Association of rhTSH and 131-Iodine in the treatment of non-surgical multinodular goiter.

Dos Santos, Gerardo; Kapitán, Miguel; Orellano, Pablo;
Terán, Mariella; Paolino, Andrea; Coppe, Fátima; Hermida, J Carlos.

Centro de Medicina Nuclear, Hospital de Clínicas
Montevideo, Uruguay

HOSPITAL DE CLINICAS
Dr. Manuel Quintela

Clinical History

- A 66 year-old housewife presents with recurrence of multi-nodular goiter (MNG) with intra-thoracic extension.
- The patient has a history of mild, intermittent asthma and chronic hypertension treated with ACEI, with no cardiovascular symptoms.
- Her MNG was discovered 33 years before, treated with sub-total thyroidectomy, with benign changes on pathology examination.

Clinical History

- Seven years ago she had a thyroid scintigram performed using ^{99m}Tc pertechnetate which revealed significant residual thyroid tissue extending to mediastinum, with globally decreased uptake.
- She received no treatment at that time.
- Two years later she presented with large MNG recurrence, surgery being contraindicated because of anatomic considerations.
- Radiometabolic treatment was performed with 30 mCi of ^{131}I in an attempt to reduce gland volume.

Clinical History

- Five years later, a follow-up thyroid scintigram showed large thyroid remnants in the neck, with poor tracer uptake.
- FNA of relatively ‘colder’ areas revealed no malignancy.
- Laboratory functional tests were normal:
  TSH = 0.52 µU/ml; T4L = 1.24 ng/ml.
- Doppler ultrasound showed heterogeneous thyroid tissue with two dominant nodules, one in the right and the other in the left lobe, both with central vascularization.
- CT scan of neck and thorax (no contrast) revealed enlarged thyroid with calcified areas, trachea displaced to the right with preserved lumen, 15 mm minimal diameter.

Clinical History

- Because there was faint glandular uptake of tracer, radiometabolic treatment with recombinant human TSH (rhTSH) was decided.
- For dose calculation, ^{99m}Tc thyroid scintigraphy is performed before and after intramuscular injection of rhTSH (0.1 mg), as well as plasmatic TSH determinations (figs. 1 and 2).
- At 24 hours, 30 mCi of ^{131}I was given orally.
- The patient was clinically stable and a follow-up ultrasound examination at 6 months was consistent with absence of thyroid tissue on the right side of the neck and slight volume reduction of the left lobe.

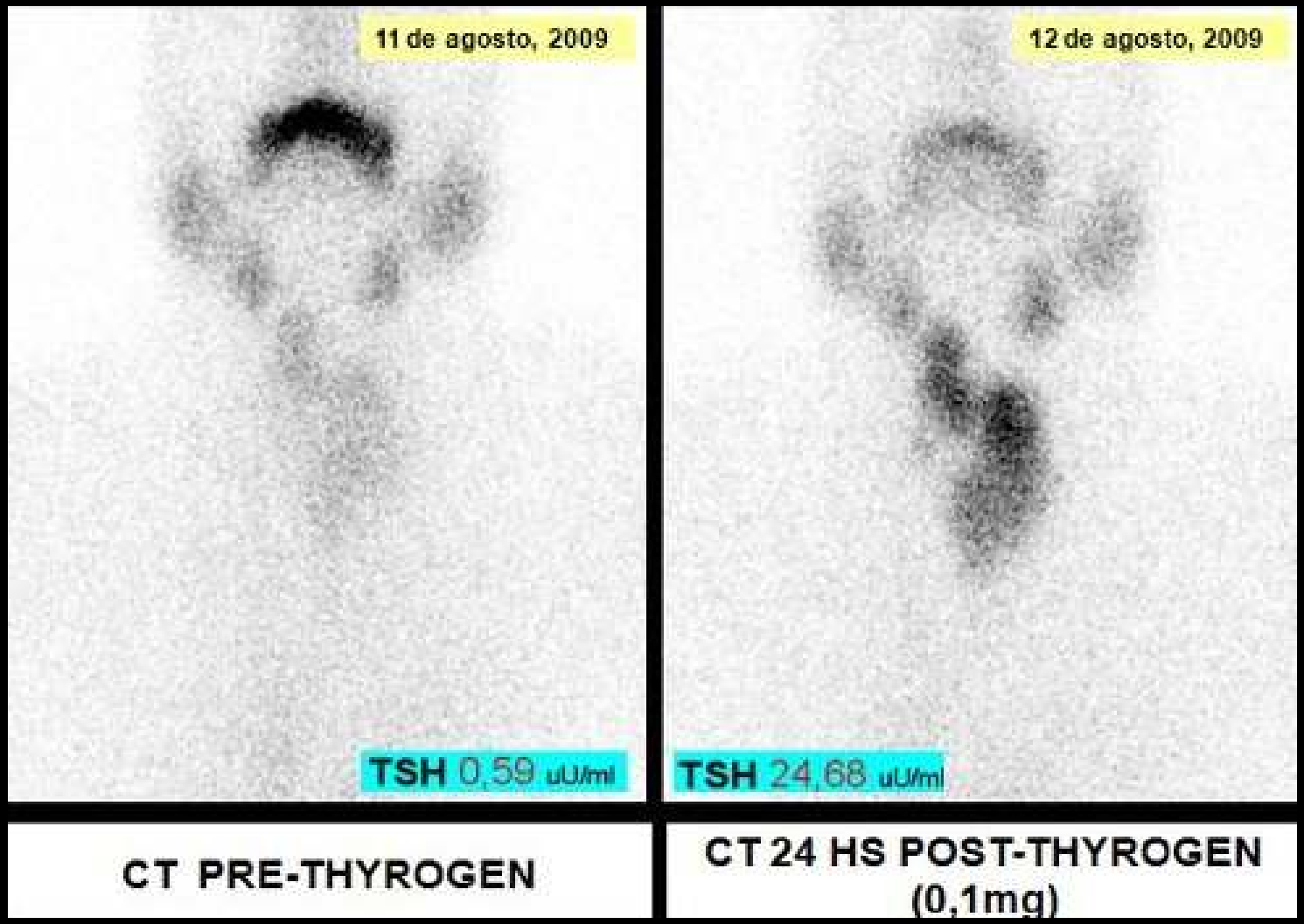

Figure 1.- Thyroid scans with ^{99m}Tc before and after stimulus with rhTSH, together with TSH values. Increased uptake after rhTSH is quite evident.

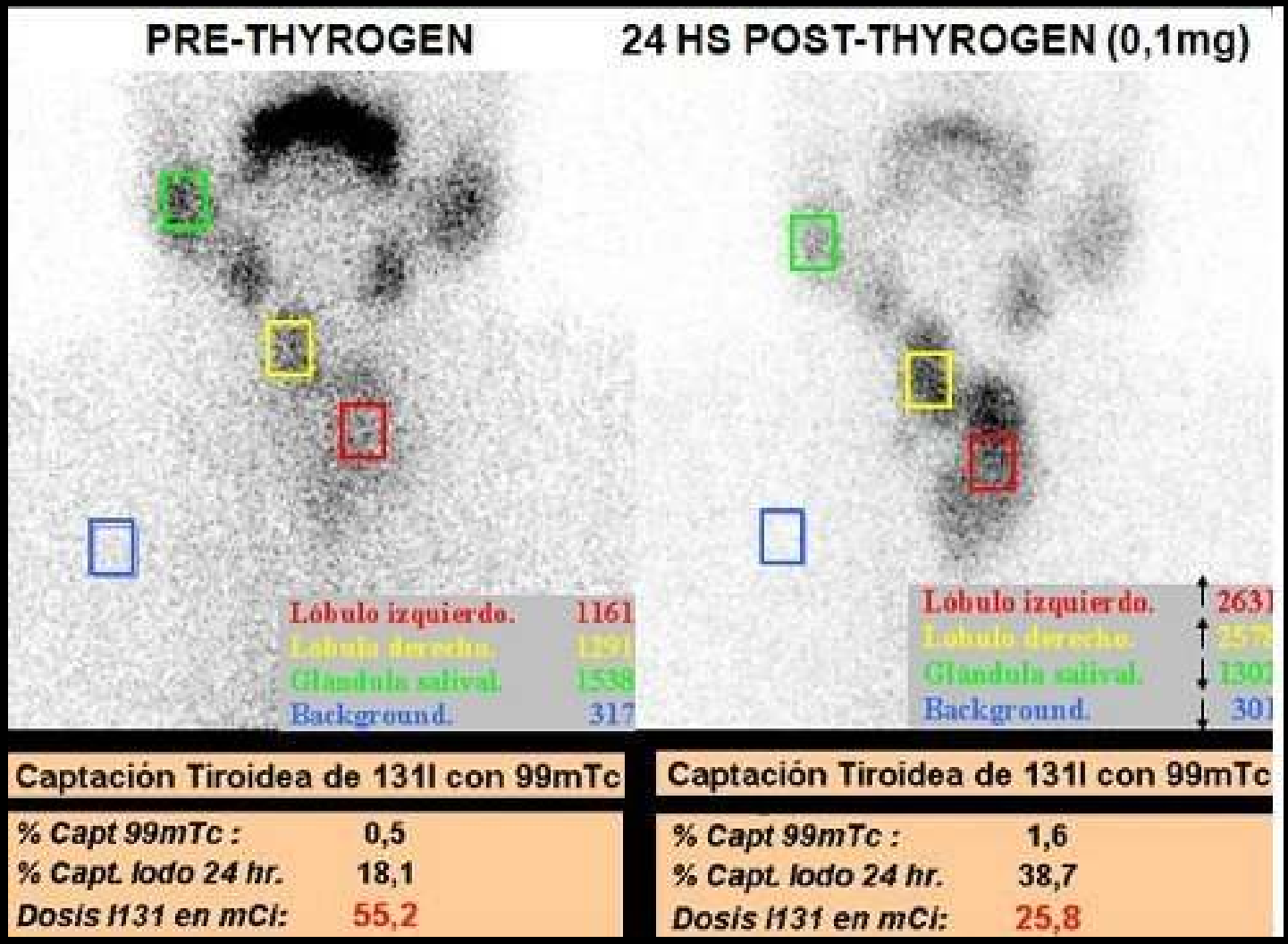

Figure 2. Relative and absolute quantitative uptake studies, together with calculated values of ^{131}I for therapy. Calculated dose was 55.2 mCi before and 25.8 mCi after rhTSH.

Discussion

- Although for the present case there is still lack of follow-up data to assess treatment efficacy, TSH significantly changed from 0.59 µU/ml to 24.68 µU/ml before and after rhTSH, while thyroid uptake of ^{131}I at 24 hs estimated through ^{99m}Tc uptake (1,2) showed an increment from 18% to almost 39%, similar to published data (3).

- This information allowed to deliver a dose of ^{131}I which was approximately half of that initially calculated (~55 mCi vs. ~26 mCi).

Conclusions

- Although rhTSH is an expensive product, its use is justified in cases for large eufunctioning goiters with relatively poor radioiodine uptake when surgical treatment is contra-indicated, with clear dosimetric advantages (4).

Teaching Points

- Recombinant human TSH (rhTSH)-stimulated iodine scintigraphy is an effective and safe alternative to thyroid hormone withdrawal, to be used during the post-surgical follow-up of papillary and follicular thyroid cancer.
- Its clinical efficiency for the detection of persistent and recurrent disease is similar to that of thyroid hormone withdrawal.
- As a novel clinical application, compressive goiters with benign changes and low uptake of ^{131}I can be efficiently treated with the use of rhTSH.
- Recombinant human TSH-stimulated radioiodine therapy of nodular goiter allows major reduction of the radiation burden with retained efficacy.

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