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Case Report

A giant thrombus in the right atrium of a patient with acute promyelocytic leukemia M3 ☆,☆☆

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ABSTRACT

Acute promyelocytic leukemia is a special type of acute myeloid leukemia. Patients with this disease are at high risk of complications. Right atrial thrombosis is a rare but potentially serious complication. A 55-month-old girl with acute promyelocytic leukemia M3 was in her last phase of treatment. Radiologic examination revealed an echo structure in the right atrium that was still present after 6 weeks of anticoagulation treatment with enoxaparin. Cardiac surgery was performed to remove the mass, which was found to be a calcified thrombus. Although this is a rare occurrence, recognition of the possibility of a calcified thrombus may minimize misdiagnosis and allow surgical retrieval if the thrombus is sufficiently large.

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Background

Acute promyelocytic leukemia (APL) is a special type of acute myeloid leukemia. The symptoms commonly include anemia, hemorrhage, and bone pain [1,2]. Bleeding tendency is the most remarkable clinical manifestation of APL patients and the primary cause of early death [3–6]. Furthermore, the incidence of thrombotic events in APL is higher than in other types of leukemia. Intracardiac thrombosis localizations in APL are rare, especially involving massive spontaneous thrombosis in the right atrium, and are scarcely reported in the literature [7]. Herein, we present a case of a giant thrombus in the right atrium that was successfully removed surgically.

Case presentation

A 55-month-old girl was admitted to a local hospital in September 2022 with acute bruising widespread on her body. She was transferred to the Children's Hospital 1 (CH1), where the workup established an initial diagnosis of acute promyelocytic leukemia (APL) M3. The patient later underwent chemotherapy in the induction phase at the blood transfusion hematology hospital no 2, then transferred to our hospital to complete the other phases of treatment in December 2022. She completed the first 3 phases.

In February 2023, during the patient's last treatment phase, a thick echo structure was found near the superior vena cava. It measured 12 × 8 mm, with no compression of the superior vena cava and tricuspid valve, and heart function was within normal limits by echocardiography. The echo structure was assumed to be a thrombus in the right atrium (Fig. 1). Cardiac computed tomography revealed a medium-density mass with a diameter of around 13 mm in the right atrium, which did not cause complete obstruction, and no bilateral pulmonary embolism was noted (Fig. 2). No abnormal physical findings existed other than ecchymosis. Peripheral blood tests revealed 10.0 g/dL of hemoglobin, a white blood cell count of $1.54 \times 10^3/\mu L$ with 51.3% lymphocytes, and a platelet count of $138 \times 10^3/\mu L$, and coagulation tests were normal.

The patient was treated with enoxaparin for 6 weeks. She was followed up with cardiac computed tomography and cardiac magnetic resonance imaging, which did not show a statistically significant difference after six weeks of anticoagulation therapy. No abnormal findings existed in the head or abdominal computed tomography. Bone marrow aspirate was blast <5%. The patient was asymptomatic, and the physical examination was negative. She was not in danger of pulmonary embolism. Given the large size of the mass, it was finally decided to remove it surgically.

The patient was operated using cardiopulmonary bypass, with aortic and bicaval cannulation performed in a standard manner. The right atrium was opened, and a large, solid, calcified 20-mm diameter mass was found (Fig. 3). The pectinate muscles were partly calcified. After the mass was removed, it was cut open, showing a pinhole in the right auricula. The mass showed pathological findings of a calcified thrombus (Fig. 4). The postoperative course was uneventful.

Discussion

APL is frequently complicated by thrombotic events. In clinical practice, their prevalence may be underestimated. De Stefano et al. reported a venous thrombosis rate of 3% as a current symptom and 1% in the first 6 months from the diagnosis in 279 patients diagnosed with acute myeloid leukemia. Arterial thrombosis represents only 1% of individuals [8].

Currently, the risk factors for thrombosis in APL patients have not been fully discovered. The risk is thought to arise from male gender, high score performance status, high white blood cell count and platelet count, low fibrinogen levels, hypoalbuminemia, PML/RARa fusion gene variant, and being CD2/CD15 and FLT3-ITD positive [9–11]. In light of the patient's history and these findings, we can infer that her lymphopro-

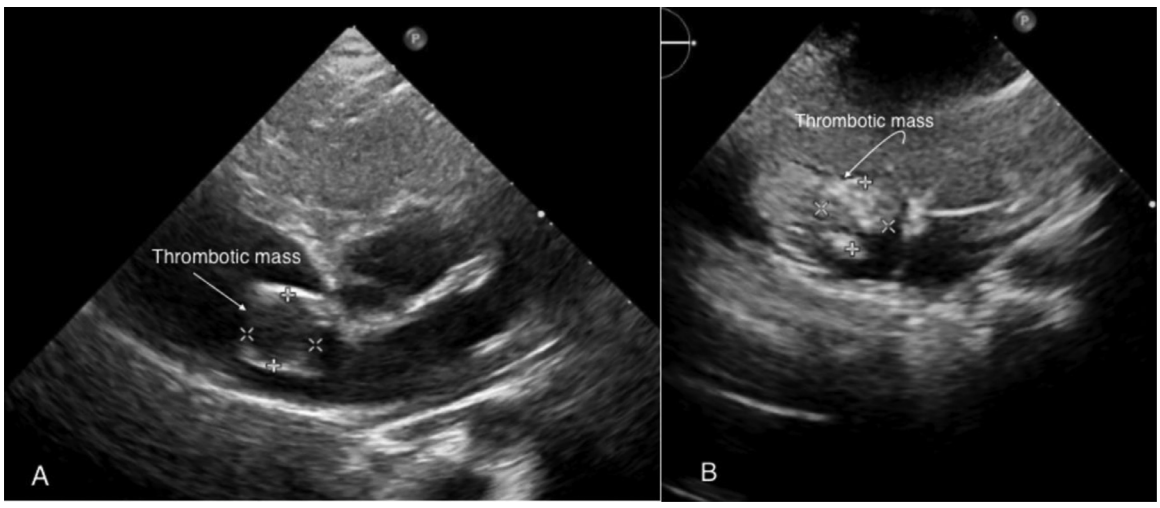

Fig. 1 – Serial echocardiography. (A) First echocardiography, a thrombotic mass in the right atrium (B) After 6 weeks of enoxaparin treatment.

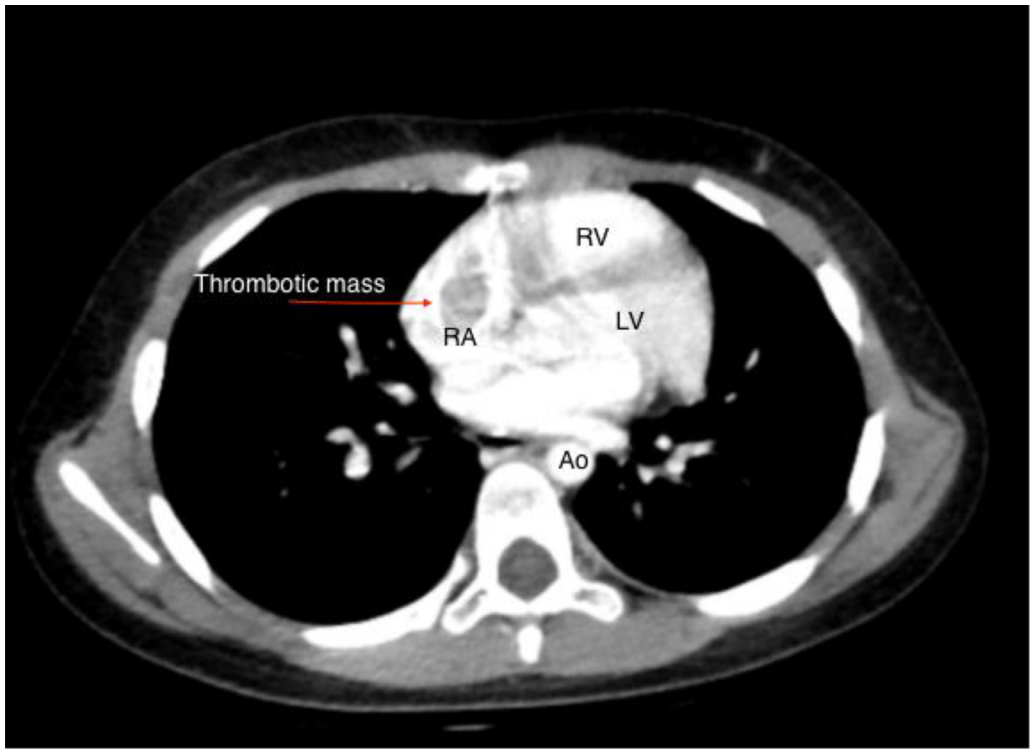

Fig. 2 – Computed tomography showed the large, calcified thrombus in the right atrium. Ao, aorta; LV, left ventricle; RA, right atrium; RV, right ventricle.

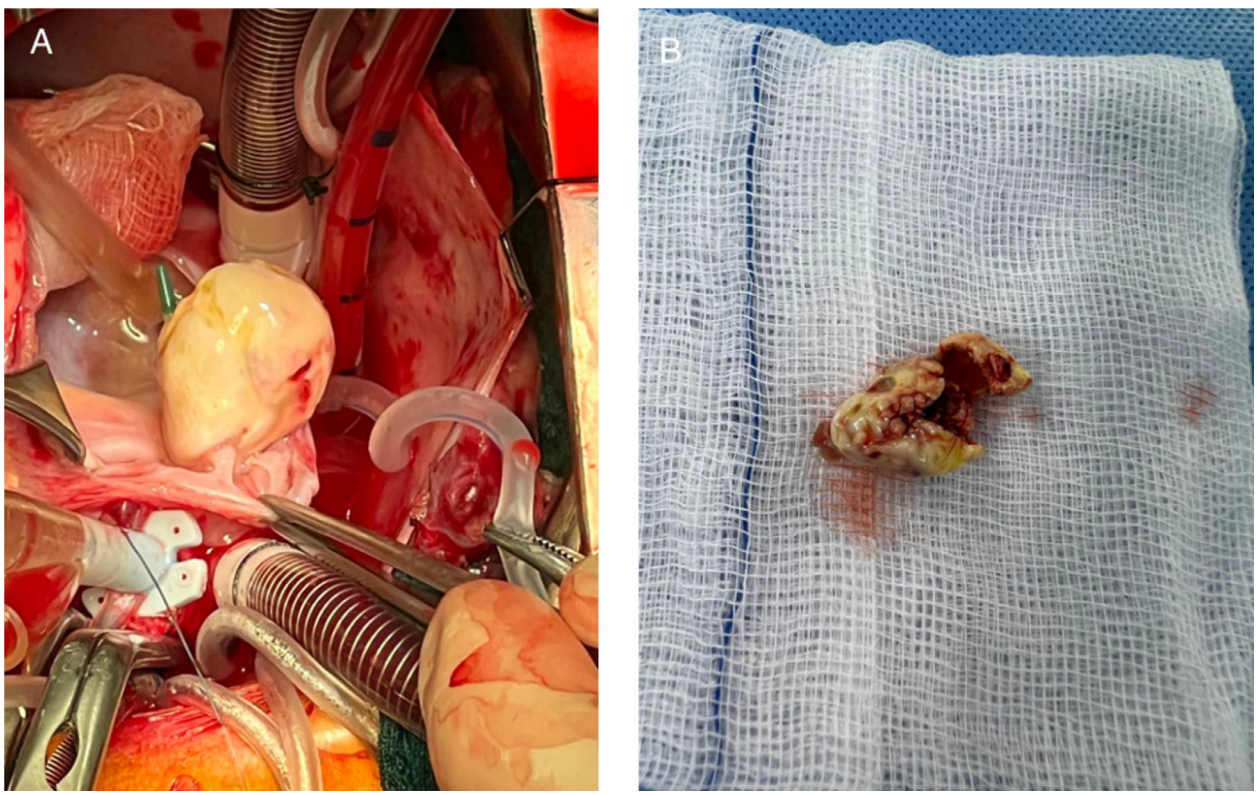

Fig. 3 – Thoracotomy was performed to remove the calcified thrombus.

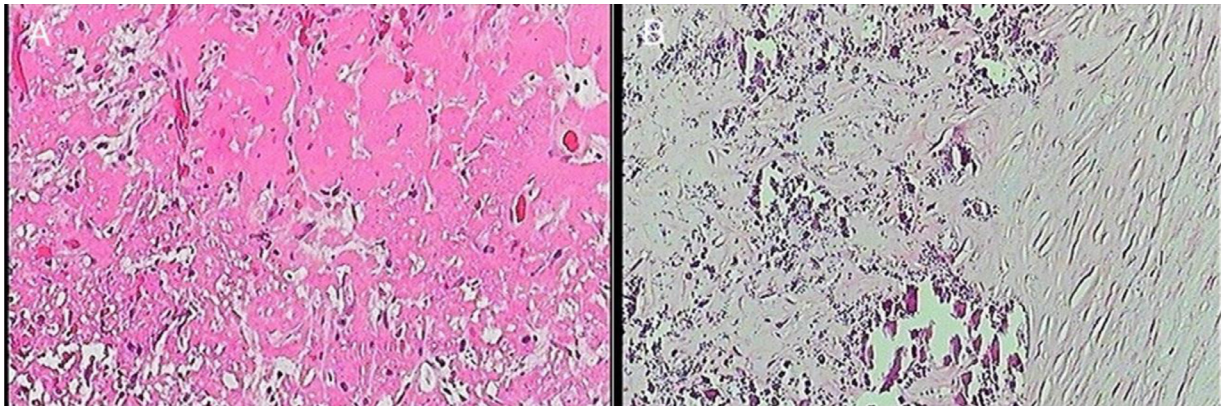

Fig. 4 – HE staining identifying a calcified thrombus.

liferative disease may have been the cause of the thrombotic event.

Clinical characteristics of thromboembolic complications in APL patients can be unremarkable, especially when dealing with extremely rare sites of thrombus formation, such as the right atrium. Therefore, examination by medical imaging is particularly important. The detection is mainly based on vascular ultrasonography or echocardiography, and, if necessary, contrast-enhanced computed tomography may be used [12].

Previous studies have made different recommendations for right heart thrombosis treatment, such as surgical removal, the administration of thrombolytic agents, or anticoagulation therapy with heparin [13]. When medication is no longer effective, removal of the thrombus by open heart surgery may be an effective solution. Regardless of the high risk of open heart surgery, surgical removal is an efficacious and safe procedure for calcified thrombus in the right atrium. It is to be preferred in elective conditions, especially in young asymptomatic patients without hemodynamic involvement, who are at low risk of surgery-related morbidity and mortality.

Conclusions

In this case, the thrombus in the right atrium appeared as a massive strong echo and remained unchanged in follow-up studies. The presence of these features may indicate surgical removal to resolve this type of calcified thrombus.

Author's contributions

Pham Ngoc Thach and Nguyen Minh Duc contributed to writing the original draft. Pham Ngoc Thach, Ho Tran Ban, and Nguyen Minh Duc made substantial contributions to collect patient data and clinical data analysis. All authors have read, revised, and approved the final published version of the manuscript. All authors were responsible for the submission of our study for publication.

Availability of data and materials

All data generated or analyzed during this study are included in this article and/or its online supplementary material files. Further inquiries can be directed to the corresponding author.

Ethics approval and consent to participate

Ethical approval was not necessary for the preparation of this article. Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

Patient consent

Informed consent for patient information to be published in this article was obtained.

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