



CATASTROPHIC TRACHEOBRONCHIAL INJURY DURING AIRWAY STENTING : A MULTIDISCIPLINARY CRISIS.

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ABSTRACT Central airway obstruction (CAO) due to malignancy poses a significant challenge, often requiring urgent interventional bronchoscopy for palliation or stabilization. Complications such as pneumothorax, massive hemorrhage, and respiratory distress are known risks during these procedures. We present the case of a 50-year-old woman with metastatic thyroid tumor causing critical tracheal compression undergoing elective tracheal stenting under general anesthesia. The patient acutely developed severe bradycardia and desaturation, rapidly progressing to circulatory collapse necessitating Cardiopulmonary Resuscitation (CPR). Immediate diagnosis of a tension pneumothorax lead to prompt decompression via chest tube insertion. Despite initial stabilisation patient developed a massive subcutaneous emphysema across face, neck, chest and extremities requiring unconventional interventions, including superficial surgical incisions and peritoneal tapping to release trapped air and manage the resultant hemodynamic compromise. This emergency situation warranted immediate, coordinated action by anesthesia and pulmonology teams. Prompt diagnosis, decompression, and teamwork resulted in rapid patient stabilization for ICU transfer, thus highlighting the potentially life-threatening nature of complications during interventional bronchoscopy and the role of interdepartmental collaboration and swift decision-making in the bronchoscopy suite, saving the patient's life during a catastrophic perioperative airway event.

KEYWORDS : Central Airway Obstruction, Interventional Bronchoscopy, Tension Pneumothorax, Subcutaneous Emphysema.

INTRODUCTION

Malignant central airway obstruction (CAO) is a frequent cause of dyspnea, stridor, and life-threatening respiratory failure in advanced cancer (4). Tracheal stenting is a common palliative measure to restore airway patency (3). Catastrophic complications, including airway trauma, pneumothorax, and subcutaneous emphysema, may arise with both flexible and rigid bronchoscopy, making procedural vigilance and collaborative crisis planning essential. Interdepartmental coordination and rapid intervention have been shown to improve outcomes during airway emergencies and should be prioritized in procedural planning (2). This report demonstrates the value of teamwork between anesthesiology and pulmonology in managing an acute crisis during tracheal stenting for thyroid cancer.

Case Details

A 50-year-old female with hypertension for five years presented with a progressive, firm, immobile central neck swelling for 9–10 months, increasing shortness of breath and difficulty swallowing for the past month, and stridor for two weeks.

NCCT neck and thorax revealed a large mass originating from the left thyroid lobe and part of the right lobe, causing severe tracheal compression and near-complete intraluminal obstruction at C7 (minimum diameter 2.6 mm). The tumor extended into the anterior mediastinum and was associated with cervical and mediastinal lymphadenopathy and diffuse lung metastases.

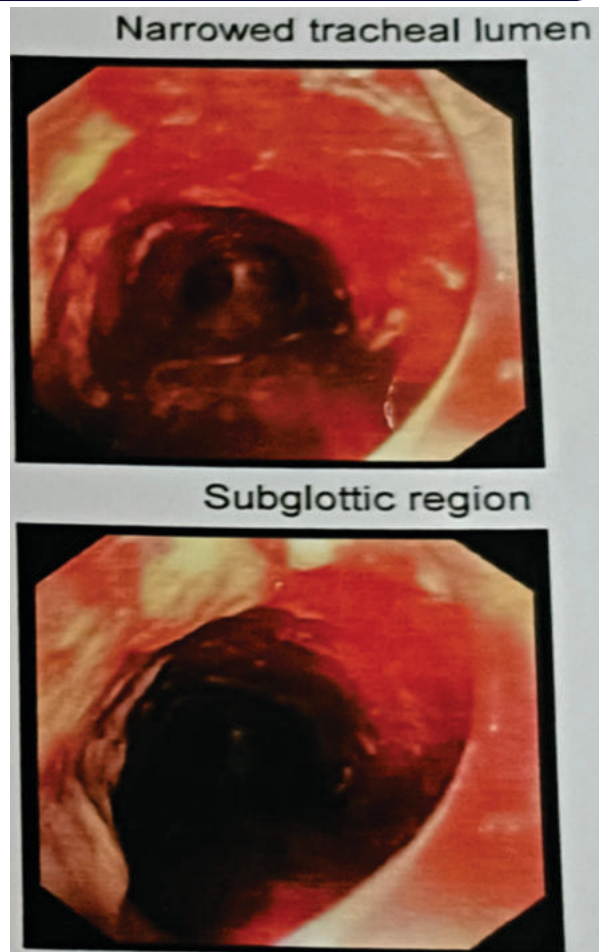
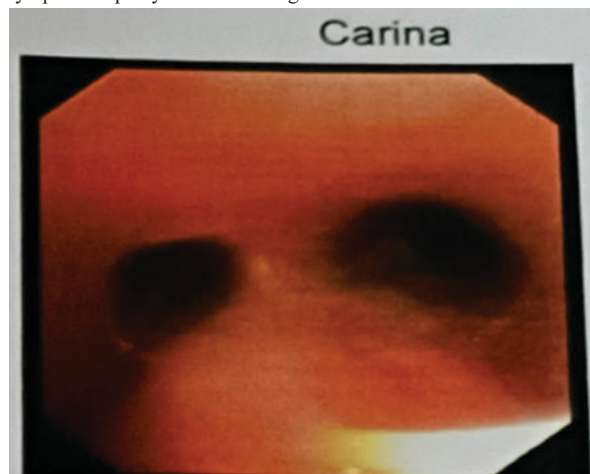


Figure 1: Screening Bronchoscopic Images and Carina, Tracheal Lumen and Subglottic Region with Endotracheal Tube in Situ.

Given the critical airway compromise, and the infeasibility of a neck tracheostomy due to the mass, the patient was intubated. An elective

tracheal stenting procedure was planned under general anesthesia. The patient was deeply sedated with fentanyl and propofol, maintained on sevoflurane, and intentionally not given muscle relaxants to preserve spontaneous ventilation. An initial attempt to deploy the stent via flexible bronchoscopy failed. A ventilating bougie was inserted through the endotracheal tube, and the tube was then removed to accommodate rigid bronchoscopy.

During the rigid bronchoscopy, the patient developed bradycardia and desaturation. The procedure was abandoned; intravenous atropine administered and a 7.0-mm endotracheal tube railroaded over the bougie. Removing the bougie resulted in a gush of yellowish-white fluid from the tube. Manual ventilation was attempted but there was no air entry bilaterally. The patient's saturation, heart rate, and blood pressure continued to drop necessitating the initiation of Cardiopulmonary Resuscitation (CPR). Tension pneumothorax was suspected. Point-of-care ultrasonography revealed absent 'sliding sign' on the left side; confirming pneumothorax and an intercostal drain (ICD) was placed, draining both air and some yellowish effusion. Air entry and patient's saturation improved. Noradrenaline infusion was started. An attempt was made to place an ICD on the right side, but it failed, and since the patient's vitals had stabilized, a repeat attempt was deferred. During this time, the patient developed extensive swelling and crepitus all over the face, neck, chest, abdomen, and bilateral extremities, consistent with massive subcutaneous emphysema. Repeat ultrasound could not be performed due to air under the skin. Superficial incisions were made over the chest wall to allow the trapped air to escape the subcutaneous plane. Air was also 'milked' from the abdominal and chest wall. The abdomen was tense, necessitating peritoneal tapping with a 14 G cannula, which released air, relieving the abdominal pressure. Under bronchoscopic guidance, the ETT was definitively positioned above the carina.

The patient was shifted to the Intensive Care Unit on ventilatory and noradrenaline support. A femoral central line was inserted. A subsequent Chest X-ray confirmed both the extensive subcutaneous emphysema and a right pneumothorax (missed on initial USG due to occasional sliding sign). A right-sided ICD was then successfully inserted. The patient's oxygen and inotropic requirements showed a decreasing trend over the subsequent hours.

DISCUSSION

Interventional bronchoscopy for malignant CAO, while often life-saving, is associated with a number of potential complications (1). The rapid deterioration observed in this patient—bradycardia, desaturation, and circulatory collapse—is characteristic of a critical airway or circulatory event, leading to cardiac arrest, a known severe complication in this context (5).

The sequence of events—removal of the ETT over a bougie to accommodate the rigid bronchoscope, followed by acute respiratory distress and the spurt of yellowish-white fluid—suggests a massive air leak or a tracheal tear. The forceful ventilation required to overcome the critical stenosis, combined with the manipulation of the airway by the bougie and rigid scope, likely resulted in a tracheobronchial injury (3). The yellowish fluid could have been effusion fluid or gastric contents aspirated due to loss of airway protection or direct mechanical trauma. The rapid onset of tension pneumothorax, confirmed by the absence of lung sliding on the left, demanded immediate decompression, which was successfully achieved with the left ICD placement (2).

The development of extensive subcutaneous emphysema, extending to the face, abdomen, and extremities, along with a tense abdomen requiring decompression, indicated a massive air leak, likely originating from the initial airway injury site and dissecting through fascial planes into the mediastinum (pneumomediastinum), subcutaneous tissues, and even the peritoneum (pneumoperitoneum) (4). This rare, massive presentation required immediate, unconventional treatment—superficial surgical incisions and peritoneal tapping—to release air, prevent compartment syndrome-like effects, and stabilize the patient's hemodynamics. This aggressive, multi-modal crisis intervention, involving the rapid coordinated efforts of the anesthesia and pulmonology teams, was pivotal in the patient's stabilization. The subsequent discovery and drainage of a right pneumothorax, guided by CXR, further solidified the diagnosis of a complex, multi-compartment air-leak probably due to airway trauma (3). Vigilance regarding the potential for bilateral pneumothorax, even with subtle USG findings, is paramount (4).

CONCLUSION

Airway stenting for advanced central airway obstruction due to malignant thyroid disease presents catastrophic risk requiring rapid recognition and intervention. This case highlights that inter-departmental teamwork, coordinated action and procedural adaptability are necessary for successful management and patient survival during perioperative airway crises in the bronchoscopy suite.

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