Closed endotracheal suction catheter system related complications in mechanically ventilated COVID-19 patients

Sir,

In the current coronavirus disease 2019 (COVID-19) pandemic, about 15% of patients may develop severe disease and 5% critical disease requiring admission to an intensive care unit (ICU) and mechanical ventilation.[1] In mechanically ventilated patients, closed endotracheal suctioning system is used to prevent disconnection of circuit and consequent de-recruitment of alveoli and to prevent aerosolisation of droplets and potential contamination of surroundings.[2,3]

However, in times of sudden surge in cases, trained ICU staff may not be always available. Moreover, efficiency is reduced after wearing personal

protective equipment (PPE) and visibility may turn poor due to fogging of goggles. Therefore, inadvertent human errors may occur. We report two such cases involving the use of in-line closed suction catheter system (DAR™ closed suction system, Covidien Ireland Limited).

In the first case, we noticed that the closed suction catheter was not completely withdrawn outside after suctioning was complete and the rotatory access knob was closed. Presence of part of the suction catheter inside the endotracheal tube led to increase in the peak airway pressures and frequent ventilator alarms that was initially interpreted as bronchospasm [Figure 1a]. However, a very close inspection revealed the actual problem. In another case, although the suction catheter was completely withdrawn, the rotating access knob was not closed, which led to significant leak in the circuit and activation of ventilator alarms [Figure 1b]. Inflated plastic sheath covering of the closed suction system revealed this problem. These kinds of problem may lead to unnecessary troubleshooting warranting treatment/interventions (like treating with bronchodilators in case of misdiagnosed bronchospasm or inflating the pilot balloon further in case of leak), which may even harm the patient (like barotrauma or alveolar de-recruitment). Fortunately, in both our cases, the actual problems were identified and no adverse events were seen. Problems like blocked tip of closed suction catheter leading to inadequate suctioning[4] and migration of piece of closed suction catheter leading to bronchial obstruction have been already reported.[5]

While the nursing staff were aware of the standard operating procedures for the closed suction system in ICU, impaired visibility due to fogging of goggles was the reason reported behind such inadvertent mistakes in both the cases. The fogging issue has been addressed by regular use of antifogging markers.[6] However, we would like to suggest two design modifications of the closed suction system. First, the colour of the in-line catheter may be made more conspicuous throughout the length of the catheter. The suction catheter of DAR™ closed suction system (Covidien Ireland Limited) is blue in the advancing end while being transparent towards the tail end [Figure 1b] and may evade detection if left inside the ventilator circuit with suboptimal visibility while working with PPEs. Second, an in-line self-sealing valve/diaphragm may be placed at the rotatory access knob to eliminate the risk of circuit leak in case the rotating access knob is inadvertently left open.

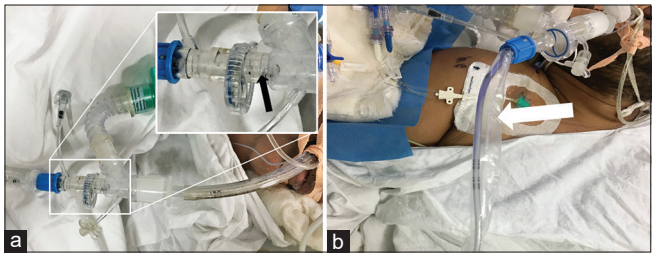

Figure 1: (a) Closed suction catheter (black arrow) partially kept inside endotracheal tube and difficult to detect due to transparent colour of distal part of the catheter; (b) rotating access knob was not closed causing leak and overinflated plastic sheathing (white arrow)

To conclude, impaired visibility due to fogging of goggles may lead to inadvertent errors while operating equipment like closed suction catheter system in COVID-19 ICUs. Heightened vigilance and appropriate troubleshooting interventions might avoid and resolve such unintentional mistakes.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

Anirban Bhattacharjee, Rahul Kumar Anand, Dalim Kumar Baidya, Bikash Ranjan Ray

Department of Anaesthesiology, Pain Medicine and Critical Care, All India Institute of Medical Sciences, New Delhi, India

Address for correspondence:
Dr. Rahul Kumar Anand,
Room No 5012, 5th Floor, Teaching Block, All India Institute of Medical Sciences, New Delhi - 110 029, India.
E-mail: rahulanand00@gmail.com

Submitted: 26-Aug-2020
Revised: 09-Oct-2020
Accepted: 09-Feb-2021
Published: 13-Mar-2021

REFERENCES

1. Wu Z, McGoogan JM. Characteristics of and important lessons from the Coronavirus disease 2019 (COVID-19) outbreak in China: Summary of a report of 72 314 cases from the Chinese center for disease control and prevention. JAMA 2020;323:1239-42.
2. Cereda M, Villa F, Colombo E, Greco G, Nacoti M, Pesenti A.

Closed system endotracheal suctioning maintains lung volume during volume-controlled mechanical ventilation. Intensive Care Med 2001;27:648-54.
3. Malhotra N, Joshi M, Datta R, Bajwa SJS, Mehdiratta L. Indian society of anaesthesiologists (ISA national) advisory and position statement regarding COVID-19. Ind J Anaesth 2020;64:259-63.
4. Kaur S, Singh S, Gupta R, Bindra T. Foreign body blocking closed circuit suction catheter: An unusual cause of retained tracheal secretions in a mechanically ventilated patient. Int J App Basic Med Res 2014;4:50-2.
5. Iannuzzi M, De Robertis E, Rispoli F, Piazza O, Tufano R. A complication of a closed-tube endotracheal suction catheter. Eur J Anaesthesiol 2009;26:974-5.
6. Anand RK, Ray BR, Baidya DK, Bhattacharjee S, Maitra S. A simple solution to fogging inside goggles used as a part of personal protective equipment. J Anaesthesiol Clin Pharmacol 2020;36:413-4.

Access this article online

Quick response code

Website: www.ijaweb.org

DOI: 10.4103/ija.IJA_1050_20

How to cite this article: Bhattacharjee A, Anand RK, Baidya DK, Ray BR. Closed endotracheal suction catheter system related complications in mechanically ventilated COVID-19 patients. Indian J Anaesth 2021;65:254-6.