

ACHALASIA: A CAUSE OF FALSE POSITIVE MEDIASTINAL ¹³¹I UPTAKE IN A PATIENT WITH THYROID CANCER

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ABSTRACT

Unusual features of ¹³¹I uptake during thyroid cancer scintigraphy may lead to a false-positive diagnosis of residual or recurrent malignancy and associated metastasis. A proper understanding of the causes of false positive ¹³¹I scans is essential for accurate interpretation of the images and to obviate diagnostic errors which may lead to administration of unnecessary therapy doses. We are reporting a case of a 55-years old man with history of total thyroidectomy for papillary thyroid cancer, followed by ablation therapy with 100 mCi of ¹³¹I for residual thyroid disease. A follow-up scan obtained after one year showed a large area of ¹³¹I uptake in mediastinum, which was subsequently found to be due to accumulation of radioiodine in a grossly dilated esophagus secondary to achalasia. For the accurate interpretation of ¹³¹I whole-body scans, awareness of potential causes of false positive findings is important to avoid unnecessary radiation burden to the patients.

Introduction

Most well differentiated thyroid cancers retain the ability to trap iodine, and radionuclides of iodine can be used both diagnostically and therapeutically. The availability of sensitive diagnostic tests, coupled with the ability to deliver targeted therapy, gives physicians the ability to manage thyroid cancer better than with any other type of cancer.¹ Whole body ¹³¹I scintigraphy is a relatively inexpensive, simple yet highly accurate procedure that plays a pivotal role in clinical decision-making in the evaluation of post thyroidectomy cases of differentiated thyroid carcinoma. The central indication for treating with ¹³¹I is the appearance of abnormal focal uptake in a diagnostic whole body scan. Overall, the whole-body scan has a very high specificity that is reported to be in the range of 98% to 100%.² Though thought highly specific, there is growing evidence of false positive uptakes in several other organs and their associated disease processes. The present case is a classical example of it.

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Case Report

A 55-year-old man was diagnosed to have papillary thyroid cancer and had total thyroidectomy in March 2007. He presented to the Nuclear Medicine department of Karachi Institute of Radiotherapy and Nuclear Medicine (KIRAN) in April 2007 for post-operative radioiodine ablation therapy with ¹³¹I for thyroid cancer. A 2-mCi diagnostic ¹³¹I whole body scan showed functioning thyroid tissues in neck only. Laboratory work up showed a TSH level of 78.58 uL/ml (0.17-4.05 uL/ml), FT4 level of 0.42 ng/dl (0.89-1.78 ng/dl), serum thyroglobulin level of 16.4 ng/ml (1.7-55.6 ng/ml) and serum thyroglobulin and microsomal antibodies (Thyroid Peroxidase antibody {anti TPO}) were negative. In view of patient's age and evidence of residual functioning thyroid tissue, the patient was treated with 100 mCi of ¹³¹I in May 2007 and was subsequently put on suppressive doses of levothyroxin. Patient's serial serum thyroglobulin levels with suppressive doses of levothyroxin between May 2007 and April 2008 were <0.02 uL/ml (0.17-4.05 uL/ml). In June 2008, follow-up whole body scan (21 days after withdrawing levothyroxin) with 2-mCi ¹³¹I was performed 2008 which revealed an elongated area of

intense uptake in the mid of chest visualized both anterior and posterior views (Fig. 1).



Figure 1: A diagnostic 2-mCi ^{131}I whole-body scan revealed an oblong area of intense tracer uptake in midline chest both anterior and posterior views.

The initial suspicion was of mediastinal soft tissue functioning thyroid metastasis. But his serum thyroglobulin level (off levothyroxin) at the same time was <0.02 uL/ml (0.17-4.05 uL/ml) with negative antibodies. This discordance has raised suspicion of a false positive scan.

Subsequently a barium swallow examination was performed which showed a grossly dilated thoracic esophagus with delayed passage of barium, showing multiple mobile filling defects intraluminally suggestive of food residue. The terminal esophagus revealed concentric narrowing diagnosed as achalasia with mega dilated esophagus (Fig. 2) and the cause of false positive whole body ^{131}I scan. Patient was referred for the surgical opinion for achalasia and suppressive dose of levothyroxin was restarted.

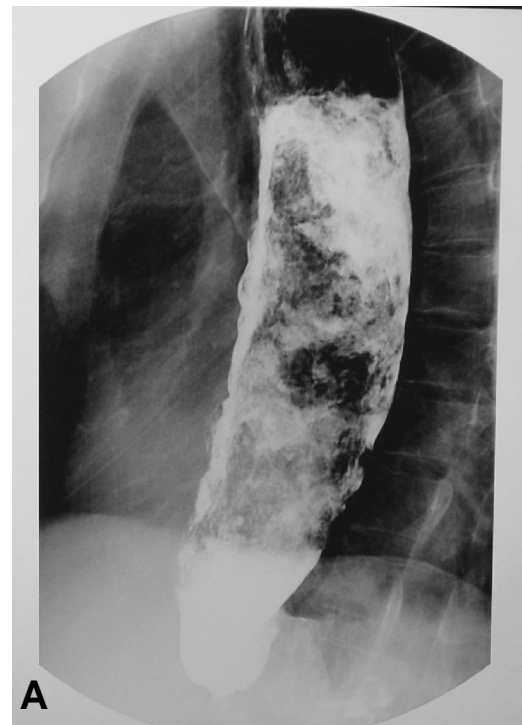


Figure 2: Barium meal study (a) and (b) showed hugely dilated thoracic esophagus with concentric narrowing of terminal esophagus, showing multiple mobile filling defects intraluminally suggestive of food residue.

Discussion

The correct interpretation of radioiodine scans is critical in the appropriate management of patients with thyroid cancer.³ Radiographic or cross-sectional imaging correlation should help to differentiate truly functioning thyroid lesions from physiological or artifactual tracer.⁴ The detection of uptake on chest views of radioiodine whole-body scans in thyroid cancer patients usually indicates the presence of pulmonary, skeletal, hilar or mediastinal lymph node metastasis and prompts the administration of therapeutic radioiodine doses. Therefore, it is essential to recognize the pathological conditions and artifacts that can cause false positive radioiodine scans.

The case presented here illustrates a false-positive cause on a ¹³¹I whole-body scan and emphasize caution in interpretation of this study. Excellent reviews describing in detail all possible causes of false-positive findings have been published elsewhere^{2,5} and are beyond the scope of this case report. In the chest, false-positive uptake may be due to external contamination,⁶ retention of secretions in the esophagus or trachea,⁷ or pathologic activity unrelated to thyroid carcinoma, such as lung or pericardial disease.⁸ The causes of false-positive radioiodine uptake in the chest can be classified⁶ according to the underlying mechanism into four categories:

1. Physiological uptake (breast, thyroid, blood-pool activity, gastric and colonic mucosa).
2. Pathological activity (lung, pleura, pericardium, thymus, meninges).
3. Internal retention of body secretions (esophagus, trachea).
4. External contamination (skin, hair, garment). False positive uptake of ¹³¹I in chest caused by dilated esophagus secondary to achalasia has been reported rarely.⁹ In our case there was an elongated area of intense ¹³¹I uptake in midline of chest raising the suspicion of mediastinal metastases, but the undetectable level of serum thyroglobulin (tumor marker) made it imperative to exclude the possibility of functioning mediastinal metastasis. The typical appearance on barium swallow made the diagnosis of mega dilated esophagus secondary to achalasia.

Conclusions

Knowledge of potential causes of false positive findings, coupled with careful history, physical examination and

radiological and cross-sectional correlation, is needed for accurate interpretation of positive radioiodine scans and to avoid unnecessary therapy doses.

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