Accumulation of ^{131}Iodine in the nasolacrimal sac/duct after radioiodine therapy for papillary thyroid cancer

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Abstract

SPECT/CT is a powerful tool for assessing unexpected concentrations of radioiodine resulting from benign uptake in organs with sodium-iodide symporter (NIS) expression. We report a case of accumulation of ^{131}Iodine in the nasolacrimal sac/duct after radioiodine therapy for papillary thyroid cancer. A whole-body scan was taken 3 days after the administration of 5.5 GBq of ^{131}Iodine. SPECT/CT images localized the focal tracer uptake in the nasolacrimal sac/duct likely due to nasolacrimal duct obstruction secondary to prior radioiodine or iodine therapies. Hybrid SPECT/CT allows precise anatomical localization and help differentiate benign mimics of disease, which can alter patient management.

Keywords: ^{131}Iodine SPECT-CT, thyroid cancer, papillary thyroid cancer, nasolacrimal duct obstruction
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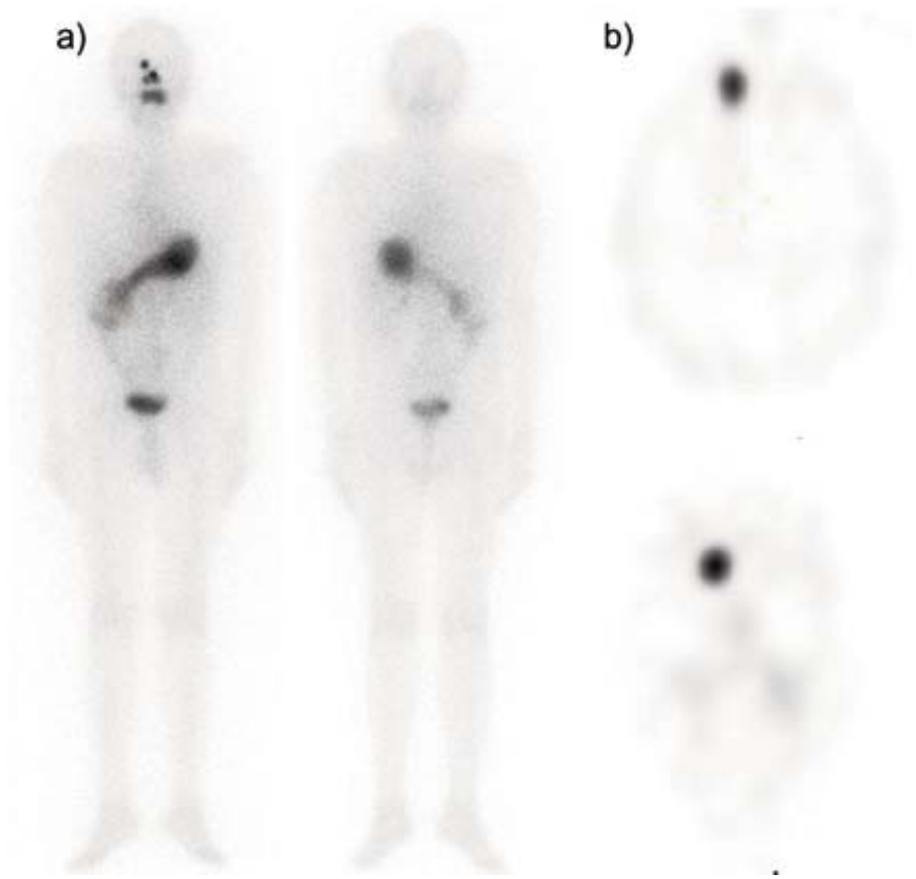

Figure-1: a) Post therapy planar whole-body iodine scan shows focal area of increase tracer uptake at the medial side of right orbital region. b) SPECT/CT images of the head and neck region localized the uptake at right nasolacrimal sac/duct. Noted is also made for mild diffuse physiological increase uptake in the nasal cavity and around dentures.

A 67-years-old man with recurrent metastatic papillary thyroid carcinoma underwent radioiodine therapies twice with a cumulative dose of 8.4 GBq. Patient was referred for third dose of radioactive iodine due to high Tg (Thyroglobulin) levels. Patient received 5.5 GBq of radioactive iodine. Post therapy planar whole-body iodine scan showed focal area of increase tracer uptake at the medial side of right periorbital region. SPECT/CT images of the head and neck region localized the uptake at right nasolacrimal sac/duct (Figure 1 and 2). On further questioning, the patient described epiphora of the right eye. Significant amount of radioactivity was detected in tear sample collected from right eye as compared to the left eye. Findings are in keeping with nasolacrimal duct obstruction with pooling of tracer in lacrimal sac secondary to radioiodine ablation.

The nasolacrimal ducts are an integral part of the lacrimal

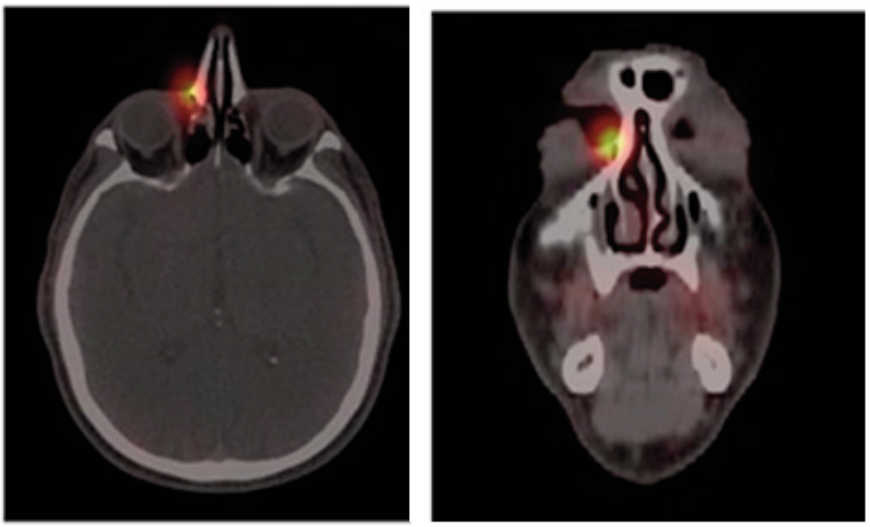

Figure-2: Zoom axial CT and fused SPECT-CT images show focal increase uptake in the right nasolacrimal sac/duct. It is noted that mucosal thickening at right ethmoidal sinus is likely due to sinonasal disease that further decreases the flow in the nasolacrimal ducts and thus increases the exposure to ^{131}Iodine, which is secreted through the lacrimal system.

system and are responsible for transporting tears from the ocular surface to the lacrimal sac and ultimately to nasal cavity through inferior nasal meatus.[1] Blockage of the nasolacrimal system can cause tears to flow over the eyelid and down the cheek known as epiphora. ^{131}Iodine is excreted in tears and is actively accumulated in the nasolacrimal duct. Nasolacrimal duct obstruction (NLDO) has been reported as complication of high-dose radioiodine therapy in the treatment of thyroid cancer.[2] The postulated mechanism for ^{131}Iodine therapy-acquired NLDO is the direct uptake of ^{131}Iodine in the nasolacrimal duct membrane epithelial cells via the sodium (Na+)/iodide symporter (NIS) leading to radiation-induced cell damage (inflammation and fibrosis/stenosis).[3] The frequency of nasolacrimal duct obstruction is reported to range from 2.2% to 18% following ^{31}Iodine therapy.[4] Nasolacrimal duct obstruction following radioiodine treatment is a distinct clinical entity and mostly bilateral and noted in patients who receive radioactivity more than 150 mCi.[5] Increased awareness would facilitate timely diagnosis, management, and an enhanced quality of life for the patients. Although uncommon, it is important to increase awareness among treating physicians and patients receiving radioiodine therapy about the potential side effect of nasolacrimal duct obstruction.

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