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. 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.

However, in times of sudden surge in cases, trained ICU staff may not be always available. Moreover, efficiency is reduced after wearing personal
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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In the first case, we noticed that the closed suction catheter was not completely withdrawn outside after suctioning was complete and the rotatory access knob was closed.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 In another case, although the suction catheter was completely withdrawn, the rotating access knob was not closed, which led to significant leak in the circuit and activation of ventilator alarms [Figure 1b].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 and migration of piece of closed suction catheter leading to bronchial obstruction have been already reported.

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.

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.

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