figure 2**).

Follow-up laboratory tests showed a decrease in the serum CPK level to 468 U/L. Several tests were performed due to the suspicion of HES. On day 8 of the patient's hospitalization, no evidence of single or malignant hematologic disease was found in a bone marrow biopsy, lymphoma phenotype testing, or abdominal computed tomography. Serum antinuclear antibodies were negative, and the patient did not meet the diagnostic criteria for an immune disease. Acute HES with myocardial infarction was diagnosed based on the clinical findings and test results. Low-dose prednisolone (10 mg daily) combined with antiplatelet therapy (clopidogrel 75 mg/day) was prescribed. After the second week of hospitalization, the patient's condition improved, his local left ventricular function returned to normal, and he was discharged. He is currently undergoing regular surveillance and remains disease free at 21 months after the dis-

charge. At the follow-up examination, the patient still felt well, and the general clinical examination, subsequent chest radiography, and ECG revealed no significant findings under corticosteroid therapy.

Discussion

Cardiac manifestations of HES are not particularly evident, especially in the pre-onset stage [1-4]. HES can manifest as chest pain, arrhythmia, heart failure, or cardiogenic shock [1, 2, 5-7]. Among patients with HES, as was our patient, the main cause of morbidity and mortality is often related to the myocardium damage. According to the pathophysiological mechanism of eosinophil expansion, HES can be further subdivided into neoplastic, reactive, and idiopathic types [1, 3, 4, 6, 8]. In neoplastic HES, there is a clonal eosinophil expansion triggered by stem cells, eosinophils, or myeloid tumors. Reactive HES is a polyclonal form caused by parasitic infections, drug allergies, and excess eosinophils seen in certain solid tumors and lymphocyte variants of HES.

The HES diagnostic criteria include organ dysfunction defined as eosinophil-associated organ damage induced by eosinophils. HES may be associated with one or more of the following conditions: (1) cutaneous erythema, edema/angioedema, ulcer, or eczema (2) fibrosis, (3) the presence or absence of thrombosis and thromboembolism; (4) peripheral or central neuropathy with recurrent neurological deficits; and (5) other less-common organ manifestations [1, 4, 7]. In our patient, the bone marrow biopsy and flow cytometry did not reveal any signs of lymphoid hyperplasia. In addition, familial eosinophilia is a rare form of hereditary HES that usually manifests in the early stage. However, our patient did not have a family history of eosinophilia. The heart signs and symptoms in the early stages of HES may be concealed and ignored by clinicians in the emergency department.

Although our patient did not present any specific symptom or sign of HES, the level of high-sensible troponin-I, one of the markers of myocardial injury, was significantly increased. The other imaging examinations were normal, except for the thallium-201 myocardial perfusion image scan; additionally, the cardiac catheterization revealed significant coronary abnormalities. HES combined with acute myocardial infarction was diagnosed according to the clinical and paraclinical findings.

The most interesting fact was that patient's condition improved after two weeks of corticosteroid treatment. Furthermore, the corticosteroid dose was relatively low compared to those reported by previous studies on cardiac involvement in HES, in which the corticosteroid dose ranged from 1 mg/kg prednisolone to 500 mg methylprednisolone daily, or 1 g per day for 3 days [9-11]. We found that there is currently no strong evidence that high-dose steroids can significantly improve the current manifestation. Therefore, we choose low-dose steroid therapy in the clinical treatment to avoid the side effects caused by high-dose steroids, which include poor control of blood pressure and blood sugar and an increased risk of infection.

According to recent relevant research, corticosteroid therapy is considered the first-line treatment in HES [1, 3, 7, 10-12]. Several studies have reported the efficacy of corticosteroids in the treatment of acute coronary syndrome associated with hypereosinophilia [9, 11]. However, there is still controversy about the right dosage of corticosteroids in HES. Corticosteroids can significantly inhibit coronary artery spasm recurrence, relieve inflammation, and inhibit coronary spasms and arterial hyperactivity. In view of the current treatment of HES, it remains to be elucidated whether the first-line corticosteroid treatment should be combined with immunosuppressive drugs. However, antithrombotic therapy is still necessary due to the possibility of thromboembolism development in the course of HES. A consensus is needed for the treatment response criteria and the subsequent parameters. In this case, the patient's subjective and clinical symptoms were not particularly evident or specific. HES was suspected based on early laboratory tests and was confirmed by the presence of cardiac involvement diagnosed by the thallium-201 scan and the coronary angiography. Finally, HES with myocardial infarction was diagnosed. This case highlights the fact that common diseases may be combined with other uncommon diseases and present in a rather concealed manner. Clinicians must be very careful about the possibility of any disease manifested in a silent and obscured way.

Conclusion

Eosinophilic myocardial infarction is rare and needs to be accurately diagnosed and treated with low doses of corticosteroids and antiplatelets in the early stage. Meanwhile, the treatment response should be closely monitored. Therefore, although corticosteroid therapy is essential for prolonging the survival of patients with cardiac involvement in HES, the maintenance dosage must be carefully evaluated in the future.

Disclosure of conflict of interest

None.

Abbreviations

CPK, Creatine phosphokinase; ECG, Electrocardiogram; HES, Hypereosinophilic syndrome.

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