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Case Report

ANTERIOR MEDIASTINAL MASS CAUSING SUPERIOR VENA CAVA OBSTRUCTION: A CASE REPORT

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ABSTRACT

Anterior mediastinal masses are uncommon but potentially life-threatening, particularly when they cause vascular compromise such as superior vena cava (SVC) obstruction. Thymoma is the most frequently encountered anterior mediastinal tumour in adults and may produce critical complications including complete SVC occlusion, haematological toxicity, and post-treatment pulmonary sequelae.

CASE PRESENTATION: A 53-year-old woman from Gilgit Baltistan presented with a 20-day history of fever and cough. Contrast-enhanced computed tomography of the chest revealed a large infiltrative anterior mediastinal mass encasing the great vessels and causing complete SVC obstruction with significant collateral venous formation. She was treated with concurrent chemoradiotherapy (CCRT), with serial imaging demonstrating partial tumour regression. However, persistent SVC obstruction, post-radiation pulmonary fibrosis, and progressive haematological toxicity — including dimorphic anaemia, leucopenia, and thrombocytopenia — developed as sequelae of treatment. This case highlights the importance of early imaging evaluation, a multidisciplinary treatment approach, and diligent haematological surveillance in patients with anterior mediastinal masses complicated by SVC obstruction. Holistic nursing care addressing both the physical and psychosocial burden of long-term malignancy is equally essential to optimise patient outcomes.

KEYWORDS: superior vena cava obstruction; anterior mediastinal mass; thymoma; concurrent chemoradiotherapy; haematological toxicity

INTRODUCTION

The mediastinum is the central compartment of the thoracic cavity, situated between the lungs and extending from the sternum anteriorly to the vertebral column posteriorly. It is anatomically divided into the superior, anterior, middle, and posterior regions, each housing vital structures including the heart, trachea, oesophagus, thymus, major blood vessels, and lymph nodes. The mediastinum plays a crucial role in supporting cardiopulmonary function and protecting these essential organs, and its central location renders it a common site for various pathological conditions, including tumours (1).

In this case, the diagnosis is thymoma, a tumour arising from thymic epithelial cells and most commonly located in the anterior mediastinum. Thymic epithelial tumours are rare, with an estimated annual incidence of 1–5 per million population globally (2). In Asian countries, and particularly in China, anterior mediastinal masses are reportedly more prevalent, with thymomas accounting for 30.6% to 30.7% of all mediastinal neoplasms, surpassing benign mediastinal cysts and neurogenic tumours (3). Thymoma arises from thymic epithelial cells and is most commonly found in the anterior mediastinum (4). In 2015, the World Health Organization classified tumours of the thymus into three main categories: thymomas, thymic carcinomas, and thymic neuroendocrine tumours (5).

CASE PRESENTATION

A 53-year-old woman from Gilgit Baltistan presented to the Emergency Department of a private tertiary care hospital in Karachi, Pakistan, on 19 December 2022, with a 20-day history of fever and cough. A chest computed tomography (CT) scan had been performed at a district hospital in Gilgit Baltistan, following which she was referred to the cardiothoracic service in Karachi for further evaluation.

On admission, the patient was alert, afebrile, and mildly tachypnoeic and hypertensive. Respiratory examination revealed bilateral crepitations and diminished air entry. Chest radiography demonstrated bilateral pleural effusions. Neck veins were distended; no lymphadenopathy or peripheral oedema was observed.

Imaging Findings

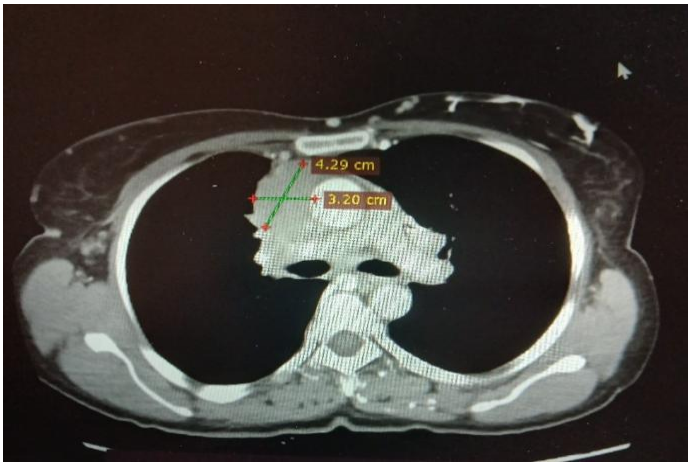
Serial contrast-enhanced CT scans of the chest demonstrated progressive reduction in the size of the anterior mediastinal mass, consistent with the therapeutic effect of concurrent chemoradiotherapy (CCRT) (Table I). Despite partial tumour regression, the residual mass continued to cause complete obstruction of the superior vena cava (SVC) and non-visualisation of both brachiocephalic veins, resulting in significant collateral venous circulation through the anterior and posterior chest wall soft tissues. Dilated azygos and hemiazygos veins were noted, with a small filling defect in the azygos vein at the T8–T10 level.

Post-radiation fibrosis and traction bronchiectasis were identified in the anterior segment of the right upper lobe, the medial right middle lobe, and the posterior right lower lobe, with minimal ground-glass opacities and fibrotic changes in both lungs. No pleural effusion, pulmonary nodules, or distant metastases were identified, findings consistent with local disease control and treatment-related pulmonary sequelae.

Date of CT Scan	Mass Dimensions (AP × T × CC, mm)	Key Findings
29 March 2023	52 × 44 × 115	Baseline; complete SVC obstruction; collateral venous circulation
12 March 2024	48 × 17 × 76	Partial regression post-CCRT; persistent SVC occlusion; post-radiation fibrosis
8 April 2025	43 × 16 (two dimensions)	Further size reduction; infiltrative mass; traction bronchiectasis; no metastases

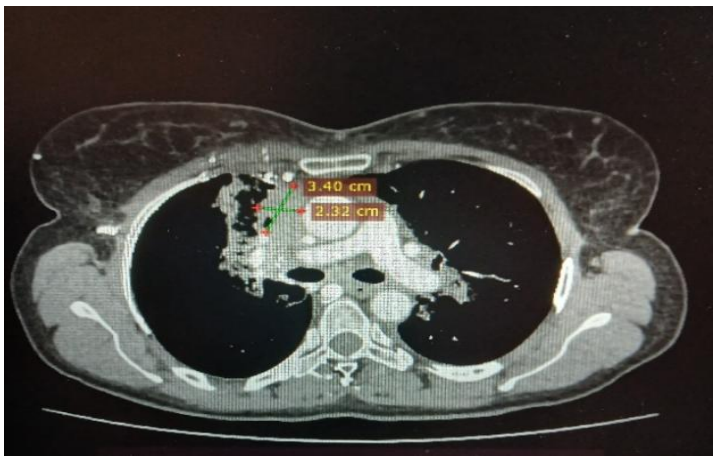
Table I: *Serial CT chest findings demonstrating tumour response to CCRT and persistent SVC obstruction. AP = anteroposterior; T = transverse; CC = craniocaudal; CCRT = concurrent chemoradiotherapy; SVC = superior vena cava.*

Before Chemo radiotherapy



29th March 2023 (52x44x115mm)

After Chemo radiotherapy



12th March 2024(48x17x76mm)

DISCUSSION

Anterior mediastinal masses encompass a range of pathologies, including thymomas, lymphomas, germ cell tumours, and thyroid conditions. In adults, thymic neoplasms and lymphomas are the most frequent causes. Given the confined space of the mediastinum, these tumours can exert significant pressure on surrounding structures, resulting in catastrophic complications such as SVC obstruction. [6] We report a case of an infiltrating anterior mediastinal tumour in a 53-year-old woman who initially presented with systemic symptoms and subsequently developed complete SVC obstruction.

The initial symptoms of fever and cough were non-specific, which may have contributed to diagnostic delay. Subsequent imaging, however, demonstrated a marked anterior mediastinal mass. This case illustrates the pivotal role of contrast-enhanced CT in evaluating tumour size, extent of infiltration, and vascular encasement. The CT findings demonstrated not only tumour invasion but also collateral venous formation and haemodynamic changes consistent with SVC obstruction, necessitating urgent oncological attention.

The haematological complications in this case followed a progressive course, beginning with iron deficiency anaemia (7), evolving to dimorphic anaemia, and ultimately culminating in pancytopenia comprising leucopenia and thrombocytopenia. This progression is attributable to the combined effects of chronic disease and CCRT (8). Dimorphic anaemia arises from concurrent nutritional deficiencies and may coexist with anaemia of chronic disease or megaloblastic processes. The development of neutropenia and thrombocytopenia following CCRT is consistent with bone marrow suppression, a well-recognised adverse effect of combined modality therapy (9). These findings underscore the importance of close haematological monitoring in patients receiving intensive oncological treatment.

Although partial tumour regression was achieved, the patient continued to experience complications from residual tumour burden, as well as treatment-associated pulmonary fibrosis and bronchiectasis. These post-radiation changes may necessitate long-term respiratory support and surveillance. Furthermore, the persistence of SVC obstruction despite tumour response suggests irreversible structural damage or fibrotic occlusion of the vessel, and endovascular or surgical intervention should be considered based on clinical presentation.

Several important clinical lessons emerge from this case. First, early detection and characterisation of mediastinal pathology are paramount, as delayed treatment can result in compression of critical structures within the mediastinum. Second, the management of such tumours necessitates a multidisciplinary approach incorporating oncological intervention, supportive care, radiological surveillance, and, where appropriate, surgical consultation. Third, this case emphasises the integral role of holistic nursing care, encompassing monitoring for treatment side effects, promoting respiratory function, and addressing the psychosocial burden of chronic malignancy.

Concurrent chemoradiotherapy can achieve tumour reduction and disease control in anterior mediastinal masses with vascular involvement (10). However, residual complications such as SVC syndrome and haematological toxicity require close ongoing monitoring. This case reinforces the value of both advanced diagnostic assessment and comprehensive nursing care in achieving optimal patient outcomes.

Clinical Recommendations

Based on the findings of this case, the following clinical recommendations are proposed:

- Prompt imaging with contrast-enhanced CT should be performed in patients with unexplained respiratory symptoms and systemic signs, particularly prolonged fever, when mediastinal pathology is suspected. Early diagnosis may prevent the development of SVC obstruction.
- Regular full blood count monitoring is essential in patients receiving CCRT, as early detection of anaemia, leucopenia, or thrombocytopenia enables proactive management, including transfusions, haematopoietic growth factors, or dose adjustments, thereby preventing serious clinical sequelae.
- Nurses play a pivotal role in recognising signs of SVC syndrome, monitoring respiratory status, managing treatment side effects, and providing emotional and psychosocial support. Patient education regarding symptom reporting and medication adherence is critical.
- Long-term follow-up with serial imaging and pulmonary function testing is recommended given the risk of post-treatment complications including pulmonary fibrosis, bronchiectasis, and vascular compromise. Interventional radiology or surgical approaches may be indicated for persistent SVC syndrome.

CONCLUSION

This case illustrates the importance of clinical expertise and a multidisciplinary approach in managing anterior mediastinal masses complicated by SVC obstruction. The clinical course — characterised by initially non-specific respiratory symptoms followed by progressive haematological toxicity — underscores the need for early imaging evaluation, collaborative oncological management, and diligent supportive care. Although the vascular response to CCRT was only partial, long-term follow-up of the vascular architecture and haematological profile reflects the chronic nature of these malignancies and their treatment effects. For nursing professionals, this case reaffirms the importance of holistic, patient-centred care addressing both the physical and psychosocial dimensions of living with chronic malignancy. Early recognition, interdisciplinary collaboration, and compassionate patient support represent the cornerstones of achieving the best possible outcomes in patients with these challenging thoracic pathologies.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

PATIENT'S CONSENT

Written informed consent was obtained from the patient for publication of this case report and accompanying clinical data.

ETHICAL CONSIDERATION

This case report was conducted in accordance with the principles of the Declaration of Helsinki. Patient confidentiality was strictly maintained throughout.

Authors' Contribution

RS and AM contributed to the study conception, clinical data acquisition, and manuscript drafting. GA contributed to clinical management and critical revision. HA contributed to data collection and manuscript review. All authors approved the final version for publication.

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