

The Impact of COVID-19 Pandemic on Cancer Care in a Tertiary Care Facility

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Abstract



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Background Coronavirus disease 2019 (COVID-19) pandemic had an overwhelming impact on health care worldwide. Cancer patients represent a subgroup that is vulnerable and is under high risk. It is, therefore, necessary to analyze factors that predict outcomes in these patients so that they can be triaged accordingly to mitigate the effects of COVID-19 on cancer management. To date, the impact of COVID-19 on cancer patients remain largely unknown.

Methods Data of 291 cancer patients undergoing active treatment from March 23 to August 15, 2020 were retrospectively reviewed; the incidence, demographic and clinical characteristics, treatment, and outcomes of cancer patients infected by COVID-19 were included in the analysis.

Discussion During the index period (March 23–August 15, 2020), 4,494 confirmed cases of COVID-19 were admitted at our institute. In the department of medical oncology out of 578 patients presented to outpatient department, 291 patients were admitted for active treatment. Considering the cancer patients, infection rate was 7.9% (23/291) and mortality 13% (3/23). Median age was 40 years and the majority of patients were male (60%). The most common cancer type was acute lymphoblastic leukemia presented at various stages of treatment. Twenty patients (86.9%) were discharged after full clinical recovery and negative real-time polymerase chain reaction on a nasopharyngeal swab. Anticancer treatment was modified according to the type of cancer under intensive surveillance.

Conclusion Although mortality rate in COVID-19 cancer patients is elevated, our results support the feasibility and safety of continuing anticancer treatment during pandemic by endorsing consistent preventive measures, but however should be modified based on the type and prognosis of cancer.

Keywords

- ▶ anticancer treatment
- ▶ cancer care
- ▶ coronavirus
- ▶ COVID-19
- ▶ impact
- ▶ retrospective study

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COVID-19 Outbreak Overview

Coronavirus disease 2019 (COVID-19) pandemic has present new challenges for us to live with, as there is currently no proven vaccine or drugs that will effectively prevent or treat COVID-19 infection. There has been a reluctance of patients to visit hospitals and clinics and thus delay the screening or treatment in fear of development of COVID-19 and potentially succumb to the disease. This is especially true with elderly patients as they have high risk factors (diabetes, heart problems, and hypertension) and immunosuppressed patients.¹ The reduced availability of fundamental services such as diagnostic tests, surgeries (with predicted hospital overloaded with COVID-19 patients), and shortage of expert staff leading to lack of proper treatment, monitoring, and follow-up. The clinical presentation of COVID-19 is heterogeneous and a large proportion of the patients are asymptomatic. The scenario is even more intricate in cancer patients, as manifestations of the tumor and side effects of the treatment might mimic COVID-19.²⁻⁴

Preliminary data from China reports that the case fatality rate (CFR) for COVID-19 affected cancer patients is approximately double than that for COVID-19 affected general population (5.6% vs. 2.3%).^{5,6} Although this pandemic has massively spread worldwide, the impact on cancer patients is still largely unknown. Currently, there are only few retrospective reports published, including a small number of subjects on active anticancer treatment and suggesting that cancer patients might be prone to develop severe presentations of COVID-19. India is the second most populous country, with geographical and ethnic variation, various institute in India has formulated their own guidelines suitable for the population they cater.^{7,8} In this period of uncertainty, these very preliminary data could induce physicians to abstain from life-saving treatments in fear of the risk of infection. As one of the tertiary care centers for oncology in central India, we would attempt to delineate a comprehensive picture of our experience, CFR, and adaptations that were made to tackle this situation.

Methods

Data of all the patients who received chemotherapy and other systemic therapies in the Department of Medical Oncology at Sri Aurobindo Institute of Medical Sciences, from March 23, 2020 to August 15, 2020 were retrospectively analyzed. We identified patients with a confirmed diagnosis of COVID-19, defined according to the World Health Organization (WHO) criteria, with a positive real-time polymerase chain reaction (RT-PCR) assay for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) on a nasopharyngeal swab. Demographic, clinical, and treatment characteristics of the patients were retrieved from the medical records and from our institution's archiving systems.

Results

Considering the index period (March 23–August 15, 2020), 4,494 confirmed cases of COVID-19 were admitted at our institute.

In the department of medical oncology out of 578 patients presented to the outpatient department, 291 patients were admitted for active treatment. During admission all the patients underwent mandatory screening for COVID-19 by RT-PCR assay, of which 23 cases were diagnosed with laboratory-confirmed COVID-19, which constitutes approximately 0.51% of the total cases. However, the infection rate among the patients with cancer seems to be higher 7.9% (23 out of 291 cases). Similarly, total mortality among COVID-19 positive cases was 3.6% (162 death out of 4,494) with the mortality rate recorded among the cancer patients with COVID-19 was 13% (3 deaths/23). Details are summarized in **Table 1**.

Median age was 40 years and the majority of patients were male (60%). The most common cancer type was acute lymphoblastic leukemia (ALL) presented at various stages of treatment, totaling 21.7% (5/23). Fifty percent (6/12) of patients with solid malignancies (other than hemato-lymphoid) have presented with stage IV disease. Thirty-four percent patients had associated comorbidities like hypertension, diabetes mellitus, cerebrovascular, cardiovascular, pulmonary, and hepatic diseases, the most common being diabetes mellitus (17%).

Out of three deceased, one patient (age 45) had good performance status and received high dose consolidation for acute myeloid leukemia (AML) (diagnosed with COVID-19 within 14 days of chemotherapy), the second patient (age 30) was on palliative treatment for metastatic carcinoma of the rectum and had poor performance status (Eastern Cooperative Oncology Group Performance Status = 3), and the third patient was a newly diagnosed elderly AML (age 60) Details of the patient's characteristics mentioned in table 2.

All the positive cases were periodically evaluated also by the colleagues of pulmonary and anesthesiology departments and the majority were treated with hydroxychloroquine, antiviral drugs, and azithromycin; none of our patients received tocilizumab. Three patients (13%) developed severe disease (defined as necessity of high-flow supplemental oxygen) and were supplemented by oxygen and subsequently by continuous positive airway pressure. None of our patients were offered invasive ventilation, due to the absence of indication attributable to prognosis. Eighty-seven percent (20/23) patients were discharged after full clinical recovery and negative RT-PCR on a nasopharyngeal swab.

Table 1 Details regarding the COVID-19 patients

SAIMS COVID-19 hospital	Number of cases (from March 23 to August 15, 2020)
Total COVID-19 patients hospitalized	4,494
Total COVID-19 deaths reported	162
Total cancer patients with COVID-19 hospitalized	23
Total cancer patients with COVID-19 deaths reported	03
Total mortality 3.6%	Mortality among cancer patients 13%

Abbreviations: COVID-19, coronavirus disease 2019; SIAMS, Sri Aurobindo Institute of Medical Sciences.

Table 2 Demographic and baseline clinical characteristics of COVID-19 infected cancer patients

Characteristic patients (N = 23)	
Median age (interquartile range), y	40 (28.0–65.0)
Male sex	14 (60.8)
Tumor diagnosis	
Acute lymphoblastic leukemia (ALL)	5 (21.7)
Acute myeloid leukemia	3 (13.0)
Hodgkin's lymphoma	1 (4.3)
Low grade lymphoma	1 (4.3)
Ovarian cancer	3 (13.0)
Lung cancer	1 (4.3)
Colon cancer	2 (8.6)
Rectum cancer	2 (8.6)
Liver cancer	1 (4.3)
Breast cancer	1 (4.3)
Multiple myeloma	1 (4.3)
Osteosarcoma	2 (8.6)
Tumor stage	
Stage I/II/III	6 (26.0)
Stage IV	6 (26.0)
History of prior treatment	
Chemotherapy ^a	21 (91.3)
Chemotherapy (< 14 d) ^b	18 (78.2)
Surgery ^b	5 (21.7)
Source of infection	
In community	17 (74.0)
Nosocomial transmission	6 (26.0)
Comorbidities	
Diabetes	4 (17.3)
Chronic cardiovascular and cerebrovascular disease (including hypertension and coronary heart disease)	2 (8.6)
Chronic pulmonary disease (including chronic obstructive pulmonary disease and asthma)	1 (4.3)
Chronic liver disease (including hepatitis B and cirrhosis)	1 (4.3)
Symptoms and signs on admission	
Fever	17 (73.9)
Cough	6 (26.0)
Dyspnea	4 (17.3)
Myalgia and fatigue	10 (43.4)
Death	3 (13.0)

Abbreviation: COVID-19, coronavirus disease 2019.

Note: Data are presented as n (%) unless noted otherwise.

^aTreatment after the diagnosis of cancer.

^bTime from last antitumor treatment to diagnosis of COVID-19.

Discussion

Out of 291 patients admitted in our department, 23 patients had laboratory-diagnosed COVID-19. Median age was 40 years (28–65 years), similar analysis done by Ramaswamy et al showed that the median age at presentation was 42 years⁹ and by Mehta et al where the median age was 52 years.¹⁰ This median age at presentation is way less when compared with other countries like China, where Liang et al⁶

(63 years) and Zhang et al¹¹ (65 years) have concluded that the infection is more in advanced age group cancer patients. The possible reason for this discordance could be: first, younger age at diagnosis of cancer in our population; second, older age group patient was strictly not allowed to come out of home during lockdown, and hence, could not attend the hospital; and third, approximately 60% of our population is less than 35 years of age. Sixty percent patients were male, which is similar to the report by Mehta et al¹⁰ (56%), Ramaswamy et al⁹ (54%), and Zhang et al¹¹ from China (60%). Most common cancer seen in COVID-infected cancer patients was ALL, similar to that reported by Ramaswamy et al⁹ (20%) and Mehta et al¹⁰ (17.7%), whereas lung cancer was most common in studies done by Liang et al⁶ and Zhang et al.¹¹ Six (26%) of them presented with stage IV disease.

The infection rate among the patients with cancer was 7.9% (23 out of 291 cases) which was similar in comparison to other tertiary care institute in India, where positivity rates were 6 (Mehta et al)¹⁰ and 3.4% (Ramaswamy et al).⁹ On comparison with China, where Zhang et al¹¹ reported a positivity rate of 2.2%. As both countries are densely populated, still the incidence rate of COVID-19 in cancer patients from China was lesser, the cause behind it could not be ascertained and should be investigated with larger study population in our scenario.

Mortality rate in COVID-infected cancer patients was higher (13%) in comparison with general population (3.6%). However, the high proportion of risk factors for severe disease (age, comorbidities, immunocompromised state, and anticancer therapy) among our patients must be considered. CFR in other hospitals of India was 14.2 (Mehta et al)¹⁰ and 10% (Ramaswamy et al).⁹

In a large case series of 72,314 patients published by the Chinese Center for Disease Control and Prevention (CDC),⁵ the case fatality in general population was around 2.3%, and in patients with a history of malignancy, it was 5.6%. The WHO China Joint Mission on COVID-19 reported a CFR of 7.6% for cancer patients. Zhang et al¹¹ reported a very high mortality rate of 28%.

The most common symptom at admission was fever ($n = 17$, 74%), followed by fatigue and myalgia ($n = 10$, 43%) and cough ($n = 6$, 26%). Only three patients (13%) developed severe disease and required supplemental oxygen therapy and finally succumbed. Symptoms resolved in all the survived patients, obtained RT-PCR assay clearance, and were transferred to oncology wards in good general condition for the continuation of anticancer therapy. The results of our study are more or less consistent with the review of literature on outcomes of cancer patients with COVID-19 published by Sharin et al.¹²

It was also noted that 26% of our patients have developed COVID-19 infection during hospitalization and nosocomial transmission of SARS-CoV-2 was suspected. Hospital-related transmission has been reported in both patients¹³ and health care workers. In a retrospective case study by Wang et al¹⁴ with 138 patients, 41.3% of the patients were reported to have acquired COVID-19 infection during hospitalization, and of these, 5 patients were from the

oncology department. Nationwide statistics of the Chinese CDC confirmed COVID-19 transmission within patients in health care settings.⁵ Therefore, health care facilities need to reemphasize the importance of basic infection control measures to combat the spread of contagious pathogen via respiratory droplets.

Seventy-eight percent of the COVID-19-acquired cancer patients have received antitumor chemotherapy within past 14 days of diagnosis of COVID. However, delaying antitumor treatment cannot be recommended as a reasonable choice to reduce the infection risk in the ongoing pandemic. Cancer patients should receive antitumor treatment in the setting of vigorous screening for COVID-19, including chest computed tomography scan and RT-PCR testing, and the same should be extended to their companions.

Adaptations Done at our Center to Continue Cancer Care

1. In aggressive cancers like ALL and AML where delaying the treatment is associated with poor outcomes or fear of relapse, de-escalation strategies were executed such as avoidance of intensive therapy and use of oral metronomic chemotherapy, and minimization of blood and platelet transfusions.
2. Increasing duration between chemotherapy cycles (three weekly instead of weekly).
3. Use of colony-stimulating factors to decrease the risk of neutropenia helped to tackle this situation.
4. Promoting home-based chemotherapy or with nearby centers with shared care with primary physician.
5. In COVID-19 positive cancer patients, palliative intent systemic chemotherapy, elective surgeries, and radiotherapy planning were postponed until full clinical recovery and repeat negative RT-PCR on swab.

We strongly recommend the continuation of anticancer treatment by endorsing consistent preventive measures, mitigating some concerns previously expressed. We suggest considering the risk of severe infection on a case-by-case basis and balancing it with the harm that could be created by treatment delay or interruption.

Limitations

Our findings support the vulnerability of cancer patients in the current pandemic. However, the limits of our study must be acknowledged. The study was retrospective, nonrandomized, and based on a small sample size. The tumor types were diverse, and heterogeneity could not be avoided.

Conclusion

Cancer patients affected with COVID-19 have worse outcomes when compared with the general population; hence, they should undergo vigorous screening and intensive surveillance. Anticancer treatment during COVID-19 should be altered according to the type and prognosis of cancer. Fear of COVID infection risk should not divert the physician from the

urge to treat the patients, particularly when a curative option is considered and if a delay could reduce its efficacy. In this setting, the dread of a possible threat should not doom to a certain debacle.

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Availability of Data and Materials

Data has been retrospectively collected from our hospital database.

Conflict of Interest

There are no conflicts of interest.

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