Radioiodine contamination mimicking metastases on whole body imaging after radioiodine therapy running head: I-131 contamination mimicking metastases

İyot-131 ablasyon tedavisi sonrası tüm vücut taramada metastazı taklit eden radyoiyot kontaminasyonu

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Abstract

Contamination with body secretions is one of the causes of false positivity in I-131 whole body scans. In this report, a 62 years old patient with radioiodine contamination mimicking distant metastases on whole body imaging after I-131 ablation therapy is presented. The patient had a diagnosis of follicular thyroid carcinoma and was treated surgically prior to radioiodine therapy. On her whole body scan multiple extra thyroidal foci of I-131 accumulation were present. Reevaluation was inevitable since the pattern of the activity was indecisive. A repeated whole body scan after decontamination revealed that there were only two foci of thyroid cancer metastases and that the other accumulations were due to contamination.

Being aware of the possibility of contamination and advising the patients in detail on the necessary precautions would increase the accuracy of I-131 whole body scans.

Keywords: radioiodine therapy, I-131 whole body imaging, differentiated thyroid carcinoma, contamination

Özet

I-131 tüm vücut taramada, vücut sıvıları ile kontaminasyon yanlış pozitiflik nedenlerinden biridir. Yazarlar I-131 ablasyon tedavisi sonrası tüm vücut tarama görüntülerinde uzak metastazı taklit eden kontaminasyon izlenen 62 yaşında bir hasta sunmaktadır. Foliküler tiroid karsinomu tanısı alan hastaya ablasyon öncesi total tiroidektomi yapılmıştır. Hastanın tüm vücut taramasında tiroid loju dışında da birden çok odakta I-131 birikimi izlenmiştir. Odakların kuşkulu tutulum paterni nedeniyle hasta tekrar değerlendirilmiştir. Dekontaminasyon sonrasında alınan görüntülerde odakların sadece ikisinin tiroid kanser metastazlarına, diğerlerinin kontaminasyona bağlı olduğu teyit edilmiştir. Kontaminasyon artefaktlarının farkında olmak ve hastaları bu konuda detaylı bir şekilde bilgilendirmek I-131 tüm vücut tarama sintigrafisinin doğruluğunu artıracaktır.

Anahtar sözcükler: radyoaktif iyot tedavisi, I-131 tüm vücut tarama, diferansiye tiroid karsinomu, kontaminasyon

Introduction

I-131 whole body imaging has a well established role for the follow up of patients with differentiated thyroid carcinoma[1]. Being informed about the biodistribution of radioiodine allows the physician to avoid misinterpretations and consecutive unnecessary diagnostic and therapeutic interventions. The presented case is a 62 years old patient with radioiodine contamination mimicking distant metastases on whole body imaging after I-131 ablative therapy.

Case Presentation

A 62 years old woman was admitted to the hospital with a large nodule in the right lobe of her thyroid. Thyroid hormone levels of the patient were normal. Fine needle aspiration of the nodule was suspicious for follicular

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neoplasm. The patient underwent total thyroidectomy and the pathological diagnosis was a follicular thyroid carcinoma with a tumor diameter of 4.5 cm. The histological subtype was hurtle cell carcinoma. There was no vascular or lymph node invasion. Post-operative thyroid scintigraphy revealed minimal residual thyroid tissue. Afterwards the patient was treated with 100 mCi radioiodine when her thyroid stimulating hormone level reached 75 μIU/mL. Simultaneous thyroglobulin and anti-thyroglobulin antibody levels were 10.86 ng/mL and 12 IU/mL, respectively. A post-treatment scan was performed five days later with a dual-head gamma camera equipped with high-energy collimators (Siemens, E-cam, IL, USA). The whole body images showed foci of increased activity above the left side of the skull, on the right thyroid bed, as wll as on the superior mediastinum, abdomen, right thoracoabdominal and right femoral regions (figure 1). Lateral static views revealed that some of the abdominal foci were outside body contours (figure 2 a-b). Spot views of the neck without headscarf showed no activity above the skull, thus confirmed that the previous activity was due to a contaminated headscarf (figure 2 c). Whole body imaging was repeated after self cleaning on the seventh day of treatment. The images showed remnant thyroid tissue on the right thyroid bed, and a metastatic focus on the right thoracal region which was compatible with lung metastasis (figure 3). Other foci observed in the initial imaging had disappeared and they were attributed to radioiodine contamination by body secretions.

Discussion

I-131 whole body scan is a useful tool for the detection of the local or distant metastases of differentiated thyroid carcinoma as well as of remnant thyroid tissue after the surgical operation. Trapping of the radioiodine by the sodium iodine symporter allows the physician to evaluate the state of the patient and administer an adequately targeted therapy. Salivary glands, lacrimal glands, lactating breasts, gastrointestinal and urinary tracts are well known physiological uptake sites of radioiodine[2]. The

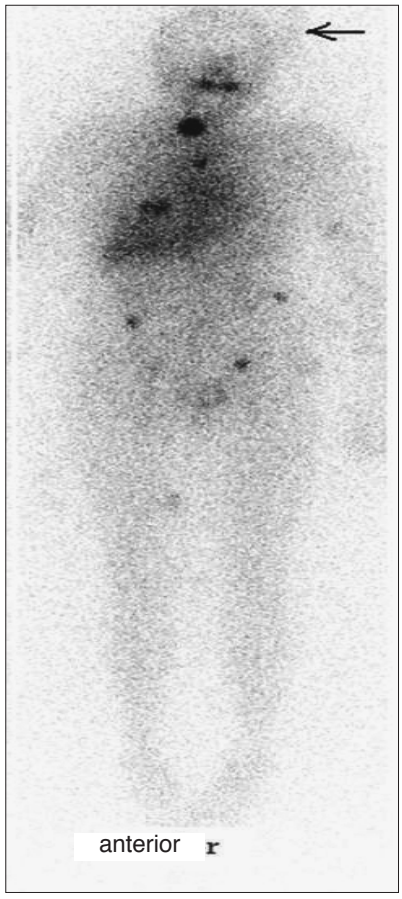

Figure 1. I-131 whole body image showing increased radioiodine accumulation above the left side of the skull (arrow), on the thyroid bed, mediastinum, right thoracoabdominal and femoral regions, including three foci in the abdomen

Figure 3. After self cleaning, whole body imaging was repeated and revealed a remnant thyroid tissue on the right thyroid bed and a metastatic focus at the basis of the right thoracal region (arrows).

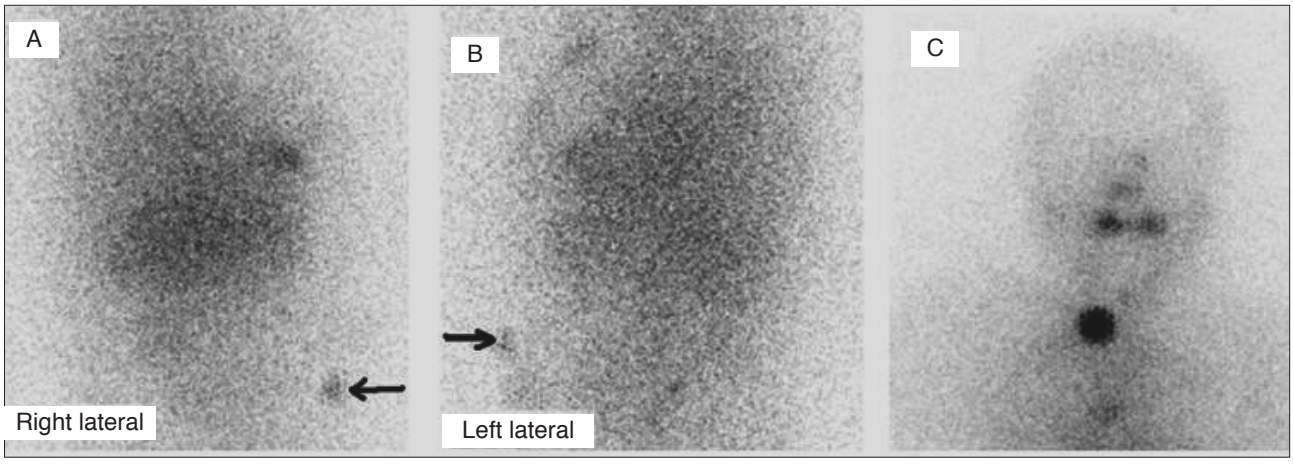

Figure 2. Lateral views of the thoracoabdominal region (a-b) showed that two of the focal activities on the abdominal region were outside the body contours (arrows), and that a static view of the head (c) without headscarf was normal

larger part of the radiodine is excreted in the urine and stool. Besides the stomach, the large intestine and bladder are also visualized. Inflammation, non thyroidal neoplasms, presence of gastric mucosa in abnormal sites such as in hiatus hernia and Meckel's diverticulum, an surgical interventions such as tracheostomy may also cause I-131 accumulation on whole body scan[3-6]. Being informed about the clinical history of the patients is important for the interpretation of the findings.

The most frequent cause of false positivity on I-131 whole body imaging is contamination with body secretions[7,8]. Artifactual accumulations of radioiodine reported in the literature include sites such as contaminated skin, clothes and hair.. Although radioiodine uptake secondary to contamination is usually observed outside of body contours, sometimes superposition with body structures may lead to misinterpretation of metastases[7]. Then, lateral position images may be helpful, as was the case in our patient. Our patient was diagnosed to have a follicular carcinoma with the subtype of hurtle cell variant, a subtype known to be more prone to distant metastases[9]. On her whole body imaging there was also true positive metastatic sites besides contamination artifacts. The I-131 images of our patient, if not carefully examined, might have been interpreted incorrectly.

Differentiation of artifacts is important in order to avoid misinterpretations and , unnecessary interventions as well as assessing a need for reevaluation. Contamination artifacts may always occur as a result of radioactive sweat, saliva or urine. However, contamination can easily be prevented by taking simple precautions. In order to avoid radioiodine contamination artifacts, patients must be informed about the need to take a shower and change underwear before wholebody imaging. Physicians should be alert about the possibility of the contamination, especially when they come across a patient with limited intellectual capacity or a patient in the geriatric age group.

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