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TRACHEAL INTUBATION IN PATIENTS WITH COVID-19 PRESENTING FOR EMERGENCY SURGERY

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ABSTRACT

Background: The Novel Corona virus spread from Wuhan, a city of Hubei province in China since December 2019. Corona Virus disease (COVID-19) is highly contiguous and transmitted easily through droplets, aerosol As Such, it carries a high risk of spread to health professionals especially the anesthesia care team trained to secure the patients airway. During current pandemic almost all elective surgeries were cancelled and emergency surgical procedures were performed for suspected or confirmed COVID-19 positive patients. Performing surgical procedure or securing an airway in COVID-19 patients, special attention and the recommended guidelines must be followed for health professional safety. Safely securing a patient's airway promptly using rapid sequence induction with muscle relaxant is challenging. Video laryngoscopy can increase mouth to mouth distance and its use is recommended in place of conventional laryngoscopy with goggles coated besides with an antifogging agent. When performing a surgical procedure on a COVID-19 patient, it is recommended to have a limited number of well trained staff who have plenty of knowledge on how to don and doff personal protective equipment's (PPE) in the operating room (OR).

Pre-oxygenation with 100% oxygen for 3-5minutes with tight fitting mask using AE technique and lidocaine 1.5mg/kg is recommended in order to avoid coughing during intubation. Post-op muscle relaxant used video laryngoscopes and monitor End tidal carbon dioxide (ETCO2) to check the placement of tube. Necessary equipment and mask should be ensuring to the patient at time of extubation and avoid the high nasal flow oxygen to prevent aerosol.

Conclusion: This review highlighted important steps of tracheal intubation in patients suffering from COVID-19 presenting for emergency surgery. A special consideration should also be given to include limited staff in the OR, negative pressure air room with advance and well prepared intubation trolley along with video laryngoscope. An expert and highly sophisticated trained anesthetist with one assistant should follow the intubation procedure and avoid the high nasal flow to prevent aerosol in order to minimize the risk of getting infected.

Key words: End tidal carbon dioxide ($ETCO_2$); Operating room (OR); Personal protective equipment (PPE); severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2); Endotracheal tube (ETT); Rapid sequence induction (RSI)

INTRODUCTION

WHO on 11th February 2020, named Coronavirusdisease as COVID-19 after case presentation of pneumonia of undetermined etiologyon 31st December 2019 in Wuhan city of China. COVID-19 is new viral infection caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) **[1, 2]**. Since 7th July 2020, total number of confirmed cases of COVID-19, across the globe are 11,818,564 and reported deaths are 542,818 **[3]**. SARS-CoV-2 is highly contagious and spreads easily through droplets and aerosol. Disease transmission is complex and depends on size, nature, viscosity and expulsion direction from airway **[4]**. COVID-19 is associated with high mortality rate ranges from 16.7% to 61.5% in critically ill patients **[5]**. Both symptomatic and asymptomatic patients need critical attention of health care professionals to ensure patient and their own safety. During current pandemic almost all elective surgeries were cancelled and emergency surgical procedures were performed for Suspected or COVID-19 positive patients. In Tongi Hospital (China) a total 105emergency surgeries were performed in which 90 cases were obstetrics and rest 15cases were non-obstetrics **[6]**. As the airway of the patients with COVID-19 is very contagious and it's important to ensure the safety of patient and the health care provider using recommended guidelines during emergency surgeries. A separate operating room (OR)

must be designed for the COVID-19 patients to minimize the exposure and prevent the non-COVID-19 patients to become infected **[7]**.

SAFETY OF THE HEALTH CARE PROVIDERS:

As the anesthetists play a major role in intubation and the highly contagious nature of COVID-19 makes it mandatory to minimize the involvement of superfluous staff in tracheal intubation. All the participated staff in intubation must wear standard level 3 protection. Level 3 protection follow Hand disinfection → head cap → protective mask N95 1860 → surgical masks → isolation gown → disposable latex gloves → goggles → protective clothing → disposable latex gloves → shoe covers → disposable gown → disposable latex gloves → full head hood **[8]**. While intubating the COVID-19 patient, it is recommended to use the powered air-purifying respirator system. The use of video laryngoscope increase mouth to mouth distance and thus reduces the chance of infection. Due to coughing or aerosol awake fiber-optic intubation should be avoided. Enhanced engineering controls come up with barrier protection opposed to droplet sprays and protection against small airborne particles produced during intubation process would be especially fruitful.When removing the personal protective equipment (PPE) special attention should be given not to touch eyes, nose and mouth before washing the hands. Care must be taken not to contaminate the clean area and follow strict guidelines in dispose off or disinfect the infected materials **[9]**.

SAFETY OF PATIENT:

Safety of patients are important concern in emergency surgeries because of possible risk of myocardial infarction as well as multi organ failure. Intubation might be challenging due to infection and inflammation of pharynx. Most of the patients experience hemodynamic instability with low oxygen saturation. Such procedures needs senior well trained anesthetist with experience assistant and professional nursein order to manage the patient's airway for maximum patient safety. Luo M et al[8]in his report recommend rapid sequence induction for tracheal intubation and possible risk of aspiration. Pre-planned and a coordinated response must be given to patients presented for an emergency intubation. The point of concern for swift action is necessary in order to prevent the critical situation such as severe hypoxemia (SpO_2< 80%) that develops in about 10% patients and cardiac arrest in about 2% patients in this setting **[10, 11]**. The use of muscle relaxants and video laryngoscope is recommended which lead to increase mouth to mouth distance and ease the

intubation process overall. To ensure the correct placement of the tracheal tube the better indicator is end tidal carbon dioxide ($ETCO_2$). During the intubation of COVID-19 patients the serious problem is fogging of goggles which make the intubation and managing the airway more challenging. To minimize risk of fogging apply some antifogging agent inside the goggles **[8]**.

MANAGEMENT OF COVID-19 PATIENT:

As intubation in COVID-19 is a high risk procedure, therefore, a pre-prepared intubation trolley has to be prepared in advance to avoid mishaps when intubation is required. All the staff involved in tracheal intubation should be highly trained and well informed about the protocols. Single use disposable equipment should be used for each patient. For pre-oxygenation, follow tight fitting mask using AE technique **[11]**.

For anxious patient, consider Midazolam 1 to 2 mg and during tracheal intubation intravenous injection of lidocaine 1.5mg/kg is worthwhile to suppress cough reflex.[6]For induction phase, Propofol 1 to 1.5 mg/kg and the patients with cardiovascular instability, Ketamine 1 to 2 mg/kg should be used **[11]**. Before tracheal intubation, guarantee full muscle relaxation achieved by 1.2 mg/kg Recoronium or suxamethonium1.5 mg/kg. Immediately after achieving the muscle relaxation correct placement of ETT should be checked by using video laryngoscope. To ensure the safe surgery, all the essential monitors should be installed pre-operatively specially end tidal carbon dioxide ($ETCO_2$) for evaluation of tube. For ventilatory management, the established guidelines for ARDS patients should be followed **[6]**. Mostly all the COVID-19 patients are extubated in ICU and maintenance of the oxygen supply is continued through nasal cannula for about 24 hours. Extubation may be delayed in such patients but whenever it is required to extubate the patient, it must be performed in the presence of anesthetist with respiratory therapist promptly **[8]**. Before extubation, it is ensured all necessary equipment and low flow oxygen delivering devices are ready and immediately after extubation the patients wear face mask along with oxygen or nasal cannula. It is recommended to avoid the use of mask ventilation like CPAP or BiPAP and high flow nasal oxygenation due to aerosol generation **[12]**.

Following are steps of tracheal intubation in covid-19 patient **[11, 10]**.

1. Regardless of the clinical cruelty of disease tracheal intubation is a high risk procedure for health professional in covid-19 positive.

2. Hand hygiene should be followed pre and post-operatively of the procedure to be carried out.
3. Limited staff presence shall be made sure in order to minimize the chance of infection spread. One well trained person who intubates the patient mainly an anesthetist, 2nd anesthesiologist assistant, and a 3rdone for administering drugs and to monitor the patient cautiously.
4. Prepare and design a covid-19 tracheal intubation trolley to ensure quick availability of drug inside operating room.
5. All the time, it is necessary to wear (PPE) personal protective equipment and give consideration to double gloving. If feasible defog eye wear or goggles.
6. Tracheal intubation should be performed in a room of negative pressure with greater than 12 air changes per hour.
7. Make sure to ready the required drugs and airway equipment outside the operating room like intravenous access and suctioning device. If available a kit dumping mat should be used.
8. Highly trained anesthetist is required for the successful attempt of tracheal intubation.
9. Remain secure, precise and instant with modified rapid sequence induction (RSI) to save patient safety within short time.
10. In case of difficult situation the selected technique may vary according to local practices and apparatus. With previous training and accessibility this is probable to include:
    - Pre-oxygenation with 100% oxygen for 3-5 minutes through a well-fitting mask and a Mapelson-C (waters) or anesthetic circuit.
    - Follow Video laryngoscopy for intubation and A wake fiber optic intubation should be avoided.
    - To improve seal for mask ventilation using VE-grip by 2-handed mask ventilation technique.
    - For airway saving a second generation supraglottic airway device, likewise to enhance seal.
11. Between the circuit and catheter, Heat and moisture exchanger (HME) filter must be placed all the time and retain it dry to evade occlusion.
12. All the procedures which contribute in aerosol generation should be avoided, including non-invasive

ventilation, high flow nasal oxygen, tracheal suction deprived of an in-line suction system in position and bronchoscopy.

13. A trained anesthesia assistant will apply the cricoid pressure during modified RSI (rapid sequence induction) but if it encounters any difficulty in intubation then don't consider it.
14. If cardiovascular instability during induction is increased then the use of ketamine 1-2 mg/kg and suxamethonium 1.5 mg/kg or rocuronium 1.2 mg/kg for muscle relaxant is recommended.
15. Avoid face mask ventilation and use low flow, 2-person, low pressure method if required.
16. In case of difficult intubation practice a standard algorithm used for failed tracheal intubation with intellectual support.
17. When tracheal intubation is accomplished put a (NG) naso-gastric tube and achieves ventilation securely.
18. If patient status is not clear about COVID-19 then take a deep tracheal aspirate for virology by means of closed suction.
19. Post-op discards all disposable equipment carefully. Disinfect reusable apparatus completely according to the institutional policies. After exit from the room guarantee doffing of PPE in careful and precise way.
20. The extubation may be delayed and done in ICUs with vigilant monitoring of all vital sign.
21. Ensure that all necessary equipment and low flow oxygen delivering devices must be ready and immediately after extubation the patient must wear face mask along with oxygen mask or nasal cannula.

CONCLUSION

This review highlighted important steps of tracheal intubation in patients suffering from COVID-19 presenting for emergency surgery. The premier objective was to put some knowledge into consideration regarding the safety of patients, attempting professionals and besides that to achieve end results of successful intubation. For staff safety, number of attempting professionals should be limited to not more than three member team of anesthesia. Operating room with a negative pressure, essential equipment like video laryngoscope, suctioning device, and nasogastric tube for undergoing procedure of intubation in COVID-19 should be arranged pre-operatively with a separate intubation trolley. In case of any difficulty in intubation the procedure may be modified according to the situation and

some modified protocols prevailing locally. All the procedures should be carried by trained health professional to minimize the risk of complications and avoid aerosol generating procedures. Such procedures can be placed at bay which are potentially threatening and carry high risk of contagious, like, noninvasive ventilation, high flow nasal suction, and tracheal suction. Follow the reported guidelines for intubation to ensure the safety of health professional and COVID-19 patients as well.

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REFERENCES

[1] "Naming the coronavirus disease (COVID-19) and the virus that causes it." https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/naming-the-coronavirus-disease-(covid-2019)-and-the-virus-that-causes-it (Accessed Jul. 07, 2020).

[2] "WHO | Pneumonia of unknown cause – China." https://www.who.int/csr/don/05-january-2020-pneumonia-of-unkown-cause-china/en/ (Accessed Jul. 22, 2020).

[3] "Coronavirus Update (Live): 11,818,564 Cases and 542,818 Deaths from COVID-19 Virus Pandemic - Worldometer." https://www.worldometers.info/coronavirus/? (Accessed Jul. 07, 2020).

[4] D. Hall, A. Steel, R. Heij, A. Eley, and P. Young, "Videolaryngoscopy increases 'mouth-to-mouth' distance compared with direct laryngoscopy," *Anaesthesia*, vol. 75, no. 6, pp. 822–823, 2020, doi: 10.1111/anae.15047.

[5] W. Yao *et al.*, "Emergency tracheal intubation in 202 patients with COVID-19 in Wuhan, China: lessons learnt and international expert recommendations," *Br. J. Anaesth.*, no. January, 2020, doi: 10.1016/j.bja.2020.03.026.

[6] L. Meng *et al.*, "Intubation and Ventilation amid the COVID-19 Outbreak: Wuhan's Experience," *Anesthesiology*, no. March, pp. 1317–1332, 2020, doi:10.1097/ALN.0000000000003296.

[7] T. Siny, R. Colin F., and T. Abdullah Sulieman, "Avoiding failed spinal anesthesia : ' Advik technique ' A very rare unusual site of ventilator breathing circuit leakage : Beware !!," *Saudi J. Anesth.*, vol. 11, no. 5, pp. 80–89, 2017, doi: 10.4103/sja.SJA.

[8] M. Luo *et al.*, "Precautions for Intubating Patients with COVID-19," *Anesthesiology*, vol. 132, no. 6. Lippincott Williams and Wilkins, pp. 1616–1618, Jun. 01, 2020, doi:10.1097/ALN.0000000000003288.

[9] D. N. Weissman, M. A. De Perio, and L. J. Radonovich, "COVID-19 and Risks Posed to Personnel during Endotracheal Intubation," *JAMA - Journal of the American Medical Association*, vol. 323, no. 20. American Medical Association, pp. 2027–2028, May 26, 2020, doi: 10.1001/jama.2020.6627.

[10] B. A. Orser, "Recommendations for Endotracheal Intubation of COVID-19 Patients," *Anesth. Analg.*, vol. 130, no. 5, pp. 1109–1110, 2020, doi:10.1213/ANE.0000000000004803.

[11] T. M. Cook, K. El-Boghdadly, B. McGuire, A. F. McNarry, A. Patel, and A. Higgs, "Consensus guidelines for managing the airway in patients with COVID-19: Guidelines from the Difficult Airway Society, the Association of Anaesthetists the Intensive Care Society, the Faculty of Intensive Care Medicine and the Royal College of Anaesthetist," *Anaesthesia*, vol. 75, no. 6, pp. 785–799, 2020, doi: 10.1111/anae.15054.

[12] P. Medicine, "COVID-19 guidance for anaesthesia and perioperative care providers Guidance on COVID-19 and anaesthesia," pp. 11–13, 2019.