

Vascular Invasion of Papillary Thyroid Carcinoma into Neck Veins and Superior Vena Cava: A Case Report

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ABSTRACT

Papillary thyroid cancer is the most common thyroid malignancy in women which spreads through lymphatic. Even though microscopic vascular invasion has been published in the recent past, direct venous extension is rare. This case report is about a rare presentation of a Fine Needle Aspiration Cytology (FNAC) proven papillary thyroid carcinoma in a 45-year-old female patient, who presented with a swelling in the neck. The Contrast Enhanced Computed Tomography (CECT) of the neck showed multiple nodular lesions of both lobes of thyroid extending to the retrosternal region and direct tumour thrombus extension to thyroid veins, External Jugular Vein (EJV), Superior Vena Cava (SVC) and subcutaneous veins of neck with lung metastases.

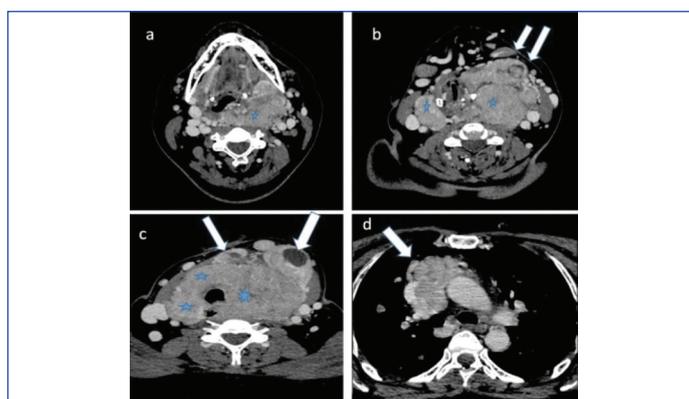
Keywords: Thyroid malignancy, Tumour thrombus, Venous extension

CASE REPORT

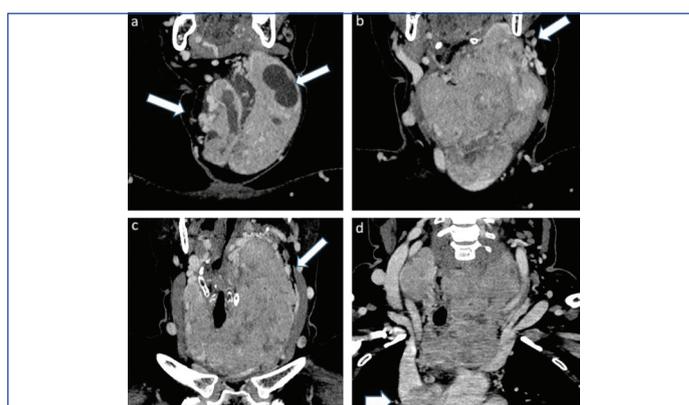
A 45-year-old female presented to the Outpatient Department (OPD) of department of surgery with a history of swelling in the neck for one and half years, she had breathlessness and discomfort while swallowing of less than one-week duration. She was a known diabetic for one year and was on medication. Clinical examination revealed a large swelling measuring approximately 20×10 cm, in the thyroid region with more prominence towards left-side. The swelling was moving while deglutition. The surface was smooth with no local rise of temperature and no tenderness. Patients' vitals were stable. Laboratory investigations for thyroid function tests revealed mild elevated serum Triiodothyronine (T3) and levels (2.71 ng/mL), low Thyroxine (T4) levels (3 ug/dL) and normal Thyroid Stimulating Hormone (TSH) levels (1.68 uIU/mL). Renal function tests (Blood Urea-16.5 mg/dL, Creatinine-0.59 mg/dL, Uric Acid-3.5 mg/dL) were normal. With this background features and clinical diagnosis of multinodular goitre, the patient was advised to undergo Ultrasonography (USG) of neck in the department of radiodiagnosis of our hospital for further evaluation.

The USG neck showed grossly enlarged thyroid gland with multiple heterogenous nodular lesions and significantly increased vascularity of left lobe nodular lesions. Since the lower extension of the gland and appearance of subcutaneous extension of nodular lesions were not very clear on ultrasound, further evaluation was carried out with plain and CECT using GE Revolution Evolution 128-Slice machine with slice thickness of 5 mm and postprocessing 1.25 mm multiplanar reformats.

The CECT revealed enlarged thyroid lobes (left>right) and isthmus with multiple enhancing nodular lesions replacing the parenchyma [Table/Fig-1a] with areas of necrosis and calcifications within. More local extension was noted on left-side than on right-side into carotid sheath, prevertebral and retropharyngeal spaces [Table/Fig-1b]. There was direct tumour thrombus extension into neck veins, which was obvious on left-side superiorly at the level of C2 vertebra and inferiorly at the level of root of aorta. At the level of C2 vertebra, direct extension was noted into the left External Jugular Vein (EJV) and its tributaries with involvement of entire course of the veins [Table/Fig-2]. In the retrosternal region, there was extension into distal Internal Jugular Vein (IJV), brachiocephalic vein, SVC, subclavian vein on left-side, left EJV, left superior, middle and inferior thyroid veins [Table/Fig-2]. Similar tumour thrombus was also noticed in the multiple subcutaneous neck veins. The involved vessels of the



[Table/Fig-1]: Contrast Enhanced Computed Tomography (CECT) axial sections of neck with right and left thyroid lobe lesions extend posterior pharyngeal wall (a), Thyroid veins (white arrows) in (b), Superior Vena Cava (SVC), External internal jugular veins (white arrows) in (c), and brachiocephalic vein (d).

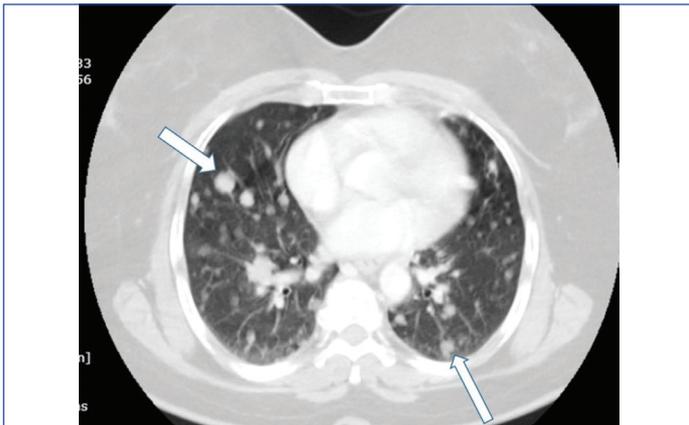


[Table/Fig-2]: Coronal CECT images: White arrows in images indicate dilated tortuous veins with thrombus within (a) extension of thyroid lesion to hyoid (b), tumour thrombus in left external jugular vein (c) and thrombus in brachiocephalic vein (d).

neck were grossly dilated, measuring up to 3 cm in the maximum diameter and showed a tortuous course in the subcutaneous plane of suprasternal notch.

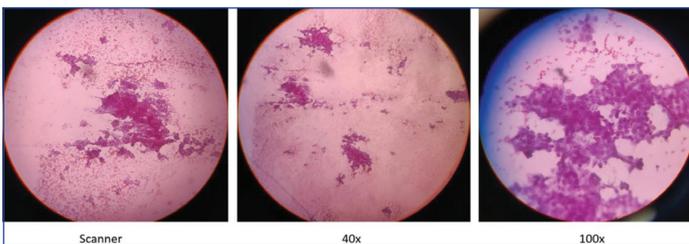
Multiple bilateral lymph nodes of level II and IV were present with maintained normal morphology of size, shape, fatty hilum and absence of necrosis. Multiple, variable-sized, rounded and irregular shaped parenchymal nodular lesions measuring a maximum size of 18 mm were diffusely present in both the lungs [Table/Fig-3]. No suspicious lesions of skeletal system and liver were observed at the

time of examination. Based on local extension and lung features, the imaging diagnosis was made as malignant thyroid lesion with histological differentials of papillary and follicular thyroid carcinoma.



[Table/Fig-3]: Axial Computed Tomography (CT) images of thorax, lung window shows multiple nodular lesions (white arrows) on both sides.

Fine Needle Aspiration Cytology (FNAC) was performed from left lobe thyroid lesion which showed clusters of highly cellular and follicular cells [Table/Fig-4,5]. The cytological diagnosis impression was of papillary carcinoma of thyroid (Bethesda cytology category VI malignant lesion) [1]. Surgery was not attempted as there was diffuse local extension and the patient was subjected to chemotherapy. Patient was advised to take Tablet Lenavato 4 mg, Tablet Ultracet, Tablet Glimy M2 2/500 and Tablet Tenglyn 20 mg for one month and advised close monitoring of liver function tests, thyroid profile and blood sugar levels.



[Table/Fig-4]: Cytology of thyroid lesions show papillary thyroid carcinoma at different magnifications.



[Table/Fig-5]: Fine Needle Aspiration Cytology (FNAC) showing clusters of follicular cells (400X).

DISCUSSION

In general, papillary thyroid carcinoma has an excellent prognosis with mild biological behaviour, however, factors like age, gender, tumour size, lymphatic metastases, distant metastases, capsular invasion and vascular invasion might worsen the clinical outcome [2]. The common presentation of papillary thyroid carcinoma in a locally advanced disease is either lymph nodal metastases and/or

symptoms like dysphagia, dyspnoea and dysphonia. Direct invasion to the regional veins is not a common feature in papillary thyroid carcinoma (2-14%) but associated with high mortality [3,4]. Vascular invasion is the presence of tumour cells either within the lymphatic channels or blood vessels (angio-invasion) and is associated with a high frequency of lymph node metastases, distant metastases and recurrence in many other malignancies [2].

The first two cases of papillary thyroid carcinoma associated with vascular tumour thrombosis were reported by Kauffmann and Graham in 1879, one in the jugular vein and another in the thyroid vein. Since then, few studies of thyroid carcinoma with tumour thrombus into the veins have been published [4]. There are published reports about vascular recurrence of papillary thyroid carcinoma in the jugular vein [5], tumour thrombus extension to IJV [6], cerebral venous thrombosis and pulmonary embolism [7].

Tumour thrombosis of large veins is observed more frequently in hepatocellular carcinoma and renal cell carcinoma where there is direct extension of tumour thrombus into adjacent draining veins [6]. This type of extension in thyroid malignancies was documented in Hurthle cell carcinoma and follicular carcinoma with microscopic invasion into great cervical veins [6,8]. Whereas, papillary thyroid carcinoma has most common documented spread through lymphatics than haematogenous spread. The intravascular extension is even rarer in Papillary Thyroid Carcinoma (PTC), which can vary in extent [8]. The intravascular extension starts at thyroid veins where there is intraluminal invasion of tumour cells and deposition of fibrin, which prevents tumour cells invasion of endothelium [9]. This intravascular extension has to be differentiated from extravascular extension which is common in anaplastic thyroid carcinoma [6]. However, any type of vascular invasion has poor outcome with high chances of pulmonary and distant metastases [10].

The lymph nodal metastases in papillary carcinoma may correlate with lymphatic channel invasion whereas angio-invasion may be associated with distant metastases [2]. According to studies conducted by Mete O and Asa SL, Gardener RE et al., Nishida T et al., and Chung DJ et al., papillary carcinoma with vascular invasion are more aggressive than those without [3,11-13]. The study conducted by Cao J et al., in 412 patients, the incidence of tumour multifocality in patients with vascular invasion PTC was slightly higher than in those without vascular invasion and following aggressive therapy regimens they showed decreased distant recurrence-free survival compared to patients, who had no vascular invasion stating that vascular invasion is an independent risk factor for distant recurrence free survival, which necessitates need for postoperative treatment and follow-up [2].

Clinical diagnosis of vascular tumour thrombus is difficult, which is solely dependent on site and extent of tumour thrombus. However, features like presence of dilated neck veins and or unilateral upper limb swelling might indicate extensive involvement of large veins such as subclavian vein or superior vena cava. Preoperative imaging with USG combined with Doppler and/or CECT in arterial and venous phase, has a significant role in its diagnosis [6,10]. The study reported by Al-Jarrah Q et al., showed that USG neck was helpful in identifying the solitary lesion which showed local extension. However, tumour thrombus extension to the ipsilateral jugular vein was identified preoperatively [6]. In the present case due to extensive local spread of the lesions of both thyroid lobes, CECT was more helpful in identifying the superior and inferior extension of the thyroid lesions, tumour thrombus extension into the EJV, and to the SVC resulting in multiple varices in the neck region. In addition to these CECT had added advantage of identifying lung metastases which further supported the finding of vascular invasion of the tumour thrombus. Lymph nodal metastases was not a prominent feature in patient in the present case, as none of the lymph nodes met the criteria of pathological lymph nodes on CT/USG.

CONCLUSION(S)

Intravascular extension of tumour thrombus in papillary carcinoma of thyroid is uncommon and might be associated with serious complications, distant metastases and recurrence. Hence, preoperative diagnosis is important, which might alter treatment plan and management. In addition to USG neck with Doppler, CECT would definitely help in diagnosis of local extension and vascular invasion.

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