Diagnosis of Left-Ventricular Mural Thrombus by Means of Radionuclide Ventriculography

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Radionuclide ventriculography was used to diagnose the presence of a left-ventricular mural thrombus in a patient with left-ventricular aneurysm. Diagnostic features of the radionuclide study are described and correlated with postmortem findings.


Radionuclide ventriculography is frequently helpful in establishing the diagnosis of left-ventricular aneurysm in patients with known or suspected ischemic heart disease (1). Patients with left-ventricular aneurysm also may have a mural thrombus overlying the endocardial surface of the aneurysm. While mural thrombi have been diagnosed by means of standard contrast ventriculography (2), the detection of this entity by means of radionuclide ventriculography has not been generally recognized. Accordingly, we wish to report the case of a patient with mural thrombus and left-ventricular aneurysm in whom the diagnosis was made by radionuclide ventriculography and subsequently confirmed postmortem.

CASE REPORT

A 69-year-old white woman who was admitted to Rhode Island Hospital on October 26, 1980 with a chief complaint of cough and shortness of breath during several days before admission. There was a 10-yr history of hypertension treated with alpha methyl DOPA and hydrochlorothiazide. The patient was admitted to another hospital in August 1980 with unstable angina pectoris. While there she sustained an acute anterior myocardial infarction documented by serial electrocardiograms and serum enzymes (maximum CK = 5539 IU, positive MB band). The subsequent course was complicated by left-ventricular failure and Dressler's syndrome. Following discharge from hospital on September 24, 1980, she complained of fatigue, shortness of breath, and cough. The patient was treated with digoxin p.o., 0.125 mg alternating with 0.25 mg, q.i.d. and furosemide, 20 mg p.o., qd, with some symptomatic improvement. However, symptoms worsened again several days before admission, so she was admitted for further evaluation and treatment. There was no history of recent anginal chest pain, paresthesias, numbness, limb or hand weakness, or seizures.

Admission physical examination revealed blood pressure 140/70, pulse 100 and regular, respirations 28, temperature 37.7°C. The patient was in no distress. The chest gave dullness to percussion at the bases and scattered rales bilaterally. Auscultation disclosed very distant heart sounds but no appreciable murmur, rub, or gallop. The neck veins were not distended. There was no abdominal or peripheral edema. Neurologic exam was within normal limits. The chest radiograph demonstrated cardiomegaly, interstitial edema, and bilateral pleural effusions. The admission electrocardiogram (Fig. 1) was unchanged from previous tracings and demonstrated evidence of extensive anterolateral myocardial infarction with persistent ST-segment elevations consistent with left-ventricular aneurysm.

The patient was continued on digitalis and diuretic therapy, with

FIG. 1. Standard 12-lead electrocardiogram obtained at time of patient’s admission (10/80) to hospital. Tracing demonstrates sinus rhythm with evidence of extensive anterolateral myocardial infarction. ST-segment elevation in leads V3-V6 was unchanged from previous tracings (9/80) and is consistent with diagnosis of left-ventricular aneurysm.

Received Jan. 12, 1981; revision accepted Feb. 19, 1981.
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FIG. 2. Anterior and left anterior oblique projections of patient's radionuclide ventriculogram are shown. Note persistent filling defect (arrowhead) along anterolateral wall in anterior view. Defect also is apparent adjacent to interventricular septum in LAO view (arrowhead). Images were obtained with gamma camera equipped with a general, all-purpose collimator and interfaced to computer system. Cardiac cycle was divided into 26 frames. Each scan contained 200 K counts/frame. ED = end diastole; ES = end systole.

FIG. 3. Heart at postmortem, opened along anterolateral wall, with anterior surface facing toward ruler. Note large mural thrombus, which has organized along anterolateral wall (arrow), interventricular septum (arrowhead), and apex.

certainty regarding the true incidence and natural history of mural thrombus in patients who survive acute myocardial infarction (with or without left-ventricular aneurysm) it is not surprising that the issue of whether or not to offer anticoagulant therapy to some or all of these patients is also unsettled (9).

Despite these unresolved questions, recognition of a mural thrombus may prove useful in the evaluation of an individual patient, particularly one who presents with evidence of systemic emboli without obvious cause. Whereas imaging with indium-111-labeled platelets (10) may be a more sensitive method of detection (especially for smaller thrombi), current methods of labeling platelets are relatively difficult to perform and are not widely available. In contrast, radionuclide ventriculography with technetium-99m-labeled red blood cells is readily available and easy to accomplish. The principal diagnostic features observed in the multigated cardiac blood-pool scan in this case were (a) a fixed anterolateral filling defect along with blunting of the left-ventricular apex in the anterior scan and (b) excessive separation of right- and left-ventricular blood pools on the LAO scan. These findings in all likelihood were related to the large thrombus that had organized over the interventricular septum, anterolateral wall, and apex of the left ventricle (Fig. 3). Blunting of the left-ventricular apex has also been noted in contrast ventriculograms of patients with left-ventricular aneurysm and mural thrombus (2).

Thus the case reported here, which is very similar to one briefly described by Strauss et al. (11), demonstrates that radionuclide ventriculography may be useful in detecting the presence of large mural thrombi in patients with left-ventricular aneurysm. In addition to being potentially helpful in the evaluation of patients with evidence of systemic emboli, such information may also help to identify a subset of individuals who are at increased risk from emboli following acute myocardial infarction. Surgeons may also find it useful, in planning their operative approach, to know whether or not patients referred for aneurysmectomy have a thrombus lining the wall of the aneurysm.

Whether radionuclide ventriculography will prove to be generally useful for the diagnosis of left-ventricular mural thrombi is uncertain at present. Problems such as the minimal volume and location of thrombus that can be detected by this technique have not been examined under controlled conditions. Furthermore, short of open-heart surgery, there is no widely accepted method for establishing the diagnosis in living patients. Contrast left-ventricular angiograms have been used for this purpose but may not be reliable because of low sensitivity (12). Accordingly, since the true incidence of left-ventricular mural thrombus in survivors of acute
myocardial infarction is unknown, the overall predictive accuracy of radionuclide ventriculography in making the diagnosis cannot be reliably estimated at this time. Similar considerations apply to two-dimensional echocardiography, which also has been used to make the diagnosis of left-ventricular mural thrombus (13, 14).

In summary, both radionuclide ventriculography and two-dimensional echocardiography may be helpful in detecting the presence of left-ventricular thrombi. Additional studies are needed, however, to define better the role of each in this regard.

ACKNOWLEDGMENTS

The authors gratefully acknowledge the secretarial assistance of Christine Abatiello and Katherine A. Seropian in the preparation of this manuscript.

REFERENCES


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THE JOURNAL OF NUCLEAR MEDICINE