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Incidental Finding of Large Mediastinal Mass: Chasing A Diagnosis

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Abstract

Background: ***The majority of mediastinal masses occur in the anterior mediastinum. Differential diagnosis of such masses is thymoma, thyroid goiter, teratoma, or lymphoma. Anterior mediastinal masses can present as an incidental finding on radiographic studies. Thymomas are rare tumors representing about 50% of anterior mediastinal masses and about 20-30% of all mediastinal tumors.*** ***Case Description:*** ***We present a case of an 81-year male in whom chest X ray revealed mediastinal widening. The patient did not present with symptoms of mediastinal mass effect or paraneoplastic symptoms as myasthenia gravis. CT chest showed multiple large smooth lobular homogeneous fluid attenuation cystic mass in the anterior mediastinum measuring up to 15.7 cm in width, which did not appear to invade vasculature, lung, or pericardium. The patient declined to undergo an imaging guided biopsy of the mass. Hence, F- 18 FDG PET-CT imaging was performed and visualized the anterior mediastinal mass as a cystic lobulated photopenic lesion with no appreciated FDG uptake, representing a thymic cyst.*** ***Conclusions:*** ***Fifty Percent of patients with thymomas are diagnosed incidentally with chest radiography as anterior mediastinal mass. The standard diagnostic workup includes CT chest imaging, while standard management is thymectomy. However, individualized patient management on a case per case basis should be implemented.***

Keywords: ***Thymoma; Anterior Mediastinal Mass.***

1. Introduction

Majority of mediastinal masses occur in the anterior mediastinum. Differential diagnosis of such masses is thymoma, thyroid goiter, teratoma, or lymphoma. Anterior mediastinal masses can present as an incidental finding on radiographic studies. Symptoms emerge from either a mediastinal mass or systemic effect. The most common etiologies of anterior mediastinal masses are thymoma, lymphoma, thyroid tissue retrosternal growth, or lymphoma [1]. Combining clinical data from thorough history taking and physical examination represents the first step in the diagnostic workup and followed by diagnostic imaging studies that leads to a presumptive diagnosis in most patients.

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Computed tomography chest (CT) provides invaluable information regarding the mass characteristics, size, location and relationships to surrounding structures. While definitive diagnosis is always a tissue biopsy, Positron Emission Tomography (PET) using 18F-fluorodeoxyglucose (FDG) has been shown to be useful in identifying those PET avid masses that may represent malignancies [2], [3].

2. Case Reports

An 81-year-old South American man lifetime nonsmoker with past medical history of hypertension, hypercholesterolemia, eruptive skin lesions and benign prostatic hypertrophy presented for further evaluation of worsening abdominal discomfort and constipation for the past 3 days. His abdominal discomfort was not aggravated or relieved by any factors. He had no nausea, vomiting, gastroesophageal reflux disease, or red blood in stool. The patient had no significant personal or family history of carcinoma and there were no complaints of hoarseness of voice or dysphagia. He also denied any symptoms of chest pain, dyspnea, or respiratory symptoms. He worked as a driver but recently retired. Family history was non-contributory. During evaluation, the patient's blood pressure was 153/77 mmHg, pulse was regular at 73 beats/min, Temp 98.6 F, oxygen saturation of 99%, and respiratory rate of 18/min. On examination, the patient had bilateral upper and lower extremities skin rash. Chest examination was unremarkable apart from a noted tortuous dilatation of the subcutaneous veins of the chest wall (Fig. 1) with more prominence on the right side.

A)

B)

Fig. 1. Collateral venous circulation causing distension and tortuous dilatation of the subcutaneous veins of the chest wall with more prominence on the right side (A) than the left side (B).

Neck examination did not reveal any lymphadenopathy or thyroid gland enlargement. Abdominal and cardiovascular examinations were unremarkable. Labs was significant for elevated White Blood Cells of 20.4 (reference range 3.4-11.0 10*3/uL, serum creatinine of 1.54, reference 0.8-1.4 mg/dL, Blood Urea Nitrogen 35, reference 8-26 mg/dL, and BUN/create 23, reference 10-14 mg/dL), and a COVID positive rapid test. A chest radiograph (Fig. 2) showed an enlarged upper mediastinal silhouette with no focal pulmonary consolidations, pleural effusions, or pneumothorax.

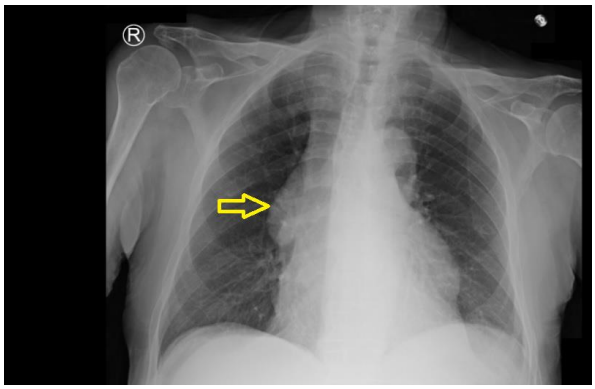


Fig. 2. Postero-anterior chest X-ray showing widened mediastinum suggestive of anterior mediastinal mass (arrow).

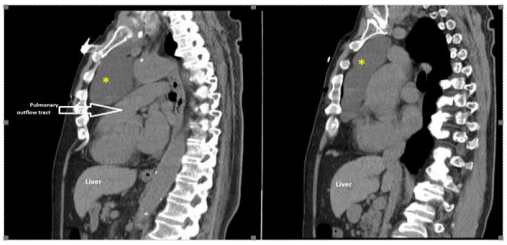
The patient was admitted to the hospital and COVID protocol was followed, and he was given laxative and interestingly, on the first day of admission he had a bowel movement resolving his original complaint of constipation. Further clinical workup for the enlarged mediastinal silhouette was undertaken. Since the patient was in acute kidney injury, CT chest without contrast was performed showing a COVID positive rapid test. Further clinical workup for the enlarged mediastinal silhouette was undertaken. Thyroid ultrasound demonstrated the normal size, echogenicity, and vascularity of the thyroid gland with the right lobe of the thyroid measuring 5.1 x 2.4 x 2.1 cm, left lobe measuring 3.8 x 1.2 x 1.4 cm and the thyroid isthmus measuring 0.2 cm. Furthermore, no retrosternal extension was noted. Doppler ultrasound of the bilateral upper extremity venous system demonstrated no evidence of acute deep venous thrombosis or mass effect obstruction in the visualized bilateral internal jugular veins, subclavian veins, and brachiocephalic veins. Comprehensive 2D, Doppler, and color-flow echocardiogram revealed mild left ventricular (LV) hypertrophy, normal LV segmental wall motion, normal left ventricular ejection fraction (LVEF) of 55-60%, and normal right ventricular (RV) size and systolic function. There was no evidence of mass pressure effect on the heart. With the limitation of presenting with acute kidney injury on admission and Iodine allergy, CT scan of the chest was performed using individualized dose optimization techniques including automated exposure control, adjustment of the mA and/or kV and without the use of intravenous contrast agent. CT chest demonstrated subtle peripheral ground-glass opacities in the right upper and lower lobes consistent with atypical/viral pneumonia. Additionally, multiple large smooth lobular homogeneous fluid attenuating cystic mass in the anterior mediastinum measuring up to 15.7 cm in width, which do not appear to invade vasculature, lung, or pericardium (Fig. 3 A-D) was noted. Additionally, the mass was described following the recommendation of standard report terms for chest CT reports of anterior mediastinal masses suspicious for thymoma [4], as shown in Table 1. The patient declined to undergo an imaging guided biopsy of the mass. Hence, F- 18 FDG PET-CT imaging was performed from the base of the skull to mid thighs. The mediastinal mass was visualized as a cystic lobulated photopenic lesion in the anterior mediastinum measuring 3.9 x 11.4 cm with no appreciated FDG uptake, representing a thymic cyst. Furthermore, no FDG avid chest wall lesion, pulmonary nodules or mediastinal lymph nodes

were noted (Fig. 4). The patient was informed with the test result. His hospital course was benign and COVID infection resolved. He was clinically and hemodynamically stable and was educated about symptoms of possible anterior mediastinal mass effect. He was discharged from the hospital with instruction to follow up with his primary care physician on a regular basis.

A)

B)

C)



D)

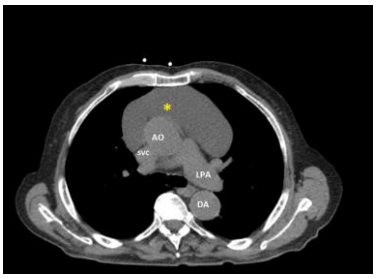


Fig. 3. Chest CT illustrating the mass in different sections (A, B) Coronal CT section showing mediastinal mass (*) surrounding vascular structures. SVC, Superior Vena cava; Ascending aorta (C) Sagittal Section demonstrates a well circumscribed soft tissue mass in the anterior mediastinum (*); (D) Transverse CT section revealing a large necrotic mass in the anterior mediastinum.

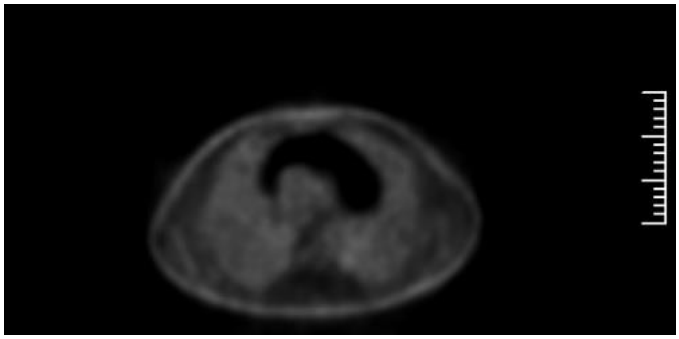


Fig. 3. CT, PET, and PET/CT images demonstrate no homogeneous 18F-FDG uptake in anterior mediastinal mass of lobulated contour.

3. Discussion

The anterior mediastinum is the perivascular compartment that extends from the diaphragm inferiorly to the thoracic inlet superiorly and contains the thymus, mediastinal fat, lymph nodes, and internal mammary arteries and veins. Thymic lesions comprise a large percentage of anterior mediastinal mass. As we demonstrated in our case, chest radiographs were the first commonly performed imaging modality that led to the incidental discovery of anterior mediastinal mass. Usually, the abnormality on Chest X Ray is either diffuse widening of the mediastinum or a focal bulge or mass. The trachea was not deviated in our case; hence the thyroid origin of the mass can be excluded. Furthermore, ultrasound of the thyroid showed normal size thyroid glands with no retrosternal extensions. A multidisciplinary diagnostic approach is recommended for the evaluation and treatment of thymic masses given its potential for invasion and local recurrence. Furthermore, distinguishing malignant or benign pathologies for an anterior mediastinal mass is fundamental to guide the proper management for each patient, given that patient is consenting to biopsy.

Contrast enhanced computed tomography (CT) is the imaging modality of choice for imaging thymic masses due to its high spatial and temporal resolution, ease of access, and convenience. Furthermore, CT imaging can discern mediastinal mass location, morphology, shape, margins, size, density, enhancement, and relationship to, or invasion of, adjacent structures with equal diagnostic accuracy to magnetic resonance imaging (MRI). *However, the diagnostic approach should always be individualized.* In our case, the patient had an allergy to iodine and was in acute kidney injury at presentation, hence utilizing a CT chest was performed without contrast. Despite this limitation, we were able to characterize the mass on chest CT (Table 1) following the standard recommendations described elsewhere [4]. While 18F-FDG-PET/CT is not a routine workup but, in this case, it was further recommended since the patient refused CT guided biopsy. 18F-FDG-PET/CT is crucial in further characterizing the mediastinal mass to predict advanced thymoma and distinguish thymoma from thymic cancer [5]. In our case, 18F-FDG-PET/CT showed absent uptake, no invasion to surrounding structures, and no presence of metastasis and necrosis, confirming the mass as thymoma.

Table 1: Documentation of Anterior Mediastinal Mass Characteristics and Involvement of Surrounding Structures.

Variables	
Size (cm)	15.7 cm width
Contour	Smooth lobulated
Internal density	Homogenous
Calcifications	No
Infiltration of surrounding structure	No
Abutment of ≥50% of a mediastinal structure with loss of fat plane	No
Additional mediastinal Yes structures the tumor abuts	No
Direct vascular endoluminal invasion	No
Abnormalities in adjacent lung parenchyma	No
Presence of a pleural effusion	No
Mediastinal lymph node enlargement (>1 cm in short axis on an axial image)	No

Abutment at the expected location of the phrenic nerve	No
Elevated hemidiaphragm	No
Presence of a pulmonary nodule	No
Extra thoracic suspected metastases	No

4. Conclusion

Managing Thymic masses follow a multidisciplinary approach from surgical resection and induction chemotherapy if advanced stages with vascular invasions. Additionally, 18F-FDG-PET/CT also plays a major role in following up patients and assessing response to therapy [6].

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