Case Report

Retrosternal goiter managed with endobronchial ultrasound-guided biopsy and transcervical resection: A case report

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ABSTRACT

Retrosternal goiter is the extension of the thyroid tissue into the mediastinum. We present the case of a 48-year-old man who highlights the diagnostic challenges of such lesions, particularly in the absence of obvious visible neck swelling, and with only minimal symptoms. Subsequently, he presented for follow-up with progressive dyspnea, and repeat imaging revealed marked tracheal narrowing and a large mediastinal mass, raising suspicion for malignancy. Further evaluation with ultrasound, contrast-enhanced computed tomography (CT), and positron emission tomography-CT identified a large cervico-mediastinal thyroid mass with no fluorodeoxyglucose uptake. Endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA) with rapid onsite cytology confirmed as a benign multinodular goiter. The patient underwent a successful transcervical total thyroidectomy, and the 9.8 cm mediastinal component was delivered through the neck without requiring sternotomy. This case highlights the role of EBUS-TBNA as a safe diagnostic tool for retrosternal lesions and also reinforces that even sizable intrathoracic goiters can often be managed through a cervical approach in experienced hands.

Key words: Endobronchial ultrasonography with transbronchial needle aspiration, Mediastinal mass, Positron emission tomography-computed tomography, Retrosternal goiter, Tracheal stenosis, Transcervical-thyroidectomy

Retrosternal goiter (RG), commonly known as substernal or intrathoracic goiter, is characterized by the descent of thyroid tissue into the mediastinum. Although definitions vary in the literature, it is considered retrosternal when over 50% of the thyroid mass lies below the thoracic inlet. These goiters can remain asymptomatic for years and are often discovered incidentally on imaging. However, as they enlarge or change position, they may exert compressive effects on adjacent structures, and leading to symptoms [1]. The majority of RGs are benign and usually result from long-standing multinodular goiters. Management of asymptomatic RGs is still up for debate. Some experts suggest early surgery intervention to prevent future complications, while others believe that observation is appropriate in the absence of suspicious or compressive symptoms. Pre-operative planning requires the use of contrast-enhanced computed tomography (CT), which helps determine the best surgical approach. While most cases can be operated through a cervical incision, a sternotomy may be required for extensive mediastinal involvement [2,3]. In addition to imaging, ultrasound-guided fine-needle aspiration (US-FNA) is a safe and reliable method for evaluating thyroid lesions. However, accessing intrathoracic or mediastinal extensions can be technically challenging. In such cases, endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA) offers a minimally invasive alternative, though its use in thyroid lesions remains uncommon [4,5].

This case report describes an RG causing progressive dyspnea, successfully managed by combining EBUS-TBNA and transcervical surgery. This strategy enabled accurate diagnosis and effective treatment while avoiding more invasive procedures, such as sternotomy or thoracotomy. Our study adds to the limited literature that already exists and supports the idea that EBUS-TBNA can be a useful adjunct in the pre-operative assessment and treatment of RG.

CASE PRESENTATION

A 48-year-old male was referred by a pulmonologist for the evaluation of progressive shortness of breath

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(SOB) over 6 months. He reported a productive cough but denied associated symptoms such as hoarseness, fever, weight loss, appetite changes, or hemoptysis. His exertional dyspnea, accompanied by intermittent stridor, was initially misdiagnosed as a respiratory infection.

On physical examination, a 1×1 cm soft, non-tender swelling was noted over the right supraclavicular region. Inspiratory stridors, along with bilateral expiratory rhonchi, were heard on lung auscultation. The patient experienced SOB during neck hyperextension. Vital signs were stable, with a SpO_2 of 98% on room air.

Routine hematological and biochemical parameters were within normal limits, with normal parathyroid hormone (PTH) levels, and were Euthyroid. A chest X-ray revealed a homogeneous soft-tissue opacity with widening of the superior mediastinum, tracheal narrowing, and rightward deviation (Fig. 1).

Given the clinical signs of airway compression and radiologic evidence of a mediastinal mass with tracheal deviation, further imaging with neck ultrasound, contrast-enhanced CT, and positron emission tomography-CT (PET-CT) was performed to evaluate the nature, extent, and possible etiology of the lesion. Neck ultrasound demonstrated a right thyroid lobe measuring 1.3×1.6×4.2 cm with a colloid nodule and a left lobe of 1.3×1.7×3.7 cm containing a 1.0×1.5 cm solid-cystic (TIRADS III) nodule. Multiple jugular chain lymph nodes were also identified, the largest measuring 1.9×0.7 cm. A contrast-enhanced CT scan of the neck and thorax revealed a large, heterogeneous mediastinal mass measuring 6.0×5.2×9.8 cm with central necrosis. This mass was located in the middle mediastinum, extending into the posterior compartment, causing rightward tracheal displacement and compression. In addition, a separate 1.9×2.5 cm lesion was noted in the left prevascular space, compressing a 2 cm segment of the left brachiocephalic vein. Multiple subcentimeter enhancing nodes and tiny pulmonary and pleural nodules were also present, raising suspicion for neoplastic processes such as lymphoma, germ cell tumor, metastatic disease, or Castleman disease. Consequently, a PET-CT was performed (Fig. 2). PET-CT imaging demonstrated that both lesions were non-fluorodeoxyglucose (FDG)-avid: A 5.5×7.0×9.1 cm mass in the superior visceral compartment (D1–D5 level) and a 2.1×2.7×3.2 cm lesion in the prevascular superior mediastinum.

Figure 1: Posteroanterior chest radiograph showing a broad-based mediastinal opacity at the thoracic inlet with tracheal deviation to the right

Based on these findings, histopathological correlation was recommended. EBUS-TBNA was performed and demonstrated significant tracheal deviation with nearly 50% luminal narrowing due to extrinsic compression. A large, heterogeneous echogenic mass with cystic and necrotic changes was visualized. ROSE of the aspirated hemorrhagic fluid revealed ghost-like follicular cells with vacuolated cytoplasm and prominent nucleoli, suggesting atypical follicular thyroid elements. Cytologic smears showed lymphocytes, neutrophils, and foamy macrophages in a hemorrhagic background. Core biopsies confirmed thyroid follicular cells arranged in both micro- and macrofollicular patterns, filled with colloid and lacking features of papillary or anaplastic carcinoma. Since histopathological slides of the EBUS-TBNA sample were unavailable, we present the specimen biopsy slide instead, which correlates with the EBUS-TBNA findings and is consistent with a benign, non-FDG-avid RG (Fig. 3).

Under standard monitoring, general anesthesia was induced, and the airway was secured with a 7.5 mm flexo-metallic tube after moderate difficulty with bag-mask ventilation. The patient was positioned supine with neck extension in the "Rose position." The neck was prepared and draped using a standard antiseptic technique. A transverse cervical incision was made approximately 2 cm superior to the sternal notch, extending laterally to the anterior borders of both sternocleidomastoid muscles. The skin, subcutaneous tissue, and platysma were divided, and subplatysmal flaps were elevated superiorly to the thyroid cartilage and laterally to the sternocleidomastoids. The deep cervical fascia was incised to expose the pretracheal fascia and thyroid gland. The left superior thyroid artery was ligated and divided near the superior pole of the thyroid, followed by careful mobilization of the inferior pole with ligation of the inferior thyroid artery and vein. A retrosternal extension approximately 10 cm long, with a fibrous stalk connecting the left thyroid lower pole to its mediastinal component, was identified. The lesion was adherent to the trachea and esophagus and extended beyond the aortic arch posteriorly. This was carefully dissected with gentle blunt dissection. The left recurrent laryngeal nerve was identified in the tracheoesophageal groove and preserved throughout the procedure. During dissection, the lesion appeared adherent to the esophagus. However, meticulous separation of the lesion was achieved. Both left and right thyroid lobes were completely mobilized and excised, with preservation of the right superior and inferior parathyroid glands. The right recurrent laryngeal nerve was visualized and protected during the ligation of the inferior thyroid vessels. A closed-suction drain was placed in the thyroid bed, and the wound was closed in

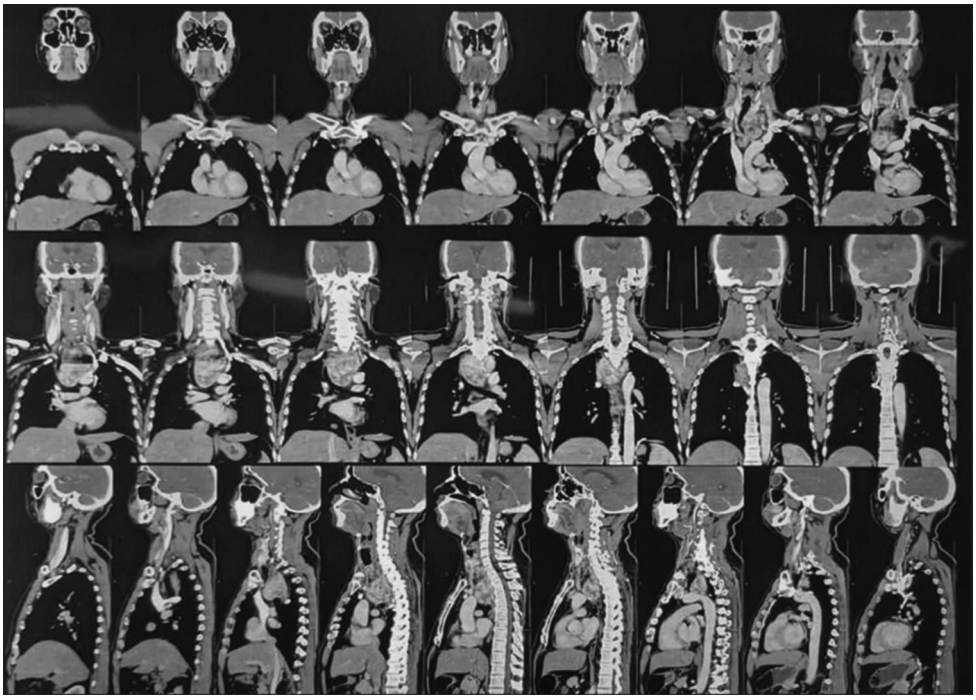

Figure 2: Contrast-enhanced sagittal and coronal computed tomography images of the neck and chest revealing a 9 cm cervico-mediastinal thyroid mass extending below the aortic arch, compressing the trachea with preserved surrounding fat planes

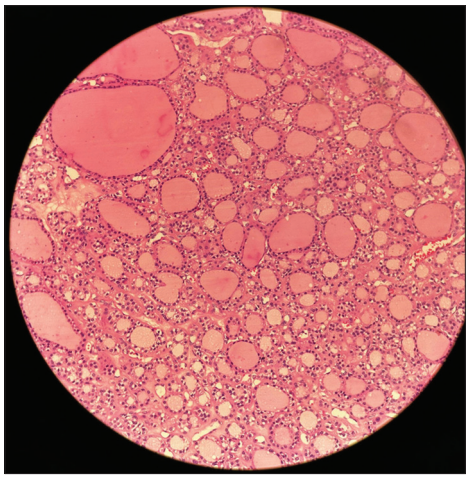

Figure 3: Low-power (×20) hematoxylin and eosin-stained section of the resected specimen demonstrating variably sized thyroid follicles lacking nuclear atypia, consistent with benign multinodular goiter

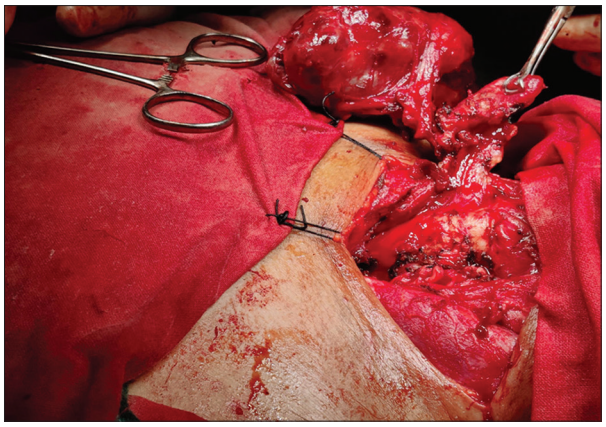

Figure 4: Intraoperative photograph after mobilization of the left thyroid lobe, showing the retrosternal component delivered through the cervical incision; note preservation of surrounding neurovascular structures and intact esophageal wall following careful dissection

layers, with an approximation of the platysma and skin (Fig. 4).

Dexamethasone 8 mg IV was administered intraoperatively for airway edema prophylaxis. The patient was extubated without complications and transferred to the recovery unit in stable condition. Postoperatively, the patient remained hemodynamically stable and was started on thyroxine (T_4) 125 mcg on day 2. Except for the transient hoarseness, no signs of hypocalcemia were noted. Laboratory evaluation showed a PTH level of 32.5 pg/mL, calcium of 9.8 mg/dL, triiodothyronine at 1.08 ng/mL, T_4 at 5.73 µg/dL, and thyroid-stimulating hormone at 0.45 µIU/mL. On post-operative day 6, the patient returned for staple removal and was noted to be recovering well, with only mild persistent hoarseness. He was advised to follow-up in 3 months and referred to speech therapy for voice rehabilitation.

DISCUSSION

RG, or substernal or intrathoracic goiter, results in widely varying reported incidences of 0.2–45% of all goiters. Definitions may differ based on clinical examination, imaging, or surgical findings [3]. For instance, any thyroid tissue that extends below the sternal notch is considered RG, according to the 2020 American Association of Endocrine Surgeons. According to Ríos *et al*., there are more than ten definitions. Still, none of them have become accepted as standard, leading to an "identity crisis" that makes it difficult to evaluate investigations and plan surgeries [6].

RGs are classified into two types: Secondary and primary. Secondary RGs are more common and result from the downward extension of a cervical thyroid gland, typically into the anterior mediastinum, though

10–15% may extend into the posterior mediastinum. These maintain vascular connections to the cervical thyroid through the superior and inferior thyroid arteries. In contrast, primary RGs are rare, accounting for <1% of cases, and arise from ectopic thyroid tissue within the mediastinum, likely remnants of the embryonic foregut. These lesions receive their blood supply from intrathoracic vessels such as branches of the aorta [7]. In our patient, the goiter was confirmed to be a secondary retrosternal extension, and intraoperatively, the mass was continuous with the cervical thyroid, and we were able to de-vascularized it entirely through transcervical ligation of the superior and inferior thyroid arteries before extracting the 9.8 cm mediastinal component upward into the neck.

Understanding the anatomical constraints of the thyroid gland explains its tendency to extend retrosternally. The gland resides in the cervical compartment, bordered superiorly by the thyroid and cricoid cartilages, anteriorly by the strap muscles and cervical fascia, and posteriorly by the vertebral bodies and prevertebral fascia. These anatomical boundaries limit upward, anterior, or posterior growth. As a result, when the thyroid gland enlarges, it typically extends downward into the thoracic cavity, driven by gravity, negative intrathoracic pressure during inspiration, and traction during swallowing [8].

Symptoms do occur due to the mass effect on adjacent mediastinal structures. Common presentations include dyspnea, orthopnea, stridor, chronic cough, dysphagia, and hoarseness, primarily due to trachea or esophageal compression or recurrent laryngeal nerve involvement [9,10]. In rare cases, more serious complications such as superior vena cava syndrome, Horner's syndrome, or acute airway obstruction may occur, particularly when rapid enlargement occurs due to intra-goiter hemorrhage or infection [1,11]. In our case, the RG was initially misdiagnosed as a lower respiratory tract infection, leading to a 6-month delay in diagnosis.

Diagnosis requires both imaging and tissue sampling to assess its size, anatomical extent, compressive effects, and potential for malignancy. Contrast-enhanced CT remains the gold standard for assessing anatomical extension, tracheal deviation, esophageal compression, and mediastinal involvement. Magnetic resonance imaging scan offer additional insights in select cases, particularly for assessing vascular invasion or continuity with the cervical thyroid. While ultrasound is effective for evaluating cervical components, its ability to visualize intrathoracic extension is limited. 18F-FDG PET/CT can help identify metabolically active lesions suspicious for malignancy, though histologic confirmation is essential due to the possibility of false positives. For tissue diagnosis, US-FNA is the first-line technique for accessible cervical nodules [12]. In deeper or intrathoracic lesions, CT-guided biopsy, endoscopic ultrasound-guided FNA, or EBUS-TBNA may be required. Among these, EBUS-TBNA is often preferred for its safety, accuracy, and to provide real-time minimally invasive sampling of mediastinal and peribronchial lesions, potentially avoiding the need for invasive procedures such as mediastinoscopy or sternotomy [13]. In our case, EBUS-TBNA was instrumental in obtaining diagnostic tissue from a deeply located RG. Meanwhile, PET-CT findings showed no FDG avidity, which helped reduce suspicion of high-grade malignancy. These combined techniques highlight the importance of a multimodal approach integrating imaging and tissue analysis for evaluating complex mediastinal thyroid lesions.

Once the diagnosis is confirmed and the extent of the lesion is clearly defined through imaging and tissue sampling, attention shifts toward selecting the most appropriate surgical approach. Management of RGs depends on their anatomical features, symptom burden, and malignancy risk. These lesions present greater technical challenges than typical cervical goiters due to their deep location and proximity to vital mediastinal structures. While most RGs can be removed through cervical approach, extracervical approaches (sternotomy or thoracotomy) may be required when the goiter is too large to traverse the thoracic inlet, extends deep into the posterior mediastinum, or derives blood supply from intrathoracic vessels. In the end, successful surgery depends on a tailored approach guided by pre-operative imaging and intraoperative findings to ensure complete removal and minimize complications [14].

Our surgical approach aligns with current literature, which increasingly supports the transcervical route as the preferred method for managing RGs, even those with substantial posterior or mediastinal extension. In a retrospective analysis of 265 patients, over 92% underwent successful thyroidectomy through the cervical route, with sternotomy required in only 1.1% of cases [15]. Similarly, another study reported that 83.87% of RGs were managed transcervically, while only 16.13% required sternotomy, an approach associated with longer operative times and extended hospital stays, and they carry higher morbidity, including chest wall dehiscence and fistula formation [16]. In our case, the goiter was safely and completely excised through a standard transverse cervical incision without the need for sternotomy. This experience reinforces the growing evidence that even large, posteriorly extending RGs can often be mobilized and removed transcervically, supporting a paradigm shift toward less invasive surgical techniques.

CONCLUSION

This case emphasizes the diagnostic and surgical challenges associated with RGs, particularly when initial symptoms are nonspecific and lead to delayed recognition. The use of EBUS-TBNA provided a safe, minimally invasive alternative to mediastinoscopy for obtaining diagnostic tissue from a deep intrathoracic lesion. Despite the goiter's substantial size and posterior

extension, complete resection was achieved through a transcervical approach without the need for sternotomy. This case adds to the growing evidence supporting transcervical thyroidectomy as a feasible and effective strategy for most RGs when guided by thorough pre-operative evaluation and surgical expertise.

REFERENCES

1. Can AS, Nagalli S. Substernal goiter. In: StatPearls. Treasure Island, FL. StatPearls Publishing; 2025. Available from: https://www.ncbi.nlm.nih.gov/sites/books/nbk557416 [Last accessed on Oct 25].
2. Wang X, Zhou Y, Li C, Cai Y, He T, Sun R, *et al*. Surgery for retrosternal goiter: Cervical approach. Gland Surg 2020;9:392-400.
3. Cullinane C, Evoy D, McDermott E, Prichard R. The surgical management of retrosternal goiter; an ongoing controversy. World J Surg Surg Res 2021;4:1328.
4. Li P, Zheng W, Liu H, Zhang Z, Zhao L. Endobronchial ultrasound-guided transbronchial needle aspiration for thyroid cyst therapy: A case report. Exp Ther Med 2017;13:1944-7.
5. Madan K, Mittal S, Hadda V, Jain D, Mohan A, Guleria R. Endobronchial ultrasound-guided transbronchial needle aspiration of thyroid: Report of two cases and systematic review of literature. Lung India 2016;33:682-7.
6. Khan NS, Zhang Y, Bollig K, Bollig CA. Extracervical approaches to substernal thyroid goiter resection: A systematic review and meta-analysis. OTO Open 2024;8:e103.
7. Unlu MT, Aygun N, Kostek M, Isgor A, Uludag M. Substernal goiter: From definitions to treatment. Sisli Etfal Hastan Tip Bul 2022;56:167-76.
8. Sandasecra S, Yahya MM, Mamat Z, Soh JY, Ramely R, Aziz ME. A monster in the chest: A tale of a goiter. Cureus 2022;14:e25827.
9. Abdelrahman H, Al-Thani H, Al-Sulaiti M, Tabeb A, El-Menyar A. Clinical presentation and surgical treatment of retrosternal goiter: A case series study. Qatar Med J 2020;2020:13.
10. Chaudhry IU, Cheema AI, AlShamasi Z, Mutairi H. Hoarseness of voice, respiratory distress and dysphagia due to giant primary posterior mediastinal ectopic goitre: A rare clinical entity. BMJ Case Rep 2016;2016:bcr2016215132.
11. Giulea C, Enciu O, Nadragea M, Badiu C, Miron A. Pemberton's sign and intense facial edema in superior vena cava syndrome due to retrosternal goiter. Acta Endocrinol (Bucur) 2016;12:227-9.
12. Chaudhary V, Bano S. Imaging of the thyroid: Recent advances. Indian J Endocrinol Metab 2012;16:371-6.
13. Chalhoub M, Harris K. Endobronchial ultrasonography with transbronchial needle aspiration to sample a solitary substernal thyroid nodule: A new approach. Heart Lung Circ 2012;21:761-2.
14. Battistella E, Pomba L, Sidoti G, Vignotto C, Toniato A. Retrosternal goitre: Anatomical aspects and technical notes. Medicina (Kaunas) 2022;58:349.
15. Tsur N, Levi L, Frig O, Koch N, Eshel Y, Bachar G, *et al*. Extended cervical approach for retrosternal multinodular goiter. Acta Otorhinolaryngol Ital 2024;44:21-6.
16. Anikin V, Welman K, Asadi N, Dalal P, Reshetov I, Beddow E. Retrosternal goiter in thoracic surgical practice. Khirurgiia (Mosk) 2021;12:20-6.

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