Gallium-67 Imaging of Pericardial Lymphoma in AIDS

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A 33-yr-old homosexual man with acquired immune deficiency syndrome (AIDS) and *Mycobacterium avium intracellulare* (MAI) infection presented with fever, sweats, lethargy and dyspnea. A chest radiograph showed cardiomegaly and an echocardiograph revealed a large pericardial effusion. After pericardial aspiration, which confirmed T cell non-Hodgkin's lymphoma, he remained dyspneic. Gallium-67 imaging was performed to determine whether the patient's residual dyspnea was related to pulmonary MAI infection or lymphomatous infiltration of the heart. Planar ^{67}Ga scintigraphy revealed intense tracer uptake in two areas within the mediastinum and surrounding the entire heart shadow but no evidence of pulmonary MAI infection. SPECT ^{67}Ga scintigraphy precisely localized the two mediastinal abnormalities and demonstrated the tracer uptake around the heart to be pericardial rather than myocardial. Gallium-67 scintigraphy suggested that pericardial lymphoma was the likely basis of the patient's dyspnea.

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CASE REPORT

A 33-yr-old man with AIDS was admitted electively for treatment of disseminated *Mycobacterium avium intracellulare* (MAI) infection. On admission, he gave a 6-wk history of fever, night sweats, lethargy, weight loss and dyspnea. Abnormal physical signs included a pyrexia of 38.0°C, a resting tachycardia of 100 bpm and a pericardial rub.

His hemoglobin was 8.2 g/dl, white cell count was 5.1 × 10^9/liter and platelet count was 60 × 10^9/liter. A CD4 count was 0.01 × 10^9/liter (normal range 0.35 − 2.2 × 10^9/liter). Tests for human T cell lymphoma virus (HTLV-1) infection were negative. An electrocardiogram showed sinus tachycardia and low voltage complexes. A chest radiograph showed cardiomegaly and echocardiography revealed a large pericardial effusion. Radionuclide equilibrium ventriculography was performed and the left ventricular ejection fraction was 49% (normal range 40%–59%).

Blood-stained pericardial fluid (500 ml) was aspirated, the cytology of which revealed large numbers of lymphoid blasts and pleomorphic large cells. Immunocytochemistry revealed CD4 markers in the lymphoid blasts but CD3, CD30 and CD40 markers were negative suggesting a diagnosis of T cell non-Hodgkin's lymphoma. Thoracic MRI and abdominal US revealed no evidence of lymphomatous infiltration. Although an initial bone marrow biopsy and trephine were negative when these were repeated 2 mo later, there was infiltration with T cell lymphoma.

Three units of blood were transfused and therapy for MAI infection initiated. After this therapeutic regimen, the patient improved symptomatically, although he remained dyspneic on exertion.

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Indications for Gallium Scintigraphy

Gallium-67 whole-body scintigraphy was performed to determine whether the patient's residual dyspnea was related to pulmonary MAI infection or lymphomatous infiltration of the heart. Gallium-67[20 MBq, (3.2 mCi)] was injected intravenously according to the Administration of Radioactive Substances Advisory Committee (ARSAC) recommendations. Images were acquired at 48 and 72 hr after injection using dual-head gamma camera fitted with a medium-energy, parallel-hole collimator. SPECT was performed around the thorax over 360° (2 × 180°) for a total acquisition time of 16 min.

Scintigraphic Results

The whole-body ^{67}Ga scintigrams revealed intense tracer uptake in two areas within the mediastinum and surrounding the entire heart shadow as if it was within the pericardium (Fig. 1).

Figure 2 shows one ^{67}Ga image (A) and a 45° left anterior oblique (LAO) projection of the radionuclide ventriculogram (B). The ^{67}Ga image is a 2.25-cm thick oblique slice on a tomographic plane parallel to the projection plane of the LAO radionuclide ventriculogram. The XY pixel dimensions are matched in both images. Gallium-67 uptake is seen surrounding the area occupied by right and left ventricular cavities. Gallium-67 uptake around the apex of the left ventricle is almost indistinguishable from splenic tracer uptake. No ^{67}Ga is seen within the interventricular septum. There are two areas of more intense ^{67}Ga uptake seen within the mediastinum and these are close to the right atrium.

From this description it can be inferred that abnormal ^{67}Ga uptake is pericardial and also within two mediastinal nodes.

MRI

TI-weighted, spin-echo sequences were performed without gadolinium enhancement. An abnormal signal is seen within the mediastinum close to the right atrium (Fig. 3).

DISCUSSION

There is an increased incidence of non-Hodgkin's lymphoma among patients with AIDS (*1*). Most AIDS-related lymphomas are extranodal, histologically high grade, rapidly progressive and of B cell origin (*2,3*). There are only 23 published reports (Medline search 1966–1995) of cardiac involvement by lymphoma in HIV-positive patients and all these are B cell lymphoma (*4–16*). T cell lymphoma is usually HTLV-1 associated and carries a similar or worse prognosis than B cell lymphoma.

There are three reports of planar ^{67}Ga scintigraphy in patients with cardiac lymphoma. Two patients had metastatic cardiac lymphoma; one had intense myocardial and pericardial ^{67}Ga uptake (*17*), the other had pericardial ^{67}Ga uptake only (*4*). One patient had primary cardiac lymphoma and there was intense ^{67}Ga uptake in the myocardium (*7*).

Our case has two interesting aspects. First, T cell lymphoma of the pericardium is reported in a patient with AIDS and

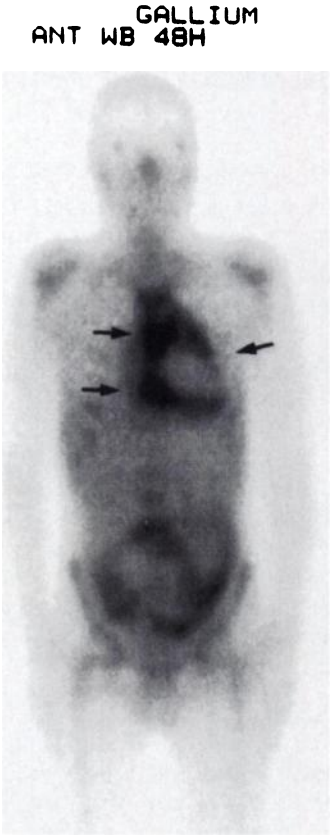

FIGURE 1. Whole-body anterior gallium image. The two arrows on the left indicate two mediastinal areas of increased tracer uptake. On the right, tracer surrounding the heart shadow is marked.

without HTLV-1 infection. Second, ^{67}Ga SPECT improved the anatomical localization of the mediastinal abnormalities noted on the planar images and demonstrated tracer uptake around the heart to be pericardial rather than myocardial. Because of the patient's poor prognosis pericardial biopsy was felt to be inappropriate (*8*). The final diagnosis was made on cytology of the pericardial fluid.

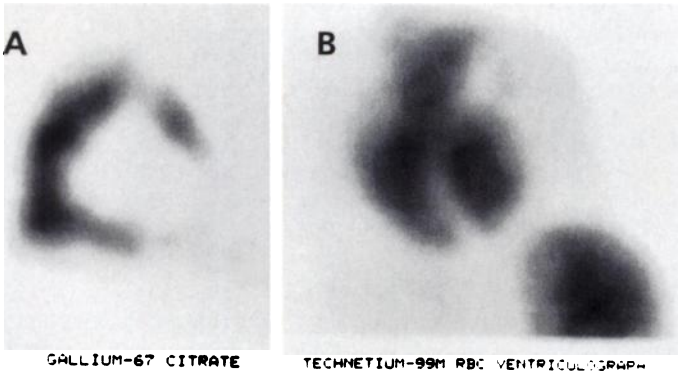

FIGURE 2. (A) Gallium tomographic slice in a projection parallel to the projection of the radionuclide ventriculogram. (B) 45° left anterior oblique radionuclide ventriculogram.

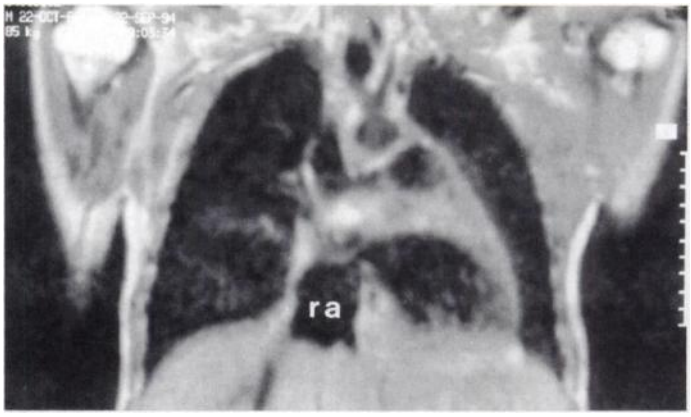

FIGURE 3. Coronal MR image. ra = right atrium.

CONCLUSION

In immunocompromised patients with AIDS, dyspnea may be attributed incorrectly to opportunistic pulmonary infection or to AIDS-related cardiomyopathy. Gallium-67 SPECT is a noninvasive imaging technique that may be used to confirm a diagnosis of cardiac lymphoma and in the differentiation between myocardial and pericardial involvement.

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