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CASE REPORT

Giant Mature Anterior Mediastinal Teratoma in a Young Female: A Rare Case Successfully Managed by Complete Mediastinal Excision via Median Sternotomy

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Abstract:

Background: Mediastinal teratomas are rare germ cell tumors, usually benign, and typically arise in the anterior mediastinum. They commonly present in young adults and may remain asymptomatic until they reach a considerable size. Large teratomas may compress adjacent structures, causing cough, chest pain, dyspnoea, or recurrent infections. Early diagnosis using CT imaging and complete surgical excision remains the standard of care, offering excellent prognosis. ***Case Report:*** A 22-year-old female who presented with chronic cough with expectoration and left-sided chest pain. Chest X-ray revealed a large homogenous opacity obscuring the cardiac silhouette. CT chest demonstrated a 12 × 16 cm well-defined fat-containing anterior mediastinal mass with cystic components and areas of calcification, suggestive of a teratoma. A trace left pleural effusion was also noted. Baseline laboratory investigations were within normal limits. Echocardiography showed normal cardiac chambers and systolic function. The patient underwent median sternotomy with complete excision of the anterior mediastinal mass. Intraoperatively, the tumor was found encapsulated and was removed in toto. Gross specimen measured approximately 20 × 10 × 10 cm, with cystic areas containing seromucinous fluid and visible hair follicles. Histopathology confirmed a mature teratoma containing squamous epithelium, sebaceous glands, adipose tissue, and keratinous debris. Postoperative recovery was uneventful.

Keywords: Mediastinal teratoma, anterior mediastinal mass, germ cell tumor, sternotomy

INTRODUCTION

Mediastinal masses constitute a diverse group of lesions arising from the complex anatomical structures located within the thoracic cavity. Among these, germ cell tumors of the mediastinum represent an uncommon but clinically significant subgroup (1). Teratomas, which arise from pluripotent germ cells, are characterized by the presence of tissues derived from all three germ layers ectoderm, mesoderm, and endoderm. While teratomas more commonly originate in the gonads, extragonadal teratomas account for 1–3% of all germ cell tumors, with the anterior mediastinum being the most frequent extragonadal site. Mature mediastinal teratomas are typically benign, well-differentiated tumors that grow slowly and often remain asymptomatic until they reach considerable size (2).

The anterior mediastinum is anatomically confined and contains vital structures including the thymus, pericardium, great vessels, lymph nodes, and adipose tissue. Consequently, even benign lesions can produce significant clinical symptoms when they enlarge and cause compressive effects. Patients often present with persistent cough, chest pain, dyspnoea, recurrent respiratory infections, or nonspecific discomfort (3). Rarely, mediastinal teratomas may rupture into adjacent structures such as the pleura, lung parenchyma, pericardium, or bronchial tree. Such rupture can lead to severe complications including pleural effusion, haemoptysis, cardiac tamponade, or expectoration of hair and sebaceous material significantly increasing morbidity (4).

Radiological imaging plays a pivotal role in the diagnosis and characterization of mediastinal teratomas. Chest radiographs may reveal a widened mediastinum or homogeneous opacity. However, contrast-enhanced computed tomography (CT) is considered the most

informative imaging modality (5). CT can reliably identify hallmark features such as fat density, cystic components, soft tissue septations, and calcifications, each of which strongly supports the diagnosis of a teratoma. The presence of fat and calcification together is considered virtually diagnostic (6). Magnetic resonance imaging (MRI) may further delineate tumor margins and its relationship with adjacent structures, especially in large or surgically complex cases. Tumor markers including alpha-fetoprotein (AFP) and beta-human chorionic gonadotropin (β-hCG) are generally within normal limits in mature teratomas, aiding differentiation from malignant germ cell tumors (7).

Complete surgical excision remains the definitive treatment for mature mediastinal teratomas. Surgery not only prevents complications but also provides tissue for histopathological confirmation and eliminates the potential for malignant transformation. (8) Median sternotomy is often the preferred approach, especially for large anterior mediastinal tumors, as it provides excellent exposure and facilitates safe dissection from neighbouring vital structures (9).

This case reports a rare instance of a giant, well-encapsulated mature anterior mediastinal teratoma in a young female, presenting with respiratory symptoms and managed successfully through complete surgical excision. Its impressive size, classical radiological features, and excellent postoperative outcome underscore the importance of timely diagnosis and multidisciplinary management in such cases.

CASE PRESENTATION

Patient Information- A 22-year-old female with no known comorbidities presented with a history of persistent cough with expectoration and intermittent left-sided chest pain for several weeks. There were no associated symptoms such as fever, dyspnoea, palpitations, orthopnoea, haemoptysis, or weight loss. She denied any prior history of hypertension, diabetes, tuberculosis, or malignancy. Her appetite and sleep patterns were normal, and there was no significant family history of similar illnesses or cancer.

Clinical Findings- On general examination, the patient was alert, afebrile, and hemodynamically stable with a pulse rate of 80/min, blood pressure of 120/70 mmHg, and normal oxygen saturation. Respiratory system examination revealed reduced air entry over the left mid and lower lung zones. No chest wall deformity, lymphadenopathy, or signs of superior vena cava obstruction were observed. Cardiovascular and abdominal examinations were unremarkable.

Diagnostic Assessment- Initial chest radiograph showed a large homogeneous opacity in the left mid and lower zones with blunting of the costophrenic angle and obscuration of the cardiac silhouette, suggestive of a mediastinal mass. A contrast-enhanced CT chest revealed a 12 × 16 cm well-defined fat-containing anterior mediastinal mass with cystic areas, soft tissue components, and areas of calcification, highly suggestive of a mature teratoma (Fig 1). A trace left pleural effusion was noted without evidence of invasion into adjacent structures. Laboratory investigations including complete blood count, liver and renal function tests, and serum electrolytes were within normal limits. Tumor markers AFP, β-hCG, and LDH were normal. CT abdomen showed mild hepatomegaly and right renal calculi; no metastatic lesions or lymphadenopathy were identified. ECG and 2D echocardiogram demonstrated normal cardiac structure and systolic function.

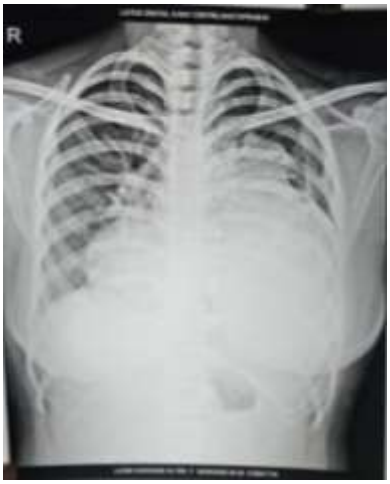

Figure 1: Preoperative Chest X-ray (PA View). A large homogeneous opacity is seen occupying the left mid and lower lung zones with blunting of the costophrenic angle and obliteration of the left cardiac border, suggestive of a large anterior mediastinal mass.

Therapeutic Intervention- The patient was planned for surgical excision via median sternotomy (Fig 2). Under general anaesthesia, a midline sternotomy was performed, and the anterior mediastinum was exposed. A large, well-encapsulated mass occupying the anterior mediastinal compartment was identified. Meticulous dissection was carried out to free the tumor from surrounding structures including the pericardium, pleura, and thymic tissue (Fig 3). The mass was removed in toto with its capsule, ensuring no spillage. Haemostasis was achieved, and bilateral mediastinal drains were placed before the chest was closed in layers.

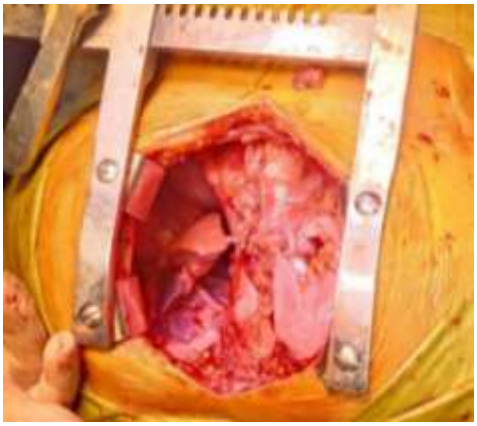

Figure 2: Excision View of the Anterior Mediastinum.

Intraoperative photograph taken immediately after complete removal of the large anterior mediastinal teratoma, showing an empty mediastinal cavity with well-preserved surrounding structures. No residual tumor tissue is visible. Hemostasis has been achieved, and the pericardial and mediastinal planes appear intact following block excision.

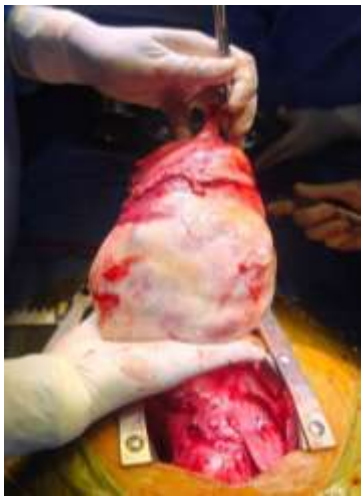

Figure 3: Intraoperative Image Showing Complete Excision of the Mediastinal Teratoma.

Histopathological Findings- Gross examination of the resected specimen revealed a globular, encapsulated mass measuring 20 × 10 × 10 cm, with solid and cystic areas, yellowish sebaceous material, seromucinous fluid, and focal areas of hair and calcification. Microscopy demonstrated mature squamous epithelium, sebaceous glands, adipose tissue, and lamellated keratin without any immature or malignant components, confirming a mature mediastinal teratoma.

Follow-up and Outcome- The postoperative course was uneventful. The patient remained hemodynamically stable with satisfactory pain control. Follow-up chest radiograph showed clear lung fields and normal mediastinal contour (Fig 4). Drains were removed appropriately, and the patient was discharged on postoperative day 5 with instructions for routine follow-up. She remained asymptomatic on subsequent evaluations.

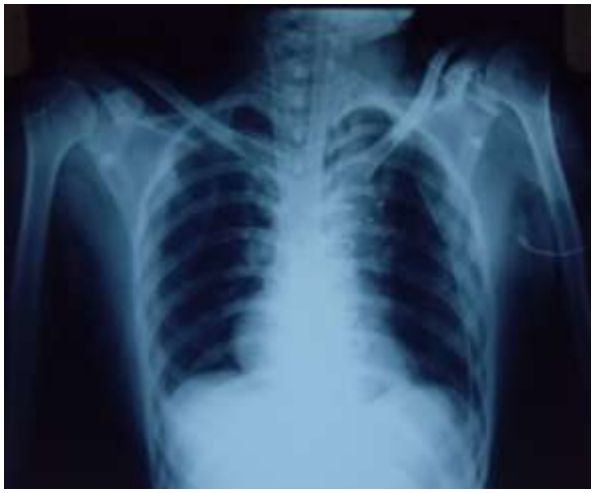

Figure 4: Postoperative Chest X-ray

The postoperative radiograph shows a well-expanded bilateral lung field with resolution of the previously noted left-sided mediastinal opacity. The median sternotomy wires are in situ, and the mediastinal contour appears normal. No pneumothorax, pleural effusion, or residual mass effect is seen, indicating satisfactory postoperative recovery following complete excision of the anterior mediastinal teratoma.

DISCUSSION

Mediastinal teratomas represent a rare but well-recognized group of germ cell tumors arising from pluripotent cells capable of differentiating into tissues derived from the ectoderm, mesoderm, and endoderm. While teratomas most commonly occur in the gonads, the mediastinum is the most frequent extragonadal site, accounting for approximately 8–13% of all mediastinal tumors (10). Mature mediastinal teratomas, such as in this case, are typically benign, slow-growing, and often discovered incidentally or when they reach a size large enough to exert compressive effects on adjacent organs (11).

The clinical presentation varies depending on the size and location of the mass. The anterior mediastinum is a confined anatomic space containing the thymus, great vessels, lymphatics, and upper pericardial structures. As such, enlarging lesions may cause cough, chest pain, dyspnoea, and recurrent respiratory infections (3). In our patient, chronic cough with expectoration and left-sided chest pain were likely due to compression of lung parenchyma and pleural irritation by the large anterior mediastinal mass. Importantly, there was no evidence of superior vena cava obstruction, dysphagia, or

haemoptysis symptoms that occur in more advanced compressive presentations.

Imaging remains the cornerstone of diagnosis. Chest X-ray often provides the first indication of a mediastinal mass, as seen in this case where a large homogenous opacity obscured the left cardiac border. CT scan is the diagnostic modality of choice due to its ability to identify fat, soft-tissue elements, fluid-density cysts, and calcification features characteristic of teratomas (12). The presence of both fat and calcification in a well-defined anterior mediastinal lesion is considered virtually pathognomonic for teratoma. In this patient, CT findings of a large 12 × 16 cm heterogenous mass with fat, cystic components, and calcifications strongly suggested the diagnosis even prior to surgery. The absence of local invasion or encasement of major vessels was reassuring and supported a good surgical prognosis (13).

Laboratory investigations such as AFP, β-hCG, and LDH are useful in differentiating mature teratomas from malignant germ cell tumors. The normal tumor markers in this patient provided further evidence of a benign pathology. Although MRI can offer additional soft-tissue resolution, it was not required in this case due to the clarity of CT findings (14).

Surgical excision remains the definitive and curative management for mature mediastinal teratomas. Complete resection eliminates symptoms, prevents complications such as rupture, infection, or malignant transformation, and allows for histopathological confirmation. For large anterior mediastinal tumors, median sternotomy remains the gold standard as it provides optimal exposure and allows safe dissection from vital mediastinal structures (15). In this case, the mass was well encapsulated, allowing an block resection without rupture or spillage. The operative findings were remarkable for the sheer size of the tumor 20 × 10 × 10 cm filling the anterior mediastinum but not invading adjacent organs.

Histopathological examination confirmed the diagnosis of a mature teratoma, demonstrating mature squamous epithelium, sebaceous glands, adipose tissue, and keratinous debris findings typical of benign teratomatous differentiation. The absence of immature components or malignant transformation indicated an excellent prognosis (16).

Postoperative outcomes in such cases are generally excellent, and recurrence is exceedingly rare after complete excision. Our patient recovered uneventfully, with no postoperative complications and rapid symptomatic improvement. Follow-up imaging showed restoration of normal mediastinal anatomy, further confirming the success of the surgical intervention.

This case underscores the importance of timely imaging, early diagnosis, and appropriate surgical planning in managing large anterior mediastinal teratomas. The impressive size of the tumor, classic radiological features, and complete surgical excision with excellent recovery make this case a valuable contribution to the literature.

CONCLUSION

Mature anterior mediastinal teratomas are rare but typically benign tumors that may remain asymptomatic until they reach substantial size and begin exerting pressure on surrounding structures. Early clinical suspicion supported by diagnostic imaging, particularly CT, is crucial for accurate identification, as the presence of fat, fluid, and calcification is highly characteristic. Surgical excision remains the definitive and curative treatment, providing both symptom relief and histopathological confirmation. In the present case, complete removal of a giant 20 × 10 × 10 cm mature teratoma via median sternotomy resulted in an excellent postoperative outcome with full resolution of symptoms. This case highlights the importance of multidisciplinary management and emphasizes that timely surgical intervention offers an excellent prognosis, with minimal risk of recurrence when complete resection is achieved. It also reinforces the need to consider teratomas in the differential diagnosis of anterior mediastinal masses in young adults.

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