

A rare case of minimally invasive follicular thyroid cancer with intraluminal superior vena cava and right atrium metastases

ABSTRACT

Follicular thyroid cancers are known to spread hematogenously to the bones and lungs and rarely presenting with massive angioinvasion. We report a case of a middle-aged female who had undergone total thyroidectomy for minimally invasive follicular thyroid cancer with angioinvasion in 2014. She was noted to have a large tumor thrombus extending from the superior vena cava to the right atrium on whole body scan post-iodine-131 (¹³¹I) remnant ablation therapy. We discuss the various imaging modalities, treatment options, and difficulties in managing such massive angioinvasion in patients with well-differentiated thyroid cancers.

Keywords: Intracardiac, metastases, radioiodine-131, thyroid cancer

INTRODUCTION

Follicular thyroid cancer (FTC) constitutes approximately 10%–15% of the total incidence of well-differentiated thyroid cancers worldwide. FTC is generally divided into either minimally invasive (MI-FTC) or widely invasive (WI-FTC) types. There are mixed reports of the clinical outcome for MI-FTC with some reporting the benign clinical course of the disease and the others reporting the more aggressive metastatic nature of the disease.^[1] We report a rare case of a female with MI-FTC with metastases to the superior vena cava (SVC) and right atrium.

CASE REPORT

A 57-year-old woman with underlying diabetes mellitus and hypertension initially presented with thyrotoxicosis and anterior neck swelling in early 2013 and was treated for toxic multinodular goiter. However, she had total thyroidectomy in April 2014 when the progressively enlarging goiter caused dysphagia. The histopathology report revealed minimally invasive follicular thyroid cancer with angioinvasion. The large 17 cm lesion in the right thyroid gland extended to the left gland through the isthmus (pT3N0). She was started

on thyroxine suppression (150 mcg daily) and referred for radioiodine-131 (¹³¹I). Her first post-¹³¹I remnant ablation scan in 2015 revealed iodine-avid lesions in the neck and mediastinum [Figure 1]. Contrast-enhanced computed tomography (CECT) of the neck and thorax in March 2016 revealed no obvious lesion in the neck, but there was a filling defect in the SVC extending into the right atrium suggesting intraluminal SVC thrombosis with intracardiac extension or SVC tumor with intracardiac extension. Despite the extensive lesion, there were no signs and symptoms of SVC obstruction. She was started on warfarin and had repeated ¹³¹I therapies with cumulative doses of 25 GigaBecquerel (GBq).

Magnetic resonance imaging of the thorax in January 2017 revealed an SVC mass extending into the right atrium. The mass measured approximately 8.6 cm × 3.9 cm × 3.9 cm

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with clear demarcation of the lesion from the interatrial septum [Figure 2a]. A repeat CECT on March 10, 2017, showed extensive thrombus from the right brachiocephalic vein confluence up to the right atrium with irregular filling defects signifying non-patent part of the lesion [Figures 2b and c].

The transesophageal echocardiography in June 2016 revealed a well-circumscribed mass with regular margin in the right atrium arising from the SVC with neither dilatation of the cardiac chambers nor regional wall motion abnormalities. There was only trivial tricuspid regurgitation. No septal defects were noted. The left ventricular ejection fraction was measured at 60% [Figure 2d].

The post-¹³¹I therapy (5.6 GBq) scan on February 27, 2017, revealed intense iodine uptake in the mediastinum and faint uptake in the neck [Figure 3]. The uptake in the neck has reduced compared to the previous scans, but the uptake in the mediastinum remained relatively intense. If the residual disease was due to the uptake in the neck alone, the thyroglobulin (Tg) levels would have reduced in tandem. However, the Tg levels remain persistently elevated (>300 ng/mL) with negative anti-Tg levels. She remains well and is still adamant to continue treatment with ¹³¹I rather than other forms of intervention. The definite diagnosis of the mediastinum lesion remains unknown, but the likelihood of it being tumor thrombus is high due to the persistently elevated Tg levels. Therefore, treatment with ¹³¹I remains the best available treatment option for her.

DISCUSSION

The classification of follicular thyroid cancer into widely invasive follicular thyroid cancer (WI-FTC) and minimally-invasive follicular thyroid cancer (MI-FTC) is frequently questioned due to the mixed reports of favorable and aggressive behaviors of MI-FTC. Therefore, some clinicians would further classify these tumors by identifying the presence of angioinvasion, for example, MI-FTC with angioinvasion and MI-FTC without angioinvasion. The identification of MI-FTC without angioinvasion and the other FTC with angioinvasion is useful in terms of prognostic and therapeutic purposes.

While MI-FTC without angioinvasion carries a relatively good prognosis, MI-FTC with angioinvasion, and WI-FTC with or without angioinvasion carries higher potential of metastatic disease. FTC is known to metastases hematogenously to involve the lungs and bones, and it is rare for FTC to present with massive angioinvasion, and the prognosis for such cases is grave.^[2] With the extensive thrombus from the confluence of the right brachiocephalic vein up to the right atrium seen in this case, the patient

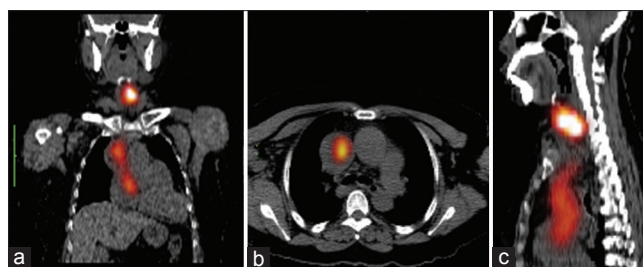


Figure 1: Fused single photon emission computed tomography coronal, axial and sagittal (a-c) images of postradioiodine-131 therapy (5.6GBq) in 2015 showing intense uptake in the thyroid bed, superior vena cava and right atrium

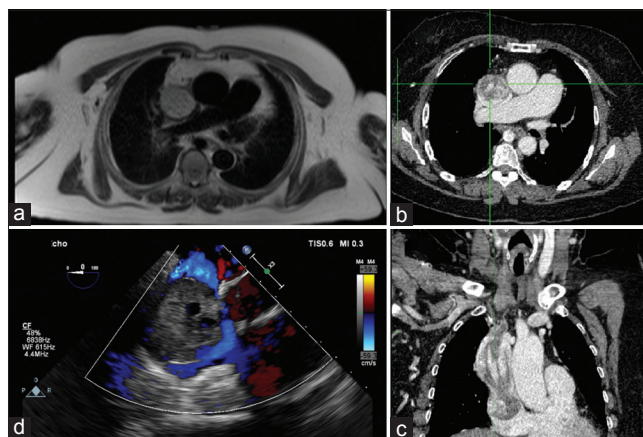


Figure 2: Combo images showing the tumor thrombus in relation to the heart in axial T1-sequence magnetic resonance imaging thorax (a), axial view of contrast-enhanced computed tomography thorax (b), coronal view of contrast-enhanced computed tomography thorax (c) and transesophageal echocardiogram (d)

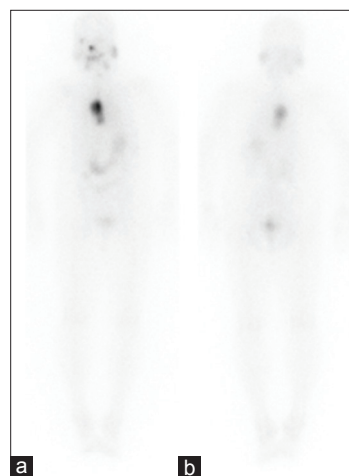


Figure 3: Postradioiodine-131 therapy scan on February 27, 2017 (a) anterior view, (b) posterior view showed intense uptake in the mediastinum and faint uptake in the neck. Physiological uptake is seen elsewhere

has a high risk of pulmonary embolism and obstructed tricuspid valve.

The lesion seen in the SVC up to the right atrium is likely due to tumor thrombus. The CT findings for this case are fairly

similar to the findings described by Thomas *et al.* For purely venous thrombus; the typical CECT findings include distended veins with enhancing walls, low-attenuating intraluminal filling defects, and adjacent soft-tissue swelling. On the contrary, tumor thrombus show enhancing heterogeneous intraluminal tumor thrombi and low-density thrombi surrounded by a rim of contrast.^[3] Nevertheless, it is occasionally difficult to distinguish venous thrombus and tumor thrombus as both may occur concurrently. Therefore, the early initiation of anticoagulants to prevent and dissolve the existing thrombus is essential.

Surgery remains the mainstay in the management of such cases, but there are no definite management guidelines to date. Vascular resection and reconstruction is the preferred choice in poorly differentiated and papillary thyroid cancers whereas thrombectomy is more often performed for follicular tumors. Transcervical tumor thrombectomy has been shown to be a safe surgical option in patients with positive “ring” sign, which is a thin rim of contrast surrounding the thrombus on CECT.^[4,5] Thrombectomy is thus possible in this case as there was no adherence to the venous wall.

Radiation therapy is possible in the event of the manifestation of SVC syndrome. In fact, radiation therapy has been shown to be effective and safe as demonstrated by Davenport *et al.* in 1976.^[6] Nevertheless, radiotherapy is not without side effects and complications. The risk of cardiac toxicity is high as the lesion, in this case, involves not only the SVC but also the right atrium.

Nevertheless as forementioned, the patient had refused the options for either surgery or radiotherapy, and preferred to be treated with ¹³¹I and anticoagulants. This case illustrates the various imaging modalities and, treatment options, in managing well-differentiated thyroid cancer with intraluminal SVC and right atrium metastasis.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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