

# The Hidden Neck Mass: Unmasking a Giant Retrosternal Multinodular Goitre

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## ABSTRACT

**Objective:** Retrosternal goitre is the fall of thyroid tissue below the thoracic inlet, which may necessitate a sternotomy if the mediastinal component is substantial or adjacent to major arteries. Safe surgical care requires proper preoperative evaluation and multidisciplinary planning.

**Material and Methods:** A 55-year-old woman presented with a 6-month history of gradually progressing anterior neck edema, no compressive symptoms, or thyroid dysfunction. A thyroid tumor of 10 × 8 × 3 cm was found to be uneven and bosselated, with an impalpable lower border. Thyroid function tests were normal, and Fine-needle aspiration cytology revealed characteristics compatible with a benign multinodular goiter classified as Bethesda Category II. Contrast-enhanced computed CT revealed significant thyroid enlargement with left-sided retrosternal extension up to the D7 vertebral level, touching the aorta but lacking vascular encasement. Due to substantial inferior mediastinal extension, a multidisciplinary team decided to perform a combination cervical approach with median sternotomy.

**Results:** The mediastinal component was mobilized under direct vision, allowing for full thyroid resection. The specimen weighed 450 g and had dimensions of 12 x 12 x 5 cm. Except for transitory hypocalcaemia, which recovered with oral supplements, postoperative recovery went smoothly. There were no recurring laryngeal nerve palsies. The patient was discharged on the ninth surgical day and is still symptom-free one year later, with no residual disease seen on imaging.

**Conclusion:** Median sternotomy may be necessary for safe and complete resection of massive retrosternal multinodular goitres extending beyond the aortic arch. Multidisciplinary collaboration improves surgical outcomes and patient safety.

**Keywords:** Retrosternal goitre; Multinodular goitre; Mediastinal extension; Median sternotomy; Thyroidectomy

**How to cite this article:** Geetha Lakshmi N, Ganesh Guru K, Ramalakshmi V, Raghupathy T. The Hidden Neck Mass: Unmasking a Giant Retrosternal Multinodular Goitre. *Int J Drug Deliv Technol.* 2026;16(16s): 285-290; DOI: 10.25258/ijddt.16.16s.31

## Introduction

Retrosternal goitre, also known as substernal or intrathoracic goiter, is thyroid tissue that spreads below the thoracic inlet, typically into the anterior mediastinum. While most retrosternal goiters can be treated with a typical cervical technique, 5-10% require an extra cervical approach, such as a median sternotomy or thoracotomy. This is usually due to severe mediastinal involvement, proximity to important arterial structures, a posterior mediastinal position, or dense adhesions, all of which present considerable surgical problems (1). Multinodular goitres are one of the most frequent thyroid disorders. Because the mediastinum is a relatively expansile area, retrosternal expansion may go undetected for years. Patients frequently present late, when the goiter has grown significantly or when compressive symptoms arise, such as dyspnoea, dysphagia, or vascular compromise. The delayed appearance increases diagnostic and therapeutic complexity (2).

Preoperative evaluation is critical and includes clinical assessments, laboratory investigations, cytology, and sophisticated imaging. Thyroid function testing can help diagnose hypo- or hyperthyroidism. Fine-needle aspiration cytology may aid in the diagnosis of malignancy, whereas imaging, typically contrast-enhanced computed tomography (CT) or magnetic resonance imaging (MRI), determines the extent of mediastinal involvement, relationship to major vessels, and potential tracheal or oesophageal compression. Such in-depth review aids surgical planning and lowers perioperative risk (3).

Surgical removal remains the only definitive treatment for retrosternal goiters, especially those that cause compressive symptoms or grow quickly. While most can be successfully removed by a cervical incision, big goiters that extend beyond the aortic arch or encase significant mediastinal structures may necessitate a combination cervical and median sternotomy. Multidisciplinary cooperation among endocrine

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surgeons, cardiothoracic surgeons, anaesthesiologists, and radiologists is frequently required for optimal results (4).

We present a unique example of a huge retrosternal multinodular goitre that extends beyond the aortic arch. Due to the sheer size and mediastinal extension, a combined cervical and median sternotomy approach was required for safe and full excision, emphasizing the significance of rigorous preoperative planning and a tailored surgical strategy in handling severe retrosternal thyroid disease (5).

## Case Presentation

### Patient History

A 55-year-old lady presented with a 6-month history of gradually growing anterior neck edema. The swelling was painless and had no indications of dysphagia, dyspnoea, hoarseness, or thyroid dysfunction. She had no previous neck irradiation, thyroid surgery, or familial thyroid illness. Her previous medical history included well-managed hypertension and type 2 diabetes.

### Clinical Examination

The thyroid gland was significantly enlarged, measuring roughly  $10 \times 8 \times 3$  cm. The surface was uneven and bosselated, and the gland had a hard texture. The lower border of the thyroid was not palpable, indicating retrosternal expansion (Figure 1). There were no clinical indications of airway impairment. Indirect laryngoscopy revealed normal vocal cord motions with no cranial nerve impairments. The cardiovascular, pulmonary, and abdominal exams were all normal.

### Laboratory Investigations

Thyroid function tests were within normal limits, indicating a euthyroid condition. Fine-needle aspiration cytology revealed characteristics compatible with a benign multinodular goitre classified as Bethesda Category II (Figure 2). The complete blood count, renal function tests, and liver function tests all came back normal.

### Imaging Findings

Contrast-enhanced computed tomography of the neck and thorax revealed diffuse thyroid enlargement with numerous nodules. A left-sided retrosternal extension was observed, reaching the D7 vertebra (Figure 3). The mediastinal component was tightly adhered to the aortic arch and the major vessels, but there was no sign of vascular encasement or tracheal compression. There was no evidence of cervical lymphadenopathy.

### Surgical Intervention

A complete preoperative assessment was performed by a multidisciplinary team consisting of endocrine surgeons, thoracic surgeons, and anaesthesiologists. Because of the substantial mediastinal extension and proximity to key thoracic structures, the team decided on a combined cervical approach and median sternotomy to guarantee a safe and complete excision.

### Operative Details

### Cervical Phase

A conventional transverse cervical incision was performed. The cervical thyroid lobes were mobilized while keeping the recurrent laryngeal nerves and parathyroid glands intact. To maintain proper haemostasis, the superior and inferior thyroid vessels were separately ligated.

### Median Sternotomy Phase

A midline sternotomy was performed to provide access to the mediastinal component (Figure 4). The retrosternal section of the gland was dissected with both blunt and sharp procedures. The mass was gently removed from the aortic arch, brachiocephalic arteries, trachea, and oesophagus. Continuous communication among the surgical teams contributed to safe dissection around these critical structures.

### Specimen Removal

The complete thyroid gland, including the cervical and mediastinal components, was removed in one en bloc specimen (Figure 5). Haemostasis was confirmed prior to closure.

### Specimen Characteristics

The removed gland weighed 450 g and was  $12 \times 12 \times 5$  cm (Figure 6). The retrosternal component measured  $10 \times 5 \times 7.5$  cm, indicating a considerable mediastinal expansion.

### Intraoperative Challenges and Precautions

To avoid nerve injury and surgical hypocalcaemia, the recurrent laryngeal nerves and all parathyroid glands were carefully identified and preserved. Due to the near proximity of major vessels, bleeding was controlled with careful dissection and safe vascular ligation. The trachea, oesophagus, and main arteries were all properly safeguarded during retrosternal component mobilization. This combination approach allowed for the complete and safe excision of the enormous retrosternal multinodular goitre, which could not have been accomplished with a cervical incision alone.

### Postoperative Course

#### Recovery

The postoperative period was unremarkable, with the exception of minor transitory hypocalcaemia (serum calcium level of 7.5 mg/deciliter). This was successfully controlled using oral calcium and vitamin D supplementation.

#### Complications

No major issues arose. There was no recurrent laryngeal nerve damage, vocal cord palsy, or postoperative bleeding.

#### Hospital Stay

On the ninth postoperative day, the patient's vital signs remained steady and the wound healed well (Figure 7).

#### Follow-Up

At the one-year follow-up, the patient remained asymptomatic and continued to get levothyroxine for the rest of his life. Ultrasonography revealed no remaining

thyroid tissue. Serum thyroglobulin was less than 2 ng/mL, indicating full excision. Routine biochemical measures, such as calcium and thyroid function tests, were within acceptable levels.

### Discussion

Retrosternal goiters, also known as substernal or intrathoracic goitres, pose unique diagnostic and surgical challenges due to their mediastinal extension and closeness to important thoracic structures. They account for roughly 5-20% of all thyroid enlargements and are more common in women, generally resulting from long-standing multinodular goiters that gradually descend into the mediastinum (6).

Most retrosternal goiters are asymptomatic and only become clinically apparent when they compress mediastinal tissues, causing dyspnoea, dysphagia, cough, stridor, and, in rare cases, superior vena cava syndrome. Thyroid function is normally normal, however malfunction can develop on occasion. The patient's completely asymptomatic appearance highlights the possibility of silent mediastinal extension (7).

Ultrasonography is beneficial for early cervical examination, although it has limitations in evaluating retrosternal components. Contrast-enhanced CT or MRI are still the preferred imaging modalities for determining mediastinal extent, linkages with major arteries, airway involvement, and surgical planning. CT revealed left-sided retrosternal expansion up to the D7 vertebral level, bordering the aortic arch, with no vascular encasement or tracheal compression (8).

Although most retrosternal goiters can be removed with a cervical approach, a sternotomy or thoracotomy may be required if the goiter extends below the aortic arch, occupies the posterior mediastinum, or includes important arteries. In such difficult instances, multidisciplinary management involving endocrine, thoracic, and anaesthesiologists is essential. In our patient, a combination cervical and median sternotomy strategy enabled safe en bloc resection (9,10).

Major surgical problems include preserving recurrent laryngeal nerves and parathyroid glands, maintaining vascular control, and carefully mobilizing mediastinal structures. Hypocalcaemia, recurrent laryngeal nerve palsy, and haemorrhage have all been reported as problems, however our patient only had temporary hypocalcaemia (11,12). Previous research has supported sternotomy in specific situations and emphasized personalized surgical planning, as seen in this massive (450 g) retrosternal goiter extending to D7 (13,14). This instance emphasizes the value of thorough imaging, interdisciplinary care, and lifelong postoperative monitoring (15).

### Conclusion

This case demonstrates the difficulties in controlling enormous retrosternal multinodular goiters, which can stay asymptomatic despite extensive mediastinal expansion and potential threat to important structures. Early diagnosis through extensive clinical evaluation and detailed imaging is critical for correct assessment

and surgical planning. Multidisciplinary collaboration is essential, especially when substantial mediastinal involvement needs a simultaneous cervical and median sternotomy for a safe and thorough removal. Complications are reduced with meticulous intraoperative methods, such as the preservation of recurrent laryngeal nerves and parathyroid glands with thorough haemostasis. Even big and difficult retrosternal goiters can be successfully handled with great long-term outcomes through tailored surgical planning and coordinated care.

### Informed Consent

Written informed consent was obtained from the patient for publication of this case report and related images, with assurance of anonymity and confidentiality.

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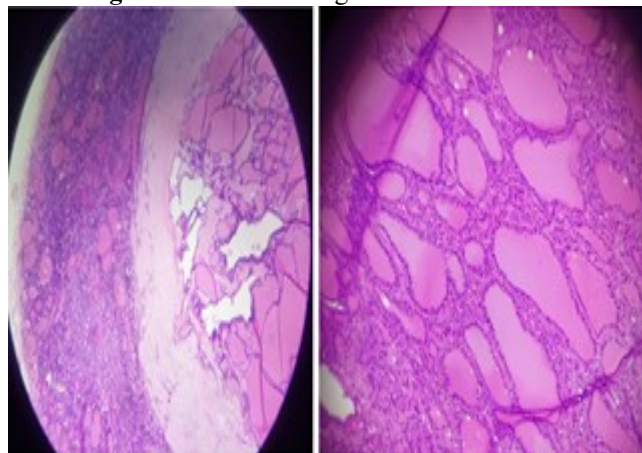
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**Figure Legends:**

**Figure 1:** Clinical photographs showing an anterior neck swelling — lateral/oblique view and frontal view.



**Figure 2:** HPE Showing Multinodular Goitre



**Figure 3:** CECT coronal view showing inferior extension to D7



**Figure 4:** Midline Sternotomy for Mediastinal Access



**Figure 5:** En Bloc Excision of Cervical and Mediastinal Thyroid Components



**Figure 6:** Gross Specimen (450 g) With Large Retrosternal Component



**Figure 7:** Good Wound Healing at Discharge (Day 9)

