Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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One-Lung Ventilation: A Simple Technique to Reduce Air Contamination During the Coronavirus Disease 2019 (COVID-19) Pandemic

To the Editor:

We would like to present a simple and efficacious technique to reduce contamination in the operating room (OR) while performing one-lung ventilation (OLV) during the coronavirus disease 2019 (COVID-19) pandemic.

A 68-year old man, with an American Society of Anesthesiologists score II (body mass index, 21.5 kg/m^2) and history of arterial hypertension, underwent left thoracotomy and subsequent left upper lobectomy, due to a positron emission tomography/computed tomography (PET/CT)—positive nodule in the left upper lobe. The patient was asymptomatic and negative in the preoperative nasopharyngeal test for COVID-19. However, in our department, every patient presenting in the OR is considered as a potential transmitter of the disease, taking into account that the upper respiratory swabs specimen exhibits a low but nevertheless potential false negative value.[1] Indeed, it is well-established that transmission may occur from asymptomatic patients.[2] Therefore, the personnel in the OR were provided a minimum of personal protective equipment (PPE), which included fitted respirator masks (FFP2 masks with 94% filtration efficiency, approximately equivalent to N95 respirator masks[3]), double gloves, safety goggles, and gown, and the patient was wearing a surgical mask at his arrival. Moreover, strict infection protocols are implemented to reduce cross-infection in the OR, despite the fact that in our institution there is only 1 negative- pressure OR dedicated to procedures for patients with confirmed COVID-19. Specifically, an anteroom for donning and doffing is available in every OR, a high air exchange cycle rate (≥25 cycles/h) is applied to reduce the viral load in the OR, and a minimum number of OR staff is present throughout the procedure.[4] Two high-efficiency particulate air (HEPA) filters are used in every patient, 1 between the patient and the breathing circuit and the other at the distal end of the expiratory limb. In addition, low-flow anesthesia is performed to keep the viral filtration efficiency of HEPA filters at acceptable levels, mitigating the viral transmission.[5]

After the insertion of a thoracic epidural catheter, rapid-sequence induction was performed, and the patient was intubated with a left double- lumen tube (DLT) 39 French (Fr) size (Portex, Smiths Medical Inc.). The correct position of the DLT was verified with chest auscultation immediately after intubation, in the final right lateral decubitus position, avoiding our common practice of using a flexible fiberoptic bronchoscope, to minimize aerosol-generating procedures (AGPs).

Before skin incision, OLV had already been implemented to allow adequate time for lung collapse. The access to the non-ventilated lung was occluded to avoid dispersion of droplets or aerosol.[6] After the thorax was opened, the nondependent lung was not adequately deflated, rendering the operating field challenging for the thoracic surgeons, although ventilation was not delivered in the aforementioned lung. At that point, it was deemed essential for the patient's safety to make the upper lung deflate by opening the corresponding connector, thus allowing a communication of the patient's lower respiratory system with the environment of the OR. To decrease the amount of the aerosol contamination, a HEPA-pleated hydrophobic filter was used in the bronchial connector (Hydro-Guard Mini breathing filter, Intersurgical). Specifically, a disposable bronchial connector was used for the appropriate connection of the HEPA filter. The first step was to cut the bronchial connector obliquely (Fig 1, A). In that way, it acquired a suitable shape that enabled wedging in the bronchial (nonventilated) lumen of the DLT by advancing it with rotating moves, and subsequently the HEPA filter was connected to the tube connector (Fig 1, B). The last step was to open the bronchial lumen of the DLT and connect it with the improvised structure (Fig 2). The nondependent lung was then deflated, and the operation was completed uneventfully.

A previous attempt at using a tube connector of a single-lumen endotracheal tube (ETT) (incidentally size 8) had failed. Postoperatively, we examined the reason of this failure and concluded that solely the connectors of ETTs with internal diameter (ID) of 7.0 mm and 7.5 mm could fit on the bronchoscope entry point of an adult DLT (35-41 Fr). Connectors from smaller ETTs could not be wedged firmly, whereas connectors from larger ETTs could not fit at all (Fig 3).

A direct connection of the HEPA filter into the adapter on the bronchial lumen before the Y connector could be another simple and efficient option; however, it demands consecutive handling and discontinuation of the breathing circuit, increasing the possibility of droplet dispersion and subsequent OR contamination (Fig 4). It also increases tubing length and therefore resistance to airway deflation.

The novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) virus is oval or round, with an approximate diameter of 60 to 140 nm.[7] However, HEPA-pleated hydrophobic filters perform a filtration efficiency greater than 99% for aerosol-generating sodium chloride particles, with a count median diameter of 0.07 μm at a flow of 30 L/min.[8] Although appropriate viral filtration efficiency to prevent SARS-CoV-2

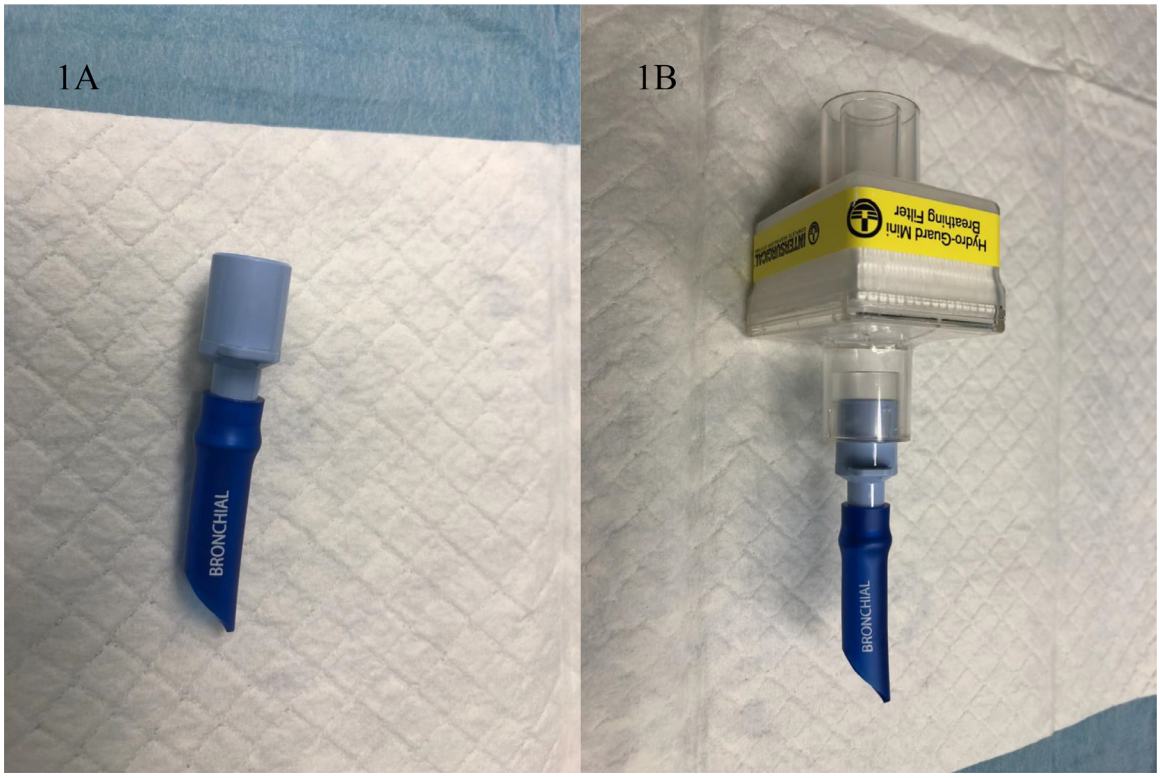

Fig. 1. (A) Oblique-cut bronchial connector. (B) Bronchial connector and HEPA filter.

Fig. 2. Bronchial connector and HEPA filter attached in the patient's bronchial lumen.

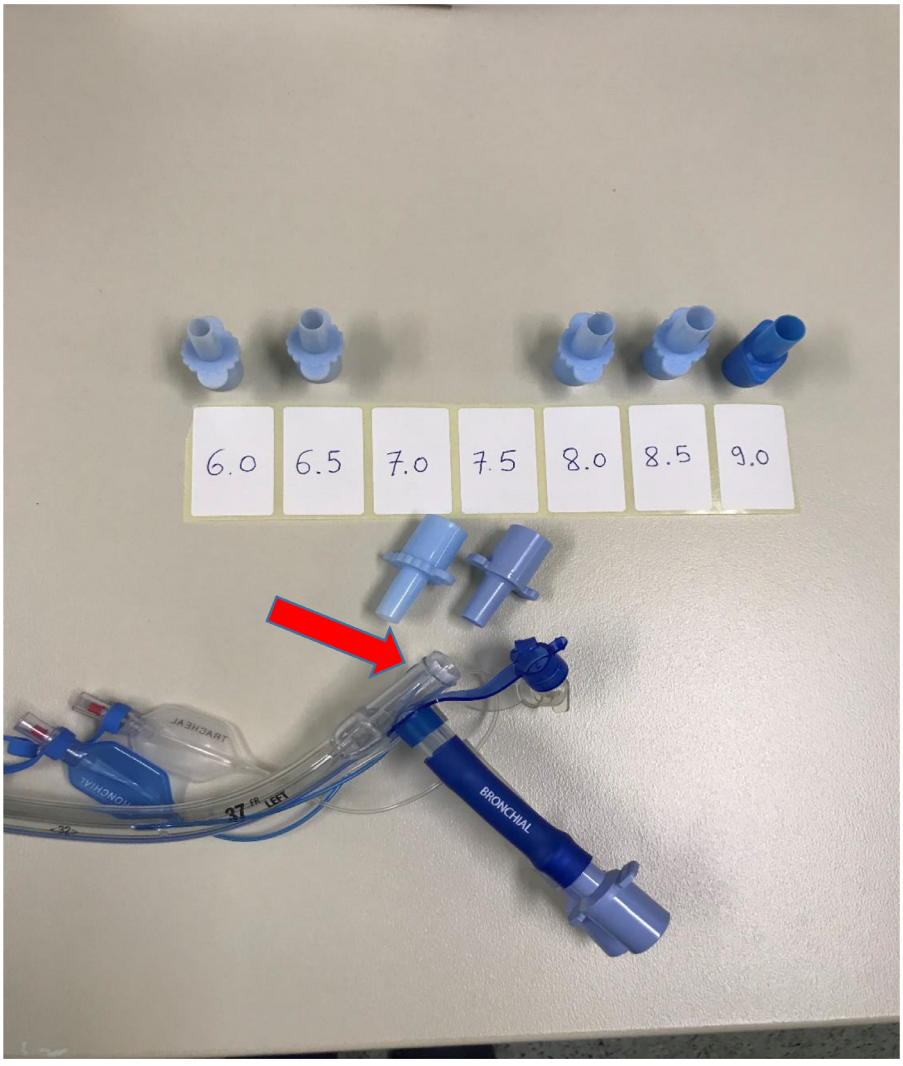

Fig. 3. Common connectors of ETTs with several ID and an adult size DLT (Portex). Solely the connectors from 7.0 mm and 7.5 mm ID were suitable to fit to the bronchoscope entry point (*red arrow*).

passage is not known, HEPA filters should constitute an efficient and reasonable solution.[5]

During the COVID-2019 pandemic, it is highly recommended to minimize the aerosol-generating procedures, thus reducing significantly the possibility of air contamination in the OR. However, in thoracic surgery, lung deflation by allowing direct communication of the nondependent lung with the OR environment may be deemed necessary for the patient's safety. In such circumstances, the use of a HEPA filter, as we described, could constitute a practical solution.

Fig. 4. The HEPA filter connected into the bronchial adapter before the Y connector.

Conflict of Interest

None.

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Sometimes Less Is Worse: A Recommendation Against Nonintubated Video-Assisted Thoracoscopy During the COVID-19 Pandemic

To the Editor:

In late 2019, a new virus, the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), emerged in Wuhan, China, causing a severe flu-like illness named coronavirus disease 2019 (COVID-19).[1] The new virus has spread rapidly all over the world, and the World Health Organization declared it