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Cardiac Aneurysm Complicated by *E. coli* Abscess

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An *E. coli* myocardial abscess developed in the region of an old aneurysmal myocardial scar. In spite of vigorous antibiotic therapy fever and positive blood cultures persisted. A combination of In-111 WBC scanning and Tc-99m RBC gated heart imaging located the infection in the aneurysmal scar. The abscess was resected and the patient survived.

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A myocardial abscess developing in a pre-existing left-ventricular aneurysm is rare. There have been only seven previously reported cases (*1-6*). In contrast, there have been 15 reported cases of an infected left-ventricular aneurysm in the setting of an acute myocardial infarction (*4,7,8*). This report concerns a case of an abscess that developed in a pre-existing aneurysm of long duration, diagnosed preoperatively.

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CASE REPORT

A 73-yr-old man was hospitalized with a 3-wk prodrome of chills and night sweats, and a 1-wk history of diarrhea and vomiting. Before admission he had been treated for 5 days with erythromycin. There was a history of a large anterior-wall myocardial infarction (AWMI) 4 yr before. Cardiac catheterization and chest radiograph at 1 mo after the infarction demonstrated a large left-ventricular (LV) aneurysm with total occlusion of the left anterior descending (LAD) coronary and only minor changes in the right and circumflex coronary arteries. He had been on digoxin and diuretics since this episode, and was asymptomatic. The admission physical examination revealed blood pressure of 130/70,

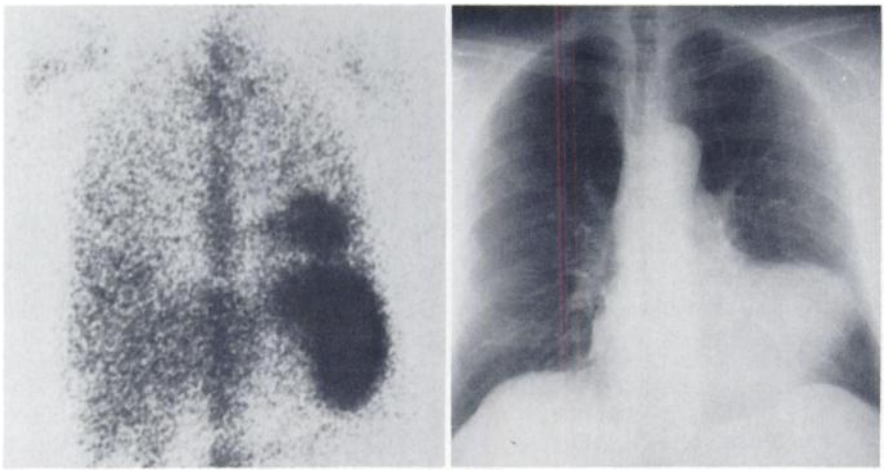

FIG. 1. Anterior view of thorax and abdomen, obtained with 800 μCi In-111 WBCs (left). Intense accumulation appeared in chest above spleen, and was initially throught to be pneumonia before examination of patient's chest radiograph. Six mCi of Ga-67 citrate was injected i.v. immediately after this scan because of complaints of left shoulder pain and concern for osteomyelitis not seen on this study. PA chest radiograph (right) demonstrates cardiac enlargement with grossly abnormal left-ventricular border highly suggestive of LV aneurysm. No pulmonary infiltrates are present, thus making pneumonia unlikely. Left hemidiaphragm is normal in position, making subdiaphramatic location for In-111 WBCs unlikely. Infected mural thrombus and/or aneurysm was suspected at this time.

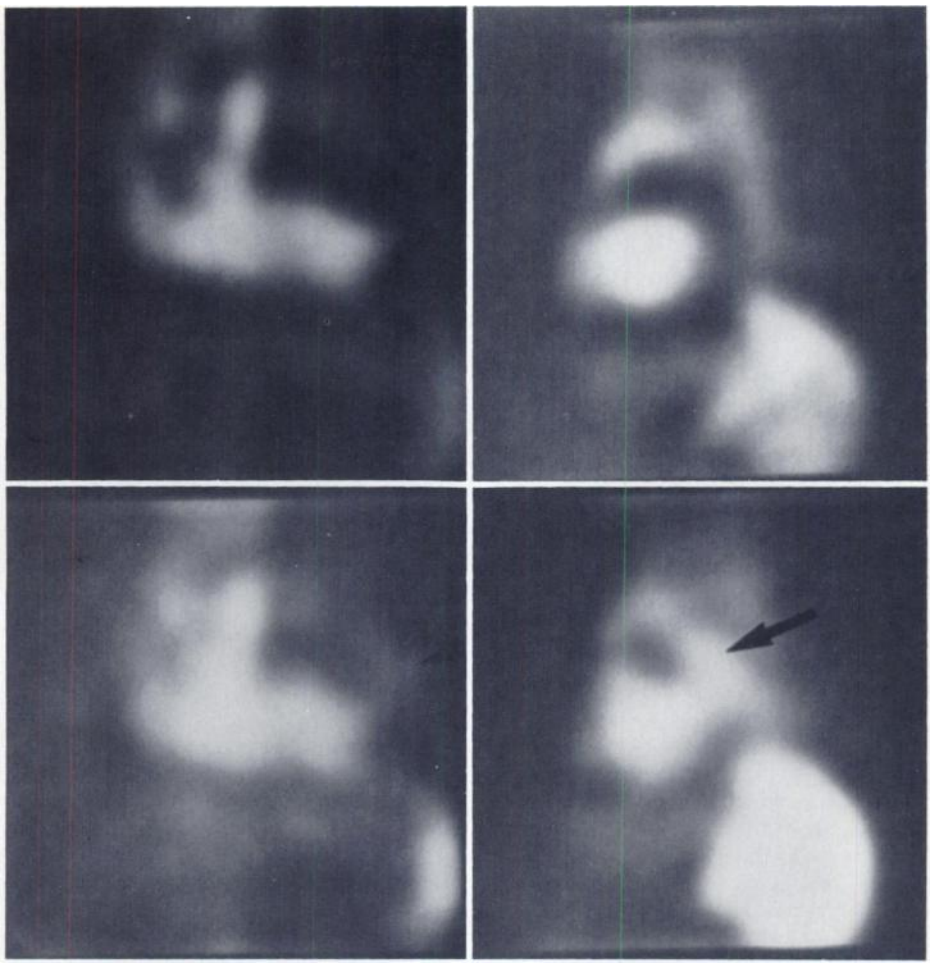

FIG. 2. Anterior view of gated heart study (upper left), performed within hours of study of Fig. 1, with 22.5 mCi of RBCs tagged in vitro with Tc-99m. Medium-energy collimator was used, with 15% camera window peaked for Tc-99m. This view shows distorted anterior wall with little evidence of large aneurysm known to be present. Distal half of anterior wall and apex were akinetic. At surgery, aneurysm was filled with clot and pus. Upper right: 70° LAO view of gated heart study performed with Tc-99m RBCs. LV is enlarged, but no evidence of discrete aneurysm is seen in this view. Combined anterior view, gated, with tagged RBCs and WBCs (lower left). Separate gated heart acquisition was made using In-111 WBCs, medium-energy collimator, and 15% windows set for 173- and 247-keV photopeaks of In-111. Positioning was identical to that at upper left. Because of poor count rate, all frames of indium study were summed into single frame, which was added to end-diastolic frame of gated RBC study. This shows juxtaventricular location (arrow) of WBC accumulation, which is similar in location to LV aneurysm on chest radiograph. Combined 70° LAO view of gated RBC and WBC study (lower right). WBC portion of this study was acquired and processed as for lower left image. Positioning is identical to that for upper right. This image shows that juxtaventricular WBC accumulation (arrow) extends behind and above anterior wall of LV. These views, combined with chest radiograph and history, made infected mural thrombus and/or aneurysm almost certain.

with a clear chest and an oral temperature of 103°F. The heart was regular, with no murmurs. No organomegaly was present. The neurologic examination was within normal limits. The chest radiograph showed the left-ventricular aneurysm unchanged from 1978. The IVP was normal. The white count was 8,400 with 50% segmental polymorphonuclear leukocytes and 17% bands. Urinalysis revealed pyuria. The ECG demonstrated an old AWMI; the only ST elevation was in AVL. Blood and urine cultures on admission were positive for *E. coli*, and the patient was started on ampicillin. He had a hectic fever, up to 105° F. After 3 days, gentamicin was added to the antibiotic regimen but was discontinued after 5 days. Positive blood cultures persisted for 2 wk.

An In-111 WBC image preformed on the 10th hospital day revealed a focal area of uptake in the left hemithorax that correlated with the LV aneurysm seen on chest radiograph (Fig. 2). The radiograph revealed no infiltrates in the lungs. The combined image and chest radiographic findings suggested either an abscess in the aneurysm or an infected mural thrombus. A gated heart study was performed the same day using RBCs labeled in vitro with Tc-99m, along with the previously injected In-111 WBCs. This study failed to visualize the aneurysm with Tc-99m RBCs but the In-111 WBCs did show up (Fig. 2). These findings strongly suggested either an infected mural thrombus or an abscess involving the LV aneurysm. Gallium-67 was injected immediately following the WBC image, and imaging was done 2 days later. Gallium also revealed uptake in the area of the aneurysm (Fig. 3). Neither the In-111 WBC nor the Ga-67 image indicated abnormal renal accumulation of these agents, so presumably the patient's urinary-tract infection had been cleared with antibiotics before these procedures. On the 14th hospital day, a left-heart catheterization demonstrated a large mural thrombus filling a large anterior-wall aneurysm, with a pseudoaneurysm at the site of the In-111 WBC accumulation. An M-mode and 2D echocardiogram obtained before catheterization was nondiagnostic.

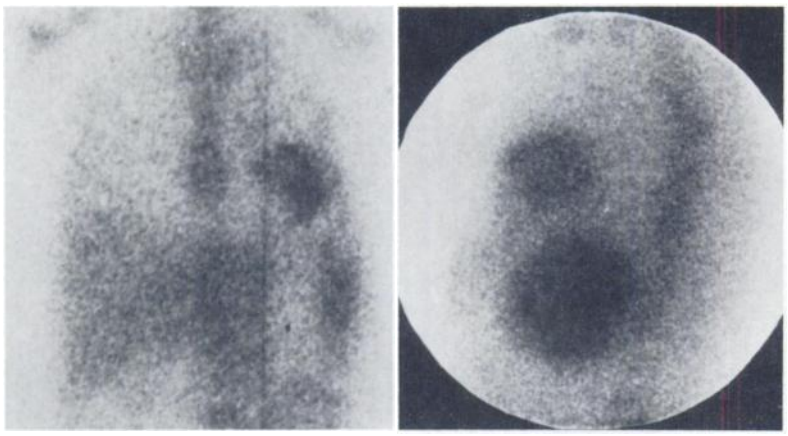

FIG. 3. Left: Anterior view of chest and abdomen, at 48 hr after injection of Ga-67. Intense accumulation of Ga-67 in chest resembles that in Fig. 1. No accumulation of gallium was seen in left shoulder. Right: Left lateral spot view of chest with Ga-67 at 48 hr after injection. Intense accumulation is seen in anterior portion of chest, above spleen. Here Ga-67 image and In-111 WBC image were of equivalent diagnostic value, but results of WBC image were more timely.

Immediately following catheterization the patient was taken to surgery. Operation revealed a left-ventricular aneurysm containing a mural thrombus, with accumulation of purulent material between the thrombus and the wall of the aneurysm. A sinus tract extended through the wall of the aneurysm into an adjacent purulent pseudoaneurysm, which was walled off by adhesions to the surrounding pericardium and pleura. The aneurysm and pseudoaneurysm were excised, the area debrided, and the ventricle closed. Surgical samples from the abscess and thrombus cultured positive for *E. coli*. The following day the patient was afebrile. On the 4th and 5th days after surgery the patient became febrile, which was attributed to focal pulmonary infiltrates noted on the chest radiograph. Thereafter he remained afebrile. Ampicillin was continued throughout the hospital course. Schlicter titers were obtained and the blood levels of ampicillin were in the therapeutic range. Cefamandole was added at the time of surgery and continued for 1 wk. Multiple postoperative blood cultures remained negative. The patient was discharged 2 wk after surgery.

DISCUSSION

Abscesses of the myocardium most commonly result from a septicemia or from an extension of an infectious endocarditis (*9*). There have been 15 documented cases of abscess associated with acute myocardial infarction, but only one case was diagnosed preoperatively, with survival (*4,7,8*). In the seven previously reported cases of an abscess developing in an old myocardial aneurysmal scar, definite clinical diagnosis was not established (*5,6*). These patients had signs of septicemia but no signs suggestive of an infected aneurysm, and diagnoses were made usually at autopsy or during thoracotomy performed because of signs of pump failure in the presence of an expanding left-ventricular aneurysm (*1-6*). None of these patients survived. In our case, an abscess that developed in an aneurysmal scar of an old anterior-wall myocardial infarction was diagnosed preoperatively by scintigraphic studies sensitive to infectious processes. The timely diagnosis of an aneurysmal or mural-thrombus abscess by both the indium-111 WBC and Ga-67 scans led to successful surgical intervention before the pseudoaneurysm ruptured.

Rupture of the heart is common in patients with myocardial abscess. Thirty-six percent of myocardial abscesses, associated with either an acute MI or in the area of a scar, terminate in cardiac rupture (*4*). The frequency of myocardial abscess rupture unassociated with a scar is 5-10%, while the frequency of rupture of an uncomplicated MI is 5% (*4*). Myocardial rupture is generally a dramatic event. In a recent report (*10*), a gated heart study was used to diagnose a subacute rupture in an acute MI. In that study labeled RBCs were seen in the pericardial space. There was no such finding in our patient to suggest a subacute rupture.

Both gallium-67 and In-111 WBC images are reported to have a sensitivity of approximately 90% in detecting abscesses (*12,15*). The differential diagnosis of a positive indium-111 WBC image in the region of the heart should include a myocardial, pericardial, or mural-thrombus abscess, an acute myocardial infarction, an empyema, or a localized pneumonia (*11,15,16*). The differential diagnosis of a positive Ga-67 image is similar but in addition should include subacute bacterial endocarditis, a myocardial or pulmonary tumor, and myocarditis or pericarditis (*12,13,14*). In our case, the clinical history, chest radiographs, and scintigraphic findings limited the diagnostic considerations to an abscessed mural thrombus or abscessed LV aneurysm.

The failure to make a clinical diagnosis of an abscess in a myocardial scar is understandable, since this complication is rare and the clinical symptoms are nonspecific. This case report illustrates the importance of scintigraphic methods in evaluating the septic patient.

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