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INTERMEDIATE

CLINICAL VIGNETTE: IMAGING VIGNETTE

Primum Non Nocere

A Rare Case of Amplatzer Erosion and Cardiac Pseudoaneurysm with Multimodality Imaging

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ABSTRACT

Complications of septal-occluder devices include erosion, perforation, and embolization, which are most commonly caused by oversized devices or thin rim margins. Cardiac pseudoaneurysm is a rare phenomenon that forms as a result of device erosion into the myocardium. Although this is often an incidental finding, they are at risk for rupture. (**Level of Difficulty: Intermediate.**) (J Am Coll Cardiol Case Rep 2019;1:396–400) © 2019 The Authors. Published by Elsevier on behalf of the American College of Cardiology Foundation. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

Device erosion is rare but catastrophic complication of septal-occluder devices used in the transcatheter repair of septal defects (1).

A 76-year-old woman presented with hypotension and sinus tachycardia. The patient appeared malnourished and contracted with generalized weakness. Laboratory results, electrocardiogram (ECG), and cardiac enzymes were unremarkable. Chest x-ray showed a large mass at the left lung base. Computed tomography (CT) chest scan revealed a 13-cm x 11-cm mass along the left atrium that was proximal to an atrial septal defect (ASD) closure device (**Figure 1**). Transthoracic echocardiogram (TTE) with contrast material showed a small pericardial effusion without tamponade physiology, an interatrial septal device near the mitral valve with smoke in the left atrium, and a large pseudoaneurysm along the left ventricular inferolateral wall of unclear origin (**Figure 2**). The right atrium was normal in size and structure with normal right and left systolic function. Both atrioventricular (AV) valves were of normal structure without regurgitation. The aortic root was normal in size and structure. Transesophageal echocardiogram (TEE) with contrast material was performed for better visualization (Videos 1, 2, and 3). It revealed a large pseudoaneurysm along the lateral aspect of the heart, with contrast flowing freely between the pseudoaneurysm and the cardiac chambers. There was Doppler flow between the mass, left atria and left ventricle, confirming continuity between the pseudoaneurysm and the heart (**Figure 3**). The authors performed cardiac magnetic resonance imaging (MRI), because the exact origin of the pseudoaneurysm was not appreciated on echocardiography (**Figure 4**, Video 4). It revealed the pseudoaneurysm originating from the base of the heart along the AV groove. An Amplatzer device (Abbott, Abbott Park, Illinois) was visualized along the interatrial septum in close proximity to the pseudoaneurysm. There was also involvement of the right coronary artery (RCA), which was dilated and aneurysmal and appeared to be feeding into the pseudoaneurysm.

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DISCUSSION

Complications of closure devices include erosion, perforation, and embolization. Large devices >24 mm or inadequate rim margins are the biggest risk factors. Thin margins cause atrial septal malalignment, resulting in impingement of the atrial disc onto the myocardium (1,2). This is exacerbated by oversized devices, which are often used with thin margins to improve device stabilization. The embedded device stretches the atrial wall with every cardiac cycle, ultimately eroding through the interatrial septum and potentially the aorta (1,2). Significant erosion can perforate the myocardium or pericardium, causing fistulas or cardiac tamponade, respectively (2). Cardiac pseudoaneurysm is another rare complication that results from rupture of the myocardium within the epicardial wall. Although they are often found incidentally, they may rupture with increasing pseudoaneurysm growth (3).

ABBREVIATIONS AND ACRONYMS

CT = computed tomography

ECG = electrocardiogram

MRI = magnetic resonance imaging

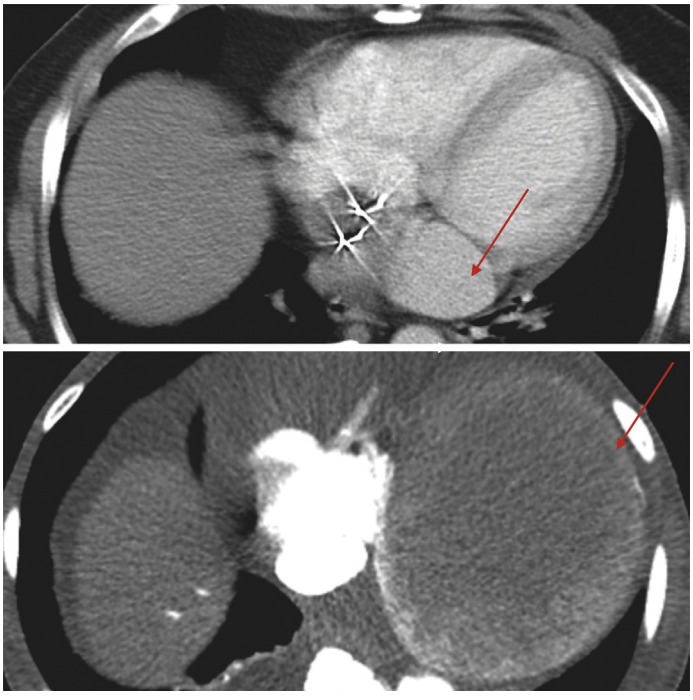
TEE = transesophageal echocardiogram

TTE = transthoracic echocardiogram

FOLLOW-UP

The authors speculate that disc erosion into the base of the heart created a pseudoaneurysm that started at the interatrial septum and formed along the AV groove, which involved the RCA and led to its aneurysmal dilatation because of its anatomical orientation. Given that the crux of the heart is embryologically formed by the membranous part of the ventricular septum and septum primum, the device had proximity to the RCA that runs along the AV groove between the left atrium and left ventricle. A CT chest scan from 7 years before and 3 years after Amplatzer placement showed the pseudoaneurysm was 4.1 cm × 3.8 cm (**Figure 1**). Although multimodality imaging did not explicitly confirm the Amplatzer-pseudoaneurysm connection, this is the only reasonable explanation to this anatomical finding of a progressively growing pseudoaneurysm.

FIGURE 1 Pseudoaneurysm Growth



Pseudoaneurysm **(arrows)** on initial computed tomography (CT) chest scan with contrast material measuring 4.1 cm x 3.8 cm **(top)** and on follow-up CT chest scan without contrast material 7 years later measuring 13 cm x 11 cm **(bottom)**.

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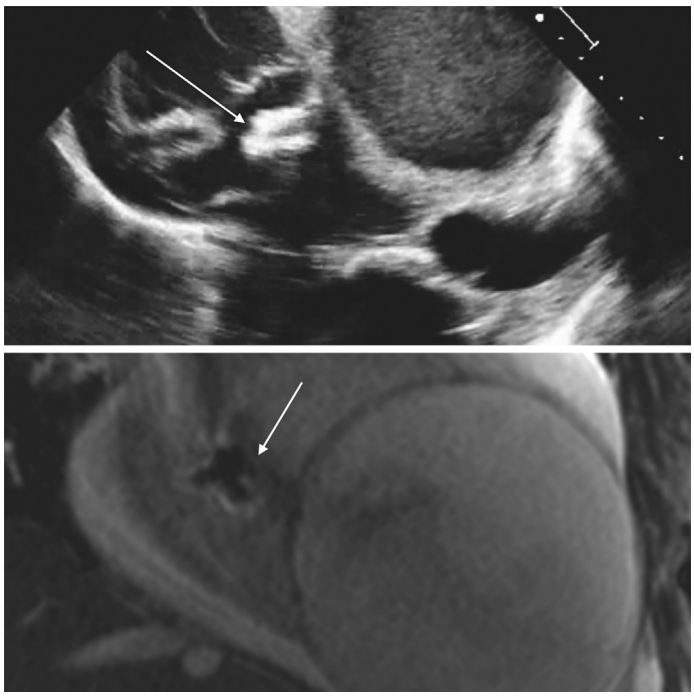
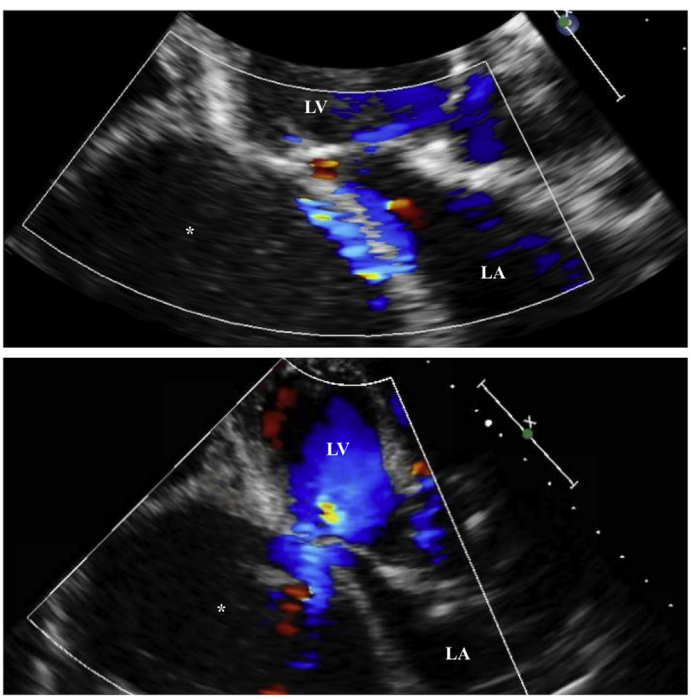
FIGURE 2 Ampltazer Device



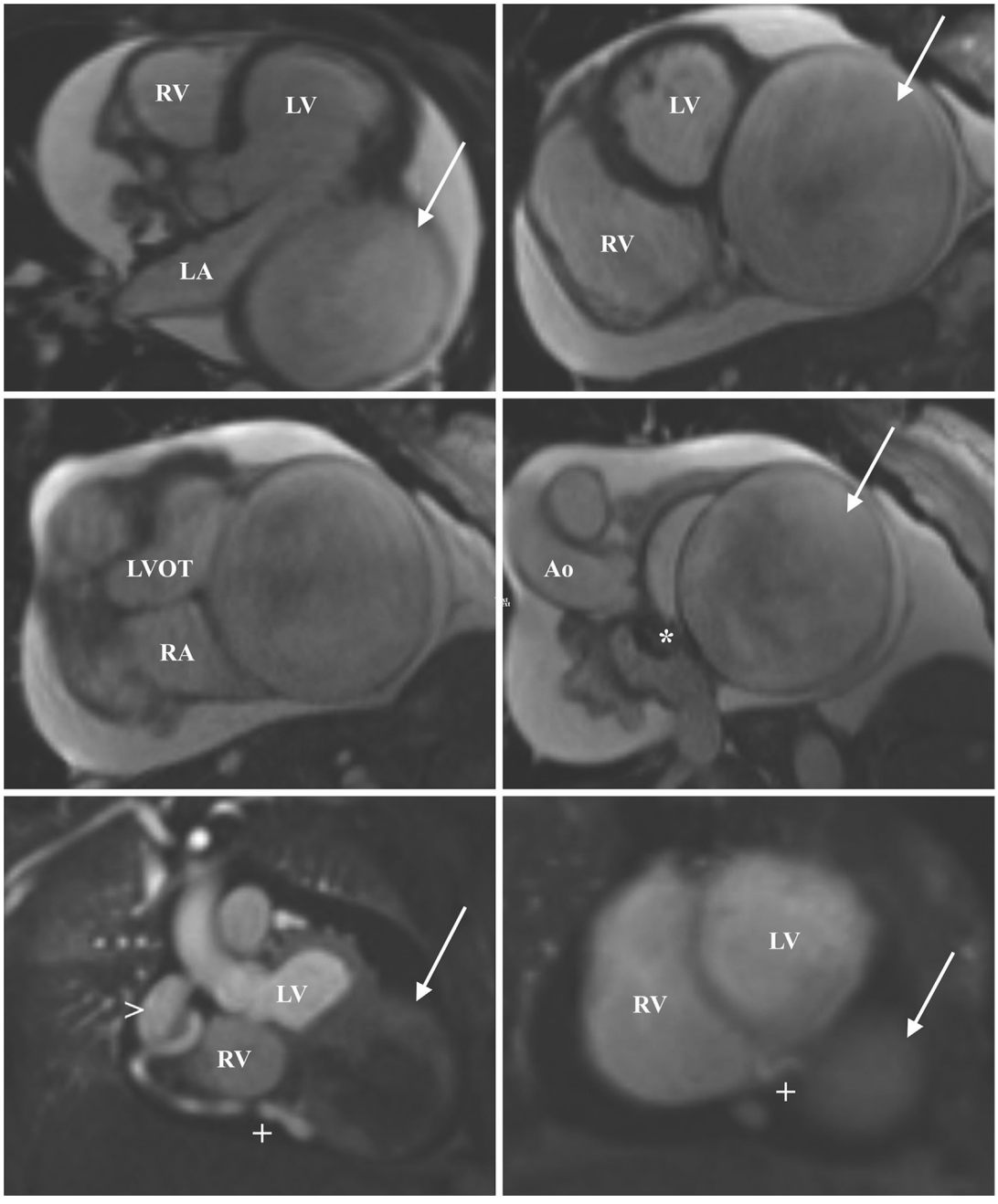
Amplatzer device **(arrows)** on transthoracic echocardiogram with contrast material **(top)** and cardiac magnetic resonance imaging **(bottom)**.

FIGURE 3 Pseudoaneurysm Connection to Left-Sided Heart Chambers



Long-axis on transthoracic echocardiogram showing Doppler flow from pseudoaneurysm **(*)** and the left atria **(top)** and between the pseudoaneurysm, left atria (LA), and left ventricle (LV) **(bottom)**.

FIGURE 4 Spatial Relationship of Pseudoaneurysm on Cardiac MRI



Cardiac MRI showing the spatial anatomy of pseudoaneurysm **(arrows)** to left atrium (LA), right atrium (RA), left ventricle (LV), right ventricle (RV), aorta (Ao), left ventricular outflow tract (LVTO), right coronary aneurysm **(>)**, right coronary artery **(†, bottom left)**, posterior descending artery **(cross, bottom right)**, and occluder device **(*)**.

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The small pericardial effusion was initially concerning for tamponade but ruled out with echocardiogram. The patient was hypotensive because of her preload-dependent state due to increased intracardiac pressures from compression of the mass against the left ventricle, which resolved with fluid resuscitation. Although surgery was ideal to prevent pseudoaneurysm rupture, it would have caused more harm, given her age, frailty, immobility, and poor functional capacity with little likelihood of recovery and short life expectancy (3).

CONCLUSIONS

Cardiac pseudoaneurysm is a rare phenomenon that may result from occluder device erosion. Although it is often an incidental finding, the risk of rupture is of clinical importance.

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KEY WORDS imaging, atrial septal defect, occluder

APPENDIX For supplemental videos, please see the online version of this paper.