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Transesophageal Echocardiography Probe Sheath to Decrease Provider and Environment Contamination

To the Editor:

The 2019 novel severe acute respiratory syndrome coronavirus (SARS-CoV-2) and its associated disease, coronavirus disease 2019 (COVID-19), have resulted in a global pandemic and caused significant morbidity and mortality.[1] The American Society of Echocardiography (Durham, North Carolina) released a statement adjudicating the use of personal protective equipment for all echocardiographic procedures. Special attention was given for transesophageal echocardiograms (TEE) which "carry a heightened risk of spread of the SARS-CoV-2 since they can provoke aerosolization of a large amount of virus."[2,3] The concern for potential aerosolization and provider contamination during the performance of TEE has led our institution to define all TEEs, even in the presence of an endotracheal tube managed airway, as an aerosol-generating procedure. This is in part because of the risk of small particle generation occurring during the procedure but also because of concerns over cross contamination of the probe, operator, echo machine, and surrounding surfaces with oropharyngeal secretions which are known to contain the virus.[4] As such, full COVID-19 personal protective equipment consisting of an N95 respirator, face shield, gown, and two layers of gloves was mandated for all staff involved in the performance of TEE.

To reduce the risk of both aerosolization and provider/environmental contamination, we devised a sheathing system using two preexisting commercially available products seen in figure 1A. As demonstrated in figure 1B, a CIV-Flex 8.9 cm × 91.5 cm Transducer Cover (CIVCO, USA) probe cover is combined with a Blox 54 FR Endoscopic Bite Block (EndoChoice, Inc., USA) to create a freely sliding barrier which still allows the imager to position the TEE probe normally, then engage the bite block to the patient's mouth and secure it around the head with the included elastic strap. Note that the distal end of the sheathing system is open to allow the probe to advance past the bite block with one of the included rubber bands holding the components together (fig. 1C) and the proximal extent of the sheath extending to the 1-meter mark (fig. 1D). The second rubber band is folded three times and secured around the proximal end of the sheath to keep it from moving. Step-by-step assembly instructions are demonstrated in Supplemental Digital Content, video 1 (http://links.lww.com/ALN/C390). This way, the combination of a secured airway *via* an endotracheal tube and a fully enclosed TEE sheath, we have converted our TEE procedure categorization from a high-risk aerosol-generating procedure to a low-risk procedure, removing the need for use of N95 masks. This simple and easily generalizable modification preserves scarce personal protective equipment resources[5] and reduces the risk of contamination by the provider to oneself or the environment.

Although use of a TEE probe cover has been previously described,[6] it does not eliminate contamination when the cover is moved within the oropharynx and the esophagus. The sheath design herein described maintains a noncontaminated surface for the echocardiographer to grasp when manipulating the TEE probe. In addition to mitigating the risk that SARS-CoV-2 poses to both patients and providers, we believe that this inexpensive adjustment to practice will reduce both unnecessary personal protective equipment usage and risk for contamination.

Research Support

Support was provided solely from institutional and/or departmental sources.

Competing Interests

Dr. Cawcutt was paid an honorarium for the creation of educational materials by the Society of Healthcare Epidemiology of America (Arlington, Virginia) and is a paid medical writer for The Clorox Company (Oakland, California). The other authors declare no competing interests.

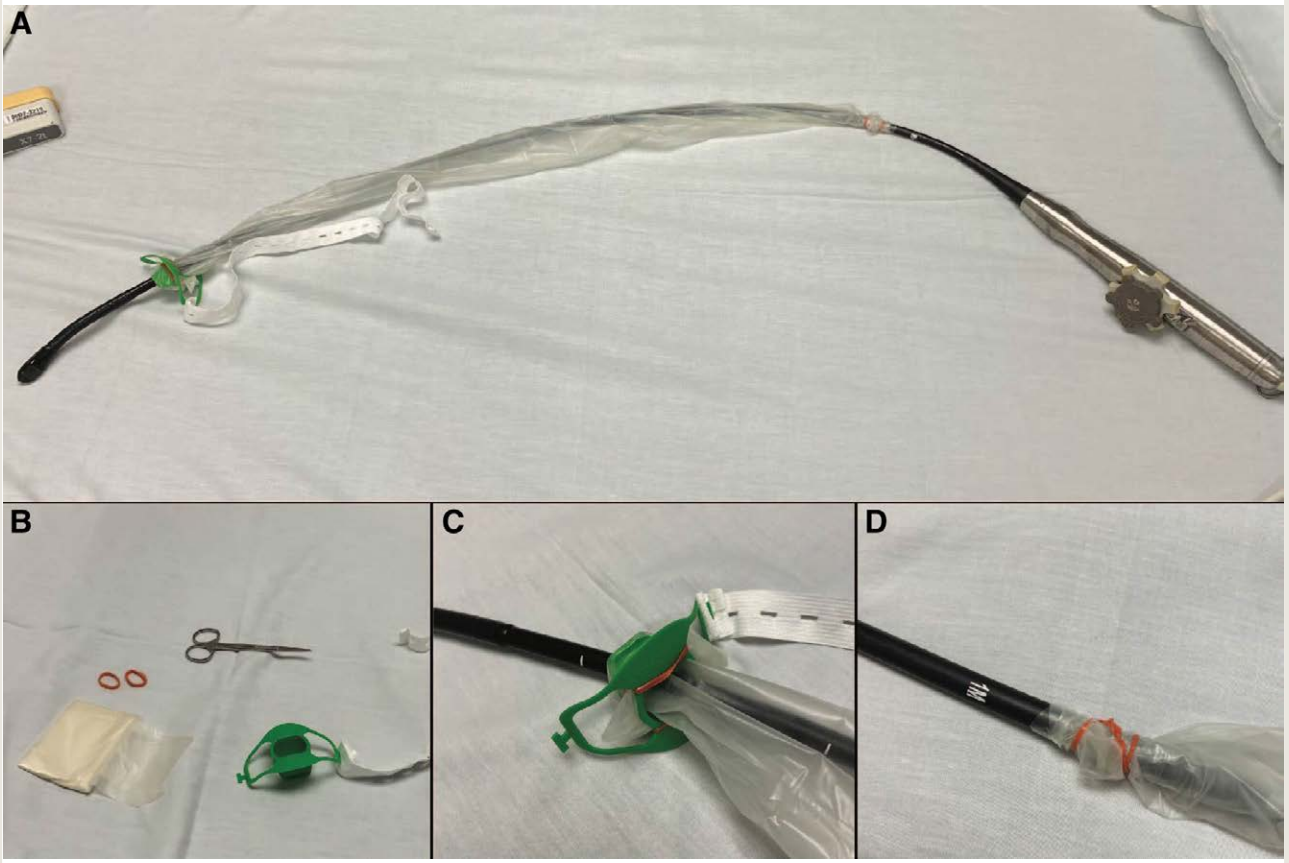

Fig. 1. (*A*) Transesophageal echocardiogram probe clean sheath assembled. (*B*) Required components for the assembly of the sheath: bite block, probe cover with rubber bands, and scissors. (*C*) Detail of the distal end of the sheath demonstrating the probe cover and rubber band arrangement. (*D*) Detail of the proximal end showing the rubber band holding the cover to the probe near the 1 meter mark.

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Remote Control and Monitoring of GE Aisys Anesthesia Machines Repurposed as Intensive Care Unit Ventilators

To the Editor:

The requirements of early intubation and prolonged mechanical ventilation in the management of patients with coronavirus disease 2019 (COVID-19) has created a shortage of intensive care unit (ICU) capacity and ventilators. Operating rooms and anesthesia machines[1] are being repurposed to care for these critically ill patients. Certain ICU ventilators, such as the Hamilton G5 (Hamilton Medical AG, Switzerland), permit their control monitor to be detached from the ventilator and extended outside the room on an umbilical electrical cable, which allows "frequent ventilator adjustments while simultaneously decreasing the risk of exposure to staff."[2] Although no studies have examined effects on clinical outcomes, the pragmatic benefits are evident: ICU staff need not be continuously present in the patient's room, nor frequently don and doff scarce personal protective equipment to perform alarm checks and setting changes.

In light of this public health crisis, the U.S. Food and Drug Administration has issued guidance that anesthesia machine device modifications may be made that do not create undue risk.[3] We now describe a novel, inexpensive modification to add umbilical cabling to GE Aisys and Aisys CS2 anesthesia machines (GE Healthcare, USA), allowing the same advantageous remote control and monitoring of ventilation.

The Aisys display unit control panel is anchored to a mounting plate on the boom arm by four small bolts (fig. 1, *left*). Three cables attach to the control panel, marked *A*, *B*, and *C* in figure 1 and *inset*. Loosening these bolts and cables allows the control panel to be detached. *A* is a DB15/male cable, which communicates with the electronic medical record. *B* is an HD26/male cable, which carries ventilator signals and data. *C* is a DB15/female cable, which provides

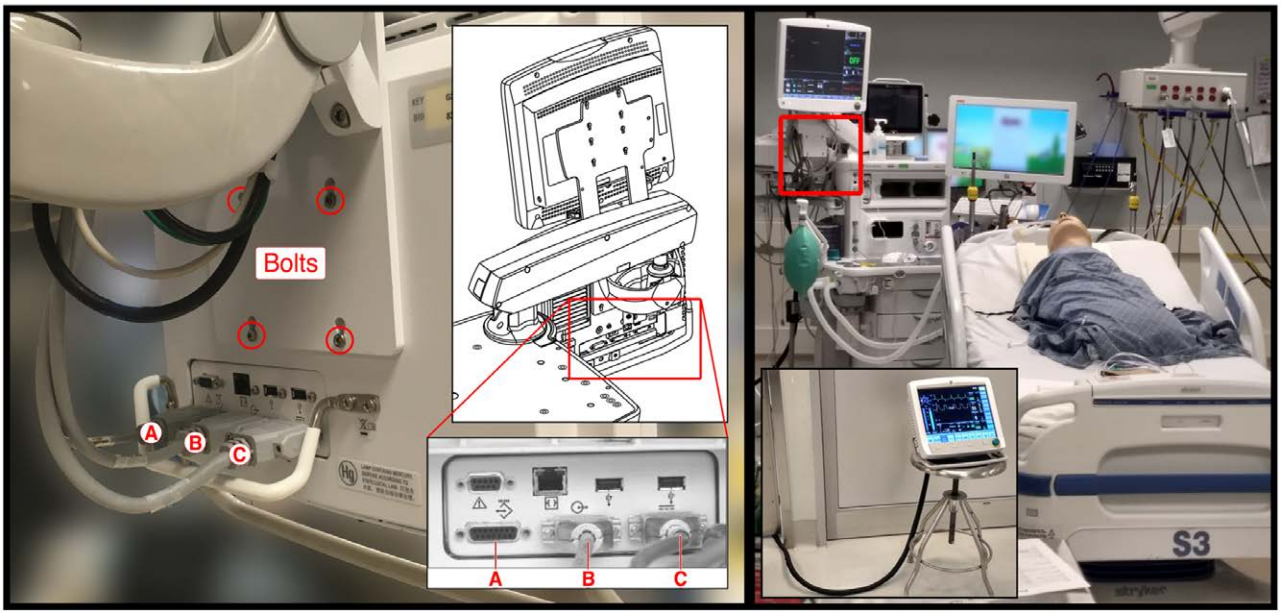

Fig. 1. Remote placement of the GE Aisys display unit control panel. The modification steps are highlighted at *left*, with *inset* engineering drawings modified from the *Aisys Anesthesia Machine Technical Reference Manual*. At *right*, an Aisys control panel is shown relocated outside of an operating room repurposed as an intensive care unit bay. The *rectangular highlight* indicates the original position of the control panel before detachment from the anesthesia machine.