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Case report

Columnar cell thyroid carcinoma – the diagnostic dilemmas and pitfalls

Ivana Žagar[1], Barbara Vidergar-Kralj[1],
Andreja A. Schwarzbartl-Pevec[1], Franc Pompe[2]

[1]Department of Nuclear Medicine,
[2]Department of Surgery, Institute of Oncology, Ljubljana, Slovenia

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Abstract

BACKGROUND: Columnar cell carcinoma is a rare variant of papillary thyroid carcinoma associated with aggressive clinical behaviour.

A CASE REPORT: of a 34-year-old male patient, who presented withe rapidly growing mass in the neck, extending to the anterior and middle mediastinum, tightly closing the upper thoracic apperture and causing tracheal and oesophageal deviation, with minimal compression and stenosis. A diagnosis of columnar cell carcinoma, arising from the ectopic thyroid tissue just adjacent to the left thyroid lobe was based on histological and intraoperative findings. Near total thyroidectomy and lymph-node dissection were followed by external beam radiotherapy of the neck and mediastinum, chemotherapy and radioiodine ablation of the remaining functional thyroid tissue. Pre- and post-operative radionuclide imaging (99mTc(V)-DMSA, 99mTc-MIBI, 123-I-mIBG and Octreoscan^r) findings are discussed, with a special emphasis given to the dilemmas in histological characterisation of the tumor, the problems in therapeutic approach and the dilemmas and pitfalls in the interpretation of radionuclide findings in this patient, especially the ones performed post radiotherapy of the neck and mediastinum.

Key words: columnar cell thyroid carcinoma, therapy, radionuclide imaging, interpretation pitfalls

Correspondence to: Ivana Žagar
Department of Nuclear Medicine, Institute of Oncology
SI-1000 Ljubljana, Zaloška 2, Slovenia
Tel: (+ 386 1) 587 95 09, fax: (+ 386 1) 587 94 00
e-mail: izagar@onko-i.si; izagar@eunet.yu

Introduction

Papillary thyroid carcinomas comprise a heterogenous group of tumors that show marked variability in macroscopic and histologic appearance and clinical behaviour. Columnar cell thyroid carcinoma (CCTC) is a rare variant of papillary thyroid carcinoma, considered to be associated with an aggressive clinical course and high mortality, with common extrathyroidal invasion and the high occurence of regional lymph-node and distant metastases. It tends to have a male predilection and to affect a population older than the one associated with other papillary carcinomas. Its histologic appearance is reported as quite distinct, characterized by papillary growth pattern, with papillae lined by tall columnar cells with elongated, often hyperchromatic nuclei showing stratification and high mitotic activity. It usually shows immunoreactivity for thyroglobulin, which may be useful when employed to rule out a metastatic carcinoma from other, closely resembling columnar cell tumors of the endometrium, or from the aerodigestive system [1–5]. In some cases thyroglobulin may not be reactive or focally positive, as CCTC is less differentiated than the usual types of papillary carcinoma [2, 8].

Case report

A 34-year-old male patient, with no previous history of a thyroid disease or irradiation of the neck region, presented with a rapidly growing mass in the neck, that was extending to the anterior upper and middle mediastinum and was causing tracheal and oesophageal deviation, with minimal compression and stenosis and was tightly closing the upper thoracic apperture. FNA cytology findings revealed a clearly malignant lesion, with numerous cells showing oval, hyperchromatic nuclei. The tumor was found to be CK-positive and immunologically non-reactive to: CEA, chromogranine, S-100, thyroglobulin, thyreocalcitonine and synaptophysin, yet further confident cytological characterisation was not possible.

This multinodular lesion was ultrasonographically hypoechogenic and heteroechogenic. Pre-operative scintigraphy of the neck with pertechnetetate, whole-body scintigraphies with 99mTc(V)-DMSA and 123-I-mIBG were performed according to the widely accepted protocols and EANM guidelines.

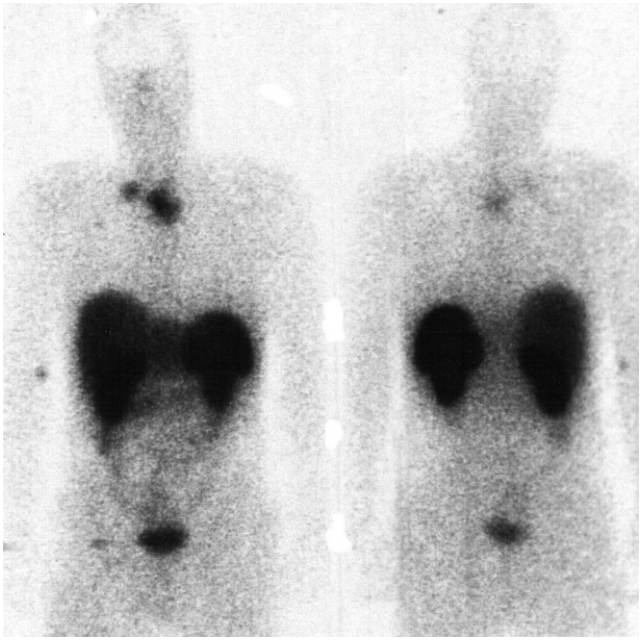

Figure 1a. 111-In-pentetreotide, 24 hrs post injection, planar scans: left-anterior, right-posterior: intense focal tracer uptake may be noted in the left thyroid lobe, jugular fossa, and the right supraclavicular region.

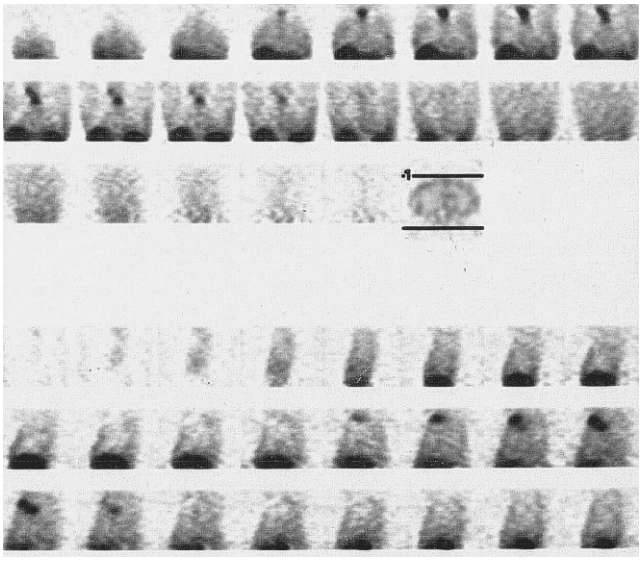

Figure 1b. 111-In-pentetreotide, SPECT of the thorax, 24 hrs post injection: top-coronal slices, bottom-sagittal slices, showing the tumor extension from the neck and jugular fossa to the anterior and posterior middle mediastinum and to the right supraclavicular fossa.

The tumor was scintigraphically "cold" on a pertechnetate scan and showed no accumulation of either 99mTc(V)-DMSA or 123-I-mIBG.

The results of all thyroid function tests, including Tg and anti--Tg and anti-TPO-antibodies, were within normal limits. Neither clinically nor biochemically was the patient suspected to have a phaeochromocytoma.

Pre-operative scintigraphy with 111-In-pentetreotide (Octreoscan®) (Fig. 1a and 1b) confirmed the tumor extension from the neck and jugular fossa to the anterior and posterior middle mediastinum and to the right supraclavicular fossa.

A definite origin of the tumor remained unclear due to the massiveness of the metastatic tissue in the neck and mediastinum. A diagnosis of columnar cell thyroid carcinoma with high mitotic activity and proliferation index, probably arising from the ectopic thyroid tissue just adjacent to the left thyroid lobe and giving massive metastases to the anterior and middle mediastinum and to the right supraclavicular fossa, was based on the intraoperative findings and on the revision of histopathological findings by three independent experts. Considering the results of a thorough clinical examination, biochemical and functional tests and the visualisation modalities used, the possibility of another primary location of the other columnar cell-type tumor was ruled out.

A total thyroidectomy and lymph-node dissection were followed by external beam radiotherapy of the neck and mediastinum (TD = = 50.4 Gy) and chemotherapy (Oncovyn and Adriamycin), that was not given in full dose, due to severe neutropenia.

A post-operative 99mTc-MIBI whole body scan was found to be negative.

A post-operative 131-I whole body scan, performed under rhTSH stimulation, showed tracer accumulation in the functional thyroid tissue of the right and pyramidal lobe (Fig. 2), with a 1.5% uptake.

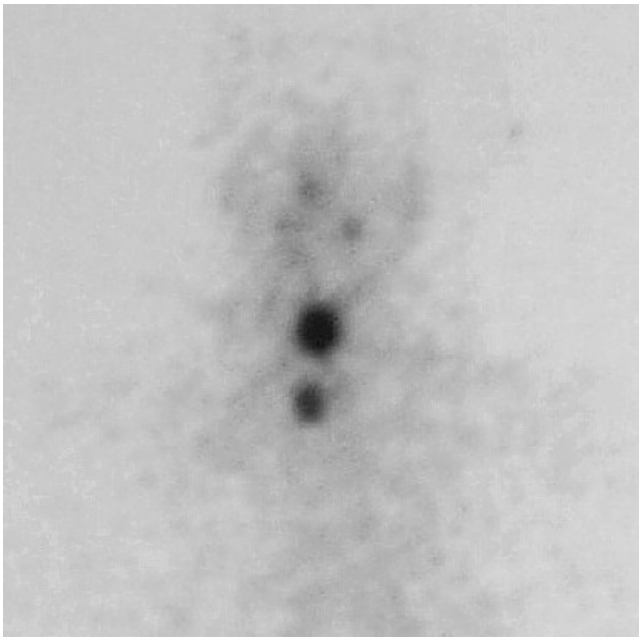

Figure 2. Post-operative radioiodine scan¨under rhTSH stimulation, (111 MBq 131-I), head and neck spot-view, showing tracer uptake in the functional thyroid tissue of the right and pyramidal lobe.

Post-operative 111-In-Pentetreotide (Octreoscan®) scintigraphy, 3 months after radiotherapy of the neck and mediastinum, revealed a symmetric tracer uptake in the thorax (Fig. 3a and 3b) which, only after a careful review of the patient's history and along with a comparison with chest CT findings, was attributed to post-irradiation pneumonitis. No other pathological uptake has been detected on these scans. A follow-up Octreoscan finding,

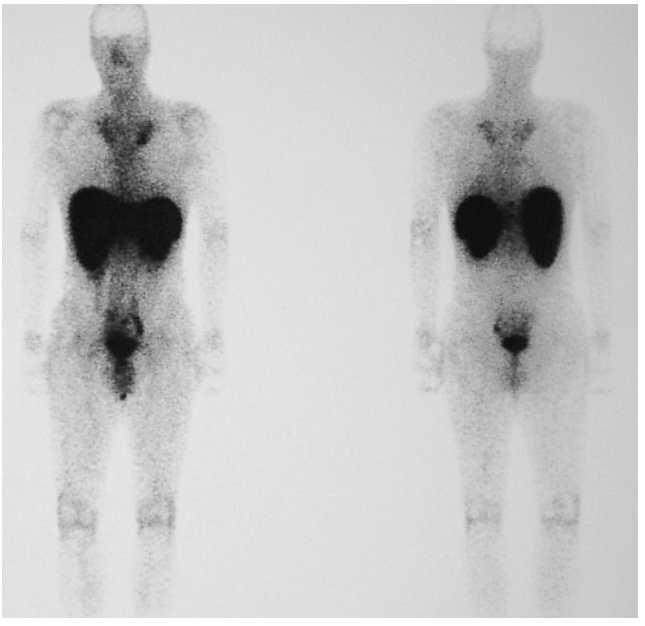

Figure 3a. Post-operative 111-In-pentetreotide planar scans 3 months after radiotherapy, left-anterior, right-posterior, 24 hrs post injection, showing symmetric 111-In-pentetreotide uptake in middle mediastinal regions.

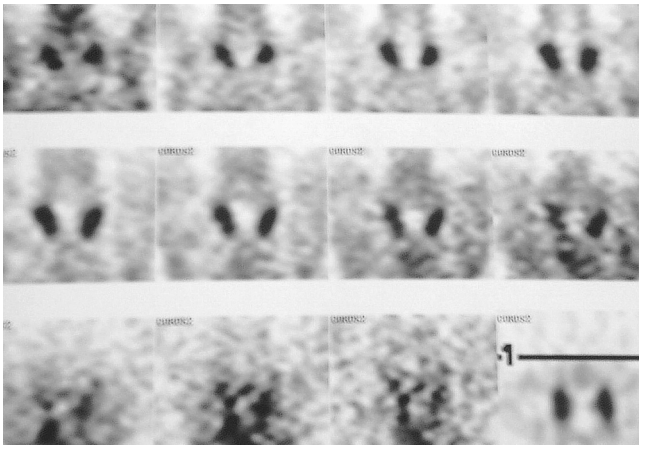

Figure 3b. Post-operative Octreoscan^r, SPECT of the thorax, 3 months after radiotherapy, 24 hrs post injection, coronal slices showing intense and symmetrical tracer uptake in parahilar regions.

6 months after radiotherapy, showed no significant change in either the intensity or pattern of parahilar tracer uptake in the mediastinum.

The functional thyroid tissue was ablated by 3.7 GBq 131-I and the patient put on L-thyroxin (a daily dose of 200 μg) replacement-suppression therapy. At the moment, the patient is symptomless and with no clear clinical evidence of the disease.

Discussion and conclusion

Variations in the macroscopic and histologic appearance and biological behaviour of papillary carcinomas of the thyroid, contributing to the heterogeniety of this group of tumors, is well-known. We report another case of its rare variant, a columnar cell thyroid carcinoma.

A diagnostic problem occured in our patient in the face of extensive cervical lymph-node metastases of a columnar cell tumor with nuclear stratification. Colloid and thyroglobulin reactivity were absent — this is uncommon in the columnar cell papillary carcinomas of the thyroid [1–8]. As there was no primary columnar cell tumor localised to another site (aerodigestive tract), a thyroid origin of the primary tumor was considered.

Although being a distinct morphologic type, a columnar cell thyroid carcinoma is not nowadays considered to be a distinct clinical type of papillary thyroid carcinoma. Recent evidence suggests that the presence of extrathyroid invasion is the most important parameter in predicting its behaviour and aggressiveness [6–8] — in our patient's particular case it necessitated aggressive management and evaluation of a disseminated disease.

Another problem was a symmetric 111-In-pentetreotide uptake in the middle mediastinal regions that had been irradiated, revealed by a somatostatin receptor scintigraphy 3 months, and persisting with a follow-up scan 6 months after external beam radiotherapy of the neck and mediastinum. These correlated well to the areas of the chest X-ray and CT-abnormalities. Octreoscan^r uptake in lungs after irradiation, mainly by the activated macrophages within the granulomas and the alveoli, expresssing the somatostatin receptors, is well-recognized and believed to reflect the histological changes: alveolitis, followed by interstitial fibrosis as a complication of radiotherapy. In the literature, the peak Octreoscan^r uptake has been described at 4 weeks post external beam irradiation and may be seen up to months and years after radiotherapy [9, 10]. Valdes Olmos et al. [10] suggested that 111-In-pentetreotide scans may have a role in differential diagnosis as well as in monitoring the response to steroid therapy in patients with post-irradiation pneumonitis.

We believe that the thoracic uptake of 111-In-pentetreotide months after external beam radiotherapy should be considered a potential pitfall in the follow-up with this radiopharmaceutical. Attention should be paid to avoiding a false-positive interpretation of somatostatin receptor scintigraphy findings in these patients.

References

1. Evans HL. Columnar-cell carcinoma of the thyroid: a report of two cases of an aggressive variant of thyroid carcinoma. Am J Clin Pathol 1986; 85: 77–80.
2. Gaertner EM, Davidson M, Wenig BM. The columnar cell variant of thyroid papillary carcinoma: a case report and discussion of an unusually aggressive thyroid papillary carcinoma. Am J Surg Pathol 1995; 19: 940–947.
3. LiVolsi V. Surgical pathology of the thyroid gland. Major problems in pathology, Volume 22. WB Saunders, Philadelphia Co 1990: 160––161.
4. Mizukami Y, Nokomura A, Michigishi T, Noguchi M, Nakamura S, Hashimoto T. Columnar cell carcinoma of the thyroid gland: A case report and review of the literature. Hum Pathol 1994; 25: 1098–1101.
5. Wenig BM, Thompson LDR, Adair CF, Schmookler B, Heffess CS. Thyroid papillary carcinoma of columnar cell type. A Clinicopathologic Study of 16 Cases. Cancer 1998; 82 (4): 740–753.
6. Evans HL. Ecapsulated Columnar-cell Neoplasms of the thyroid. A Report of four cases suggesting a favourable prognosis. Am J Surg Pathol 1996; 20 (10): 1205–1211.

7. Yunta PJ, Ponce JL, Prieto M, Merino F, Sancho-Fornos S. The importance of a tumor capsule in columnar cell thyroid carcinoma: a report of two cases and review of the literature. Thyroid 1999; 9 (8): 815–819.
8. Perez F, Llobet M, Garijo G, Barcelo C, Castro P, Bernardo L. Fine-needle aspiration cytology of columnar-cell carcinoma of the thyroid: report of two cases with cytohistologic correlation, Diagn Cytopathol 1998; 18: 352–356.
9. Stoffel M, Jamar F, Donckier J, Hainaut P, Decoster P, Becker P, Pauwels S. Increased uptake of indium 111-indium pentetreotide up to 10 years after external thoracic irradiation: a report of two cases. Eur J Nucl Med 1996; 23 (6): 723–726.
10. Valdes Olmos RA, van Zandwijk N, Boersma LJ, Hoefnagel CA, Baas B, Baars JP, Muller SH, Lebesque JV. Radiation pneumonitis imaged with indium-111-pentetreotide. J Nucl Med 1996; 37 (4): 584–588.