Inverted Left Atrial Appendage Appearing as a Left Atrial Mass with Transesophageal Echocardiography during Cardiac Surgery

SOLOMON ARONSON, M.D.*, WINNIE RUO, M.D.,† MARK SAND, M.D.‡

Two-dimensional echocardiography is one of the most commonly used imaging modalities for the detection and diagnosis of cardiac mass lesions. Indeed, echocardiography is the diagnostic procedure of choice for recognition of atrial myxomas and atrial thrombi and is superior to angiography. Transesophageal echocardiography (TEE) in particular provides clear images of posterior cardiac structures, such as the posterior atrial wall, and is the most specific diagnostic technique for the recognition of atrial thrombi.

We report a case in which a new left atrial mass with unique ultrasound characteristics was recognized after a left ventricular thrombectomy during open heart surgery.

CASE REPORT

The patient, a 56-yr-old woman, was admitted to the hospital because of abdominal pain. Her history revealed that she had had an anteroseptal wall myocardial infarction in 1982 and a subendocardial myocardial infarction in 1983. Additional work-up revealed left renal and splenic parenchymal infarcts. A transthoracic echocardiogram showed anterior wall hypokinesis and a left ventricular thrombus. After anticoagulation with warfarin sodium (Coumadin), her symptoms resolved spontaneously.

Three days after discharge, the patient was readmitted to the hospital with a complaint of right lower extremity pain and coldness. Subsequent work-up revealed an acute embolic occlusion of the right common femoral artery. She underwent embolectomy under general anesthesia without complications. An intraoperative transesophageal echocardiogram confirmed the presence of the left ventricular thrombus. After consultation with a cardiothoracic surgeon, the patient underwent cardiac catheterization, which revealed that there was no significant occlusive coronary artery disease. A left ventriculogram was not performed because of the known thrombus. Anticoagulation was continued with the intention of obtaining a follow-up echocardiogram in 3 weeks.

On postoperative day 6, while receiving heparin, the patient had a transient ischemic attack. Symptoms of aphasia, disorientation, and right-sided weakness resolved spontaneously after a few minutes. Carotid duplex scan showed minimal stenosis (20%) without ulceration. The patient was taken to the operating room for emergent left ventriculotomy and removal of the intraventricular thrombus. Intraoperative monitoring included TEE. Immediately after intubation and nasogastric tube insertion, the TEE probe was inserted. Preincision echocardiographic images of the long-axis, four-chamber view of the heart revealed a 2 × 3-cm mass in the left ventricle (fig. 1). The apex and anterior wall appeared hypokinetic. The left atrium appeared normal. Cardiopulmonary bypass (CPB) was initiated at 2.4 l-min⁻¹ m⁻² at 32°C. A 2.5-cm longitudinal ventriculotomy revealed that the thrombus was held within the ventricular chamber by looping around a trabeculation on the ventricular septum. The thrombus was removed, and the ventriculotomy was closed. Routine desiring maneuvers were then performed, which included inversion of the left atrial appendage into the left atrium. The patient was rewarmed to 37°C.

As preparation for discontinuing CPB began, the echocardiogram revealed a new mass in the left atrium just proximal to the mitral valve (fig. 2). The mass was not attached to the mitral valve apparatus, nor was it attached to the atrial septal wall. The margins of the mass were smooth and rounded. The density of the mass appeared homogeneous. It was initially believed that a part of the ventricular thrombus had "dropped" into the left atrium during surgical manipulation. The aortic occlusive clamp again was placed and cardioplegia administered. A left atriotomy was performed. It was then recognized that the "mass" was not a thrombus, but rather the inverted left atrial appendage, which had remained inverted because of an unusually narrow neck of the left atrium. The appendage could not be everted by pushing from within the left atrium and was gently everted when grasped from the outside of the heart with a forceps. When the atrial appendage was everted to its normal anatomic position, the "mass" disappeared (fig. 3). The atriotomy then was closed. The patient was separated from CPB without difficulty.

DISCUSSION

TEE is superior to precordial echocardiography for examination of the left atrium and for detection of intratral tumors and thrombi. In one large series, 83 cardiac mass lesions (nonvegetative) were detected from 1,639 TEE examinations. Among the 83 lesions, 46 arose from the left atrium. Nine of the left atrial lesions were tumors characterized by round shapes with smooth margins. They lacked a laminated appearance and were not located in the left atrial appendage. Of the 46 left atrial mass lesions, 37 were left atrial thrombi. Typical identifying features of thrombi in the series were presence in the left atrial appendage, laminated appearance, irregular or lobulated borders, and associated spontaneous microcavitations. Thrombi did not have a narrow stalk and were not of atrioseptal origin. The left atrial "mass" we noted did not correspond to the echocardiographic characteristics of either tumor or thrombus. Since the patient was hemodynamically metastable, (possibly because of restricted inflow to the left ventricle), cannulated, and heparinized, it was decided that the atrium be explored again in the event that the left ventricular thrombus had migrated into the left atrium.

* Assistant Professor, Department of Anesthesia and Critical Care.
† Resident, Department of Anesthesia and Critical Care.
‡ Assistant Professor, Department of Surgery.

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Address reprints to Dr. Aronson: Department of Anesthesia and Critical Care, University of Chicago Medical Center; 5841 S. Maryland Avenue, Box 4028, Chicago, Illinois 60637.

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TEE is an excellent imaging technique for delineating the attachment of atrial tumors and can be useful for planning the optimal surgical approach for resection. Examination of the left atrium is easily accomplished with TEE; the left atrial appendage, however, is not always visualized during CPB when the heart is empty, cannulated, and contracting irregularly. Regardless of the definitive diagnosis assigned to the left atrial mass, it was important to recognize that an abnormality existed before separation from CPB and decannulation. The left atrial appendage was inverted during ballottement as part of the surgeon's routine desiring maneuver before separation from CPB. The collapsed atrial appendage within the left atrium would likely have interfered with ventricular filling and thus caused reduced cardiac and stroke indices.4

In summary, inverting the left atrial appendage is a commonly practiced maneuver before separation from CPB to facilitate efficient desiring of the heart.5 Inverted left atrial appendages may not spontaneously evert with positive atrial pressure if the base is narrow. This phenomenon can be easily recognized with TEE monitoring. In the absence of TEE, the surgeon should inspect the left atrial appendage to ensure it has returned to the anatomic position before separation from CPB. This will avoid the possibility of this condition's causing impaired ventricular filling and low cardiac output syndrome after separation from CPB.

REFERENCES