

FALSE-POSITIVE ¹³¹I TOTAL-BODY SCANS

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One of three patients who had a false-positive ¹³¹I total-body scan for metastatic thyroid carcinoma or recurrence is presented in detail. This false-positive scan had the appearance of recurrent neoplasm and was present on both a 5:1 minification image and on a 1:1 image of the neck and mediastinum. An esophagram demonstrated abnormal accumulation of barium in the cervical esophagus corresponding to the areas of ¹³¹I accumulation. The abnormal scan was secondary to accumulations of saliva containing ¹³¹I. Each of the other two cases demonstrated similar findings which disappeared following several swallows of water. Other reported and observed causes of false-positive ¹³¹I total-body scans are discussed.

The use of orally administered ¹³¹I sodium iodide in dose ranges of 100 mCi or greater is well established as an acceptable and efficacious mode of therapy for metastatic or recurrent thyroid carcinoma. Similarly, the ¹³¹I total-body scan study is an acceptable method of detecting areas of functioning metastatic disease (1). When a dose or doses of 100–200 mCi of a beta- and gamma-emitting radionuclide such as ¹³¹I is contemplated for administration to a patient, it is imperative that the presence of residual or metastatic carcinoma be established unquestionably before administration of the treatment dose. There are several possible causes of “false-positive” total-body radioiodine scan studies which should be kept in mind. We have recently observed three patients, each of whom had a false-positive total-body ¹³¹I scan secondary to esophageal and/or pharyngeal accumulation of ¹³¹I. In each case the abnormal activity disappeared following several swallows of water. The case to be presented is illustrative of these three cases and demonstrates a most dramatic false-positive ¹³¹I total-body scan.

CASE REPORT

EG, a 54-year-old white man, was found to have carcinoma of the thyroid 7 years prior to this hospital admission. The patient was seen initially at another hospital at which time he had a surgical resection of a mixed papillary follicular thyroid carcinoma. At the time of surgery he had regional lymph node involvement by the tumor and a radical neck dissection was performed. Following surgery the patient received a course of external beam radiation therapy. The total radiation dose is unknown. He was then seen at another hospital and received 30 mCi of ¹³¹I sodium iodide. He was first seen at our hospital 2 years after his initial therapy. At that time an ¹³¹I total-body scan revealed functioning thyroid metastases within the regional cervical lymph nodes and within the lungs. During the next 2 years he received three courses of ¹³¹I therapy totaling 330 mCi. Subsequently there has been no evidence of metastatic thyroid carcinoma for the 3 years prior to this present hospital admission. This current admission was prompted by recurrent visual disturbances and recurrent dysphagia. As part of his evaluation a total-body ¹³¹I scan study was performed 24 hr following the oral administration of 1 mCi of ¹³¹I sodium iodide solution. The patient had received three 10-unit doses of TSH prior to administration of the radioiodine. Images were obtained with a dual-probe 5-in. rectilinear scanner (Ohio-Nuclear Model 84). The 5:1 total-body minification image revealed the presence of abnormal tracer concen-

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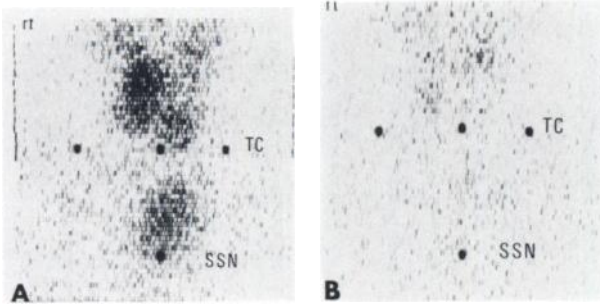


FIG. 1. (A) Initial anterior neck scan. TC, level of thyroid cartilage; SSN, level of suprasternal notch. (B) Repeat anterior neck scan following several swallows of water.

tration in the region of the thyroid bed. A 1:1 image of the neck and mediastinal area was then obtained and is shown in Fig. 1A. This image revealed two areas of abnormal tracer activity just above the thyroid cartilage and one area of abnormal tracer above the suprasternal notch. These were thought to represent areas of recurrent neoplasm. Because of the prior history of pulmonary metastases, the patient was returned to the nuclear medicine division approximately 1 hr later for 1:1 scan images of his chest. At this time the suprasternal concentration of abnormal tracer activity was no longer visible and a repeat 1:1 image of the neck and mediastinal area produced the image seen in Fig. 1B showing only faint evidence of tracer concentration in the aforementioned regions. Technical imaging factors were checked and were not varied. A 1:1 scan image 24 hr after this study confirmed the absence of significant tracer concentration in the areas previously described. An esophagram ("barium swallow") examination revealed accumulations of barium in both pyriform sinuses and in the cervical esophagus which



FIG. 2. Barium swallow examination demonstrating accumulation of barium in pyriform sinuses and cervical esophagus. This corresponds to three areas of abnormal ^{131}I accumulation seen in Fig. 1A.

corresponded precisely to the three areas of abnormal ^{131}I activity seen on the original images (Fig. 2). These three areas of abnormal activity apparently represented saliva accumulation in the pyriform sinuses and esophagus which was swallowed prior to the 1:1 image of the chest. It is possible that this patient might have been treated with a therapeutic dose of ^{131}I because of an accumulation of saliva which would have disappeared following therapy or "persisted" as unresponsive "thyroid metastases".

DISCUSSION

A few instances of ^{131}I concentrations not caused by pathologic processes have been reported. Most, as in our cases, have represented physiologic concentrations of radioiodine. Concentration of ^{131}I is frequently seen in the salivary glands and in the mouth. Sitterson, et al reported several patients exhibiting concentrations of saliva and nasal secretions containing ^{131}I (2). These included accumulation of ^{131}I in dental cavities, tracheotomy tubes, and several instances of a linear accumulation of ^{131}I to the left of midline thought to represent esophagus. No localized areas of radioiodine accumulation in the esophagus were described as was seen in our patients.

The localized accumulation of material in the cervical esophagus of the patient presented in this report is thought to be secondary to the surgical procedure because dysphagia has been present to some extent since the time of original surgery. Both of our other patients had surgical thyroidectomies without radical neck dissections.

Abnormal areas of activity in the midline region of the neck or chest in patients scanned for thyroid metastasis, especially those who have undergone thyroid surgery, should be carefully questioned. If the patient gives any history of dysphagia or difficulty in swallowing, or if any suspicion of salivary or nasal secretion contamination is present, a repeat examination several hours later following several swallows of liquids and solid food should be obtained.

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