CLINICAL CASE REPORTS

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Echocardiographic Confirmation of Mitral Valve Prolapse: A New Finding on Radionuclide Ventriculography—A Case Report

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Abstract

A prominent filling defect was depicted on a radionuclide ventriculogram in a patient with mitral regurgitation. This defect was later shown, by cardiac ultrasound, to be due to mitral valve prolapse into the left ventricle during diastole. This case illustrates that mitral valve prolapse should be added to the list of clinical entities that can result in an intraventricular defect on a radionuclide ventriculogram.

Introduction

Radionuclide ventriculography (RNV) is frequently used in the evaluation of patients with valvular regurgitation.[1-4] The severity of regurgitation can be estimated by determining a regurgitant index.[3,5-9]

Mitral valve prolapse (MVP) is the most common cause of mitral regurgitation in developed countries and has a prevalence of 5-15%.[10-13] It may occur in association with Marfan's syndrome or with congenital atrial septal defects or be an isolated finding.[10,12] In the case of mitral regurgitation due to MVP the regurgitant fraction is usually small, since the mitral valve leaflets are not damaged, but lax and redundant, resulting in billowing into the left atrium during end-systole.

We report an unusual case of mitral valve prolapse that resulted in significant mitral regurgitation. A large filling defect was noted in the left ventricle during diastole on the RNV,

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leading to a suspicion of thrombus or left atrial myxoma. However, an echocardiogram showed that there was a redundant posterior mitral valve leaflet that prolapsed into the left ventricular cavity during diastole. The differential diagnosis of filling defects in the left ventricle on RNV is reviewed. This finding of a large filling defect in the left ventricle due to MVP seen initially on RNV has not, to our knowledge, been previously reported.

Case Report

The patient, a thirty-eight year old white male, with a history of low grade (I/IV) holosystolic cardiac murmur since age twenty-five was diagnosed as having MVP by echocardiography, but no specific treatment was instituted. More recently he noted occasional nonradiating atypical angina, primarily while recumbent, unrelated to activity. Most noteworthy was the onset of dyspnea on exertion, progressing over the past three years and occasional paroxysmal nocturnal dyspnea without orthopnea or ankle edema. On physical examination there was no jugular vein distension; however, the point of maximum impulse of the cardiac apex was displaced to the sixth intercostal space at the midclavicular line. There was a grade III/IV holosystolic murmur at the apex that radiated to the axilla, and a questionable grade II/IV diastolic murmur at the left third intercostal space heard best while the patient was sitting up and leaning forward.

A chest roentgenogram showed a normal cardiac contour without left atrial or left ventricular enlargement and there was no evidence of pulmonary venous hypertension. A resting RNV was performed that showed slightly hyperdynamic wall motion of the left ventricle and a normal left ventricular cavity size with a 72% left ventricular ejection fraction. The regurgitant index was hemodynamically significant at 3.5. All of these findings are consistent with the diagnosis of mitral regurgitation. Most importantly, there was a prominent filling defect seen during diastole in the left ventricular cavity (Figure 1 left), which was not visible during systole (Figure 1 right). The patient received an M-mode echocardiogram, which demon-

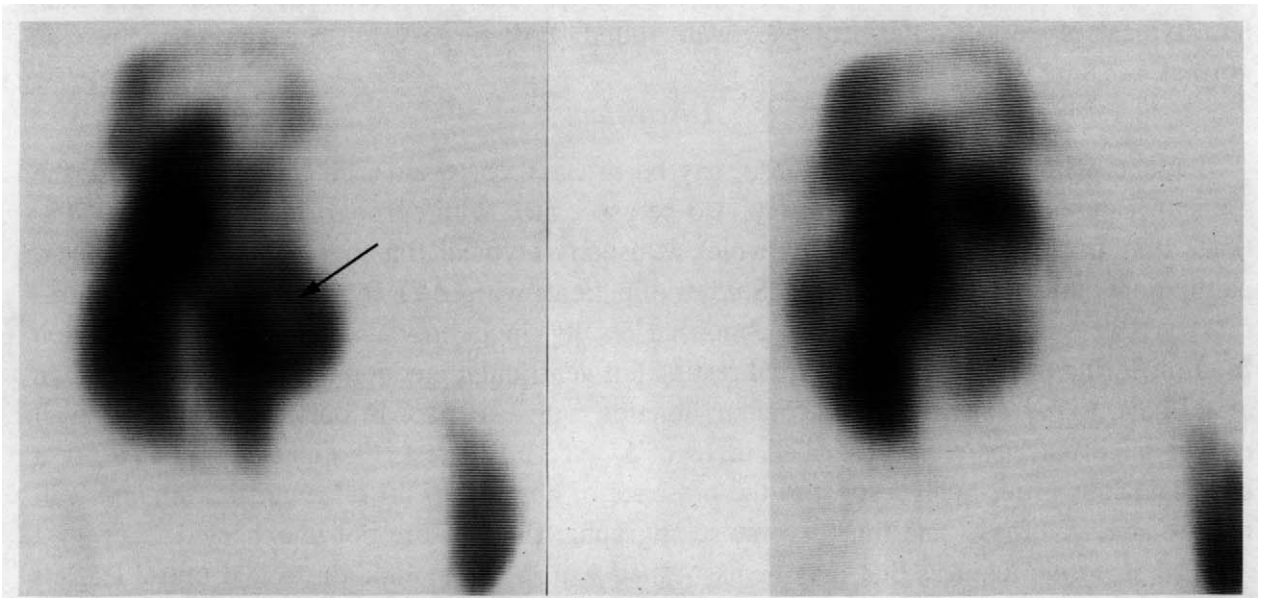

FIG. 1. (Left) End-diastolic left anterior oblique view of the RNV showing the prominent filling defect in the left ventricle (arrow). (Right) End-systolic left anterior oblique view of the RNV showing excellent contractility of the left ventricle.

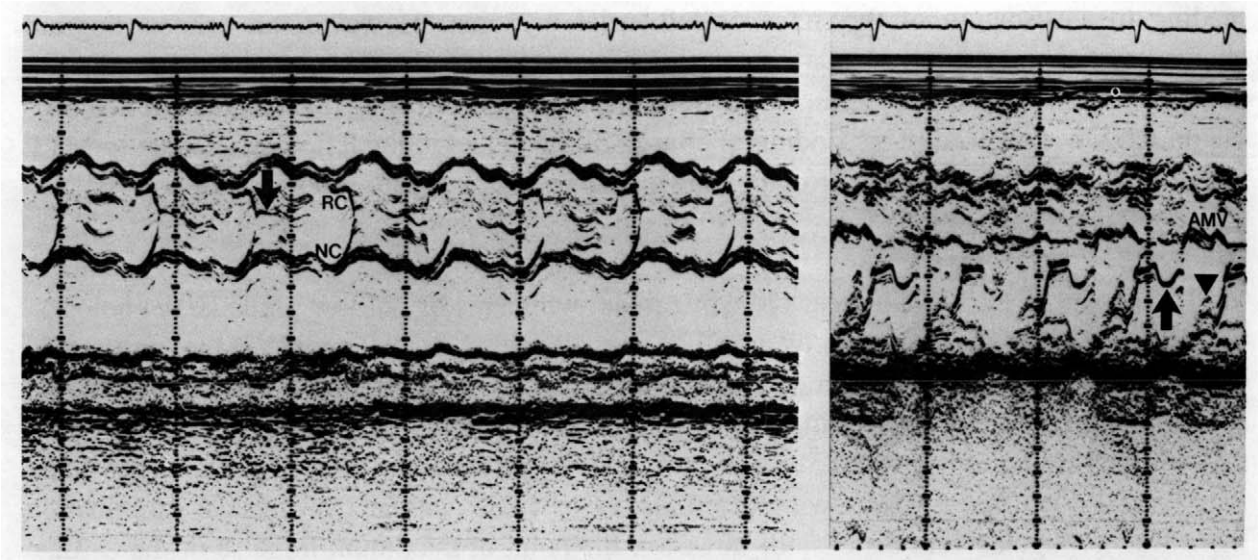

FIG. 2. (Left) Normal aortic valve M-mode echocardiogram trace. Closure of leaflets during diastole (arrow) and normal opening of right coronary leaflet (RC) and noncoronary leaflet (NC) during systole. (Right) Abnormal mitral valve M-mode echocardiogram trace. Billowing of the posterior mitral leaflet during end systole (arrow), anterior mitral leaflet during diastole (AMV), and multiple echoes of the posterior mitral valve and chordae tendinae (arrowhead) representing chaotic motion and excursion of the valve into the left ventricle, resulting in the filling defect seen on the RNV.

strated a normal aortic valve (Figure 2 left), normal septal and posterior wall motion, and normal thickness of the pericardium. Figure 2 right demonstrates significant prolapse of the mitral valve during systole. There was no evidence of mitral valvular stenosis. The chamber sizes and wall motions were normal; however, in addition to the mitral valve prolapse noted during systole, the echocardiogram showed an abnormal echo pattern during diastole, compatible with an extremely lax, redundant posterior mitral valve leaflet, also shown in Figure 2 right. This finding was confirmed by a 2-D echocardiogram. The patient subsequently underwent mitral valve repair and annuloplasty. At surgery thickened, redundant mitral valve leaflets, typical of mitral valve prolapse, were found. Post-surgery the regurgitant index was normal.

Discussion

Patients with mitral valve prolapse may be referred for evaluation by RNV because the clinical features often mimic and may also be associated with coronary artery disease.[14] Patients may present with chest pain, which is usually atypical for angina pectoris, dyspnea, palpitations, dizziness, and anxiety.[12] Studies of patients with MVP by RNV have been contradictory. Two studies[15,16] have shown abnormal results, including subnormal average ejection fraction during exercise despite normal resting left ventricular ejection fractions, and Newman et al[14] have found normal left ventricular function with exercise. In one series regional wall motion abnormalities were described in 15 of 54 patients at rest.[11] Patients with MVP are a heterogeneous group with respect to the presence or absence of mitral regurgitation and wall motion abnormalities,[4] and thus diverse scintigraphic findings are not unexpected.

The anatomic features that may be associated with MVP include thickened mitral leaflets with myxomatous transformation of valve substance and possibly mitral annular dilatation.[12] The redundant mitral valve leaflets with elongated chordae tendineae dome toward the left

atrium during late systole.[13] In the patient presented here, echocardiography demonstrated prolapse of the mitral valve into the left atrium during systole as expected, but in addition there was significant protrusion of the leaflet into the left ventricular cavity during diastole, resulting in a large scintigraphic filling defect.

The differential diagnosis of intraventricular defects on RNV include hypertrophied papillary muscle,[17] thrombus,[18,19] and intramyocardial neoplasms such as atrial myxoma,[20] myocardial rhabdomyoma,[21] and cardiac metastasis.[22] Artifactitious defects, commonly the result of EKG lead attenuation of radioactivity, should also be considered. Hypertrophy of the papillary muscles is visualized as a persistent filling defect in the lateral basal region of the left ventricle throughout the cardiac cycle.[17] Thrombus formation and adherence to the valves are also reported to result in persistent filling defects on RNV, usually in the distal anterior wall or apex, often in an area of akinesia or dyskinesia.[19] Cardiac metastasis almost invariably occurs in the right side of the heart and can produce filling defects in the blood pool image.[17] Left atrial myxomas, the most common primary cardiac tumor, may be seen in the left ventricle at end-diastole. However, the echocardiogram in this patient is not compatible with myxoma, for no filling defect could be identified in the left atrium. Thus, a hypertrophied, myxomatous mitral valve with protrusion of the leaflets into the left ventricular cavity during diastole should be borne in mind when one is considering the differential diagnosis of a filling defect in the left ventricle on RNV.

Conclusion

In considering the gamut of filling defects in the left ventricle, which are known to include left atrial myxoma, left ventricular fibroma, left ventricular clot, left ventricular hypertrophied papillary muscle, left ventricular rhabdomyosarcoma, and idiopathic hypertrophic subaortic stenosis, we add to the differential diagnosis a hypertrophied, myxomatous posterior leaflet of the mitral valve resulting from long-standing prolapse and eventual protrusion into the left ventricular cavity during diastole.

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