Electroconvulsive therapy during a highly contagious respiratory pandemic–A framework during COVID-19

ABSTRACT

Necessary procedures during the COVID-19 pandemic include electroconvulsive therapy (ECT). Providing ECT has been considered an essential service during COVID-19 in the Singapore healthcare system, not least to contribute to disease control within a society in part due to the nature of the ECT patient population. There is limited evidence-based scientific information available regarding a procedural framework for ECT during a respiratory pandemic, when much attention in the healthcare system is focused on different areas of clinical care. This article attempts to describe such a framework for ECT procedures acknowledging limited solid scientific evidence at this time and being mindful of future changes to these suggestions as testing, immunization, and treatment options develop. This approach can be adopted in whole or in part to assist practitioners to protect the patient and themselves during the procedure.

Key words: Care team; cognitive aid; COVID-19; electroconvulsive therapy; ECT

Introduction

A highly contagious respiratory virus poses significant challenges for the electroconvulsive therapy (ECT) team and its patients requiring constant care adaptation as disease insight is gained and testing capacity, treatment options, and therapies develop. The current state of COVID-19 suggests that even when tested for the disease, a significant false negative rate may be unavoidable, and even when antibodies are present, immunity is uncertain, and viral shedding may still be possible. ECT candidates often need multiple procedures and frequently present from an institutionalized high-risk environment. Airway management suggested for single procedural care episodes may not be appropriate in the setting of ECT, and unique considerations for these patients require a feasible approach that is supported by the literature as much as available at this time. This article presents a

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framework akin to a cognitive aid to assist the team with a systematic approach to ECT conduct during COVID-19.

Background

ECT during the COVID-19 pandemic may be necessary without the option of a delay as this treatment is life-saving for some candidates. In addition, it is likely that multiple ECTs will be necessary in a treatment cycle to be effective. Most patients with severe mental health conditions requiring ECT will present from an inpatient environment with a high risk of asymptomatic and symptomatic COVID-19 infections at various stages of the disease and often limited capability to strictly observe infection control measures. The complexity of these considerations for patients in need of ECT have been described in detail in the Singapore mental healthcare system experience.[1]

Testing reliability for COVID-9 depends on many factors, including the adequacy of specimen collection which may not be possible in some ECT patients, specimen processing, and the test itself. Treatments and immunity have remained uncertain at this time. Therefore even a patient tested recently and possibly repeatedly COVID-19 negative under the best of circumstances can only be considered to present a minimized but not eliminated risk for spread of the disease.

The recently documented potentially high percentage of pre- and asymptomatic COVID-19 viral shedding individuals suggests that optimal disease control measures should be used to prevent potential aerosol, droplet, or contact transmission.[2] It has become clear that aerosol viral viability max extend beyond 2 h, and that such small particle aerosols can be carried by air currents even from normal breathing and turbulence, a particular problem in poorly ventilated enclosed spaces.[3,4] Airway management recommendations for general anesthesia advocate rapid sequence induction and intubation practices thought to minimize viral contamination in surrounding air.[5] Recommendations for successful tracheal extubation and cough prevention are less clear.[6] Aerosolization, dispersion, and suspension of small particles (e.g., viruses) in surrounding air is greatest from coughing, and hence its prevention and containment during ECT is critical. Data on aerosolization for different airway management options are limited. However, previously reported high-quality mask airway management using a high-efficiency particulate air (HEPA) filter minimizes particle spread.[7]

Currently many healthcare systems have developed their own protocols for the procedural management of patients under investigation or carrying COVID-19 that includes transport, facility and recovery mechanisms for them. This article does not address these issues beyond very general recommendations for ECT patients.

Framework for ECT conduct

With limited scientific literature on the conduct of ECT during COVID-19, we present a clinical ECT step-by-step framework, that includes selected information from a recent American Society of Anesthesiologists townhall webinar.[8] These steps may require local adjustments balancing maximal safety, procedural urgency, and facility resources and are primarily based on the assumption of treating a patient who tested COVID-19 negative the day before or on the day of the procedure and who presents with features that allow for a high-quality mask seal in experienced hands. This framework aims to provide a cognitive aid for clinicians about the individual steps to be considered for the conduct of a standard ECT procedure under the conditions of a respiratory pandemic, where available supported by the literature.

Location

The preferred location is an airborne infection isolation room for each ECT. Such a room may not always be available and alternative locations should require consideration of the hourly air exchange rate and the associated consequences for the safety and cleaning of the care environment between patients and appropriate scheduling. A recovery room environment for the procedure with physical barriers between multiple patients presenting for ECT often consisting of curtains only is not appropriate during this pandemic.

The patient

The patient should wear a standard face mask during transport and at all times in the procedural facility as feasible.

The team

To minimize potential exposure to clinicians and the patient, presence of only 3 team members in the room during the ECT is suggested:

1 anesthesia provider (airway management, medication selection, monitoring).

1 psychiatrist (medication selection, ECT delivery, monitoring).

1 nurse (assist anesthesia and psychiatry providers as needed, monitoring, IV start).

Adherence to donning and doffing of appropriate personal protective equipment (PPE) per health ministry, institutional and departmental guidelines for all team members is

essential. The suggested minimum anesthesia provider PPE for screen negative, test negative, asymptomatic patients is a headcover, an N95 or equivalent mask, full face shield and/or goggles, an impervious gown and double gloves. The same principles should be followed by the psychiatrist and nurse adapted to the PPE guidance of their respective departments for patients with unknown COVID-19 status.

A team huddle, if possible away from the patient, with clear role descriptions and confirmation of the expected procedural steps summarized below should precede the ECT episode. A standard pre-procedure time out with the patient should follow, when all participants are ready.

Airway management

A high-quality mask seal and manual ventilation with a HEPA filter equipped bag mask apparatus produces minimal aerosolization, and is suggested as the preferred airway management technique during ECT.[7] To achieve this objective, patients should be strongly encouraged to shave facial hair. The procedure is very short and mask management by an experienced provider reduces chances for air leaks and coughing. Use of supraglottic airways or endotracheal tubes may be associated with a higher likelihood of coughing and/or aerosolization, but scientific confirmation is lacking. The effect of neuromuscular blockade on muscle groups is not uniform and the degree of aerosolization from residual contraction of respiratory muscles during ECT delivery is uncertain. We consider mask airway, endotracheal intubation, and then supraglottic airway (typically a laryngeal mask airway) as the preferred airway management sequence in order of each methods expected potential impact on environmental contamination. However, this suggestion lacks scientific evidence. Barrier enclosures may be useful during airway management and ECT delivery to prevent clinician droplet and aerosol contamination [Figure 1].[9,10] Changes of environmental airflow inside and around solid or flexible barrier enclosures is a subject of investigation and therefore their exact role during ECT remains to be determined.

Figure 1: Example of a flexible barrier enclosure. The images present lithotomy leg holders to "tent" the barrier enclosure as just one of many possible creative solutions, some of which have been described in the literature. Use of a Mayo-stand as a frame upon which to place a plastic drape is another option, when an OR table is not used. Images do not portray COVID-19 PPE

ECT procedure step-by-step suggestions

1. Preparation
   a. Employ functioning suction with Yankauer tip
   b. Employ a HEPA filter between bag and mask
   c. Consider transparent disposable sheet covering of anesthesia monitoring, documentation equipment and the ECT machine to ease real time documentation and post-procedure contact surface cleaning
   d. Employ HEPA filter-protected end-tidal carbon dioxide ($ETCO_2$) monitoring, preferably available as standard monitoring
   e. Avoid connection of unprotected $ETCO_2$ sampling or breathing circuit to an anesthesia machine.
2. Preoxygenation
   a. Consider slight reversed Trendelenburg position to improve functional residual capacity
   b. Consider glycopyrrolate 0.2 mg IV as an anti-sialogogue[8]
   c. Explain the procedure (i.e., tight mask fit) to the patient
   d. Do not use supplemental oxygen at this stage unless the patient is on oxygen at home.
   e. Prefill any bag mask reservoir with oxygen
   f. Have the patient or a team member remove the patient's face mask
   g. Apply the mask with a non-suffocating, high-quality seal
   h. Consider the possible use of adjuncts such as mask straps to achieve the best fit
   i. Consider to ask the patient to take 5 maximized breaths under protection of the high-quality mask seal
   j. Have cranial leads applied by the psychiatrist per standard protocol during the preoxygenation phase.
3. Induction
   a. Have a team member administer anesthetic induction medications, allowing the anesthesia provider to maintain an optimized airway technique (e.g., mask seal)
   b. Have a team member apply a flexible barrier enclosure (transparent plastic cover) over work area immediately after induction but before mask ventilation start*
   c. Apply low tidal volumes as per provider best clinical judgment or monitoring when available[8]
   d. If an oral airway is needed, await complete patient exhalation, then remove the mask and insert oral airway under cover of the barrier enclosure
   e. If a doublehanded mask airway is needed, the nurse operates the ventilation bag that is shielded by the flexible barrier enclosure. Escalate airway

management as appropriate using the highest-level barrier protection commensurate with the clinical circumstance

f. Consider brief mask hyperventilation of the patient[11]
g. Immediately prior to ECT administration, await complete exhalation before mask removal and bite block placement
h. The psychiatrist to place the ECT handles under cover of the barrier enclosure
i. Stay clear of patient until seizure completion or as guided by oxygen saturation (goal ≥90%)
j. Consider oropharyngeal suctioning before recovery of muscle strength
k. Restart masking with high quality seal and assistance as needed until emergence and re-establishment of spontaneous ventilation
l. Consider cough suppression (e.g., remifentanil and/or lidocaine and or propofol or other medication after seizure completion)[8]
m. Provide face mask or nasal cannula oxygen on top of, or underneath a surgical face mask respectively per institution standard when spontaneous ventilation has returned.
n. Remove barrier enclosure once patient is arousable and no longer coughing
o. Debrief and prepare for appropriate PPE doffing, equipment disposal and patient recovery per institutional guidelines.

*While use of a flexible barrier may reduce provider exposure, scientific evidence is not available and this step may be modified at the teams' discretion

Psychiatry Patient Management Considerations

Patient education regarding the rationale for facial hair removal and consequences for the alternative of tracheal intubation should be part of the consent process. Patients too psychotic or disorganized to understand the rationale for such requests, including those who are catatonic, non-responsive, or undergoing involuntary treatment present particular challenges. Involving supportive family members in deliberations and decision-making is often very helpful. Patients may regard court-ordered ECT and involuntary shaving as more intrusive than the treatment itself, and may physically resist. For patients who refuse treatment or cannot cooperate, the ethics of balancing treatment need vs. safety of the care environment must be considered individually.

Patients may be more anxious when treated by staff who are depersonalized by gowns, masks, and eye shields. Administration of chlorpromazine 100 mg as an anxiolytic on the floor before transfer to the ECT suite may be an appropriate option because it can be given IM and will not raise the seizure threshold.

Statement

Our understanding of COVID-19 is ongoing and we are continuing to learn about the virus and its clinical care implications including for ECT. A framework and cognitive aid may advance to become a compelling clinical care guideline when good scientific facts become available and new evidence-based research and information can be expert vetted and applied. As such this document may be updated accordingly.

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Conflicts of interest

There are no conflicts of interest.

Glossary

ECT	-	Electroconvulsive therapy
IV	-	intravenous
PPE	-	personal protective equipment
HEPA	-	high-efficiency particulate air
$ETCO_2$	-	End-tidal carbondioxide.

References

1. Tor PC, Phu AH, Koh DS, Mok YM. ECT in a time of COVID-19. J ECT 2020. doi: 10.1097/YCT.0000000000000690.
2. He X, Lau EH, Wu P, Deng X, Wang J, Hao X, *et al*. Temporal dynamics in viral shedding and transmissibility of COVID-19. Nat Med 2020. doi: 10.1038/s41591-020-0869-5.
3. van Doremalen N, Bushmaker T, Morris DH, Holbrook MG, Gamble A, Williamson BN, *et al*. Aerosol and surface stability of SARS-CoV-2 as compared with SARS-CoV-1. N Engl J Med 2020;382:1564-7.
4. Meselson M. Droplets and aerosols in the transmission of SARS-CoV-2. N Engl J Med 2020. doi: 10.1056/NEJMc2009324.
5. Anesthesia Patient Safety Foundation. Zucco L, Levy N, Ketchandji D, Aziz M, Ramachandran SK. Recommendations for Airway Management in a Patient with Suspected Coronavirus (2019-nCoV) Infection. Available from: https://www.apsf.org/news-updates/perioperative-considerations-for-the-2019-novel-coronavirus-covid-19. [Last accessed on 2020 Apr 07].
6. Peirovifar A, Eydi M, Mirinejhad MM, Mahmoodpoor A, Mohammadi A,

Golzari SEJ. Comparison of postoperative complication between laryngeal mask airway and endotracheal tube during low flow anesthesia with controlled ventilation. Pak J Med Sci 2013;29:601-5.
7. Chan MTV, Chow BK, Lo T, Ko FW, Ng SS, Gin T, *et al*. Exhaled air dispersion during bag mask ventilation and sputum suctioning-Implications for infection control. Sci Rep 2018;8:198.
8. COVID-19 Townhall Webinar. Available from: https://www.asahq.org/in-the-spotlight/coro navirus-covid-19-infor mation/town-halls/april-23. [Last accessed on 2020 Apr 04].
9. Canelli C, Gonzales M, Nozari A, Ortega R. Barrier enclosure during endotracheal intubation. N Engl J Med 2020. doi: 10.1056/NEJMc2007589.
10. Brown S, Patrao F, Verma S, Lean A, Flack S, Polaner D. Barrier system for airway management of COVID-19 patients. Anesth Analg 2020. doi: 10.1213/ANE.0000000000004876.
11. Sawayama E, Takahashi M, Inoue A, Nakajima K, Kano A, Sawayama T, *et al*. Moderate hyperventilation prolongs seizure duration of the first electroconvulsive therapy. J ECT 2008;24:195-8.