



CASE REPORT

Left atrial appendage thrombus detected by transesophageal examination with linear endoscopic ultrasound

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Abstract

Linear endoscopic ultrasound (L-EUS) is mainly performed to assess pancreaticobiliary and mediastinal diseases. In this report, transesophageal observation with L-EUS revealed an LAA thrombus that was not detected by transthoracic echocardiography. This report highlights a novel potential role for L-EUS in the detection of cardiovascular diseases including LAA thrombi.

KEYWORDS

atrial fibrillation, endoscopic ultrasound, left atrial appendage thrombosis, spontaneous echo contrast, transesophageal echocardiography

1 | INTRODUCTION

Linear endoscopic ultrasound (L-EUS) is mainly performed by gastroenterologists to assess pancreaticobiliary and mediastinal diseases,^{1,2} and EUS-guided fine-needle aspiration (EUS-FNA) can provide definitive cytopathological diagnoses.³⁻⁵ Transesophageal observation with L-EUS is primarily used for the examination of esophageal submucosal tumors and mediastinal diseases, such as lymph node swelling.^{6,7} Recently, it was reported that L-EUS can be used to visualize cardiac structures, such as mitral valves, aortic valves, the atrial septum, and the left atrial appendage (LAA).⁸

The LAA is known as a long, tubular, hooked structure derived from the left atrium. Among intracardiac thrombi in patients with atrial fibrillation (AF), approximately 90% are located in the LAA.⁹ Transthoracic echocardiography does not usually afford detailed views of the LAA because it is posteriorly located.¹⁰ On the other hand, transesophageal echocardiography (TEE) provides highly accurate images of the LAA and is considered to be a valuable tool for diagnosing LAA thrombi.^{11,12} In this report, we provide

images of an LAA thrombus detected by transesophageal observation with L-EUS and highlight a new potential role for L-EUS.

2 | CASE

A woman in her 80s with Child-Pugh class A liver cirrhosis and AF underwent contrast-enhanced computed tomography (CE-CT) as a follow-up examination after treatment for hepatocellular carcinoma. CE-CT revealed not only a hypovascular liver mass and para-aortic lymph node swelling but also an LAA filling defect diagnosed as a thrombus (Figure 1). This thrombus was not detected by transthoracic echocardiography.

Eight days after starting anticoagulant therapy with heparin, the patient underwent EUS-FNA for lymph node swelling, which was histologically diagnosed as poorly differentiated carcinoma, with a GF-UCT260 linear echoendoscope (Olympus Medical Systems) and a ProSound F75 ultrasound processor (Hitachi-Aloka Medical, Ltd.). To assess cardiac

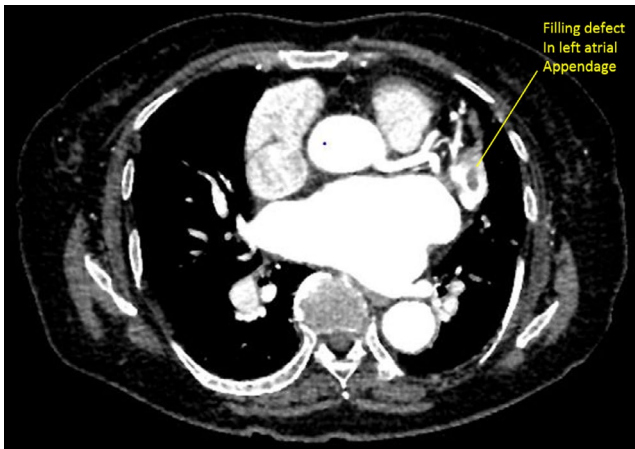


FIGURE 1 Contrast-enhanced computed tomography revealed a filling defect in the left atrial appendage (LAA) that was diagnosed as a thrombus. Arrowhead: The filling defect

structures, the frame rate was increased from 20 to 45 Hz in accordance with a previous report.⁸ Transesophageal observation revealed an LAA thrombus and spontaneous echo contrast (SEC; an echogenic swirling pattern of blood flow known as a marker of increased thromboembolic risk¹³) in the left atrium and the LAA (Figure 2, Video S1). The EUS examination was performed without any adverse event.

One month after initiating anticoagulant therapy, TEE revealed the reduction in the thrombus and SEC (Figure 3). Three months later, the LAA filling defect was not visible on CE-CT.

3 | DISCUSSION

In the present report, transesophageal observation with L-EUS clearly revealed the LAA thrombus and SEC, which were not

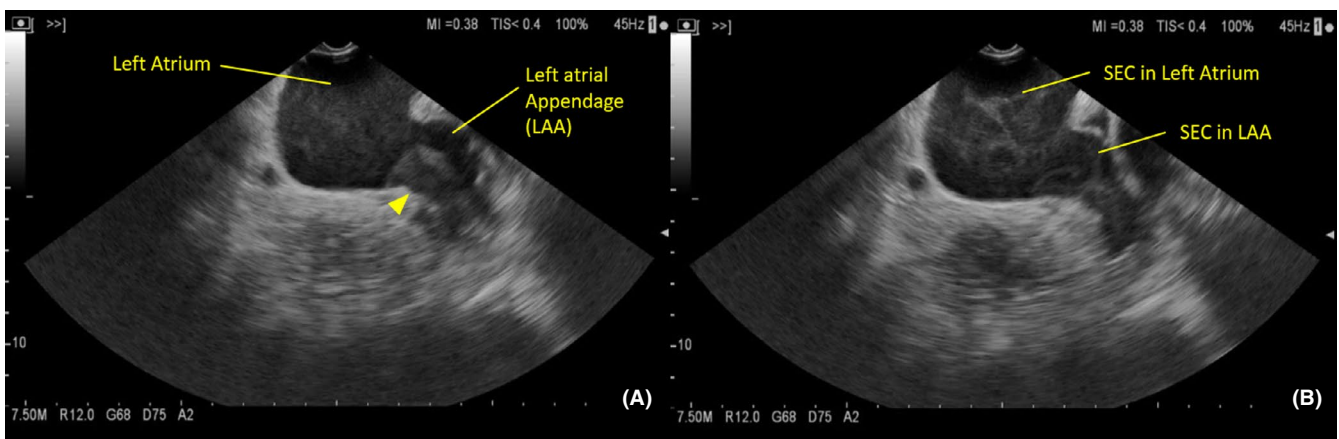


FIGURE 2 Transesophageal observations of the left atrium and the left atrial appendage (LAA) obtained via linear endoscopic ultrasound (L-EUS). A, L-EUS revealed an LAA thrombus (arrowhead). B, L-EUS showed spontaneous echo contrast (SEC; an echogenic swirling pattern of blood flow) in both the left atrium and the LAA

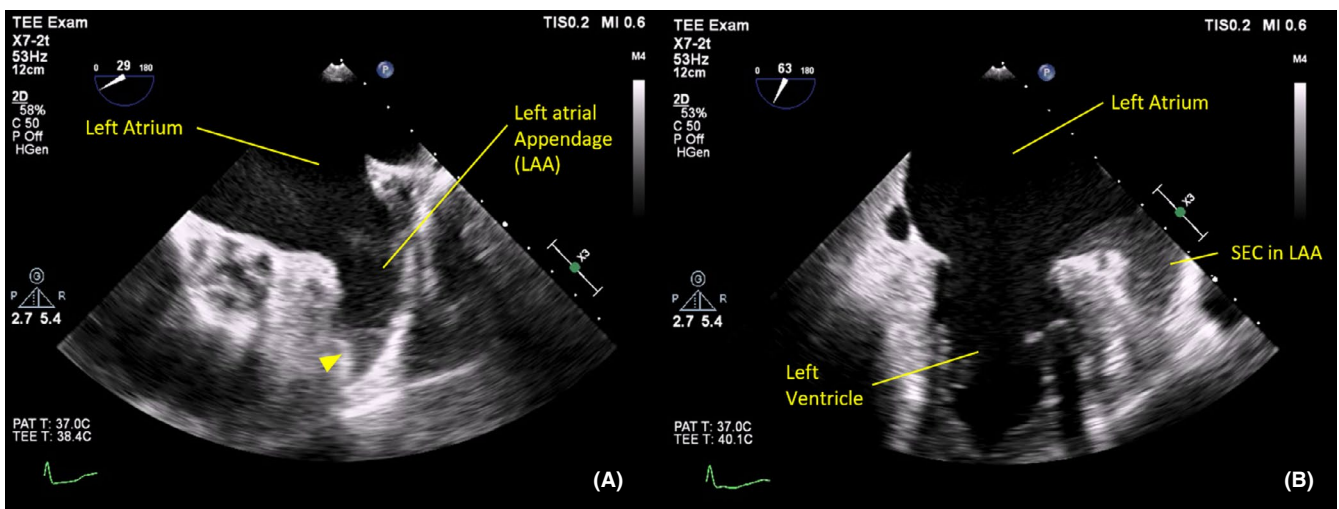


FIGURE 3 Transesophageal echocardiography after the initiation of anticoagulant therapy revealed that the thrombus and spontaneous echo contrast (SEC) were reduced. A, The thrombus was localized at the tip of the left atrial appendage (LAA) (arrowhead). B, SEC was not detected in the left atrium. SEC remained only in the LAA

detected by transthoracic echocardiography. Compared with transthoracic echocardiography, TEE provides excellent images of the LAA because of the short length between the ultrasound transducer and the LAA.¹⁴ Therefore, L-EUS can also be superior to transthoracic echocardiography in terms of LAA observation due to the proximity of the transducer to the LAA. In a previous report about the use of L-EUS for assessing the cardiac anatomy, the LAA was visualized in 100% of the study patients.⁸ To observe rapidly moving cardiac structures, we increased the frame rate to 45 Hz. TEE images are typically obtained at a frame rate of 30-60 Hz.⁸ Higher frame rates are important for clear visualization of the LAA.

Atrial fibrillation predisposes patients to developing left atrial thrombi, most commonly in the LAA, which are the main cause of cardiogenic thromboembolism.¹⁰ SEC is a swirling pattern of blood echogenicity. Patients with AF and SEC have an increased risk of cerebral embolism.¹⁵ The detection of thrombi and SEC in the left atrium and the LAA could lead to the prevention of thromboembolism. The TEE scanning plane can be rotated from 0° to 180°, but the ultrasound transducer used for L-EUS is fixed.^{8,16} Therefore, L-EUS has more limited capabilities than TEE with respect to the evaluation of cardiac structures. Despite this limitation, transesophageal L-EUS observation with higher frame rates could contribute to the detection of LAA thrombi and SEC, especially in EUS examinations of patients with AF because L-EUS provides valuable information regarding the left side of the heart including the LAA.⁸ Gastroenterologists rarely pay attention to the observation of cardiac structures because there have been few reports on the clear visualization of cardiac structures and the detection of cardiovascular diseases with L-EUS.^{8,17} The present report could stimulate the interest of gastroenterologists in the observation of cardiac structures and lead to the detection the treatment of overlooked LAA thrombi before the development of cardiogenic thromboembolism.

CONFLICT OF INTEREST

None declared.

AUTHOR CONTRIBUTION

KI: designed the study and wrote the initial draft of the manuscript. KI, MS, KS, TY: contributed to the collection and the interpretation of data. MS, RS, YS, TT: contributed to the interpretation of data and critical revision of the manuscript.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

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