False-positive Radioiodine Uptake in a Functional Ovarian Cyst in a Patient Treated with Total Thyroidectomy for Papillary Cancer

Hye Yoon Jang, Bo Hyun Kim, Won Jin Kim, Yun Kyung Jeon, Sang Soo Kim, Yong Ki Kim and In Ju Kim

Abstract

False positive radioiodine uptake following thyroidectomy for differentiated thyroid cancer has been reported in some cases. A 42-year-old woman was referred for ablative radioiodine treatment six weeks after undergoing total thyroidectomy for papillary thyroid carcinoma. Posttherapeutic I-131 scintigraphy showed an intense hot spot in the left pelvis. Pelvic computed tomography (CT) revealed a benign left ovarian mass such as a functional cyst. After menstruation, ultrasonographic imaging demonstrated a shrunken ovarian mass. Therefore, we diagnosed the patient with a functional cyst that was influenced by hormonal fluctuation. It is believed that this is the first case of false-positive radioiodine uptake in a functional ovarian cyst.

Key words: thyroid cancer, ovarian cyst, radioiodine, false positive


Introduction

Both postoperative radioiodine ablation and whole body scanning (WBS) are widely accepted therapeutic regimens for treating differentiated thyroid carcinoma (1-3). The presence of uptake sites following diagnostic or therapeutic I-131 administration may suggest the need for further therapy with I-131. Therefore, interpreting whole body scanning is very important for detecting recurrence and metastasis of thyroid cancer. On I-131 WBS, with the exception of physiological radioiodine uptake in the salivary glands, stomach, and gastrointestinal and urinary tracts, lesions exhibiting radioiodine uptake can be considered to be metastatic in thyroid cancer patients who have previously undergone total thyroidectomy (4, 5).

However, the presence of numerous unusual lesions may cause a false-positive results on radioiodine WBS; therefore, it is imperative to carefully evaluate abnormal scans in order to appropriately manage patients with differentiated thyroid cancer (DTC). Uncommon findings have been reported in some cases, including ovarian masses (6-19). Due to the difficulty in diagnosing these findings, in most cases, surgery is ultimately performed for diagnosis. We herein report an interesting case of false positive radioiodine uptake in a functional ovarian cyst.

Case Report

A 42-year-old woman with an incidentally detected thyroid nodule and mild diffuse goiter visited our outpatient clinic. A physical examination, laboratory tests and fine-needle aspiration were performed. The results of cytology of the dominant nodule were suggestive of papillary thyroid cancer. Subsequently, total thyroidectomy with central neck dissection was performed. Gross and microscopic examinations disclosed a 0.5×0.3 cm papillary microscopic carcinoma in left thyroid gland and a 0.2 cm papillary carcinoma in the right thyroid gland. There was no extrathyroidal extension. All surgical resection margins were free of tumor tissue, and there were no metastatic lymph nodes (pT1N0M0). After surgery, the patient did not take any...
levothyroxine for six weeks. The pre-ablative thyroid stimulating hormone (TSH) level was 60 uU/mL (normal range, 0.3-5.0 μU/mL). The stimulated serum thyroglobulin level was 43.48 ng/mL. Subsequently, the patient was treated with 30 mCi of I-131. Posttherapeutic I-131 whole body scintigraphy revealed an area of left paramedian pelvic uptake. However, there was no uptake in the thyroid bed (Fig. 1A). To determine why pelvic uptake was observed on the scan, we performed CT (Fig. 1B).

The CT findings were suggestive of a functional cyst or struma ovarii. Two weeks after the CT scanning, the patient visited the outpatient department to undergo pelvic ultrasonography (US) and measurement of the cancer antigen 125 (CA125) level. Pelvic US showed a smaller ovarian cyst that looked like a functional cyst (Fig. 2). The CA125 level was 15.19 U/mL (reference range 0-35 U/mL). The follow-up thyroglobulin level was found to be 1.59 ng/mL after 10 months. CT and pelvic US were also performed at the outpatient clinic, and the imaging findings demonstrated a normalized left ovary. Ultimately, we diagnosed the lesion as a functional cyst related to hormonal fluctuation. Because the patient had no symptoms, we planned to perform follow-up, with no treatment for the ovarian cyst.

**Discussion**

When I-131 is administered, it accumulates in thyroid cancer tissue. Therefore, radiiodine whole body scans play an important role in the management of patients with DTC. The uptake of iodine by thyroid cancer tissue is related to the expression of sodium iodide symporter (NIS). However, normal physiologic uptake by extrathyroidal tissues, for example, in the gastrointestinal tract, salivary glands and breasts, is also known to be associated with the NIS expression, and these organs can physiologically take up iodine (20).

In addition, there are various causes of false-positive radiiodine scans following thyroidectomy for DTC. Cystic lesions, effusion of the pleural, pericardial and peritoneal cavities, inflammatory and infectious diseases and non thyroidal neoplasms are known to take up radiiodine as false-positive lesions. False-positive uptake on radioiodine WBS can be used to distinguish metastatic thyroid cancer from other diseases using the serum thyroglobulin level. In patients with a normal thyroglobulin level, conducting imaging, and laboratory tests and taking a careful history can help to make the differential diagnosis. CT, magnetic resonance imaging (MRI), and US are widely used imaging modalities (1-5).

There are interesting cases of false-positive iodine uptake in the ovaries that was finally diagnosed as benign neoplasms or struma ovarii. Table summarizes the cases of false- positive radiiodine uptake in the ovaries or ovarian tumors reported in the English literature from 1984 through 2012 (8-19). The cases included 12 women with a mean age of 48.3 years. With the exception of struma ovarii, there are no clear answers regarding the mechanisms for abnormal uptake. The false-positive finding of a functional ovarian cyst is uncertain. However, a possible mechanism for this
The authors state that they have no Conflict of Interest (COI).

**Table. The Summary of the Reported Cases of False Positive Radiiodine Uptake in Ovary or Ovarian Tumor**

<table>
<thead>
<tr>
<th>Authors (year of publication)</th>
<th>Age</th>
<th>Pathology</th>
<th>Uptake site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turker O, et al. (2010) [16]</td>
<td>51</td>
<td>Cystadenofibroma</td>
<td>Pelvic mass</td>
</tr>
</tbody>
</table>

*All were female.

uptake is passive diffusion of the tracer into the cyst (21). In some cases of false-positive I-131 uptake in simple cysts, the inflammation-induced exchange of water and chemical substances between the cyst and surrounding tissues is thought to be a possible mechanism (6, 7). In this case, the patient underwent ultrasonography rather than other invasive procedures. Follow-up images indicated that the ovarian mass was a functional cyst; therefore, we did not administer unnecessary additional therapy, such as surgery.

To our knowledge, this is the first case of false-positive radiiodine uptake in a functional ovarian cyst. In this case, we performed follow-up imaging tests for diagnosis rather than other invasive diagnostic procedures so as to avoid the use of additional therapy, such as unnecessary surgical removal or administration of a high dose of I-131, which can result in harmful radiation exposure. Therefore, the differential diagnosis of false-positive radiiodine uptake should be taken into account in cases of functional ovarian cysts. If a functional cyst is suspected, follow-up imaging tests can reduce the need for unnecessary invasive procedures.

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**References**


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