



The effect of COVID-19 pandemic on laryngeal cancer in a tertiary referral center

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Abstract

Purpose This study aimed to evaluate whether there was a significant change in the laryngeal cancer stage before and after the COVID-19 pandemic.

Methods This retrospective cohort study was conducted to evaluate the data of patients who operated due to laryngeal cancer in a tertiary referral hospital's ear, nose, and throat (ENT) department between June 2018 and 2021. The patients were included at the same period of the years to rule out any seasonal changes. The basic characteristic, tumor localization, and TNM stage of the patients were compared.

Results 97 patients were operated due to laryngeal cancer during the time period reviewed. 57 (58.8%) patients were operated before and 40 (41.2%) after the COVID-19 pandemic. When comparing the patients before and after the COVID-19 pandemic period, the mean age significantly differed between the study groups that older age was observed in patients who admitted before the COVID-19 pandemic (62.8 ± 6.5 vs. 57.3 ± 6.8 , $p < 0.001$). Regarding the TNM classification, the patients in the after COVID-19 pandemic group had higher rates of T4 stage laryngeal cancer compared to before COVID-19 pandemic group (12 (30%) vs. 4 (7%), $p: 0.003$).

Conclusion Younger patients have operated after the COVID-19 pandemic, and the patients were presented with larger tumor sizes. The pandemic may increase the time between diagnosis and surgery in laryngeal cancer patients.

Keywords COVID-19 · Laryngeal cancer · SARS-CoV-2 Infection

Introduction

The COVID-19 disease was first observed in the Republic of China at the end of December 2019, and it was declared a pandemic by the World Health Organization (WHO) on March 11, 2020 [1]. Consequently, curfew measures, travel restrictions, and social distancing are accepted as the "new normal" of daily life. Moreover, routine health services were limited, and surgeries were canceled except for emergency and oncological cases [2]. These alterations made it difficult for cancer patients to reach healthcare facilities resulting in delays in scheduled appointments and diagnosis of the patients with laryngeal or oropharyngeal cancer [3, 4].

During this period, associations published recommendations on managing patients with head and neck cancer [5–7].

Accordingly, it was suggested that patients should be guided by triage to use the existing equipment effectively, and the severity of cancer should be determined as soon as possible [8]. At the same time, it was aimed to protect ear, nose, and throat (ENT) surgeons from transmission risk of the virus during orolaryngeal procedures such as tracheostomy or mucosal resections.

Studies from different countries have been conducted to evaluate the risk of delays in the diagnosis and treatment of head and neck cancers during this period. The common result of these studies was that the disease stage was significantly advanced in patients admitted after COVID-19 restrictions [8]. However, there is a lack of evidence regarding the tumor stage of the patients in our country with laryngeal cancer.

This study aimed to reveal whether there was a significant change in cancer stage in patients who were operated laryngeal cancer before and after COVID-19 lockdown in a high-volume tertiary referral center.

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Methods

This retrospective cohort study was conducted to evaluate the data of patients who operated due to laryngeal cancer in a tertiary referral hospital's ENT department between June 2018 and June 2021. The institutional ethical approval was obtained before data collection (approval number 2021/E2-21-898). The patients were included at the same period of the years to rule out any seasonal changes. The basic characteristic, tumor localization, and TNM stage of the patients were compared.

Statistical methods

The data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 23. The data were presented as mean, standard deviation, frequency, and percentages. The Kolmogorov–Smirnov test was used to test the normality distribution of the continuous variables. Mann–Whitney *U* test was used to compare continuous variables. The Chi-square test or Fisher's exact test was used to compare categorical variables. A *p* value < 0.05 was considered statistically significant.

Results

Ninety-seven patients operated due to laryngeal cancer during the time period reviewed. The majority of patients were male (93.8%). The mean age of the study population was 60.5 ± 7.1 years. 57(58.8%) patients operated before the COVID-19 pandemic and 40 (41.2%) after COVID-19 pandemic. The majority of the involvement sites were as following glottic 57 (58.8%), anterior commissure 57(58.8%), supraglottic 47 (48.5%), and pre-epiglottic 38 (39.2%). Regarding TNM classification, 37 (38.1%) patients had T0, and 21 (21.6%) patients had T1 involvement. 73 (75.3%) patients had N0 involvement (Table 1).

When comparing the patients before and after the COVID-19 pandemic, the mean age significantly differed between the study groups that older age was observed in patients admitted before COVID-19 pandemic (62.8 ± 6.5 vs. 57.3 ± 6.8 , $p < 0.001$). No difference was observed regarding gender and the area of involvement between the study groups. Regarding the TNM classification, the patients in the after COVID-19 pandemic group had higher rates of T4 stage laryngeal cancer compared to before the COVID-19 pandemic group (12 (30%) vs. 4 (7%), $p: 0.003$). No significant difference was observed considering other TNM stages between the study groups (Table 2).

Table 1 The general characteristic of the study population

	<i>n</i> (97)	%
Gender		
Female	6	6.2
Male	91	93.8
Age (years)		
Mean \pm SD	60.5 ± 7.1	
Time period		
Before COVID-19	57	58.8
After COVID-19	40	41.2
Glottic	57	58.8
Subglottic	17	17.5
Supraglottic	47	48.5
Transglottic	26	26.8
Pre-epiglottic	38	39.2
Anterior commissure	57	58.8
Subglottic extension	17	17.5
Thyroid	23	23.7
Cricoid	4	4.1
T0	37	38.1
T1	21	21.6
T2	9	9.3
T3	2	2.1
T4	16	16.5
N0	73	75.3
N1	2	2.1
N2a	8	8.2
N2b	8	8.2
N2c	4	4.1

Discussion

This study revealed that younger patients with larger tumors were operated after the COVID-19 pandemic.

According to the previous studies, a crucial decrease was observed in outpatient and surgical services in the time period between 9th March and 20th April 2020 in otolaryngology departments [9]. A 10% decrease was observed in oncological cases despite allowance in emergency and oncologic procedures [9]. This decrease could be related to the fear of hospital-related contamination and the shortage of healthcare services. In another study, the number of patients dropped from 4993 to 556 cases despite allowance in emergency and cancer patients during the pandemic. The decrease in elective cases also caused a reduction in the number of diagnostic procedures in cancer suspected patients [10]. Laccourreye et al. reported a 10.9% reduction in ENT oncological activities. The number of cancer patients varied between 75.8 and 79%, and no significant differences were observed in cancer diagnosis before and

Table 2 Comparison of the laryngeal cancer frequency before and after COVID-19 pandemic

	Before COVID-19 pandemic (n:57)	After COVID-19 pandemic (n:40)	p Value
Gender			
Female	3 (5.3%)	3 (7.5%)	0.48
Male	54 (94.7%)	37 (92.5%)	
Age (years)			
Mean ± SD	62.8 ± 6.5	57.3 ± 6.8	<0.001
Glottic	35 (61.4%)	22 (55%)	0.52
Subglottic	9 (15.8%)	8 (20%)	0.59
Supraglottic	23 (40.4%)	24 (60%)	0.06
Transglottic	12 (21.1%)	14 (35%)	0.12
Pre-epiglottic	20 (35.1%)	18 (45%)	0.32
Anterior commissure	35 (61.4%)	22 (55%)	0.52
Subglottic extension	9 (15.8%)	8 (20%)	0.59
Thyroid	11 (19.3%)	12 (30%)	0.22
Cricoid	1 (1.8%)	3 (7.5%)	0.18
T0	26 (45.6%)	11 (27.5%)	0.07
T1	13 (22.8%)	8 (20%)	0.74
T2	6 (10.5%)	3 (7.5%)	0.44
T3	1 (1.8%)	1 (2.5%)	0.65
T4	4 (7%)	12 (30%)	0.003
N0	47 (82.5%)	26 (65%)	0.06
N1	2 (3.5%)	0 (0)	0.34
N2a	3 (5.3%)	5 (12.5%)	0.18
N2b	3 (5.3%)	5 (12.5%)	0.18
N2c	1 (1.8%)	3 (7.5%)	0.18

Bold values depicts $p < 0.05$

after the COVID-19 period [8]. Besides, there was no significant difference between the time period before and after pandemic regarding surgical technique, postoperative course, intensive care, or hospital stay [8]. Regarding the tumor stage, T3/4 and N2/3 tumors were more frequent after COVID-19 pandemic (p : 0.002 and 0.0004, respectively). The authors concluded a limited impact of the COVID-19 pandemic on surgical diagnosis and cancer surgery in their otorhinolaryngology department [8].

Murri et al. evaluated the numbers of laryngeal SCC patients during the pandemic and compared them with the patients attended before the pandemic [11]. The authors concluded that there were 19 laryngeal cancers in the post-pandemic group and 25 patients in the before the pandemic group. No significant differences were observed regarding the tumor stage between the study groups. However, they reported an increase in the time between cancer diagnosis and surgical treatment [11].

In our study, there was 57 patients before the pandemic and 40 patients after the pandemic group, which lower

admission was observed after the pandemic period. Besides, the younger patients with laryngeal cancer were mostly admitted to the hospital after the pandemic. These results could be related that the older patients might be keen to stay away from the hospitals due to fear of COVID-19 infection. Regarding the TNM classification results after the COVID-19 pandemic group had higher T4 stage cancer than the before COVID-19 pandemic group. We may speculate that the delays in the diagnosis and appointments could lead to late diagnosis of the patients with laryngeal cancer.

The strengths of our study are the number of patients who admitted to a tertiary referral hospital and the first study that present the results of this issue in our country. The limitation of our study is its retrospective nature that could increase the risk of bias.

In conclusion, the time between cancer diagnosis and surgery might increase during the pandemic due to the lack of the medical and health care providers. An effective appointment system, telemedicine, or priority for cancer patients could decrease the delays in a unit dealing with laryngeal cancers.

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Declarations

Conflict of interest The authors have no conflict of interest to declare.

Ethics approval This study was approved by the local ethics committee (approval no: 2021/E2-21-898) and conducted in concordance with Helsinki declaration and good clinical practice guidelines.

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