

# **Case 5: Thyroid cancer in 42 yr-old woman with Graves' disease**

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# Thyroid cancer in 42 yr-old woman with Graves' disease

## Background

- Radioiodine treatment is well established as an effective and safe therapeutic modality for Graves' disease.
- In comparison to anti-thyroid drug therapy, such treatment has virtually no side-effects, brings in good control of hyperthyroidism, and decreases the goiter size. Before treatment, patients should be carefully screened for possible worsening of ophthalmopathy.

- Autoimmune thyroid diseases are frequently associated with differentiated thyroid carcinomas.
- The role of autoimmune phenomena in the origin and clinical course of coexisting papillary and follicular carcinomas is still controversial.

- In Graves' patients, the prevalence of palpable thyroid nodules is 15.8% (33.6% when using ultrasonography).
- Since the malignancy rate of palpable thyroid nodules in Graves' patients is 16.9% (approximately three-fold higher than in the general population), any thyroid nodule diagnosed in Graves' patients is at a relatively high risk for harboring malignancy.

## Relevant history

March 2008: 42-yr old woman referred to Nuclear Medicine for  $^{131}\text{I}$  radiometabolic therapy because of poorly controlled Graves' disease.

## **Rationale for examination**

In addition to overt hyperthyroidism, positive anti-Tg and anti-TSH-receptor auto-antibodies.

In order to treat Graves' disease with radioiodine, it is necessary to evaluate the gland's volume and iodine uptake.

The uptake of radioiodine and  $^{99m}\text{Tc}$ -pertechnetate is proportional to the expression of the thyroidal sodium/iodine symporter (NIS).

Qualitative and quantitative scintigraphic evaluation of the thyroid is performed with a gamma camera fitted with an on-line computer system and enables determination of the iodine uptake, or of the pertechnetate uptake (TCTU) as an iodine clearance equivalent.

Quantitative pertechnetate scintigraphy is the most sensitive and specific technique for the diagnosis and quantification of thyroid autonomy.

The method has proved to be valuable in risk stratification of spontaneous or iodine-induced hyperthyroidism, in the estimation of the target volume prior to radioiodine therapy and in the evaluation of therapeutic success after definitive treatment. The gland's volume is also estimated with US.

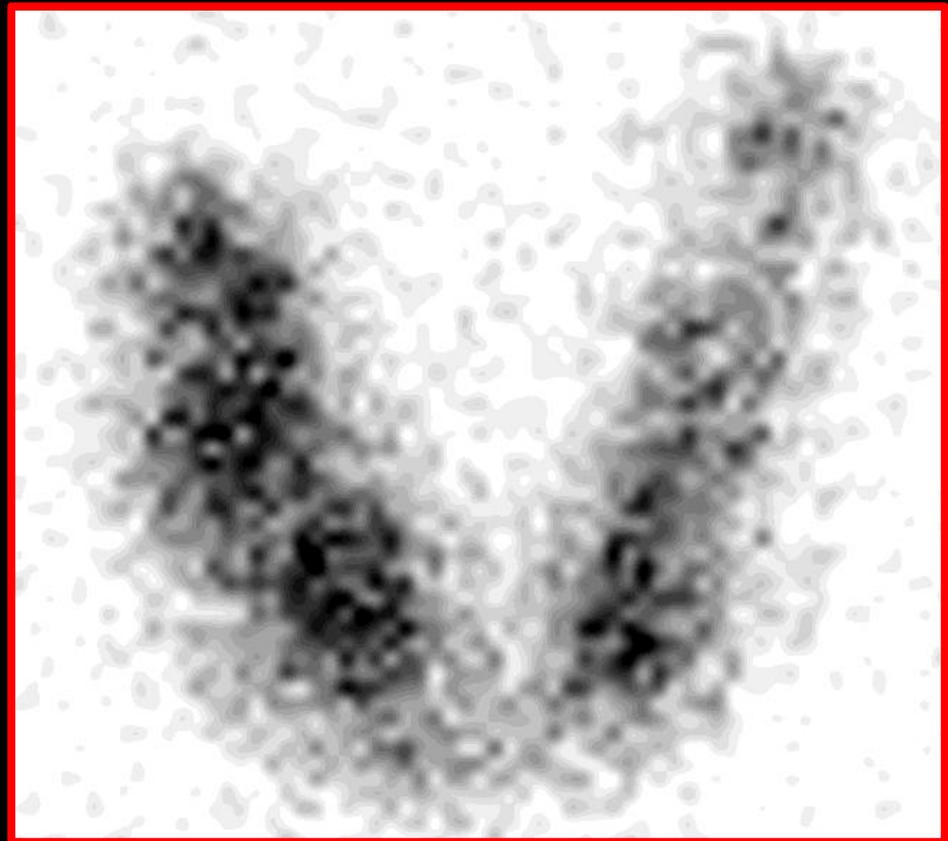
## Presentation of clinical data:

Hyperthyroidism, positive anti-Tg and anti-TSH-receptor antibodies.

Standard procedure for individualized dosimetric estimates prior to  $^{131}\text{I}$ -iodide therapy

Thyroid scan with pin-hole 24 hr after oral administration of  $50 \mu\text{Ci } ^{131}\text{I}$ -iodide. 

1.85 MBq  $^{131}\text{I}$ -iodide:  
4-hr uptake: 45%;  
24-hr uptake: 62%.



## Thyroid US for volume measurements

Right lobe: 11.4 mL

Left lobe: 10.4 mL

US detection of previously unnoticed solid nodule in right lobe (18 × 16 mm).

FNAC: suspected papillary thyroid carcinoma.

### Change of therapeutic strategy

- The patient did not undergo radioiodine therapy, but was instead sent to surgery for total thyroidectomy.
- Histology: differentiated papillary thyroid cancer of right lobe infiltrating the soft perithyroid tissues (pT3NxMx - I/UICC 2002).

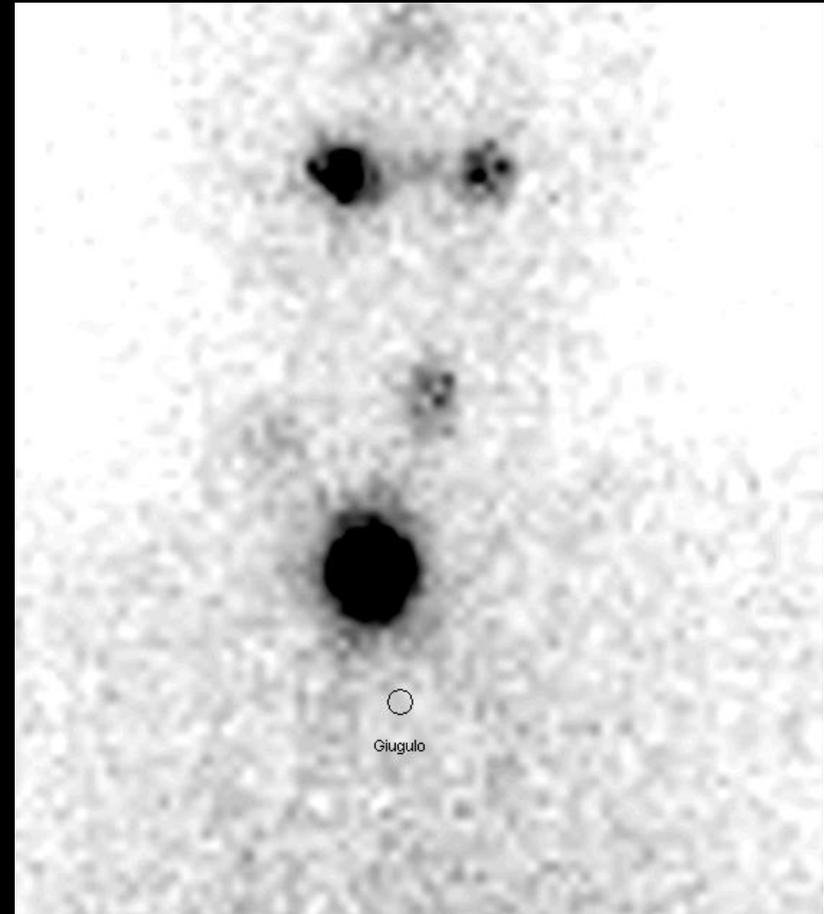
November 2008:

$^{131}\text{I}$ -iodide therapy for ablation of post-surgical thyroid remnants.

Post-ablation WBS:

Intense  $^{131}\text{I}$  uptake consistent with thyroid remnants.

Additional lower intensity uptake suspect for metastatic cervical lymph node(s).



Follow-up

May 2009: Cervical US: not evidence of metastatic lymph nodes.

Serum Tg  $<0.1\text{ng/mL}$  (suppressed TSH, and positive anti-Tg autoantibodies).

Close follow-up, with diagnostic radioiodine WBS within 6 months.

# Teaching points

Radioiodine treatment is a well established, safe and effective therapeutic modality for Graves' disease.

Autoimmune thyroid diseases are frequently associated with differentiated thyroid carcinomas

Nodule(s) in Graves' disease must always be evaluated with FNAC (especially if “cold” on thyroid scintigraphy).

# References

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