Reversible Atrial Fibrillation with Bradycardia Associated with Primary Cardiac B-Cell Lymphoma

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Abstract

Primary cardiac lymphoma (PCL) only rarely occurs and it is defined as a lymphoma in which the bulk of the tumor is located within the heart and pericardium. A 53-year-old woman was referred due to dyspnea, and an electrocardiogram exhibited atrial fibrillation (AF). Echocardiography revealed no abnormal findings. Scintigraphy and a lymph node biopsy led to a diagnosis of PCL. After the start of chemotherapy, AF was converted to atrial tachycardia prior to sinus rhythm with a first-degree atrioventricular block, which was finally restored to a normal sinus rhythm. PCL is only rarely encountered, but it should be included in the differential diagnosis as a possible cause of AF, and such AF could be reversible if the patient can be treated in a timely manner.

Key words: atrial fibrillation, chemotherapy, diffuse large B-cell lymphoma, primary cardiac lymphoma


Introduction

Primary cardiac lymphoma (PCL) is an extremely rare disease (1), which is usually aggressive, and consists of B-cell non-Hodgkin lymphoma confined to the heart or pericardium, or a lymphoma in which the bulk of the tumor is located in the heart (2). The diagnosis of PCL is difficult because there are no specific symptoms. The prognosis is often poor, but a few cases have demonstrated a prolonged survival after undergoing chemotherapy (3, 4). We herein present a case of PCL associated with atrial fibrillation (AF) and bradycardia, which markedly improved to a normal sinus rhythm following the administration of systemic chemotherapy.

Case Report

A 53-year-old immunocompetent woman with no significant medical history presented with a 1-month history of dyspnea on exertion, shortness of breath, and palpitations. Her physical examination revealed jugular venous distention and pitting edema of the bilateral pretibias. Electrocardiography showed AF with bradycardia and a prolonged QTc of 475 msec (Fig. 1A), and chest radiography revealed mild cardiomegaly (cardiothoracic ratio =60%). Blood tests showed elevated levels of lactate dehydrogenase (474 IU/L), and brain natriuretic peptide (280 pg/dL). Transthoracic echocardiography showed mild pericardial effusion.

Considering the atypical presentation of AF onset with bradycardia, and due to the fact that the patient was a young woman with only mild pericardial effusion, we initially suspected the presence of an underlying invasive cardiomyopathy, such as cardiac sarcoidosis or amyloidosis. Contrast-enhanced computed tomography (CT) and gallium (67Ga) scintigraphy were performed. CT showed mild pericardial effusion with no mass in the myocardium and swelling of the mediastinal and left inguinal lymph nodes. 67Ga scintigraphy showed a positive uptake in the heart and left inguinal lymph nodes (Fig. 2A). She underwent a left inguinal lymph node biopsy prior to initiating treatment. Histological examinations uncovered large, diffuse cells (Fig. 3) that were positive for the B-cell markers CD20, CD79a, and Bcl-2, but negative for the T-cell markers CD3, CD5, and CD10.
Figure 1. (A) An electrocardiogram (ECG) taken on admission shows atrial fibrillation with bradycardia. (B) ECG shows atrial tachycardia after the second cycle of chemotherapy. (C) ECG shows a normal sinus rhythm after the fourth cycle of chemotherapy.

Considering the vast intrapericardial invasion and the smaller secondary lesion in the left inguinal lymph nodes, the patient was diagnosed with primary cardiac B-cell lymphoma according to the most recent definition (5).

The patient subsequently received chemotherapy. The first cycle consisted of cyclophosphamide/prednisolone; the second consisted of pirarubicin and vincristine; and the third, fourth, and fifth cycles consisted of pirarubicin and vincristine and rituximab. After five cycles, $^{67}$Ga scintigraphy confirmed the disappearance of the positive uptake in the heart and lymph nodes (Fig. 2B). After the second cycle, the ECG changed from AF with bradycardia to atrial tachycardia (AT) (Fig. 1B). After the fourth cycle, she experienced a sinus rhythm with first-degree atrioventricular (AV) block, which eventually returned to a normal sinus rhythm (Fig. 1C) with a normal QTc of 425 msec. The patient’s heart failure symptoms also resolved. She has maintained a normal sinus rhythm without recurrence of AF or bradycardia for 2 years since the initial therapy. Careful follow-up examinations will continue to be performed.

Discussion

The incidence of a primary cardiac tumor is only -0.02%, and PCL accounts for -1% of these, the majority of which are diffuse large B-cell lymphoma (6). PCL is classically defined as a non-Hodgkin lymphoma involving the heart and/or pericardium alone (7); however, several cases with exten-
The manifestations of PCL have previously included chest pain, congestive heart failure, pericardial effusions, and arrhythmias including AV block, AF, atrial flutter, and ventricular tachycardia (9). When lymphoma cells infiltrate the myocardium it becomes heterogeneous and the risk of cardiac arrhythmias or conduction disorders increases. In our case, the ECG on admission showed AF with a slow ventricular response of 40-50 beats per minute without any negative chronotropic drugs. Furthermore, a first-degree AV block was revealed when chemotherapy converted AF to a sinus rhythm. These serial ECG changes may suggest that the cardiac lymphoma had infiltrated and impaired the AV node and impulse conduction system of the heart, which reversibly improved with the reduction of the lymphoma by chemotherapy. As for the mechanisms of a prolonged QTc, it was unclear, but it might be attributed to bradycardia.

Although several cases of AF have been reported, those with a serial return to a normal sinus rhythm during treatment are rare. The present report describes the first case of a patient with AF with bradycardia in whom serial ECG changes of AT and first-degree AV block to a normal sinus rhythm were seen following the administration of systemic chemotherapy.

Because of the typical delay in diagnosis, the prognosis of patients with PCL is poor. A recent review indicated the median survival time to be 7 months after initial treatment (9). Therefore, to improve the outcome, a careful and complete investigation of the clinical features of PCL is mandatory to facilitate an accurate and timely diagnosis. In this regard, $^{67}$Ga scintigraphy was found to be useful in our case. An abnormally high $^{67}$Ga uptake was apparent in the right atrium and ventricle, whereas echocardiography and CT did not detect a cardiac tumor. In addition, no $^{67}$Ga uptake after chemotherapy was observed, suggesting that $^{67}$Ga scintigraphy would also be useful for monitoring the treatment response.

In summary, lymphoma should be ruled out in cases with an atypical presentation of AF. Although PCL is a rare dis-

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**Figure 2.** (A) Gallium ($^{67}$Ga) scintigraphy on admission showing a positive uptake in the heart. (B) After 5 cycles of chemotherapy, $^{67}$Ga scintigraphy confirms the disappearance of a positive uptake in the heart.

**Figure 3.** Histological staining of the inguinal lymph nodes (Hematoxylin and Eosin staining) prior to treatment reveals atypical, intermediate to large-sized lymphoid cell infiltration.
ease and shows a poor prognosis, using the correct diagnostic procedure and appropriate therapy could result in a resolution of electrocardiographic abnormalities and a better survival outcome.

The authors state that they have no Conflict of Interest (COI).

References


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