Two-Dimensional Echocardiographic Recognition of an Aortic Intimal Flap Prolapsing Into the Left Ventricular Outflow Tract

J. SINGH SRAOW, MD, KENNETH B. DESSER, MD, FACC, ALBERTO BENCHIMOL, MD, FACC, ARTHUR DeSa’NETO, MD, FACC, SYDNEY PEEBLES, RDMS

Phoenix, Arizona

A 59 year old man presented with dyspnea and a new murmur of aortic regurgitation. Two-dimensional echocardiography demonstrated a to and fro motion of the intimal flap as it prolapsed into the left ventricle and was thrust into the aorta during diastole and systole, respectively. At surgery, the echocardiographic and autopsy findings were confirmed and a proximal aortic dissection was identified. Prolapse of an intimal flap from the aorta into the left ventricular outflow tract represents a new two-dimensional echocardiographic sign of aortic dissection.

Case Report

History and physical examination. A 59 year old man was admitted to this institution on February 28, 1983 because of dyspnea. There was a past history of atherosclerotic heart disease for which he underwent triple coronary artery bypass graft surgery 3½ years before this admission.

Two months before presentation, the patient had an acute anterior wall myocardial infarction with typical electrocardiographic abnormalities and serum cardiac enzyme elevation. A new grade 3/6 systolic ejection murmur was noted over the precordium, being loudest at the apex and left lower sternal border. No precordial thrill was palpated. Insertion of a Swan-Ganz floating balloon catheter did not provide any findings suggestive of mitral regurgitation or ventricular septal defect. M-mode and two-dimensional echocardiograms did not disclose any abnormality.

Physical examination on the current admission revealed an acutely ill man in respiratory distress. He was afebrile with a blood pressure of 110/40 mm Hg and a regular pulse of 84/min. The jugular veins were slightly distended. The carotid pulses were bounding and equal bilaterally. No precordial thrill or heave was noted. There was a grade 4/6 harsh systolic ejection murmur heard at the apex and base with radiation to the neck. The first heart sound was diminished and the second sound was followed by a prominent decrescendo diastolic murmur heard loudest at the left lower sternal border. All peripheral pulses were normal.

Noninvasive and echocardiographic findings. An electrocardiogram disclosed evidence of previous anteroseptal wall myocardial infarction. A chest roentgenogram taken on admission revealed moderate cardiomegaly; no mediastinal widening was noted. Computed axial tomography of the chest demonstrated slight dilation of the ascending aorta without evidence of dissection.

An M-mode echocardiogram of the aortic root showed a normal dimension of 31 mm. An abnormal echo oscillating within the aortic root was noted during diastole. It projected into the left ventricular outflow tract on the M-mode sweep from the left ventricle to the aorta (Fig. 1). At the level of the mitral valve, diastolic fluttering of the anterior leaflet and interventricular septum was noted.

Two-dimensional echocardiography demonstrated prolapse of a posterior aortic wall structure into the left ventricular outflow tract during diastole. This abnormal structure was thrust upward into the aortic root during systole and was attached to the inferior portion of the posterior aortic root (Fig. 2).

Cardiac catheterization, surgical and pathologic findings. Cardiac catheterization revealed severe aortic regurgitation. A mobile filling defect was noted in the aortic root...
Figure 1. M-mode echocardiographic sweep from the left ventricle up to the aorta. The intimal flap (X) prolapses into the left ventricular outflow tract anterior to the mitral valve during diastole.

AA = ascending aorta; AAW = anterior aortic wall; AML = anterior mitral leaflet; AO = aortic; DM = diastolic murmur; IVS = interventricular septum; LA = left atrium; LII = lead II electrocardiogram; LVOFf = left ventricular outflow tract; PAW = posterior aortic wall; SM = systolic murmur.

just above the level of the aortic valve. The aortic root was not dilated and no false lumen could be identified.

At surgery, the patient had a proximal dissection of the ascending aorta, extending to the level of the arch. A circumferential tear in the aortic root resulted in prolapse of an intimal flap through the aortic valve. The aortic valve itself was found to be normal without any tears in the cusps. After the coronary grafts were separated from the aortic root, a tightly woven Dacron graft was implanted in the ascending aorta just above the aortic valve. The proximal coronary grafts were then reimplanted into the aortic graft. Thirty minutes after termination of cardiopulmonary bypass, the patient had cardiac arrest and died. Postmortem examination confirmed the operative findings. In addition, the left anterior descending coronary artery graft was found to be occluded. Microscopic examination of the aortic wall disclosed marked atherosclerotic change with medial degeneration.

Discussion

Intimal flap prolapse: a new ultrasonic sign of aortic dissection. To our knowledge, two-dimensional echocardiographic demonstration of intimal flap prolapse from the aortic root into the left ventricle has not been previously described (1–9). This phenomenon, which was confirmed at surgery in our patient, provides the basis for the ultrasonic finding. Clearly, the mobile filling defect noted on angiography corresponded to the prolapsing intimal flap displayed by two-dimensional echocardiography and observed at surgery. Because the aortic valve was not involved by dissection, it is possible that proper coaptation was disturbed by the intimal flap, thereby enhancing aortic insufficiency.

Specificity of intimal flap on echocardiography for the diagnosis of dissection. The detection of an intimal flap on M-mode echocardiography was reported by Nicholson and Cobbs (2) to be very specific for aortic root dissection. Because it is not always possible to demonstrate an intimal flap by M-mode examination; other ultrasonic techniques must be applied for the evaluation of aortic dissection. Recently, attention has been directed to the utilization of two-dimensional echocardiography for this diagnosis. DeMaria et al. (5) described the utility of the two-dimensional study for the identification and localization of aortic aneurysms. Victor et al. (6) have shown it to be very useful in the diagnosis of aortic root dissection, especially the proximal
variety. Intimal flap identification was the cardinal diagnostic feature in 12 of their 15 patients.

A recent report (7) demonstrated an oscillating intimal flap within the dilated aortic root on real time two-dimensional echocardiography. An intimal flap has also been noted in association with dissection of the descending aorta during this type of examination (10).

Implications of current report. This report emphasizes the utility of two-dimensional echocardiography for the diagnosis of aortic dissection and specifically in patients whose condition deteriorates after aortocoronary bypass surgery. The only clinical sign of dissection was aortic regurgitation, which should suggest the diagnosis in any patient who has undergone cardiovascular surgery with aortic manipulation or incision. Although the chest roentgenogram, computed tomographic study of the thorax and even aortography failed to disclose dissection, echocardiography was highly specific for this entity.

We acknowledge the technical assistance of Carole Crevier and Jennie Goff.

References