BRIEF COMMUNICATIONS

INVERTED LEFT ATRIAL APPENDAGE: AN UNRECOGNIZED CAUSE OF LEFT ATRIAL MASS

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When a new left atrial mass is discovered by means of echocardiography, the differential diagnosis is usually between thrombus, vegetation, and tumor.[1] Moreover, several steps may be necessary to establish an accurate diagnosis. Therapy may be different for each of these conditions and may include anticoagulation, antibiotics, or operation. Recently, however, we were able to document another cause that allowed us to avoid an unnecessary reoperation or therapeutic intervention.

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Clinical history

PATIENT 1. A 5-month-old male infant was confirmed to have tetralogy of Fallot by preoperative echocardiogram and cardiac catheterization. With the aid of cardiopulmonary bypass, the ventricular septal defect was patched, infundibular muscle resected, and a pulmonary valvulotomy performed. Because of unfavorable coronary anatomy (left anterior descending originating from the right coronary artery), the right ventricular outflow tract was not patched.

Eighteen hours after the cardiac operation, an echocardiogram was performed to evaluate the adequacy of the right ventricular outflow tract repair. This demonstrated minimal pulmonary stenosis or regurgitation. However, there was a new fingerlike mass in the left atrium measuring approximately 12 × 6 mm (Fig. 1), and color Doppler ultrasonography revealed flow around this lesion with no significant left ventricular inflow obstruction. The mass appeared mobile and was found to be related to the anterolateral wall of the left atrium immediately superior to the left lower pulmonary vein. Because of concern as to

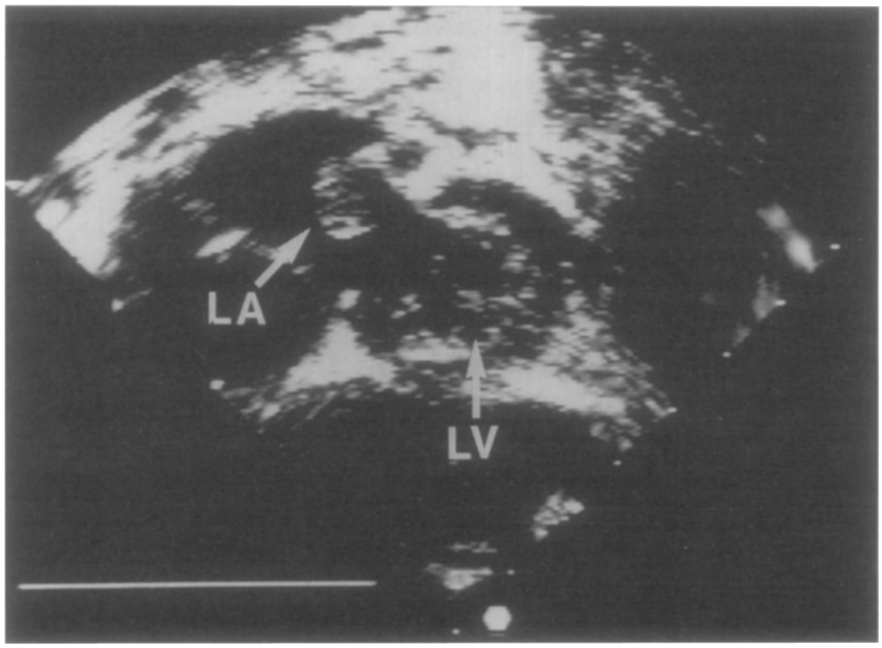

Fig. 1. Parasternal transthoracic echocardiogram demonstrates a new mass in the left atrium 18 hours after repair of tetralogy of Fallot (patient 1). The mass appeared mobile and seemed to arise from the anterior wall of the left atrium near the left superior pulmonary vein.

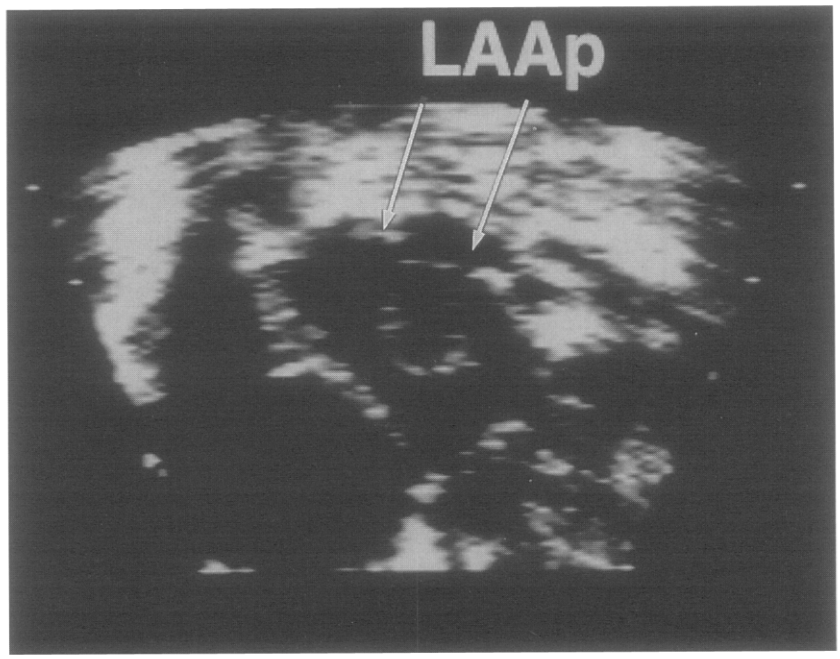

Fig. 2. Transthoracic echocardiogram in the same patient taken from an unconventional view. Note: By tracing the atrial walls, the mass can be easily identified as an inverted left atrial appendage.

the nature of this mass, further studies were performed including another echocardiogram done from unconventional views. This revealed the mass to be an inverted left atrial appendage (Fig. 2). Clinically, the child made a quick recovery and was discharged to his home on the eighth postoperative day. This mass had significantly decreased in size by 6 weeks after the operation and had disappeared at 1 year's follow-up. The patient was free of symptoms during this entire time and continued to have an excellent surgical result.

PATIENT 2. In a 54-year-old woman undergoing a mitral valve repair, a new mass in the left atrium was detected on intraoperative transesophageal echocardiogram (done to assess the repair). Examination by the surgeon revealed an inverted left atrial appendage that was easily everted, resulting in the disappearance of this mass on echocardiogram.

Discussion. Typically, a left atrial mass is a tumor, vegetation, or thrombus. With increasing use of echocardiography to assess surgical repair both during and after operations, unusual and previously undiagnosed images may become apparent.[1] In the first patient, absence of a mass on an immediate preoperative echocardiogram ruled out the possibility of tumor. Full heparinization and postbypass coagulopathy made the development of a large thrombus unlikely. In addition, the lack of any systemic signs of embolization also spoke against this diagnosis. Finally, a vegetation was though to be unlikely because there were no other signs of infection, and the mass seemed to come from the atrial wall and not the mitral valve. This led us to perform more extensive echocardiographic analysis with unconventional views, which confirmed that this mass was an inverted left atrial appendage (Fig. 2). This entity can usually be diagnosed by means of echocardiography without the need for more detailed studies, but only if the diagnosis is suspected.

The most likely cause for postoperative left atrial inversion is the negative pressures created by the left ventricular vent introduced during surgery via the right superior pulmonary vein. It is also possible that the appendage may be inverted as part of the deairing maneuvers. Shorter appendages with a wider base are more likely to become inverted.

To the best of our knowledge, this entity has been reported only once, and the diagnosis was made only during reoperation.[2] In contrast, by considering this possibility and determining the cause using unconventional echocardiographic views, we were able to avoid a reoperation. Once the correct diagnosis is ascertained this lesion can be left alone because (1) it is totally endothelialized, (2) it usually gets better with time, and (3) it cannot embolize. Moreover, an inverted left atrial appendage should not induce thrombus formation because it is directly in the path of rapid blood flow and no longer has a long cylindric shape, which can induce blood to stagnate. So long as it does not disturb mitral valve function, the appendage should not be a problem. Therefore, by identifying the etiology of these masses, we avoided further surgery.

In conclusion, an inverted left atrial appendage must be considered as one of the causes for a left atrial mass after surgery. Although the prevalence is unknown, it is probably more common that the other rare causes of left atrial mass, such as septal aneurysm,[3] pulmonary vein remnant,[4] diaphragmatic hernia,[5] and septal hematoma.[1, 3] Knowledge that such an entity exists should direct surgeons and

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cardiologists to investigate its possibility and, if confirmed, help avoid an unnecessary reoperation or other inappropriate therapy.

REFERENCES

1. Tallano JV, Gardin JM. Vegetation, tumor, masses & thrombi. In: Tallano JV, Gardin JM, editors. Textbook of two-dimensional echocardiography. New York: Grune & Stratton, 1993:239-70.
2. Slavik Z, Salmon AP, Lamb RIC. Unusual left atrial mass following cardiac surgery in an infant. Eur J Cardiothorac Surg 1994;8:566-7.
3. Mera F, Patt J, Israel W, Dubin JD. Atrial septal aneurysm simulating a left atrial mass diagnosed by transesophageal echocardiography. Am Heart J 1993;126:1224-5.
4. Manning WJ, Waksmonski CA, Riley MF. Remnant of the common pulmonary vein mistaken for a left atrial mass: clarification by transoesophageal echocardiography. Br Heart J 1992;68:4-5.
5. Movsowitz HD, Jacobs LE, Movsowitz C, Kotler MN. Transesophageal echocardiographic evaluation of a transthoracic echocardiographic pitfall: a diaphragmatic hernia mimicking a left atrial mass. J Am Soc Echocardiogr 1993;6:104-6.

GIANT ATHEROSCLEROTIC ANEURYSM OF THE SINOATRIAL NODAL ARTERY

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Aneurysms of the right coronary artery (RCA) are rare and occur most frequently in proximal or midportions of the artery. We report a case of giant atherosclerotic aneurysm of the sinoatrial (SA) nodal artery causing vena caval syndrome, which was treated successfully by surgery. We believe that it is the first case of an aneurysm arising from one of the branches of the RCA.

A 61-year-old woman was referred to our hospital with the diagnosis of right atrial mass in January 1996. She had a 2-month history of shortness of breath on exertion and of slowly progressing facial edema. On physical examination, the patient had facial edema, engorgement of neck veins, engorgement of veins on the chest wall, and a liver palpable by a breadth of four fingers. Findings on the electrocardiogram were within normal limits. A chest roentgenogram showed a huge mass obliterating the right cardiac border. Chest computed tomography (CT) demonstrated a 15 × 10 × 10 cm cystic mass that contained a highly enhanced crescent portion similar to the adjacent vascular structure in its posterosuperior part. The mass compressed both the venae cavae and atria severely. CT of the midportion of the mass showed an abnormally dilated vascular structure emerging from the anterior aspect of the aortic root toward the mass (Fig. 1). Our impression was that the patient had an aneurysm of the RCA system, and a root angiogram was performed. The early phase of aortography revealed an abnormally enlarged artery that originated from near the RCA ostium, followed by the dense accumulation of contrast material in the posterosuperior part of the mass. The remainder of the RCA appeared normal.

The patient underwent surgery on the day of admission. The median sternotomy and the exposure of the left femoral vein were performed simultaneously. One venous cannula was inserted directly into the superior vena cava with some difficulties, and another cannula had to be inserted into the femoral vein because of severe compression of the inferior vena cava. After cardiopulmonary bypass had been initiated, the aorta was crossclamped and opened so that the internal structure of the coronary ostia could be examined. The ostium of the RCA was dilated to about 6 mm, but there was no extracoronary ostium. The RCA was then dissected from its upper third portion toward the aorta. The abnormally dilated branch originated directly from the RCA, 5 mm apart from the aorta, and its diameter was about 7 mm (Fig. 2, *left*). It ran behind the superior cavoatrial junction for about 2.5 cm, along the same course as the SA nodal artery, and blended into the aneurysm. Because the branch ran along the same course, we believe that it was a section of the SA nodal artery. After division of the dilated artery, the aneurysmal sac was opened. About 100 ml of fresh blood was released and the remaining part of the sac was seen to be filled with well-organized thrombi (Fig. 2, *right*). The total weight of the thrombi was 600 gm. The aneurysmal sac was excised except for a small portion that was attached to the right

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