

## Case Report

# Synchronous papillary thyroid carcinoma and follicular thyroid carcinoma: case report and review of literature

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**Abstract:** Collision tumor is a term denoting two histologically distinct tumor types occurring at the same anatomic site, which is a rare clinical entity. In the thyroid gland, collision tumors are rare. Here we report a case of the synchronous occurrence of follicular thyroid carcinoma (FTC) and papillary thyroid carcinoma (PTC). The current case report describes a 40-year-old woman with synchronous FTC and PTC. Pathologists and surgeons should be aware of collision tumors to avoid possible misdiagnosis.

**Keywords:** Collision tumor, follicular thyroid carcinoma, papillary thyroid carcinoma, thyroid.

## Introduction

Papillary thyroid carcinoma (PTC) is the most common thyroid carcinoma, and is derived from thyroid follicular cells. Collision tumor is a term denoting two histologically distinct tumor types occur at the same anatomic sites, which is a rare clinical entity. The organs most implicated are the stomach, liver, adrenal gland, lungs, ovary, kidneys, and colon [1]. In the thyroid gland, collision tumors are rare, constituting about only 1% of all thyroid malignancies, and the most frequently identified combination is foci of PTC with medullary thyroid carcinoma [2-4]. Here we report a case of the synchronous occurrence of follicular thyroid carcinoma (FTC) and PTC.

## Case presentation

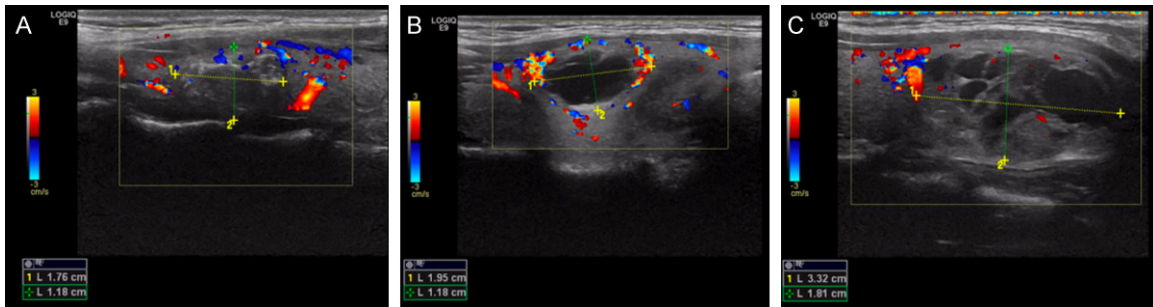
A 40-year-old woman was referred to our hospital due to the nodules in a thyroid lobe detected on ultrasonography (US) during a routine health checkup (**Figure 1**). She did not have history of neck radiation or familial thyroid cancer. The initial laboratory findings showed normal thyroid function tests (including thyroid stimulating hormone, free T3 and free T4, and calcitonin). Tumor marker tests for carbohydrate antigen 19-9, carbohydrate antigen 125,

carcinoembryonic antigen, and alpha-fetoprotein were all within the reference range.

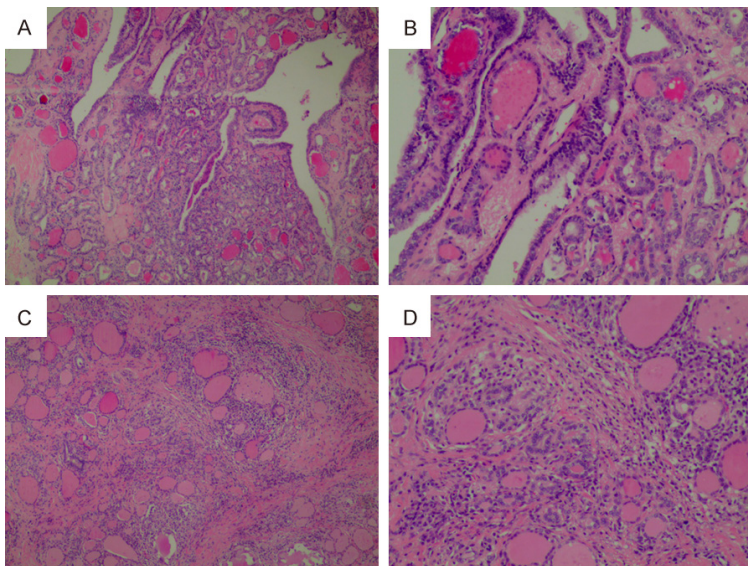
According to preoperative US, the nodule in the right lobe was considered a malignant tumor, therefore, the patient underwent total thyroidectomy plus central lymph node dissection. There were no postoperative complications.

Postoperative pathology suggested that the nodule with a size of about 1.8 \* 1.2 cm in the right lobe was PTC, and there were no metastatic lymph nodes in the central compartment (**Figure 2**). As for the nodule in the left lobe, histopathology revealed the nodule was FTC with papillary hyperplasia (**Figure 3**). Immunohistochemistry was performed using a panel of antibodies to tumor markers, which showed that the tumor cells were positive for cytokeratin 19 and thyroglobin, and about 1% positive staining for Ki67, while negative for calcitonin, Galectin-3, chromogranin A, synaptophysin, CD56, and TIF-1 (**Figure 4**). These findings further confirmed the diagnosis of FTC.

She was initiated on suppressive doses of thyroid hormone replacement therapy following thyroidectomy and the dose was subsequently increased to maintain thyroid stimulating hormone levels less than 0.1 µIU/mL. During the follow-up, thyroglobulin level declined to less



**Figure 1.** Preoperative ultrasound findings. A. In the middle part of the right lobe of the thyroid gland, a nodule with a size of about 1.8 \* 1.2 cm was seen, with irregular shape and unclear borders. The interior of the mass was hypoechoic and unevenly distributed, with scattered sand-like and arc-like calcification strong echoes. CDFI: a few blood flow signals can be seen at the edge of the nodule. B. There was a mixed echo nodule in the right lobe of the thyroid gland, and the size was about 2.0 \* 1.2 cm. The shape was oval, and the boundary was clear. CDFI: a few blood flow signals can be seen in and around the nodule. C. In the left lobe of the thyroid, a medium-echo nodule could be seen, with a size of about 3.3 \* 1.8 cm, and a strong mass echo can be seen inside. CDFI: a small amount of blood flow signal can be seen in and around the nodule.



**Figure 2.** Routinely stained hematoxylin and eosin (H&E) photomicrographs of papillary thyroid carcinoma (PTC) in the right lobe. A. The PTC component at magnification  $\times 100$ . B. The PTC component at magnification  $\times 200$ . C. The lymph nodes in the right central compartment showed reactive hyperplasia (H&E stain,  $\times 100$ ). D. The lymph nodes in the right central compartment showed reactive hyperplasia (H&E stain,  $\times 200$ ).

than 0.04 ng/mL and anti-thyroglobulin remained negative ( $< 1.0$  IU/mL). Twenty-six months after initial surgery, swollen lymph nodes were detected in the fourth area of the right and left neck, respectively (**Figure 5**). Fine needle aspiration biopsy and thyroglobulin detection were performed for these suspected lymph nodes. Lavage fluid showed thyroglobulin was less than 0.04 ng/mL. Pathology suggested that the needle-sampled lymph nodes had reactive hyperplasia.

## Discussion

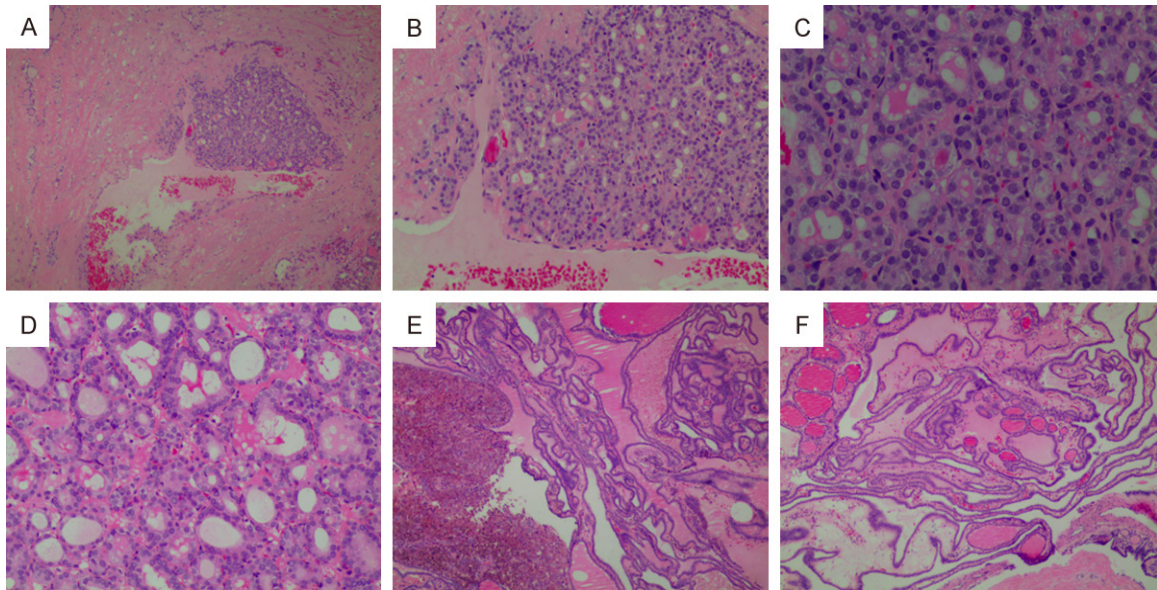
Papillary (PTC) and follicular (FTC) tumors of the thyroid originate from the foregut endoderm, and are characterized by ground-glass nuclei, and lymphatic versus blood-stream metastasis with immunoreactivity for thyroglobulin [5]. PTC is the most common tumor of the thyroid, comprising about 70% to 90% of thyroid cancers. FTC, which tends to spread by hematogenous routes, is the second most common type of malignancy in thyroid, accounting for 5% of cases.

The synchronous or metachronous presence of two neoplasms is rare, especially in the thyroid, and presents a diagnostic and treatment challenge.

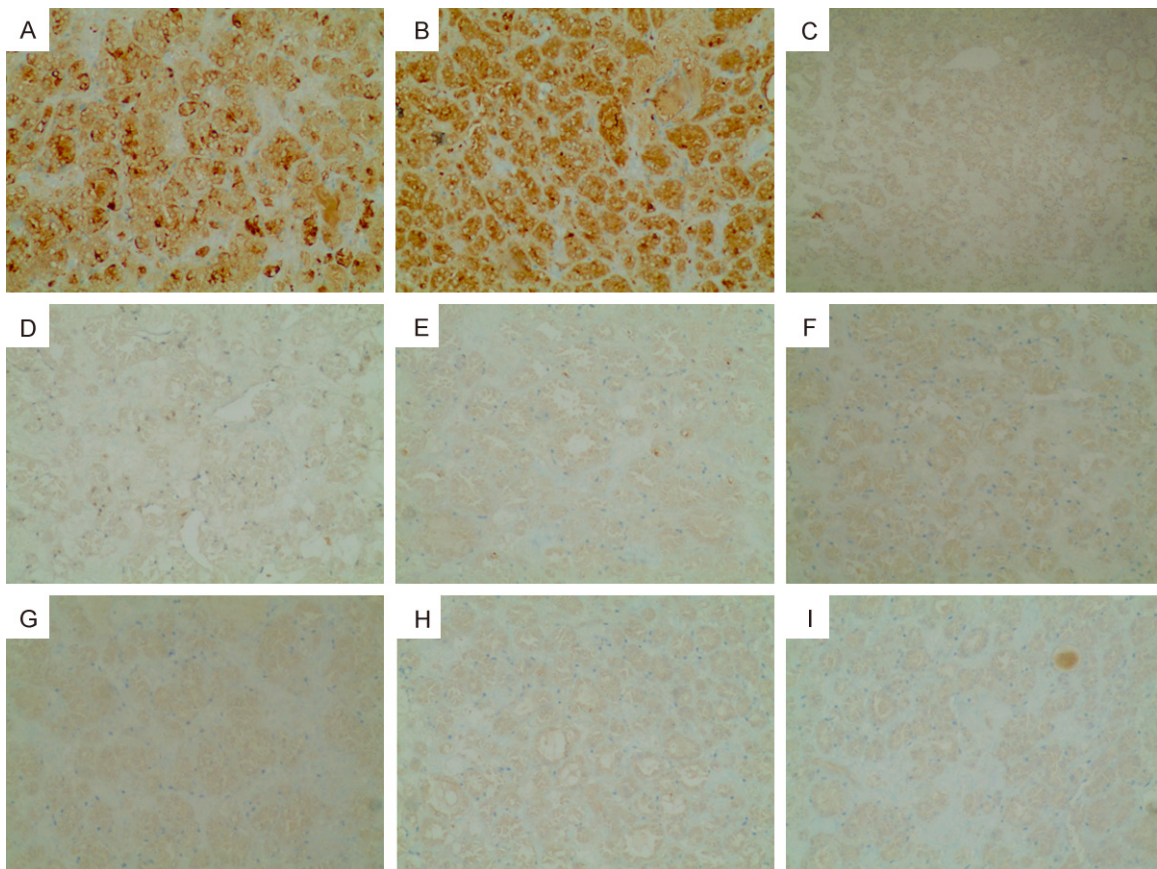
Previous literature has reported the simultaneous concurrent occurrence of medullary thyroid carcinoma (MTC) and FTC. Hypotheses, such as stem cell theory, a single progenitor cell theory, and collision theory have been used to explain the simultaneous occurrence of thyroid neoplasms of different cellular origins [1, 6-8]. The stem cell theory postulates that cancer stem cells, which differentiate into different tumor cell lines, have the capacity to acquire a thyrocyte phenotype when exposed



## Thyroid collision tumor

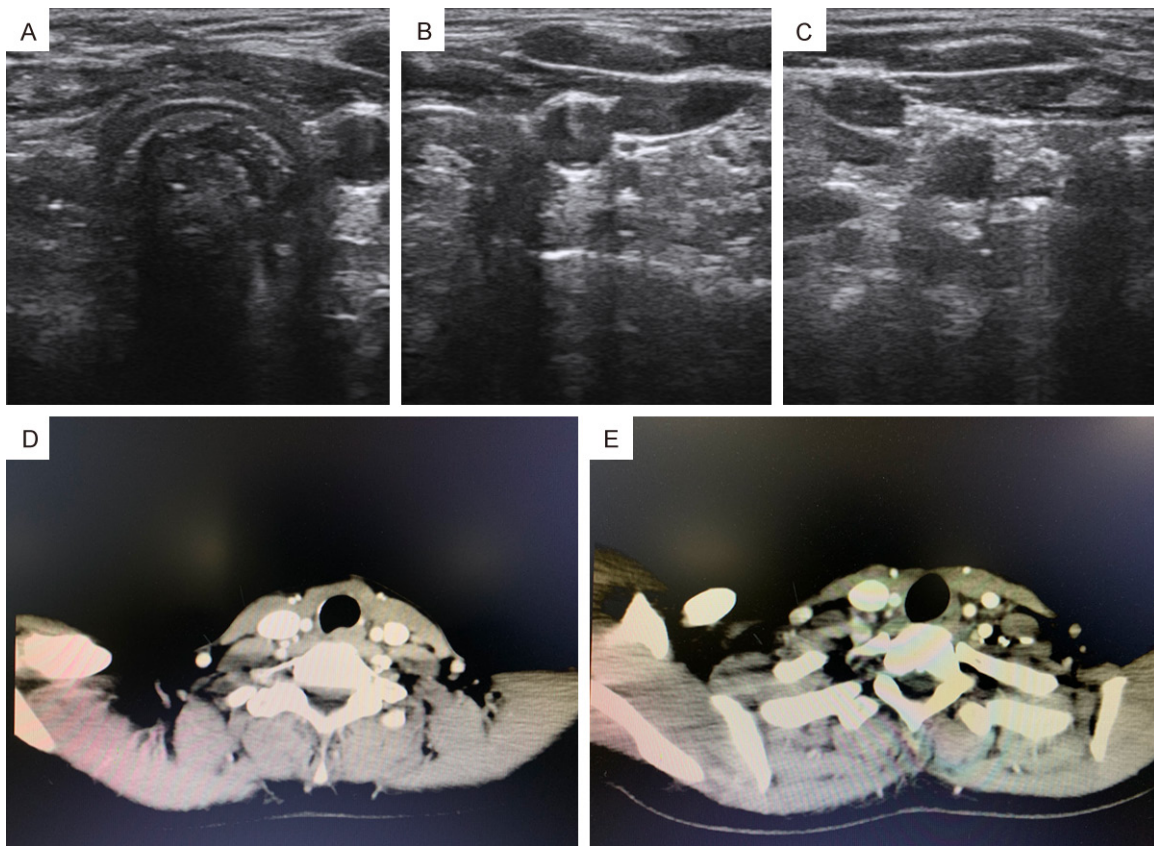


**Figure 3.** Routinely stained hematoxylin and eosin (H&E) photomicrographs of follicular thyroid carcinoma in the left lobe. A. The infiltrating thyroid follicular carcinoma component at magnification  $\times 40$ . B. The infiltrating thyroid follicular carcinoma component at magnification  $\times 100$ . C. The infiltrating thyroid follicular carcinoma component at magnification  $\times 200$ . D. The infiltrating thyroid follicular carcinoma component at magnification  $\times 200$ . E. Nodular goiter-like hyperplasia of thyroid tissue around cancer cells (H&E stain,  $\times 40$ ). F. Thyroid tissue around cancer cells with papillary hyperplasia of follicular epithelium (H&E stain,  $\times 40$ ).



## Thyroid collision tumor

**Figure 4.** Immunohistochemical analysis for follicular thyroid carcinoma in the left lobe. The majority of the tumor cells had positive staining for cytokeratin 19 (A) and thyroglobin (B), about 1% positive staining for Ki67 (C), while negative for calcitonin (D), Galectin-3 (E), chromogranin A (F), synaptophysin (G), CD56 (H), and TIF-1 (I).



**Figure 5.** Postoperative imaging examination. A. After total thyroidectomy, there was no abnormality in front of trachea and surroundings. B. There was an abnormal echo lymph node in the fourth area of the right neck, with low internal echo. C. There was an abnormal echo lymph node in the fourth area of the left neck, with low internal echo. D and E. Computed tomography of the neck showed several lymph nodes on both sides of the neck.

to genetic alterations. The theory of a single progenitor cell assumes that the development of a MTC with normal follicles trapped among cancer cells is the result of the neoplastic transformation of C cells. MTC cells provide the microenvironment, which would subsequently stimulate the proliferation of the trapped follicular cells into a tumor phenotype capable of metastasizing. Collision theory suggests that two separate and distinct tumor types get initiated in close proximity to one another, thus resulting in a polyclonal neoplasm.

Due to the dual pathology of the tumor tissue, and given the scarce literature on this condition, the treatment of thyroid collision tumors is often complicated. Ryan et al. recommended that the most aggressive neoplasm should

guide treatment. Moreover, surgical management with adjunct therapy is also essential [9].

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Informed consent was obtained from the individual participant included in the study.

### Disclosure of conflict of interest

None.

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## References

- [1] Thomas V and George R. Collision tumors of the thyroid: review of literature and report of a case of papillary-Follicular collision tumor. *Thyroid Research and Practice* 2018; 15.
- [2] Atespare A, Calis AB, Celik O, Yener N and Vural C. Concurrent medullary and papillary carcinoma of thyroid. *Kulak Burun Bogaz Ihtis Derg* 2015; 25: 170-173.
- [3] Dionigi G, Castano P, Bertolini V, Boni L, Rovera F, Tanda ML, Capella C, Bartalena L and Dionigi R. Simultaneous medullary and papillary thyroid cancer: two case reports. *J Med Case Rep* 2007; 1: 133.
- [4] Zhou J, Luo Y, Ma BY, Ling WW and Zhu XL. Contrast-enhanced ultrasound diagnosis of hepatic metastasis of concurrent medullary-papillary thyroid carcinoma: a case report. *Medicine (Baltimore)* 2017; 96: e9065.
- [5] Monden T and Mori M. Many faces of mixed medullary-follicular and papillary carcinoma of the thyroid. *Intern Med* 1998; 37: 909-910.
- [6] Biscolla RP, Ugolini C, Sculli M, Bottici V, Castagna MG, Romei C, Cosci B, Molinaro E, Faviana P, Basolo F, Miccoli P, Pacini F, Pinchera A and Elisei R. Medullary and papillary tumors are frequently associated in the same thyroid gland without evidence of reciprocal influence in their biologic behavior. *Thyroid* 2004; 14: 946-952.
- [7] Kim WG, Gong G, Kim EY, Kim TY, Hong SJ, Kim WB and Shong YK. Concurrent occurrence of medullary thyroid carcinoma and papillary thyroid carcinoma in the same thyroid should be considered as coincidental. *Clin Endocrinol (Oxf)* 2010; 72: 256-263.
- [8] Rios A, Rodriguez JM, Ferri B, Balsalobre MD and Parrilla P. Association of medullary and differentiated thyroid carcinomas. *Otolaryngol Head Neck Surg* 2006; 135: 473-475.
- [9] Ryan N, Walkden G and Lazic D, Tierney P. Collision tumors of the thyroid: A case report and review of the literature. *Head Neck* 2015; 37: E125-129.