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【 CASE REPORT 】

Isolated Left Atrial Infective Mural Endocarditis

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Abstract:
A 52-year-old man presented with a fever and malaise. Transthoracic echocardiogram was performed because of a holosystolic murmur, which showed mitral valve prolapse and a regurgitation jet toward the posterior wall of the left atrium. There was no apparent vegetation at any valves. Blood cultures were positive for *Streptococcus mitis/oralis*. Transesophageal echocardiogram revealed vegetation only at the posterior wall of the left atrium exposed to the mitral regurgitant jet. We diagnosed this condition as infective mural endocarditis. This case highlighted the need for a detailed observation of the valves and the atrial wall when infective endocarditis is suspected.

Key words: mural endocarditis, mitral regurgitation, infective endocarditis

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Introduction

Infective endocarditis (IE) is a relatively rare disease that is associated with severe complications and a high mortality. An early diagnosis is required for the prevention of complications and death. However, the lesions (known as vegetations) are rarely located intracardially, except for in the valves. We herein report a case of isolated left atrial mural endocarditis detected by transesophageal echocardiogram (TEE).

Case Report

A 52-year-old man presented with a fever and malaise that persisted for several weeks. He went to the clinic and was prescribed an oral antibacterial agent for suspected lymphadenitis. However, his symptoms persisted for 3 weeks, and he was admitted to our hospital for further investigation. On admission, he had a temperature of 38.8°C, and his pulse rate was 105 beats per minute. A II/VI holosystolic murmur could be heard loudest at the apex of the heart; however, there were no physical findings to suggest an embolism. The laboratory data showed elevation of the white blood cell count (12,460/μL), C-reactive protein level (5.51 mg/dL) and procalcitonin level (0.42 ng/mL). Transthoracic echocardiogram displayed a mild mitral regurgitation with a regurgitant jet towards the posterior wall of the left atrium; however, there were no apparent vegetations at any of the valves (Fig. 1).

Antimicrobial therapy with ceftriaxone was started after collection of multiple sets of blood cultures. On the 5th day of hospitalization, the blood cultures were found to be positive for *Streptococcus mitis/oralis*. A further examination with TEE was performed, and eccentric mitral regurgitation due to a slight prolapse of the anterior mitral leaflet was detected (Fig. 2). Furthermore, a tiny vegetation was observed at the posterior wall of the left atrium exposed to the mitral regurgitant jet (Fig. 3, arrow). There was no vegetation at any of the valves and no obvious abscess. The definite clinical diagnosis of IE was established, as the symptoms met two of the major modified Dukes criteria.

The antibacterial drug was changed to penicillin G for 4 weeks and gentamicin for 2 weeks. Contrast-enhanced computed tomography (CT) showed no systemic embolism at any of the thoracic or abdominal organs; however, CT angiography of the head revealed a 3-mm aneurysm at the peripheral branch of the left middle cerebral artery. After initi-

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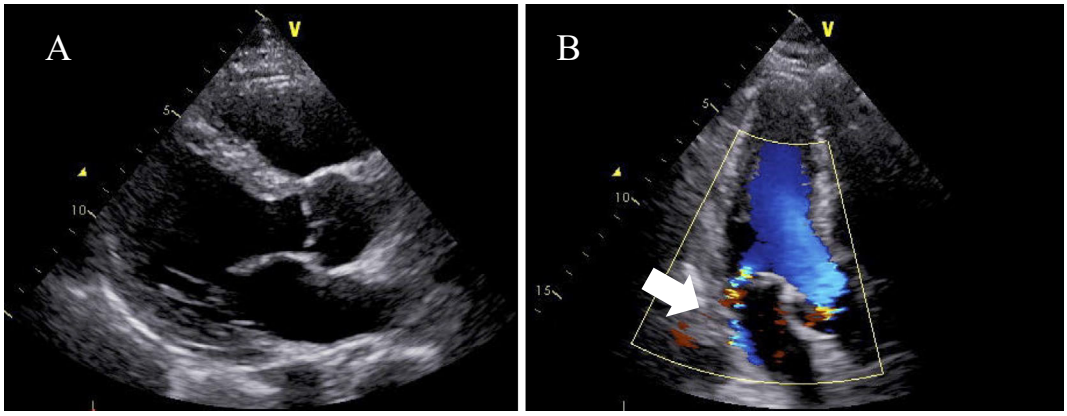

Figure 1. **A: Transthoracic echocardiography from a left parasternal view showing no apparent vegetation. B: Color-flow Doppler from an apical three-chamber view showing mild mitral regurgitation with a regurgitant jet toward the posterior wall of the left atrium (arrow).**

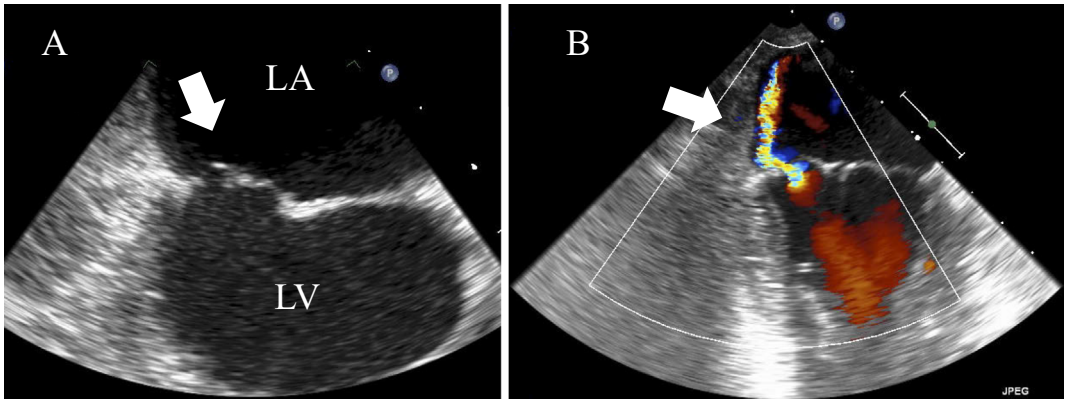

Figure 2. **A: Transesophageal echocardiography (TEE) showing slight prolapse of the anterior mitral leaflet (arrow). B: TEE showing eccentric mitral regurgitation (arrow). LA: left atrium, LV: left ventricle**

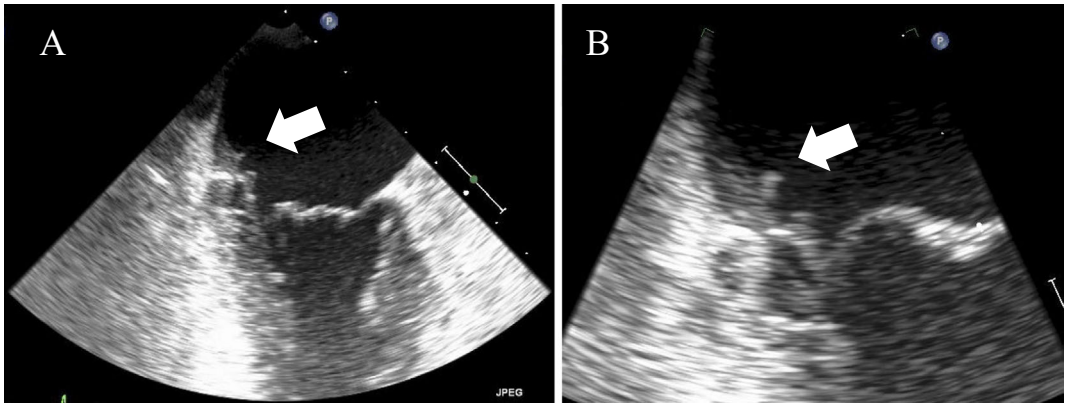

Figure 3. **A: Transesophageal echocardiography (TEE) showing vegetation at the posterior wall of the left atrium (arrow). B: TEE showing magnification of the vegetation (arrow).**

ating antimicrobial therapy, the patient's temperature dropped, and the white blood cell count and levels of C-reactive protein decreased gradually. The blood culture was negative on the 5th day of hospitalization. There was no recurrence of an increased temperature, and inflammatory marker levels remained normal; thus, the patient was discharged on day 35 of hospitalization. TEE performed after treatment showed organized vegetation (Fig. 4, arrow). Head CT angiography showed no enlargement of the intracranial infectious aneurysm.

Discussion

IE is an infection of the endocardium or prosthetic valves caused by various bacteria or fungi. The onset of IE is associated with an underlying cardiac structural abnormality. A pre-existing valvular disease, particularly mitral regurgitation, is a primary predisposing cardiac condition of IE. The high-velocity regurgitant jet causes endothelial disruption and platelet fibrin deposition, resulting in nonbacterial thrombotic endocarditis (NBTE). Pathogens adhere to NBTE and infect the injured endothelial cells (1). The vegetation of IE is typically located intracardially and involves the valves. Although primary mural endocarditis is uncommon, the vegetation is mainly located on the left or right ventricle in such cases (2). Left atrial mural endocarditis including other endocardial structures has been reported in the past (3, 4), but isolated left atrial mural endocarditis is a very rare condition. In 1980, Ringer et al. (5) reported the first case with isolated left atrial infective mural endocarditis in autopsy case study, and only six cases in total have been reported in the literature (Table) (5-10). In general IE cases, the vegetation is located on the atrial surface of the mitral valve just distal to the orifice between the high-pressure jet and a low pressure sink (11, 12).

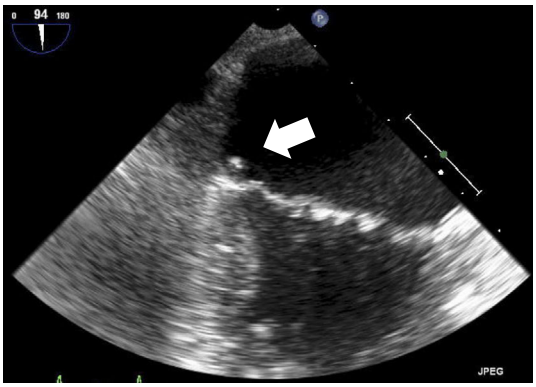

Figure 4. **Transesophageal echocardiography (TEE) after antibiotic therapy showed organized vegetation (arrow).**

In contrast, most cases with isolated left atrial mural endocarditis show an eccentric regurgitant jet due to mitral valve prolapse directed toward the left atrial wall. The direct impact of the high-velocity jet originating from the small regurgitant orifice can cause endothelial denudation, resulting in the deposition of fibrins and platelets that can serve as a nidus for bacterial infection. In most of the cases shown in Table, the degree of mitral regurgitation was relatively mild, and the vegetation was located at the posterior wall, which was just above the mitral valve and was exposed to the regurgitant jet. In our case as well, the mild eccentric regurgitant jet was directed to the left atrial posterior wall close to the mitral valve, and the tiny vegetation was located at the left atrial posterior wall, i.e., the impact site of the regurgitant jet. Thus, the high-velocity jet originating from the small regurgitant orifice and the direction of the regurgitant stream toward the left atrial wall close to the regurgitant orifice seem to play an important role in the etiology of the isolated left atrial endocarditis.

About 70% of patients with left or right ventricle mural endocarditis had predisposing risk factors, including a compromised immune state and intravenous drug use, and *Staphylococcus aureus* or fungi were the major pathogens (2). In contrast, in isolated left atrial mural endocarditis, *Streptococcus* is detected more frequently, and most cases - including our own case - had no predisposing risk factors associated with IE. *Streptococcus* is not very destructive, and the progression of the clinical course is relatively slow compared to *Staphylococcus aureus*.

In cases of isolated left atrial mural endocarditis, it is very difficult to detect vegetation using transthoracic echocardiogram at an early phase. Consequently, a delayed diagnosis of IE can lead to enlargement of the vegetation and a serious embolism. Indeed, in the aforementioned six cases, large vegetations were detected in all cases, and stroke or systemic embolism occurred in four cases. In addition, pa-

Table. **Summary of Published Cases with Isolated Left Atrial Infective Mural Endocarditis.**

Case	Age	Sex	Pathogen	MR jet	Size of vegetation	Clinical condition	Treatment	Clinical outcome (major event)	Ref
1	53	M	*Streptococcus*	NR	20×20 mm	Previously healthy	Medical	Died (cerebral hemorrhage)	5
2	45	F	*S aureus*	+	20×15 mm	Previously healthy	Surgical	Survived (cerebral infarction, peripheral emboli)	6
3	27	F	*Streptococcus*	-	20×10 mm	IV drug use	Medical	Survived (-)	7
4	24	F	MRSA	+	20 mm	Previously healthy	Surgical	Survived (-)	8
5	54	F	*Streptococcus*	+	NR	Mild RHD	Medical	Survived (cerebral infarction)	9
6	38	M	*Streptococcus*	+	21×11.5 mm	Previously healthy	Surgical	Survived (infarction of spleen)	10

F: female, IV: intravenous, M: male, MR: mitral regurgitation, MRSA: methicillin-resistant *Staphylococcus aureus*, NR: not reported, Ref: reference, RHD: rheumatic heart disease, *S*: *Staphylococcus*

tients with large vegetations often undergo surgical intervention. In our case, a tiny vegetation was detected using TEE, and the infection was able to be controlled by antimicrobial therapy without any complications, such as systemic embolism or cerebral hemorrhaging. To our knowledge, this is a unique case of isolated left atrial endocarditis that was able to be diagnosed in the early stage and treated with medical therapy without any complications. If no apparent vegetation is detected on transthoracic echocardiogram, even when a patient is suspected of having IE based on the clinical manifestation, TEE should be performed immediately. TEE may reveal the accurate location and size of the vegetation as well as the extent of infection to the surrounding tissue and help confirm a therapeutic effect. In addition, the precise observation of the structure, including the atrial wall, is necessary if the mitral regurgitant jet is eccentric and aimed toward the atrial wall.

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

References

1. Werdan K, Dietz S, Löffler B, et al. Mechanisms of infective endocarditis: pathogen-host interaction and risk states. Nat Rev Cardiol **11**: 35-50, 2014.
2. Tahara M, Nagai T, Takase Y, et al. Primary mural endocarditis without valvular involvement. J Ultrasound Med **36**: 659-664, 2017.
3. Gutierrez-Fajardo P, Espinola-Zavaleta N, Romero-Cardenas A, et al. Left atrial mural endocarditis: diagnosis by transesophageal echocardiography. Echocardiography **15**: 99-100, 1998.
4. Reddy G, Chatterjee A, Leon K. Left atrial mural endocarditis secondary to mitral valve jet lesion. Circulation **131**: 1529-1530, 2015.
5. Ringer M, Feen DJ, Drapkin MS. Mitral valve prolapse: jet stream causing mural endocarditis. Am J Cardiol **45**: 383-385, 1980.
6. Bierbrier GS, Novick RJ, Guiraudon C, Wisenberg G, Boughner D. Left atrial bacterial mural endocarditis. Chest **99**: 757-759, 1991.
7. Joseph J, Brigden G, Handler CE. Disappearing left atrial vegetation in an intravenous drug abuser. Eur Heart J **16**: 1158-1160, 1995.
8. Yuda A, Asada K, Hasegawa S, et al. A case report of infective endocarditis caused by MRSA and characterized by pedicled vegetation on the posterior wall of left atrium. Jpn J Thorac Cardiovasc Surg **46**: 915-918, 1998.
9. Grigorov V, Goldberg L, Manga P, Patel N. Diagnosis and management of complicated left atrial mural endocarditis. Echocardiography **16**: 585-586, 1999.
10. Choi JY, Kim KS. Left atrial mural endocarditis diagnosed by transesophageal echocardiography in a patient with mitral valve prolapse. J Cardiovasc Ultrasound **16**: 84-86, 2008.
11. Rodbard S. Blood velocity and endocarditis. Circulation **27**: 18-28, 1963.
12. Gregory SA, Yepes CB, Byrne JG, et al. Atrial endocarditis - the importance of the regurgitant jet lesion. Echocardiography **22**: 426-430, 2005.