

Impending Paradoxical Embolism From Atrial Thrombus: Correct Diagnosis by Transesophageal Echocardiography and Prevention by Surgery

ULRICH NELLESEN, MD, WERNER G. DANIEL, MD, GÜNTER MATHEIS, MD, HELLMUT OELERT, MD, KARL DEPPING, MD, PAUL R. LICHTLEN, MD, FACC

Hannover, West Germany

During recovery from a posterolateral myocardial infarction, a 56 year old patient developed signs of deep vein thrombophlebitis and subsequently of pulmonary embolism. After conventional echocardiography showed masses in both atria, transesophageal two-dimensional

echocardiography clearly revealed an elongated mass overriding an atrial septal defect. Impending paradoxical embolism was confirmed at surgery.

(J Am Coll Cardiol 1985;5:1002-4)

Paradoxical embolism, as first defined by Cohnheim in 1877 (1), is usually an unexpected postmortem finding; diagnosis during life is rare (2). According to Johnson (3), a paradoxical embolism may be considered to be "proved" when a venous thrombus is found lodged within an intracardiac septal defect at necropsy. A "presumptive" diagnosis may be based on the triad of: 1) venous thrombosis with or without pulmonary embolism, 2) an intracardiac defect allowing a right to left shunt, and 3) arterial embolism without a corresponding source in the left heart. The following case is that of an impending paradoxical embolism in which, for the first time, a thrombus overriding the interatrial septum could be correctly visualized by transesophageal echocardiography.

Case Report

On January 14, 1984, a 56 year old patient without any prior cardiac symptoms and without any known cardiac abnormalities was admitted to a community hospital because of persistent retrosternal chest pain, and subsequently was proven to have an acute posterolateral myocardial infarction. His recovery was complicated by left lower lobe bronchopneumonia and phlebothrombosis of the right leg. On Feb-

ruary 19, he suddenly complained of left-sided chest pain and dyspnea that was considered to be due to pulmonary embolism. One day later, a conventional two-dimensional echocardiographic study was performed, showing masses in both atria. On the same day, the patient was transferred to Hannover Medical School because of recurrent left thoracic pain with an associated pleural friction rub.

On admission, the patient was in stable hemodynamic condition but was severely dyspneic. The conventional two-dimensional echocardiographic study including multiple parasternal, apical and subcostal views was repeated and again showed masses in both atria (Fig. 1). The interatrial septum, however, could not be clearly visualized, and the intraatrial masses showed no connection with each other.

To obtain additional information, a transesophageal echocardiographic study was performed in the coronary care unit without any premedication or anesthesia using a Dasonics 3400 R phased array sector scanner connected to a 3.5 MHz transducer mounted at the top of a gastroscope (Dasonics Echoscope) (4). This showed a large elongated mass overriding the interatrial septum with the ends approaching the atrioventricular valves in diastole; a small atrial septal defect could clearly be visualized (Fig. 2).

On the basis of the findings of the transesophageal echocardiographic study, the patient was operated on immediately without undergoing cardiac catheterization or any other diagnostic procedure in an attempt to prevent an impending paradoxical embolism. At surgery, a 12 cm long thrombus (Fig. 3) was found lodged in an atrial septal defect of the secundum type. The thrombus was completely removed, and the septal defect closed with a Dacron patch. Histologic

From the Division of Cardiology, Department of Internal Medicine, and Department of Thoracic and Cardiovascular Surgery, Hannover Medical School, Hannover, West Germany. Manuscript received June 12, 1984; revised manuscript received October 2, 1984, accepted October 22, 1984.

Address for reprints: Werner G. Daniel, MD, Division of Cardiology, Department of Internal Medicine, Hannover Medical School, Konstanty-Gutschow-Str. 8, D-3000 Hannover 61, West Germany.

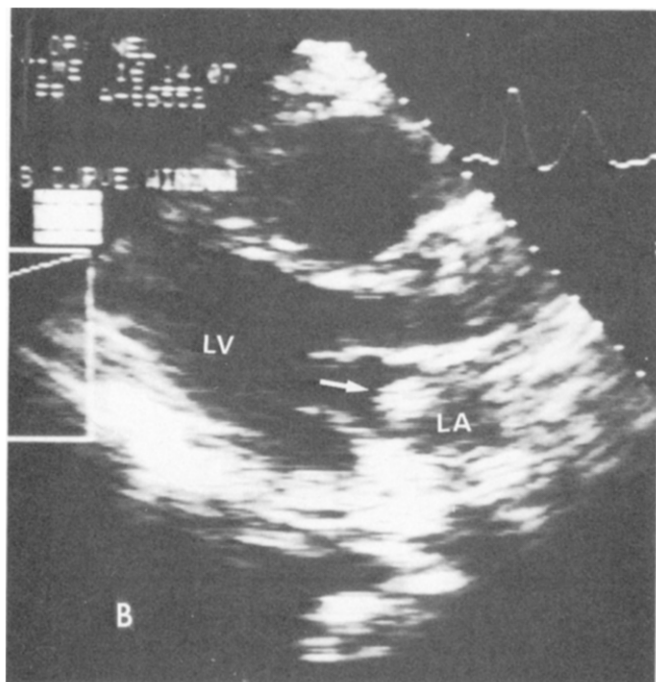
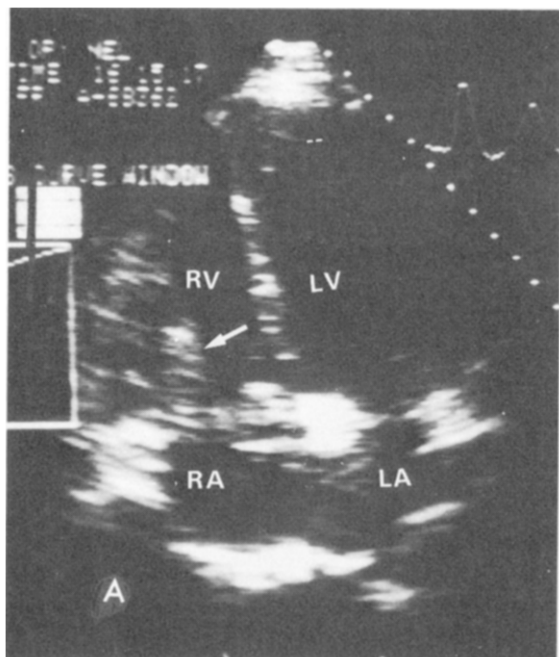


Figure 1. Conventional transthoracic two-dimensional echocardiogram. **A**, Four chamber view showing a mass (arrow) prolapsing through the tricuspid valve. **B**, Long-axis parasternal view showing a mass (arrow) within the left atrium (LA). LV = left ventricle; RA = right atrium; RV = right ventricle.

examination of the surgical specimen revealed the typical pattern of partially organized thrombus.

After surgery, the patient underwent phlebography show-

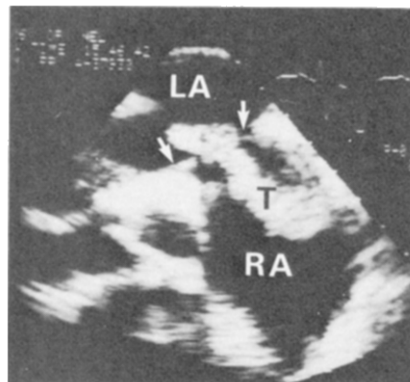


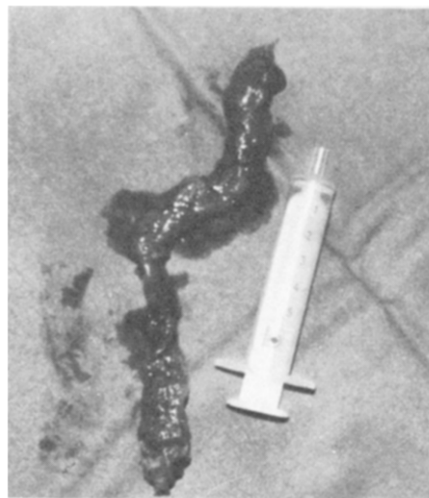
Figure 2. Transesophageal two-dimensional echocardiogram showing a thrombus (T) in the left (LA) and right (RA) atria overriding the interatrial septum (arrows).

ing deep pelvic vein thrombosis on the right side, and consequently dicumarol therapy was instituted.

Discussion

Paradoxical embolism is a well known complication of cardiac diseases associated with an intracardiac shunt. However, until now paradoxical embolism in surviving patients could be only suspected on the basis of indirect criteria (2,5) and could be only proven at autopsy. To our knowledge, this is the first case in which an embolus already overriding the interatrial septum could unequivocally be visualized by transesophageal echocardiography allowing successful surgical removal. Since transesophageal echocardiography is an ideal tool for clear visualization of the interatrial septum (7), this method may facilitate diagnosis in cases where

Figure 3. Surgical specimen of the atrial thrombus shown in Figure 2.



paradoxical embolism is suspected on clinical grounds and conventional transthoracic echocardiography fails to image the interatrial septum adequately.

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