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Head and Neck Surgery during the Covid-19 Pandemic

[1]**Dr. Antarika Gogoi** MDS, [2]**Dr. Aneesh Ganguly** MDS
[1]Public Health Dentistry, Consultant Dental Surgeon, Dental Clinic,
[2]Oral and Maxillofacial Surgery, Observer in Head and Neck Oncology, Dr B. Barooah Cancer Institute

***Corresponding Author:**
Dr. Antarika Gogoi
C/o Dr. Ajoy Gogoi, Dental Clinic, Milan Nagar, Dibrugarh 786001

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ABSTRACT
The COVID-19 pandemic is likely to be the biggest public health crisis that we will encounter in our lifetimes. The scale of viral spread worldwide, coupled with the subsequent burden on healthcare systems, makes tackling the virus a monumental task. All elective, non-essential cases are currently cancelled. While we adapt to our new ways of working, we remind ourselves that surgeons are flexible, resilient and, ultimately, we are doctors in the first instance. We present a short article on operating during the COVID-19 pandemic.

Keywords: Head and Neck Surgery, Tracheostomy, COVID 19, Craniomaxillofacial Trauma

INTRODUCTION

Our professional and private lives changed on March 11, 2020 when the corona virus disease 2019 (COVID-19) was declared as a pandemic by the World Health Organization. The COVID-19 pandemic is likely to be the biggest public health crisis that we will encounter in our lifetimes. The scale of viral spread worldwide, coupled with the sub-sequent burden on healthcare systems, makes tackling the virus a monumental task. Governments around the world are employing strategies to minimize loss of life while trying to maintain functioning economies. The response from the general public is mixed: one of fear and frustration. Initially manifested as panic-buying from supermarkets (soap, antibacterial hand gel, and toilet-rolls), there is now a gradual acceptance that social distancing and self-isolation will stop the spread of covid-19 and thereby reduce the strain on the health care system.[1] At time of writing 203 countries / areas are affected with 2,471,136 confirmed cases and 169,006 confirmed deaths.[2,3]

With the cancellation of elective operating and clinics, clinicians are being redistributed throughout hospitals to assist colleagues in other specialties. These may include roles outside our comfort zones / normal remit. Many surgical colleagues are being trained in managing infected patients suffering with corona virus on the wards, others have been supporting emergency departments and intensive care units. Despite covering an increasing number of patients admitted with COVID-19, surgeons will still be dealing with emergency surgical admissions and will continue to operate on emergency cases. Many of these patients will be COVID-19 positive when tested and some may be acutely sick, as a result of the infection. Emergency operating during the COVID-19 crisis can be challenging for a wide variety of reasons. Additionally, we have started to see patients presenting late to hospital with advanced pathological stage often due to a fear of hospital admission during this pandemic or due to a reduction in outpatient activity.

At time of writing, WHO advises full PPE (FFP3 mask, visor or safety glasses, gown and gloves) for aerosol generating procedures (AGPs) for patients with known or symptomatic COVID-19.[4] The N95

mask that we use must "pass" the test in order to use safely. If you are able to taste the aerosolized bitter solution sprayed you have "failed" the test and it is ineffective in providing protection. Training is also required in the donning and doffing process to ensure this is done correctly and minimizes your own risk of exposure.[4,12]

Operating can be challenging: uncomfortable and unfamiliar. Full PPE can be distracting when first worn, therefore where possible operate with other senior team members to reduce the risk of error. Furthermore, as we have experienced, FFP3 masks can make some procedures such as operating down a microscope more challenging as it can affect the usual comfortable eye positions.

Wearing face masks and hoods can also significantly reduce the clarity of verbal communication between OT staff. Additionally, it may be more difficult than usual to read non-verbal cues. Therefore, care must be taken to ensure open, focused channels of communication are established between all team members throughout the entire procedure. We must use names to address individual team members and ask people to repeat our requests back to us to ensure a shared understanding. Situational awareness may be impaired given the circumstances; therefore care should be taken to ensure all team members are aware of our expectations for the procedure including volume of blood loss and duration.[5] Consider allocating roles for various members of the team to raise the alarm if these exceed what is expected. Operating in full PPE can also be exhausting, when performing long procedures, breaks may be required to prevent fatigue. Dehydration and hunger are also linked to an increased risk of surgical error; therefore it is imperative that we look after ourselves at work. Lack of sleep has been attributed to slower cognitive processing and decision-making, increasing the risk of error. Despite increasing workloads during this pandemic it is essential that clinicians take care of their own health to optimise their ability to care for others. Burnout amongst clinicians may become more common in such a demanding environment. It is important that we look out for this in ourselves and our colleagues, recognising and dealing with this early before it can lead to suboptimal performance.

In 2007, the WHO listed intubation and extubation, manual ventilation, open suctioning, cardiopulmonary resuscitation, bronchoscope, surgery, and post-mortem procedures involving high-speed devices, some dental procedures (e.g. using dental burs), non-invasive ventilation (NIV) e.g. bi-level positive airway pressure (BiPAP) and continuous positive airway pressure ventilation (CPAP) as aerosol generating procedures (AGP's).[6]

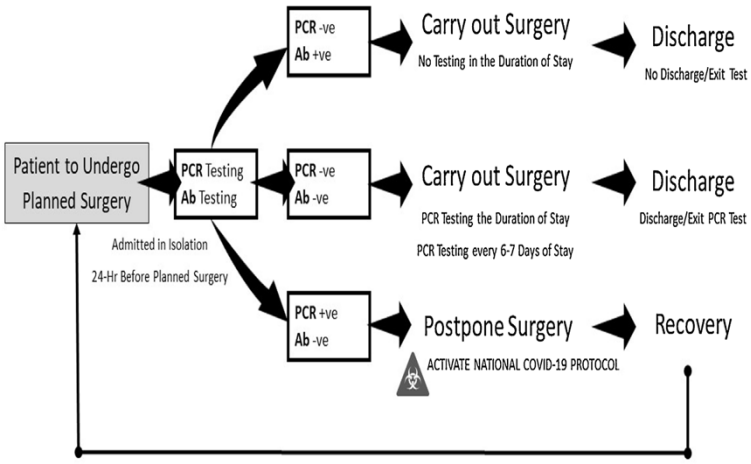

Figure-1: Flowchart suggesting COVID-19 testing protocol for planned surgical patients.[7]

COVID-19-Specific Preoperative Planning and Preparation

Institutions will also need to develop novel preoperative protocols. Given the high attack rate [8,9,10] and prolonged aerosolization of this virus, augmented infection control and containment training for OR, ICU and floor teams is necessary.[11,12] Teams should seek to minimize AGPs and limit the length of these procedures whenever possible. For example, anesthesia may consider avoiding bag-mask ventilation, employing rapid sequence intubation techniques, and applying intratracheal or intravenous lidocaine to avoid postoperative coughing.[13,14] Teams will also need augmented training in the appropriate use of respirators and enhanced PPE donning and doffing.[12] Surgeons will need to develop COVID-19-specific contingencies, such as preparing for anticipated shortages in blood supply. Since indicated, enhanced PPE may be incompatible with the use of loupes, an operating microscope or the DaVinci console; surgeons should test the use of these devices with enhanced PPE prior to surgery.

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Protocol for conducting the surgical operative procedure

Head and Neck surgery, tracheostomy are aerosol generating procedures (AGP) and carries a very high risk of contamination by exposing the airway secretions to the clinical staff involved.[15] The overall procedure needs to be thoroughly and appropriately planned and carefully executed in order to ensure staff and patient safety. For this reason we have framed the procedure into 5 main domains. We have coined them the '5Ts', introducing nomenclature that can be universally applied:

1. Theatre Set-up
2. Team Briefing
3. Transfer of Patient
4. Head and Neck Surgery, Tracheostomy Procedure
5. Team Doffing and De-Brief

Theatre Set-up: All covid19 patients are operated on in a dedicated "Covid Theatre". This theatre should operate under negative pressure. Reverse laminar flow in the perimeter around the operating table is estimated to exchange 90% of air (removing the generated aerosol) in 6 minutes. The anaesthetic room allows fora circulating nurse ("runner") to remain for the attainment of any essentials throughout the procedure. This team member holds a two-way radio and remains in communication with the theatre personnel throughout the procedure. However, if the procedure has been planned appropriately, there should not be any need for any further equipment to be handed in to the theatre during the procedure. The surgical team's protective equipment (PPE) is displayed in the photograph. The minimum PPE for an open tracheotomy should comprise of a FFP3 face mask with confirmed seal, surgical hood, goggles or visor and double gloves. This is in accordance with WHO guidance. Since a global scarcity of PPE kits still exist, many health workers have come up with innovations regarding barrier techniques, which can minimize the spread of the aerosols. The team members write their names on the coronal end of the visor; allowing for safe and easy intraoperative communication. Given the challenges and the complexity of surgical tracheostomies on covid-19 patients, the aim is to have weekly dedicated days and slots for these patients.

Picture: PPE for a surgery during COVID 19

Team Briefing

The team briefing occurs outside the "Covid Theatre". A specific checklist that applies to all covid-19 positive patients should be used. Following introductions, a check is under-taken to confirm that all staff are appropriately mask-fit tested and trained in "Donning and Doffing". These elements are vital; if the appropriate training has not occurred then these members of the team are excluded and replaced for this procedure. The anaesthetic machine, operating table and operating lights are all checked in advance to establish that they are functioning correctly. The location of emergency equipment is also identified. At this point, similar to the pre-covid19 era, we discuss the patient's case in detail focusing on the anaesthetics/ICU and surgical aspects. The surgical aspects are described in detail below. Here, we highlight some important points:

• Pre-transfer requests (such as endotracheal suctioning)

• Patient positioning

•Critical exposure points of the transfer and procedure

• Equipment required

• Type and size of the required tracheostomy tube. We aim for the largest size possible. A second tube should be available in case of malfunction, as well as one size larger and one size smaller, should they be required.

At the end of the briefing everyone's role should be clear; this is confirmed and documented.

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Team Members:

Anaesthetics – Consultant anaesthetist, Senior Anaesthetics Trainee, Anaesthetics Nurse

ICU – ICU consultant

Surgical Team – Lead Surgeon, 2 experienced consultants

Nursing Staff – Senior Nurse Co-coordinator, Scrub Nurse, Circulating Nurse

Transfer of the patient

The patient's transfer is co-ordinated by the ICU and anaesthetic team. Deep suctioning of the chest using the closed suctioning circuit prior to transfer is considered to be a critical procedural step. We also request the oral cavity to be suctioned prior to transfer. This minimizes the amount of secretions. These are the first of the series of critical procedural steps that we utilize to minimize the risk of viral transmission. The anaesthetic team then transfers the patient using appropriate PPE. The transfer time is between 20-30 minutes, mainly due to the fact that our theatres are connected to ICU via a public corridor. Security staff has to close the corridor temporarily during transfers, and the anesthetic team needs to put on PPE prior to entering ICU. During the transfer downtime, the surgical and nursing staff begins to 'donn' the PPE and enters the theatre to prepare the surgical trays and check the tracheostomy tube. The patient is transferred along the back corridor of the theatres and not through the main theatre entrance. We appreciate that not all theatres have a back corridor; but should it be present it is important to utilize it to minimize exposure. On arrival to theatre the patient is transferred to the operating table by the anesthetic staff and the circulating nurse. The surgeon is able to oversee the positioning of the patient at this stage. Once the anaesthetic staffs are satisfied with the transfer and the positioning, the standard WHO time-out takes place. The next critical procedural step occurs when the patient is disconnected from the transferring ventilator and connected to the anesthetic machine.] This is crucial as it is a point of increased viral exposure. The anesthetic viral filter should remain on the endotracheal tube; if one is not present we recommend transient clamping. For the reasons above, we advocate that all the team members who are in theatre should be in full PPE when the patient arrives in theatre. This is different to covid19 patients requiring intubation in theatre for other types of procedures; in those instances itis common practice for surgical staff not to enter theatre for 20 minutes after intubation to allow recirculation of air. Following the procedure the patient is transferred back to ICU by the ICU team (Consultant Intensivist, Senior Trainee, ICU Nurse) using PPE and the same route and as described above.[16]

Head and Neck surgery and Tracheostomy Procedure

Although systemic therapy without immunosuppressant may seem attractive during a pandemic, there is insufficient evidence to guide the use of induction immunotherapy without chemotherapy for primary or recurrent, respectable mucosal SCC patients at this time. In extenuating circumstances, primary radiation +/- chemotherapy may be selected for oral cavity, T4a laryngeal or advanced sino-nasal SCC patients. Traditional surgery for certain patients may involve the Upper Aero-Digestive Tract (UADT) (e.g. minor salivary gland carcinomas) or free tissue transfer (e.g. temporal bone resection for a cutaneous or parotid malignancy). These patients may present high intraoperative and/or postoperative risk of SARS-CoV-2 transmission. Consequently, multidisciplinary evaluation of multilevel surgical risks and risks of alternative therapies of all cases alongside shared decision-making with patients will be necessary. Assuming adequate hospital-based resources, surgery will likely maintain a principal role in the management of most low-risk patients with cutaneous, salivary and thyroid malignancies. In select patients, the COVID-19-specific multilevel risks of surgery may outweigh the benefits. In these cases, traditionally substandard, disease-specific alternative therapies may be considered. In patients with cutaneous SCC and basal cell carcinoma (BCC), the longstanding preference for primary surgery over primary radiation +/- chemotherapy is based primarily on low-level evidence and patient convenience.[17]

Tracheostomy in COVID-19 patients is performed for similar indications to non-COVID patients. Mortality in patients intubated for COVID-19 associated respiratory failure is greater than 50% and duration can be 3 - 6 weeks. The decision for

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percutaneous or open approach for the procedure is at the discretion of the surgeon. In general, in the hands of an experienced provider, an open approach may lead to less potential aerosolization, and therefore less risk. The patient should be paralyzed, preoxygenated, ventilation held before the trachea is incised to minimize aerosolization. Suctioning should be limited as much as possible, to avoid aerosolization. Bipolar cautery is preferred over monopolar. Advance the tube distally prior to incising the trachea, to avoid creating a hole in the ETT balloon. Closed suctioning systems are preferred for tracheostomy care.

Craniomaxillofacial Trauma

Procedures should be performed by an experienced Oral and Maxillofacial surgeon, with a minimal number of assistants possible. In general, closed procedures, if internal fixation is not required for stability of the reduction are favored. Specific recommendations follow based on the anatomical region.

Lower face/mandible fractures:

1. Consider closed reduction with self-drilling MMF screws

2. Scalpel over monopolar cautery for mucosal incisions

3. Bipolar cautery for hemostasis on lowest power setting

4. Self-drilling screws for monocortical screw fixation

5. When drilling is required, limit or eliminate irrigation

6. If drilling is required, consider a battery powered low speed drill

7. If a fracture requires ORIF, consider placement of MMF screws intra-orally, then place a bio-occlusive dressing over the mouth, and use a trans cutaneous approach rather than an extended intraoral approach

8. If osteotomy is required, consider osteotome instead of power saw

Midface fractures

1. Consider closed reduction alone if fracture is stable following reduction

2. Consider using Carroll-Girard screw for reduction, and avoid intra-oral incision, if two-point fixation (rim and ZF) is sufficient for stabilization

3. Scalpel over monopolar cautery for mucosal incisions

4. Avoid repeated suctioning/irrigation

5. Bipolar cautery for hemostasis on lowest power setting

6. Self-drilling screws preferred

7. If osteotomy is required, consider osteotome instead of power saw or high-speed drill

Upper face fractures/frontal sinus procedures

Consider delay of non-functional frontal bone/sinus fractures

1. Endoscopic endonasal procedure, and the associated instrumentation (power micro debriders) carry a very high risk of aerosol generation and should be avoided if possible
2. When performing a frontal sinus obliteration or cranialization consider performing the mucosal stripping manually, and not using a burr or power equipment
3. Avoid repeated suctioning/irrigation
4. Bipolar cautery for hemostasis on lowest power setting
5. Self-drilling screws preferred
6. If osteotomy is required, consider osteotome instead of power saw

Oral and Head and Neck Oncologic Care (adapted from KP NorCal)

If non-surgical therapy is equivalent to surgery + radiation, non-surgical therapy is recommended.

1. Cases in which a worse outcome is expected if surgery is delayed more than 6 weeks. SCCA of the oral cavity, oropharynx, larynx, hypopharynx

2. Cancers with impending airway compromise

3. Papillary thyroid cancer with impending airway compromise, rapidly growing, bulky disease

4. High grade or progressive salivary cancer

5. T3/T4 melanoma

6. Rapidly progressing cutaneous Squamous Cell Carcinoma with regional disease

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7. Salvage surgery for recurrent/persistent disease

8. High grade sino-nasal malignancy without equally efficacious non-surgical options[18]

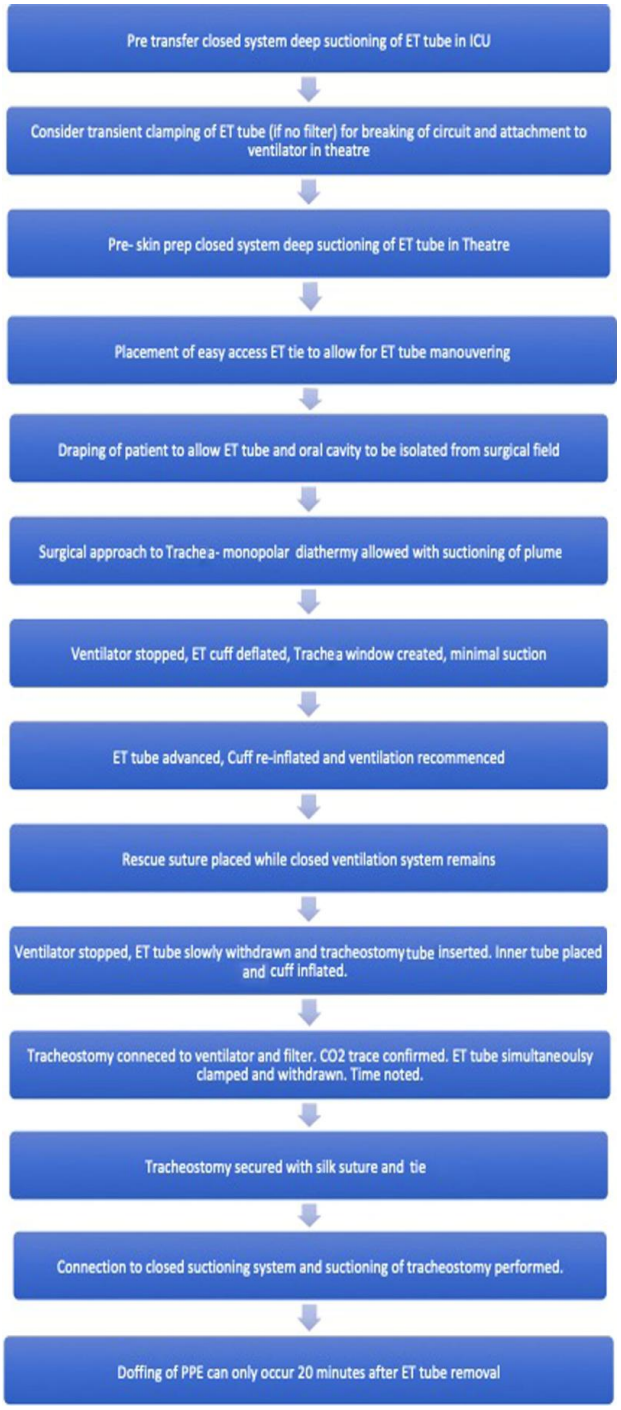

Figure 2: The North Manchester General Hospital covid19 surgical tracheostomy algorithm[16]

Team "doffing" and de-brief

The appropriate time to doff our PPE is a minimum of 20 minutes after removal of the ET tube. This is done in the theatre's designated area and following the current standard practice guidelines. After this 20 minute hiatus the patient can be transferred back to ICU. The ICU team transfers the patient back to ICU using the same route and procedures described above.

De-brief on these cases is crucial in order to pollinate any future practice. As a surgical team we are liaising very closely with our anaesthetic/ICU and nursing colleagues to make sure we approach these cases as safely as possible.[16]

COVID-19-Specific Postoperative Protocols

Health-care professionals and institutions should also develop novel postoperative protocols. Limited low-level evidence from the SARS 2003 outbreak suggests that these patients should be cared for in entirely separate units, or potentially even separate hospitals, from COVID-19 patients. It is advisable for post-op patients to have dedicated sterile recovery rooms having adequate path for transport with designated health care staff.[17]

Conclusion

We are going through a rapidly changing situation that has not been experienced before. Not being aggressive with testing while carrying out surgical services could have catastrophic consequences. As health care professionals and indeed as human beings, we have all been challenged by the recent covid19 pandemic. This has reinforced the need for us to be adaptable and reflective practitioners. The aforementioned recommendations may be expensive, but they can mitigate the risks to patients, staff, and public. These tests, when carried out in all surgical units, can also be a part of a pandemic suppression campaign leveraged to move the current crisis closer to the ideal situation, especially in the absence of therapeutics or vaccines.

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