

Aerosol containment device for use on suspected COVID-19 patients

Sir,

The current pandemic of COVID-19 has opened up new challenges for the healthcare workers (HCWs) who may get infected in the course of care activities. Infection is transmitted mainly through droplets and aerosols that remain suspended in the air for a longer period. The main risk is at the time of intubation or extubation which are high aerosol generating activities (AGPs). We have developed a novel device that limits the escape of aerosol and thus minimizes the risk of transmission of infection.

The device consists of two cross bars held in place by two rods that pass through small metal tubes fixed at the base of the cross bars [Figure 1]. The cross bars can be moved up and down on the rods that connects...
them. The device is placed on the patient covering the head up to the lower part of chest. Over it is stretched a transparent plastic sheet, which is tucked under the mattress on the head end as well as the sides. The distal part of the sheet is folded over the abdomen and tucked there. On the head end side of the sheet, two vertical linear cuts, 6-8” are given with their center at the level of the patient’s forehead and about 7-8 inches apart. Another vertical cut of similar length is given on the right side for assistance at the time of intubation. After adequate pre oxygenation, anesthesia is induced; trachea is intubated with rapid sequence induction technique and maintenance done in a standard manner. In case of surgery on the upper abdomen, the distal cross bar is moved up to make room for the surgeon. The device is kept on the patient throughout the surgery. After the reversal and extubation, we suggest that alcohol based disinfectant spray be done in the chamber with the patient breathing spontaneously through face mask and eyes closed, or eye pads placed, to neutralize the viral load before removing the device. The sheet is then removed; rolled outside in without touching the inside and discarded appropriately.

Till date, there is no definitive treatment or vaccine for the COVID-19 infection; hence, protection of the HCW is paramount. The main advantages of the device described are its simplicity, ease of use, and very low cost. Also, it can be quickly assembled and disassembled after use. The storage space required is just minimal. Because the distal cross bar of the device can be moved up, the surgeon can operate without any inconvenience. We suggest placing an open suction tip inside the chamber to create a mild negative pressure to decrease the aerosol load inside the containment chamber.

Lai Hsien-Yung described a cubic box to be placed on the patient’s head and torso with two large holes on the head end. The “Aerosol box” has thereafter been described with various modifications of the size of the holes and additional hole on the right to assist the anesthesiologist and also incorporation of sleeves. In these boxes, the two large holes on the head end may not be at suitable height for every anesthesiologist as the head size and the height of the pillow under the occiput, varies. To achieve first pass success, it is suggested that the most skilled airway clinician should perform intubation. Because the level of holes cannot be adjusted to the size of the patient's head, the edges of these holes can bite the arms and make intubation more difficult, requiring more attempts, and thus more aerosol generation. Also, it is a big box which requires huge storage space. The multiple open holes and an open foot end allow the aerosols to escape. It may reduce the blast of aerosol on the anesthesiologist’s face but the aerosols would eventually be released outside the box. It may not work for patients with short neck because it will be ergonomically difficult to manipulate the head position. The staff may not be adequately protected if there is failed intubation and bag and mask ventilation is needed as the dispersion of aerosol is likely to be caudad. Furthermore, the box needs to be removed so that surgery can be performed and this would lead to dispersion of the aerosol. It may work in smooth intubation but in a difficult airway situation, the risk of contamination may even be higher than normal if the box is removed urgently in a hurry to secure the airway.

In our device, linear cuts are made corresponding to the size of the patient’s head and there is very low probability of inconvenience of height to the anesthesiologist and there cannot be any bite on the anesthesiologist’s arms as there are no hard edges. Once the hands are pulled out, the two edges appose and are virtually closed. The risk to the HCW is also less because the device stays on the patient all through the surgery. Spraying alcohol based disinfectant inside the containment zone of the device further reduces aerosol exposure to the HCW. It is authors’ opinion that the aerosol containment device described is safer than the various kinds of boxes with various modifications.

This device is an additional measure besides personal protective equipment (PPE) and is in no way a
replacement for the standard safety measures to deal with COVID-19 patients.

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**Conflicts of interest**
There are no conflicts of interest.

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**Baljit Singh, Sham L Singla, Priyanka Gulia, Ajay Kumar, Rashmi Bhanwala**

Departments of Anaesthesiology and Critical Care and *Surgery, Faculty of Medicine and Health Sciences, SGT University, Gurugram, Haryana, India,*

**Address for correspondence:**
Prof. Baljit Singh,
Department of Anaesthesiology and Critical Care, Faculty of Medicine and Health Sciences, SGT University, Gurugram, Haryana, India.
E-mail: drbaljitsingh@gmail.com

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