

## **Radioactive iodine uptake in post-operative seroma: a cause for false positivity**

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## **Abstract**

Besides the known physiological uptake of  $^{131}\text{I}$ , literature describes various false-positive findings on  $^{131}\text{I}$  scans in benign lesions, inflammation, traumatic sites, and post-surgical sites to name a few. However, no study to the best of our knowledge has shown the false-positive uptake of  $^{131}\text{I}$  in a post-operative seroma at the post-surgical site.

**Keywords:** Iodine-131; seroma; papillary thyroid carcinoma

## **Introduction**

Radioactive iodine ( $^{131}\text{I}$ ) uptake at the inflammatory or post-operative site is an uncommon finding with few reports showing false positive  $^{131}\text{I}$  uptake at the site of surgical sutures, subcutaneous injections, post-operative inflammation or post-trauma (1-4). Here is a case of elderly male of papillary thyroid cancer (PTC) who showed false-positive  $^{131}\text{I}$  localization in post-operative seroma.

## **Case report**

A 61-year-old man presented with an insidious neglected right-sided thyroid swelling of 20 years duration, rapidly growing since two years. Contrast-enhanced computed tomography of neck revealed hypodense lesions in the thyroid gland with enlarged supraclavicular and infraclavicular lymph nodes. He was incidentally diagnosed with multiple myeloma on detailed evaluation and put on steroids and combination chemotherapy. Cytopathology from thyroid lesion and right supraclavicular lymph node revealed PTC. He underwent total thyroidectomy with central and bilateral modified radical neck dissection. Histopathology revealed multifocal classical-variant of

PTC with gross extrathyroidal extension into the strap muscles, angioinvasion, and perineural invasion, however with free surgical margins. Thirty out of 82 resected lymph nodes were involved (largest ~1.5 cm) along with the extra-nodal extension resulting in pT3bN1Mx stage. Post-surgery, he developed gradually progressive, well-defined, non-pulsatile, and fluctuant bilateral supraclavicular swellings with history of multiple therapeutic aspirations from the recurrent right-sided supraclavicular swelling. His stimulated serum thyroglobulin, antithyroglobulin, and thyroid-stimulating hormone levels after thyroid hormone withdrawal were 47.6 ng/mL (0-9), 1.9 IU/mL (<10), and 217.5  $\mu$ IU/mL (0.27-4.2) respectively. Whole-body diagnostic and post-therapy  $^{131}\text{I}$  (5 days after adjuvant therapy of ~100 mCi/3700 MBq) planar + SPECT/CT scans of neck (Figure 1) revealed faintly tracer avid right supraclavicular hypodense collection (~9.0 x 4.3 x 6.7 cm) and non-tracer avid left supraclavicular hypodense collection (~2.8 x 2.3 x 2.5 cm). The post-therapy SPECT/CT showed tracer avid thyroid bed remnant and right level IB lymph node, with tracer contamination over bilateral thigh regions. Lymphoscintigraphy ruled out lymphocele as the etiology of the bilateral cystic neck swellings. The right-sided swelling yielded clear yellow serous fluid on aspiration, having protein (3.77 g/dL), triglyceride (10.9 mg/dL), and thyroglobulin levels (4.75 ng/mL) respectively (Figure 2). Fluid cytology showed sparse inflammatory cells without any malignant thyroid cells. The aspirated fluid counted in well counter showed a gamma-ray emission spectrum with a peak corresponding to  $^{131}\text{I}$  gamma energy (364 KeV) confirming the presence of radioiodine in aspirated fluid (Figure 2).

## **Discussion**

Only few reports have shown false-positive  $^{131}\text{I}$  uptake in the post-operative and inflammatory sites (1-4), but no study has shown false-positive tracer uptake in a post-operative seroma following thyroidectomy and neck node dissection, best to our knowledge. The localized inflammatory hyperemia and exudation of radioiodine-containing serous fluid into the post-surgical site may explain radioiodine localization in the index case. Serous cystic lesions can retain radioiodine by passive diffusion from blood pool or slow exchange of water and chemical elements as an alternate possible mechanism (5). Though post-thyroidectomy seroma formation may be multifactorial, recurrent seroma in the index case despite multiple aspirations might be due to steroid treatment for multiple myeloma (6-7). Moreover, multiple aspirations from the right-sided cystic swelling resulted in frequent microhemorrhages and radioiodine leak into that cavity only, but not in the contralateral cystic swelling.

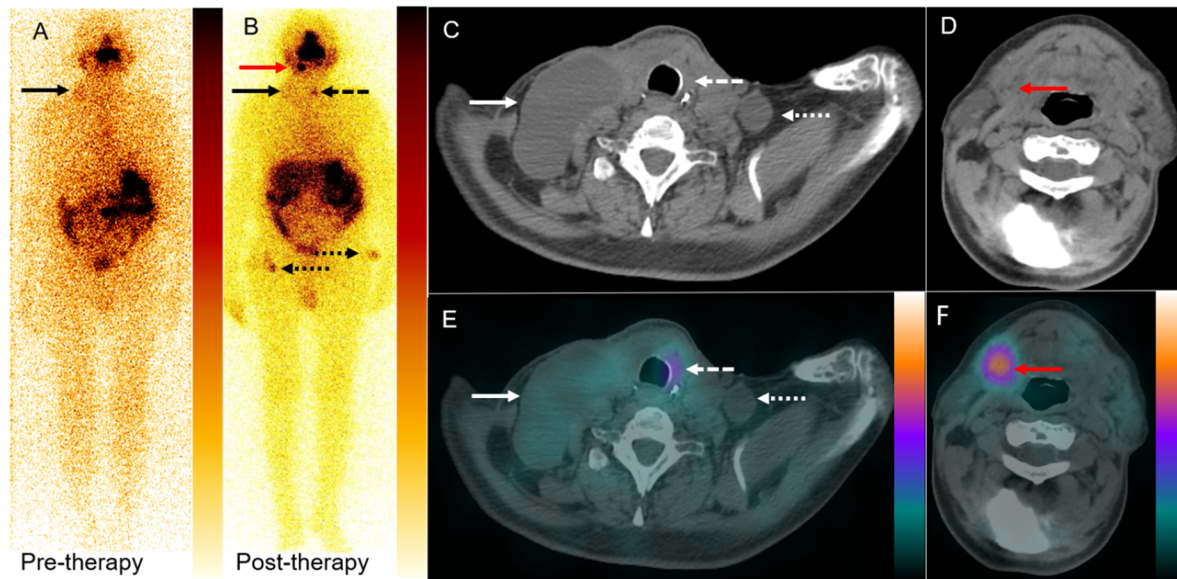
## **Conclusion**

Radioiodine localization at post-operative site on planar scintigraphy might be misleading but the combination of clinical history, cross-sectional imaging (SPECT/CT), biochemical and cytopathology examination could prove to be crucial in guiding the correct diagnosis and management in this index case.

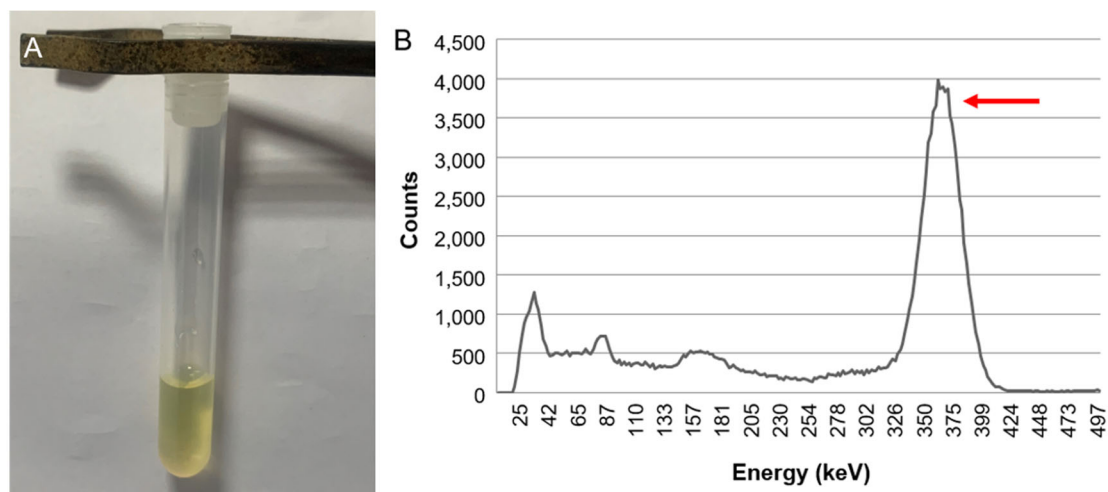
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### **Figure legends**



**Fig 1:** Whole-body diagnostic (A) and post-therapy planar scans (B) showing faint tracer uptake in the right supraclavicular region (black arrows), increased tracer uptake in the midline neck (dashed black arrow), right submandibular region (red arrow) and bilateral thigh regions (dotted black arrows). Post-therapy CT and SPECT/CT images (C-F) showing faintly tracer avid right supraclavicular hypodense collection (white arrows), non-tracer avid left supraclavicular hypodense collection, tracer avid thyroid bed remnant (dotted and dashed white arrows respectively) and right level IB cervical lymph node (red arrows).



**Fig 2:** Suspended test tube containing clear yellow fluid aspirate from the right-sided swelling (A). Gamma-ray emission spectrum of the aspirated fluid with a peak corresponding to gamma energy of  $^{131}\text{I}$  (364 KeV) (B, arrow).