

Innovative Draping Method to Mitigate Aerosolization during Coronavirus Pandemic

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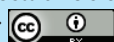
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ABSTRACT

Otolaryngologists are at high risk of acquiring coronavirus because most of the procedures are aerosol generating and we have to deal with upper airways which contain high viral load. The objective of this study is to elaborate the draping technique which diminishes aerosol in the operating room. Use of a framework and a drape with customized hand insertion ports help to contain the aerosol generated during the operative procedure. The draping technique acts as an additional form of protection from aerosol along with an increase in self-confidence to the healthcare workers during this pandemic.

INTRODUCTION

Coronavirus disease 19 (COVID-19) was declared a pandemic by the World Health Organization on March 11, 2020.¹ Coronavirus transmits via droplets, aerosols or fomites. The virus could be aerosolized in droplet nuclei of size less than five μm that can travel more than one-meter distance and remain in the air for up to three hours.² Otolaryngologists are at high risk of acquiring coronavirus as we deal with upper airways which contain high viral load.³

The aerosol generation could occur during routine ENT (ear, nose and throat) examination and nasopharyngolaryngoscopy via induction of sneezing, gagging or coughing. Procedures like laryngoscopy, bronchoscopy, tracheostomy, esophagoscopy and open airway surgery are high- risk procedures during this pandemic. During surgery, the use of high-speed drills, electrocautery, laser, microdebrider, saws and ultrasonic devices could generate the aerosol.² Aerosol containing the viral particles are the source of nosocomial infection to the surgeon and other healthcare workers.²

Different guidelines have been formulated during COVID 19 pandemic for the protection of the healthcare workers. The use of personal protective equipment (PPE) is of utmost importance. The enhanced PPE recommended by Saadi et al

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includes N95 respirator and eye protection or powered air-purifying respirator (PAPR), disposable cap, disposable gown and gloves. Powered air-purifying respirator (PAPR) is recommended to be used in high-risk aerosol generating procedures. However, PAPR is not easily available everywhere. Airtight eye protection or full face shield is recommended if PAPR is unavailable.⁴ Surgery should be performed in negative pressure room with HEPA (high-efficiency particulate air) filter and by the experienced surgeon with limited operating room manpower.⁵

In addition to taking all the precautions as per the guidelines, we present here an innovative technique of using a drape which diminishes the aerosolization in the operating room.

SET-UP

In the operating bed, the anesthetized patient is positioned supine with the appropriate head and neck position. Routine cleaning and draping of the operating part are performed. An instrument tray containing the minimum number of the required instruments can be placed over the chest or abdomen part of the body or at the rear end of the bed in case of small children under the drape. Then the framework of the drape should be positioned as shown in figure 1. One edge of the framework should be at the head end of the bed.



FIGURE 1. The framework being placed over the bed after the patient is intubated.

Then the sterile drape is placed over the framework (Figure 2). The drape is tailored such that the superior rectangular shape is

transparent and made of plastic. The side at the head end and the rear end is also transparent and made of plastic whereas the other two sides are made of rubberized taffeta fabric. The draped lower end is tucked underneath the body of the patient to make it airtight as much as possible. The head end side of the drape contains two customized hand insertion ports at an appropriate distance to fit the hands and forearm of the surgeon (Figure 3). Similarly, there are other two customized hand insertion ports each on the right and left side of the drape so that another surgeon and the scrub nurse could assist from each side of the bed (Figure 4).

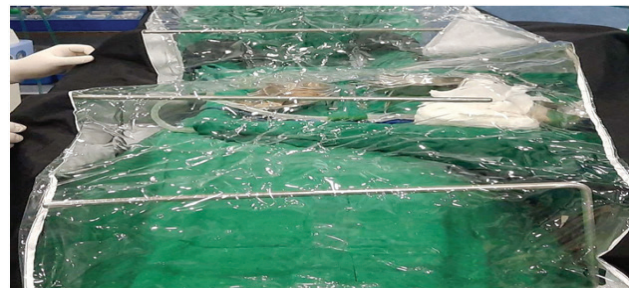


FIGURE 2. Our innovative drape is placed over the metallic framework

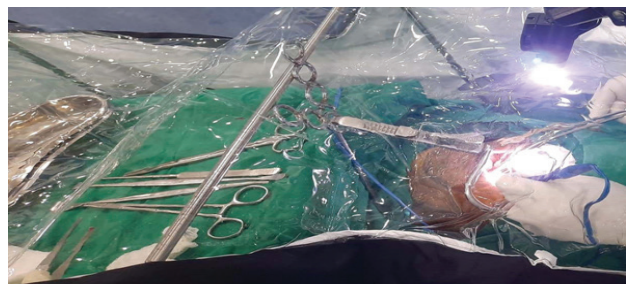


FIGURE 3. Head end side of the drape containing two customized hand insertion ports to fit the hands and forearms of the surgeon

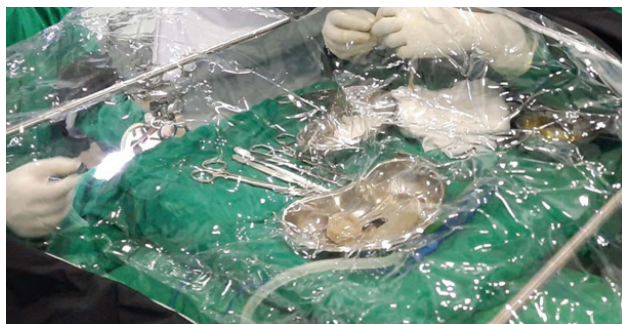


FIGURE 4. The sides of the drape containing two customized hand insertion ports to fit the hands and forearms of the surgeon or the assistant.

The suction and electrocautery could be adjusted from one corner of the drape, preferably from the rear end. For procedures like laryngoscopy, bronchoscopy and esophagoscopy, the surgeon has to operate from the head end of the bed, so customized hand insertion ports at the head end of the drape would be used in these procedures and customized hand insertion ports of the left side can be used to insert cautery cable, suction pipe. In tracheostomy and other neck procedures, surgeries are done from sides and the customized hand insertion ports at the head end could be used to insert cautery cable and suction pipe and made airtight with help of rubber bands to reduce aerosolization. Double pair of gloves should be worn by the surgical team. The contaminated pair of gloves should be left inside the surgical field after completion of the surgery. Utmost care should be taken while removing the drape and the framework to prevent re-aerosolization.

DISCUSSION

This draping technique is easy, cost-effective and reproducible. The drape forms an effective barrier to prevent droplet and aerosol leak during high-risk aerosol generating procedures. Foster et al came up with an idea of using a plastic drape for performing tracheostomy in this pandemic.⁶ They had open access set-up with the hands of the operator and the assistant underneath the plastic drape. Wolter et al used a three-layer enhanced draping technique. They

created holes in the drape to fit the arm of the surgeon. They used this technique for various procedures such as bronchoscopy, esophagoscopy, tracheostomy tube change and endoscopic sinus surgery.⁷

These types of draping techniques are emerging to protect the surgeon and other healthcare staff from acquiring COVID as they seem to contain a good amount of the aerosolized material. The extra protection from these draping techniques will increase the self-confidence to the surgeons. However, there were certain difficulties while using this drape such as: restricted arm movement of the surgeon and light reflection through the transparent material of the drape. But, the benefit of these drapes outweighed its drawbacks. Further improvements will be made in the draping technique used by us as we learn from our experience. Studies which generate objective data showing prevention of aerosolization by this sort of draping technique is necessary. These draping techniques are to be used as a supplement to proper donning and doffing of personal protective equipment and other precautionary measures as given in the guidelines.

CONCLUSIONS

The protection of healthcare workers should be a top-level priority during the COVID pandemic. The draping technique acts as an additional form of protection along with an increase in self-confidence to the healthcare workers from the aerosols generated during various surgical or non-surgical procedures.

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