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Case Series

Thyroid Collision Tumour: Concurrence of Two Thyroid Malignancy

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Abstract

Thyroid carcinoma is the most common endocrine malignancy. However, it is exceptionally uncommon for two different thyroid malignancies to co-exist within the same thyroid gland. Herein, we present two cases where two different thyroid malignancies present as collision tumours of the thyroid gland. The hypothesis, epidemiology and management are discussed here. Case presentation: Case 1 was a 60 year-old woman presented with an accidental finding of left neck swelling. Ultrasound neck identified multinodular goitre with a suspicious left thyroid nodule. Ultrasound-guided fine-needle aspiration cytology of left thyroid nodule confirms papillary thyroid carcinoma. She underwent total thyroidectomy with central compartment neck dissection. However, histopathology reports a presence of medullary thyroid carcinoma and papillary microcarcinoma in the left thyroid gland. Case 2 was a 59 years old woman presented with left vocal cord paralysis with rapidly enlarging of a long-standing left thyroid swelling. Computed tomography identified bilateral thyroid swelling with left mass causing compression to the trachea and oesophagus. The patient subsequently underwent a total thyroidectomy bilateral central and left selective neck node dissections and left primary non-selective nerve re-innervation. A collision tumour with components of both Hurthle cell carcinoma and papillary microcarcinoma has been shown in histopathology. Collision tumours of the thyroid pose a diagnostic as well as a therapeutic challenge. They should be treated in a multidisciplinary team environment, and the care should be unique to the patient. The treatment should usually be directed by the most aggressive neoplasm.

Keywords: *Thyroid, collision tumours, hurthle cell, papillary microcarcinoma, medullary goitre*

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INTRODUCTION

Collision tumour is a term refers to when there is two or more tumour which are completely different in morphology and histology coexist in the same organ.In thyroid it is regarded as sporadic disease and has been documented through several literatures.[1] The commonest collision tumour in thyroid is the co-existent of medullary and papillary carcinoma but papillary thyroid carcinoma with Hurthle cell carcinoma is extremely rare[2]. We report two cases of collision tumor in thyroid and its associated management.[3, 4]

CASE PRESENTATION

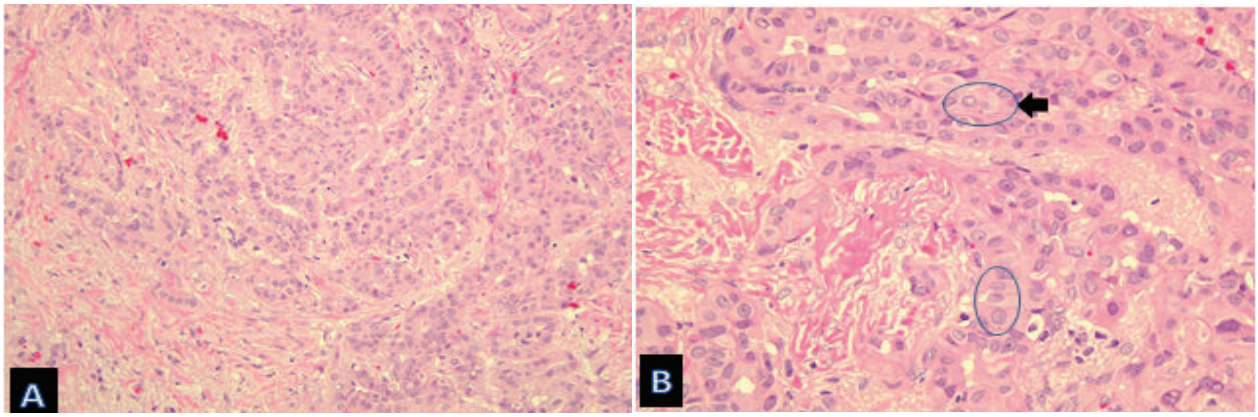
Case 1

A 60 year-old female presented with painless left neck swelling for one month. She denied any hyperthyroid or hypothyroid symptoms with no compressive symptoms. She had no previous history of irradiation to the neck and any known family history of thyroid cancer. On examination, she had left thyroid swelling measuring 1.5 cm with no palpable enlarged cervical lymph node.

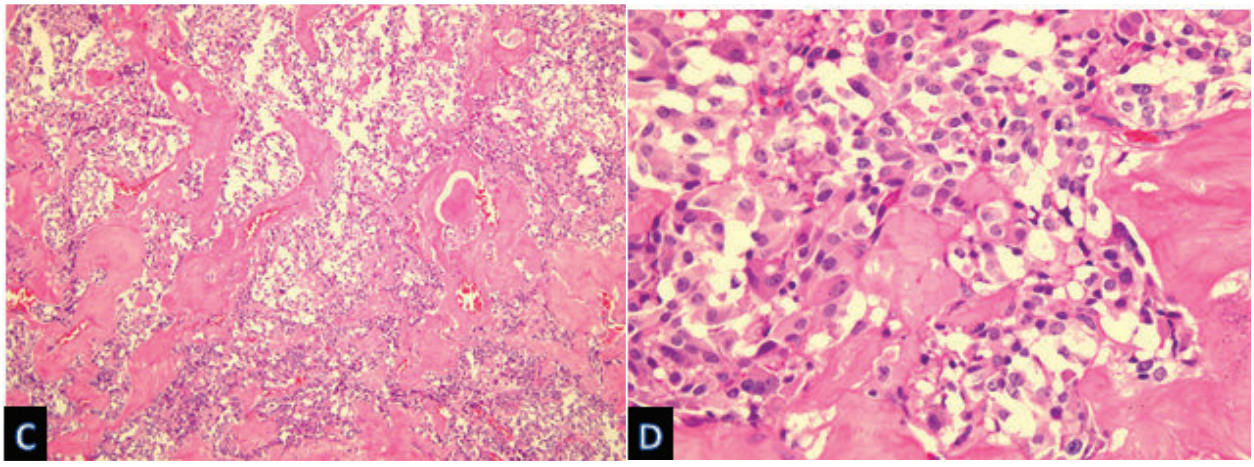
Thyroid function tests were normal. An ultrasound of the thyroid showed several multiple small nodules over both lobes with a suspicious nodule at inferior left lobe measuring 0.8 cm x1.2 cm. However, with no significant bilateral central and lateral cervical lymph nodes were detected. Ultrasound-guided fine-needle aspiration cytology yielded papillary thyroid carcinoma. She was counselled and agrees for total thyroidectomy with prophylactic central node dissection.

Histopathological examination of left thyroid lobe showed present of 3 nodules, largest 1.9 cm x 1.0cm x 1.0 cm at the center with cystic appearance filled with colloid and blood while the other two nodules measuring 0.7 cm x 0.5 cm x 0.3 cm and 0.6cm x 0.5 cm x 0.5 cm respectively at the opposite pole in the left lobe. Microscopic examination of the second nodule showed a neoplastic cell arranged in papillary structures with characteristic nuclei changes suggestive of papillary carcinoma. The third nodule revealed a tumor of neoplastic cells arranged in nests and trabeculae with amyloid suggestive medullary thyroid carcinoma. The cells were positive for calcitonin but not thyroglobulin. The central nodes had no metastasis and the right lobe is normal.

Her postoperative recovery was uneventful, with early postoperative serum calcitonin <2.00pg/ml (normal range 0.00-5.00 pg/ml), carcinoembryonic antigen 1.8 ng/ml (normal range <5.0 ng/ml), intact parathyroid hormone 3.1 pmol/L (normal range 1.1-7.3). She was later started on L-thyroxine. Her five year follow up show no recurrence.



Papillary Thyroid Carcinoma, Picture A*: The tumor composed of cluster of neoplastic cells arrange in papillary structure.* ***Picture B****: The cells have crowded oval nuclei exhibiting nuclear clearing, nuclear grooving and intranuclear pseudoinclusions. Circle with arrow show nuclear pseudo inclusion, circle show nuclear grooving*



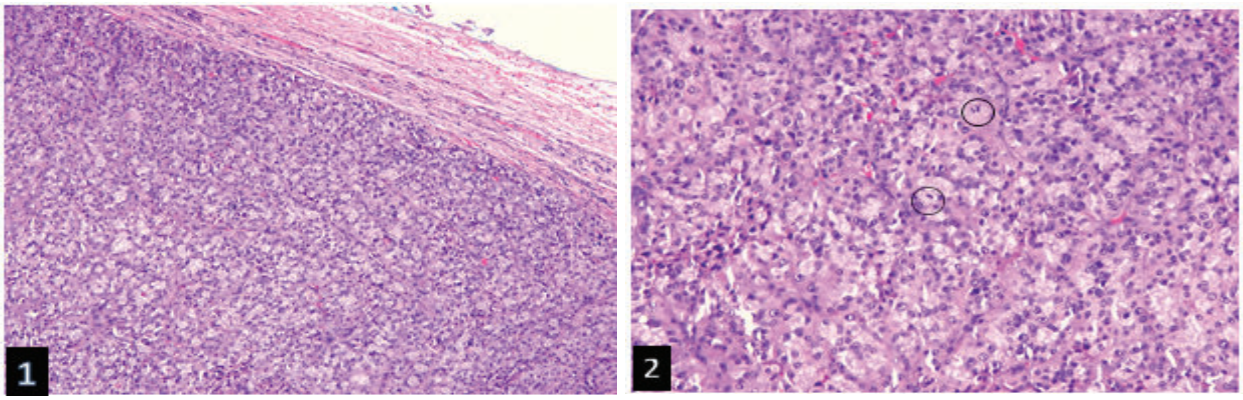
Medullary Thyroid Carcinoma, Picture C*: The tumour composed of neoplastic cells arranged in nests and trabeculae. The presence of amyloid material is confirmed by Congo red stain.* ***Picture D:*** *The cells have round to oval nuclei with conspicuous nucleoli and moderate amount eosinophilic cytoplasm.*

Case 2

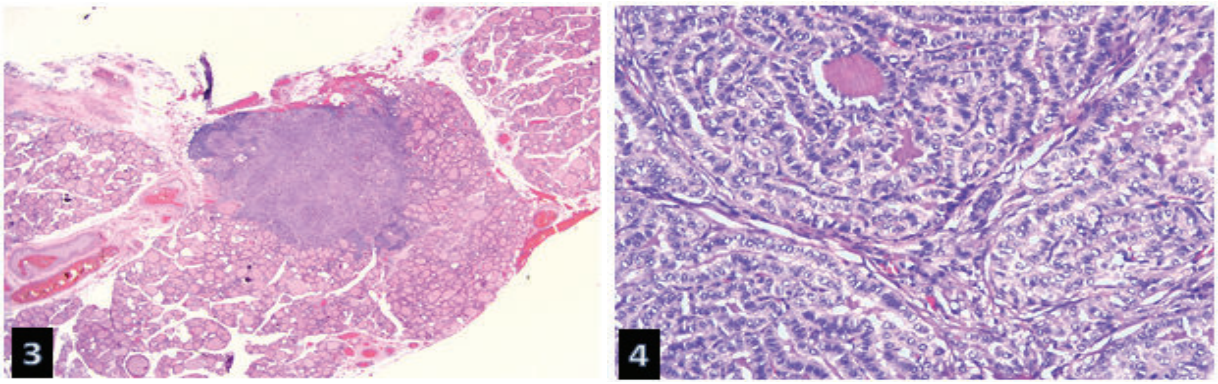
A 59-year-old lady was admitted to surgical ward for difficult in swallowing water and hoarseness of voice for the last one week. She had thyroid swelling for one year but since the last three months the swelling rapidly increase in size. She denied any hormonal thyroid symptoms, no previous irradiation to the neck and no family history of thyroid cancer. On examination, she had firm, 10 cm left thyroid nodule with palpable ipsilateral left cervical lymph nodes. A flexible laryngoscope revealed left vocal cord palsy. A CT scan of the neck and thorax showed the suspicious large had extended to the superior mediastinum with a compressed trachea and esophagus. The left internal jugular vein had thrombus within. There is no distant metastatic were observed. Fine-needle aspiration the nodule yielded Hurthle cell neoplasm. She underwent total thyroidectomy with bilateral central and left lateral lymph node dissection and left primary non-selective recurrent laryngeal nerve repair.

Histopathological examination of the left thyroidectomy specimen shows a capsulated tumour measuring 1.12 cm x 5.5 cm x 8.2 cm with invasion into perithyroidal tissue. The tumour composed of malignant cells infiltration arranged in solid sheets, pseudopapillary, microfollicular and trabecular growth pattern with vascular invasion. The cells are pleomorphic, exhibiting enlarged, vesicular nuclei with prominent nucleoli and voluminous eosinophilic granular cytoplasm: hence suggestive of Hurthle cell carcinoma. The right lobe had a whitish lesion over lower pole measuring 0.3 cm x 0.3 cm x 0.3 cm. It composed of follicles of varying sizes and papillary structures lined by neoplastic follicular cells exhibiting nuclear crowding, nuclear clearing with nuclear grooving and pseudo inclusion suggestive of papillary thyroid carcinoma. The central cervical group specimen had five lymph nodes and one of the lymph node had metastatic cells of papillary thyroid carcinoma.

The postoperative period of hospital stay was uneventful. The patient was subsequently referred for radio-iodine therapy.



Left thyroid gland *Figure 1: Malignant cells in left thyroid lobe arranged in solid sheets surrounded by fibrous capsule. Figure 2; The malignant cells are pleomorphic, exhibiting enlarged, vesicular nuclei with prominent nucleoli and voluminous eosinophilic granular cytoplasm. Mitotic figures in circle.*



Right thyroid gland *Figure 3: The tumour composed of follicles with varying sizes and papillary structures with fibrovascular core measuring 3mm in greatest dimension. Figure 4: Neoplastic follicular cells arranged in papillary structure with fibrovascular core exhibiting nuclear crowding, nuclear clearing with nuclear grooving and pseudoinclusion.*

DISCUSSION

Thyroid cancer ranked ninth for overall cancer incidence accounting for 567000 cases worldwide. It is frequently seen in women rather than men, with an incidence rate of 10.2 per 10000. Papillary thyroid cancer is the commonest thyroid cancer account for more than 90% of cases while[5] anaplastic carcinoma accounts for 2% of thyroid malignancy.[6,7] Even though differentiated thyroid cancers are the most common form of thyroid cancer, it is rare for them to have more than a single of malignancy existed concurrently within the same thyroid gland. The existence of two collision tumor in this case series has caught us by surprise in the cases of medullary thyroid carcinoma (MTC)-papillary thyroid microcarcinoma (PTMC) or Hurtle cell carcinoma (HCC)-papillary thyroid microcarcinoma (PTMC).

The criterial for collision tumor were first establish by Bilroth in 1879 and later redefined by Warren and Gates.[8] The criteria are: (a) each tumor provides a clear picture of malignancy, (b) each tumor must be distinct, and (c) it is necessary to eliminate the possibility that one of the tumors is a metastatic lesion from another. A combination of such malignancy occurring in the same gland or organ can be collision tumors, mixed tumors, or composite tumors.

A collision tumour is a coexistent independent tumour that is histologically distinct within the same organ or adjacent organ.[1] Collision tumours are different from mixed tumours, where there is a similar cell of origin for both tumours and distinguish from composite tumours, which contain two discrete cell populations.[10] However, the term had being used interchangeable in the literature. Collision tumours can happen in various organs such as the ovaries, lung, skin, colon, kidney, and stomach but are extremely rare in the thyroid.[11]

The occurrence of collision tumours is not well understood, but several hypotheses have been suggested, especially in explaining the coexistence of medullary carcinoma and papillary carcinoma. The first theory called random collision effect concerning the two primary tumours arose in continuity by accidental meeting with a random interaction related to an ambient alteration due to the same carcinogenic stimuli.[1] In this theory, changes in the thyroid gland for example due to radiation to the neck lead to changes in the environment in the thyroid gland that promote any primary tumor to growth independently. The second, hostage theory or neoplastic coercion is that the first tumour's growth alters the microenvironment, resulting in the second adjacent tumour development after the entrapment of normal follicular cells within the first tumor. However, this latter theory does not account for the rarity of collision tumours. The third theory called the stem cell theory when indicated a similar stem cell of origin for the two primary tumours.[12] It happen when the stem cell had the ability to transform into two different type of tumor in the same organ.[12]

Collision tumour of the thyroid gland shows female predominance with a mean age of incident 53.4 years.[2] This finding is similar to the general population of patient being diagnosed with single thyroid malignancy. An anterior cervical mass in 90% of cases is the initial presentation of the tumours. The majority of the patient has metastasis during presentation toward cervical node and often a mixed combination of the two collision tumour in about 36% of cases. It found that fine-needle aspiration cytology rarely detects collision tumour presence and the majority of the cases diagnosed from the histological finding after thyroidectomy. The most common collision tumour is medullary and papillary carcinoma and its accounts for 60% of cases, followed by papillary and squamous cell carcinoma.[2] There is only two other reported case of Hurthle cell carcinoma – papillary carcinoma combination reported in the literature, with this cases adding to the number of cases reported.[3,4] A population-based study has placed the incidence of differentiated thyroid cancer, and medullary cancer coexisted in 12.3% of all medullary cancers with incidence is increasing.[13] Patients with coexisting medullary thyroid carcinoma and differentiated thyroid carcinoma have also been shown to be diagnosed sooner in tumor growth than patients with medullary thyroid carcinoma alone, leading to a better prognosis. They also conclude that medullary thyroid carcinoma tend to impact patient survival more than differentiated thyroid cancer.[13]

The management for collision tumour of the thyroid possesses a unique challenge due to the presence of the dual pathology in the tumour and rarity of the disease. The treatment must involve a multidisciplinary approach, and patient-specific with the most aggressive tumour should be the target treatment. Most collision tumours received multimodal treatment in the literature, involving surgery and adjuvant treatment. In about 27% of the collision tumour, will receive total thyroidectomy, neck dissection and radioactive iodine.[2] The survival data for a patient with collision tumour is very limited owing to the rarity of the

disease; however, Ryan N et al. suggested that the metastatic and survival rates are consistent with matched single thyroid pathology.[2]

CONCLUSIONS

Collision tumor of thyroid is a rare condition with scarce literature case series reported. It poses management challenges for these tumors. As no clear hypothesis is able to describe clearly the pathogenesis of this tumor, a combination of several hypotheses must be embraced for better understanding. The best management of this tumor should be based on the multidisciplinary team decision with the most aggressive tumor should be the target treatment.

REFERENCES

1. Brandwein-Gensler M, Urken M, Wang B. Collision tumor of the thyroid: a case report of metastatic liposarcoma plus papillary thyroid carcinoma. Head Neck. 2004; 26:637-641.
2. Ryan, N., Walkden, G., Lazic, D., & Tierney, P. Collision tumors of the thyroid: A case report and review of the literature. Head & Neck.2015; 37(10), E125–E129.
3. Baloch ZW, Mandel S, LiVolsi VA. Combined tall cell carcinoma and Hurthle cell carcinoma (collision tumor) of the thyroid. Arch Pathol Lab Med. 2001;125:541-543
4. Sinno, S., Choucair, M., Nasrallah, M., Wadi, L., Jabbour, M. N., & Nassif, S. Activating BRAF Mutations Detected in Mixed Hürthle Cell Carcinoma and Multifocal Papillary Carcinoma of the Thyroid Gland. International Journal of Surgical Pathology. 2016; 24(6), 519–524.
5. Bray, F., Ferlay, J., Soerjomataram, I., Siegel, R. L., Torre, L. A., & Jemal, A. Global Cancer Statistics 2018: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries.2018;CA: A Cancer Journal for Clinicians.
6. Davies L, Welch HG. Current Thyroid Cancer Trends in the United States. JAMA Otolaryngol Head Neck Surg. 2014;140(4):317–322.
7. American Cancer Society. April 12, 2012. Cancer facts and figures. Available at: http://www.cancer.org /cancer/thyroidcancer/detailedguide/thyroidcancer-key-statistics. Accessed February 06, 2021
8. Warren S, Gates O. Multiple primary malignant tumours. Am J Cancer 1932; 16:1358–1414.
9. Baloch ZW, Mandel S, LiVolsi VA: Combined tall cell carcinoma and Hurthle cell carcinoma (collision tumor) of the thyroid. Arch Pathol Lab Med 2001, 125:541-543
10. Walvekar RR, Kane SV, D'Cruz AK. Collision tumor of the thyroid: follicular variant of papillary carcinoma and squamous carcinoma. World J Surg Oncol 2006; 4:65.
11. Zhang Z, Min J, Yu D, Shi H, Xie D. Renal collision tumour of papillary cell carcinoma and chromophobe cell carcinoma with sarcomatoid transformation: A case report and review of the literature. Can Urol Assoc J 2014;8:E536-9.
12. Lax SF, Beham A, Kronberger–Sch€onecker D, Langsteger W, Denk H. Coexistence of papillary and medullary carcinoma of the thyroid glandmixed or collision tumour? Clinicopathological analysis of three cases. Virchows Arch 1994; 424:441–447.
13. Wong RL, Kazaure HS, Roman SA, Sosa JA. Simultaneous medullary and differentiated thyroid cancer: a population-level analysis of an increasingly common entity. Ann Surg Oncol 2012; 19: 2635–2642