

Prominent Transverse Sinus of Pericardium is Uncommon Diagnostic Pitfall on Echocardiography: Clues to Diagnosis

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Abstract

Transverse sinus (TS) is a normal structure of pericardium, usually visualized on transesophageal echocardiography (TEE). Rarely, when it is prominent, it may be visualized on transthoracic echocardiography (TTE), as a mobile circumscribed mass in the parasternal short-axis view. Due to its location adjacent to left atrial appendage (LAA), it can be misdiagnosed as an LAA thrombus. A 41-year-old woman presented with heart failure signs. TTE showed a circumscribed mass (1 cm × 2 cm), in or adjacent to the LAA, suggestive of an LAA thrombus. Additional maneuvers with the transducer made it obvious that it was a prominent TS, adjacent to the LAA, while the appendage was empty. TEE confirmed the diagnosis.

Keywords: Diagnostic clues, diagnostic pitfall, left atrial appendage thrombus, prominent transverse sinus of pericardium, transthoracic echocardiography

INTRODUCTION

Transthoracic echocardiography (TTE) is one of the most widely used noninvasive imaging methods and remains a first-line diagnostic method for imaging of cardiac masses.^[1]

Transverse sinus (TS) is an anatomic structure of the pericardium. It represents a region where two layers of pericardium fuse together and form a pericardial sinus, around the proximal parts of the great vessels. It is in communication with the pericardial cavity at its endings. It is located on the superior surface of the left atrium (LA), beneath the ascending aorta and main pulmonary artery, adjacent to the left atrial appendage (LAA).^[1,2]

TS is best visible on transesophageal echocardiography (TEE) as a triangular echo-free space, which contains a variable amount of pericardial liquid. It can be rarely visualized as a mobile circumferential mass, on TTE in parasternal short-axis view, in circumstances, when it is prominent and filled with enough pericardial fluid to gain a circumferential shape. In this view, the TS can be misdiagnosed as an LAA thrombus, due to its location adjacent to the LAA.^[2]

We describe an unusual and a rare case of prominent TS mimicking an LAA thrombus found on TTE, which was confirmed by TEE imaging. In this report, we emphasize that a prominent TS could be an uncommon diagnostic pitfall that may be found during routine transthoracic echocardiographic examination and we give some clues to diagnosis.

CASE REPORT

A 41-year-old woman with heart failure symptoms was admitted in the cardiology department for investigation. Electrocardiogram showed sinus rhythm with left bundle branch block. A TTE indicated a dilated left ventricle (LV) with reduced LV ejection fraction (LVEF of 40%) and severe

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diastolic dysfunction. Right heart chambers were dilated. There was mild circumferential pericardial effusion as a sign of heart failure. Incidental finding was a mobile circumferential mass in or adjacent to LAA, with dimensions 1 cm × 2 cm. At first glance, it was suggestive of an LAA thrombus. Additional maneuvers with the probe made it clear that the mass was located outside of the LAA, while the LAA was very small. This mass was indeed a prominent TS, a normal cardiac structure [Figure 1 and Video 1]. To confirm the diagnosis, TEE was done. The LAA was empty, without any thrombus inside [Figure 2 and Video 2], while TS appeared as a mobile circumscribed mass, located outside of the LAA, and moving with every cardiac cycle [Figures 3, 4 and Videos 2, 3]. The patient was treated with heart failure medicaments and safely discharged from the hospital.

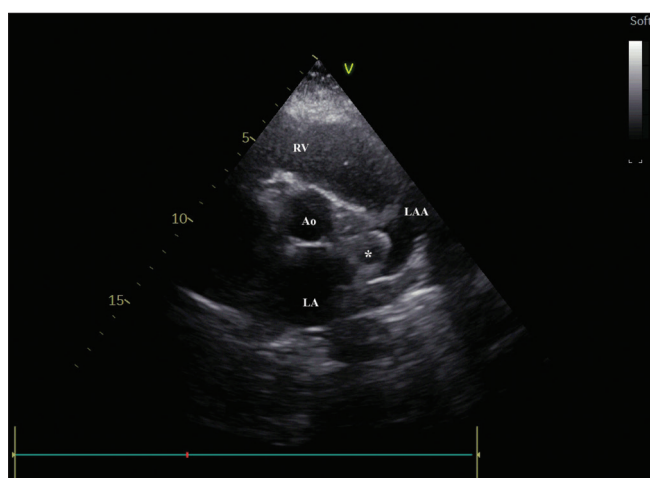


Figure 1: Transthoracic parasternal short-axis image of a mobile, well circumscribed, prominent transverse sinus (TS, *) of pericardium, located adjacent to the left atrial appendage (LAA). Pericardial fluid filling the TS assisted visualization of the TS as a circumscribed mass, with echo free space. Ao: Aorta, LA: Left atrium, RV: Right ventricle

DISCUSSION

TS is a pericardial sinus, presenting as a cul-de-sac in the pericardial cavity, formed between the points where great vessels enter it. It is an important anatomic landmark for cardiac surgeons during cardiac operations. It may be incidentally found on echocardiography without any pathologic consequences. It is best visualized with TEE but may also be rarely visible during TTE as a very small circular anechogenic structure containing minimal amounts of pericardial fluid. When it contains enough pericardial fluid, the sinus extends over its normal boundaries and becomes prominent. In these circumstances, prominent TS appears as a mobile circumferential mass in the parasternal short-axis view on TTE. In this view, due to its close location to LAA, it can simulate an LAA thrombus.^[1,2] This structure as an entity is not commonly known to many echocardiographers, so it can easily be misinterpreted as a pathology.^[1-3]

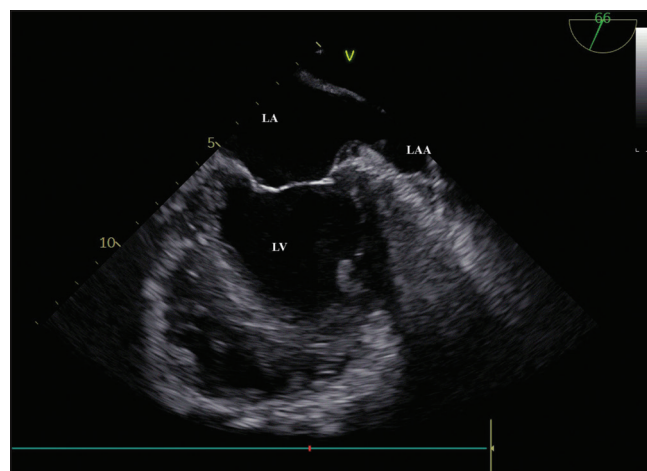


Figure 2: Transesophageal midesophageal view of a left atrial appendage (LAA) showing a small and empty LAA. LA: Left atrium, LV: Left ventricle

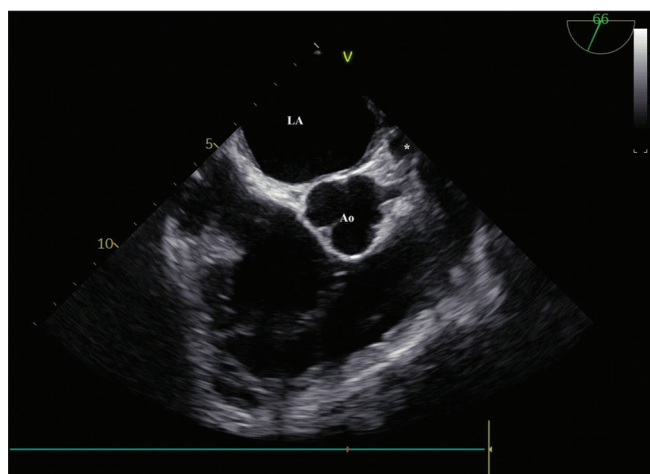


Figure 3: Transesophageal midesophageal view of a prominent transverse sinus (TS). The left atrial appendage and the TS were not visualized in the same imaging plane. The TS is assigned with *. Ao: Aorta, LA: Left atrium

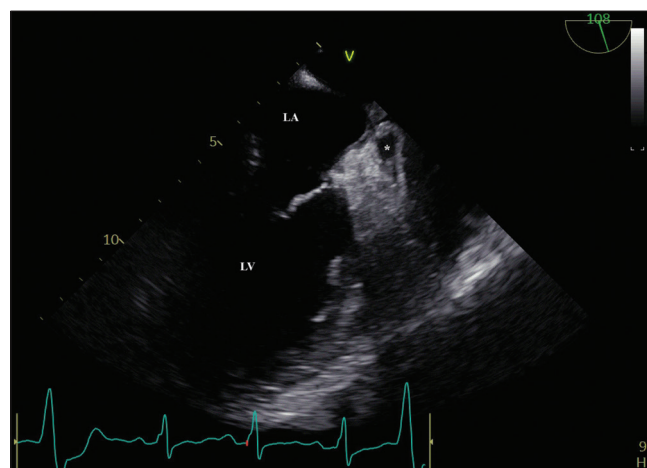


Figure 4: Transesophageal midesophageal off-axis view of a prominent transverse sinus (TS). The different mid-esophageal views confirmed the exact location of the TS (assigned with *), which was outside the left atrial appendage, and was best visible in the off-axis views. LA: Left atrium, LV: Left Ventricle

The echocardiographic literature has not taken much interest in describing the anatomic structures of pericardium, so echocardiographers do not pay adequate attention to these structures. Only two cases^[4,5] of a prominent TS are described in the literature, both were initially misdiagnosed as an LAA thrombus, and both were visualized on TEE. In one case, TS was filled with pericardial effusion,^[4] and in the other case^[5] with fat. In our case, a prominent TS was visualized by TTE in the parasternal short-axis view, which is quite uncommon. Probe maneuvers^[6,7] helped to visualize the LAA, which was empty. If we had not done these probe maneuvers, we would have made the wrong diagnosis of an LAA thrombus. Correct identification of the TS as a normal structure helped to avoid unnecessary anticoagulation therapy. However, TEE can always assist in confirming the diagnosis.

Diagnostic utility of TTE is operator-dependent, so some clues can be useful to delineate a prominent TS from an LAA thrombus. The anatomic location of the TS is the most valuable clue. It lies on the superior surface of LA beneath the ascending aorta and pulmonary artery, adjacent to the LAA,^[2] while the thrombus is located inside the LAA.^[6,7] Mobility of the mass is another clue. The thrombus is immobile or less mobile, while the TS is mobile and moves with every cardiac cycle. Finally, the thrombus is more echogenic than pericardial fluid within TS, which is generally anechoic.^[6,7] Furthermore, the use of ultrasound contrast for left heart chamber opacification during TTE can be helpful, especially in patients with suboptimal image quality.^[6,8] However, if TTE remains inconclusive, TEE can confirm the diagnosis by demonstrating the actual location of TS outside the LAA.^[2]

CONCLUSION

A prominent TS is a very unusual diagnostic pitfall encountered during TTE. The presence of enough pericardial effusion within the TS facilitates the appearance of the TS as a circumscribed mass in the parasternal short-axis view on TTE. Due to its close proximity to LAA, TS can simulate an LAA thrombus and can become a source of confusion, if it is not recognized as a normal structure by the echocardiographer. Knowledge of its location is the most useful diagnostic clue. When doubt persists, TEE can clarify the diagnosis.

Authors' contributions

MKA wrote the manuscript, was involved in the clinical care of the patient, and performed echocardiography; DA was involved in the preparation of the manuscript; ADD critically

revised the manuscript. Manuscript has been read and approved by all the authors.

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None.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient (s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and that due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

Conflicts of interest

There are no conflicts of interest.

Video legends

Video 1: Transthoracic echocardiography parasternal short-axis view of a prominent transverse sinus.

Video 2: Transesophageal echocardiography view of a left atrial appendage and a prominent transverse sinus.

Video 3: Transesophageal echocardiography off-axis view of a prominent transverse sinus.

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