

COVID-19 AND NON-OPERATING ROOM ANESTHESIA – A SUMMARY OF PRACTICES AT THE AMERICAN UNIVERSITY OF BEIRUT MEDICAL CENTER, LEBANON

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Abstract

Non-operating room anesthesia is a practice that is gaining popularity and expanding rapidly within the broader field of ambulatory care anesthesia, owing in particular to advancement in procedures and an increasing number of trained proceduralists, as well as improvements in equipment and facilities that can accommodate such procedures. Non-operating room anesthesia, however, does come with its own set of challenges that can adversely affect patient safety during these procedures. Namely, unfamiliar environments that are often remote in location with limited access to resources are some of the many challenges that can face the anesthesiologist providing anesthetic care outside of traditional operating rooms.

The advent of the COVID-19 pandemic added a multitude of complex and intricate layers of challenges that providers must account for to provide safe anesthetic practice not only to patients but to healthcare workers as well. Thorough planning for procedures beforehand becomes paramount to ensure safety of all parties involved. This includes preprocedural planning, screening, and testing, intraoperative precautions including proper room preparation, donning of adequate personal protective equipment as well as attempting to minimize aerosolization of the virus, and postoperative considerations of post anesthetic care and transport. This article summarizes the practices adopted at American University of Beirut Medical Center.

Keywords: COVID-19, Anesthesia, Non-operating room, Anesthetic planning.

Introduction

Non-operating room anesthesia (NORA) is a growing component of anesthesiology practice that is undoubtedly gaining popularity. For instance, the proportion of NORA cases in the US increased from 28.3% in 2010 to 35.9% in 2014.¹ NORA offers the opportunity to cover a wide range of sites, namely endoscopy suites, cardiac labs, radiology suites for imaging and interventional procedures, vascular suites, psychiatry units, pediatric units.

Despite its growing appeal, NORA is not without its own set of challenges. Most of these procedures are usually done in unfamiliar, remote settings with limited access to all the necessary equipment should emergencies such as difficult airways arise.² Staff unfamiliarity with safe anesthesiology practices and equipment is also an issue.³ Often, access to the patient's airway might be limited due to small room size and design. Furthermore, these procedures are increasingly

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being performed on older individuals as well as more comorbid patients (ASA status III or above) compared to procedures in the operating room (37.6% vs 33.0% respectively)(1), with higher incidence of NORA claims in these patient populations.⁴ One study even showed a 0.05% increased incidence of death in cardiology and radiology suites when compared to other NORA sites.³ Moreover, it is important to note that NORA had higher rates of emergent procedures as compared to the operating room.³

The advent of the COVID-19 pandemic caused by SARS-CoV-2, a viral pathogen highly spreadable by aerosols, droplets, and contaminated surfaces, only added to these challenges and preemptive planning to ensure safety of healthcare workers and staff during these procedures has become of utmost importance. This is especially important when aerosol generating procedures (AGP) such as intubations, upper gastrointestinal endoscopies, and bronchoscopies are expected to be performed. Furthermore, it is important to note that most of NORA procedures are usually done under sedation and monitored anesthesia care (MAC) with patients spontaneously breathing.³

In fact, a report of 44,672 COVID-19 cases in China showed a 3.8% transmission rate to healthcare workers with 14.8% of them in severe or critical conditions.⁵ Thus, given the substantial risk of transmission during these procedures, it is important to pay particular attention to detail and plan ahead at every stage: the pre-procedural, intra-procedural, and post-procedural stages.⁶ Currently, most of the evidence in the literature regarding safe anesthesia practices during the COVID-19 pandemic involve procedures in the operating room, and very little literature exists regarding prevention of transmission during NORA.⁶ Therefore, each institution must develop its own guidelines to mitigate risks, and the following are general guidelines being followed at American University of Beirut Medical Center (AUBMC).

Pre-procedure phase

Determining urgency of procedure

Given the initial surge of COVID cases and the high risk of transmission during these procedures, decision at AUBMC was made to postpone all elective,

non-urgent cases and limit exposure to only urgent or emergent procedures. Confirmed COVID-19 positive procedures are generally avoided unless there is absolute necessity. As restrictions slowly ease down, somewhat more elective cases are expected to resume, and thus careful precautions and screening become vital.

Screening patients

Prior to hospital presentation, patients undergo a series of screening questions over the phone. Patients are asked about any symptoms including fever above 38 degrees Celsius, cough, or breathing difficulties, as well as sore throat, myalgia, anosmia, ageusia, nausea, and diarrhea. Patients are also asked about sick contacts and recent travel history within 14 days of presentation. To pass this screening test, one must give negative answers to all the above questions. Any “yes” answer marks the patient “at risk” for COVID, and his electronic medical records on EPIC will notify physicians of that. The proceduralist will then weigh the risks of transmission by not delaying the procedure versus the benefits of undergoing the procedure.

Testing patients

Pre-procedure testing of patients can also be considered, since some patients with COVID-19 might be asymptomatic and that symptom-based screening alone can miss around half of subclinical cases.⁷ Every patient presenting to the operating room must undergo preoperative testing via nasopharyngeal swab PCR or rapid test in case of emergency, as per hospital policy. The same might apply to NORA patients, especially those expected to undergo general anesthesia (GA) and intubation. However, it might not be feasible to test all the patients presenting for NORA cases, especially when faced with limited testing kits. Therefore, physicians might consider testing patients with at least one screening risk factor and opt not to test low risk patients undergoing procedures that are not associated with aerosol generation.

Intra-procedure phase

Room preparation

Careful consideration of facilities where these procedures are to be performed is essential. Operating rooms have been equipped with negative pressure

rooms with HEPA filters to decrease viral loads.⁸ but negative pressure rooms in most sites outside of the operating room are rare or not structurally feasible. Ideally, all unnecessary equipment should be removed from the room to prevent contamination⁹ and personnel in the room are reduced to only necessary staff. In case of confirmed COVID-19 patients undergoing procedures, equipment including anesthesia machines should be draped with disposable plastic covers.⁹ ASA standard monitors should be present, with medications and equipment to be used prepared in advance. Areas to don and properly doff personal protective equipment (PPE) must also be set up when dealing with such patients. A checklist is set up to ensure proper donning and doffing.

Anesthetic planning

Anesthetic plan is agreed upon beforehand with the proceduralist depending on the type of procedure, its expected duration, and the patient's medical history. It is important to note that most procedures in NORA are done under MAC without a secured airway.^{3,9} Thus, particular care should be paid to oxygenation and ventilation of NORA patients, which alone historically account for a third of NORA malpractice claims.^{3,4} This is especially important in COVID-19 confirmed patients that suffer from pneumonia and impaired oxygenation.⁹ Full standard ASA monitors are applied; the anesthetic machine is checked beforehand with heat and moisture exchanger (HME) filters placed in the circuit.¹⁰ All airway equipment should be ready before starting. Strict ASA NPO guidelines are followed.

GA is generally avoided if possible to reduce aerosol dispersal. However, sudden need to convert to GA is undesirable, so at risk patients for conversion to GA might benefit from initially undergoing GA.⁶ AGP must be identified beforehand to don proper PPE and take necessary precautions (see section below). AGPs namely include endotracheal intubation, bronchoscopy, open suctioning, administration of nebulized treatment, manual ventilation before intubation, disconnecting the patient from the ventilator, non-invasive positive pressure ventilation, transesophageal echocardiography, tracheostomy, and cardiopulmonary resuscitation.⁸ Finally, during

intubations and extubations, only anesthesiology personnel are allowed to be in the room. Sufficient time (at least 4 minutes) is required for air recirculation in most sites before allowing other staff to re-enter the room. For COVID-19 confirmed cases, a "runner" is present outside the room to provide any additional equipment or medication not found in the room.

PPE

COVID-19 airborne precautions are to be taken when interacting with confirmed COVID-19 patients, suspected COVID-19 patients (symptomatic, not tested, and procedure cannot be postponed), and emergency or "lifesaving" cases with that could not be assessed for symptoms and cannot be tested. These precautions are also to be assumed by the anesthetic team during AGPs like intubations, regardless of the status of the patient. These airborne precautions consist of wearing a gown (or Tyvek suit), a fitted N95 respirator covered by a surgical mask, goggles or face shields, and gloves.

However, if the procedure is non-aerosol generating and the NORA patient presenting is completely asymptomatic and at low suspicion for COVID-19 (through negative screening or testing), then droplet precautions consisting of a gown, gloves, a surgical face mask +/-face shield are taken. (See Figure 1).

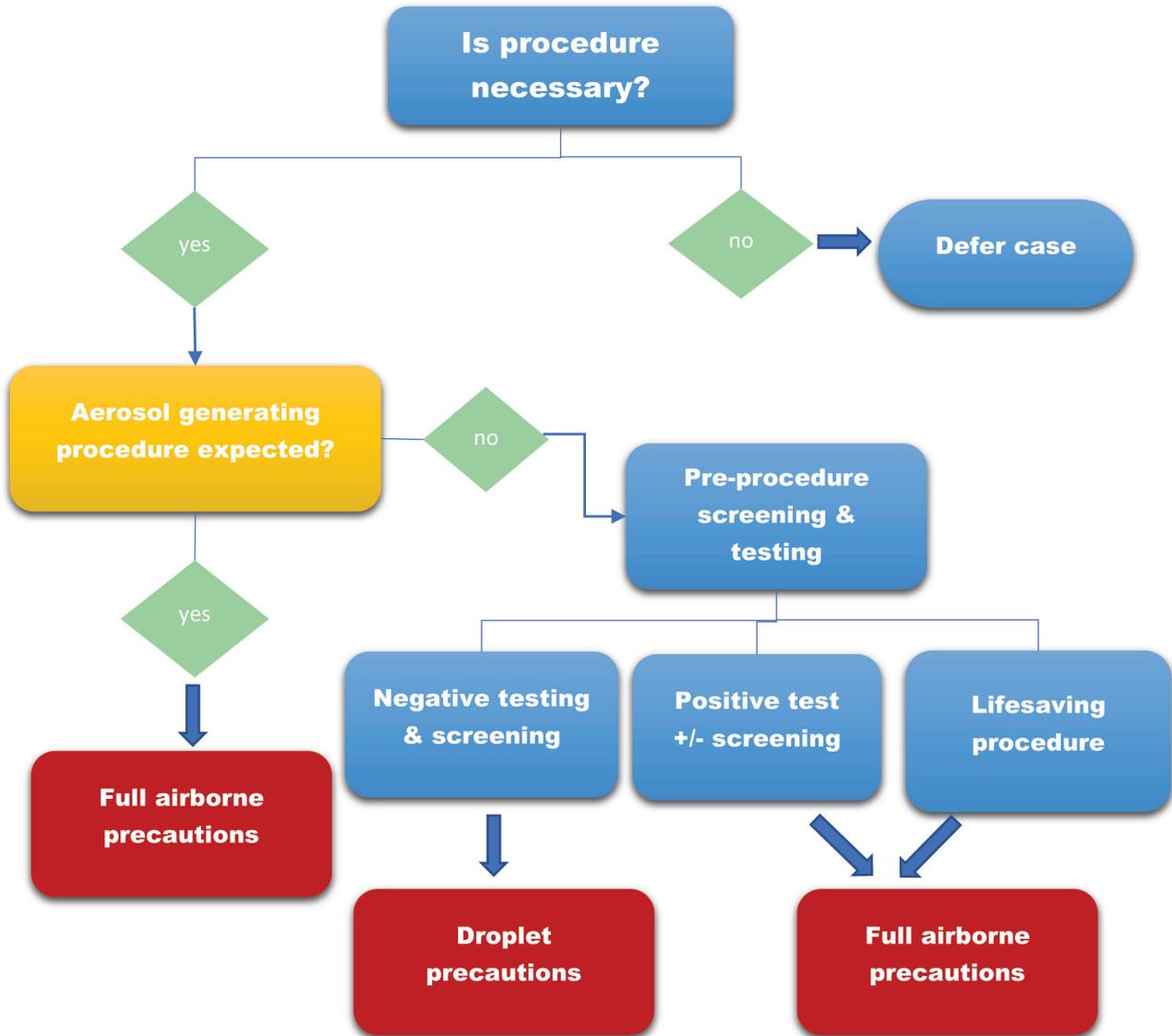
On the other hand, patients are always required to wear a surgical mask; oxygen supply can be added on top of the surgical mask during sedation. When feasible, oxygen face masks are generally preferred over nasal cannulas to decrease dispersion of exhaled air.⁶

Post-procedure phase

Post anesthetic care

Post anesthetic care of COVID-19 confirmed or suspected patients is usually done in the procedure room to minimize transmission. Low risk patients are transferred to the post anesthesia care unit (PACU) as

Fig. 1
AUBMC ALGORITHM FOR NORA PRECAUTIONS DURING THE COVID-19 PANDEMIC



per usual protocol and hand off is done with recovery room nurse. Surgical face masks are kept on the patients with supplemental oxygen on top if needed. Discharge from recovery unit is per regular PACU discharge criteria (e.g. Modified Aldrete Score).

Transfer of patients

Careful planning of the patient transfer to and from the procedure room should be done in advance with proper communication and hand-off between all parties involved. Certain “low traffic” routes have been

established to provide the safest pathways to transfer COVID-19 patients with minimal transmission and contamination. These routes and hallways should also be cleared ahead of time by security personnel. Droplet precaution should be worn by personnel involved in the transfer of COVID-19 patients.

Infection control

Anesthetic machines, workstations, and procedural rooms undergo frequent cleaning and disinfection to reduce transmission risk during the

COVID-19 pandemic. Cleaning and disinfection with hospital grade EPA registered disinfectants that are effective against viral pathogens including SARS-CoV-2 occur before and after every procedure. Ideally, disposable medical equipment are used whenever available and are discarded in their appropriate biohazardous bags. Non-disposable medical equipment on the other hand are sterilized according to manufacturer instructions and AUBMC policy.

Discussion

The hospitalized COVID-19 patient is often a sick patient requiring advanced critical care. The most important issue faced is that of ventilation and oxygenation,^{8,10} a matter that the anesthesiologist must take special care of. These patients usually only undergo NORA procedures on an urgent or emergent basis. While some might be intubated, other COVID-19 patients presenting to NORA might not have an advanced airway. As respiratory distress is a major concern in these patients with underlying pneumonia, the anesthesiologist must carefully weigh sedation against the risks of respiratory depression and the need to convert to GA. Crash intubations are generally undesirable⁶ and can increase the healthcare workers' exposure to the virus. This might prove to be even more challenging in NORA sites as patient's airway might not be directly accessible and difficult airways become even more challenging in remote areas with limited resources and often uncomfortable patient positioning.

On the other hand, with restrictions slowly easing down and elective procedures expected to resume while the COVID-19 outbreak is not as of date completely under control, it becomes vital to establish

the necessary guidelines and take the necessary precautions to decrease healthcare transmission and exposure, especially given the fact that some patients might not exhibit symptoms at the time of presentation. Hence, pre-procedure screening efforts and testing combined with effective infection control methods must continue to reduce transmission risk.

Conclusion

As the practice of NORA expands globally and in AUBMC, so do the multitude of challenges the anesthesiologist has to overcome to provide the safest standards of anesthetic care to patients. Namely, these procedures, which are often performed in unfamiliar, remote settings with limited resources should emergencies arise, are often performed under emergency basis on sicker, older individuals. The COVID-19 pandemic and the expected rising need to provide anesthesia for procedures outside of the operating rooms added more hurdles that must be overcome, the primary concern being prevention of transmission to healthcare workers. Detailed planning at every stage of the procedure becomes essential to mitigate risks. Given the asymptomatic nature of the disease in some carriers, patients should be screened prior to presentation and ideally tested. Rooms should be adequately prepared and the anesthetic plan should be discussed with the proceduralist in advance. Unnecessary AGPs should be minimized and proper PPE should be donned. Meticulous care should be paid during transfer and post anesthetic care of the patient, with strict infection control protocols at AUBMC placed in efforts to decrease contamination and protect healthcare workers at the frontlines.

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