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Coronavirus Neurosurgical/Head and Neck Drape to Prevent Aerosolization of Coronavirus Disease 2019 (COVID-19): The Lenox Hill Hospital/Northwell Health Solution

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BACKGROUND: The coronavirus disease 2019 (COVID-19) pandemic has infected more than 13 million people on a global scale and claimed more than half million deaths across 213 countries and territories. While the focus is currently on recovery from the pandemic, the disease has significantly changed the way we practice medicine and neurosurgery in New York City and the United States. Apart from the emergency cases, several health systems across the country have similarly started to perform elective surgeries. Although COVID-19 screening and testing guidelines have been proposed and adopted by many hospitals, these may not adequately protect the operating room personnel who are in proximity to the patient for prolonged periods. There are concerning reports of especially high transmission rates of COVID-19 in transmucosal head and neck procedures conducted by otolaryngologists and neurosurgeons, despite attempts at wearing what constitutes appropriate personal protective equipment.

METHODS: Here, we describe a simple technique of additional draping that can be used for all cranial, endonasal, spinal, and neurointerventional cases to limit the transmission of coronavirus.

RESULTS: The proposed technique offers a simple, commonly available, cost-effective alternative that avoids the use of additional retractor systems. Moreover, this technique can be used in all neurosurgical procedures.

CONCLUSIONS: With the rising concerns regarding airborne spread of the virus, we expect that these precautions will prove highly useful as we enter the recovery

phase of this pandemic and hospitals attempt to prevent a return to widespread infection. In addition, its availability and cost effectiveness make this technique especially attractive to practical use in centers with limited resources.

INTRODUCTION

The “coronavirus disease 2019” or COVID-19 pandemic has resulted in dramatic changes in the way we practice medicine and neurosurgery. Given its long incubation period, high transmission rate, and estimated 3% mortality, this virus will likely affect the way we live and work for the foreseeable future.^{1,2} This has been particularly true in New York City, which quickly became the global epicenter of the infection. Although many departments have curtailed elective surgery, neurosurgical cases that are deemed emergent, urgent, or semi-urgent will warrant intervention during these restrictive times. Although COVID-19 screening and testing guidelines have been proposed and adopted by many hospitals, these may not adequately protect the operating room personnel who are in proximity to the patient for prolonged periods. There are concerning reports of especially high transmission rates of COVID-19 in transmucosal head and neck procedures conducted by otolaryngologists and neurosurgeons, despite attempts at wearing what constitutes appropriate personal protective equipment (PPE).³

Here, we describe the simple intraoperative technique we use at Lenox Hill Hospital/Northwell Health for all cranial, endonasal, spinal, and neurointerventional cases to limit the intraoperative transmission COVID-19 to essential staff in the operating rooms

Key words

- Coronavirus
- COVID-19
- Endoscopic endonasal
- Neurosurgery

Abbreviations and Acronyms

AAO-HNS: Association of Otolaryngology-Head and Neck Surgery

COVID-19: Coronavirus disease 2019

PPE: Personal protective equipment

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and the endovascular suite who are at a substantially greater risk of exposure to the disease.^{4,5} We expect that these COVID-19 pandemic intraoperative precautions will extend into the COVID-19 recovery period as well as hospitals attempt to prevent a return to widespread infection.

Screening/Testing Guidelines

Formal screening and testing guidelines are currently being devised. We recommend that all patients should undergo testing within 24 hours of emergent/planned surgical procedures. These services may be provided by the hospital preoperative department or via at-home companies capable of performing the testing (i.e., Labfly; <https://www.northwell.edu/northwell-health-labs/labfly>).

Perioperative Precautions

Aerosolization of the virus before and during intubation and extubation deposits the virus into the air and on fomites in the operating room.^{4,5} This is particularly important, as transconjunctival spread has been reported. Enhanced PPE precautions should be used by all personnel in the negative pressure operating room and endovascular suites. Furthermore, all nonessential staff should leave the room during intubation and extubation.

The COVID-19 Prevention Drape Technique

We are currently using a large fluoroscope drape to cover the eyes, nose, and mouth following intubation to limit potential dispersal of aerosolized virus (91 × 112 cm; Premiere Guard Fluoroscope Drape, Houston, Texas, USA; <http://www.premierguard.com>; **Figure 1A**). With the help of the self-adhesive edges, the clear drape is secured low on the brow and hangs down over the eyes, nose, and mouth, allowing visualization of the face and endotracheal tube (**Figure 1B**). The application of this drape can be modified to accommodate necessary cranial incisions or secured at the neck for cases in which the patient is positioned prone or lateral. After drape application, the surgical site can be prepped

and draped sterily in the usual fashion (**Figure 1C**). Since the drape only covers the face and is not applied over the cranium, it leaves the whole cranium accessible for usual prepping, which is performed after the application of this drape. Any cranial incision can be easily marked and draped around using the sterile blue towels in the conventional manner. The drape does not restrict any surgical activity, including the use of a drill. The drape is carefully discarded at the end of the surgery before, or after, extubation according to anesthesia's desired protocol. Strong consideration should be given to leaving the drape over the mouth and nose during extubation, as preliminary reports support its utility in limiting aerosolization.⁶ This is particularly important in cranial cases in which the surgeon and his or her assistant stand at the head of the bed, although we feel it should be used for all interventions using general anesthesia (cranial, spine, endovascular). Notably, the mechanism of protection of this drape is proposed to limit aerosolization from the oropharynx during intubation, extubation, and endonasal sinus cases. This is not proposed to protect the surgeon during drilling of aerosolized sinuses such as the mastoid bone. In all settings, and in particular these cases, we recommend maintenance of recommended PPE practices.

Endoscopic Endonasal Procedures

Infected patients have a high viral load in the upper airways, and the risk of aerosolization of COVID-19 may be extremely high during sino-nasal and upper airways procedures.⁷ This is particularly true when high-speed operative drills are employed. Recently, the American Association of Otolaryngology-Head and Neck Surgery (AAO-HNS) has recommended deferring endoscopic endonasal procedures unless emergent.⁸ In these scenarios, enhanced PPE should be used regardless of COVID-19 testing status. In such cases, the prevention drape should be modified with a small aperture (horizontal slit) to allow instruments to pass into and out of the nares (**Figure 2**). If an approach surgeon is

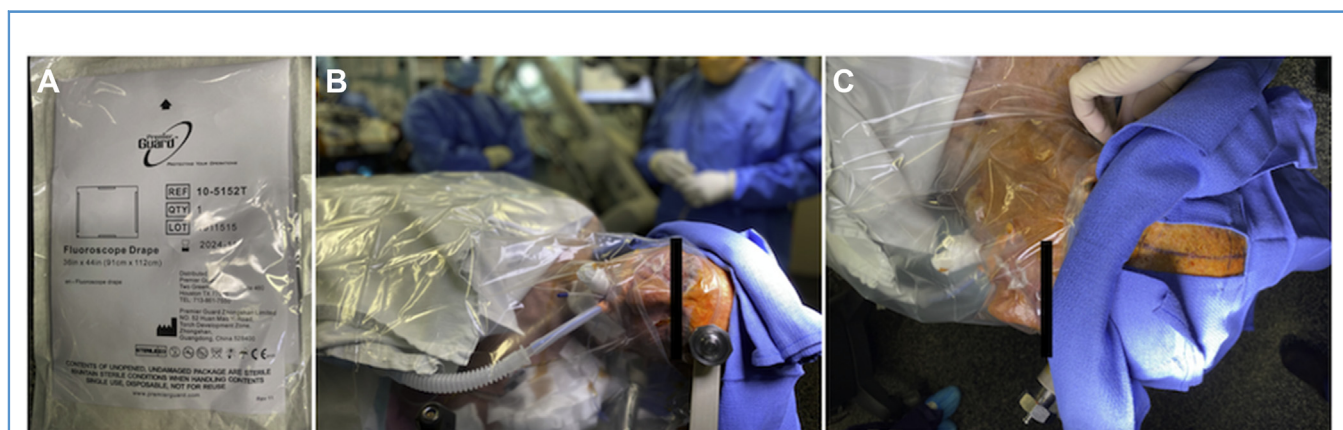


Figure 1. (A) A large fluoroscope drape (91 × 112 cm; Premiere Guard Fluoroscope Drape, Houston, Texas, USA; <http://www.premierguard.com>) can be used to cover the eyes, nose, and mouth following intubation to limit dispersal of aerosolized virus. (B) The clear drape is secured low on

the brow and hangs down over the eyes, nose, and mouth, allowing visualization of the face and endotracheal tube. (C) The drape can be modified to accommodate necessary cranial incisions. The surgical site is then prepped and draped sterily in the usual fashion.



Figure 2. For endonasal endoscopic cases in which the risk of aerosolization of coronavirus disease 2019 (COVID-19) may be extremely

high, the prevention drape should be modified with a small aperture (*dotted line*) to allow instruments to pass into and out of the nares.

used, we recommend all nonessential personnel remain outside of the operating room until adequate exposure has been achieved.

Recently, a negative-pressure otolaryngology viral isolation drape was used at another center for endoscopic skull base and transoral surgical procedures in 4 patients.⁹ Compared with the negative-pressure otolaryngology viral isolation drape, our technique offers a simple, commonly available alternative that avoids the use of additional retractor system. Moreover, this technique can be used in all neurosurgical procedures.

CONCLUSIONS

As we continue to work through the COVID-19 pandemic and focus on recovery, sustained efforts to limit transmission will be necessary to protect physicians, staff, and patients. The COVID-19 aerosolization prevention drape may limit intraoperative dispersal of COVID-19 particles and add an additional layer of protection against the spread of the virus. In addition, its availability and cost effectiveness make this technique especially attractive to practical use in centers with limited resources.

CRedit AUTHORSHIP CONTRIBUTION STATEMENT

Randy S. D'Amico: Conceptualization, Writing - original draft, Writing - review & editing. **Deepak Khatri:** Conceptualization, Data curation, Writing - original draft, Writing - review & editing. **Kevin Kwan:** Conceptualization, Data curation, Writing - original draft. **Griffin Baum:** Conceptualization, Data curation, Writing - original draft. **Yafell Serulle:** Conceptualization, Data curation, Writing - original draft, Writing - review & editing. **Danilo Silva:** Conceptualization, Data curation, Writing - original draft. **Michael**

L. Smith: Conceptualization, Data curation, Writing - original draft. **Jason A. Ellis:** Conceptualization, Data curation, Writing - original draft, Writing - review & editing. **Mitchell Levine:** Conceptualization, Writing - original draft, Writing - review & editing, Supervision. **Rafael Ortiz:** Conceptualization, Writing - original draft, Writing - review & editing, Supervision. **David J. Langer:** Conceptualization, Writing - original draft, Writing - review & editing, Supervision. **John A. Boockvar:** Conceptualization, Writing - original draft, Writing - review & editing, Supervision.

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