

# Outcomes of Elective Major Cancer Surgery During COVID 19 at Tata Memorial Centre

## Implications for Cancer Care Policy

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**Background:** Overburdened systems and concerns of adverse outcomes have resulted in deferred cancer surgeries with devastating consequences. In this COVID pandemic, the decision to continue elective cancer surgeries, and their subsequent outcomes, are sparsely reported from hotspots.

**Methods:** A prospective database of the Department of Surgical Oncology was analysed from March 23rd to April 30th, 2020.

**Findings:** Four hundred ninety-four elective surgeries were performed (377 untested and 117 tested for Covid 19 before surgery). Median age was 48 years with 13% (n = 64) above the age of 60 years. Sixty-eight percent patients were American Society of Anaesthesiology (ASA) grade I. As per surgical complexity grading, 71 (14.4%) cases were lower grade (I-III) and 423 (85.6%) were higher grade complex surgeries (IV – VI).

Clavien-Dindo  $\geq$  grade III complications were 5.6% (n = 28) and there were no postoperative deaths. Patients >60 years documented 9.3% major complications compared to 5.2% in <60 years (P = 0.169). The median hospital stay was 1 to 9 days across specialties.

Postoperatively, 26 patients were tested for COVID 19 and 6 tested positive. They all had higher grade surgeries but none required escalated or intensive care treatment related to COVID infection.

**Interpretation:** A combination of scientific and administrative rationale contributed to favorable outcomes after major elective cancer surgeries. These results support the continuation of elective major cancer surgery in regions with Covid 19 trends similar to India.

**Keywords:** cancer care, cancer surgery, Covid 19, oncologic surgery, outcomes, pandemic

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Health systems have been under duress due to pandemic caused by SARS coronavirus 2 (SARS-CoV-2). Based on information suggesting that India was faring better compared to the west<sup>1</sup> and that oncology patients were likely to get deferred care with significant implications,<sup>2</sup> the department of surgical oncology took a conscious decision to continue offering elective cancer surgeries albeit deescalated by approximately 50% (and continues to do so till date of submission of manuscript). Outcome data of elective cancer resections are sparsely reported from Covid hotspots around the world. We aimed to analyze and report outcomes of 494 elective cancer surgeries and discuss the implications of our decision.

## METHODS

A prospective database of the Department of Surgical Oncology was analysed from March 23rd to April 30th, 2020.

### Screening and Selection of Patients for Surgery

Patients likely to benefit from potentially curative cancer surgery were given the highest priority. Younger patients with fewer comorbidities were preferred.

Asymptomatic patients were not tested preoperatively for COVID 19 unless there was history of contact or international travel in the initial part of the study (23rd March – 18th April 2020). In the last 2 weeks of the study (19th – 30th April) with increasing concern of community spread, routine preoperative COVID 19 testing was instituted. The test was performed on nasopharyngeal and the oropharyngeal swabs by TaqMan probe-based real-time reverse

**TABLE 1.** Patient Characteristics, Surgical Procedures, and Overall Postoperative Outcomes (n = 494)

Age (yrs)	48 (range, 27–85)
Sex (M: F)	173:321 (35%:65%)
ASA* status	
I	337 (68.2%)
II	148 (30%)
III	09 (1.8%)
Cancer surgery site	
<i>Breast Oncology</i>	204 (41.3%)
Modified/radical mastectomy	118
Breast conservation surgery	78
Others	08
<i>Head &amp; Neck Oncology</i>	87 (17.6%)
Oral cavity composite resections	26
Wide excisions ± neck dissection	31
Thyroidectomy/maxillectomy	11
Others	19
<i>Gastrointestinal and HPB† Oncology</i>	84 (17%)
Anterior/inter-sphincteric/abdomino-perineal resection	31
Colectomy	07
Radical gastrectomy (distal/total)	09
Pancreatico-duodenectomy	12
Cholecystectomy (simple/radical)	09
Liver resection	02
Others	14
<i>Gynae- Oncology</i>	28 (5.7%)
Primary/interval cytoreduction	14
Radical hysterectomy	04
Others	10
<i>Bone &amp; Soft tissue Tumors</i>	27 (5.5%)
Bone en-bloc excision ± reconstruction (femur/tibia/humerus)	19
Sarcoma excision	05
Others	03
<i>Thoracic Oncology</i>	23 (4.7%)
Transthoracic oesophagectomy	07
Partial oesophago-gastrectomy	03
Lung resection (lobectomy)	03
Lung metastatectomy	05
Others	05
<i>Uro-Oncology</i>	20 (4%)
Radical nephrectomy/adrenalectomy	11
Partial/radical cystectomy	04
Others	05
<i>Paediatric Oncology</i>	12 (2.4%)
Excision of Wilm's tumor/Retroperitoneal Sarcoma	06
Others	06
<i>Neuro-oncology</i>	09 (1.8%)
Excision of CNS tumors	05
Shunts and other procedures	04
Head & Neck surgeries	87
Plastic reconstructive procedure performed	30 (34.4%)
Elective tracheostomy added	07 (8%)
Coelomic Surgeries	165
Open	125 (75.8%)
Laparoscopic	40 (24.2%)
Grade of Surgery	
I	04 (0.8%)
II	11 (2.2%)
III	56 (11.3%)
IV	266 (53.8%)
V	95 (19.2%)
VI	62 (12.6%)
Readmissions	12 (2.4%)
Complications	
Overall	132 (26.7%)
Minor (CD‡ grade I/II)	113 (22.9%)
Major (CD‡ grade III/IV)	29 (5.8%)
Reexplorations	13 (2.6%)
Mortality	None

\*ASA indicates American Society of Anesthesiologist.

†CD grade, Clavein Dindo grade.

‡HPB, Hepato-pancreatico-biliary.

transcriptase polymerase chain reaction (RT-PCR) method. Irrespective of preoperative testing, all patients were considered as COVID positive and the operating room staff had to adhere to full precautions.

### Data Recording and Analysis

The electronic clinical data were reviewed and documented. Surgeries were graded (grade I - grade VI) with increasing surgical complexity. All perioperative parameters were documented in detail. Statistical analyses was performed using Statistical Product and Service Solutions (SPSS), IBM Corp, for Windows version 21-0, (SPSS Inc, Armonk, NY). Descriptive analysis was performed to identify distribution of variables under study and continuous variables were presented as median with interquartile range.

The study was approved by the Institutional Ethics Committee.

### RESULTS

During the study period, 520 surgeries were performed of which 494 (95%) cases were elective surgeries whereas 26 (5%) were emergency surgeries. Demographic and operative outcomes are provided in Table 1.

Of all patients undergoing elective surgery, 181 (36.6%) were residents of Mumbai or Maharashtra state and rest from other parts of India (63.4%).

As per the surgical complexity grading, 71 (14.4%) cases were of lower grade (I-III) and 423 (85.6%) were higher grade surgeries (IV-VI). Breast cancer surgeries constituted 41.3% (n = 205), followed by head and neck (87 cases; 17.6%) and GI cancer surgeries (84 cases; 17%). Plastic reconstructive procedures were required in 34.4% of the Head & Neck resections. Postoperative major morbidity (Clavein Dindo grade ≥III) occurred in 28 (5.6%) patients and there were no deaths. Perioperative outcomes across cancer sites are presented in Table 2. Sixty-four patients were above 60 years age, of which 9.3% developed major complications compared to 5.2% in <60 years (P value = 0.169). Grade IV to VI surgeries accounted for more than 85% of cases in both groups.

None of the patients undergoing surgery had clinical suspicion for COVID 19, based on symptoms or contact history, and initial 377 surgeries were performed without any testing. One hundred seventeen surgeries were carried out after testing for subclinical COVID 19 infection. Postoperatively, 26 patients were tested in view of specific symptoms or contact history from the community (to patients or their kins) and 6 tested positive. All these patients had undergone grade IV to VI surgeries (Buccal mucosa composite resection - 3, total thyroidectomy with neck dissection - 1, pancreatico-duodenectomy - 1, distal femur resection with total knee replacement - 1). None of these patients required escalated or intensive care treatment related to COVID infection. All of them recovered well from surgery and COVID infection.

### DISCUSSION

The reasons for our decision to continue elective major cancer surgery were not easy. Mumbai, is currently rated as a COVID 19 hotspot. The population of Mumbai is approximately 21 million with a population density of 21,000 people per square kilometre.<sup>3</sup> It is pertinent to note that despite good testing rates (1221/million, the mortality rate in Mumbai is 4.24/million population.<sup>4</sup> There are about one million new cancer cases in India,<sup>5</sup> of which around 0.2 million will require surgery. In the absence of surgery, most patients will experience disease progression with resultant mortality. Given that death due to COVID-19 in India is 0.99 per million of population with case fatality rate of about 3%,<sup>1</sup> the cancer mortality in absence

**TABLE 2.** Perioperative Details and Outcomes According to Cancer Site

	Breast Oncology	Head & Neck Oncology	Gastro Intestinal and HPB Oncology	Gynaecology	Bone & Soft Tissue	Thoracic Oncology	Uro-oncology	Paediatric Oncology	Neuro-oncology
Grades of surgery									
I–III	02 (1%)	40 (46%)	14 (16.7%)	04 (14.3%)	03 (11%)	03 (20%)	2 (10%)	—	03 (33.3%)
IV–VI	202 (99%)	47 (54%)	70 (83.3%)	24 (85.7%)	24 (89%)	20 (87%)	18 (90%)	12 (100%)	06 (66.7%)
Surgery duration (min, median)	100	240	240	195	180	90	190	90	180
Blood loss (ml, median)	150	300	400	350	300	200	450	100	150
>1 d of ICU stay	6 (2.9%)	1 (1.1%)	5 (6%)	None	None	2 (8.7%)	None	1 (8.3%)	3 (33.3%)
Postoperative stay (d, median)	1	6	6	5	6	8	6	9	7
Readmissions	2 (1%)	3 (3.4%)	4 (4.8%)	None	1 (3.7%)	None	None	None	2 (22.2%)
Reexplorations	1 (0.5%)	4 (4.6%)	4 (4.7%)	None	1 (3.7%)	1 (4.3%)	None	None	2 (18%)
Major complications (CD grade III/IV)	6 (3%)	8 (9.2%)	8 (9.2%)	None	1 (3.7%)	3 (13%)	None	None	3 (33.3%)
Mortality	None	None	None	None	None	None	None	None	None

CD grade indicates Clavein Dindo grade; ICU, intensive care unit.

of definitive surgery will far exceed the mortality due to infection with COVID-19.

These observations, coupled with patients prebooked for surgery - a number of them from outside of Mumbai under national lockdown - was compelling enough to continue elective major cancer surgeries.<sup>6</sup>

Decisions for individual patients were made by balancing the risk that patients will contract Covid-19 because of hospitalization and subsequent cancer surgery and their potential for associated complications, with the benefits of receiving potentially curative cancer surgery.

Our results reflect a cautious approach adopted initially that has gradually widened in scope with increasing confidence. Breast cancer surgeries, gastrointestinal cancer resections, and head and neck surgeries accounted for over 76 percent of our resections. Head and neck cancer surgeries, traditionally registering the highest number of resections, recorded a modest number once again reflecting a safety first approach. The service is now scaling up their efforts with increasing availability of operating rooms and increasing confidence of operating room teams with specialized protection and stringent standard operating procedures compared to other services.

The median age of 48 years, the majority with American Society of Anaesthesiology (ASA) grades 1 and 2, confirm our policy decision of offering elective cancer surgeries to “low risk” patients as far as possible. However, there was no difference in morbidity and mortality when patients over 60 years were compared to those younger than 60 years of age.

Our low rates of major complications and zero mortality in this series 494 resections over 5 weeks not only reflects our “Covid 19 centric policy” of case selection, adopting best surgical practices and having the best operating teams (average age 40 years) led by senior consultants (with an average age of 48 years) but also confirm that there were no deviations from earlier benchmarks established by the various surgical specialties in the pre-Covid era.<sup>7–10</sup>

Also, all 6 patients detected with COVID infection in the postoperative period, did not develop any major complication with uneventful recovery. Although a small number, all of them had undergone major resections. Thus magnitude of surgery did not affect their recovery in the presence of a potentially sinister infection.

The various overall outcome measures - specifically intensive care unit stay, major morbidity and mortality - seem to validate our scientific and administrative rationale for continuing elective cancer surgeries in a referral centre.

Our strategy may well be applicable to regions where mortality is less than 10/million population (such as China, Japan, Russia, South Korea, Australia, Saudi Arabia, Singapore etc) but may not be applicable for countries like USA with high number of COVID-19 cases (3498 per million) and a high death rate.

Although our results possibly represent the largest series published on elective cancer surgeries during the ongoing pandemic, there are certain limitations to this study. Not all patients and the staff associated with their treatment delivery were tested preoperatively. The possibility of asymptomatic carriers remains a concern; however all have been monitored closely even after discharge from the hospital and outcome measures for patients and staff alike have been very encouraging. The applicability of our experience to the larger population of patients, especially the elderly and those with comorbidities is yet to be fully established. Finally, the prevalence of COVID-19 in India could have been truncated to a large extent by the national lockdown, and the trajectory of infection rates after restrictions are lifted is as yet, unknown.

## CONCLUSIONS AND FUTURE PERSPECTIVES

Cancer surgeons are currently facing a dilemma. Whereas world awaits definitive treatment options, new information about the virus will continue to impact decisions.<sup>11</sup> Our results would not only serve as a springboard for a good action plan for nations with a pandemic profile similar to that of India, but also help resolve the conundrum of continuing cancer surgeries in health systems worldwide. We believe this would ultimately result in development of guidelines for continuation of elective major cancer surgery in a world that may well have to learn to live with COVID 19. The philosophy that regardless of COVID 19, cancer centres and specialists are available to care for their patients, should gain ground as we attempt to move ahead in this pandemic.<sup>12</sup>

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