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Case Report

Surgery Section

Papillary Thyroid Carcinoma in a Toxic Retrosternal Goitre: A Case Report

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ABSTRACT

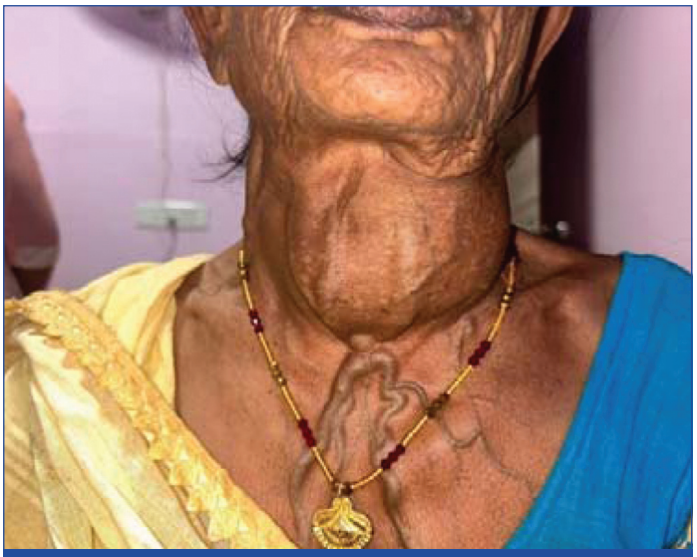
Thyroid nodules are common worldwide, with Multinodular Goitre (MNG) accounting for the majority of benign thyroid disease. Although hyperfunctioning ("toxic") nodules have traditionally been considered at low-risk for malignancy because of chronic Thyroid Stimulating Hormone (TSH) suppression, emerging evidence suggests a clinically significant incidence of occult carcinoma, particularly in the presence of underlying molecular alterations. Retrosternal extension further complicates evaluation. A 64-year-old woman presented with a five-year history of painless anterior neck swelling and a recent onset of difficulty in breathing when lying down. Clinical and biochemical evaluation revealed hyperthyroidism, and imaging demonstrated a large, heterogeneous thyroid mass with retrosternal extension and compressive features. Due to concerning clinical and imaging findings, she underwent total thyroidectomy. Histopathology confirmed a follicular variant of papillary thyroid carcinoma arising within a toxic MNG. The patient recovered well postoperatively with levothyroxine replacement and remained asymptomatic at follow-up. This case highlights the rare occurrence of malignancy within a hyperfunctioning thyroid nodule and underscores the importance of thorough evaluation and multidisciplinary management in patients with atypical thyroid swellings, especially when retrosternal extension or suspicious imaging features are present.

Keywords: Compressive features, Hyperfunctioning thyroid nodule, Hyperthyroidism, Retrosternal extension, Thyroidectomy

CASE REPORT

A 64-year-old woman, from a rural region in India, presented to our outpatient clinic with a history of a gradually enlarging thyroid swelling. The swelling was first noticed by a relative about five years prior, initially small and asymptomatic. Over time, the swelling progressively increased in size. The patient began experiencing difficulty breathing when lying on her right-side, which gradually worsened. She did not report difficulty in swallowing or any voice changes. Her medical history was otherwise unremarkable. She had been on irregular antithyroid drug carbimazole 5 mg three times daily and propranolol 20 mg tid for the toxic symptoms like heat intolerance and palpitations for one year before presenting to our clinic. There was no significant family history of thyroid disease, cancer or autoimmune conditions. She had no history of exposure to radiation or known goitrogens.

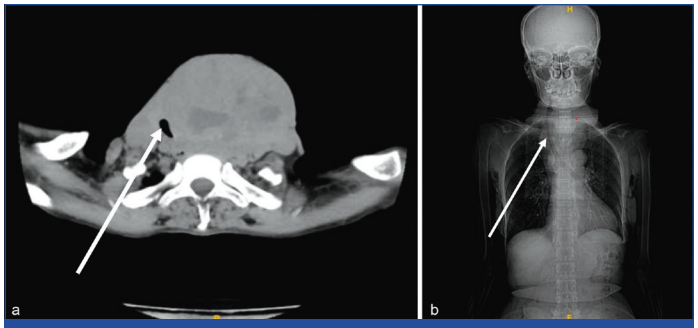
On examination, the patient was comfortable at rest, with no signs of respiratory distress. Neck examination revealed a 10 x 6 cm nodular thyroid swelling that was firm and non tender on palpation. The lower border of the thyroid swelling was not felt, suggesting retrosternal extension. Engorged superficial veins were visible over the neck and upper chest [Table/Fig-1]. There was no palpable cervical lymphadenopathy. The trachea was grossly deviated to the right. Bilateral carotid artery pulsations were palpable and normal. Pemberton's sign was positive, indicating significant retrosternal extension with compression of major neck veins. The systemic examination was unremarkable. Blood tests showed elevated free T3 (16.25 pmol/L), free T4 (32.63 pmol/L) and decreased thyroid-stimulating hormone (<0.005 mIU/L). Antithyroglobulin antibodies were elevated (215 IU/mL), and Antithyroid peroxidase antibodies were normal. She was diagnosed with toxic MNG with retrosternal extension. Neck radiograph exhibited a well-defined anterior neck mass with tracheal deviation to right and no calcifications within thyroid. Neck ultrasonography identified a hypoechoic, mixed solid-cystic lesion (8.4×6.7×5.1 cm) in the left thyroid lobe, classified as Thyroid Imaging, Reporting and Data System (TIRADS) IV. Computed tomography of the neck and thorax revealed a heterogeneously enhancing thyroid swelling (10.9×8.8×7.5 cm) with retrosternal extension to the T5 vertebral level, with gross distortion and displacement of the trachea, oesophagus, and major vessels [Table/Fig-2]. Few insignificant sub-centimetric cervical lymph nodes were noted. The possibility of tracheomalacia was considered due to longstanding compression from the huge goitre.



[Table/Fig-1]: Large goitre with retrosternal extension and venous compression.

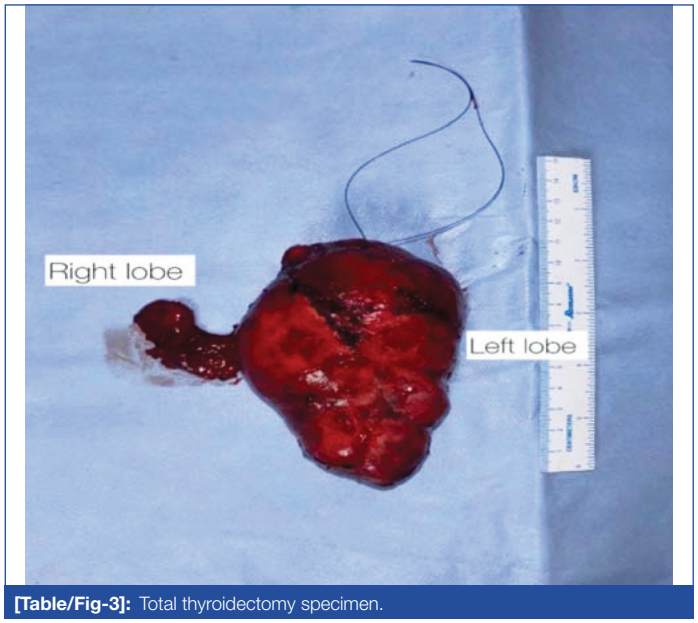
The patient was prepared for surgery with a fast-track protocol utilising high-dose beta blockade and a short course of Inj. Dexamethasone (2 mg twice daily) for 10 days. This is our unit policy, tried and tested for many years, and has been successful in preparing patients much earlier rather than waiting for 3-4 weeks, which is the usual practice.

The repeat TFT at 10 days of therapy showed both free T3 (7.3 pmol/L) and free T4 (10.3 pmol/L) within normal limits. Video



[Table/Fig-2]: a) CT transverse section showing grossly shifted and compressed trachea (white arrow); b) CT scout film view showing right-sided tracheal shift with bent pipe appearance (white arrow).

direct laryngoscopy revealed mobile bilateral vocal cords. Thoracic surgeons were on standby for a standby sternotomy in case of difficulty while delivering the goitre via the cervical route. Intraoperative bronchoscopy was arranged to assess possible tracheomalacia before extubating. Ear, Nose and Throat (ENT) surgeons were also involved for the possible need for tracheostomy in case of severe tracheomalacia. Total thyroidectomy was successfully completed via the low trans cervical route, thus avoiding the need for sternotomy. Intraoperatively, a grossly enlarged left lobe of thyroid was noted with increased vascularity and adhesions to surrounding structures. Bilateral recurrent laryngeal nerves and parathyroid glands were identified and preserved [Table/Fig-3].

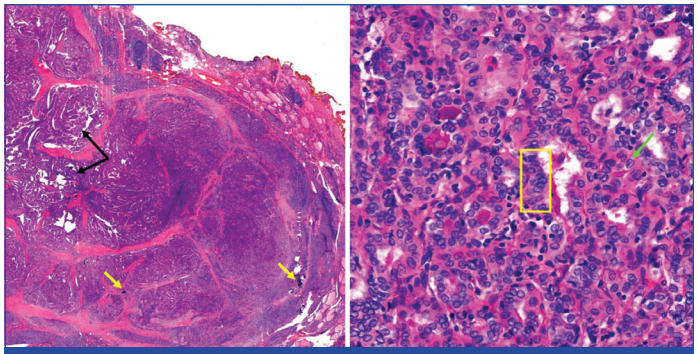


[Table/Fig-3]: Total thyroidectomy specimen.

Gross examination of the thyroidectomy specimen revealed a 9x7.5x6 cm lesion in left lobe. Microscopic examination revealed a follicular variant of papillary thyroid carcinoma in the left lobe and hyperfunctioning follicles with thyroiditis. No extracapsular spread, lympho-vascular invasion or lymph node involvement seen. Right lobe showed multiple colloid filled nodules. Resected margins were negative for tumour invasion [Table/Fig-4]. Patient received a tablet containing Calcium 500 mg with Vitamin D 250 units four times daily for four weeks to alleviate her transient hypocalcaemia (serum calcium levels were 7.5 mg/dL). Her serum calcium levels returned to normal at four weeks of follow-up. As the patient had a papillary carcinoma nodule > 4 cm in one lobe, she was categorised as an intermediate -risk type and hence referred to the regional nuclear medicine centre for a radioactive iodine thyroid scan that showed no remnant thyroid tissue. The patient was started on a suppressive dose of levothyroxine (1.6 µg/kg/day) and advised regular surveillance.

DISCUSSION

The MNG is the thyroid condition most frequently associated with retrosternal extension and is the most common indication for surgical intervention [1]. Although chronic TSH suppression in toxic MNG has traditionally been considered protective against malignant transformation by reducing trophic stimulation of thyroid follicular cells, accumulating molecular evidence suggests that autonomous nodules may still undergo neoplastic progression through TSH-independent oncogenic pathways. Activating mutations involving the MAPK and PI3K/AKT signaling cascades, particularly BRAF V600E, RAS, TERT promoter, and PAX8 alterations, have been implicated in thyroid carcinogenesis even within hyperfunctioning nodules [2,3].



[Table/Fig-4]: Histopathology showing features of papillary carcinoma a) Papillary thyroid carcinoma, follicular variant: characterised by papillary architecture with fibrovascular cores (black arrows)and calcified psammoma bodies (yellow arrow) (H&E, 20x); b) Papillary thyroid carcinoma, follicular variant: characterised by enlarged, overlapping nuclei (yellow box) with nuclear clearing and nuclear grooves (green arrow) (H&E,100x).

Ultrasound examination is the imaging modality of choice for papillary thyroid carcinoma. Sonographic features include a hypoechoic or isoechoic solid nodule with irregular or poorly defined margins, micro-calcifications, taller-than-wide shape, and disorganised internal vascularity. Other imaging modalities, including Computed Tomography (CT), Magnetic Resonance Imaging (MRI), and Fluorodeoxyglucose - Positron Emission Tomography (FDG-PET), may be needed to assess the extent of extra-thyroidal extension, evaluate the presence of substernal masses, detect recurrent tumours, and improve diagnostic accuracy [3]. In this case, a CT scan revealed retrosternal extension to the T5 vertebral level.

Malignancy rates in retrosternal goitre range from 12-21%, with papillary thyroid carcinoma being the most frequent subtype, though follicular, Hürthle cell, medullary, lymphoma, and even anaplastic carcinoma have been reported [4,5]. This histologic diversity combined with the frequent occult intrathoracic extension of tumours mandates thorough radiological and pathological assessment of retrosternal goitres even in the absence of overt clinical suspicion for underlying carcinoma [4].

Prete FP et al., demonstrated that a retrospective study of 411 MNG patients showed that thyroid cancer was more common in cervical MNG than retrosternal goitre. However, unexpected thyroid carcinoma rates were similar in both groups, with occult cancers >1 cm identified in 11% of retrosternal goitres, highlighting the risk of clinically significant hidden malignancy despite benign preoperative evaluation [5].

A case report by Ray S et al., highlights that malignancy can co-exist with hyperfunctioning thyroid disease. The findings emphasise the importance of careful clinical, radiological, cytological, and histopathological assessment of suspicious nodules in patients with toxic MNG to avoid missed or delayed diagnosis of thyroid malignancy [6].

CONCLUSION(S)

Although toxic thyroid nodules are generally considered to have a low-risk of malignancy, the possibility should not be overlooked. Careful evaluation is essential in cases presenting with retrosternal extension. Any large vascular retrosternal goitre, toxic or non toxic, must be managed with a high-index of suspicion for underlying malignancy.

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