MEDIASTINUM SCANNING WITH ^{75}Se-SELENOMETHIONINE

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Selenium-75-selenomethionine has been available for some 10 years, having been used clinically to visualize tissues with relatively rapid protein turnover rates, such as pancreas, parathyroid and thyroid glands, parathyroid adenomas, lymphomas, and thyroid carcinomas (*1–3*). Despite its availability for this period of time, there appear to have been only two reports of its use in delineating mediastinal masses, both occult thymomas in patients with myasthenia gravis (*4,5*). The purpose of this report is to call attention to the clinical utility of this radiopharmaceutical. We have confirmed that ^{75}Se-selenomethionine is concentrated in some mediastinal masses and can help in localizing lesions that are equivocal on chest films.

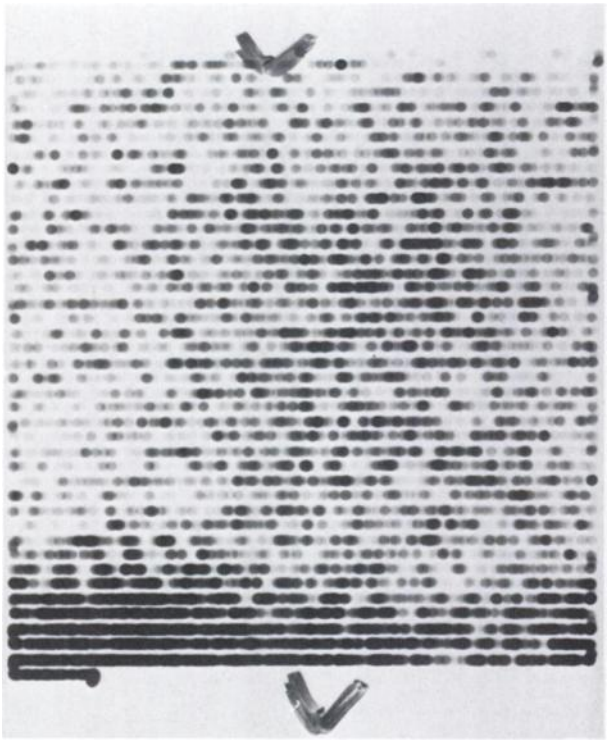

FIG. 1. Mediastinal scan with ^{75}Se-selenomethionine showing "hot" area in left upper mediastinum.

The dose of selenomethionine was 250 μCi given intravenously. The first patient was scanned with a Picker Magnascanner V at 24 hr; the second at 1, 24, 48, and 72 hr. Additional scans were not obtained in the first patient because of good visualization on the 24-hr study.

CASE REPORTS

The first patient was a 45-year-old female complaining of nausea and vomiting, dizziness on standing, and generalized weakness of several weeks duration. She was found to have a left mediastinal mass on x-ray of chest. A ^{75}Se-selenomethionine scan of mediastinum showed a "hot" area corresponding with the shadow seen on the x-ray (Fig. 1). Exploration of left hemithorax revealed a roughly spherical mass about 7 cm in diam, covered by parietal pleura on the mediastinal side and by visceral pleura laterally, situated anterior to the aortic arch but extending into the arch and surrounding the pulmonary vessels on the left side. Although the mass was adjacent to the bronchus posteriorly and contiguous with a portion of it, it could not be determined whether or not the mass arose from the bronchus, but it was thought to arise within the mediastinum and extend laterally and anteriorly.

The histology of mass removed from this patient showed nests of epithelioid-like malignant cells with an intervening small cell stroma. The differential diagnosis included anaplastic bronchogenic carcinoma, malignant thymoma, and reticulum cell sarcoma. Pathologist's impression from histological

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standpoint was that the most likely diagnosis would be anaplastic small cell bronchogenic carcinoma although possibility of a malignant thymoma could not be excluded.

The second patient, a 34-year-old female with a relatively short history of generalized muscular weakness, easy fatiguability, and heat intolerance was found to have a toxic goiter. Chest x-rays showed no definite abnormality but were suggestive of an anterior mediastinal mass seen on lateral projection only with no tracheal deviation. An ^{181}I scan of the suspected mediastinal mass was negative. The patient underwent subtotal thyroidectomy and became asymptomatic. A ^{75}Se-selenomethionine scan was performed 3 months postoperatively with settings to achieve an information density of 800. An area of radioisotope concentration was seen in upper mediastinum in midline and to the left of it (Fig. 2). In this series of scans the best resolution was seen at 72 hr. The patient had a thoracotomy 96 hr after administration of ^{75}Se-selenomethionine, and a diffusely enlarged but otherwise normal-appearing thymus weighing 40 gm was resected. The ratio of activity in the resected mass to that in blood was found to be 2.8/1.0.

The mass removed from this patient consisted of soft greyish-white flat tissue and appeared compatible with hyperplastic thymus. Histology showed normal structure suggestive of noninvolution rather than hyperplasia.

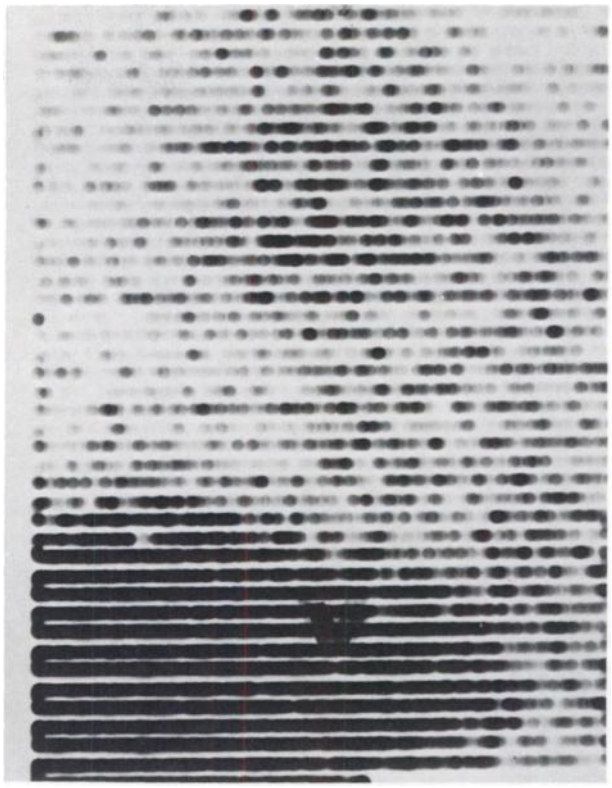

FIG. 2. Mediastinal scan with ^{75}Se-selenomethionine showing "hot" area in midline and to left of it.

COMMENT AND CONCLUSION

Selenium-75-selenomethionine scanning is a simple, safe, and atraumatic procedure for visualizing mediastinal masses, as compared with other investigative procedures such as pneumomediastinography and venography. This radiopharmaceutical is incorporated into actively dividing cells of various neoplasms, including bronchogenic carcinoma, and apparently into noninvoluted thymus tissue. A dose of 250 μCi has been estimated to deliver 2.2 rads to the whole body, 2.5 rads to the gonads, 14 rads to the kidneys, 0.6 rads to the pancreas, and 0.5 rads to the liver (*6*). This radiation dose is within acceptable limits for diagnostic studies in such patients.

Mediastinal scanning provided information confirmatory of a mass in one of our patients and in the other allowed detection of a mediastinal mass that was not otherwise clearly apparent. The ^{75}Se 265-keV photopeak was sufficient to penetrate the thorax, and the target-to-background ratio of radioactivity in these studies was sufficient for the lesion to be seen on scans in the above conditions. Selenomethionine scanning should prove useful for routinely delineating occult thymomas and other mediastinal masses.

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