A 45-year-old man was admitted to our hospital for evaluation of a left atrial (LA) mass. The patient had a history of dilated hypertrophic cardiomyopathy, atrial fibrillation (AF), diabetes mellitus, and sustained ventricular tachycardia that was treated by implantation of a cardioverter-defibrillator. He had developed AF 1 year earlier and was followed up at the outpatient clinic. He had been treated with warfarin at a dose that resulted in an international normalized ratio of 2.0 to 3.0. The LA mass was detected incidentally on routine transthoracic echocardiography. He was referred to our hospital because the size of the LA mass was unchanged after intensive anticoagulation with intravenous heparin infusion. The mobile LA mass along the interatrial septum was detected by transthoracic echocardiography in the apical 4-chamber view (Figure 1 and Movie I in the online-only Data Supplement). Transesophageal echocardiography showed a huge mobile mass (2.6 x 1.4 cm) originating from the roof of the LA (Figure 2A and Movie II in the online-only Data Supplement) with remarkable spontaneous echo contrast. No evidence of thrombus formation was found in the left atrial appendage (LAA). LV indicates left ventricle; RA, right atrium.

Figure 1. Transthoracic echocardiography in the apical 4-chamber view showing a mobile left atrial (LA) mass (asterisk) along the interatrial septum (Movie I in the online-only Data Supplement). LV indicates left ventricle; RA, right atrium; and RV, right ventricle.

Figure 2. A, Transesophageal echocardiography showing a large, mobile mass (asterisk) attached to the left atrial (LA) roof with marked spontaneous echo contrast (Movie II in the online-only Data Supplement). B, No evidence of thrombus formation was found in the left atrial appendage (LAA). LV indicates left ventricle; RA, right atrium.

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The online-only Data Supplement is available with this article at http://circ.ahajournals.org/lookup/suppl/doi:10.1161/CIRCULATIONAHA.110.000315/-/DC1.

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(Circulation. 2011;124:1086-1088.)

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Circulation is available at http://circ.ahajournals.org DOI: 10.1161/CIRCULATIONAHA.110.000315
Computed tomography (Figure 3 and Movie III in the online-only Data Supplement). Although the LA mass was presumed to be a thrombus, the differential diagnosis included a tumor, often detected as myxoma in the LA. He was treated by surgical removal of the LA mass combined with a maze procedure and closure of the LA appendage. A large thrombus with a short stalk originating from the diverticulum on the LA roof was clearly identified, and these structures, including the LA diverticulum, were removed at surgery. No obvious cauliflower-like formation was found on the LA wall, and the diagnosis of thrombus as well as diverticulum was confirmed by histology (Figure 4). The patient has remained in sinus rhythm for 3 months postoperatively, and transesophageal echocardiography revealed no LA thrombus, no evidence of residual LA diverticulum, and no sign of spontaneous echo contrast (Figure 5 and Movie IV in the online-only Data Supplement).

The progression of cardiac computed tomographic technology and the growing indication for catheter ablation of advanced AF have led to the identification of more patients with LA diverticulum originating from the anterior roof of the LA. The terms LA diverticulum and accessory LA appendage have both been used to describe structures protruding from the LA that have normal myocytes and are clearly different from a LA aneurysm. Accessory LA appendage is diagnosed if the structure is shaped like a cauliflower (ie, obvious neck

Figure 3. A and B, Computed tomography (256 slice) showing the diverticulum (white arrow) and mass (asterisk) within the left atrium (LA). No thrombus was detected in the left atrial appendage. C, Note that a stalk (black arrow) from the mass was attached to the LA roof diverticulum (Movie III in the online-only Data Supplement). RA indicates right atrium; RV, right ventricle.

Figure 4. A, Histological findings of the left atrial mass showing evidence of thrombus formation. B, Histological findings of the left atrial wall attached to thrombus revealed that the tissue attached to the thrombus contained normal myocardium consistent with diverticulum.

Figure 5. Transesophageal echocardiography 3 months after the surgical procedure revealed no left atrial (LA) thrombus, no evidence of residual LA diverticulum, and no sign of spontaneous echo contrast (Movie IV in the online-only Data Supplement). RA indicates right atrium.
at the ostium and the presence of pectinate muscles that resemble the true LA appendage).\textsuperscript{1,2} However, the discrimination between LA diverticulum and accessory LA appendage may often be difficult, and these 2 terms are used synonymously in the clinical setting. The incidence of LA diverticulum/accessory appendage was found to be 10\% to 23\%.\textsuperscript{2,3} This condition is thought to be associated with ectopic foci that initiate AF, incomplete ablation lines on the LA roof, and potential complications such as steam pop and cardiac tamponade during AF ablation. We report here the first case of a giant LA thrombus originating from LA diverticulum, without LA appendage thrombus formation, in a patient with AF. Our finding suggests that there may be a latent relationship between LA diverticulum and systemic embolic events during AF ablation.

Disclosures

None.

References

3. Duerinckx AJ, Vanovermeire O. Accessory appendages of the left atrium as seen during 64-slice coronary CT angiography. 
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*Circulation.* 2011;124:1086-1088
doi: 10.1161/CIRCULATIONAHA.110.000315
*Circulation* is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
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Print ISSN: 0009-7322. Online ISSN: 1524-4539

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://circ.ahajournals.org/content/124/9/1086

Data Supplement (unedited) at:
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