

A Deteriorating Patient Scenario (DPS) Due To an Obstructed Tracheostomy Tube by a Blood Clot -A Case Report

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I. INTRODUCTION:

Obstruction of a tracheostomy tube is a common cause of respiratory compromise in ventilated patients, which can lead to a life-threatening emergency. Compromised airway patency has many potential etiologies; however, the scenario described in this case report focuses specifically on tracheostomy obstruction through the presence of a blood clot and viscous secretions.

Obstruction of the endotracheal tube due to a ball-valve clot is a recognized but, fortunately, a rare complication. A ball-valve obstruction in the upper airway could create an one way check valve during respiration, resulting in a sudden deteriorating patient scenario due to tension pneumothorax-like respiratory and circulatory abnormalities.

II. CASE REPORT:

This scenario relates to a 44 yr old serving soldier in a tertiary care hospital of the armed forces in an high altitude environment (>12000 ft).this patient was air evacuated from a peripheral location with symptoms of respiratory distress and moderate grade fever. the individual was recently inducted into high altitude region (<2 months Aug 2020). Presenting c/o fever, cough, and shortness of breath since two weeks. Non-smoker. Condition on admission --O/E:RR-28/mt,Spo2-50% (Room air)→ 92 %(6 L O2);BP-126/84 mm hg. Chest -B/L crackles in infra axillary/mammary area other systems: NAD .CXR-B/L consolidation. Rx- Inj Piptaz+levoflox+dexamethasone 6 mg iv OD+LMWH+tab. Montelukast and levocetizine+tab Vit C 1B.D. he was also started on inj. LMWH 1mcg/kg .he was planned for RT-PCR.. Admitted in isolation ward/ acute medical ward with high flow O2 with a non-rebreathing mask (NRBM) in a propped up position. however, as there was no improvement in his condition as per serial ABGs, he was shifted to ICU. He was planned for elective mechanical ventilation. After 4 days, with the expectation of long term ventilation, a surgical tracheostomy was performed. Initially a 8.0 single lumen tracheostomy tube was used which was subsequently exchanged with a fenestrated double lumen tube. The patient was conscious and obeying commands.

This particular scenario occurred on day-4 of the double lumen tracheostomy placement. we recieved an urgent call from the ICU regarding a sudden deterioration in patient's breathing pattern with sharply falling SpO2. the anesthesiologist, medical specialist and the ENT spl were intimated.

- Upon reaching the ICU, his condition was--Noisy, labored breathing with pronounced use of accessory muscles, increased agitation and not following commands.
- SpO2- around 80 %, PR-120/mt, breath sounds-slightly decreased bilaterally.
- There was no difficulty in passing suction catheter. the tracheal lumen was bone dry. Increased resistance with significant increase in mean airway pressure noted. We were unable to ventilate through tracheostomy tube. With continued deterioration, patient was hand ventilated via bain's circuit. Though the ENT spl opined that total obstruction is ruled out as suction catheter could be passed, he agreed to change the tracheostomy tube. No rigid bronchoscope was available to view and clear the cause of obstruction. Fibre-optic bronchoscopy through the tracheostomy tube revealed a large blood clot with some brownish hued sludge partially obstructing the distal end of the tube...
- Repeated suctioning with a large-bore catheter failed to aspirate the clot. lavage with normal saline was also attempted. After the tracheostomy tube was removed, the clot was found to be solidified within the lumen of the tube. The clot was approximately 1 cm in diameter and 5 cm in length (Figures 1-3). Collapse of

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ventilation was a result of tracheostomy tube obstruction by the insidiously -developing blood clot functioning as a ball-valve clot, and not tension pneumothorax.



Image 2 1 double-lumen tracheostomy with lumen blocked by a blood clot



Image 2 2: thick brownish-red sludge in the tracheal lumen after suctioning with saline.



Image 2 3: thick brownish-red sludge in the tracheal lumen after suctioning with saline.

III. DISCUSSION:

Tube obstruction is an important cause of deterioration in the intubated patient with a sudden deterioration of ventilation. Ball valve mechanism like blood clot obstructions of the airways are rare, but known to occur in long-term mechanically ventilated patients. Ball valve obstruction of the airways is an emergency situation. The blood clot acts as a one-way valve, allowing normal air entry into the airways, but (completely) blocking expiration. Hyperinflation may occur, with sudden rise in mean airway pressures along with pneumothorax and haemodynamic compromise. It usually presents as sudden and life-threatening ventilatory problems, further undermining the already compromised ventilatory status. The patient had been receiving Inj LMWH since > 3 wks, and the massive blood clot may have formed over several days. However, his clotting parameters (INR-1.8) were within range.

One of the important goals in the care of the mechanically ventilated patients is to prevent airway obstruction by airway suctioning and respiratory physiotherapy. Most nursing protocols mandate regular and intermittent suctioning of the airway (3-10 times). A probable contributory factor in this case would have been the regular and excessive suctioning of the airway creating a raw area. Clotted blood or organised thrombus in the lower airway may present with life-threatening airway obstruction or pulmonary collapse. The patient was also undergoing intensive chest physiotherapy to draw out the secretions. One of the effective physiotherapy methods is the squeezing technique or manually assisted coughing, which includes manual compression of the thorax during expiration and leaving it at the end of expiration to help the movement of pulmonary secretions. [1,5,13,14] This method stimulates the normal cough mechanism through elevation of intrathoracic pressure. The stimulation of cough reflex and the associated retching with rise in intrathoracic pressure may have also compounded this particular incident. Although an urgent and rapid diagnosis of a ball-valve clot is not simple, intensivists should keep in mind this rare and fatal complication.

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