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Short Communication

Transverse sinus fat pad may masquerade as left atrial appendage thrombus

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ABSTRACT

Transesophageal echocardiography (TEE) is a commonly utilized investigation in patients with atrial fibrillation to study the left atrial appendage (LAA) and exclude an appendage thrombus before proceeding with cardioversion. Although TEE is considered the procedure of choice for this purpose, it may sometimes offer a limited specificity due to common anatomical variations associated with either the LAA or the adjoining cardiac structures. We herewith present a patient with atrial fibrillation who underwent TEE and was found to have an echodensity in the vicinity of left atrial appendage that mimicked a thrombus. A careful further evaluation however confirmed that the echodensity actually was consistent with a dense epicardial fat pad. TEE imaging evaluation in different planes and angulations is thus paramount in establishing a correct diagnosis. Supplemental information from other imaging modalities such as cardiac computed tomography may sometimes offer an additional value, especially if the diagnosis remains unclear.

Introduction

Atrial fibrillation (AF) is one of the most commonly encountered arrhythmia in clinical practice, especially in the elderly. Direct current cardioversion (DCCV) is frequently utilized for rhythm restoration in patients with symptomatic AF, since its first implication by Bernard Lowen in 1962 [1,2]. Presence of an intra-cardiac thrombus is a contraindication for cardioversion procedure as it can potentially cause dislodgement of the thrombus and can lead to disabling and life-threatening embolic complications such as stroke. Left atrial appendage (LAA) is the most common site for intracardiac thrombus formation in AF due to a sluggish blood flow in the LAA. Transesophageal echocardiogram (TEE) is usually performed prior to DCCV to rule out a LAA thrombus [3,4]. Some common normal anatomical variations of either the atrial appendage (such as presence of thick pectinate muscles) or the variations associated with normal cardiac structures may sometimes mimic as a thrombus on TEE. The differentiation of normal structural variants from a true thrombus on TEE is critical in order to deliver an appropriate treatment strategy. The use of specialized imaging modalities such as cardiac computed tomography (CT) or magnetic resonance imaging (MRI) may sometimes be required to make a correct diagnosis [5,6]. In this report, we present a case of a prominent epicardial fat pad that may easily be misdiagnosed as an atrial appendage thrombus.

Case presentation

71-year-old woman with past medical history of coronary artery disease and hypertension, presented with symptoms of palpitations and dyspnea. Her admission electrocardiogram revealed new onset atrial fibrillation with rapid ventricular response. Her pharmacological stress myocardial perfusion imaging demonstrated normal myocardial perfusion and left ventricular systolic function. She underwent TEE before a planned DCCV which revealed a small echodensity measuring (1.2 cm * 1.1 cm) near the LAA. The echodensity was considered to possibly represent either a small thrombus localized in a multi-lobulate LAA versus possibly a prominent epicardial fat pad (Fig. 1A and Video 1). She underwent spontaneous cardioversion during the TEE probe withdrawal and then remained in normal sinus rhythm. She was initiated on sotalol, apixiban and a follow up contrast-enhanced cardiac CT was performed for further evaluation of the echodensity. Cardiac CT showed a normal left atrial appendage with no evidence of appendage thrombus [Fig. 1B]. The previously noted echodensity was confirmed to be a transverse sinus pericardial fat pad, which measured as 1.17 cm * 0.97 cm on

Abbreviations: TEE, transesophageal echocardiography; LAA, left atrial appendage; TS, transverse sinus; CT, computerized tomography; AF, atrial fibrillation; DCCV, direct current cardioversion.

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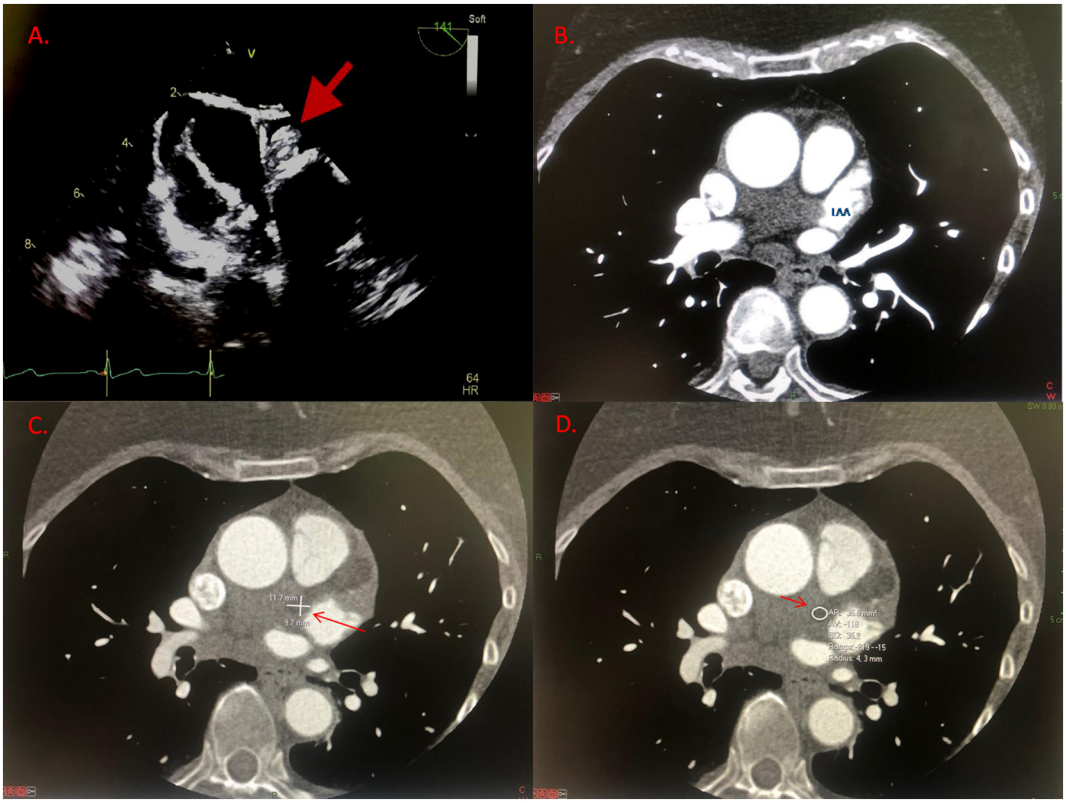

Fig. 1. ***A*** TEE long-axis view at 140° angulation demonstrates a small echodensity marked by the red arrow (measuring 1.2 cm * 1.1 cm approximately) abutting the left atrial appendage. ***B*** Contrast-enhanced cardiac CT demonstrates a normal left atrial appendage (LAA). There is no contrast filling defect in the LAA. ***C*** and ***D*** represent the same echodensity on the cardiac CT which measures 1.17 cm * 0.97 cm on the bi-dimensional plane which represents pericardial fat. Radio-density is −119 HU, which is consistent with fat tissue.

the bi-dimensional plane on the cardiac CT and had densitometric value of −119 Hounsfield Units (HU). [Fig. 1C–D].

Discussion

The left atrium is the most postero-superior chamber receiving pulmonary venous return and is attached to the LAA [7,8]. The posterior wall of the primitive left atrium, which normally receives the four pulmonary veins, represents the smooth portion of the left atrium proper, while the remainder of the primitive left atrium forms the trabeculated portion or LAA. LAA is tubular in shape, has a narrower base, and contains trabeculated pectinate muscles. Blood flow in the LAA is sluggish and therefore prone to thrombus formation, especially in patients with atrial fibrillation. TEE is the diagnostic test of choice to exclude LAA thrombi prior to DCCV, however there can be some limitations of TEE examination. Normal anatomic variants such as thick pectinate muscles of LAA and transverse sinus fat pad (epicardial fat interposed between the transverse sinus of the pericardium and the ascending aorta) can pose a diagnostic challenge [7–11].

The pectinate muscles can have a linear or globular appearance and can rarely be misinterpreted as an intracardiac mass or thrombus. The pectinate muscles are usually parallel in configuration and give a frond-like appearance [7,8]. These can be easily detected by a careful TEE imaging at different increment angles and a slight rotational manipulation of the TEE probe. In contrast, a thrombus is seen as a focal echodensity in different views.

The left superior caval vein (LSCV) is enclosed within the Marshall ligament, which is a fold of the visceral pericardium containing the vascular and nervous structures. The Marshall ligament courses obliquely above the LAA and lies laterally to the left superior pulmonary vein. It is also known as the Q-tip or Coumadin ridge. Sometimes, a prominent ridge can be mistaken as a pedunculated mass or thrombus on TEE [7,8].

The transverse sinus (TS) is a pericardial reflection located between the arterial mesocardium, which envelopes the ascending aorta and pulmonary trunk anteriorly, and the venous mesocardium, which covers the superior vena cava, left atrium and pulmonary veins postero-inferiorly [8,9]. Inferiorly, the floor of the TS is formed by the roof of the LA. Prominent pericardial fat or adipose tissue contained in the TS adjoining the LAA can rarely masquerade as a thrombus, especially in a multiloculate LAA [11]. Although echocardiographic differentiation of the adipose tissue from pericardial fluid/effusion is easier based on the differences in the echogenicity, texture and mobility (fat pad being more echogenic and lobulated), its differentiation from an intracardiac thrombus may be challenging. Most importantly, the location of pericardial adipose tissue is distinctly outside the normal LAA anatomical margins which can be identified by a careful multi-planar echo imaging. Sometimes, other modalities such as cardiac CT may be helpful. CT imaging can definitively differentiate epicardial transverse sinus fat from a thrombus. The measurement of HU (a quantitative scale for describing radiodensity) can be helpful in differentiating the adipose tissue from a thrombus. Fat usually has a densitometric value between −90 to −120 HU, while a thrombus (clotted blood) measures between +50 to +75 HU.

Conclusion

The differential diagnosis of an echodensity may sometimes be challenging, even though the imaging quality and techniques have significantly improved in the current era. Cardiologists and electrophysiologists should be familiar with normal anatomic variants to avoid a misdiagnosis of LAA thrombus in patients with AF. A correlation with previous images, a short-term interval imaging follow-up and use of alternative imaging modalities may be valuable to establish a correct diagnosis and prevent inappropriate treatment.

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jelectrocard.2019.06.019.

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