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Case Report

A giant left atrial appendage aneurysm with recurrent chest tightness and atrial tachycardia: Multimodal imaging findings ☆

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ABSTRACT

Left atrial appendage aneurysm (LAAA) is a rare cardiac anomaly that is usually incidentally found in middle-aged patients. Though initially asymptomatic, LAAA can cause some serious complications: atrial tachyarrhythmia, thromboembolism, peripheral compression, and cardiac dysfunction. Multimodal imaging technologies, especially echocardiography and computed tomography (CT) scanning play an important role in the diagnosis of LAAA. Transthoracic echocardiography (TTE) is generally used for preliminary evaluation and diagnosis of the aneurysm. CT scanning can further confirm the diagnosis by demonstrating the spatial structure relationships and eliminating the possibility of other cardiac tumors. The following case study pertains to a 54-year-old patient with recurrent chest tightness and atrial tachycardia. The patient was diagnosed with a giant LAAA by multimodal imaging technology, and the aneurysm was surgically removed under cardiopulmonary bypass. After 4 years of follow-up, the patient reported living a healthy life without chest discomfort, complications, or medication. Multimodal imaging can provide important information for the diagnosis and treatment of left atrial appendage aneurysms, and aneurysm resection can be an effective therapeutic approach with a good long-term prognosis.

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Introduction

Congenital aneurysm of left atrial appendage is a rare cardiac anomaly first described by Dimond et al. in 1960 [1]. Most LAAA's patients were initially asymptomatic, and several LAAA's were incidentally discovered by cardiac imaging. Those patients that were symptomatic had chest pain, pal-

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pitations, dyspnea, and thrombus embolism after middle age [2–4]. Given the potentially serious and life-threatening complications of LAAA, surgical resection has been proposed for most patients [5]. A 54-year-old male patient diagnosed with LAAA by multimodal imaging was reported at our institute for recurrent chest oppression.

Case report

A 54-year-old man was hospitalized with repeated chest tightness occurring over 4 months. The patient described chest tightness exacerbated by exertion, and accompanied by dizziness and episodes of palpitations. However, the patient had no cardiovascular risk factors, or medical or surgical history.

No abnormalities were found in the physical examination and laboratory tests of the patient. However, a 12-lead electrocardiogram showed sinus rhythm and left atrial (LA) enlargement. Paroxysmal episodes of atrial tachycardia and ventricular tachycardia were recorded by 24-hour Holter monitoring (Supplementary Material Fig. S1). Chest radiography (X-ray) demonstrated a prominent bulge at the left cardiac border (Fig. 1). An aneurysm in the normal left atrial appendage (LAA) position communicating with the LA was detected by TTE (Fig. 2A, Supplementary Material Videos S1 and S2). To-and-fro blood flow between the LA and LAA through the orifice was detected by color Doppler imaging (Fig. 2B, Supplementary Material Video S3 and S4). The flow velocity at the orifice measured by Pulsed-wave Doppler was 96 cm/s (Supplementary Material Fig. S2). TTE showed mild mitral regurgitation and normal left ventricular systolic and diastolic function. Therefore, the patient was initially diagnosed with congenital LAAA. To further confirm the echocardiographic results, cardiac contrast-enhanced CT was performed, which demonstrated that the LAAA (7.2 × 6.7 × 4.0 cm) was connected to the LA via a 2.1-cm neck with no thrombus (Fig. 3A). A 3-dimensional CT reconstruction showed compression of the LV anterior wall by an aneurysm (Fig. 3D); pericardial cysts and other cardiac

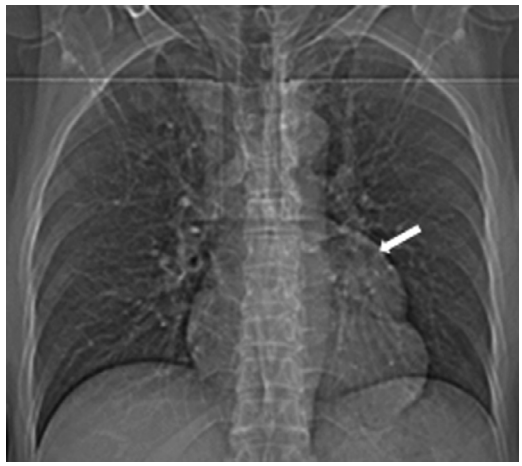

Fig. 1 – Chest X-ray showed a prominent outpouching which appear as a mass on the left cardiac border (indicated by white arrow).

tumors were ruled out. Coronary CT angiography revealed no significant stenosis or oppression in the coronary arteries.

Due to the patient's chest tightness, the repeated atrial tachycardia attacks, the representation of the LV anterolateral wall by the aneurysm, and the potential risk of thromboembolism and aneurysm rupture, the patient underwent LAAA resection under cardiopulmonary bypass. Pathology revealed fibrosis of the wall of the aneurysm and thinning of the myocardial layer (Fig. 4). During the 4-year follow-up period, the patient has been living a healthy life without chest discomfort, complications, or medication.

Discussion

Left atrial appendix aneurysm is a rare disease that can be either congenital or acquired. Congenital LAAA is caused by

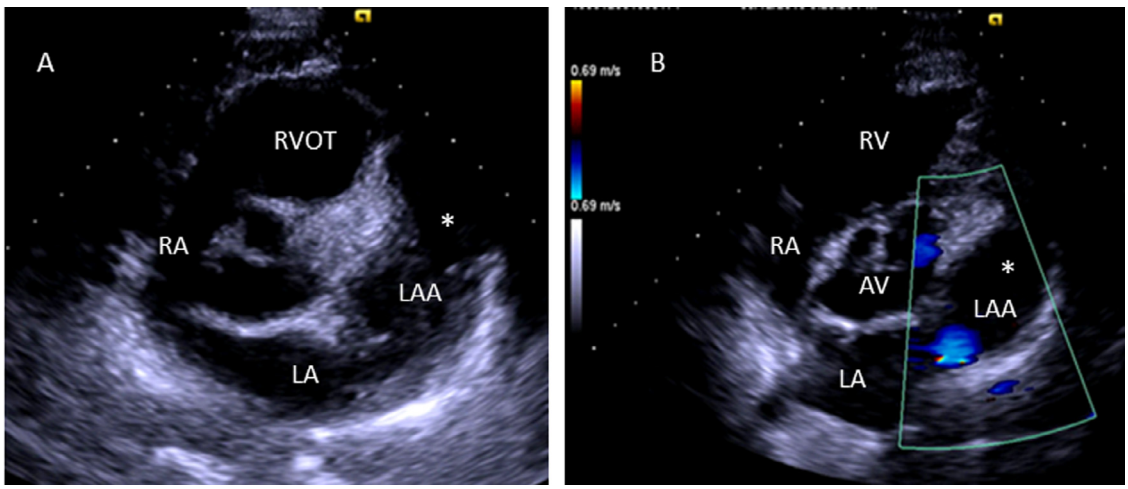

Fig. 2 – (A) Transthoracic echocardiography image visualized a giant LAA aneurysm, connecting with the left atrium (LA); (B) color Doppler image showed the blood passing through the orifice between LA and LAA.

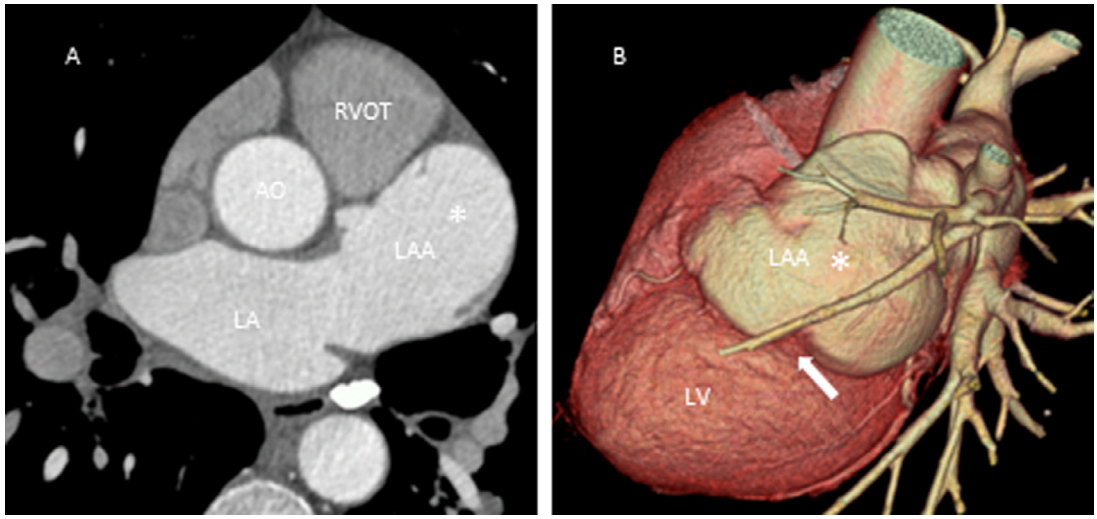

Fig. 3 – (A) Contrast-enhanced computed tomography (CT) scan showed a giant LAA aneurysm (7.2 × 6.7 × 4.0 cm, showed by white star) and no thrombus within the aneurysm; (B) Three-dimensional CT reconstruction image revealed that the left ventricular anterior wall was compressed by the aneurysm (showed by white arrow).

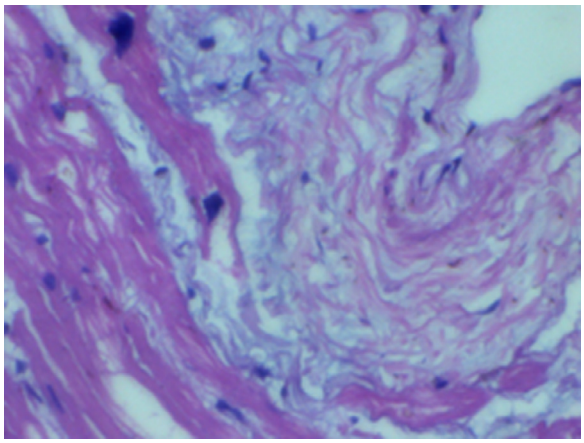

Fig. 4 – Histopathological examination revealed that the atrial wall myocardium was thinned and there was extensive fibrous edema (hematoxylin and eosin stain, ×400).

the dysplasia of the atrial pectinate muscles, and acquired LAAA is resulted from the mitral valve disease [2,6]. To date, approximately 150 cases of congenital LAAA have been reported in the medical literature [5]. Due to their uncommon and non-specific characteristics, these aneurysms are incidentally discovered through cardiac imaging in middle-aged patients [2]. LAAA may enlarge with age and lead to severe complications, such as: atrial tachyarrhythmia, serious thromboembolic events, compression of the coronary arteries, and heart failure [7]. Therefore, the diagnosis and management of this disease are important.

Multimodal imaging, especially echocardiography and CT, is used for the diagnosis of LAAA,. Echocardiography plays an important role in the early diagnosis of LAAA. It can reveal an aneurysm of the LAA communicating with the LA and evaluate the valve regurgitation and cardiac function. CT scanning is performed to demonstrate a more precise spatial structure relationship and to exclude other cardiac tumors [7]. Three-dimensional CT reconstruction showed that the aneurysm compressed the left ventricular anterior wall in our case. The LAAA may potentially disturb flow in the coronary arteries. Given the potential involvement of the coronary arteries, coronary CT angiography was also necessary for our patient. Although no significant abnormality was revealed in this patient's coronary artery, part of the LV shape was deformed by the enlarged LAAA.

To date, the patient has maintained normal cardiac function with no signs of myocardial ischemia. However, myocardial ischemia was caused by LAAA in a few cases, such as, a 15-year-old boy who presented with chest pain due to the left coronary artery being oppressed by a giant LAAA [2]. A 46-year-old man with a large LAAA was diagnosed with a left ventricular wall motion anomaly by spot tracking imaging [8]. As the effect of LV deformation on myocardial function has not yet been determined, it is important to periodically monitor the mechanical function of the left ventricle. Multimodal imaging techniques, including magnetic resonance imaging (MRI), can accurately evaluate myocardial function, which can help with diagnosis.

Surgical resection of the aneurysm is usually recommended to prevent serious complications and has a generally good prognosis [5]. Several patients with large LAAA were stable during the follow-up with medication. A 45-year-old patient with a large LAAA (11.2 × 8.0 cm) chose conservative treatment and was stable at the 20-year follow-up [9]. A 35-year-old patient with LAAA (6.6 × 5.1 cm) was released in a stable condition after anticoagulation treatment [10]. To ensure that the international standardization ratio (INR) is within the normal range, these patients must regularly monitor coagula-

tion function and adjust anticoagulation dosage. Otherwise, our patient who had the aneurysm removed by surgery has been living a healthy life without symptoms, complications, or medication for 4-year follow-up.

Conclusion

LAAA is a rare abnormality often without typical symptoms. Accurate diagnosis and selection of appropriate therapies are essential due to the risk of serious and life-threatening complications. Multimodal imaging technology is considered an important assessment tool for the diagnosis, treatment, and prognosis of LAAA.

Patient consent

Written informed consent was obtained from the patient for the publication of this case report and relevant images.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.radcr.2022.11.062.

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