

Case Reports

Primary Pericardial Mesothelioma Detected by Gallium-67 Scintigraphy

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We present a case report of a 73-yr-old woman with progressive systemic sclerosis who showed extensive pericardial uptake of ^{67}Ga by scintigraphy. At autopsy, primary pericardial mesothelioma was found.

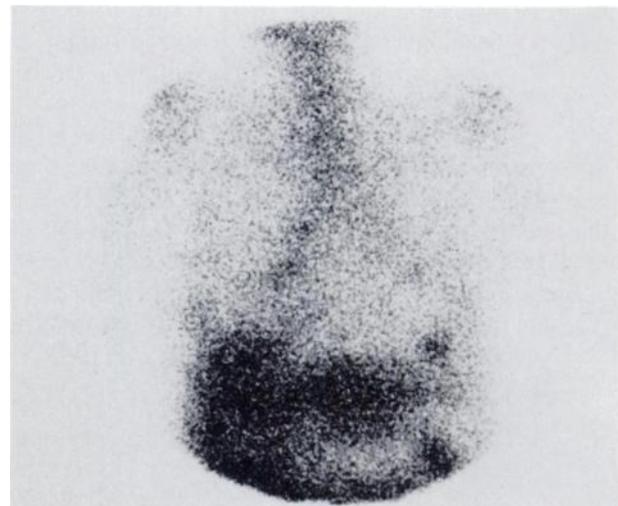
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We report a case of a primary pericardial mesothelioma, a particularly infrequent type of primary cardiac tumor. The patient was evaluated with gallium-67 (^{67}Ga) scintigraphy, which contributed to the diagnosis of a malignant pericardial tumor.

CASE REPORT

A 73-yr-old woman was admitted to our hospital in April, 1984 for evaluation of anorexia and fatigue of 1 mo's duration. One year prior to the present admission, she was found to have progressive systemic sclerosis (PSS). The diagnosis was based on the findings of Raynaud's phenomena, peripheral edema, and ulceration of her fingers. A ^{67}Ga scan, performed to assess the pulmonary abnormality in PSS, revealed abnormal uptake in the left lower portion of the chest (Fig. 1). No medication was prescribed, and she remained well until the month prior to admission, when she lost her appetite. Her past medical history revealed tuberculosis 53 yr ago and left sided partial mastectomy due to fibroadenoma 3 yr prior to admission. She had no history of occupational exposure to asbestosis. Physical examination on admission revealed a thin woman who appeared both acutely and chronically ill, with leather-like skin. Her pulse rate was 100 bpm, blood pressure 96/58 mmHg, and respirations of 18/min. Other pertinent physical findings were 2/6 systolic murmur and marked hepatomegaly. Laboratory findings included: An enlarged heart on chest radiograph (cardiothoracic ratio of 68%); low voltage on ECG with nonspecific ST-T wave changes in the precordial leads; hematocrit of 33%; white blood cell count 9,300/mm³; total protein 7.4 g/dl (gamma globulin fraction 33%); and ESR 161 mm/hr (Westergren). A ^{67}Ga scan performed ap-

proximately 1 yr interval from the first ^{67}Ga study showed marked gallium concentration surrounding the entire myocardium (Fig. 2). Technetium-99m pool and thallium-201 scan were performed after the ^{67}Ga study to detect the location of ^{67}Ga accumulation. A blood-pool scan revealed normal sized cardiac chambers, a left ventricular ejection fraction of 52%, and marked enlargement of the space between the left ventricle and lung. A ^{201}Tl scan with injection at rest showed homogeneous perfusion of the left ventricular myocardium. An ECG-gated x-ray-CT scan revealed pericardial thickening suggestive of a tumor. As a result of the imaging findings, the patient was referred for thoractomy. A hard infiltrating mass



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FIGURE 1
Initial scintigram of anterior chest of [^{67}Ga]citrate performed to evaluate pulmonary abnormality of PSS. Note abnormal uptake of gallium in the left lower portion of the chest.

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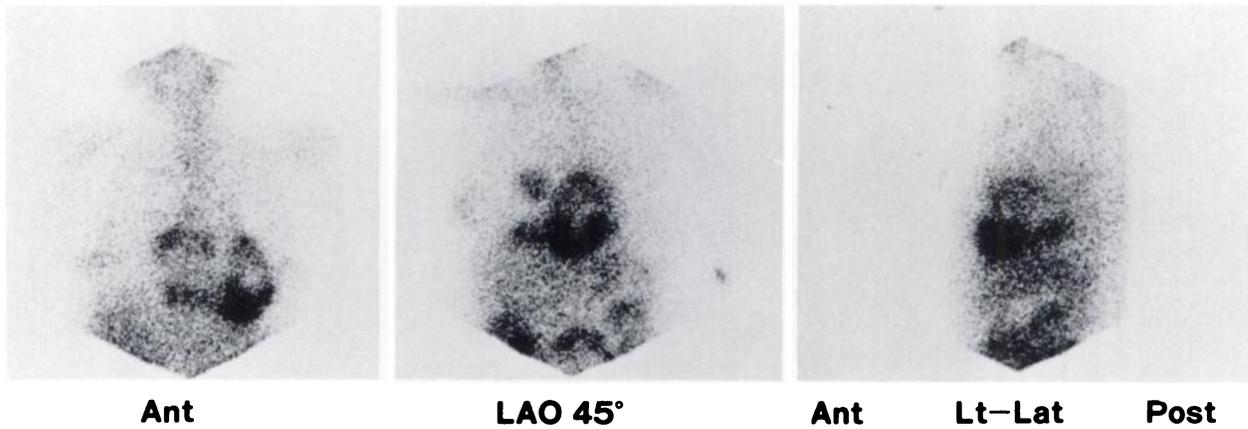


FIGURE 2
Scintigrams 1 yr later. Note abnormal uptake of gallium around the heart in anterior, LAO 45, and left lateral views.

was found originating from the left ventricular pericardium and infiltrating the myocardium. The extent of the lesion precluded removal. Several biopsies revealed mesothelioma. Gallium-67 scan was repeated 2 mo following operation, and revealed more intense localization around the myocardium (Fig. 3). The patient died of heart failure ~3 mo later. Autopsy revealed obliteration of the pericardial space by the tumor, with extension into the myocardium (Fig. 4A). Histologic examination confirmed the diagnosis of primary pericardial mesothelioma (Fig. 4B).



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FIGURE 3
Scintigram of anterior chest of [⁶⁷Ga]citrate performed 3 mo after the second gallium study. Abnormal uptake in the pericardium increased and also a hot spot was noted in the right hilum.

DISCUSSION

Primary tumors of the heart and pericardium are rare. Fine (1) reported an incidence of 0.13% (23 cases) in 18,328 autopsies and there was only one case of primary pericardial tumors. Primary pericardial mesothelioma is often very difficult to diagnose and therefore, its prognosis is poor. As elsewhere in the body, cardiac uptake of ⁶⁷Ga is nonspecific and may be the result of an inflammatory process, neoplasm, or ischemic regions, and the pattern of uptake appears to differ according to the etiology. In pericarditis, the uptake is localized to the pericardium and can show a rim of intense activity with uneven thickness surrounding an enlarged cardiac silhouette (2-5). In tumor involvement, the pericardium and left side of the heart appear to be the most frequent sites of disease. Other diseases, such as bacterial endocarditis (6), sarcoidosis (7), inflammatory cardiomyopathy (8), and myocardial abscess (9) are known to show characteristic patterns of ⁶⁷Ga uptake. In endocarditis, the uptake is localized to the endocardium, usually less intense than hepatic uptake, and could only be recognized when the background activity is low (6). In sarcoidosis, the uptake is usually less intense than hepatic uptake, localized to the myocardium, and perfusion abnormality of ²⁰¹Tl is usually observed in the left ventricle (7). In cardiomyopathy, the myocardium is diffusely involved and the uptake is localized to only the left ventricle (8). In myocardial abscess, the uptake is seen as a focal abnormality in the area of involvement (9). In our case, the uptake of the gallium was intense and irregular, and the area appeared round. Blood-pool scan showed an irregular wide halo around the cardiac blood-pool and ²⁰¹Tl myocardial scan indicated normal perfusion. These findings indicate that the involved area was localized to the pericardium (2-9). With regards to mesothelioma, gallium uptake has been reported in pleural

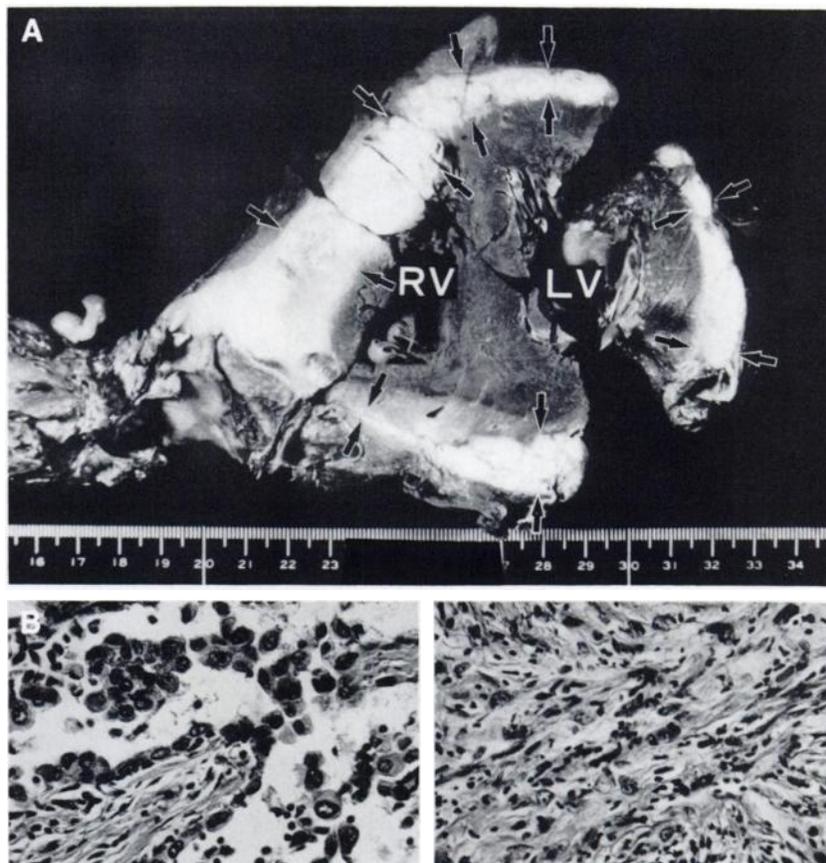


FIGURE 4

A: Autopsy demonstrated that the pericardial space was completely obliterated by the tumor. Arrows show pericardial tumor itself. LV: left ventricle, RV: right ventricle. B: Histologic examination disclosed that the tumor tissue was composed of two distinct patterns, tubular and papillary. The former consisted of malignant and round cells, resembling adenocarcinoma. The latter consisted of spindle-shaped cells, similar to those in spindle sarcoma. These findings are features of mixed type of primary pericardial mesothelioma.

and peritoneal mesothelioma (10,11). In these reports, ^{67}Ga uptake helped to define the extent of the disease. To our knowledge, this is the first report of ^{67}Ga cardiac uptake of primary pericardial mesothelioma. Autopsy revealed that the location of intense ^{67}Ga uptake coincided with the largest apical mass, considered to be the primary lesion, and the uptake around the heart delineated pericardial tumor extension in the terminal stage of disease.

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