CASE REPORT

Non-elevation of TSH after total thyroidectomy: a surgical surprise

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Accepted 23 April 2015

SUMMARY

A 31-year-old woman with papillary carcinoma of the thyroid with right cervical lymph nodal metastasis underwent total thyroidectomy with modified radical neck dissection. At follow-up 6 weeks after surgery, she had not developed clinical features of hypothyroidism and her thyroid-stimulating hormone (TSH) was within normal limits. Further evaluation including technetium scintigraphy of the thyroid and MRI of the chest confirmed thyroid tissue, thyrothymic thyroid rest (TTR), in the superior mediastinum. The patient's TSH elevated well after reoperation of TTR. She underwent radioiodine ablative therapy and suppressive thyroxine therapy as per the protocol for well-differentiated thyroid cancer follow-up. The clinical importance of these embryological rests of thyroid tissue, especially in the management of thyroid malignancies, is discussed in this report.

BACKGROUND

Thyrothymic thyroid rests (TTRs) are isolated masses of normal thyroid tissue seen below the thyroid gland usually along the line of the thyrothymic tract. It is usually found in more than 50% of total thyroidectomies.¹ These are usually an extension of a normal embryological descent of the thyroid after its separation into right and left lobes.^{1,2} TTRs have major implications in patients undergoing total thyroidectomy, especially in thyroid malignancies and toxic goitres, where they would have a direct bearing on the outcome of the procedure and follow-up. Grade III and grade IV (described later) TTRs are notable for causing difficulty in identification and ensuring complete removal if not suspected or searched for by proper imaging preoperatively or intraoperatively.² We report a case of papillary thyroid cancer with grade IV TTR that was overlooked during the primary surgery and was subsequently discovered in the postoperative period.

CASE PRESENTATION

A 31-year-old woman presented with a gradually increasing painless nodule in the right lobe of the thyroid of 2-year duration. There was no history of compressive symptoms, hypothyroidism or hyperthyroidism, childhood neck irradiation or family history of thyroid malignancy. Neck examination revealed hard thyroid nodule (size 4×3 cm) in the right lobe. Multiple, hard cervical lymph nodes were palpable over the region of level III, IV and V on the right. With a high probability of thyroid malignancy, further evaluation was carried out.

Thyroid function tests were within normal limits. Ultrasonography (USG) of the neck revealed a 3.9×3.2×2.7 cm hypoechoic lesion over the right lobe with areas of microcalcification and increased central vascularity. There were multiple cervical lymph nodes with loss of fatty hilum over level III, IV and V, suggestive of metastasis. USG-guided fine-needle aspiration cytology of the nodule and lymph nodes confirmed the diagnosis of papillary carcinoma of the thyroid with lymph node metastasis. Nuclear scintigraphy was not performed. After adequate preparation, the patient underwent total thyroidectomy and removal of the multiple enlarged central compartment lymph nodes from the hyoid region superiorly to innominate vessels inferiorly. In addition, modified radical right lateral neck dissection was also performed (figure 1). The patient had an uneventful postoperative recovery and was euparathyroid. Histopathological examination of the thyroid revealed papillary carcinoma (conventional type) with 12 central compartment lymph nodes and 18 lateral compartment lymph nodes showing metastasis. The patient was planned for radioiodine ablative therapy followed by thyroxine suppressive treatment. Anticipating the rise of thyroid-stimulating hormone (TSH; to at least >30 mIU/L) for administering radioiodine therapy, she was not given thyroxine for the first 6 weeks postsurgery. However, at the end of 6 weeks, TSH was found to be 5.63 mIU/L only (normal range 0.5–5.5). To evaluate the non-elevation of serum TSH, neck USG was performed again, and failed to show loco regional recurrence or persistence of disease. We reserved checking thyroglobulin levels after complete ablation of residual thyroid tissue post radioiodine therapy. Further evaluation with

Figure 1 Operative specimen showing total thyroidectomy (A) with central compartment (B) and right lateral lymph nodes (C).

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To cite: Sadacharan D, Mahadevan S, Muthukumar S, et al. *BMJ Case Rep* Published online: [please include Day Month Year] doi:10.1136/bcr-2015-209809

Figure 2 (A) Technetium thyroid scintigraphy, and (B) MRI of the chest and neck, confirming the presence of thyrothymic thyroid rest in the superior mediastinum.

technetium thyroid scintigraphy to look for ectopic functioning thyroid tissue surprisingly revealed an uptake in the anterosuperior mediastinum (figure 2A). To avoid excess iodine exposure interfering with radioiodine treatment, MRI of the chest was also carried out, (figure 2B), showing a scintigraphy concordant mass in the anterosuperior mediastinum. Reoperation was performed with a combined cervical and thoracic approach, and, intraoperatively, a 3×3×2 cm thyroid mass found 2 cm beneath the right subclavian vein and adherent to the right pleura was removed in toto. Histopathologically, the resected specimen was reported as normal thyroid tissue confirming the diagnosis of grade IV TTR. TSH levels rose to 55 mIU/L within the next 4 weeks and the patient underwent radioiodine ablation therapy with a 4440 MBq dose of iodine. At 6 months follow-up, she was doing well clinically and TSH was appropriately suppressed on thyroxine therapy, and thyroglobulin level was undetectable.

OUTCOME AND FOLLOW-UP

The post-therapy whole body iodine scan did not show any significant tracer uptake. At 6 months follow-up on thyroxine suppressive therapy the patient was doing well clinically. Her serum thyroglobulin levels were undetectable and the neck USG was also normal.

DISCUSSION

TTRs are isolated embryonic remnants of normal thyroid tissue seen below the normal thyroid gland usually along the line of the thyrothymic tract.¹ The anatomic growth of germinal nuclei in the thyroglossal duct fixing to a cardiopericardiac mass is presumed to be one of the reasons for occurrence of these rests.³ In a study conducted by Sackett *et al*,² TTR was classified into four grades based on the anatomical relationship with the lower pole of the thyroid gland. Grade I occurs as a protrusion of normal thyroid tissue. In grade II, the rests are attached to the thyroid proper by a narrow pedicle of thyroid tissue. In grade III, the attachment with the thyroid gland is by a fibrovascular core, and in grade IV there is no connection with the thyroid. The clinical implications of TTR are manifold. During surgery, the rests may often cause a diagnostic dilemma in differentiating from a lymph node or parathyroid gland as shown in figure 1. In certain clinical situations such as differentiated thyroid malignancy (as in our case) or toxic goitre, the non-removal of a grade IV TTR may lead to significant obstacles in the management and follow-up.² Even during surgery for benign thyroid disorders, the unaddressed grade III or IV TTR may result in primary intrathoracic goitres/mass lesions later on follow-up.

The literature regarding the incidence of TTR is scarce. In the largest series by Sackett *et al*,² of 180 sides of the thyroid examined in 100 consecutive thyroidectomy specimens, TTRs were

present in 53 patients, or in 83 separate sides (46%). Seven patients had only left-sided rests, 16 had right-sided rests only, and 30 had bilateral rests. The grades of TTR were bilaterally symmetrical in 78%. Grade III and IV TTR were present in 9% and 11%, respectively. Final histopathology revealed nine cases of thyroid cancer of which three patients had TTR (grade I in 2 cases and grade II in 1 case). These three TTRs were located in the neck, unlike in our case, where it was mediastinal. Also, in contrast to our index patient, in whom we had to search for the ectopic thyroid tissue for the reasons explained above, many grade IV TTR may enlarge and present primarily as intrathoracic mass/goitre and its attendant compressive symptoms, or in asymptomatic individuals may be detected during radiological imaging performed for other non-specific symptoms.^{4–6} Also, in these series, grade IV TTRs were most often observed in the right side of the mediastinum, as in our patient. Other causes of non-elevation of TSH after total thyroidectomy include hypopituitarism, non-thyroidal illness, significant amounts of residual thyroid tissue in the neck, or functioning thyroid malignancy metastases as in follicular carcinoma.⁷ In summary, possibility of TTR and its variations must be borne in mind during surgical management of a patient with thyroid disorder.

Learning points

- Thyrothymic thyroid rests (TTRs) are embryological remnants not uncommonly encountered during thyroid surgeries.
- Hyperthyroid patients with persistent symptoms of thyrotoxicosis, or patients with thyroid malignancy with non-elevation of thyroid-stimulating hormone even after total thyroidectomy, should be investigated for TTR and appropriately managed.
- TTRs, especially of the grade III and IV variety, may be the principal source of primary intrathoracic goitres.

Competing interests None declared.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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