

High and low radioiodine doses to indicate a simple renal cyst

To the Editor: High doses of iodine-131 (^{131}I) are commonly used in patients with differentiated thyroid cancer (DTC) after total or subtotal thyroidectomy, in order to ablate the remaining cancer or normal thyroid tissue [1]. Whole body scan performed after about 5 days can visualize possible metastatic lesions [2] and may also show the stomach, salivary glands, the breasts expressing sodium iodide symporter (NIS) [3-6], the liver due to metabolism of radioiodinated thyroglobulin and the urinary tract due to urinary excretion of the administered ^{131}I [3-5].

A 65 years old female underwent a near total thyroidectomy for a 0.9cm DTC of the papillary type on the right lobe. Histopathology revealed extrathyroid extension of the cancer with multifocal metastases in both lobes, and in one pre-tracheal lymph node. After surgery, the patient underwent ^{131}I ablation with 5.55GBq of ^{131}I and whole body scan was obtained after 5 days. The scan demonstrated usual ^{131}I accumulation in the thyroid remnant, the salivary glands and the liver. Increased ^{131}I uptake at the area of the right kidney was also noted (Fig. 1). The patient had a 5 years history of an asymptomatic large simple cyst in the right kidney. Computed tomography (CT) scan of the abdomen showed only the known cyst (7x6cm) involving the middle portion of the right kidney (Fig. 2). Serum laboratory tests performed at the time of ablation revealed thyrotropin: >81 $\mu\text{IU/mL}$ (reference range: 0.3-4.0 $\mu\text{IU/mL}$), 3.2ng/mL thyroglobulin (reference range: 0-50.0 $\mu\text{IU/mL}$), and 115.5U/mL antithyroglobu-

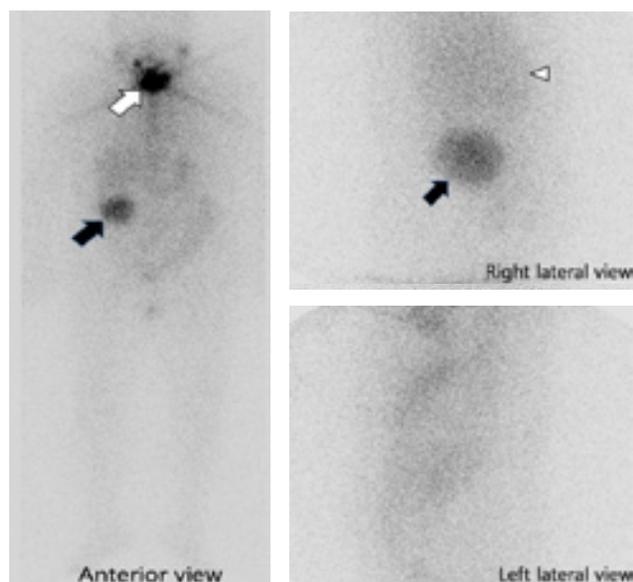


Figure 1. Whole body anterior and laterar planar images obtained at 5 days after administration of an ablation dose of ^{131}I . The scan revealed intense tracer uptake in the thyroid bed (white arrow), very low uptake in both parotid glands and diffuse uptake in the liver. Intense radioiodine uptake at the right side of the abdomen (black arrow) was also noted.

lin antibody (reference range 0-35.0U/mL). The patient was followed-up with thyroid hormone replacement and serum thyroglobulin measurements every year. The thyroglobulin levels for the follow-up period remained undetectable (detection limit 0.2ng/mL).

Three years after ablation, the patient underwent diagnostic whole body scan using 185MBq of ^{123}I . Thyroid function tests 4 weeks after thyroid hormone withdrawal were: thyrotropin >81 $\mu\text{IU/mL}$, thyroglobulin was undetectable, antithyroglobulin antibody was 74.0U/mL, and the scan demonstrated no tracer uptake in the thyroid bed. No tracer uptake was apparent at the right kidney area where the cyst had been previously seen (Fig. 3).

The origin of simple renal cysts is not clear, but enlargement of a renal tubule and the eventual loss of its connection to the parent tubule has been suggested. The epithelium of the renal cyst may still be excreting as the renal tubular epithelium and might express NIS [8, 9]. Thus, activity of NIS of renal tissue of the renal cyst might be the mechanism for the radioiodine uptake of the renal cyst on the post-ablation ^{131}I whole body scan.

Renal pelvis and ureter are not usually visualized due to the rapid transit time of the radioiodine through the kidneys [10]. Uncomplicated renal cysts do not usually accumulate radioiodine, although several cases have been identified with this tracer indicating either communication between the cyst and the renal collecting system or diffusion of radioiodine from renal sinus lymphatics, and/or NIS activity of the renal cyst tissue [7, 8, 10].

Renal metastases of DTC in the renal cyst, although very rare, have been reported [11] and may also show radioiodine uptake [12]. In the current case, the possibility of renal cyst metastases from the DTC was clinically ruled out by the typi-



Figure 2. An axial CT scan with radiocontrast enhancement, showing a well defined cystic lesion (7X6cm) involving the mid-portion of the right kidney, and corresponding to the right side of the abdomen, where ^{131}I accumulation was seen on the post ^{131}I ablation whole body scan.

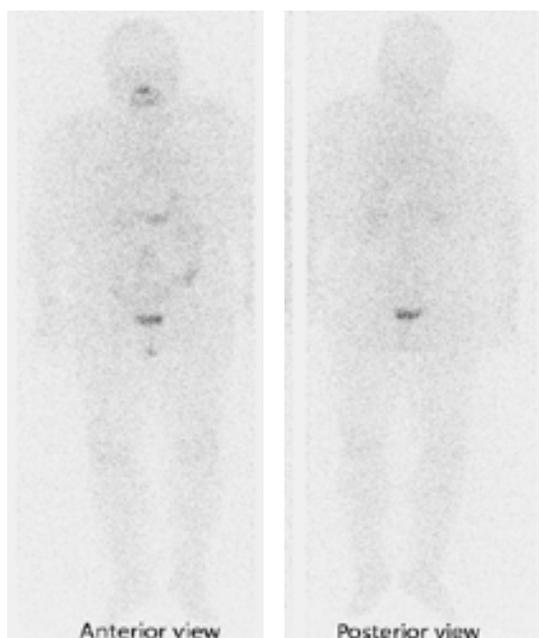


Figure 3. Diagnostic ^{123}I whole body scan obtained 3 years after the high dose ^{131}I whole body scan. The scan revealed no ^{123}I uptake at the thyroid bed and the right side of the abdomen suggesting successful ablation of the thyroid remnant and no visualization of the renal cyst.

cal finding of a well-defined cystic lesion in the right kidney on the CT scan and by the low serum thyroglobulin levels tested before both whole body scans.

A possible reason for non-visualization of the renal cyst on the follow-up diagnostic ^{123}I whole body scan might be the ablation by the high ^{131}I dose, of the cystic epithelial cells having NIS expression and excreting radioiodine into the cyst.

Both ^{131}I and ^{123}I , which emit gamma rays, can be used to detect hidden thyroid cancer lesions in thyroid cancer patients. In the present case, ^{123}I was used for the diagnostic whole body scan to reduce radiation burden to the patient. With the same administered activity, ^{123}I is known to deliver an absorbed radiation dose that is approximately one-fifth of that of ^{131}I to NIS-expressing tissues [6]. The diagnostic ^{123}I whole body scan uses about 30 times a lower dose than the post-ablation ^{131}I scan, and offers a shorter time interval between its administration and image acquisition (1 day versus 5 days). These differences may eliminate image quality give lower target-to-background ratio and poorer spatial resolution, if the diagnostic ^{123}I whole body scan is applied.

In conclusion, a renal cyst after a high dose whole body ^{131}I scan may be well identified as a false positive finding and may not reappear on a low dose diagnostic ^{123}I whole body scan performed after 3 years, possibly due to either ablation of NIS expressing cells or to the low dose of ^{123}I in the diagnostic scan.

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