Left Atrial Myxoma. Three-Dimensional Echocardiographic Assessment

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The patient was a 70-year-old female with antecedents of diabetes mellitus and hypertension, being followed up in the outpatient care clinic due to chronic anemia after corrective surgery for angiodysplasia of the proximal jejunum, in whom an image suggestive of left atrial myxoma was found on routine transthoracic echocardiography. Then multiplanar transesophageal echocardiography and 3-dimensional echocardiography were performed, showing the latter better anatomical details of the tumor. The patient underwent exeresis of the mass with anatomicopathological confirmation of the tumor. Three-dimensional echocardiography proved to be a technique that can provide additional contributions to the diagnostic investigation of structural heart diseases.

Left atrial myxoma is the most common primary cardiac tumor [1], occasionally found on routine examinations of asymptomatic patients. Only a few cases with 3-dimensional echocardiographic images of left atrial myxomas can be found in the literature [2-4]. We report the case of a patient with left atrial myxoma, in whom 3-dimensional echocardiography was useful for detailing the anatomical features of the tumor.

Case report

A 70-year-old white female with a previous history of diabetes mellitus and hypertension, followed up in the outpatient care clinic due to chronic anemia after corrective surgery for angiodysplasia of the proximal jejunum. The patient complained of dyspnea on major exertion, and, on routine transthoracic echocardiography, a left atrial mass was identified. At the time of hospital admission, the patient was afebrile, in regular general condition, with pale mucosae (++/4). Her blood pressure was 140/90 mmHg, heart rate was 82 bpm, and respiration rate was 16 bpm. On cardiac auscultation, a diastolic (++/4) and a systolic (+/4) murmur could be heard in the mitral area. The examinations of the respiratory and neurological systems and of the abdomen were normal. The laboratory tests were within the normal range. The electrocardiogram showed sinus rhythm with unspecific alterations in ventricular repolarization. Transthoracic echocardiography was repeated 5 days after the first echocardiographic investigation and confirmed the presence of a very mobile left atrial mass with homogeneous density and irregular contours, measuring 5.9 cm x 3.2 cm, with a diastolic movement through the mitral valve towards the left ventricle (fig. 1). A mean transvalvular mitral gradient of 5 mmHg was observed. Left ventricular function was within the normal range. The patient underwent multiplanar transesophageal echocardiographic investigation, which confirmed the findings of the transthoracic study and added anatomical detailing to the multilobated appearance of the mass and its insertion in the interatrial septum (fig. 2). During the transesophageal echocardiographic examination, images for 3-dimensional reconstruction were obtained (fig. 3). Then, coronary angiography was performed and showed irregularities in the coronary arteries. The patient underwent resection of the tumor, which was a left atrial nodular mass of elastic consistency, violaceous to grayish-yellow in color, with a fixating pedicle in the interatrial septum, measuring 5 cm x 5 cm x 3 cm, and weighing 32 g (fig. 4). The histological examination showed it to be a myxoma. The patient had an uneventful postoperative evolution, being discharged from the hospital 8 days after surgery.

Image acquisition for the 3-dimensional echocardiographic examination was performed with a multiplanar transesophageal transducer, according to the conventional technique, using a commercially available echocardiographic system (Sonos 5500 model, Philips, Andover, MA, USA).

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Received: 11/11/02
Accepted: 02/24/03
English version by Stela Maris C. e Gandour

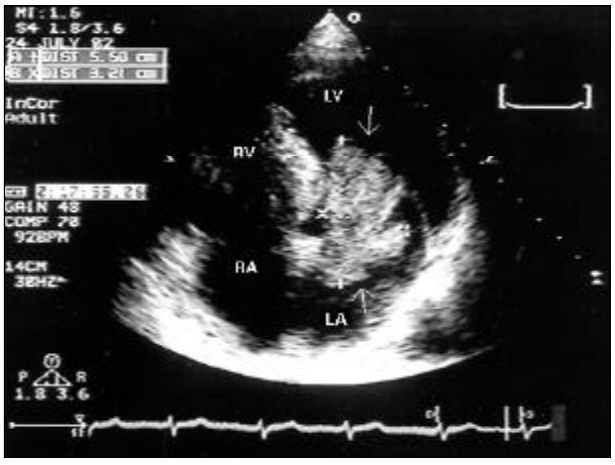

Fig. 1 - Transthoracic echocardiogram, apical 4-chamber view, showing the presence of a mass projecting into the left ventricle during diastole (arrows). RA - right atrium; LA - left atrium; RV - right ventricle; LV - left ventricle.

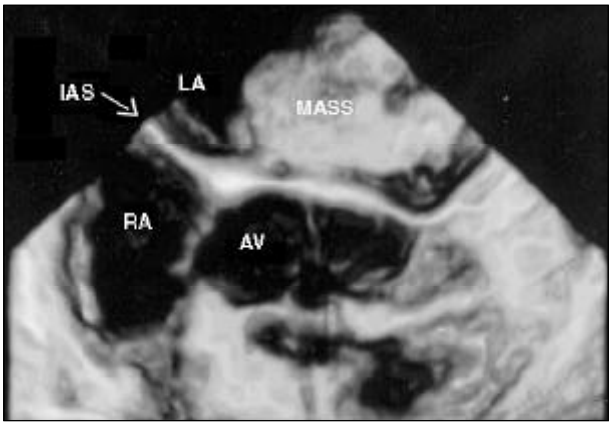

Fig. 3 - Three-dimensional echocardiogram, transverse plane, showing the presence of a mass in the left atrium with a fixating pedicle in the interatrial septum. RA - right atrium; LA - left atrium; AV - aortic valve; IAS - interatrial septum (arrow).

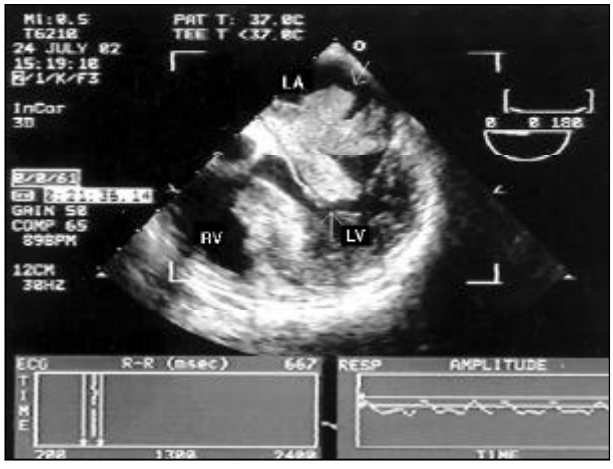

Fig. 2 - Transesophageal echocardiogram, apical view, showing the presence of a multilobated mass inside the left atrium projecting into the left ventricle (arrows). LA - left atrium; RV - right ventricle; LV - left ventricle.

Fig. 4 - Gross appearance of the myxoma found inside the left atrium.

The multiplanar transesophageal 2-dimensional images were obtained in the longitudinal and transverse planes, in 4- and 2-chamber views, evidencing the interatrial septum and the mitro-aortic junction, and in the longitudinal gastric plane. Image acquisition was performed with multiplanar 2-dimensional echocardiographic scanning from 0° to 180° every 3°, associated with a capture system determined by the respiratory variation of the patient, captured from the electrocardiographic signal and the variation in the impedance of the patient's chest during the respiratory movement. This was integrated in a computer program developed by Philips. The images were recorded and stored on an optical disk, and then transferred to the commercially available reconstruction system and 3-dimensional analysis of volumetric mapping (TomTec compact 3D model, Omniview package, TomTec Imaging Systems Corp., Boulder, CO, USA). The 3-dimensional echocardiographic analysis was performed in the coronal, sagittal, and transverse planes of the structure analyzed, in addition to the parallel and diagonal planes. The total time for obtaining the 3-dimensional image was 35 minutes, with 3 minutes for acquiring the image, 2 minutes for transferring the information from the optical disk to the work station, and 30 minutes for adjusting and reconstructing the image.

Discussion

Three-dimensional echocardiography was developed in the 1970s, as a method for measuring ventricular volume [5]. Prior to it, a laborious analysis of the images provided by 2-dimensional transthoracic echocardiography was used for obtaining that measure. However, that methodology posed some difficulties, inadequacies, and imprecisions. The evolution of the technique led to the use of a mechanical arm for ultrasound mapping, and then to the use of electromagnetic support, parallel mapping, rotational scan mapping, and, more recently, real time volumetric mapping, which is still under development [5-7]. This resulted in a progressive improvement in the quality of the images obtained. Three-dimensional echocardiography with transesophageal transducers and digital technology enables better cardiac structural de-

finition. It has been used for assessment prior to surgery and in the operating room and as diagnostic support in the surgical treatment of cardiac masses; of mitral, aortic, and tricuspid valvular diseases; and in congenital heart diseases, such as correction of interatrial septal defects, interventricular septal defects, and cor triatriatum[5-8]. In the case reported, the 3-dimensional reconstruction confirmed the transesophageal echocardiographic data and allowed a better anatomical detailing of the mass in regard to its fixating pedicle in the interatrial septum, approximating the findings in the image examinations to the anatomical and surgical reality.

We report the case of a patient with left atrial myxoma in which the 3-dimensional echocardiographic reconstruction provided better anatomical detailing, and, consequently, greater safety for the surgical team to perform the exeresis of the mass. The 3-dimensional reconstruction confirmed the transesophageal findings and allowed better spatial identification of the mass in relation to the interatrial septum. In current clinical practice, the 3-dimensional echocardiographic technique proved to be potentially useful for the anatomical identification of structural heart diseases. Its routine use will certainly provide the development of more advanced computer programs, greater familiarity of the cardiologist with the method, and a better cost/benefit ratio.

Acknowledgments

We thank Mrs. Cristiane Moreira and Dr Manuel Fontes from Philips Medical Systems Ltd., and Mr. Luis Alberto Bustamante from TomTec Imaging Systems Corp. for their technical support.

References

1. Bulckley BH, Hutchins GM. Atrial myxomas: a thirty-year review. Am Heart J 1979; 97: 639-43.
2. Melzer C, Bartel T, Baumann G. Dynamic 3-D-echo in the preoperative assessment of the left atria nmyxoma in a 51-year-old male. Cardiology, 1997; 59: 167-69.
3. Prêtre R, Vuille C, Diebold-Berger S, Lerch R. Three-dimensional imaging of atrial myxoma. Circulation 1998; 97: 2186-7.
4. Harada T, Ohtaki T, Sumiyoshi T, Hosoda S. Sucessful three-dimensional reconstruction using transesophageal echocardiography in a patient with left atrial myxoma. Jpn Heart J 2001; 42: 789-92.
5. Roelandt JRT, Yao J, Karsprzak JD. Three-dimensional echocardiography. Curr Opin Cardiol 1998; 13: 386-98.
6. Cheng TO, Xie MX, Wang XF, et al. Evaluation of mitral valve prolapse by four-dimensional echocardiography. Am Heart J 1997; 133: 120-9.
7. Li J, Sanders SP. Three-dimensional echocardiography in congenital heart disease. Curr Opin Cardiol 1999; 14: 53-9.
8. De Simone R, Glombitza G, Vahl CF, et al. Three-dimensional Doppler: techniques and clinical applications. Eur Heart J 1999; 20: 619-27.