

COVID-19 pandemic and preparedness of anesthesia team in a stand-alone cancer centre in Eastern India

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Abstract

India came under the grip of the coronavirus disease-2019 (COVID-19) pandemic and is now seeing rising graph. Cancer patients are specially in the high-risk group because of their immunocompromised status on one hand and progressive disease on the other hand. Hence, cancer care facility needs to prepare a clear strategy to manage their space, staff and supplies so that optimum patient care can be continued in the face of COVID-19 pandemic. In addition, infection prevention measures need to be robust to reduce in-hospital transmission. The working area of anesthesia and Critical Care is spread over the whole hospital such as operating room, ICU, isolation area, out-patient dept (OPD) area, various diagnostic areas and in-patient dept (IPD) to attend code blue calls. In this article, we describe the preparedness and initial response measures of the anesthesia and Critical Care department of a stand-alone tertiary level cancer care centre in eastern part of India. These include engineering controls such as identification and preparation of an isolation operating room, administrative measures such as modification of workflow, introduction and adequate supply of personal protective equipment for staff and formulation of clinical guidelines for anesthetic management. These containment measures are necessary to continue care of cancer patients, optimize the quality of care provided to COVID-19 positive cancer patients and to reduce the risk of viral transmission to other patients or healthcare providers.

Keywords: Cancer care, COVID-19, pandemic, preparedness

Introduction

India is passing through an unprecedented global emergency due to the COVID-19 pandemic caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) that has spread its footprint in almost all states. The state of West Bengal saw its first case on 17 March 2020 in Kolkata^[1] that has increased to more than 10000 cases with 451 deaths as on 14 June 2020^[2] due to rapid human-to-human transmission. Because of their immunocompromised state, cancer patients are in vulnerable group for the delicately balanced risk and benefit of their treatment. As they need to pay frequent visits to the

hospital for treatment and disease surveillance,^[3] they are at high risk of exposure to the infection; on the other hand, there is high risk of the cancer progressing, if not treated appropriately.

Being a stand-alone regional cancer centre, it was a huge challenge to balance between the risk of delaying these time-sensitive onco-surgeries and to conserve critical resources, such as hospital and ICU beds, ventilators, transfusion capacity as well as Personal Protective Equipment (PPE). The Department of anesthesia and Critical Care, (which also shares the responsibility as critical care team for the COVID patients), is the most vulnerable group as they engage with aerosol generating procedure (AGP) while taking care of

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the patient. The team developed the response strategy in coordination with other specialty team such as Medical and Surgical Oncology, Microbiology, other allied specialties and hospital administration. The main aim was to continue care of cancer patients (who may be COVID-suspects) and simultaneously to protect all healthcare workers and patients from transmission of this highly contagious virus. Our team works in various areas of the hospital such as outpatient department (OPD) for pre-anesthesia check-up (PAC), operating rooms (OR), various areas for non-operating room anesthesia (NORA), critical care, emergency, in-patient department as code blue response team and also in isolation area as care provider of critically ill COVID positive patients.

In this article, we describe the modifications, undertaken in regular departmental workflow to meet these challenges during this pandemic situation.

Hospital Measures

Increasing the capacity and continuing care

After observing 14-h voluntary public curfew on March 22, Government of India announced complete nationwide lockdown on March 24 for 21 days.^[4] Later this lockdown was extended up to May 31. So, many patients were not able to reach the hospital. Onco-surgical specialties started to make decisions on case-by-case basis depending on the cancer biology, alternate treatment options and institutional policy that reduced the surgical footfalls and increased availability of ICU beds.

Management of patients, visitors and staff

All patients entering the hospital are screened by thermal scanner and standard questionnaire. Surgical masks are provided to all of them. Patients with respiratory symptoms are isolated and sent for COVID test. Surgery is postponed, if test is positive. Visitors' entry was also restricted. Only one relative was allowed in the OR and ICU waiting area. All of them were instructed to wear a surgical mask.

In the initial period, staff returning from certain countries were quarantined for 14 days as advised by Indian Ministry of Health. We divided the workforce into groups, who would work by turn both for routine and isolation areas.

PPE

We decided upon various combinations of PPE depending upon the degree of exposure. Care givers of COVID positive patients in isolation area and code blue team members would use full PPE with coverall, N95 mask, face shields/goggles and knee-length shoe-cover. PPE in OR and for NORA procedures included impervious gown, N95 mask, face

shields/goggles, double gloves and gumboots. PPE during PAC in OPD area included N95 mask, face shields/goggles and pair of gloves. After seeing each patient, we use hand sanitizer and change into another pair of gloves.

In case of accidental exposure, risk assessment is done, staff with low and moderate risk are allowed to work with self-monitoring, whereas high-risk group remain on home-quarantine for 14 days. If symptoms appear, they need to report to hospital. They repeat COVID test when quarantine gets over.

Communications and staff support

This is an unprecedented situation, which is evolving rapidly. A hospital COVID team was set up, who made a hospital protocol after discussion with each department's representative, which was circulated among all staff by mail. Directives and policies from Ministry of Health were also communicated regularly. Online training and repeated mock drills were conducted at regular intervals by the Anesthesia and Critical Care teams for all medical and paramedical staff. Posters regarding proper donning and doffing were attached near designated places in all areas, to avoid potential exposure and self-contamination, which is highest during removal of PPE.^[5]

OR Management

Preservation of financial and human resources is of paramount importance in the prevailing crisis situation arising out of COVID-19 pandemic. The initial concerns were: exposure of health care providers (HCP), limited availability of PPE, insufficient testing kits for preoperative testing of all patients. Considering all these issues, we had adopted certain changes in operating room management based on available literature support. For rational allocation of manpower,^[6] the entire anesthesia workforce was divided into three groups. One group provided regular anesthesia services, one group stayed in reserve, while the third other group took the responsibility of caring for critically ill suspect/positive patients in isolation area. The groups interchanged their responsibility after specified a time period. As the total manpower reduced, each team worked for longer hours. Minimum duration of stay in the preoperative holding area and post anesthesia care unit (PACU) are ensured to decongest the common areas. Not more than 7-8 people are allowed inside an OR to minimize exposure and requirements for PPE. Scheduling of surgeries is done considering extra time to allow deep cleaning after each case. Mandatory wearing of surgical mask for non-intubated patients is ensured.^[5,7] Movement in and out of the OR has been minimized by one-time procurement of all necessary items. Non-anesthesia staff are not allowed to enter within 20 minutes of AGP.

As preoperative testing has become routine now in our institution, we have made certain relaxations in the policies.

Creation of a dedicated COVID OT

Negative pressure OR with its independent air handling unit (AHU) was identified and organized, which is situated in a separate block with separate entry and exit. This was made for confirmed COVID positive patients requiring emergency surgeries. Clearly marked transport pathways were made for transfer of these patients from isolation wards or emergency room.

Pre-Operative COVID Test

The COVID positivity rate in our region is around 7% that poses a significant risk to both HCP and the patients. Hence we decided to start pre-operative COVID RT-PCR test for any elective surgical procedure, which is now being done 2 days before surgery on OPD basis. The period of infectivity starts 2 days prior to onset of symptoms. Hence, a negative test report 2 days before the procedure ensures optimal safety from COVID transmission during the perioperative period.

In case of positive test report in asymptomatic surgical patients, the elective procedure is deferred for at least 2 weeks and repeat PCR is done after 14 days from the date of PCR positivity. After two negative RT-PCR tests with absence of symptoms the patient might again be posted for an elective procedure. In case of symptomatic COVID positive patients, test for virological clearance would be done only after clinical recovery. Two negative PCR reports separated by at least 24 h interval would be required to plan an elective procedure.^[8]

Anesthesia during Elective Procedure

Anesthesia technique needed few modifications considering patient safety and prevention of infection transmission during all AGPs. Preoxygenation is done with face mask with good seal and 100% oxygen, minimal gas flow (<6 L/min)^[9] with 5 cm of H₂O CPAP for 5 minutes. A locally-made aerosol box [Figure 1] or transparent plastic drape [Figure 2] is used to perform tracheal intubation-extubation and insertion-removal of supraglottic airway by experienced anesthesiologist to reduce attempts and time.^[10] Modified rapid sequence induction (without cricoid pressure) is now practised to reduce the need for mask-ventilation. If patient desaturates after muscle relaxation, bag-mask ventilation is performed using the lowest flow and small tidal volume with good sealing of mask.^[11] Endotracheal tube is clamped at the proximal end to begin intubation procedure and de-clamped only after the cuff is inflated ensuring intra-cuff pressure of 20-25 cm H₂O and positive pressure ventilation is started after attaching to the

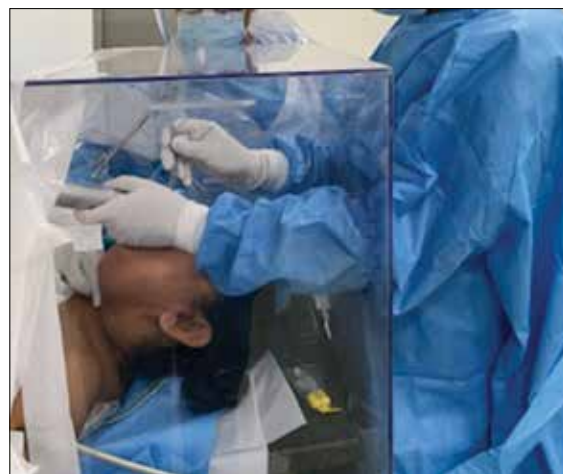


Figure 1: Intubation inside aerosol box

ventilator The difference between delivered and expired tidal volume is closely monitored to detect any gas leak. Tube and circuit disconnection are minimized. If needed, the ventilator is placed on standby mode first. Extubation is followed by bag-mask ventilation with 100% O₂ ensuring good seal.

Regional anesthesia

Considering the possibility of converting to general anesthesia in case of failed regional anesthesia, we take all safety measures.^[12] Compulsory surgical mask for all spontaneously breathing patients and full length probe cover with transparent plastic sheet cover of the ultrasound machine are used.^[13] Pencil-point spinal needle is preferred as it may reduce the risk of transmission of viral material into the CNS.^[14]

Awake fiberoptic intubation (AFOI)

AFOI is frequently required for head-neck cancer surgeries. As this is an AGP, we modified the technique in the view of this pandemic. We now use laryngeal nerve blocks and 'spray as you go' technique for airway anesthesia and avoid nebulization or gargle. The aerosol box with a top-port, is used to insert the pre-loaded fiberoptic bronchoscope [Figure 3].

Postoperative management

Surgical mask is applied to all awake and stable patients in the recovery area, where physical distancing of 1 meter is maintained. High flow oxygen, Non-invasive ventilation (NIV) or nebulized medications are avoided in the recovery area.

Non Operating Room Anesthesia (NORA)

In our cancer centre anesthesia services are provided in many non-operating room areas like MRI suite, endoscopy room, cath-lab, radiotherapy department and interventional pulmonology department. We have modified routine technique in view of ongoing pandemic. In MRI suite, some claustrophobic

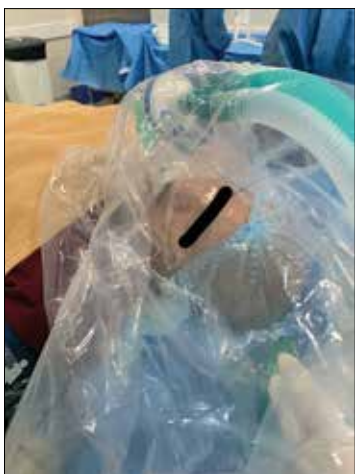


Figure 2: SGA with Plastic drape

adults and paediatric patients need anesthetic support for the procedure. We administer general anesthesia after placement of endotracheal tube routinely after taking standard precautions as in OR. During upper GI endoscopy, as scope passes through oropharynx, patient may cough producing substantial amount of aerosol. It can be prevented if the procedure is done under deep sedation after securing airway. We now place “gastro LMA” (SGA with wide gastric channel through which endoscope can pass) underneath the plastic sheet cover and use Lignocaine topical spray in oropharynx to prevent coughing. Radiotherapy in paediatric patients often need sedation to ensure immobility during the procedure. But being a short duration procedure, spontaneous respiration is usually maintained with O₂ supplementation with nasal prong under the surgical mask. Commonest procedure done in Cath-lab in our cancer centre is percutaneous transhepatic biliary drainage (PTBD), which need analgesia and sedation without any airway intervention. Interventional pulmonology procedures such as endoscopic bronchial ultrasound (EBUS), trans-bronchial needle aspiration (TBNA), tracheal stenting etc., are high AGP. COVID testing is made mandatory before these procedures.

Pre-Anesthesia Checkup (PAC) Clinic

PAC clinic is one place where an anesthesiologist may get exposed to a patient or an asymptomatic carrier absolutely unaware. Guidelines for the PAC clinic during this pandemic are available, which include a wide variety of measures such as universal precautions, maintenance of distance, fever screening and questionnaire to limit follow up visits and even telemedicine if applicable.^[3,15-17]

We have incorporated some steps according to international guidelines with few institutional modifications. The patient and one accompanying person, both masked, are allowed in the

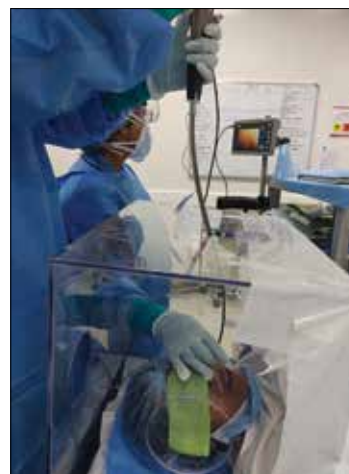


Figure 3: AFOI using aerosol box

PAC room. Prior checking of all detailed information from the electronic medical record (EMR) is done to minimize contact time. The door is kept open and seating has been arranged at least one meter away from the anesthesiologist. Airway assessment by brief removal of the mask and chest auscultation on the back are practised. We explain the additional risk of post-operative complications and possibility of exposure to COVID infection because of the ongoing pandemic. In case of review PAC, electronic or tele-communication are encouraged.

In this manner, we are able to reduce the contact time with the patients to less than 10 minutes.

Code Blue Response

Cardiopulmonary resuscitation (CPR) is a critical component of patient care with a potential of significant aerosol spread. Indian Resuscitation Council (IRC) have suggested guidelines for Comprehensive Cardiopulmonary Life Support (CCLS) for suspected or confirmed COVID-19 patient.^[18]

The minimum number of essential HCP with appropriate PPE are present in the room to conduct CPR. Listening or feeling for breaths by placing ear and cheek close to the patient’s mouth is avoided now. The absence of signs of life and normal breathing and feel for a carotid pulse are used to recognize cardiac arrest. If the rhythm is shockable, early defibrillation is preferred to prevent the need for further resuscitation measures in the form of chest compression. Airway intervention is done by anesthesiologist only, who is part of code-blue team. O₂ is supplemented through face mask or nasal cannula under the surgical mask before intubation as bag and mask ventilation causes aerosolization. Muscle relaxant and video laryngoscope are used for tracheal intubation to minimize attempts and risk of transmission. After intubation the endotracheal tube is connected to transport ventilator through HEPA filter.

After return of spontaneous circulation (ROSC), patients are shifted to the isolation room for further management, but if there is no ROSC even after treatable reversible cause of cardiac arrest has been addressed, decisions are taken not to escalate treatment. In patients with palliative intent for whom resuscitation would be futile, informed and shared decisions are made beforehand, which is communicated widely to avoid undue exposure to staff. But till now this triaging could not be well implemented in our setup.

Isolation Room in ICU

Critical Care area in our institute has one isolation room with negative pressure ventilation. Any patient with COVID-like features or any emergency postoperative patient, who is not tested before surgery, are shifted to the isolation room. We send swabs for COVID testing, while all patient care are continued with precautions. If the test reports negative, the patient is shifted out of that room. If test is positive, then either he is shifted to the dedicated isolation area in a separate building depending on bed availability or continued in the same room of ICU. This room has an adjoining scrub area, which is used for donning and doffing of PPE.

Minimum number of HCP is allowed to go inside after wearing full PPE and proper hand wash. All required items are carried for once to avoid frequent to-and-fro movement. Routine ICU care is undertaken with due care to prevent infection transmission. Nebulization and NIV are usually avoided.

Acute Care Facility in Isolation Area

During this ongoing COVID 19 pandemic, many of the cancer follow up patients are admitted with influenza-like symptoms requiring isolation till diagnosis is confirmed. Missed or delayed diagnosis of COVID 19 has a huge administrative impact along with medical concerns. So, different clinical pathways were established to receive patients requiring acute care service for COVID 19 positive/suspected case and other cancer patients. Facility upgradation was another important task. One building of the hospital is used for regular cancer service and the other one is designated for COVID-19 related service, requiring to create negative pressure ICU beds for intubated COVID-19 patients. Around 20% of COVID-19 cases need admission and 5% of them are critical requiring ICU care and ventilatory support.^[19] Considering cancer patient being positive and requiring critical care, we reorganized the isolation facility, where some are negative pressure rooms. Rest is positive pressure area, where rate of air exchange cycles has been increased to 20/h with a dedicated venting system. Most of the isolation rooms have anteroom,

which are used for donning and doffing. All the isolation beds can be upgraded to critical care bed as wall-mount oxygen source, air source and suction system are available with each bed. Ventilators, monitors, medicine cart, airway cart and CPR cart are stored in the vicinity.

A dedicated COVID roster was made comprising of fellows and consultants giving 24 h cover. Mild cases are managed by clinical oncologists and critical cases are managed by anesthesia and critical care team. Frequency of duty has been minimized to decrease viral load in the doctors.

Cleaning Disinfection Sterilization and Biomedical Waste (BMW) Management

Sodium hypochlorite at 10,000 ppm is used for a contact time of 30 minutes for disinfection of spillage of biological fluids from patients. External surfaces of medical equipment is disinfected with alcohol-based disinfectants such as 70% isopropyl alcohol. Reusable medical devices such as laryngoscope blades etc., are cleaned and disinfected with peracetic acid and sterile water. Sterilization is done by autoclave or hydrogen peroxide using plasma sterilizer based on material compatibility of the devices. Biomedical wastes generated as part of COVID management are double bagged and put in appropriate colour coded bins according to local BMW segregation guidelines.

Conclusion

This is a never-before pandemic situation and its future course is unknown. A robust policy for identification, isolation, treatment and discharge of COVID positive cancer patients helps to continue uninterrupted cancer care to other patients. Judicious duty roster allowing ample time to rest and relax, availability of appropriate PPE and involving them in the decision-making process helps to boost the morale of anesthesia staff.

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Conflicts of interest

There are no conflicts of interest.

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