Case Report

Foreign body blocking closed circuit suction catheter: An unusual cause of retained tracheal secretions in a mechanically ventilated patient

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Abstract

Closed circuit suction system (CCSS) has become a standard of care for the tracheal suctioning of mechanically ventilated patients. The advantages of CCSS over the open suction system include decreased environmental, personnel and patient contamination, preservation of lung volumes and oxygenation especially in the severely hypoxemic patients. On the other hand, CCSS has lower efficacy in removal of secretions and it may have certain other disadvantages due to the invisibility of its tip. We report an unusual case of an airway foreign body causing blockage of the CCSS leading to retained secretions and deterioration of patient. Timely changing over to open suction system helped in its detection and improvement of patient.

Key words: Catheter, closed circuit suction system, foreign body, suction

Introduction

Removal of tracheobronchial secretions to maintain airway patency is a standard of care in mechanically ventilated patients. Since the endotracheal tube (ETT) cuff abruptly stops the mucociliary escalator, endotracheal suctioning is essential to physically remove the secretions.[1] This can be achieved by the conventional open system or closed circuit suction system (CCSS). The advantages of CCSS include limiting environmental, personnel and patient contamination and preventing the loss of lung volume as well as the alveolar de-recruitment associated with standard suctioning in the severely hypoxemic patients.[2-6]

We report an unusual case of an airway foreign body blocking the CCSS, the like of which has never been reported before.

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Case Report

A 57-year-old farmer presented with a history of fall from a tractor while working in the fields. He sustained head injury, multiple rib fractures on the right side and fracture of the right leg. At the time of presentation he was agitated and tachypnoeic. Computed tomography (CT) head showed small right sided subdural hematoma. Contrast enhanced CT chest showed multiple rib fractures, hemo-pneumothorax, basal consolidative changes and surgical emphysema on the right side. Right sided intercostal drain tube was inserted. The patient's clinical condition remained stable for 3 days while he was treated with analgesics, antibiotics and 5 L/min oxygen (O_2) inhalation by face mask. Glasgow coma score remained 15, arterial blood gas (ABG) and chest X-rays showed no deterioration. On the 4th day he became drowsy and tachypnoeic. His heart rate (HR) increased from 76 to 104 bpm, blood pressure (BP) increased from 130/80 to 150/100 mmHg, respiratory rate (RR) increased from 18 to 35/min and SpO_2 dropped to 89% despite increasing inspired O_2 concentration. ABG analysis showed hypoxemia with respiratory and metabolic acidosis. He was intubated and put on ventilator on bi-level mode, following which his condition stabilized within 5 min. HR settled to 88 bpm, RR to 20/min, BP 140/84 mmHg and SpO_2 97%. As a protocol, CCSS (14 French) was attached and suctioning done every 2 h and as and when required. 6 h after

putting on ventilator, he again developed tachypnoea (RR increased from 20/min to 45/min), tachycardia (110 bpm), hypertension (150/110 mm Hg), and de-saturation (SpO_2 dropped from 97% to 90%). Anticipating secretions CCSS catheter was passed through the ETT but nothing could be sucked out. Auscultatory findings (conducted sounds all over the chest) and spirometry findings (decreased inspiratory and expiratory peak flows, low tidal volume) suggested retained secretions. The CCSS was disconnected and on close inspection a tiny stone blocking its tip could be seen [Figure 1: Blocked tip of CCSS]; [Figure 2: On close observation tiny stone foreign body blocking the tip of catheter] which the patient probably inhaled/aspirated at the time of accident. Later a large volume of secretions was sucked out using a different suction catheter; following that the patient's condition stabilized. A bronchoscopy was performed immediately to rule out the presence of any other foreign body. It showed mucosal inflammation and purulent secretions. No other foreign body was found. The patient was managed on the ventilator and tracheostomy done on the 5th day of intubation. Antibiotics were modified according to culture-sensitivity of the tracheal secretions. He was weaned off the ventilator on the 11th day, operated upon for fracture tibia on the 16th day and discharged on the 23rd day following admission in satisfactory condition.

Discussion

CCSS has become popular in the recent past because of certain advantages over the traditional open system. It prevents problems associated with ventilator disconnection like hypoxemia, hemodynamic instability, alveolar derecruitment, loss of lung volume and ventilator malfunction.[2,3] It has also been reported to have some role in protecting against ventilator associated pneumonia and in decreasing environmental contamination with patient's secretions.[4,7,8] It has been found to be more cost effective in patients requiring prolonged ventilation.[9] Despite all these benefits it has been postulated to have lower efficacy in removing endotracheal secretions.[10] In our case, it got totally blocked by an airway foreign body; leading to its failure to remove secretions. Since there are chances of the catheter tip, which is not visible in the CCSS, getting blocked by inspissated secretions, blood clot or in rare cases like authors' by an aspirated small foreign body, the authors suggest that one should be watchful for other signs of retained secretions; particularly if a closed-suction system is being used. To conclude, closed-suction system has many proven benefits, but the invisibility of its tip can pose serious problems. Hence while using CCSS, it is advisable to be extra cautious about the signs-symptoms of retention of tracheal secretions.

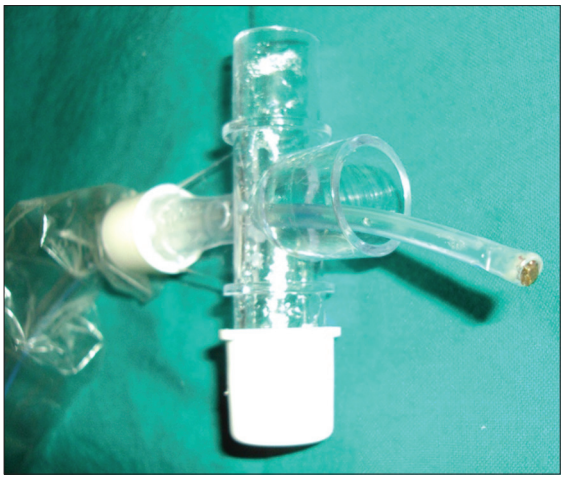

Figure 1: Aspirated foreign body blocking suction cather tip

Figure 2: Magnified view of the stone foreign body

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