

How we managed a difficult to ventilate patient

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Abstract

A 40-year-old female presented with respiratory difficulty, cough and sputum with blood streaking. Her right lung was destroyed, and trachea was shifted to the same side. On mechanical ventilation, she developed hypoxia and rise in blood pressure. Ventilator was not delivering set tidal volume. After looking into the cause, it was decided to reintubate the patient with new endotracheal tube after cutting bevel. Thereafter, there was successful ventilation.

Keywords: Difficult to ventilate, mediastinal shift, tracheal abutment, tracheal deviation

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Introduction

It is not uncommon to encounter patients in critical care unit who develop sudden problem with ventilation while on mechanical ventilation. Causes may vary from patient related to ventilator related notably poor pulmonary compliance, increased airway resistance, and problem with ventilator, circuit or its settings. To manage the patient in this scenario where the ventilator is unable to deliver predetermined tidal volume, cause must be addressed appropriately. Failing to appropriately recognize the underlying issue may lead to inappropriate management and its consequences.

Case Report

A 40-year-old female admitted with complaint of shortness of breath for last 2-3 day, associated with cough and sputum streaking with blood for last around 15 days. She had pulmonary tuberculosis in the past and had destroyed lung on the right side with mediastinal shift [Figure 1]. On the left side, she was having pulmonary infiltrates, for which she was receiving

antibiotics. Her condition further deteriorated to the point that the patient was intubated with an endotracheal tube (ETT) number eight and mechanically ventilated with sedation and paralysis.

After a few hours of mechanical ventilation, her saturation began to drop, and blood pressure increased to more than 200 mmHg systolic with tachycardia. On realizing the problem that tidal volume is not being delivered, endotracheal suction was attempted. However, it was found that the suction catheter could not be passed as an obstruction was encountered. The



Figure 1: Mediastinal shift with tracheal deviation

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tube was removed, and the patient was reintubated. On removing the tube, there was no blockage in the tube but now patient was reintubated with a seven number ETT. This was followed by delivery of set tidal volume and normalization of oxygen saturation and blood pressure.

Further into the patient's management, after a few hours, patient developed the same problem of worsening oxygen saturation with rise in blood pressure and tachycardia. Again, the delivered tidal volume was not adequate and less than the predetermined value. It was again not possible to introduce the suction catheter through the ETT. On looking specifically at airway pressure alarm limit nothing relevant found which could be the reason for failure to deliver predetermined tidal volume.

Now, it was suspected that there could be impingement of ETT bevel on the tracheal wall after intubation due to the anatomical distortion of trachea. Gradual withdrawal of the ETT tip up to just below the vocal cords did not restore the ventilation. Therefore, another ETT was introduced with its bevel tip shortened. This was followed by adequate tidal volume delivery.

Discussion

In neonates, the distal orifice of an uncuffed ETT abuts the tracheal wall and causes frequent obstruction.^[1] But for the adults, a cuffed ETT does not allow free movements of the ETT in the trachea and obstruction does not occur as often. Head movement shifts the secured ETT within the trachea.^[2] Yet for adults, anatomical deviations from normal seem to cause malposition or difficulty in ventilation.^[3]

Lee *et al.* reported a case where they encountered a similar problem of tracheal wall abutment.^[4] They also did several manipulation to overcome the problem including withdrawing of tube as we did but to no avail.

The most likely reason of persisting problem in our patient was right-sided mediastinal shift which was creating an angle in tracheal anatomy in such a way that left-sided bevel was abutting tracheal wall. We suspected this on the basis of not able to negotiate the catheter and left-sided bevel in a patient with right mediastinal shift. Furthermore, there was no other apparent cause and problem was overcome by cutting bevel of tube. Togashi *et al.* reported a case of tube orifice abutting on the tracheal wall in a patient with Forestier's disease-diffuse idiopathic skeletal hyperostosis.^[5]

Conclusion

Sudden onset of the ventilatory problem while on the mechanical ventilator requires rapid intervention. Tracheal deviation due to destroyed lung may cause this problem due to tube tip abutting tracheal wall. Diagnosis requires high index of suspicion, once more common causes are excluded.

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