

A Case Report of Multinodular Goiter with Retrosternal Extension in Euthyroid State

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Abstract

Multinodular goiter with retrosternal extension are seen in the superior and anterior mediastinum, but in 10-15% they can be found in the posterior mediastinum too. A large goiter may induce compressive symptoms. Thus, surgeries for such conditions require high levels of experience to avoid devastating complications, especially when the gland weighs <500g. Here we report the case of a 55-year-old lady who came with a swelling in the front of the neck which was insidious in onset and gradually progressed in size. She had history of breathing difficulties that worsened in the past month. On examination, a 5x5 cm firm swelling with an irregular surface in the left thyroid region moved with deglutition with no warmth or tenderness that deviated the trachea to the right; the lower border was not seen or palpable. No signs or symptoms of thyroid toxicity were seen. CT neck and chest showed a left-sided multinodular goiter with retrosternal extension, pushing the main cervical vessels posteriorly along with contact to the trachea and the right recurrent laryngeal nerve. The thyroid function test was normal. After assessments, the patient underwent total thyroidectomy via transcervical and sternotomy approaches. The patient recovered uneventfully and was discharged later. Presented in this case report is a not-so-large multinodular goiter in an euthyroid patient with retrosternal extension that had compression over the trachea and the main vessels along with right recurrent laryngeal nerve. The outcomes for this patient were discussed in light of the treatment options.

Keywords: Cervicothoracic Approach, Multinodular Goiter, Retrosternal Extension, Sternotomy, Total Thyroidectomy.

Introduction

In the mid-1700s, Haller et al. were one of the first to identify retrosternal thyroid extension. Retrosternal components may be seen in up to 45% of patients with goiter [1]. These can cause pressure symptoms like breathing or swallowing difficulties with or without hoarseness of voice because of the compression of the trachea, esophagus, and the recurrent laryngeal nerve. However, based on geographical distribution, we found that 5-50% of cases were asymptomatic in some trials [2].

Any goiter affects 5% and 15% of the population in non-endemic and endemic areas, respectively. The preoperative planning for the

approach to the gland differs by case, and in some cases, the need for exploration of the thoracic cavity by sternotomy exists. Most retrosternal goiters can be reached with the cervical approach, but in some cases, a sternotomy may be necessitated [3]. Moreover, thyroidectomy for goiters with extension to other spaces can become technically challenging, particularly when the gland weighs more than 500g [4].

Here, we present a case of a 55-year-old hypertensive, diabetic, and euthyroid female with multinodular goiter with retrosternal extension into the superior mediastinum, pushing the main cervical vessels posteriorly,

along with compression of the trachea and abutment of the left recurrent laryngeal nerve, which was safely removed via transcervical and transthoracic approaches.

Case Report

A 55-year-old female came to the OP in mid March 2022 with complaints of swelling in the thyroid region for the past year, along with mild difficulty breathing and hoarseness of voice for the past month. The swelling was first noticed a month ago; it was initially small but gradually grew in size. In the past month, she has had increased difficulty breathing, swallowing solid food, and having hoarseness of voice. There was no pain, fever, or any sudden increase in size. There were no signs of hyperthyroidism or hypothyroidism. There was no history suggestive of tuberculosis, malignancy, or metastasis. She was a known hypertensive and diabetic on regular medications for the past 4 and 1 years, respectively. There were no surgical interventions in the past or a history of irradiation of the neck. She had attained menopause 13 years ago. She had a mixed diet, normal bowel and bladder habits, normal sleep, and a normal appetite. She had no history of

addiction. There was no history of thyroid conditions or malignancies in the family.

She was 153 cm tall, weighed 62 kg, BMI 26.5, well built and nourished, ACOG score 2. Vitals were stable, with a normal pulse rate, rhythm, and volume. There were no signs of toxicosis. On local examination, a firm swelling of 5x5cm was seen in the right lobe of the thyroid gland [Figure 1], situated deep to the deep fascia, extending superiorly from the thyroid cartilage and inferiorly reaching the suprasternal notch, with an irregular surface that moved with deglutition and not with tongue protrusion. There was no warmth or tenderness. The trachea was shifted to the left. The lower border of the swelling could not be seen or felt. The skin over the swelling was normal. There was no facial asymmetry. There was a mild rhonchi that was heard on auscultation. No palpable cervical lymph nodes. There were no eye signs or pretibial myxoedema, but hoarseness of voice was present. Other systemic examinations were normal. No other signs of thyroid toxicity or metastasis were seen. Clinical diagnosis: multinodular goiter with retrosternal extension, probably benign, with hoarseness of voice without any toxic features.



Figure 1. Gross Picture of the Patient

All the lab results, including thyroid function tests, were within normal limits.

- Hemogram 11g%
- Total leukocyte count 8200 cells/mm³

- Polymorphs 59%
- Lymphocytes 39%
- Platelets 2.6lakhs/mm³
- RBS - 185 mg/dl

- Urea - 22.9 mg/dl
- Creatinine - 0.9 mg/dl
- Serology - negative
- Blood grouping - B positive
- T3 - 1.28 ng/ml
- T4 - 8.64 mg/dl
- TSH - 0.887 mul/ml
- Total serum calcium - 8.7 mg/dl
- Serum ionised calcium - 1.12 mmol/l
- ECG - normal sinus rhythm.

X-ray neck showed the trachea mildly shifting to the right side. USG of the neck showed a diffusely enlarged iso-hypoechoic mass in the left lobe of the thyroid, with some anechoic areas, intranodular vascularity, and an altered texture of the isthmus. The inferior most part of the thyroid gland was not clear due to its extension posterior to the sternum; it is likely to be a retrosternal thyroid. There were multiple subcentimeter lymph nodes on either side. The chest X-ray image showed a large radiopaque mass in the superior mediastinum, displacing

the trachea to the right side; however, the superior margin was not traceable. The USG abdomen was a normal study. CT of the neck and chest [Figure 2] showed the right lobe of the thyroid enlarged, measuring 9.1x4.5x3.7 cm and showing heterogeneous attenuation with multiple foci of calcification, extending behind the manubrium sterni into the anterior mediastinum for a length of 7.2cm below the thoracic inlet, mild compression over the trachea, displacing it to the right without any definite luminal compromise, with possible posterior and posterolateral displacement of the internal jugular vein and the left carotid artery, and partially abutting the esophagus. The aorta and inferior vena cava were normal. Fiberoptic bronchoscopy showed no tracheal infiltration: however, there was decreased movement of the right true vocal cord. Fine needle aspiration cytology (FNAC) proved a nodular colloid goiter with cystic degeneration. The thyroid scintigraphy picture is below [Figure 3].

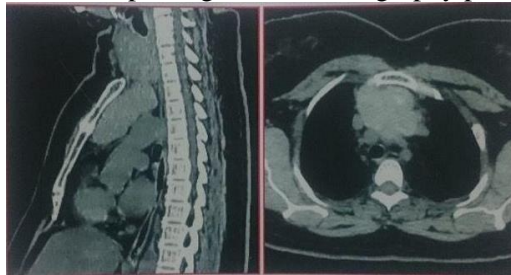


Figure 2. CT Neck and Chest Showcasing the Thyroid Gland Extending Behind the Sternum

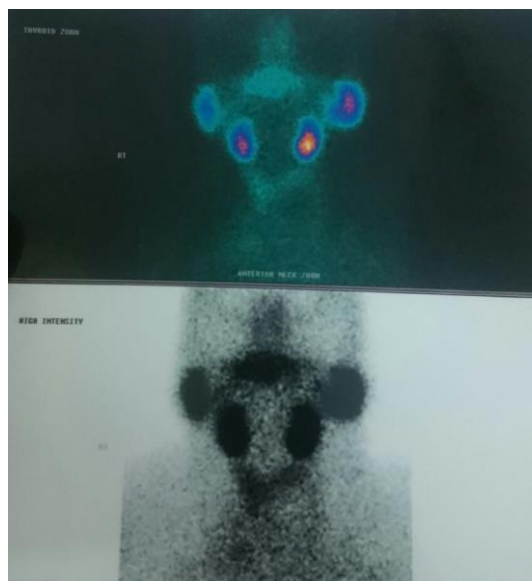


Figure 3. Thyroid Scintigraphy

The patient underwent an elective total thyroidectomy in the first week of April 2024. With the patient in the rose position, a collar incision of 10 cm (which was later extended about 3 cm on the right) was made along the skin crease above the suprasternal notch. With both the upper and lower subplatysmal flaps raised, the strap muscles were identified, and

through blunt dissection, the anterior jugular vein was secured.

With difficulty in the manual delivery of the cervical part of the thyroid gland due to its size and extent, assistance from a cardiothoracic surgeon was required. A sternotomy was done, which revealed a large multinodular goiter behind the sternum [Figure 4].



Figure 4. Cervical and Thoracic Approach Exposing the Thyroid Gland

The arteries and veins of the region were well exposed and preserved. The right internal jugular vein (IJV) and carotid artery were shifted posterolaterally and posteriorly, respectively, but there were no signs of infiltration. The goiter was seen compressing the right recurrent laryngeal nerve (RLN). Both the left and right RLN and all the parathyroid glands were identified and saved. After blunt dissection with cautery and harmonic, the goiter

was separated from the floor, and the tracheal cartilages were intact with no infiltration. The bleeders were secured, and the whole gland was removed in toto. After hemostasis and the placement of a draining tube (DT), the wound was closed in layers. The patient was extubated and recovered from anesthesia uneventfully. The thyroid specimen [Figure 5] was sent to the pathology department for histopathological examination.



Figure 5. The Gross Resected Thyroid Specimen for Histopathological Examination

Postoperatively, the patient was treated with intravenous antibiotics, analgesics, and steroids. The draining tube was removed, and the patient was discharged with supplementary thyroxine and calcium tablets. The final histopathology revealed a nodular goiter with no malignant change.

Discussion

The thyroid gland weighs anywhere between 10 and 25 g [5] in a healthy adult. When a small population in a certain geographical area is affected by goiter, it is referred to as endemic goiter [4, 6]. MNG is mostly seen in older men as an asymptomatic swelling in the front of the neck, but it can also be seen in the general population [7]. MNG may be asymptomatic or symptomatic: in an euthyroid, hyperthyroid, or hypothyroid state [2]. When a large goiter compresses the trachea, esophagus, and RLN, it results in respiratory discomfort, occasional dysphagia [8] and hoarseness of voice. A certain percentage of people with cosmetic concerns may also choose to undergo surgery [4].

Regarding radiological investigations for mediastinal goiters, the most commonly used imaging modalities are USG neck and X-ray neck. CT may be used to evaluate the anatomical position and extension of the gland, along with the characteristics of the mass (cystic or nodular) [9] and features of compression, if any are present. Though retrosternal goiter cases are regularly reported, only a few have main vessels and nerve displacement [9, 10] as in our case.

Massive goiters of more than 500g [4] can be technically challenging for both the anesthesiologists and the surgeons [6, 11]. Thus, a surgeon needs to carefully assess the patient preoperatively since each case may need to be handled uniquely [12].

Ahmed et al [8] and Batori et al [12] in their study, found that a significant percent of cases required sternotomies along with a cervical approach for retrosternal goiters. Since there are no established guidelines for identifying patients who might need a median sternotomy [3], in most retrosternal goiters, a low arc incision is used. But in recent studies, the rate of sternotomies for retrosternal goiter has been on the rise. But with recent advances and innovations like video-assisted thoracoscopy, mediastinoscopy, or robotic surgery, different surgical approaches for retrosternal goiter [13] can be tried.

With proper preoperative planning and suitable incisions, complications associated with surgeries of this extent, including hemorrhage/hematoma, RLN or phrenic nerve injury, parathyroid gland removal, pneumothorax, pleural effusion, hypocalcemia, and cervical plexopathy, can be minimized.

Conclusion

Patients with a retrosternal goiter or large MNG with partial or complete airway obstruction and esophageal obstruction should be treated as early as possible. Thyroidectomy still remains the gold standard and most effective and enduring treatment option available; however, the patient has to be in an euthyroid state. Though the transcervical approach is mainly used, a transthoracic approach with sternotomy may be needed in cases of large thyroids or retrosternal thyroids, as in our case.

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Reference

- [1]. Bizakis. J., et al., 2008, Diagnosis and management of substernal Goiter at the University of Crete, *Surgery Today*, 38, 99–103, 10.1007/s00595-006-3572-3, PubMed, Article.
- [2]. dell'Aquila, M., et al., 2019, Death due to external compression of the trachea in a patient with multinodular hemorrhagic goiter, *Forensic Science, Medicine and Pathology*, 15(3):509-512, 10.1007/s12024-019-00094-6, PubMed, Article.
- [3]. de Perrot, M., et al., 2007, Surgical management of mediastinal goiters: when is a sternotomy required?, *The Journal of Thoracic and Cardiovascular Surgery*, 55(1):39-43, 10.1055/s-2006-924440, PubMed, Article.
- [4]. Nada A, et al., 2011, A giant euthyroid endemic multinodular goiter with no obstructive or compressive symptoms, *Case Reports in Medicine*, 2011;2011:620480, 10.1155/2011/620480, PubMed, Article.
- [5]. Mescher, A. L., 2010, Junqueira's basic histology text & atlas 12th ed. New York: *McGraw-Hill Medical*; Chapter 20, Endocrine glands; p. 348–70, Book.
- [6]. Al-wageeh, S., et al., 2020, An Investigation of the Histopathological Pattern of Thyroid in Patients Undergoing Thyroid Operations: A Cross-Sectional Study, *Open Access Surgery*, 13:47-52, 10.2147/OAS.S253109, Article.
- [7]. Al-Hureibi, K. A., et al., 2004, The epidemiology, pathology, and management of goitre in Yemen, *Annals of Saudi Medicine*, 24(2):119-23, 10.5144/0256-4947.2004.119, PubMed, Article.
- [8]. Ahmed, M. E., et al., 2006, Retrosternal goiter: the need for median sternotomy, *World Journal of Surgery*, 30(11):1945-8, 10.1007/s00268-006-0011-y, PubMed, Article.
- [9]. Kermenli, T., et al., 2017, Complete excision of a posterior mediastinal goitre causing tracheal deviation, *The Clinical Respiratory Journal*, 11(6):1096-1097, 10.1111/crj.12460, PubMed, Article.
- [10]. Saif, G., 2021, A case report of a huge euthyroid goiter with retrosternal extension, *Journal of Emergency Medicine, Trauma and Acute Care*, 10.5339/jemtac.2021.14, ResearchGate, Article.
- [11]. John, R., et al., 2009, Technique of total thyroidectomy for large substernal goiters, *Operative Techniques in Otolaryngology-head and Neck Surgery*, 20, 1, 18-22, 10.1016/j.otot.2009.01.006, ScienceDirect, Article.
- [12]. Wang, R., et al., 2022, Modified subxiphoid approach for surgical resection of a retrosternal goiter, *Frontiers in Surgery*, 22;9:923389, 10.3389/fsurg.2022.923389, PubMed, Article.
- [13]. Xu, J., et al., 2009, Enormous goiter in posterior mediastinum: report of 2 cases and literature review, *Journal of the Formosan Medical Association*, 108(4):337-43, 10.1016/S0929-6646(09)60075-9, PubMed, Article.