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Left Atrial and Left Atrial Appendage Mass Diagnosed by Cardiac Imaging: A Case Report

Marija Kotevska-Angjushev, MD [1,*]; Menka Lazarevska, MD [2]

[1]Cardiology Department, "8th of September" City Hospital, Skopje, Macedonia
[2]University Clinic of Radiology, Saints Cyril and Methodius University of Skopje, Skopje, Macedonia

*Corresponding author: Marija Kotevska-Angjushev, Cardiology Department, "8th of September" City Hospital, Skopje, Macedonia. Tel: +389-2779277, Fax: +389-23112502, E-mail: angusevm@hotmail.com

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Introduction: Left atrial thrombi are present in one third of patients with severe rheumatic mitral stenosis and atrial fibrillation. A left atrial mass can be diagnosed as a thrombus by transthoracic echocardiography in the presence of the predisposing factors for a thrombus such as mitral stenosis and atrial fibrillation. The sensitivity of transthoracic echocardiography for detecting left atrial appendage thrombi is low, and only a few case reports have been described in the literature.

Case Presentation: This report describes the case of a 65-year-old female with severe rheumatic mitral stenosis and chronic atrial fibrillation presenting with congestive heart failure. This patient was shown, by means of transthoracic echocardiography, to have a large immobile left atrium cavity mass (6.5 × 3.4 × 2.3 cm) and a large left atrial appendage mass (1.7 cm) identified as a thrombus. Contrast computed tomography of the chest confirmed the diagnosis.

Conclusions: Transthoracic echocardiography was sufficient to establish the diagnosis and to decide its management.

Keywords: Atrial Function; Left Atrial Appendage; Thrombosis; Echocardiography

1. Introduction

Left atrial thrombi are present in one third of patients with severe rheumatic mitral stenosis (MS) and atrial fibrillation (AF) (1). Atrial thrombi classically reside in the left atrial appendage (LAA), but can also form in the left atrial (LA) cavity (2). Transthoracic echocardiography (TTE) became the initial gold standard test for the diagnosis of intracardiac masses. The differential diagnosis between tumors and thrombi is difficult without the presence of precipitating factors for thrombus formation. The LA has a predisposition for thrombus formation, especially in patients with low flow states such as AF, MS, and LA enlargement (3).

The sensitivity of TTE for detecting LAA thrombi is low, and only a few case reports have been described in the literature (3-5). We describe a patient with rheumatic MS and chronic AF presenting with an LA cavity mass and an LAA mass identified as a thrombus by TTE. In this patient, TTE was sufficient to establish the diagnosis and to decide further management.

2. Case Presentation

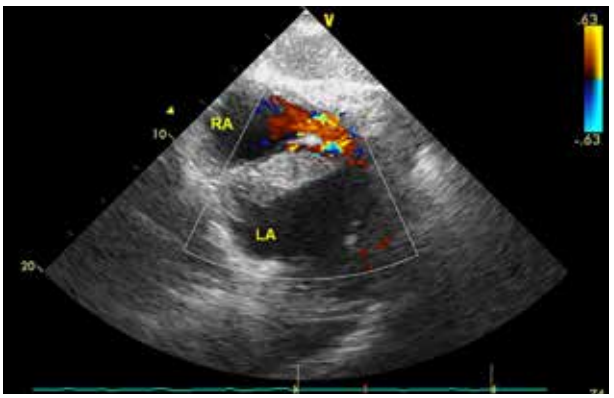
A 64-year-old woman with a history of rheumatic MS and chronic AF was admitted to our hospital for worsening heart failure. She had demonstrated no thrombo-embolic events hitherto, and nor had she ever been on oral anticoagulants and medical supervision. TTE revealed the presence of a large homogenous mass in the LA cavity adherent to the interatrial septum, suggestive of an LA thrombus (Figure 1). On the modified parasternal short-axis view, the presence of a spontaneous echocardiographic contrast in the LAA suggested the possible presence of a thrombus in the LAA. TTE also demonstrated valvular changes, typical of predominant pure rheumatic MS. The anterior mitral leaflet demonstrated "doming" and a “hockey stick” appearance in diastole, a characteristic feature of rheumatic MS. Estimated mitral valve area was 0.8 cm^2. Furthermore, there was LA enlargement and severe pulmonary hypertension. The left ventricle showed mild left ventricular systolic and severe diastolic dysfunction. Because of the high possibility of a thrombus, anticoagulation therapy with fraxiparine (0.6 mL/d) and oral coumarin was given for 2 weeks with a target international normalized ratio (INR) level of 2.5. After two weeks' therapeutic anticoagulation, the size of the LA cavity mass was substantially reduced, which was another indirect confirmation of a thrombus (Figures 2 and 3). At that time, a large LAA thrombus was revealed through transthoracic second harmonic imaging (Figure 3). Transesophageal echocardiography (TEE) was indicated, but the patient refused it. Therefore, contrast computed tomography (CT) (Figure 4) of the chest was performed, which confirmed the diagnosis. The patient was

Implication for health policy/practice/research/medical education:
Better understanding of the use of transthoracic echocardiography in the differential diagnosis of cardiac masses.

discharged on oral Coumarin. Seven days later, she had successful mitral valve replacement and LA thrombectomy.

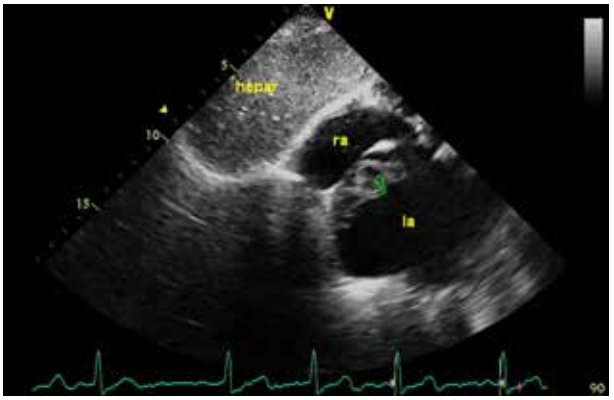
The standard parasternal short-axis view, at the level of the aortic valve, is usually modified by a slight clockwise rotation and/or by slight downtilting of the probe. In this position, the LAA may become partially visualized on the left side of the aorta. Although the LA spontaneous echocardiographic contrast is rarely appreciated on TTE, its presence inside the LAA was another finding suggesting the existence of a thrombus. After two weeks' therapeutic anticoagulation, besides the reduced LA cavity thrombus (vertical green arrow), another echodense mass was visible in the LAA (horizontal green arrow). This mass, with a defined border and 1.7 cm in length, was identified as a thrombus. The LAA is larger in patients with AF and MS (as was the case in our patient); accordingly, an LAA thrombus is visualized on TTE more easily (ra, right atrium; la, left atrium; Ao, aortic valve; rupv, right upper pulmonary vein)

Figure 1. Transthoracic Echocardiography (Subcostal Long-axis View), Demonstrating a Large Sessile Immobile Left Atrial Cavity Mass Attached to the Interatrial Septum



This mass was diagnosed as an echodense mass in the LA cavity, with a well-defined border to the endocardium. It was all suggestive of an LA thrombus, showing a constant and reproducible position in the LA cavity (RA, right atrium; LA, left atrium).

Figure 2. Transthoracic Echocardiography (Subcostal Long-axis View)



After two weeks' therapeutic anticoagulation, control TTE showed a substantial reduction in the size of the LA cavity thrombus (3.5 × 2.0 × 1.7 cm). Echo-lucent areas inside the thrombus (green arrow) were indicative of thrombus lysis (ra, right atrium; la, left atrium).

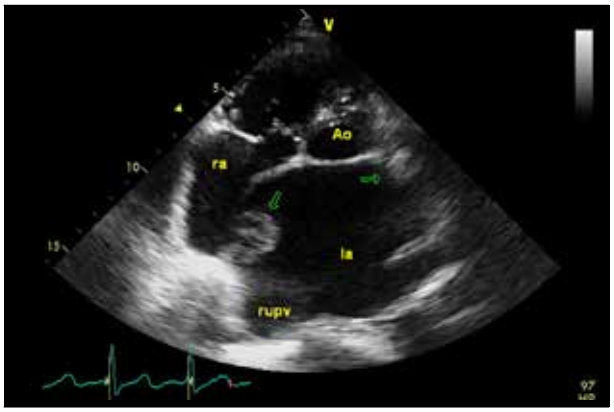
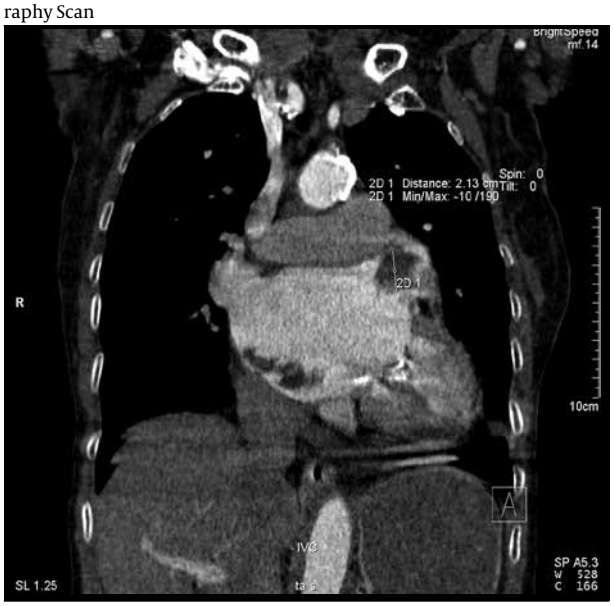


Figure 3. Modified Parasternal Short-axis View

Figure 4. Both Thrombi as Filling Defects in Contrast Computed Tomography Scan



The LA cavity thrombus was reduced (length of 4.6 cm) and was irregular in contour, and the LAA thrombus was large (2.1 × 3.6 × 1.6 cm in dimension).

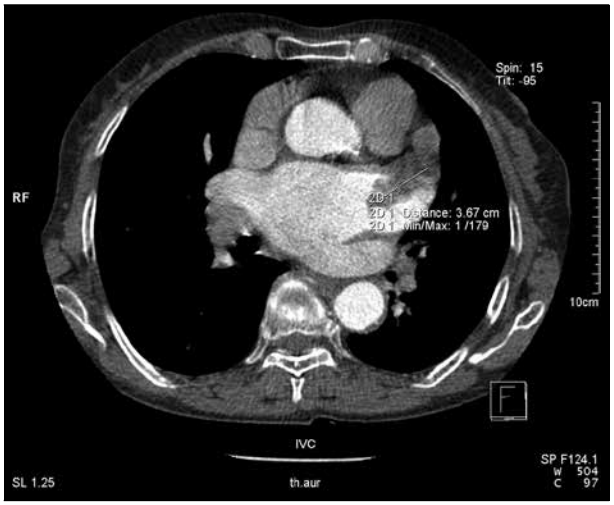


Figure 5. Left Atrial Appendage Thrombus From Another Angle and Plane in Contrast Computed Tomography Scan

3. Conclusions

TTE is the initial noninvasive method for evaluating cardiac masses (2, 6). The differentiation between tumors and thrombi is sometimes difficult, but is critical in making the right therapeutical decision. Atrial thrombi classically reside in an atrial appendage. However, they can also form in the body of the LA, occasionally attach to the interatrial septum, and may mimic a tumor (myxoma). Usually an LA myxoma arises from the interatrial septum at the level of the fossa ovalis, typically attached to the fossa ovalis by a narrow stalk, while LA thrombi tend to have a broad-based attachment to the walls, especially within the LAA (2). However, the differentiation of a thrombus from a tumor by TTE may be difficult if predisposing factors for a thrombus are not present. Any condition leading to the stasis of blood within the LA predisposes to thrombus formation. Numerous studies to date (2-4, 6, 7) have reported the presence of an LA mass diagnosed by TTE as a thrombus if associated with AF, dilated LA, mitral stenosis, low ejection fraction, prosthetic mitral valves, or atrial spontaneous echocardiographic contrast. Some authors [Omran et al. (3), Farman et al. (4) Silaruks et al. (8), and Kaymaz et al. (9)] have given echocardiographic definitions for an LA thrombus: first, there is a presence of an intracavitary echogenic mass acoustically clearly distinct from the LA endocardium and the pectinate muscles and second, it should be visualized in two or more echocardiographic views. In our patient, the presence of AF rhythm, enlarged LA chamber, severe MS, and left ventricular dysfunction, along with the echocardiographic characteristics helped the LA cavity mass to be diagnosed as a thrombus.

Approximately 60% of the LA thrombi in patients with rheumatic mitral valve disease (predominantly stenosis) and AF are seen within the LAA (1). Whereas the LAA could be visualized by TTE in most patients, the sensitivity of this method for detecting LAA thrombi and spontaneous echocardiographic contrast is low. Recent advancement in echocardiography i.e. second harmonic imaging has enabled us to visualize the LAA structure more clearly than fundamental imaging. Second harmonic imaging has been shown to improve left ventricular endocardial delineation by reducing the near-field and side-lobe artifacts and by increasing the lateral resolution (5). This method can visualize the LAA via TTE using modified parasternal short-axis view and modified apical two-chamber view. However, there are well-recognized limitations in detecting LAA thrombi by TTE. Small thrombi (< 1.0 cm) and thrombi localized in the distal part of a multilobed LAA may easily go unrecognized (4, 5).

So far, only a few studies (3-5) have reported the detection of LAA thrombi by TTE using second harmonic imaging, and all the visualized LAA thrombi have been large (length > 1.0 cm). This was in accordance with our case, where the LAA thrombus was also large (length = 1.7 cm). The contributing factors to thrombus formation in the LAA were the same, including the presence of the spontaneous echocardiographic contrast inside the LAA. The spontaneous echocardiographic contrast was due to a combination of absent atrial contractions from AF, reduced cardiac output, and high filling pressure from severe diastolic dysfunction.

TEE has been shown to be more sensitive than TTE in the identification of LA thrombi, especially for the imaging of the LAA (4-6). However, TEE is semi-invasive since it is a procedure that carries significant discomfort. Also, because it visualizes only one plane at any given time, TEE precludes a comprehensive examination of the LAA and in some patients makes it difficult to differentiate a clot from the pectinate muscles (8). Current high-resolution contrast-enhanced CT scan can define the anatomy of the LAA; therefore, it could be another noninvasive modality in the detection of atrial thrombi, especially in the LAA (6, 10). During the image-rendering process, CT scan allowed the visualization of the thrombi from multiple angles and planes, giving us a more comprehensive assessment in our patient.

Because surgical treatment is the treatment of choice in the presence of organized LA thrombi and severe MS (6), our patient was directed to successful mitral valve replacement and thrombectomy. TTE is a useful noninvasive diagnostic tool in diagnosing a cardiac mass as a thrombus in the presence of predisposing factors for a thrombus. This study also demonstrates the ability of transthoracic second harmonic imaging in identifying LAA thrombi. Although the presence of the thrombus was confirmed intraoperatively, histopathological analysis after thrombectomy was not performed.

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Authors' Contribution

Marija Kotevska-Angjushev: Substantial contributions to conception and design, data acquisition, analysis, and interpretation, article drafting, critical revision of the article for important intellectual content, and final approval of the version for publication. Menka Lazarevska: data acquisition, analysis, and interpretation, study supervision, critical revision for important intellectual content, and final approval of the version for publication.

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