False-Positive Whole-Body I-131 Scan In Thyroid Carcinoma Caused By Gastrooesophageal Reflux Disease

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Citation

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Abstract

Many false-positive findings on I-131 scans have been reported. Recognition of them may avoid unnecessary repeated therapeutic doses of radioactive iodine. The authors describe a false positive cervical and mediastinal radioiodine uptake due to gastro oesophageal reflux disease in a 63 yr-old man with papillary thyroid cancer. Trough this case report, causes of such scintigraphic features are reviewed.

INTRODUCTION

Thyroid cancer is an hormono - dependent neoplasm, radio sensible in its differentiated shapes. After surgical ablation of the primitive tumor, radio iodine completes this treatment in case of cervical remnant or extra nodal metastases. Whole body ^{131} I scintigraphy has aided the follow up of differentiated thyroid cancer for several decades. However, this strong tool based on the presence of the sodium iodide symporter (NIS) in the basolateral surface of thyroid follicular cells is not perfect. A wide spectrum of potentially misleading artefacts can arise in ^{131} I whole body scans from various anatomical variants and physiological processes as well as several unrelated non-thyroidal disease processes [1]. Recognition of potential false-positive iodine-131 scans is critical to avoid the unnecessary exposure to further radiation from repeated therapeutic doses of radioactive iodine. Here, we describe a case of false positive whole body scan due to a gastro-oesophageal motility disorder.

CASE REPORT

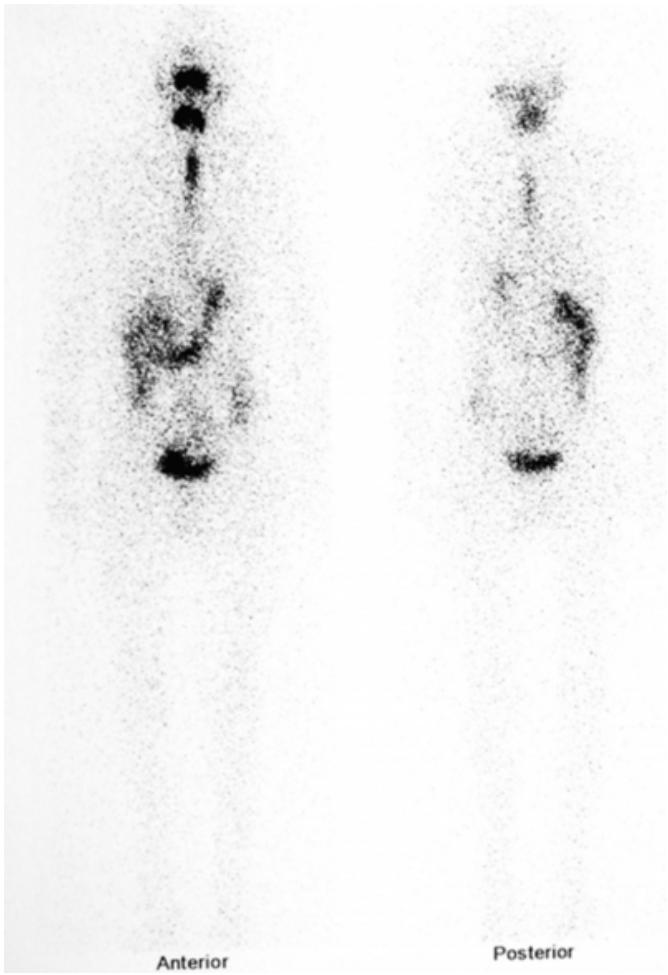
A 63-yr-old man with a long past of type 2 diabetes (25 years) and more recently a Parkinson disease (5 years), received ten years ago 3, 7 GBq of ^{131} I for post surgical ablation of residual cervical cells of a papillary carcinoma of the thyroid. Six months later, serum thyroglobulin test and whole body ^{131} I scan were negative. The patient was considered free of disease and the same results were shown on serum tests and scintigraphic follow-up for the last decade. Recently, a whole body scan performed two days after oral administration of 167 MBq of ^{131} I showed tree foci in the upper side of the neck and a linear mediastinal uptake.

Patient interrogation revealed heartburn and acid regurgitation. He was effectively treated for gastro oesophageal reflux disease.

A repeat scan after eating was negative. Serum thyroglobulin level was under 0,1 ng/ml. So we attributed the scintigraphic abnormalities to the gastrooesophageal reflux disease.

Figure 1

Figure nÂ°1: Anterior and posterior whole body I-131 scan 48 hours after oral administration of 167 MBq (4,5 mCi) of I-131. Besides physiological uptake in the gastrointestinal tract and the bladder, intense iodine uptake is shown in the anterior and upper side of the neck and mediastinum.



DISCUSSION

Whole-body radioiodine scan is an integral part of the follow-up algorithm for patients with differentiated thyroid carcinoma (DTC). The specificity of such exploration for detecting residual or recurrent local and metastatic disease is generally reported to be greater than 90% [2]. Recognition of normal and pathologic biodistribution of iodine is imperative for the nuclear medicine physician to avoid interpretation pitfalls and unnecessary repeated therapeutic doses [1]. A radioiodine scan showing abnormal uptake outside the thyroid bed must be studied carefully and alternative reasons for the finding must be considered. I-131 is excreted in gastric mucosa and can be seen in the oesophagus and pharynx after regurgitation or swallowing of saliva [3].

Oesophageal motility disorders are frequent in Parkinson disease. In our case, the patient history, the knowledge of I-131 artefacts and the serum thyroglobulin level all served to identify the abnormal tracer uptake as a false-positive result. The images revealed typical activity in the digestive tract. The linear esophageal activity generally mandates simple additional images following both eating and drinking. In the majority of cases, the intensity and shape of the activity in the oral cavity, pharynx and esophagus will change and a correct diagnosis can be made. In addition, it has been reported that the incidence of false-positive scans increases with the dose used for diagnostic scanning [4]. Therefore, the increase in sensitivity (fewer false-negative scans) obtained with higher doses has to be balanced with the decrease in specificity.

The following table summaries physiopathologic classification of benign and malignant entities that can show a false-positive result on radioiodine scan.

Figure 2

Table n°1: classification of false-positive radioiodine scan causes

Localization related to NIS function	**Localization in the thyroid at unusual sites:** • ectopic thyroid tissue [5,6], struma ovarii [7] **Non-thyroidal tissues possessing NIS:** • Normal physiological uptake in salivary gland [8], lacrimal gland [9], nasopharynx [10] and lactating breast [11]. • Neoplastic uptake: gastric adenocarcinoma [12], Warthin's tumour, adenocarcinoma of lungs [14], teratoma [15], meningioma[16], ovarian tumors[1]. • Abnormally located gastric mucosa: Meckel's diverticulum [17], Barrett's oesophagus[18], hiatus hernia [19] and gastric pull up surgeries.
Localization unrelated to NIS function	• Contamination by physiological secretions: saliva, urine, vomitus, nasal secretions[1]. • Gastrointestinal anomalies: Zenker's diverticulum [20], oesophageal stricture, oesophageal motility disorders [3], asymmetrical salivary uptake. • Hepatic uptake by 131-I labelled thyroid hormone [21] • Pleural, peritoneal and pericardial effusions [1, 22], hydrocele, septated gallbladder, ovarian cyst, laryngocele [23], subdural hematoma [24] • Ectopic kidney, transplantaed kidney, urinary tract divertculi, hydronephrosis [1] • Inflammatory conditions: cholecystitis [22], liver abscess [25], pulmonary tuberculosis [26], sebaceous cyst [22], rheumatoid arthritis associated lung disease, skin burn, psoriasis [1,22].
Uptake due to unknown mechanism	• Thymic uptake [27] , ectasia of carotid , pectus excavatum [9]. Recent myocardial infarct[1] , Intestinal scar [28].

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