Research Article
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Primary cardiac lymphoma: A comprehensive review

Abstract

Objective: To summarize and analyze the clinical features, treatment and prognosis of patients with primary cardiac lymphoma.

Method: We herein review the literature available in PubMed databases for recent five years. Then we analyze and summarize the literature data.

Result: Among the 26 patients with primary cardiac lymphoma (PCL), the right atrium was most common site involved, and most tumors were single mass, the main symptoms were dyspnoea□65.4%□□chest oppression (38.5%) and edema (19.2%). The elevations of lactate dehydrogenase (LDH) were observed, however the bone marrow aspiration or biopsy? Examinations were negative. Atrial fibrillation and atrioventricular block were also noted in some cases. The common expression of immunophenotyping were CD20, Ki-67, multiple myeloma oncogene 1 (MUM1), B-cell lymphoma/leukemia-6 (Bcl-6), CD10, and might be accompanied by expression of Bcl-2, c-myc, CD3 and CD5, while negative expression of CD30, anaplastic lymphoma kinase (ALK), Epstein-Barr virus encoded small RNA (EBER). The majority of patients in this cohort receiving R±CHOP chemotherapy (cyclophosphamide + pirarubicin + vincristine + prednisone with/without rituximab) were reported to have a poor prognosis with 1-year survival rate at 24.1% (9/26).

Conclusions: PCL is very rare, with the variable clinical manifestations potentially leading to a delayed diagnosis.

Keywords: primary cardiac lymphoma; diffuse large B cell lymphoma; cardiac tumors

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Introduction

PCL is a rare entity that accounts for up to 2% of all primary cardiac tumors.[1,2] The majority of PCLs are B cell malignancies, with diffuse large B-cell lymphoma (DLBCL) being the most common histologic subtype; however, other hematologic neoplasms have been infrequently described.[3–5] The clinical presentation of PCL is widely varied, and one third of patients have symptoms of congestive heart failure (CHF).[3] Due to the rarity of PCL, diagnosis can be challenging and patients often undergo multiple imaging modalities in order to distinguish PCL from more common atrial myxomas and thrombi.[6–8] Ultimately, tissue biopsy is required to establish the diagnosis and provide classification of the lymphoma. In many instances, such tissue sampling is performed at the time of open surgical resection or debulking.[9–11] Beyond surgery, chemoimmunotherapy performing as the first-line regimen which is appropriate for the lymphoma subtype is the standard of care. In this paper, we collected the case reports of primary Cardiac Lymphoma published in the past five years and summarized the characteristics of primary cardiac DLBCL with the aspects of general information, clinical symptoms, auxiliary examination and treatment, in order to play a guiding role in clinical activities.

Method

Literatures published between 2017 and 2023 were searched in PubMed using the keyword "primary cardiac lymphoma". A total of 26 cases of PCL were reported, and the diagnosis and treatment data of these patients were analyzed and summarized.[12–28] Inclusion criteria: a clear diagnosis of primary cardiac lymphoma. Exclusion criteria: no sufficient diagnostic basis and full text not available.

Results

General situation

This study included 26 patients with primary cardiac lymphoma, including 15 men and 11 women with a median age of 60 years (range, 15-92). Most patients were at stage IE. Most of the pathology was DLBCL, except only 1 case of T cell lymphoma, 1 case of NK cell lymphoma, and 1 case of Burkitt's lymphoma. Two patients were HIV positive.

Clinical features

Site of involvement: Right atrium was the most commonly involved site of PCL, accounting for 59.1% (13/22), followed by right ventricle 27.3% (6/22) and pericardium 18.2% (4/22). It can also involve the right atrioventricular groove, left atrium, left ventricle, and diffuse myocardial infiltration. 11.5% (3/26) of patients had pericardial effusion of some degree.

Tumor size: Tumor size was mentioned in 8 of 26 patients, with the smallest mass being 3.1cm in diameter and the largest 12.1cm in diameter. Only 1 of the 8 patients had two masses, and the rest had only single mass.

Clinical symptoms: Dyspnoea is the most common symptom (65.4%), followed by chest oppression (38.5%) and edema (19.2%). In addition, palpitation, syncope, dry cough and other symptoms may occur. Only 5 patients (19.2%) developed fever, which is the common B symptom of lymphoma.

Auxiliary examination

Clinical lab index: Only 3 of the 26 patients described their blood routine. Two patients had slightly elevated white blood cell levels, one had reduced platelet levels, and one had moderate anemia. Lactic dehydrogenase was mentioned in 11 patients, all of which showed varying degrees of increase, with a median LDH of 412U/L (155-1035 U/L). A total of 8 patients described bone marrow aspiration results, of which only 1 patient had bone marrow involvement and the rest had no bone marrow involvement.

Electrocardiograph: ECG results were described in 11 of the 26 patients, all of whom had ECG abnormalities. ECG abnormalities mainly included 5 cases of atrioventricular block (45.5%), 4 cases of

atrial fibrillation (36.3%), and others included atrial fibrillation, sinus tachycardia, QTc prolongation, Recurrent STEMI, etc.

Imaging: Echocardiography results were not mentioned in 4 patients, and abnormal ultrasonography was found in the other 22 patients. Transthoracic echocardiography or transesophageal echocardiography were used to detect abnormal masses in the heart, often accompanied by multiple heart involvement. Computed tomography and magnetic resonance imaging can also find abnormal mass shadows, which can further confirm the ultrasonic findings and more clearly showed the scope of lesion involvement. Positron emission tomography-computed tomography were performed in 3 patients, all of which showed increased fluorodeoxyglucose metabolism in cardiac masses, and the masses disappeared when reexamined after chemotherapy.

Pathology: All patients were pathologically diagnosed. 8 patients underwent cardiac tumor resection, 1 patient was diagnosed by pericardial effusion detection of tumor cell, and the rest underwent thoracoscopic, percutaneous, ultrasound, and transmediastinoscopy puncture biopsy.

Immunohistochemical: Immunohistochemical results were not described in details in 5 of the 26 patients. CD20 expression was negative in one T-cell lymphoma and positive in the remaining 25 patients. The positive rates of Ki-67, CD10, Bcl-6, MUM1, CD3 and CD5 were 47.6% (10/21), 38.1% (8/21), 47.6% (10/21), 23.8% (5/21), 14.3% (3/21) and 14.3% (3/21), respectively. Positive expression of c-myc was detected in 3 patients, positive expression of Bcl-2 was detected in 2 patients, double-expression lymphoma of C-MYC and BCL-2 was detected in 2 patients, and triple-blow lymphoma was detected in 1 patient. 10 of the 26 patients could be classified by Hans, including 3 germinal center B-cell subtype (GCB) and 7 non-GCB.

Treatment and prognosis: Of the 26 patients, 17 underwent chemotherapy. 14 patients received first-line R±CHOP regimen (4 patients received postoperative chemotherapy). Prognosis was not mentioned in 4 patients. 10 patients died within half a year, including 4 patients who died quickly after surgery and 2 patients who died during chemotherapy. The 1-year survival rate was 24.1% (9/26) (Table 1).

Table 1

	Male n=15	Female n=11
Age(years)		
<60	26-Jul	26-Jun
>60	26-Aug	26-May
Right atrium	22-Aug	22-May
B symptoms	26-Jan	26-Apr
Atrioventricular block	11-Jan	11-Apr
Atrial fibrillation	11-Mar	11-Jan
R-CHOP	26-Jul	26-Jul
Response (CR+PR)	26-Aug	26-Mar
1-year survival	26-Jun	26-Mar

Baseline characteristics, treatment type, and outcomes of the patients.

Discussion

Primary cardiac lymphoma is extremely rare, accounting for less than 2% of heart tumors. It also accounts for less than 1% of extranodal lymphomas and a lower percentage of all lymphomas.[29–32] PCL mainly involves the right cardiac system, especially the right atrium, for reasons that remain unclear. Dyspnoea is the most common symptom. The incidence of B symptoms common to lymphoma is very low, and timely imaging examination is very important for early detection of mass. The most common pathological type is diffuse large B-cell lymphoma, followed by Burkitt lymphoma, T-cell lymphoma, small lymphocyte lymphoma, and plasmablastic lymphoma. Therefore, most of the relevant cardiac symptoms are in late stage or mild, meaning that they can be easily ignored. Through this retrospective analysis of 26 patients with PCL, this study found that the distributions of sex and age in patients with cardiac lymphoma were similar to those in the overall lymphoma population, and a male predominance was identified (15:11). The vast majority of these patients had no history of immunodeficiency or immunosuppressant use. Only 2 patients had a history of HIV/AIDS. The treatment of PCL mainly includes chemotherapy, surgery and radiotherapy. Surgery can remove some of the tumor tissue, but it does not improve long-term outcomes. It is certain that chemotherapy is the most effective treatment. With the widespread use of rituximab in B-cell lymphomas, R-CHOP chemotherapy regimen is increasingly being applied to DLBCL. R-CHOP may prolong survival. The survival rate calculated in this paper is biased to a certain extent, so we are looking forward to a larger sample of clinical case statistics.

Ultimately, primary cardiac lymphomas remain rare malignancies that can present with a multitude of symptoms. Because of this, diagnosis of PCL can be elusive and often requires multimodal imaging prior to tissue biopsy. Chemotherapy is typically the mainstay of treatment, with the specific regimen chosen based on the pathologic diagnosis and patients' comorbidities. Outcomes are varied, though they appear to be improving with advances in chemo- and immunotherapy. Currently, patients with indolent NHL who can tolerate chemotherapy have the longest overall survival. Future goals should include improving the ability to diagnose PCL without invasive tissue sampling and determining the role of HSCT in PCL treatment.

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Conflicts of interest

The author declares that there is no conflict of interest.

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