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

A Biyi, Y Oufroukhi, A Doudouh

Citation
A Biyi, Y Oufroukhi, A Doudouh. False-Positive Whole-Body I-131 Scan In Thyroid Carcinoma Caused By Gastrooesophageal Reflux Disease. The Internet Journal of Nuclear Medicine. 2007 Volume 5 Number 1.

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. Through this case report, causes of such scintigraphic features are reviewed.

INTRODUCTION
Thyroid cancer is an hormone - 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 I[I] scans 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 I[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 I[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 I[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 I[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.
False-Positive Whole-Body I-131 Scan In Thyroid Carcinoma Caused By Gastrooesophageal Reflux Disease

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 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 summarizes physiopathologic classification of benign and malignant entities that can show a false-positive result on radioiodine scan.

<table>
<thead>
<tr>
<th>Location related to NIS function</th>
<th>Localization in the thyroid at usual sites:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thymus and innervation of thymus</td>
<td>Thyroid tissue [6, 11, thymic organ [1]]</td>
</tr>
<tr>
<td>Motor nerve trunk innervation NIS</td>
<td>Thyroid tissue [6, 11, thymic organ [1]]</td>
</tr>
<tr>
<td>Nonspecific uptake: gastric adenocarcinoma [12], adenocarcinoma of lung [15, 16], adenocarcinoma of ovaries [17, 18], carcinomas of lung [15, 16], carcinomas of ovaries [17, 18]</td>
<td>Thyroid tissue [6, 11, thymic organ [1]]</td>
</tr>
<tr>
<td>Abnormally located gastric mucosa: embryonic development [17], Barrett esophagus [16], adenocarcinomas [15, 16], carcinomas of lung [15, 16], carcinomas of ovaries [17, 18]</td>
<td>Thyroid tissue [6, 11, thymic organ [1]]</td>
</tr>
<tr>
<td>Localization unrelated to NIS function</td>
<td>Contamination by gastrointestinal bacteria [16, 17], urine, oral, nasal secretion [16, 17]</td>
</tr>
<tr>
<td>Contamination by gastrointestinal bacteria [16, 17], urine, oral, nasal secretion [16, 17]</td>
<td>Intestinal contents [16, 17], urine, oral, nasal secretion [16, 17]</td>
</tr>
</tbody>
</table>

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

Author Information

Abdelhamid Biyi, MD
Department of nuclear medicine MILITARY HOSPITAL MOHAMMED V. HAY RIAD RABAT. MOROCCO

Yacir Oufroukhi, MD
Department of nuclear medicine MILITARY HOSPITAL MOHAMMED V. HAY RIAD RABAT. MOROCCO

Abderrahim Doudouh, MD
Department of nuclear medicine MILITARY HOSPITAL MOHAMMED V. HAY RIAD RABAT. MOROCCO