Columnar cell thyroid carcinoma — the diagnostic dilemmas and pitfalls

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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 with a rapidly growing mass in the neck, extending to the anterior and middle mediastinum, tightly closing the upper thoracic aperture 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 intra-operative 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) 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

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 occurrence 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 aperture. 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 hypoechoic and heteroechogenic. Pre-operative scintigraphy of the neck with pertechnetate, whole-body scintigraphies with 99mTc(V)-DMSA and 123-I-mIBG were performed according to the widely accepted protocols and EANM guidelines.
The tumor was scintigraphically "cold" on a pertechnetate scan and showed no accumulation of either $^{99m}Tc(V)$-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 another 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 $^{99m}$Tc-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.

Post-operative 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,
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 heterogeneity of this group of tumors, is well-known. We report another case of its rare variant, a columnar cell thyroid carcinoma.

A diagnostic problem occurred 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 uptake in lungs after irradiation, mainly by the activated macrophages within the granulomas and the alveoli, expressing 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 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


