



CASE REPORT

False positive radioiodine uptake in the eye, detected on SPECT/CT whole-body scan: The importance of using hybrid imaging

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ABSTRACT

False positive radioiodine uptake may pose difficulties in diagnosis and subsequent management of thyroid cancer. Combined imaging techniques, such as SPECT/CT, play a crucial role in accurately identifying the specific location of radioiodine uptake, thereby avoiding potential diagnostic error. This is particularly important in situations where unexpected uptake could lead to unnecessary treatment interventions such as surgery or radioiodine treatment. In this study, we discuss a case involving a 38-year-old female with a history of thyroid cancer and I-131 treatment. Approximately six years later, her course was complicated by left sided epiphora leading to dacryocystorhinostomy and subsequently elevation of thyroglobulin (Tg) levels prompting retreatment by radioiodine. The post-therapy whole-body scan revealed false-positive radioiodine uptake on the left side of the skull, conclusively confirmed through SPECT/CT imaging to be localized in the patient's left eye.

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CASE PRESENTATION

We present the case of a 38-year-old female with a prior history of thyroid cancer (T2, N1a, MX) and I-131 ablation therapy (150 mCi or 5550 MBq) conducted 11 years ago. Approximately 6 years post-radioiodine treatment, the patient reported left-sided epiphora and subsequently underwent dacryocystorhinostomy on the left side. Due to elevated thyroglobulin (Tg=118.30 ng/mL) levels, the patient underwent retreatment with 175 mCi (6475 MBq) of radioiodine. The post-therapy whole-body scan and head SPECT/CT revealed radioiodine uptake in the patient's left eye (Figures 1 and 2). Upon reassessment, the patient reported only watering from her right eye watering in recent months, with no significant issues in the left eye. Dacryoscintigraphy, an

imaging modality for the nasolacrimal system, displayed tracer pooling in the left orbit indicative of subclinical lacrimal duct obstruction (Figures 3 and 4). Notably, there was no tracer drainage into the nasal cavity from the right eye, and no radioiodine uptake was observed in the right eye. Considering the patient's surgical history and dacryoscintigraphy findings (tracer pooling in the left orbit), we propose that the radioiodine accumulation in the left eye is likely associated with dacryocystorhinostomy and/or eyelid laxity. This case report has been granted approval by the Ethics Committee (IR.SUMS.MED.REC.1402.393) and the Institutional Review Board of Shiraz University of Medical Sciences (No.29524). Furthermore, the patient who took part in the study provided an informed consent.

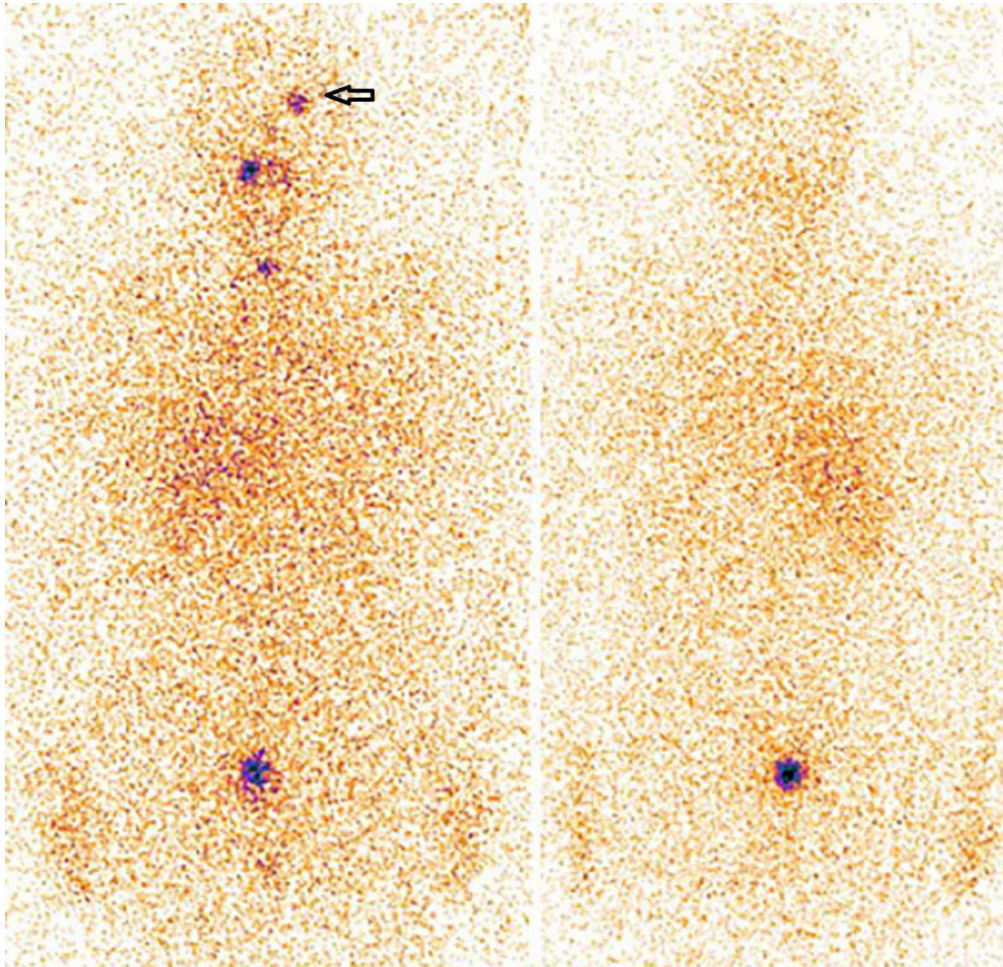


Figure 1. Anterior and posterior views of posttherapy whole-body scans 7 days after administration of 175 mCi (6475 MBq) I-131. Suspicious I-131 uptake was detected in the region of the left orbit, which could be a metastatic lesion

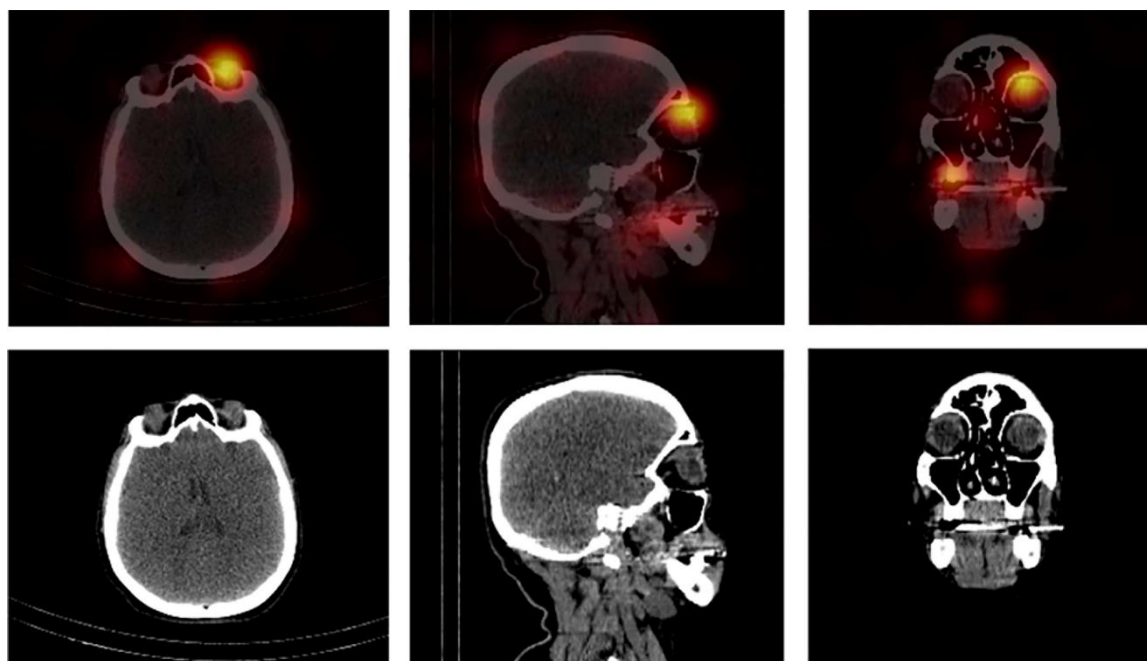


Figure 2. SPECT/CT scan for better localization and characterization of the uptake focus was done. Transaxial, sagittal and coronal slices of I-131 SPECT/CT fusion images (upper row) and corresponding CT scan slices (lower row) at the level of the orbits were shown. On a SPECT/CT scan, the I-131 uptake was localized in the left orbit



Figure 3. Immediate dynamic images of dacryoscintigraphy reveal flow of tracer to the region of medial canthus bilaterally (black arrows) and pooling of tracer in the left orbit (blue arrow)

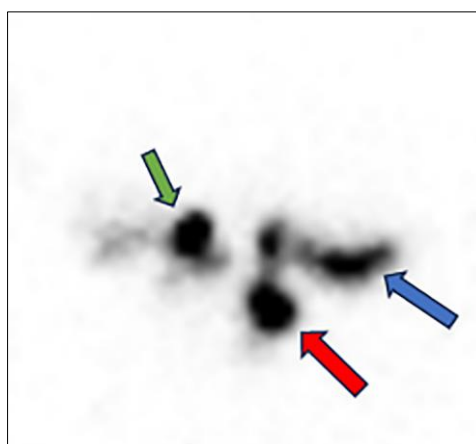


Figure 4. Image acquired after blowing of nose reveal flow of tracer into the inferior nasal meatus on left (red arrow) and into the right lacrimal sac (green arrow). Pooling of tracer in the left orbit (blue arrow)

DISCUSSION

False-positive radioiodine uptake poses challenges in thyroid cancer management. Hybrid imaging, such as SPECT/CT, proves instrumental in discerning the precise localization of radioiodine uptakes, preventing potential diagnostic pitfalls. The significance of this is highlighted in cases where unexpected uptake may result in unnecessary surgery or radioiodine therapy. The reasons for the occurrence of false-positive uptake of I-131 can be attributed to several factors. These include the presence of the sodium iodide symporter (NIS) in atypical thyroid tissue in locations such as the thyroglossal duct, the base of the tongue, or in subdiaphragmatic organs as well as in non-thyroidal tissues like the lacrimal or the salivary glands.

Additionally, physiological secretions of radioiodine may accumulate in expanded ducts or cavities, leading to false-positive uptake. Furthermore, false-positive radioiodine uptake can result from heightened vascularity and capillary permeability in inflammatory processes. Although there have been numerous case reports documenting false-positive I-131 uptake [1-4], only a limited number of reports have provided detailed accounts of the false-positive accumulation of I-131 in the eyes. Metastasis of thyroid cancer to the eye is a rare occurrence, and the precise mechanism responsible for the abnormal retention of radioiodine in the eyes remains unclear. It has been suggested that this atypical accumulation may be linked to the retention of secretions in lacrimal drainage system or the frontal sinuses, or to the non-specific uptake of radioiodine in inflamed tissues [5-9]. Inflammatory conditions such as uveitis or dacryocystitis have been associated with the accumulation of I-131 on scintigraphy [10]. However, in the case under consideration, the possibility of inflammation was ruled out as the patient did not present with any visual symptoms indicative of inflammation, and CT images did not reveal any evidence of thickening and swelling of the lacrimal sac.

CONCLUSION

Identifying instances of false-positive results is essential in order to mitigate the occurrence of diagnostic inaccuracies. This case underscores the significance of thorough evaluation, particularly in patients who have undergone I-131 ablation. The utilization of SPECT/CT is considered a valuable modality, demonstrating its potential to enhance imaging specificity in such scenarios.

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