ORIGINAL ARTICLE

The impact of the Covid-19 pandemic on cancer patients presenting to surgical wards at tertiary care hospital Peshawar

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Abstract

Cancer is a serious disease that affects the lives of millions around the globe. During COVID-19 pandemic, cancer patients were neglected and due to their miss management in hospitals, they presented in advanced stages of their primary disease specifically due to the suspension of elective services. The current study aimed to determine the impact of the COVID-19 pandemic on cancer patients. The current study was designed at the department of surgery in Khyber Teaching Hospital (KTH) Peshawar from 1st April 2020 to 30th March 2021 in Khyber Teaching Hospital, Peshawar. A total of 160-cancer patients were divided equally into 2 groups i.e. Group-A (pre-COVID-19 era patients) and Group-B (COVID-19 era patients). These two groups were selected on basis of non-probability consecutive sampling technique. Different statistic tools like SPSS and Origin 2018 software were used for means, standard deviation and percentages.

Results: During April and December a total of 160 cancer patients were studied in both years i.e. 2019 (pre-COVID-19 period) and 2020 (COVID-19 period). The mean age of presentation for patients in 2019 was 46.11 and in 2020 it was 50.38. Patients who were hospitalized to surgical wards during the COVID-19 tenure had comparatively longer mean duration of hospital stay with around 8 days (CI 2.49-13.39) hence showing significance with a p-value of 0.011. Breast cancer (n=32 [40% in 2019], n=17 [21.2% in 2020]) and rectal cancer (n=11 [13.8% in 2019], n=18 [22.5% in 2020]) were the two most common entities observed. Most importantly, study sample was analyzed and results showed that 57.5% (n=46) of the patients presented to surgical wards with less aggressive tumors in 2019 as opposed to 2020 where 67.5% (n=54) of patients came to the hospital with advanced stage malignancies; this indicates a significant p-value of 0.001.

Conclusion: We are of the opinion that the pandemic is not over yet. Problems such as the global spread of cancer due to COVID-19 and its long term effects on the quality of life of patients worldwide is still being investigated. It is stipulated that the long-term consequences of decreased cancer screening, delayed hospital visits as well as the rise in elective surgery waiting times on cancer stage progression and outcomes, are anticipated to be significant.

Keywords: Cancer, COVID-19, early stage, late stage, morbidity, mortality.

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Introduction:

Surgery is the foundation of any health system as surgical procedures, both emergency and elective, are one of the main contributing factors of community health. Surgical practice has for ever come across different challenges and kept changing according to the prevailing health emergencies. Epidemics are one such scenario where both the surgical team and the patient and attendants are at risk of infection. Since the first few cases of Corona Virus Disease 2019 (COVID-19) infections[1] that ultimately converted into the Pandemic, health care providers including surgical staff have been affected world-

wide. They are exposed to patients of corona virus disease from a-symptomatic[2] to mildly symptomatic to critical patients. Also they have to keep performing their duties amidst shortage of personal protective equipment. Further, they have to get isolated after exposure to asymptomatic or suspected infected patients during outpatient, in-patient and emergency consults.[3]

Risk of transmission of COVID-19 to surgical staff has been described in the operation theatre environments in a number of ways, in addition to the general wards and outpatient environments.[4] Aerosol generating procedures like nasogastric and endotracheal intubation that are commonly performed in surgical wards and operation theatre need special care as there have been reports of transmission of COVID-19.[5] Smoke generated due to energy devices like electrocautery has been also described as a medium for transmission of the virus.[6]

For the afore-mentioned reason mainly pertaining to the safety of health organizations, there has been a significant decline in the provision of elective services to stable as well as serious cancer patients resulting in increased complications and even mortality.[7-9] Bray and his colleagues in their global cancer statistics paper have mentioned that "cancer is a terrible disease that affects millions of people all over the world".[10] Silbermann et al, say that "managing cancer necessitates the participation of multi-disciplinary teams at all stages of the disease from diagnosis to survivorship or end-of-life care."[11] An article stated "these patients require multiple hospital visits for assessment by different clinicians and they undergo numerous investigations for diagnosis, staging, and monitoring of therapy, as well as a variety of treatments and surgical interventions, over the course of the disease."[12] Dr. Karol Sikora, Oncologist CMO of Rutherford Health has stated in a paper that "Cancer, if untreated, will most likely spread. The sickness starts in one body organ and progresses in phases. Stage 1 affects the organ tissue itself while stage 2 infects the cells around it. During Stages 3 and 4 the disease has invaded other parts of the body around the primary organ.[13]

Therefore, time is of the essence when managing cancer patients especially from a surgical point of view, and treatment options are heavily dependent on the stage of the diseases.[14,15] Staging helps clinicians plan the best treatment as well as predict prognosis. For example, the 5-year survival rate with stage 1 and stage 2 breast cancer is 90-100% which decreases to 66% at stage 3[16] and only 28% at stage 4[17] (American cancer society). Gastric carcinomas have a 5-year survival rate of 60-80% with stages 1 and 2 which declines to 32% at stage 3 and only 5.5% at stage 4.[18] Inevitably, if untreated and mismanaged, cancers will go through these stages in succession and, though localized cancer is treatable, the chances of successful treatment are much lower with cancer that spreads in the body.

The objective of this study is to determine how the COVID-19 pandemic, because of its global and regional effect on provision elective of services for cancer patients, has affected the presentation management and outcome of malignancy patients who presented to the Surgical Department in Khyber Teaching Hospital of Peshawar either through Outpatient Department (OPD) or emergency.

Therefore the current study is aimed to test the hypothesis that cancer patients have been relatively neglected in the COVID-19 era compared to the pre-COVID-19 era and this has led to increased mortality and morbidity because patients presented in advanced and terminal stages of their respective diseases.

Material and Methods:
Study design: The study was conducted at surgical departments of Khyber Teaching Hospital Peshawar after approval from hospital's ethical and research committee. Cancer patients presenting to both elective and emergency services between March and December for the year 2019 and 2020 properly investigated for staging of the disease, were included.

Data collection: All patients were admitted through OPD and emergency for further work up after meeting the inclusion criteria. Detailed

Table 1: Demographic characters of pre-COVID and COVID periods

Demographic Parameters	Time periods		p.value
	2019	2020	
Gender			
Female	48 (60.0%)	38 (47.5%)	
Male	32 (40.0%)	42 (52.5%)	
Total	80 (100.0%)	80 (100.0%	
	2019 (mean+sd)	2020 (mean+sd)	
Age	46.11+15.087	50.38+16.729	.093
Hospital Stay	5.94+4.303	7.94+5.453	.011

Table 2: Demographic characters of pre-COVID and COVID periods

	Time Periods			
Diseases	**2019**		**2020**	
Breast	32	40.0	17	21.2
CA esophagus	1	1.2	10	12.5
Colon	5	6.2	3	3.8
Others	11	13.8	9	11.2
Ovaries	2	2.5	5	6.2
Rectum	11	13.8	18	22.5
Stomach	9	11.2	12	15.0
Testicular	3	3.8	1	1.2
pancreas	6	7.5	5	6.2
Total	80	100	80	100

Table 3: Others Diseases wise distributionof cancer patients

	Time Periods			
	2019		2020	
Other Diseases	Frequency	Percentage	Frequency	Percentage
Adenocarcinoma duodenum	1	9.1	00	00
CA Caecum	00	00	1	11.1
CA Uterus	2	18.2	00	00
CA oropharynx	00	00	1	11.1
CA rectosigmoid junction	1	9.1	00	00
G.bladder	1	9.1	2	22.2
Hepatocellular	00	00	3	33.3
Hodgekins Lymphoma	1	9.1	00	00
Parathyroid CA	00	00	1	11.1
Renal	3	27.3	00	00
prostate e mets	2	18.2	1	11.1
Total	11	100	9	100

clinical history from admitted patients was obtained using designed questioner and then written informed consent was taken.

Patients were divided into two groups. The Pre-Covid-19 (2019) era group contained cancer patients who presented to surgery department either through OPD or emergency and who had under-gone complete workup of their respective conditions including history, physical examination, relevant investigations, mean length of hospital stay, staging and treatment followed by outcome. The same was done for those cancer patients who presented in Covid-19 era (2020), mostly in emergency setting, and it was assessed how they were managed using the same protocol. For both the groups the independent variable was year of presentation (2019 and 2020) and main outcome variables were stage of their respective diseases and their outcomes (discharge or death).

All the data was collected on a prescribed data sheet and results analyzed statistically by using SPSS software version 26.0 and Microsoft excel spreadsheet 2013. The data was analyzed by computing frequency and percentages for categorical variables while mean and standard deviation was calculated for numerical data. For descriptive variables like age, gender, stage of disease, outcome of disease and investigation used, the frequency distribution and percentage was calculated in both groups. The significance of different variable group was determined by applying Chi-square test and calculating p-value; $p<0.05$ and taking confidence interval at 95%.

Results:
Between April and December a total of 160 cancer patients were studied in both years i.e. 2019 (pre-COVID-19 period) and 2020 (COVID-19 period). Analysis of gender wise distribution showed relatively more female patients (60%) presenting to general surgical department in 2019 compared to 2020 where male patients were higher in number (52.5%) as presented in table-1. Demographic factors like age and hospital stay were assessed for both tenures separately as showed in table-2 which showed that the mean age of patients in 2019 was 46.11 (CI 31.023-61.197) and in 2020 it was 50.38(CI 33.651-67.109).

Table 4: Others diseases wise distributionof cancer patients

| Other diseases | Time Periods | | | |
| | 2019 | | 2020 | |
	Frequency	Percentage	Frequency	Percentage
Adenocarcinoma duodenum	1	9.1	00	00
CA Caecum	00	00	1	11.1
CA Uterus	2	18.2	00	00
CA oropharynx	00	00	1	11.1
CA rectosigmoid junction	1	9.1	00	00
G.bladder	1	9.1	2	22.2
Hepatocellular	00	00	3	33.3
Hodgekins Lymphoma	1	9.1	00	00
Parathyroid CA	00	00	1	11.1
Renal	3	27.3	00	00
prostate e mets	2	18.2	1	11.1
Total	11	100	9	100

Table 5: Grade wise distribution of cancer patients

| Grade | Time periods | | p.value |
	2019	2020	
Early Stage	46(57.5%)	26(32.5%)	0.001
Late State	34(42.5%)	54(67.5%)	
Total	80(100.0%)	80(100.0%)	

Table 6: Outcome wise distribution of cancer patients

| Outcome | Time periods | |
	2019	2020
Expired	6(7.5%)	13(16.2%)
Referred to specialized center for chemo-radiotherapy	7(8.8%)	5(6.2%)
Treated and called for follow up	67(83.8%)	62(77.5%)
Total	80(100.0%)	80(100.0%)

Table 7: Investigation wise distribution of cancer patients

| Outcome | Time periods | |
	2019	2020
Biopsy and histopathology	3(3.8%)	1(1.2%)
CT Abdomen and Pelvis with IV contrast	33(41.2%)	31(38.8%)
CT thorax with IV contrast	1(1.2%)	10(12.5%)
MRI Pelvis	11(13.8%)	19(23.8%)
Others	0(.0%)	2(2.5%)
Tripple assessment	32(40.0%)	17(21.2%)
Total	80(100.0%)	80(100.0%)

For hospital stay, a paired T-test was applied which showed significant p-value of 0.011. Patients who were admitted to surgical ward in the COVID-19 period had comparatively longer mean duration of hospital stay which was around 8 days (CI 2.49-13.39). Proportionately, Cancers related to the breast (n=32 [40% in 2019], n=17 [21.2% in 2020]), rectum (n=11 [13.8% in 2019] and n=18 [22.5% in 2020]) were the two most common pathologies followed by diseases of the stomach and the colon as given in table-3. while low frequency was observed for other disorders; bladder, parotid, oropharynx, kidney, prostate and the liver table-4.

Most importantly, before the pandemic, study sample was analyzed and results showed that 57.5% (n=46) of the patients presented to surgical wards with less aggressive tumors in 2019 as opposed to 2020 where 67.5% (n=54) of patients came to the hospital with advanced stage malignancies having a significant p-value of 0.001 as shown in table-5. Further statistical analysis on the outcome of all the patients from both years revealed relatively more deaths from cancer in 2020 (13 deaths-16.2%) contrary to 2019 (6 deaths- 7.5%) however patients who were completely treated and called for follow up was almost the same; above 60 patients for both years as shown in table-6. Method of cancer detection in breast tissue was through triple assessment, MRI pelvis was investigation choice for rectal cancer and CT scan was used for thoraco-abdominal malignancies as shown in table-7.

Discussion:

Medical organizations around the world were compelled to make changes to their systems as a result of the COVID 19 epidemic.[19] Uimonen et al. have proclaimed that cancer occurrence and development has always been a focus of active research, with long-term implications for cancer diagnosis, treatment, and research.[20]

The study demonstrates a correlation between laxity in the timely management of cancer patients during the COVID-19 period and their presentation to surgical OPD and emergency in late stage disease with metastasis as well as prolonged hospital stay and relatively bad outcomes. The length of hospital stay (which most of the time was spent in un-necessary waiting) for malignancy patients during the pandemic ranged from 8 to 13 days contrary to the same

period in 2019 where the duration was 6 to 10 days. This slight delay in cancer care is attributed to two reasons: utilizing most of the hospitals laboratory and radiology services in managing COVID-19 patients and also deploying majority of hospital staff and resources including medical and surgical specialists, residents and nursing staff towards infected COVID-19 patients rather than cancer patients.

This problem has been faced by many institutions and regions globally. Reference taken from a research paper: "due to a paucity of medical staff and the high volume of COVID-19 patients admitted, the frequency of interactions between patients and oncologists has decreased by 20% in the United States, delaying more than 22 million screening procedures.[21-22] Similarly, a study done at 41 central cancer clinics in India found significant declines in oncology treatment supply between March and May 2020 compared to the same period in 2019.[23] Staff recruitments for cancer care were decreased at many high profile centers citing various reasons like re-stationing, quarantine etc.[12] Hence proven, health-care supplies were shifted to facilitate COVID-19 management only and this reallocation of resources has raised worries about probable delays in cancer detection and treatment, which are known to impair oncological outcomes in many cancers.

The results in the study also illustrate a note worthy presentation of cancer patients in advanced stages of their respective diseases in the COVID-19 period as opposed to pre-COVID-19 phase. In this study, stage 1 and 2 cancers were considered early stage and more curable while stage 3 and 4 cancers were categorized as advanced and more complicated. TNM staging was done on the basis of classifications designed for the respective organ systems (e.g. dukes' classification was used for colorectal carcinomas). In the year 2019, out of 80 patients screened for cancer, 46 patients were found to be in early stage of disease progression while 34 patients had advanced disease. However, in 2020, only 26 patients presented to surgical ward in treatable stages while 54 patients had late presentations and some even had systemic metastasis

as well. These statistics are in line with the hypothesis that reduction in elective services and cancer screening along with post-ponement of chemo-radiotherapy sessions for cancer patients can be held responsible for patient's going into advanced stages of their respective diseases.

Some experts have proclaimed that during the pandemic many hospitals should implement measures to reduce the number of day patients and inpatients giving priority to emergency surgeries only. However adjuvant chemotherapy or elective surgery may be rescheduled to reduce the risk of cross-contamination.[24] In a multicenter study held in Finland, waiting times for elective surgery were collected for the year 2020 and compared to the reference years 2017–2019 and the results showed an "estimated 8% increase in delay for elective admissions in 2020."[25] The COVID-Surg collaborative study evaluated cancellation of 37% elective cancer surgeries during the summit period of the COVID-19 pandemic.[27] Therefore pundits have warned that, "Compulsory abrupt interruption of conservative treatment may increase the risk of degeneration in cancer patients and reduce their survival rates as well.[26]

One newsletter mentioned that "an average four-week delay in any form of cancer treatment can increase patient mortality significantly.[27] A retrospective data review of 624 patients with oral cavity squamous cell carcinoma stated that treatment delay significantly longer in 2020 due to the pandemic (median = 45 days) versus 2010–2019 (median = 35 days) (p = 0.004), and they observed a higher pathological T classification for patients in the year 2020 (p = 0.046).[29] A population based cohort study in England on real-time weekly data proposed that "curtailment in cancer services may cause significant excess mortality among cancer patients and multi-morbidity over a one-year time horizon.[30] In addition, a micro-simulation model of five cancers by Ward ZJ et al, in Chile (breast, cervix, colorectal, prostate, and stomach) for which authentic data was available disclosed that "as a result of hindrance in diagnosis during COVID-19 period, they found a worse stage dis-

tribution for detected cancers in 2020,[22] which is estimated to lead to 3542 excess cancer deaths (95% UI 2236–4816) in 2022.[30-31] The steep decrease in cancer screening suggests the possibility of a future increase in patients with later-stage cancers being seen.[32] Though trivial, the findings in our study also support this hypothesis and the number of deaths in 2020 were higher in number (n=13 out of 80 [16.2%]) compared to 2019 (n=6 out of 80 [7.5%]).

Conclusion:
Experts are of the view that the pandemic is not over yet. Problems such as the global spread of cancer due to COVID-19 and its long term effects on the quality of life of patients world-wide is still being investigated. It is stipulated that the long-term consequences of decreased cancer screening, delayed hospital visits as well as the rise in elective surgery waiting times on cancer stage progression and outcomes, are anticipated to be significant.

Conflict of interest: None

Funding source: None

Role and contribution of authors:
Muhammad Naeem, collected the data, referenced and did the intial writeup.

Mian Qaviullah, collected the data and helped in introductin writing.

Amir Hamza Khan, collected the data and helped in interpretation of data and also helped in result writing.

Muhammad Asghar, collected the data, references and also helped in discussion writing.

Noor Rehman, collected the references and also helped in discussion and conclusion writing.

Mushtaq Ahmad, critically review the article and made the final changes.

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