

# Giant substernal goiter with thyroid cancer in a young patient

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## ABSTRACT

Goiter or thyroid hypertrophy, can in some cases extend toward the mediastinum, and in rare cases grow to massive sizes. Ever since the first description of substernal goiter, many approaches have been suggested, however definitive treatment ultimately comes to surgery. Thyroid cancer within a substernal goiter can be quite challenging since cancer foci locations and technical difficulties could make the correct diagnosis more difficult. We report a case of a giant substernal goiter that was detected on a young patient. It compromised the superior mediastinum and pleura. After surgery, patient fully recovered. However, a hidden papillary thyroid cancer was found within the goiter. Thyroid disease has difficult scenarios, and when goiter is associated with cancer can make the clinical situation even more complex. One of the most valuable things in thyroid disease associated with cancer is that if detected in the early stages it can be cured. Timely diagnosis and treatment should be a vital part of thyroid disease.

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## INTRODUCTION

Goiter is a localized or generalized thyroid hypertrophy, it is usually cervical but it can extend intrathoracic beyond the thoracic inlet and down toward the mediastinum [1]. Substernal goiter can be challenging for both the patient and the surgeon, as mostly behave in an indolent manner, until the goiter compromise a structure in the thorax [1, 2]. The single most effective treatment for substernal goiter is surgery [2]. Although most of the substernal goiters can be removed with a cervical approach, sternotomy may be needed in 1 to 11 % of the cases [3].

Thyroid cancer within the substernal goiter can be difficult to detect, not only because the application of a fine needle aspiration and biopsy is technically difficult, [1, 2, 4] but because cancer foci of substernal goiters are located in the intrathoracic area and are usually not detected by images [4].

We present a case of a young patient with a giant goiter, a sternotomy was required and a giant mass was

completely resected. Patient underwent full recovery, however, papillary thyroid carcinoma was detected in the final pathology.

## CASE REPORT

Patient is a 34-year-old female, with past medical history of hypertension. She presented to the emergency room, with mild respiratory distress and dysphagia. On clinical examination, a 10x5 cm mass was discovered in the neck. Later she revealed to us that she had detected the mass 10 years ago, and had been growing ever since. However, due to the lack of sufficient access to health care because of her geographic location and economic limitations, she was never evaluated properly. No weight loss or other symptoms were identified. An echography was performed, revealing a mass dependent of the thyroid gland, the right lobe had multiples nodules with heterogeneous characteristics and calcifications. Blood work including TSH and T4 were normal. Due to the size of the mass, a neck CT revealed, a 15.3x7.5x5 cm right multinodular goiter with a cystic component that displaced the airway to the left. Some small lymph nodes and an intrathoracic occupation of goiter were detected as well (Figure 1A). Laryngoscopy showed the mass on the right side of the oropharynx that didn't compromise the airway. Vocal folds appeared normal.

A total thyroidectomy with surgical removal of the massive mediastinal mass was planned. After median sternotomy, (Figure 1B) a right thyroid lobe that measured 5x15 cm was discovered, it also had a mediastinal extension and covered the right innominate vein without invading it. The mass weighed about 1 kg and was also firmly attached the right parietal pleura and couldn't be resected without compromising it. In addition, lymphadenectomy was also performed (Figure 1C).

Pathology reported a multinodular goiter with an associated stage IV, papillary thyroid cancer with extra-thyroid invasion (Figure 2A and B), also mediastinum lymph nodes were positive for malignancy (Figure 2C).

Levothyroxine was initiated in the early postoperative period, and due to low and serous production of the thoracic drain, it was removed on the 7th postoperative day. After this patient was discharged without any complications. However, five days after initial discharge, she returned to the emergency room with a high fever. On clinical examination, purulent fluid drained from the wound, Surgery was decided and a 150 ml abscess over the muscle fascia was drained. After an extensive irrigation and debridement, the wound was closed. After this intervention, and antibiotic treatment patient fully recovered. On follow up controls patient is doing well and was referred to the oncologist.

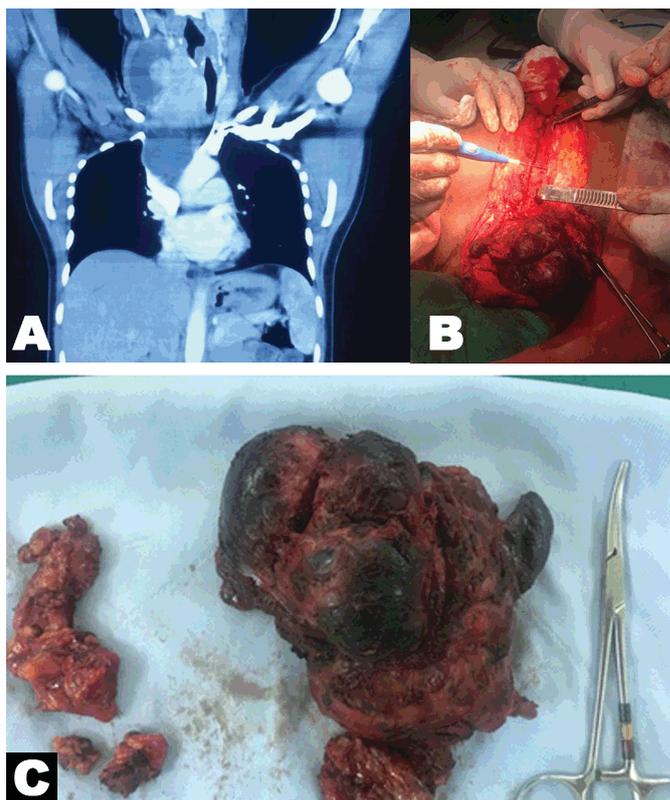


Figure 1: (A) Mediastinum mass, with lymph nodes that displace the airway. (B) Sternotomy revealing the mass within the mediastinum. (C) Thyroid gland and mediastinum mass.

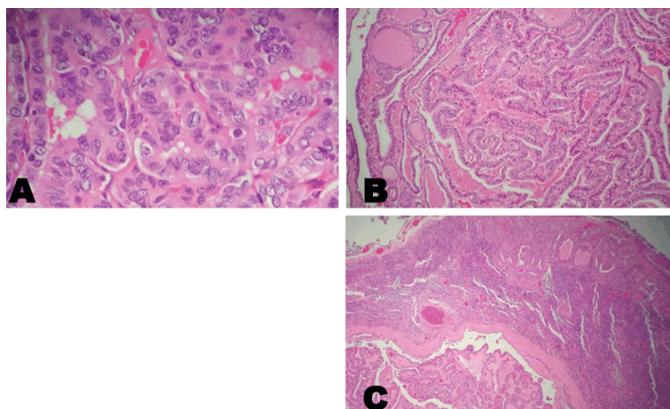


Figure 2: (A) Pleomorphic nuclei with scattered chromatin. (B) Complex papillae lined by tumor epithelium. (C) Lymph node with metastasis of papillary carcinoma.

## DISCUSSION

Thyroid disease, is the most common non-communicable disease in the developing world, affecting up to one-tenth of the world population, unfortunately, it is overlooked, underdiagnosed and still inadequately managed [5, 6].

Substernal goiter occurs from the abnormal growth of the thyroid into the mediastinum aided by the negative intrathoracic pressure, gravity, and a large mediastinal space [7, 8]. Goiter may result from iodine

deficiency, selenium deficiency, goitrogen ingestion, Graves' disease, and both benign and malignant disease. Delay in treatment is common and this may result in an increased incidence of advanced thyroid cancer [5, 6]. As it happened in our case.

The reported incidence of mediastinal goiter ranges from 6 to 30%. And in rare cases can grow to massive sizes, [1, 7] this kind of goiters can cause respiratory distress, dysphagia, as our patient experienced, or even vascular compression and sudden death [4].

Multinodular goiter with simultaneously thyroid cancer is uncommon and only happens in about 4%, that being said, it was thought that in toxic goiter the risk of cancer would be lower due to a possible protective effect of TSH suppression, however incidence of cancer in toxic and non-toxic goiters appears to be the same [9].

Substernal goiters carries a higher risk of malignancy 3–21%, [10] mostly due that it can be difficult to detect, not only because the application of a fine needle aspiration and biopsy is technically difficult, [1, 2, 4, 10], but because cancer foci of substernal goiters are commonly located in the thorax and are difficult to be detected by image studies [4].

When substernal goiter is detected, treatment is usually straightforward and surgery should be mandatory [1, 4]. However, the approach can be controversial. Sternotomy or cervical approaches are available. Several series have examined the factors that increase the possibility of sternotomy and have stated that sternotomy is inevitable when a goiter is below the aortic arch [1], other factors, like malignancy, have also been described [10].

In our patient, treatment was straight forward, due to the size of the mass, symptoms, and lymph nodes, a sternotomy was decided and the mass was resected, unfortunately for the patient, cancer was identified. Thyroid disease has complex scenarios, from asymptomatic patients to a giant mass in the neck. Early detection and primary health care detection should be a vital part of thyroid disease.

## CONCLUSION

Thyroid disease has complex scenarios, from asymptomatic patients to a giant mass in the neck. One of the most valuable things is that if the thyroid disease associated with cancer is detected in the early stages it can be cured. Timely diagnosis and treatment should be a vital part of thyroid disease.

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## Author Contributions

Gabriel Alejandro Molina – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Cristhian Ramiro Garcia – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

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Paul Sebastián Llerena – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Carlos Alberto Romero – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

**Guarantor of Submission**

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**Consent Statement**

Written informed consent was obtained from the patient for publication of this case report.

**Conflict of Interest**

Authors declare no conflict of interest.

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