

## COVID and cancer

# Marching Ahead through the Pandemic: Continuing Anesthesia Services in COVID Era—Our Experience from a Tertiary Care Cancer Centre

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## Abstract



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### Keywords

- ▶ COVID-19
- ▶ pandemic
- ▶ anesthesia
- ▶ cancer care

**Introduction** This paper aims to provide an overview of the administrative and clinical preparations done in a tertiary care cancer hospital in continuing operation theatre (OT) services through the COVID pandemic.

**Methods** Retrospective data collection, data for the past 1.5 years (COVID period) March 2020 to August 2021 were compared to surgical output for a similar duration of time before the COVID era (September 2018–February 2020).

**Results** A total of 1,022 surgeries were done under anesthesia in the COVID period as against 1,710 surgeries done in a similar time frame in the pre-COVID era. Overall, we saw a 40% drop in the total number of cases. Thorax, abdominal, and miscellaneous surgeries (soft tissue sarcomas, urology, and gynecology) saw a maximum fall in numbers; however, head and neck cases saw an increase in numbers during the pandemic. Surgical morbidity and mortality were similar in the COVID and pre-COVID era. No cases of severe COVID infection were reported among the healthcare staff working in OT.

**Discussion** We could successfully continue our anesthesia services with minimal risk to healthcare staff throughout the pandemic by adopting major guidelines in a pragmatic and practical approach with minor changes to suit our setup.

## Introduction

The COVID-19 pandemic has struck the world like a major thunderstorm, diverting all the medical attention and resources in managing this disease of unprecedented pro-

portions. The world has dealt with two major waves of this disease with some countries experiencing a third or fourth wave in the form of newer more virulent mutant strains.<sup>1</sup> The large number of COVID cases needing intensive care unit

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(ICU) care and hospitalization overwhelmed the healthcare services worldwide,<sup>2,3</sup> this led to most hospitals being able to care only for COVID patients and the normal health services being heavily restricted. The lockdowns in various states restricted patient movement and compounded this problem and lead to further delays in non-COVID patients seeking treatment.<sup>4,5</sup>

Cancer is unique among the non-COVID illness as it requires a time-bound treatment in the form of surgical resection or chemo-radiotherapy, and any delays in treatment will lead to cancer progressing into an unresectable or incurable state.<sup>6</sup> Diversion of health care facilities into COVID care and lockdown restricting patient movement are some harsh realities delaying treatment in a time-sensitive disease such as cancer, which is being faced by countries across the world.<sup>7</sup> There seems to be no immediate end to this pandemic with the emergence of newer mutant variants of the virus and breakthrough increase in cases<sup>8</sup>; thus, the need of the hour is that each healthcare organization should come up with steps and guidelines to continue care for non-COVID patients and chronic diseases.

This paper aims to provide an overview of the administrative and clinical preparations done in a tertiary care cancer hospital in continuing emergency operation theatre (OT) services, resuming anesthesia services in the waning phases of the pandemic, and continuing care for cancer patients needing surgery. Through our experience and patient data, we aim to provide a framework for the preparation and continuity of cancer patient care in this COVID era with an emphasis to highlight our manpower management and infection control practices for the safe conduct of anaesthesia in this era of an ongoing pandemic.

## Methodology

We undertook a retrospective data collection of all surgical cases done at our institute from the start of the pandemic and compared it to the surgical output from a similar time frame in the pre-COVID era. Data for the past 1.5 years where COVID peaked in the form of two waves were collected starting from March 2020 to August 2021; these were compared to surgical output for a similar duration of time before the COVID era (18 months–September 2018 to February 2020) to get a comparative idea of our work with the pre-COVID era. Data were tabulated and analyzed for demographic parameters such as age group and sex distribution of patients undergoing surgery. Surgical procedures were segregated and tabulated according to the operating specialty. Surgical morbidity in the form of Clavien–Dindo score was recorded; length of ICU stay, length of hospital stay, major surgical morbidity, and overall mortality were recorded. The major surgical morbidity was defined as Clavien–Dindo score of more than 3. The incidence of COVID positivity among healthcare staff was also noted.

## Results

A total of 1,022 surgeries were done under anesthesia from March 2020 to August 2021 as against 1,710 surgeries done in a similar time frame in the pre-COVID era (September 2018–February 2020). The basic patient demographics and the American Society of Anesthesiologists (ASA) physical status are tabulated in [Table 1](#). The number of patients operated under each surgical specialty with the type of anaesthesia given is tabulated in [Table 2](#). The main anaesthesia and surgical outcomes are shown in [Table 3](#), and the

**Table 1** Basic patient demographics and baseline physical status

Parameter	Patients – number (percentage)	
	March 2020–August 2021	September 2018–February 2020
Total cases in major OT	1022	1710
Routine:emergency	889:133 (86.98:13.02)	1385:325 (81:19)
Male:female	684:338	1043:667
ASA physical status		
• 1	715 (69.96)	1094 (63.97)
• 2	255 (24.95)	496 (29)
• 3	41 (4.01)	111 (6.49)
• 4	11 (1.07)	9 (0.52)
Age group		
< 40	296 (28.96)	547 (31.98)
40-59	531 (51.95)	923 (53.97)
60-79	174 (17.02)	231 (13.5)
> 80	21 (2.05)	9 (0.52)
Upfront resections: preop RT/NACT	603:419 (59:41)	1146:564 (67:33)
Minor OT (ICRT)	134	430

**Table 2** Types of surgeries

Type of surgery	March 2020 -August 2021	September 2018–February 2020	Percentage change
Head and neck	345	340	+1%
Breast	328	530	–38%
Thorax	38	130	–79%
Abdominal	225	508	–55.7%
Miscellaneous	86	202	–81.88
Total	1022	1710	–40.24%

**Table 3** Anesthesia and surgical outcomes

Parameter	March 2020 -August 2021 patient number (percentage)	September 2018–February 2020 patient number (percentage)
COVID positivity	97 (9.49)	0
Shifted to ICU in the postoperative period	501 (49.02)	569 (33.27)
Length of ICU stay (days)		
• 1	726 (72)	1299 (76)
• 2	123 (12)	154 (9)
• 3	112 (10.9)	137 (8)
• >3	51 (5)	120 (7)
Clavien–Dindo 3, 4	21 (2.05)	31 (1.81)
Length of hospital stay (days)		
• <5	531 (51.95)	940 (54.97)
• 5-10	388 (37.96)	591 (34.56)
• 10-15	92 (9)	154 (9)
• >15	11 (1.07)	25 (1.46)
Mortality	15 (1.46)	20 (1.16)

**Table 4** The incidence of COVID 19 among OT staff

Healthcare worker	Numbers
Onco-anesthesia residents and faculties.	23
Nursing staff	77
Operation theater assistants	11
Sanitation staff	38
Total	149
Mortality/severe disease	0

incidence of COVID positivity among health care staff is charted in [Table 4](#).

As seen by our data, anesthesia services were curtailed due to restrictions in cancer surgeries in this pandemic. Overall, we saw a 40% drop in the total number of cases. Thorax, abdominal, and miscellaneous surgeries (soft tissue sarcomas, urology, and gynecology) saw a maximum fall in numbers; however, head and neck cases saw an increase in numbers during the pandemic ([Table 2](#)). Intracavitary radiotherapy (ICRT) procedures for carcinoma cervix also saw a sharp fall of 69% (134 vs. 430 cases).

The percentage of post-operative major morbidity (Clavien–Dindo 3, 4) and mortality remained similar in the COVID period ([Table 3](#)). As per surgical guidelines,<sup>9</sup> patients with curative intent for cancer resections were taken on a priority to minimize delay in treatment; thus, head and neck cancer resections and breast surgeries saw the maximum numbers being operated ([Table 3](#)).

As seen in [Table 4](#), we detected 149 COVID cases among the doctors and healthcare staff working in the OT. However, no cases of severe disease were reported among the staff.

## Discussion

Our hospital, a 182-bedded cancer center in a tertiary care institute, witnessed an unprecedented crisis of inpatient care as the focus of immediate concern was managing COVID patients. We took several steps to tweak and redesign our infrastructure to continue emergency surgeries throughout the pandemic and restarted elective OTs as the situation permitted. At the onset of the pandemic and lockdowns, OT services were abruptly halted (March 2020); elective surgeries were resumed in three phases. To restart elective

surgeries, 20 beds out of the 46 designated surgical beds were converted into an isolation area for preoperative patients. As per our institutional practice, a disease management group (DMG) consisting of a surgical oncologist, medical oncologist, and radiation oncologist charted the treatment plan of every patient in the OPD. Patients decided for surgical intervention in the DMG were then triaged by the surgical team for the timing of surgery. A basic triaging policy depending on the nature of malignancy was followed in resuming elective cases. In the first phase (May 2020), simple surface malignancies (breast, soft tissue tumors) with no comorbidities were posted for surgery. In the second phase (June-July 2022), moderately complex surgical procedures (head and neck, colorectal, and gastric surgeries) were posted. In the third phase (August 2020 onward), complex surgical procedures such as thoracic and hepatobiliary surgeries were started.

Various society and organizational guidelines were<sup>10,11</sup> used as guiding forces to formulate work plans and alter clinical practices to protect the healthcare staff. The basic steps undertaken by us and the practical challenges faced in the ground-level implementation of various guidelines<sup>12</sup> are summarized and can be discussed under the following headings.

- a. Preparation of OTs and setting up infection control protocols.
- b. Preoperative patient evaluation and optimization.
- c. Tweaks in anesthesia practices and equipment.
- d. Postoperative anesthesia care.
- e. Disinfection practices and healthcare worker screening.

### Preparation of Operation Theatres and Setting up of Infection Control Protocols

*What the guidelines suggest* – Summary of major guidelines for infection control<sup>13</sup> suggests screening for symptoms of COVID patients and attendants on arrival in hospital, COVID testing (RT-PCR-based) before surgery, and extensive use of masks for the patient in the perioperative period. For OT, preparation of both Indian<sup>10,12</sup> and international guidelines<sup>11,14</sup> suggested that a separate operating room with its ventilation system and a designated high-efficiency particulate air (HEPA) filter system be used as an OT for COVID-positive patients, high frequency of air changes (25/h) to minimize viral load is suggested in other OTs dealing with non-COVID patients.<sup>14</sup>

*Our practice* – As COVID cases reduced, elective OTs were gradually resumed. Our basic steps to prepare OT services infrastructure with COVID care were as follows:

- Social distancing with a minimum distance of 6 feet between beds was done and only a single attendee found asymptomatic at the screening was allowed to be with the patient during the perioperative period.
- A separate isolation chamber with adequate distancing between beds was made functional, a patient admitted for surgery was given a bed here, RT-PCR for COVID was sent and the patient was kept in this area until an RT-PCR report was available. After the negative report, the patient was shifted to the preoperative ward and from there the patient was

taken into the OT. Patients when called up for the admission were screened telephonically for symptoms of COVID or any recent contact with a positive case. We avoided outside testing before admission and all RT-PCR tests were sent after admission; this was done as an institutional policy to minimize the financial burden on patients.

- The patient was taken for surgery within 48 hours of the negative report, i.e., as per the surgical list, most patients were operated the very next day of the negative report, in case of pending cases, patients were included in the list for the next day and thus were operated within 48 hours of the negative report.
- In rare postponed cases beyond 48 hours of a negative report, repeat COVID testing was done.
- A separate ward was designated as a postoperative ward and patients were shifted from the OT to this ward. From hereafter the postoperative stay patient was discharged. Thus, the one-way movement of a patient from admission to discharge was ensured.
- Separate donning and doffing rooms were created in the OT complex and separate entry-exit routes were used to ensure one-way movement of health care staff.

### Preoperative Patient Evaluation and Optimization

*What literature suggests* – The main guidelines<sup>11</sup> for the conduct of anesthesia in the COVID setting suggest minimal contact with proper hand hygiene and barrier protections such as masks during preoperative patient evaluation.

*Our practice* – Social distancing was ensured in the pre anesthesia clinic (PAC). As the planned elective surgeries were restricted the footfall in the PAC dropped thus measures such as mandatory masks for patients and attendants, and an adequate distance between patient and doctor were easily implemented.

Routine preoperative assessment in the PAC clinic of a case with unknown COVID status (first visit, OPD patient) physical evaluation with auscultation, percussion, detailed airway examination, etc., was not done. Fitness was given on the basis of history, blood investigation, and radiology (chest X-ray reports). In the preoperative visit, a day before surgery of a patient with a COVID-negative report, detailed airway assessment, auscultation, and physical examination were done by the anesthetist as deemed necessary.

Routine preoperative tests such as pulmonary function tests and cardio-pulmonary exercise tests were stopped as these are potential aerosol-generation sources. In addition, we tried to introduce the concept of PAC follow-up over the phone via a dedicated department phone for PAC follow-ups after the initial visit to reduce repeated visits to the hospital.

### Tweaks in Anaesthesia Practices and Equipment

Keeping in mind the guidelines suggesting the use of video laryngoscopes and minimizing aerosol generation procedures in the OT, we made the following changes to our practice:

- Rapid sequence induction was used as a preferred modality of induction in nondifficult airway situations.

- Video laryngoscope-guided intubation with a stylet tube and the most experienced anesthetist doing the procedure to ensure success in the first attempt in minimum time.
- Direct cuff inflation and connection to anesthesia circuit before starting positive pressure ventilation.
- Awake intubations were avoided, and an elective tracheostomy was planned in cases of an extremely difficult airway.
- Supraglottic devices were avoided in the initial stage of the pandemic over concerns about aerosol generation due to leaks around the device; however, as the literature cleared the directions for their use,<sup>15,16</sup> second-generation devices (I-gel) were brought back into use.
- Measures such as the proper fit of the SGD and insertion in a deep plane of anesthesia were taken to ensure minimal leaks. In cases where > 20% leak was detected the device was removed and the patient intubated.
- Barrier methods such as transparent boxes were initially adopted as the guidelines suggested but they were stopped from use as the literature progressed and their use showed no benefit.<sup>17</sup>
- HME filters were used in the inspiratory and expiratory limbs of the anesthesia circuit.
- Extubation practices were changed to ensure minimal coughing and generation of aerosols.
- For procedures under sedation or monitored anesthesia care, spontaneous respiration was allowed with oxygenation as required. However, high aerosol-generating methods of oxygenation such as high-flow nasal cannula, high-flow oxygen on non-rebreathing masks were not employed. Methods of oxygenation with minimum aerosolization such as low-flow oxygen via nasal prongs were used and barrier methods to prevent the spread of infection were employed at all times.
- For procedures planned under regional anesthesia alone, regional anesthesia was used as necessary and methods of oxygen supplementation with minimal aerosolization, e.g., low-flow oxygen via nasal prongs were used. However, preoperative evaluation and COVID testing protocols were the same for cases under general anesthesia, regional anesthesia, or sedation and monitored care.

### Postoperative Anesthesia Care

*What guidelines suggest* – Adequate distancing in the recovery rooms, use of masks by patients in the postoperative area, avoiding extubation in the postoperative area.

*Our practice* – We minimized the use of recovery rooms, only one or two patients were kept in the recovery to ensure distancing, and procedures such as extubation, were avoided. As seen by our data, we planned and sent every major case to the ICU for recovery/ventilation and extubation. In the ICU, we had adequate resources and could ensure appropriate practices.

### Disinfection Practices and Healthcare Worker Screening

*What guidelines suggest* – Both international and national guidelines insist on hand hygiene, wearing of masks, at least a long-sleeved water-resistant gown with eye protection,

N95 or equivalent mask for aerosol generation procedures such as intubation.<sup>10</sup>

*Our practice* – All personnel involved in intubation and extubation wore an HIV kit with eye shield and N95 masks throughout the case. A full protection PPE kit as used in COVID areas was used for all positive cases/emergency cases with unknown COVID status.

- As seen the world over the use of plastics increased in the operation theatre, we tried to minimize this. No plastic covers were put over the workstations or monitors as our OT complex was regularly fumigated if a case came out positive.
- Anesthesia circuits, soda-lime canisters, and disposables were changed after every case.
- Disposables such as patient circuits, OT table sheets, syringes, etc., were changed after every case.
- Single-use devices such as I-gel for ventilation or video laryngoscope with disposable blade (McGrath) for ease of use were increasingly put into practice.

All health care workers were regularly screened for symptoms, a symptomatic healthcare worker was immediately isolated and tested. The backup anesthesia team was kept if the main team was isolated in contact tracing with a case.

High-risk contacts with a case (more than 15 minute exposure or exposure from less than 1 meter or exposure without N95 mask, gown, and gloves) were isolated for the incubation period of the virus, i.e., 5 days, and then tested. As seen by our data (– Table 4), these practices yielded results in the form of 149 OT staff testing positive but no severe case or mortality was seen.

## Conclusion and Summary

As seen by our data and the description of our practices, by adopting major guidelines in a pragmatic and practical approach with minor changes to suit our setup, we could successfully continue our anesthesia services with minimal risk to our healthcare staff throughout the pandemic. Emergency services were continued throughout the pandemic, for elective cases, surgeries with a curative intent (head and neck cancer resections or early breast cancer) resection were continued on preference and other major surgeries were started as the pandemic waned.

As the pandemic progresses throughout the world and new variants of concern such as Omicron are being detected,<sup>8</sup> we may expect further interruption of regular healthcare services in wake of rising cases with new variants. Thus, healthcare systems around the world especially in developing nations with resource constraints may use this document for micromanagement and implementation of anesthesia and infection control protocols to continue surgical and anaesthesia services in the era of this pandemic.

### Authors' Contribution

Swati Bhan led the data collection, tabulation, and literature review, as well as manuscript writing. Raghav Gupta contributed to data collection and tabulation, while Saunabh Vig focused on literature review, data interpretation,

and manuscript writing. Editing of the manuscript was conducted by Rakesh Garg, Nishkarsh Gupta, Vinod Kumar, Sachidanand Jee Bharati, Seema Mishra, Brajesh Ratre, Anuja Pandit, Prashant Sirohiya, Ram Singh, Balbir Kumar, and Shweta Bhopale, with Seema Mishra also involved in literature review. Brajesh Ratre and Anuja Pandit primarily handled literature review tasks, while Sushma Bhatnagar significantly contributed to the conception of the idea, literature review, and final manuscript editing. All authors have thoroughly reviewed and approved the manuscript.

#### Ethical Approval

Not applicable (retrospective data collection), manuscript adheres to Helsinki guidelines.

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#### Conflict of Interest

None declared.

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