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Case Report: A Large Substernal Goiter Mimicking Lung Mass

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Abstract

Substernal goiter, also known as a retrosternal goiter, is defined as a thyroid mass that exhibit 50% or more of its volume located below the thoracic inlet. This enlarged thyroid gland grows inferiorly and passes through the thoracic inlet into the thoracic cavity. Substernal goiters are most descended into the anterosuperior mediastinum and may also extend into the posterior mediastinum behind the trachea or even into the posterior thoracic cavity. The appearance of this substernal goiter on chest radiograph may show smooth soft tissue mass which characteristically displaces the trachea. Here, we describe a rare case of a large substernal goiter in 53-year-old lady, who denied any obstructive symptoms or any noticeable thyroid swelling in the neck region. Incidentally, large mass was discovered on her right lung on chest radiograph during screening and she was considered to have a lung cancer at the first sight. Tomographic examination revealed a large mediastinal mass extending from the inferior pole of right thyroid lobe, compressing the lateral wall of trachea on the right upper lung region. Considering the large appearance of intrathoracic mass without much mediastinal structure deviation on conventional radiograph raise suspicion of lung cancer, thus computed tomography plays an important role in determining the origin of the mass.

Keywords:

Goiter, Substernal, Intrathoracic, Lung Cancer, Mediastinum, Thyroid

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Introduction

The thyroid gland is typically located anterior to the thyroid and cricoid cartilages of the larynx. The term "goiter" refers to abnormal enlargement of the thyroid gland, whereby substernal goiter is defined as extension of the thyroid tissue past the sternal notch with the patient in the supine position, diagnosed by either radiologically or clinically (1). Extension of thyroid goiter from the neck inferiorly into the thorax is relatively uncommon. It represents about 5% of all resected mediastinal tumors (2). Most of the substernal masses composed of benign multinodular goiters. However, several studies have reported malignancy in substernal goiters with malignancy rate of 3.7% and 23.3% (15). Clinical presentation usually includes dyspnea, odynophagia, dysphagia, stridor, palpable cervical and superior vena cava syndrome (3). However, most of the times, patients are asymptomatic with abnormality only detected incidentally on a routine chest radiograph. In most cases, substernal goiter is in the anterior mediastinum (4). Chest radiograph and computed tomography (CT) are useful examination tools for locating the lesion accurately. We present an interesting case of a large substernal goiter mimicking a lung mass on chest radiograph in an asymptomatic adult without any noticeable thyroid swelling in the neck region.

Case report

A 53-year-old female with underlying hypertension and childhood bronchial asthma initially presented to emergency department with recurrent painless per rectal bleeding for 1 year. Physical examination revealed fungating anorectal mass with contact bleeding. Biopsy taken with histopathology result came back as adenocarcinoma of rectum. Chest radiograph (Figure 1) was done during admission noted a large homogeneous mass occupy upper and mid zone of right hemithorax, compressing the right transverse fissure with obliteration of the right perihilar area. The mediastinal structures remain in central position without obvious displacement. A focus of vague calcification was identified within the lateral part of the mass. Given the history of recent diagnosis of rectal adenocarcinoma and chest radiograph shows large mass without unremarkable mediastinum shift, a diagnosis of right lung mass, possible of lung metastasis was made. Upon further history, she denied any symptoms of palpitation, shortness of breath, dysphagia, odynophagia, stridor, or superior vena cava syndrome. She had significant weight loss, losing 4kg in 6-month duration. Her family history was unremarkable for thyroid disease.

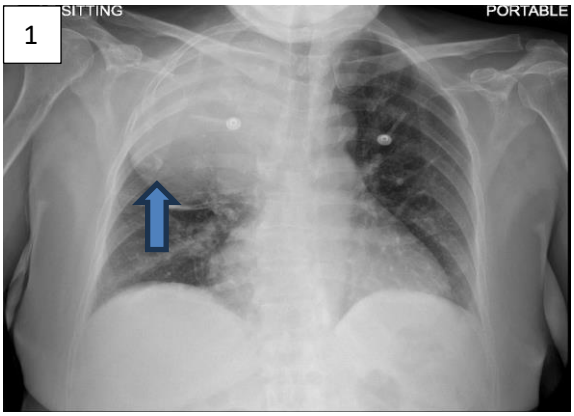

Figure 1: Frontal chest radiograph shows large mass projected at upper and mid zone of right hemithorax, showing untraceable upper border with foci of calcification within the mass (arrow).

Physical examination showed no obvious thyroid swelling in the neck region. She was hemodynamically stable, not in respiratory distress and saturating well under room air. Routine blood investigation revealed low hemoglobin level of 8.9 g/dl and depressed thyroid stimulating hormone (TSH) measuring <0.005 (normal 0.270-0.40) of with normal T4 value.

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Plain and contrast enhanced helical computed tomography (CT) of thorax (Figure 2A&2B) showed well defined large heterogenous thyroid mass arising from inferior pole of right thyroid lobe with intrathoracic extension measuring 11.3 x 9.6 x 11.6 cm in the anteroposterior, transverse and caudocranial diameter respectively. The mass slightly compresses the right lateral wall of trachea, causing focal luminal narrowing (Figure 2C). The mass is seen obliterating the upper lobe, indenting the right transverse fissure (Figure 2F). The mediastinal structure is not shifted towards the contralateral side. Multiple benign looking thyroid nodules also visualized in left thyroid lobe, causing minimal retrosternal extension on the left measuring 2.4cm from sternum (Figure 2D & 2E). A decision for biopsy was finalized by primary team, however patient was strongly refused for any intervention as she was asymptomatic since the beginning. She was then under interval close follow-up by primary team.

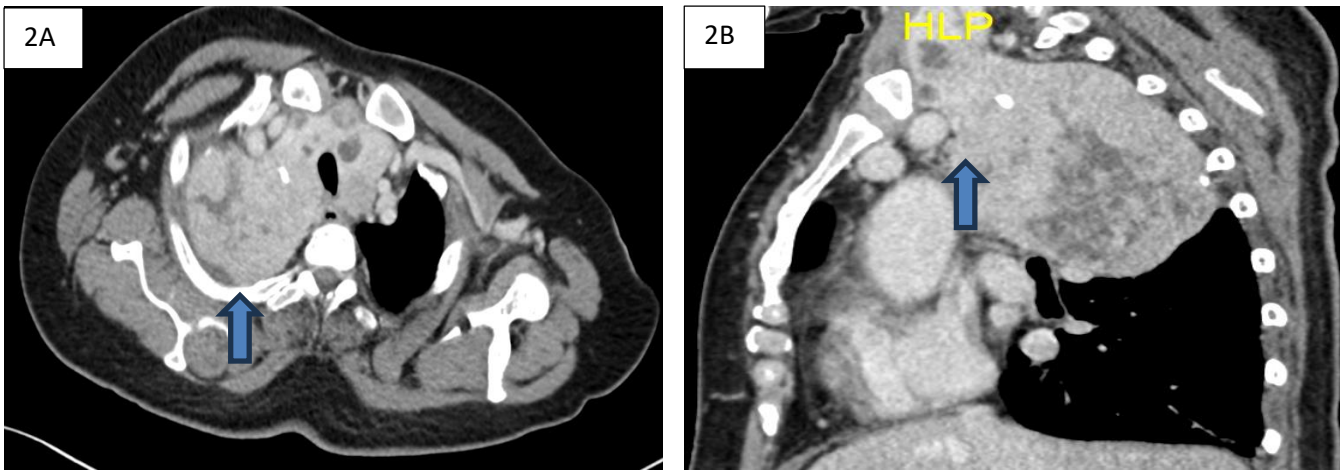

Figure 2A: Axial contrast CT Thorax shows large heterogenous thyroid mass arising from inferior pole of right thyroid lobe with calcification(arrow).
Figure 2B: Sagittal reformat CT Thorax shows intrathoracic component of thyroid mass extending posteriorly until T6 vertebral body.

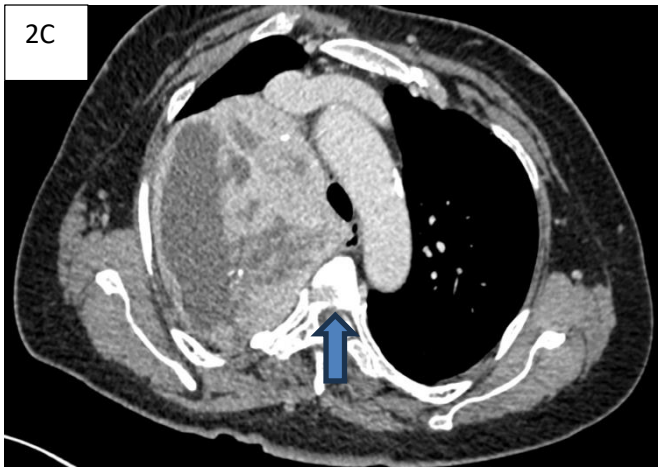

Figure 2C: Axial contrast CT Thorax shows compression of the mass into the lateral wall of trachea, causing minimal focal narrowing of tracheal lumen (arrow).

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Figure 2D (axial) and 2E (sagittal) show left thyroid lobe is also enlarged with mild retrosternal extension Multiple hypodense thyroid nodules seen within (arrow).

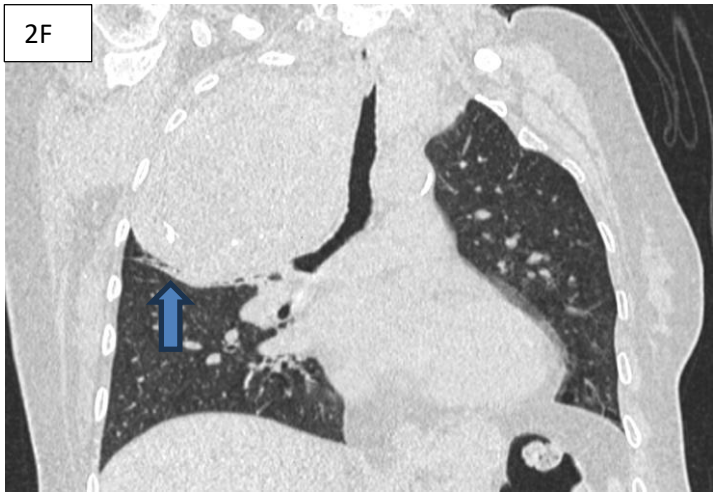

Figure 2F: Lung window shows soft tissue mass obliterating right upper lobe, indenting into the right transverse fissure (arrow).

Discussion

Large substernal goiter is a rare disease with its prevalence approximately 5.1 – 15.7% (5). Substernal goiter is commonly diagnosed after the age of 50 years and is four times more common in female patients (6). It is caused by an enlarging thyroid gland grows inferiorly, passing through the thoracic inlet into the thoracic cavity. It may involve one or both thyroid lobes. Most of the times, patients are often completely asymptomatic, thus it can be diagnosed incidentally during routine chest radiograph. Usually, the symptoms are due to local obstructive or compressive effect such as exertional dyspnea, choking sensation, cough, stridor, odynophagia, hoarseness of voice or superior vena cava syndrome due to compression of venous structure (3). Like in this case, the large substernal goiter arising from the inferior pole of right thyroid lobe causing minimal compression of lateral wall of tracheal with focal luminal narrowing. No other

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obvious compression to the esophagus or adjacent venous structure. As goiters grow slowly, this condition can be insidious and asymptomatic. Our patient did not have any symptoms despite of airway narrowing being discovered on CT.

Substernal goiters are mostly diagnosed by deviation or narrowing of the trachea on chest radiographs (7). Due to its easy accessibility and cost-effectiveness, incidental substernal goiters detection after chest radiograph is frequent. On chest radiograph, it may show a superior mediastinal radiopacity causing tracheal deviation to the opposite side. Usually, the superior margin of the mass is untraceable known as positive cervicothoracic sign. In this case, large opacity projected at upper and mid zone of right hemithorax. The upper border of the opacity appears indistinct and seen extending above the right clavicle. The opacity is indenting the right transverse fissure with loculated effusion seen within the fissure. Surprisingly, this large, big opacity/mass does not cause tracheal deviation or other mediastinal structures. Substernal goiters are common cause of contralateral displacement of trachea, larynx, and esophagus (8).

Computed tomography (CT) is currently the most useful tool especially in the pre-operative assessment of patients' anatomy. CT will be able to delineate the extension towards the aortic arch, location of goiter (anterior, posterior, or mixed) and any narrowing or stenosis as well as pathological interaction with other organs (9,10). Focal calcification can also be detected on CT. As many as 90% of intrathoracic component of substernal goiters have sharp borders separated by fat planes from other structures in the mediastinum which is best shown on CT scan (11). In our case, CT depicted the clear origin of the mass seen initially on chest radiograph. Being a large substernal goiter with intrathoracic extension, CT can show displacement of the esophagus and mass effect to the lateral wall of the trachea in this case. A thyroid ultrasound is mostly recommended if there is cervical component of the goiter. In case of the intrathoracic part of the substernal goiter, thyroid ultrasound cannot assess the extent and characteristic of goiter beyond the suprasternal notch as ultrasound waves cannot penetrate the bone and do not propagate well through the air in the lungs. Scintigraphy is one of the best imaging methods in demonstrating an ectopic thyroid focus or in the case of hyper functional nodule. However, its sensitivity is considered low in detecting substernal goiter due to the superimposed intrathoracic vasculature and bony sternum. Furthermore, substernal goiter tissue radioiodine uptake could be reduced in euthyroid patients, thus substernal goiter may not be visualized because they remain posterior to the clavicle and sternum (16).

The chances of substernal goiters turn into malignancy is assumed to be around 10%, which is not significantly different from that of cervical goiters (12). However, several literatures have recommended surgery for asymptomatic patients with retrosternal goiter as these lesions may contribute to an increased risk of malignancy (13). Apart from that, the respiratory problems that may encounter by patients in the future due to substernal goiters and the possibility of intubation problems in any future surgery are deemed the necessity of the surgical method. Surgery is preferred if presence of respiratory and gastrointestinal compression symptoms caused by enlarged substernal goiters, compression on major vasculature, high index of malignancy, and cosmetic problems (14).

Conclusion

Retrosternal goiter with intrathoracic extension should not be missed as one of the diagnoses in large mass seen on the chest radiograph. It is challenging to diagnose retrosternal goiter solely based on chest radiograph as some of the mass did not show mass effect or compression to the trachea. Thus, the preferred imaging modality is computed tomography as it can accurately assess the size and extension of the goiter and its relationship with the adjacent anatomical structures.

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Conflict of Interest Disclosure
We declare that we have no conflict of interest.

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