A cautionary tale of an emergency cerebrovascular procedure in the COVID-19 era

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ABSTRACT
The coronavirus disease 2019 pandemic has had an impact on system processes, with airway management being significantly affected. A 37-year-old woman diagnosed with stroke was found to have a filling defect at the origin of the right internal carotid artery. She was taken to the operating room urgently for carotid endarterectomy. The procedure was uneventful; however, anaphylaxis developed on extubation, subsequently attributed to sugammadex. Institutional policies and limited resources resulted in delayed reintubation. Fortunately, she did not have lasting deficits, but this highlights the potential of current policies to lead to complications and the need to improve policies to minimize harm. (J Vasc Surg Cases and Innovative Techniques 2020;6:603-5.)

Keywords: Emergency vascular surgery; COVID-19; Cerebrovascular surgery

The coronavirus disease 2019 (COVID-19) pandemic has led to several systemic changes in the delivery of health care. Some of the most pronounced changes have occurred in the management of the airway. Hospitals all over the world have adopted intubation precautions. These include minimizing staff in the room; donning appropriate personal protective equipment, typically powered air-purifying respirators (PAPRs); using rapid sequence intubation; and using video laryngoscopy.1-3 Preparation of equipment and drugs ahead of time and development of communication plans are also being strongly encouraged.2,3 In the United States, the American Society of Anesthesiologists4 and the American College of Surgeons5 have issued guidelines that are consistent with those presented internationally. However, these adjustments, among others, are a challenge to execute and are likely not without collateral damage.6 The patient described in this case report gave her consent to the publication of this case and its associated images.

CASE REPORT
A 37-year-old woman who presented to the emergency department with severe headache, ataxia, left-sided weakness, and “shaking” was found to have a small frontotemporal stroke and a filling defect at the origin of the right internal carotid artery. Of note, she did not exhibit symptoms of COVID-19, including fever, fatigue, or cough, and she tested negative for the virus before the operation. Based on thorough computed tomography angiography (Fig 1) and carotid duplex ultrasound (Fig 2) evaluation, it was believed she had a mobile floating thrombus in her right carotid bulb. She was immediately started on intravenous heparin and urgently taken to the operating room for a carotid endarterectomy to remove the free-floating thrombus and underlying plaque (Fig 3). The procedure was performed under general anesthesia. She was induced and intubated without issue. Hospital protocols developed in the setting of the COVID-19 pandemic and consistent with those developed around the world were adhered to and included minimizing staff in the room during intubation, use of PAPRs, rapid sequence intubation, and video laryngoscopy. In addition, the protocol had all staff aside from the anesthetist remain outside of the operating room for at least 21 minutes after intubation. Continuous neurologic monitoring and intra-arterial shunting were employed during the case to minimize ischemic insult to the brain. The procedure occurred without intraoperative complication. On extubation, however, the patient became profoundly hypoxic and then unresponsive. She developed acute angioedema with swelling of the face, mouth, and oropharynx. The angioedema and swelling were later attributed to a medication reaction to sugammadex (Merck & Co, Inc, Kenilworth, NJ).

Unfortunately, reintubation was complicated. Extubation protocol called for all staff to leave the operating room except for the anesthetist, who donned a PAPR during the procedure, but this left the anesthetist without equipment or assistance when the emergency presented. In fact, policy dictated that all other staff remain outside the room for a minimum of 21 minutes after extubation, which meant that the anesthetist was particularly isolated. Institutional policy also required the use of PAPRs and video laryngoscopy during intubation, and a...
limited supply of this equipment meant that they were not immediately available. These materials were eventually obtained, and she was successfully reintubated after 18 minutes. Emergent imaging revealed stable infarcts with overall decreased perfusion abnormalities. Pathologic examination of the specimen identified thrombus. She was discharged on postoperative day 5 to an acute rehabilitation facility with persistent mild dysarthria and mild left upper extremity weakness that were present preoperatively. Now 3 months postoperatively, she has no deficits.

DISCUSSION
Sugammadex is a selective relaxant-binding agent developed for rapid reversal of nondepolarizing neuromuscular blockade from rocuronium. Anaphylaxis is a known but rare complication of the administration of sugammadex and occurs in 0.036% of cases. When it occurs, urgent reintubation is necessary. However, in the context of hospital policies implemented to minimize and to prevent viral transmission, this process has become more challenging. Important equipment, including PAPRs and video laryngoscopes, is at a premium and limited in availability. In addition, there has been a reduction in the number of people available in the operating room at the time of induction and extubation in accordance with guidelines from the Difficult Airway Society. This inequity of equipment, personnel, and supplies can lead to potentially harmful consequences. Fortunately, the patient in our case did not have lasting deficits, although she required two additional days of mechanical ventilation postoperatively.

Fig 1. Computed tomography angiography image of the intraluminal thrombus (arrows) in axial (A) and coronal (B) planes.

Fig 2. Carotid duplex ultrasound image demonstrating the thrombus (arrows) in the right carotid bulb.
It is also important to highlight that this complication occurred in a patient who was not thought to be COVID-19 positive. A lack of sufficient, effective, and rapid testing dictates that intubation precautions need to be universal, which contributed to this adverse event. It is plausible that improved testing mechanisms could have spared this patient this complication. There is an urgent need for better tests and more of them.

Unfortunately, it is unlikely that complications such as this can be eliminated in the current state of affairs. However, it is imperative that steps be taken to minimize complications resulting from viral transmission prevention practices. Planning ahead and clear communication are critical to achieve this goal. One practice that may be of value would be to coordinate the availability of necessary limited resources. For example, a central team in charge of transporting this equipment could be contacted by the circulating nurse at critical junctures, such as extubation, when emergent intubation could be required.

CONCLUSIONS
We owe it to ourselves as health care workers to take the appropriate precautions to minimize our risk of exposure to COVID-19. Nevertheless, we owe it to our patients to continually improve our policies and practices so that protecting ourselves does not result in harm.