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Case Report

Airway Obstruction by an Unusual Mucous Plug

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Abstract

Bronchospasm is a medical condition commonly encountered in medical practice. Left untreated, it can cause severe morbidity and even mortality. There are first line and second line drugs as part of medical management of bronchospasm. However, our patient responded to none of the drugs in our armamentarium. A quick bronchoscopy revealed an unusual clot obstructing the airway which consisted of desiccated mucus flakes covered by a mucous plug. This was probably precipitated by dry non-humidified oxygen delivered to the patient. After the clot was removed, the patient made a full recovery.

Keywords: *Airway Obstruction; Mucous Plug; Bronchospasm*

Introduction, Case Report and Discussion

This 48-year-old male patient, 65 kgs, was a known case of Carcinoma Larynx who was on treatment for the same for the past five years. He was also operated for the same in 2019. A partial laryngectomy was done. He had a double lumen tracheostomy tube *in situ*.

Presently he was admitted to our hospital after he contracted COVID-19 and has moderate to severe dyspnea. On evaluation, he was found to have covid-19 associated pneumonia. He was managed as per institutional protocol for moderate covid-19 illness. He was given intermittent mechanical ventilation via his tracheostomy tube titrated to his ABG values.

Nine days into his illness and day 5 of his admission, the patient was in his recovery phase needing only minimal ventilatory support, achieving target PaO_2 with a CPAP pressure support of 5 cms of water. He was now subjected to weaning trials via T-piece. The patient suddenly became disoriented with a fall in saturation from 98% to 75%, associated with bradycardia (HR: 51 bpm) and profuse sweating. On chest auscultation, he had bilateral bronchoconstriction with extensive wheeze (Rt > Lt). He was nebulized with Salbutamol and Ipratropium Bromide. Inj Hydrocortisone, 200 mg was administered iv. The patient was taken on Bain's circuit and ventilated with FiO_2 [1]. The bag was tight, suggesting persisting bronchospasm. Chest auscultation revealed improved breath sounds on the Lt side, but the Rt side still had wheeze in the basal region, but the apical region was mute. The patient was given muscle relaxants for complete paralysis, along

with Inj Ketamine, 30 mg iv stat. SpO_2 was 82%. ABG showed pH: 7.1, PaO_2: 100, $PaCO_2$: 99, HCO_3: 28, BE: -11.4, O_2 sat: 95. An urgent chest X-Ray was done (Figure 1) to rule out pneumothorax. The X-ray suggested a possible Rt upper lobe collapse and no pneumothorax. Inj $MgSo_4$ 2 gm was given iv stat. The condition did not improve. Titrated doses of Inj Adrenaline (100 mcg) iv was given, twice. Despite these measures, SpO_2 did not improve beyond 90%, and the chest still remained silent in the upper and middle zones. An urgent bronchoscopy was planned. His present ABG showed severe acidosis (pH: 7, PaO_2: 83, $PaCO_2$: 154, HCO_3: 32, BE: -4.8, O_2 Sat: 85.4).

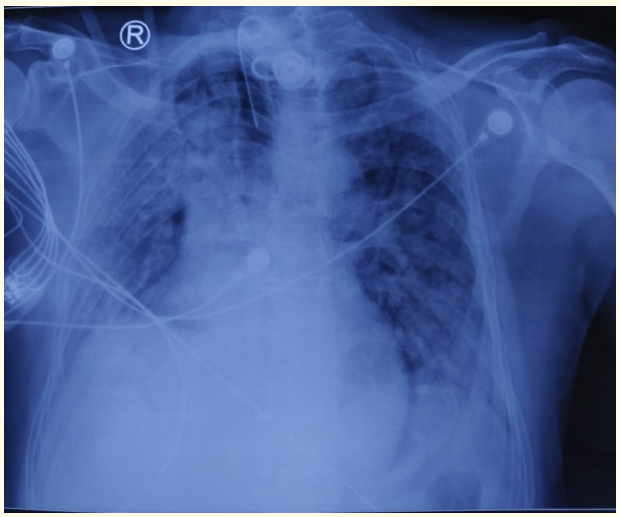

Figure 1: *Pre-procedure x-ray.*

Bronchoscopy revealed a huge mucous plug blocking the right upper lobe and extending into the bronchus intermedius. It measured 4 X 1 X 1 cms in size (Figure 2). HPE of the same revealed dried mucous casts, enveloped by thick mucous secretions. After the mucous plug was removed, the patient's saturation improved with SpO_2 at 95%. ABG post-procedure - pH: 7.40, PaO_2: 100, $PaCO_2$: 54, HCO_3: 33, BE: 7.1, O_2 Sat: 94.9. Chest X-ray showed a well expanded upper zone (Figure 3).

Figure 2: *Mucous plug that was evacuated from the bronchus.*

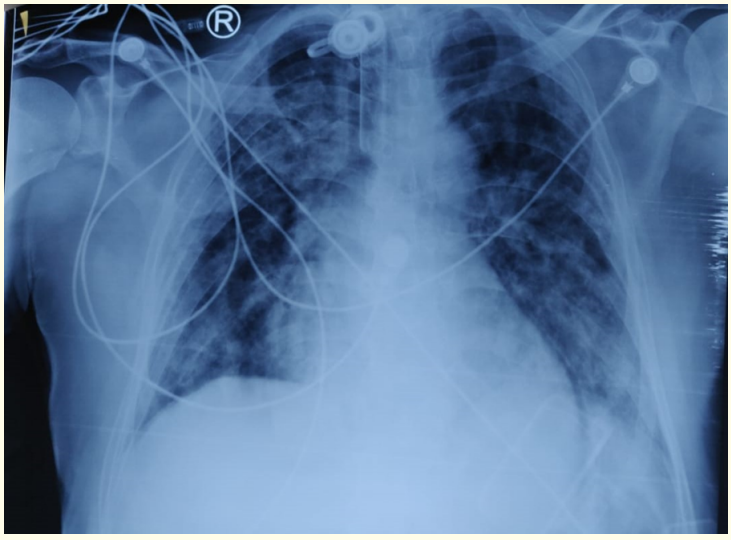

Figure 3: *Post procedure x-ray.*

The patient made a good recovery subsequently.

Airway obstruction causing severe bronchospasm is a commonly reported emergency, needing acute medical care. The incidence corresponds to one case in 634 anaesthetics or 1.7 per 1000 patients during anaesthesia [1]. The most common cause of bronchospasm is allergy causing anaphylaxis. The non-allergy related incidents causing bronchospasm are during induction or maintenance of anaesthesia (80%) due to airway irritation (35%), problems with the endotracheal tube (23%), and aspiration of gastric contents (14%) [2]. The incidence of bronchospasm was found to be more in patients infected with/recovered from COVID-19 [3].

Bronchospasm is characterized by prolonged expiration, extensive wheeze and higher peak airway pressures. Left untreated, it can cause hypoxemia, hypotension and subsequent death. Hence, any bronchospasm should be treated immediately while addressing the underlying cause [4].

The clinical management of severe bronchospasm is varied across institutions and practitioners. A few of the standard practices are discussed here. When bronchospasm is suspected, oxygen has to be switched to 100% and ventilated by hand. Any surgery or suspected stimulation should be stopped, including administration of drugs or blood products. Allergy or anaphylaxis should be ruled out. In intubated patients, consider deepening anaesthesia if under anaesthesia, and ensure ventilation through the tube. Consider replacing/ adjusting the tube if ventilation is not adequate via the tube. In non-intubated patients, consider laryngospasm as one of the cause.

Bronchodilation by Salbutamol (short-acting β2-Selective Agents) is considered as the first line of treatment, along with intravenous steroids (Inj Hydrocortisone 200 mg IV 6 hourly). Salbutamol can be administered via a metered-dose inhaler, nebulization or intravenous (250 mcg slow IV then 5 $mcg.min^{-1}$ up to 20$mcg.min^{-1}$). Various treatments are part of the second line of therapy. Nebulization with Ipratropium Bromide has shown synergistic action with β2-Selective Agents. Inhaled anaesthetics have been mentioned as a potentially life-saving therapy, optimal administration and mechanism of action still remain unclear [5]. Ketamine is a bronchodilator and hence is known to be helpful in the treatment of bronchospasm [6]. Intravenous magnesium sulphate (2g over 20 min) has also been widely used

in the management of refractory bronchospasm. Epinephrine should be administered when IgE-mediated anaphylaxis is suspected, along with cardio-vascular compromise [7].

Conclusion

In our case, all the above medical management was done, however the patient did not improve. Bronchoscopy revealed a big mucous plug. The plug contained desiccated secretions that dried by dry (non- humidified) oxygen, and engulfed by mucous. Non-humidified oxygen was used because dry gases help reduce the bacterial contamination of humidifier bottles [8]. This case is presented to sensitise health care workers that secretions can also dry up and get engulfed by mucus and cause airway obstruction.

The secondary management of acute bronchospasm should continue and it aims at continuing the ongoing therapy and addressing the underlying cause.

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