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SUBMISSIONS TO PERSPECTIVE SECTION

Operating Room Protocols in OMFS During Corona virus (Covid-19) Pandemic

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Introduction

The recent outbreak of SARS-CoV-2 has reached worldwide proportions since it began in late 2019 [1]. Due to the high virulence via aerosol transmissions, to date Covid-19 has infected more than 3,059,642 people all over the world, causing 211,028 confirmed deaths [2]. The high rate of hospital and intensive care unit (ICU) admission provoked a serious congestion across hospitals, and extreme measures have been taken to avoid a health service collapse [3].

Every healthcare worker and specialty is at increased risk of exposure as well as acting as a source of transmission to the community [4]. Oral and maxillofacial surgery is the branch that extends from a life savior of trauma and cancer patients to an artist for sculpturing beautiful faces out of anomalies and putting smiles on every patient's face. We should also consider the vicinity of our area of interest to airway that makes us highly vulnerable to Covid-19 infection. Our surgical practice is also not spared from the effects of this gigantic, invisible enemy that all of us are facing, i.e., novel corona virus called as Covid-19 pandemic.

Operating room (OR) is the heart of every surgical specialty, and in such difficult times, it is important to take very stringent actions and follow certain guidelines without any loop holes. Hence, it is of utmost importance for us to educate ourselves and act tactfully to serve the patients as well as protect the community and ourselves. This article exclusively answers the dilemma a maxillofacial surgeon will be facing while approaching the patients during Covid-19 pandemic. Operating room (OR) protocols and alteration in practice required during and after the global pandemic of Covid-19 shall be divided into five parts for ease of expression, namely (1) patient selection, (2) design and arrangement of OR, (3) anesthesia protocols, (4) surgical protocols particular to oral and maxillofacial surgery, and (5) postoperative care of OR.

Patient Selection

Patient selection has to be done very carefully, and only emergencies like oral and maxillofacial trauma, maxillofacial infections and essential elective oral cancer surgeries need to be performed during this pandemic. These surgeries cannot be postponed and need special attention as time plays a very important factor in healing and final outcome. Elective surgeries need to be deferred and, if at all, want to plan, patient should be in quarantine for 14 days before planned for elective procedure [5]. However, during this pandemic, we need to perform few extra precautions in order to avoid cross-contamination.

Al-Muharraq et al. suggested testing recommendation for Covid-19 (SARS-CoV-2) in patients planned for surgery [6]. We should try to understand the availability and

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the types of the test available for Covid-19 disease in India which at the moment is available only for the symptomatic patient. There are two categories of the tests that are available: (a) nucleic acid amplification test for viral RNA using polymerized chain reaction (PCR) and (b) antibody detection test via serology [7].

As no such testing protocols are in action in India for surgical patients at present and the emergencies do not allow to wait for the testing, we need to ramp up our sterilization and disinfection protocols to prevent infection and treat every patient as Covid-19 positive patient unless proven otherwise.

Design and Arrangement of OR

Even though OR protocols have always been focused on reducing microbial load, contagious nature of novel corona virus has embarked us with huge responsibility to contain the disease spread. So initial protocols were limited to surgical gowns, mask and fumigation has to be evolved in every possible way.

Design

1. Operating room (OR) to be spacious with 2 attached rooms for donning and doffing of personal protective equipments (PPE).
2. OR to follow concept of orange zone (sterile donning area), green zone (waiting area for OR staff) and red zone (contaminated area) as described in Fig. 1 [8].
3. OR to have two transparent doors for entry and exit for OR staff.
4. OR staff exit door to be used as patient entry and exit door.
5. Arrangement of biomedical waste management inside OR (respective color bins and bags with sodium hypochlorite in it) [9].
6. Donning room to be used as waiting area for teams before surgery.
7. Doffing area to be used as waiting area after surgery.

Arrangement of OR

Equipments

1. Minimal fomite-bearing surfaces in OR (equipments, extra medications and surgical material not to be used in the ongoing surgery to be removed from OR and kept separately in the store room).
2. All the surfaces of equipment like OR table, anesthesia work station, monitors, electrocautery and motor drills to be covered with plastic sheets. The sheets to be changed after every patient.
3. Intercom to be installed in OR connected to every department of hospital for better and quicker communication.
4. It is recommended to use OR having laminar air flow system and HEPA filter (0.1 micron efficiency) [10] is recommended relative to surrounding air. A high frequency of air changes (25 per hour) rapidly reduces viral load within the OR.
5. Prefer not to use air conditioners inside OR and in areas of possible air contamination.

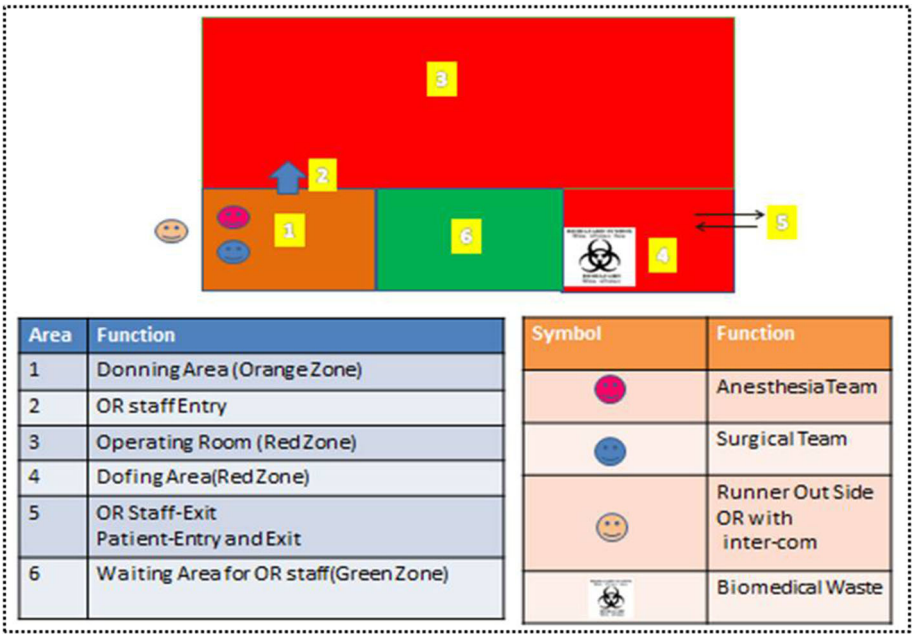

Fig. 1 Suggested diagrammatic representation of modified surgical OR

6. Aerosol barrier box an innovative modified design (SAAS box) of Arbat's safety box [11] (Fig. 2) to be installed on OR table. It allows placement of patient's head and neck region under a transparent box with gloved hands along the sides. The surgeon can operate through the gloved hands area in a closed chamber. It reduces the splatter of any aerosols into the immediate environment of the patient and surgeon.
7. At the entry of OR and exit, there should be a no touch sensor-based sanitizer dispenser.
8. A computer in OR for scans and radiographs to be covered with disposable plastic sheet. The sheet to be changed after every patient.
9. High-volume suction to be one-third prefilled with povidone–iodine solution. The povidone–iodine solution is believed to have virucidal effects and reduces viral load in aerosols produced by suction machine.
10. A high-quality HMEF (heat and moisture exchanging filter) rated to remove at least 99.97% of airborne particles of 0.3 microns or greater should be placed between the face mask and the breathing circuit or between the face mask and the reservoir bag as applicable. Insert bacterial viral filter to the expiratory limb of the breathing circuit apart from the heat and moisture exchanger (HME) [12].

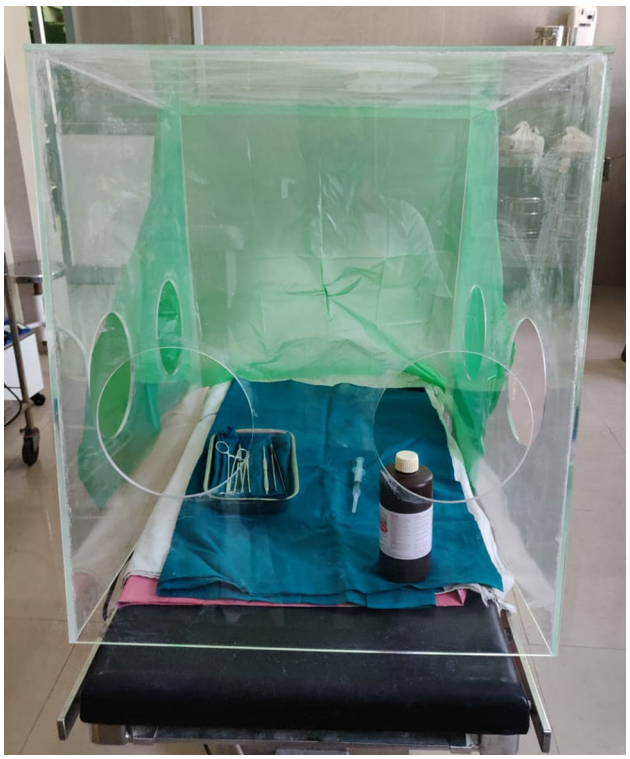

Fig. 2 Aerosol barrier box an innovative modified design (SAAS box) of Arbat's safety box

OR Staff

1. Minimal staff in OR. Only experts to perform intubation and surgery. This reduces aerosolization of the bronchial secretions and also reduces the surgical time.
2. No observers allowed inside the OR. This reduces the exposure of other healthcare personnel to any infection.
3. Two runners—one inside OR and one outside OR—with intercom access to coordinate for any needs during the procedure.
4. During intubation and extubation, only anesthesia team inside OR. The surgical team has to wait in the waiting area and allowed to enter after 20 min of completion of intubation. The contaminated aerosols settle down from the air during this period, thus reducing exposure to the surgeon. [13].
5. During surgery, only surgical team to be present inside the OR.
6. Anesthesia team to monitor patient from waiting to be sitting behind transparent barrier. This reduces the exposure time for the anesthetists.

Anesthesia Protocols

During Intubation and Extubation

The aerosolization and droplet transmission of the Covid-19 virus are important hazards in the environment of the operating theaters, especially with procedures such as endotracheal intubation and tracheostomy. [14].

1. At the time of intubation and extubation, only required auxiliary staff should be allowed in OR.
2. All the staff in the OR must wear PPE (a fit-tested N95 mask, face shield or goggles, hazmat suits and gloves and shoe covers).
3. The attempt will be made to extubate all cases in the OR suite itself at the end of surgery.
4. Avoid awake fiber optic intubation and preferably use video laryngoscope [15].
5. Preoxygenate with minimal gas flow possible, i.e., less than 6 L per min, ensure good seal with face mask.
6. Give fentanyl slowly, in small aliquots if required to reduce coughing [16].
7. Utilize rapid sequence induction to reduce the need for mask ventilation.
8. Give anti-emetics to minimize vomiting.

Maintenance under Anesthesia

1. Minimize tube and circuit disconnection.
2. Use a closed suctioning system if available.
3. Place the ventilator on standby whenever a circuit disconnection is required, such as tube repositioning.
4. Restart mechanical ventilation only after the circuit has been reconnected/closed.
5. Employ lung protective mechanical ventilation strategies by maintaining tidal volumes of 5–6 mL/kg. Increase respiratory rate to maintain minute ventilation, and keep peak airway pressure below 30 mmHg [17].

Surgical Protocols

Operating Room Discipline

1. All surgeons to use positive air pressure respirators (PAPR) in addition to suggested PPE.
2. Surgical team to wait in waiting area (green zone) during intubation and extubation and to enter 20 min after procedure.
3. Prefer extraoral approaches to facial skeleton. This will reduce contact with the saliva.
4. Pack oral and nasal cavity with bio-occlusive dressing before taking an extraoral approach.
5. Avoid use of high-power drills, oscillating saw and forceful irrigation.
6. Use self-drilling IMF screw for inter-maxillary fixation (IMF).
7. Communication and improved team approach to avoid injury to protective gear.
8. Use of povidone–iodine (10% solution in 1:9 dilution) and hydrogen peroxide (3%) in irrigation solution to minimize viral load in aerosols.

Postoperative Preparation Recommendations for OR

1. Every surface of OR to be considered as contaminated after surgery.
2. Once the patient has been shifted to the recovery room, surgical and anesthesia staff to remove PPE and leave the OR.
3. All the plastic sheets to be removed and disposed in disinfectant containing bin.
4. All the surfaces to be sprayed with sodium hypochlorite (1%).
5. Alcohol-based spray to be used on monitors.
6. Both HME filters and the soda lime should be changed.
7. OR to be fumigated and sealed for 24 h, but formaldehyde is a carcinogen and affects lungs which are primary target organs for Covid-19 infection.
8. Fogging can be a good alternative to fumigation as it generates fog or mist formed by ultralow-volume (ULV) uniform submicron-size liquid particles (dry fog) and possesses no risk to lungs. Various chemicals are used for fogging procedure like glucoprotamine, glutaraldehyde, hydrogen peroxide + silver nitrate.

Discussion

The novel corona virus has changed the healthcare system, and the delivery of maxillofacial surgical procedures is no more an exception. As an oral and maxillofacial surgeon, it is our duty to maintain the safety of ourselves, our auxiliary staff and our patients from cross-contamination. Optimization and upgradation of infection control protocol in operating room during the Covid-19 pandemic are mandatory.

Confirmed modes of viral transmission are primarily contact with contaminated environmental surfaces and aerosolization. Microorganisms that include the novel corona virus are not visible to naked eye and hence requires a very stringent approach to tackle.

Pederson et al. conducted a video audit of operating room procedures and suggested deep surface cleaning to be augmented with UV light disinfection. [18] This can be added to OR protocols along with chemical disinfection and fumigation.

As we are encountering a novel invisible enemy with respiratory and aerosol precautions, vascular care is also important and the use of closed intravenous line system to minimize blood spills is advisable [19].

Australian Society of Anesthesia advises that extubation should take place in the operating theater, and it is recommended that recovery of the patient also take place in the operating theater if resources allow.

The authors recommend to designate a single person as an infection control officer to ensure that all the policies are followed properly. The practice of maxillofacial surgery is going to increase the overheads. It is mandatory for every one of us to calculate the break even and propose revised renumerations for the surgical procedures.

Airway compromise is always a risk in maxillofacial trauma, and as emergency procedure, tracheostomy might be required. Cook et al. suggested a deep tracheal swab to be taken and sent for COVID testing. They also suggested insertion of nasogastric tube at the time of tracheostomy to prevent aerosolization in ward [20].

Conclusion

We suggest maxillofacial surgery to be very safe for staff, students and patients. Accurate planning before the surgery and its execution as planned is recommended, and the surgeries are to be done by experienced surgeons. We recommend the need to augment our strategies to reduce cross-contamination and transmission of Covid-19 pandemic.

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Availability of Data or Materials All data and material as well as software application support their published claims and comply with field standards

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

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