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# Overcoming Complex Airway Obstruction: Utilizing VV ECMO for Successful Procedure and Post-Operative Management in A Mediastinal Mass Patient

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**ABSTRACT**

This case report presents a unique application of venovenous extracorporeal membrane oxygenation (VV ECMO) therapy in a 30-year-old female patient with a massive mediastinal mass suspected to be adenocarcinoma. The mass had severely compromised the patient's airway, making her unable to lie flat. The tumor's location posed challenges for conventional treatments, and after unsuccessful attempts with chemotherapy, a multidisciplinary decision was made to proceed with tracheal stent placement. During the procedure, VV ECMO was utilised to ensure hemodynamic stability and oxygenation. Subsequently, the patient was transported on ECMO for three consecutive days to another hospital to receive radiotherapy. This report emphasizes the critical role of ECMO in facilitating complex interventions and post-operative management in patients with compromised airways and highlights its potential as a bridge to further treatments.

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## Introduction

This case involves a 30-year-old female presented with a massive mediastinal mass compromising her trachea, leading to significant shortness of breath over the last three months. The tumor's location and the involvement of major vessels and the mediastinum made complete resection impossible. After unsuccessful attempts with chemotherapy, a multidisciplinary decision was made to proceed with bronchial stent placement. Due to the critical airway compromise, venovenous extracorporeal membrane oxygenation (VV ECMO) was employed during the procedure. The patient was subsequently transported on ECMO to another hospital for radiotherapy for three consecutive days.

## Case Presentation

The patient presented with a bulky heterogeneous mediastinal mass with necrosis and calcification. Imaging revealed invasion of the inferior neck region and skin surface, raising concerns for major vessel invasion. Additionally, multiple solid pulmonary nodules were identified, suggesting possible metastatic disease. The location and extent of the tumor posed significant challenges for conventional treatment options.

**Image A:** Illustration of Airway Obstruction

## Procedure and ECMO Application

After extensive discussions, the patient was initially considered unsuitable for tracheal stenting, leaving chemotherapy or radiation therapy as viable options. Unfortunately, chemotherapy did not yield satisfactory outcomes, prompting the decision to proceed with tracheal stent placement. The patient was taken to the operating room as planned, and a sign-in was conducted with the multidisciplinary team. Before initiating general anesthesia, both femoral veins were percutaneously catheterized with sheaths under ultrasound guidance, allowing for the option of venovenous

extracorporeal membrane oxygenation (VV ECMO) if necessary. As the patient experienced desaturation, both cannulas were swiftly inserted, and VV ECMO was promptly initiated. The patient remained hemodynamically stable, with satisfactory oxygen saturation levels once VV ECMO was initiated.

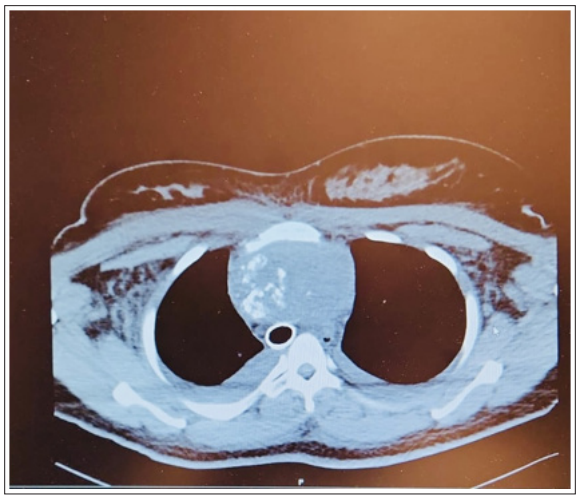

**Image B:** Illustration of Successful Tracheal Stent Placed on ECMO

**Post-Operative Management**

Following the successful tracheal stent placement, the patient was transferred to the intensive care unit (ICU) while still on VV ECMO, maintaining hemodynamic stability and satisfactory oxygenation. Subsequently, the patient required radiotherapy for definitive management of the mediastinal mass. For three consecutive days, the patient was transported on ECMO to another hospital for the radiotherapy sessions.

**Discussion**

The anterior mediastinum contains various structures like the thymus, lymph nodes, adipose tissue, nerves, and vessels. Masses originating from these structures can cause symptoms and complications. Chest radiography provides limited information, but CT imaging plays a vital role in accurately assessing the location, shape, and relationship of these masses to surrounding structures. Categorizing them based on CT attenuation values aids in differential diagnosis and guides further diagnostic procedures. Radiological evaluation is crucial for accurate diagnosis and treatment planning [1].

Extracorporeal membrane oxygenation (ECMO) has traditionally been used as a rescue treatment but is now being considered for high-risk procedures in patients with mediastinal masses. It provides temporary airway and hemodynamic stabilization, especially in cases of compromised airways or compression of the heart and great vessels due to mediastinal masses. However, the role of ECMO in managing these patients lacks definitive literature. Existing studies highlight situations where ECMO could be beneficial in the management of massive anterior mediastinal masses, emphasizing early ECMO team activation and a multidisciplinary approach [2,3].

Cases involving the use of ECMO in patients with massive mediastinal masses demonstrate its effectiveness in providing hemodynamic support during surgical procedures, improving oxygenation, and facilitating tumor resection. These cases underscore the importance of early recognition, proactive treatment of acute airway obstruction, and the availability of life-saving options such as ECMO [4,5,6]. A comprehensive treatment strategy encompassing preoperative care, intraoperative management, and the recovery period is crucial. Extracorporeal membrane oxygenation (ECMO) plays a significant role in the anesthesia strategy, particularly in cases of cardiorespiratory deterioration. Understanding the physiological changes after anesthesia induction, early recognition of complications, and multimodal anesthesia and analgesia management contribute to optimal patient outcomes [7].

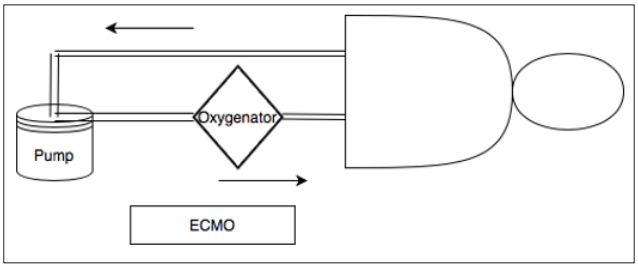


Illustration of VV ECMO

Strategies include maintaining spontaneous breathing during anterior tumor diagnosis and using core needle biopsy or tumor marker evaluation for posterior tumors. ECMO serves as cardiopulmonary support during challenging tracheal resection, with veno-arterial or veno-venous ECMO options. Recommended for tumors near the carina and patients with difficult tracheotomy access [8,9].

In summary, radiological evaluation, particularly CT imaging, plays a crucial role in diagnosing mediastinal masses and guiding further management. Safe diagnostic protocols, comprehensive treatment strategies, and the availability of ECMO as a cardiopulmonary support option contribute to optimal outcomes in patients with mediastinal masses.

**Conclusion**

In conclusion, this case report underscores the crucial role of a Multidisciplinary Team (MDT) and meticulous planning in successfully managing a 30-year-old female patient with a massive mediastinal mass. The tumor's challenging location necessitated innovative solutions, leading to tracheal stent placement after failed chemotherapy. VV ECMO played a pivotal role in ensuring hemodynamic stability during the procedure and facilitated safe transportation for radiotherapy. Radiological evaluation and collaboration among specialists were vital in tailoring the treatment plan. This case highlights the significance of teamwork and thoughtful preparation in achieving positive outcomes for patients with compromised airways due to mediastinal masses. Further exploration of such comprehensive approaches holds promise for improving critical care management.

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