Internal Medicine
The Japanese Society of Internal Medicine
doi: 10.2169/internalmedicine.7925-21
Intern Med 61: 1055-1057, 2022
http://internmed.jp

【 CASE REPORT 】

# Cardiac Involvement of Adult T Cell Leukemia/Lymphoma

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**Abstract:**
Adult T-cell leukemia/lymphoma (ATL) is a refractory T-cell lymphoma with variable clinical profiles, commonly exhibiting extra-nodal involvement. The myocardial involvement of ATL is often detected at an autopsy; however, the development of a symptomatic cardiac mass due to ATL is extremely rare. We herein report a 65-year-old man with ATL who developed cardiac symptoms due to a rapidly enlarging left ventricular mass soon after the initiation of systemic chemotherapy. We also summarize previously reported cases of symptomatic ATL with cardiac involvement.

**Key words:** cardiac ATL, cardiac symptom

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## Introduction

Adult T-cell leukemia/lymphoma (ATL) is a refractory T-cell lymphoma with variable clinical profiles commonly exhibiting extra-nodal involvement. The myocardial involvement of ATL is often detected at an autopsy (1); however, the development of a symptomatic cardiac mass due to ATL is extremely rare.

ATL with symptomatic cardiac invasion has not been well reported, even in a large-scale retrospective clinical analysis and an autopsy series (2, 3), and is mostly limited to case reports. In addition, there have been no literature reviews of case reports.

We herein report a case of acute type ATL resulting in a rapidly enlarging left ventricular mass soon after the initiation of systemic chemotherapy. We also summarize the previously reported cases of symptomatic ATL with cardiac involvement.

## Case Report

A 65-year-old Japanese man with a 10-year history of diabetes mellitus was admitted in June 2020 with left lower abdominal pain. Contrast-enhanced computed tomography (CT) detected a mass in the small intestine.

Immunohistochemistry of laparoscopic small bowel resection revealed that the tumor was positive for CD4, CD25, and CCR4 and negative for TIA-1 and EBER. The patient was positive for serum HTLV-1 antibody and was diagnosed with acute-type ATL. He developed severe bradycardia warranting the implantation of a permanent pacemaker. Coronary angiography revealed marked stenosis in the left arterial descending artery, so percutaneous coronary intervention was performed. The patient was admitted to the hospital for the treatment of ATL at two months after the diagnosis.

Abnormal lymphocytes were not detected in the peripheral blood by a visual inspection, nor were any other ATL lesions detected. The value of serum LDH was 416 U/L (range 122-222), and the serum soluble interleukin 2 receptor (sIL2R) level immediately before treatment was 4,900 U/mL (range 121-613). Thus, the ATL-prognostic index (4) was classified as intermediate-risk (Stage IV, ECOG PS 2, serum albumin 3.0 mg/dL). Pretreatment transthoracic echocardiography (TTE) showed diffuse hypokinetic left ventricular wall motion and irregular hypoechoic areas (Figure A). A cardiac mass was not detected by TTE. During two cycles of multiagent chemotherapy (VCAP-AMP-VECP) in combination with mogamulizumab (5), palpitation and shortness of breath on exertion were reported. TTE revealed a 36×25-mm stemmed mass in the middle of the left ventricular septum (Figure B) as well as a mass in the left

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Received: May 10, 2021; Accepted: August 4, 2021; Advance Publication by J-STAGE: September 18, 2021
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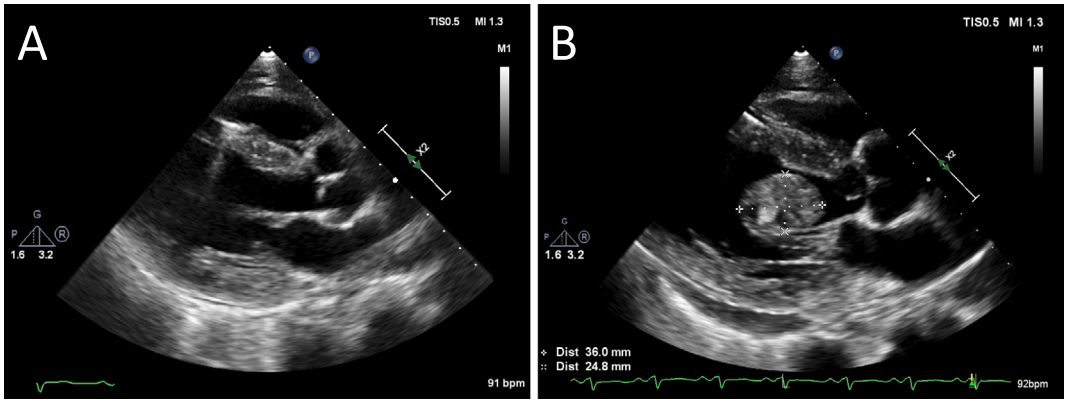


**Figure.** **A: Parasternal long-axis image obtained during the diagnosis of adult T-cell leukemia/lymphoma. B: Parasternal long-axis view obtained at the onset of cardiac symptoms.**

**Table.** **Summary of Reported Adult T-cell Leukemia/Lymphoma Cases with Cardiac Symptoms.**

| Case # | Age (years)/ gender | Cardiac symptoms at onset | Cardiac symptoms at relapse/ recurrence/ progress | OS from diagnosis (months) | OS after cardiac involvement (months) | Involved cardiac sites/events | Treatment after cardiac involvement | Reference |
|---|---|---|---|---|---|---|---|---|
| Case 1 | 40/M | No | Yes | NA* | 1 | Diffuse MC†, PE‡ | VEPA§ | 9 |
| Case 2 | 45/F | No | Yes | NA | 4 | Diffuse MC, PE | VEPA, OPEC‖, cisplatin, ifosfamide, mitoxantrone, and prednisolone, intra-epicardial cisplatin | 10 |
| Case 3 | 44/M | No | Yes | NA | 3 | Ventricular tachycardia, diffuse MC | None | 11 |
| Case 4 | 60/F | Yes | NA | 28+ | 28+ | MV¶, AV** | MV/AV replacement | 7 |
| Case 5 | 35/F | No | Yes | 126+ | 83+ | LV††mass | Resection+CHOP‡‡ | 6 |
| Case 6 | 58/F | Yes | NA | NA | NA | Diffuse MC, MV, TV§§ | CHOP+MV/AV replacement | 12 |
| Case 7 | 57/F | Yes | NA | 20 | 0 | MC, MV, AV | CHOP+MV/AV replacement | 13 |
| Case 8 | 61/M | No | Yes | 25+ | 6+ | LA‖‖mass, RA¶¶mass | Etoposide, ifosfamide, epirubicin | 14 |
| Case 9 | 50/M | Yes | NA | 12+ | 12+ | RA mass | Etoposide, prednisolone, doxorubicin, cyclophosphamide, mitoxantrone, ranimustine, vincristine, pirarubicin, sobuzoxane | 15 |
| Case 10 | 73/F | Yes | NA | 3 | 3 | PE | CHOP | 16 |
| Case 11 | 51/M | No | Yes | NA | 0.3 | MC, PE | None after progression | 8 |
| Case 12 | 34/M | No | Yes | 204+ | 120+ | MV, AV | 15 mCi yttrium-90 daclizumab, MV and AV replacement | 8 |
| Case 13 | 32/F | No | Yes | NA | 1.5 | MC, RA mass, MV, TV | None after progression | 8 |
| Case 14 | 19/M | Yes | NA | 2+ | 2+ | MC, PE | Hyper CVAD/MA*** | 17 |
| Case 15 | 55/M | No | Yes | 29 | 5 | RA mass | Chemotherapy (NA) | 18 |
| Case 16 | 65/M | Yes | NA | 8 | 4 | Diffuse MC, LV mass | Mogamulizumab+mLSG15†††(4), GDP‡‡‡(5) | Present case |

*NA: not available, †MC: myocardium, ‡PE: pericardium, §VEPA: vincristine: etoposide, prednisolone, and doxorubicin, ‖OPEC: vincristine, prednisolone, etoposide, and cyclophosphamide, ¶MV: mitral valve, **AV: aortic valve, ††LV: left ventricular, ‡‡CHOP: cyclophosphamide, doxorubicin, vincristine, and prednisone, §§TV: tricuspid valve, ‖‖LA: left atrium, ¶¶RA: right atrium, ***Hyper CVAD/MA: fractionated cyclophosphamide, vincristine, doxorubicin, and dexamethasone (hyper-CVAD) alternating with high-dose methotrexate and cytarabine (MA), †††mLSG15, modified LSG15, ‡‡‡GDP: gemcitabine, dexamethasone, and cisplatin, OS: overall survival

ventricular outflow tract and coronary sinus. A flare-up of the ATL due to the cardiac masses was suspected.

A biopsy was withheld due to the impending risk. At the time the left ventricular lesion appeared, no other ATL lesions were detected on thoracoabdominal CT. The LDH value was 387 U/L, and the serum sIL2R level was 3,570 U/mL.

The patient received combination chemotherapy with gemcitabine, dexamethasone, and cisplatin (GDP) (6). Subsequent echocardiography showed a transient reduction of

the intracardiac masses. The cardiac tumor shrank temporarily but showed an enlarging trend again after three cycles of GDP salvage therapy. The patient ultimately died of heart failure and ATL progression four months after the appearance of cardiac symptoms.

## Discussion

Despite diverse clinical presentations of ATL, the antemortem diagnosis of cardiac lesions is rare. Several cases in the literature were diagnosed antemortem, and most had cardiac lesions upon or after ATL recurrence. The reported symptomatic cardiac ATL cases are summarized in Table. The characteristic features of cardiac infiltration of ATL were diffuse myocardium, pericardial effusion, right ventricular mass, right atrial mass, left ventricular mass, aortic valve lesion, or mitral valve lesion. There has only been one report of left ventricular ATL, similar to our case (7).

Based on previous case reports in English (6-18), the prognosis of symptomatic cardiac ATL seems poor, as with other aggressive types of ATL; the median overall survival after cardiac symptoms appear is 5 months (n=15, range 0-120 months). Most of the patients were treated with chemotherapy with limited efficacy. Interestingly, the patients with indolent ATL with only peripheral blood involvement with no other extra-nodal disease and that with cardiac involvement confined to the mitral or aortic valve and the base of the ventricular septum achieved a long-term survival by replacement or massive resection of the mitral or aortic valve, with or without chemotherapy (7-9). In particular, Case 4 was an ATL case with peripheral blood lesions and cardiac lesions only presenting to the hospital with cardiac symptoms. After surgery for the cardiac lesion, the patient was monitored for more than two years with no evidence of worsening of the peripheral blood lesion and no therapeutic intervention. Case 7, a patient who underwent surgery, had extensive subendocardial infiltration in addition to mitral and aortic valve involvements and died of heart failure immediately after surgery. If myocardial infiltration is predominant, a different approach may be necessary other than for valves or cardiac masses.

In summary, we treated a case of ATL with cardiac symptoms and reviewed similar case reports in the literature. Because it was a rare extra-nodal lesion, it was difficult to ascertain its clinical course promptly. We hope our case report and review will help other clinicians facing this challenging condition.

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

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