



Impact of COVID-19 pandemic on the diagnosis of patients with laryngeal cancer

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Abstract

Introduction: Patients' access to public healthcare has been limited during the COVID-19 pandemic. The psychological factor – the fear of patients and medical staff of infection, especially before the introduction of vaccinations – had also a negative impact on the diagnostic and therapeutic procedures.

Aim: The aim of the study was to assess the impact of the COVID-19 pandemic on the degree of advancement of laryngeal cancer in patients referring for diagnosis and treatment to a IV-level clinical referral hospital.

Material and methods: The medical documentation of patients presenting to IVth level reference clinical hospital was retrospectively analyzed in pre-, during and post-pandemic period of time. The total number of patients presenting to the emergency department (ED), inclusive of those receiving otolaryngological consultation, patients diagnosed with laryngeal cancer and advancement stage of disease was assessed. Additionally the comprehensive count of diagnostic and therapeutic procedures pertaining to the larynx and trachea, during the three above mentioned periods of time was performed.

Results and discussion: The study revealed a significant decrease in the number of patients presenting to the ED during the pandemic, with a more pronounced drop among otolaryngological patients. The number of patients with laryngeal tumor treated in our hospital as well as the number of laryngeal diagnostic and therapeutic procedures remained stable throughout analysed periods of time. During pandemic period significant drop of patients with early-stage (T1) laryngeal cancers was observed.

Conclusions: Despite maintained surgical activity in level IV reference hospital, fewer patients with early stage of laryngeal cancer (T1) were diagnosed and treated during pandemic.

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1. INTRODUCTION

There are numerous reports in medical literature stating that patients' access to public healthcare has been limited during the COVID-19 pandemic. In the early stage of the pandemic, due to implemented regulations, admissions were restricted not only in family doctors' offices but also in specialist clinics. Scheduled hospital admissions and planned surgical procedures were also limited.^{1–4} Multicenter studies conducted in the UK in the early stage of the pandemic showed about a 70% decrease in reports among oncology patients.² Other studies indicate a significant decline in the number of cancer diagnoses during this period.⁵ Some medical advices were given online, which is certainly not qualitatively equivalent to direct patient examination. The psychological factor – the fear of patients and medical staff of infection, especially before the introduction of vaccinations in the face of ubiquitous shortages of personal protective equipment, including appropriate masks, goggles, and protective gowns, also had a significant impact on the quality of medical services. Some even believe that the increase in mortality during the pandemic may be due to this psychological factor and the reluctance to seek medical help by some patients.⁶

The otolaryngological examination of the oral cavity, throat, and larynx is rightly considered a procedure that particularly exposes medical personnel to viral infection. Therefore, examinations and procedures in the upper respiratory tract (nose, oral cavity, throat, and larynx), according to accepted recommendations, required special protection.^{7–9} Considering the shortage of personal protective equipment, it can be assumed that despite the dedication of the medical staff, the number of these specialist diagnostic and therapeutic procedures decreased.

2. AIM

The aim of the study was to assess the impact of the COVID-19 pandemic on the degree of advancement of laryngeal cancer in patients referring for diagnosis and treatment to a IV level clinical referral hospital.

3. MATERIAL AND METHODS

The medical documentation of patients presenting to the Emergency Department of the University Clinical Hospital in Białystok, of the IV level of reference, was retrospectively analyzed over three consecutive annual periods:

(1) I period – pre-pandemic – 2019.04–2020.03,

(2) II period – first year of the pandemic – 2020.04–2021.03

(3) III period – second year of the pandemic – 2021.04–2022.03

An assessment was conducted on the cumulative count of patients presenting to the emergency department (ED), inclusive of those receiving otolaryngological consultation within the same setting.

Concurrently, an enumeration was carried out to ascertain the number of patients diagnosed with, and subsequently hospitalized due to laryngeal cancer. Additionally, the advancement of the neoplastic disease in these patients was gauged in accordance with the TNM classification system.¹⁰

An assessment was undertaken to determine the comprehensive count of diagnostic and therapeutic interventions pertaining to the larynx and trachea, conducted by otolaryngologists within the context of a IV-degree referral hospital during the three above mentioned periods of time.

For the statistical analysis, specific tests were employed the χ^2 test, a p-value less than 0.05 was deemed indicative of statistical significance.

4. RESULTS

In the annual period before the pandemic, 42596 patients presented to the ED, and 2017 were consulted by otolaryngologists. During the first year of the pandemic, 31008 patients presented to the ED (a decrease of 27.2%), and 893 were consulted by otolaryngologists (a decrease of 55.8%). In the second year of the pandemic, 38805 patients presented to the ED (an increase of 25.1% compared to the first year of the pandemic period), and 1286 were consulted by otolaryngologists (an increase of 44.0% compared to the first year of the pandemic period).

In the cohort of patients diagnosed with laryngeal cancer, during the first period prior to the pandemic, 56 patients (18 females, 38 males) within the age range of 38 to 86 years were diagnosed and treated. During the period of the first year of the pandemic, 60 patients (19 females, 41 males) aged between 41 and 85 years were treated. In the second year of the pandemic, 59 patients (29 females, 30 males) ranging in age from 33 to 79 years received treatment.

The disparities in the number of patients, gender and age distribution in the three analyzed periods of time were not statistically significant.

The analysis of tumor advancement stage demonstrated: prior to the pandemic, 24 patients were at the T1 stage, 5 patients at the T2 stage, 22 patients at the T3 stage, and 5 patients were at the T4 stage.

In the second period, the first year of the pandemic, 11 patients were diagnosed and treated at the T1 stage, 8 patients at the T2 stage, 34 patients at the T3 stage, and 7 patients at the T4 stage.

In the third period, the second year of the pandemic, 22 patients were diagnosed and treated at the T1 stage, 7 patients at the T2 stage, 22 patients at the T3 stage, and 8 patients at the T4 stage (Table 1).

Although during the first year of the pandemic, the number of patients diagnosed and treated at stage T3 have increased compared to the pre- and the second year of the pandemic periods the differences did not reach the level of significance (X^2 test, $P > 0.05$) At the same time there was also a noticeable drop in number of patients diagnosed at the T1 stage during the first year of the pandemic and consecutive rebound in the number of this patients in the second year of the pandemic period. The differences were statistically significant (CX^2 test, $P < 0.05$).

In the period before the pandemic, 301 diagnostic and therapeutic procedures were performed involving the larynx and trachea (laryngo/tracheoscopies, endoscopic removal of laryngeal/tracheal lesions, tumor biopsies, closure of tracheoesophageal fistulas, repair operations of larynx/trachea, insertion/replacement of voice prostheses), including 52 laryngeal resection operations (partial or total).

During the first year of the pandemic, there were 326 such procedures performed, including 50 laryngeal resection operations, while during the second year of the pandemic, 310 procedures were carried out, including 55 laryngeal resection operations. Differences were not statistically significant (X^2 test, $P > 0.05$) (Table 2).

Table 1. Distribution of laryngeal cancer advancement stages in patients before and during the first and second year of the pandemic.

Period	T1	T2	T3	T4
Pre-pandemic	24	5	22	5
The first year of the pandemic	11	8	34	7
The second year of the pandemic	22	7	22	8

Table 2. Number of total laryngeal/tracheal specific diagnostic and therapeutic procedures and larynx operations performed before and during the first and second year of the pandemic.

Period	Total number of larynx/trachea procedures	Laryngeal operations
Pre-Pandemic	301	52
The first year of the pandemic	326	50
The second year of the pandemic	310	55

5. DISCUSSION

Our study revealed unfavorable change of tumor advancement stage in patients diagnosed and treated in a IV-level clinical referral hospital during the first year of the pandemic period.

Although significant differences were only observed in the case of T1 tumors (the increase in the number of T3 tumors only approached the threshold of significance), one can speak of a certain trend of gradual advancement that could become evident if the sample sizes of the studied groups were larger.

We also observed, which is not surprising, a considerable drop in number of patients presented to the ED and consulted by otolaryngologists during first year of the pandemic period, but on the other hand the total number of laryngotracheal procedures and laryngeal operations remained relatively stable throughout the analyzed periods of time.

Although literature analysis shows a considerable number of reports and scientific studies regarding the impact of the pandemic on the diagnosis and treatment of patients, only a very few studies address the problem of the laryngeal carcinoma advancement during the pandemic.^{11,12} Research by Akbari M et al.,¹¹ conducted in a level IV reference center, confirmed that during the pandemic, the number of total laryngectomy procedures significantly increased, while the number of laser microsurgeries decreased, indicating a clear trend of increasing tumor advancement among presenting patients. Also noteworthy is the fact stressed by these authors that the period between biopsy and surgical procedure during the pandemic was shorter than before the pandemic, so the increase in advancement was not due to the failure of the hospital system causing treatment delay.

In our research, we did not observe a decrease in the number of diagnostic and therapeutic procedures and laryngeal surgeries performed during the first year of the pandemic, which may indicate the lack of delays related to the organization of hospital work in this period of time.

Elibol et al.¹² reported an increase in the number of patients with T4 tumors during the pandemic. These authors also observed a statistically significant decrease in the age of patients with laryngeal cancer during this period, which they explain by the greater fear of older individuals of infection and avoidance of contact with healthcare facilities.

In our studies, we observed only a slight increase in the number of patients with T3 and T4 tumors, while there was a clear decrease in the number of patients with the smallest degree of advancement – T1. Larynx-

geal cancer is a tumor that initially develops without giving clear, unequivocal, or bothersome symptoms for the patient. Depending on the location of the tumor, it may cause hoarseness or weakened voice, sometimes mild discomfort when swallowing. Some tumors, such as subglottic cancer or those located on the vestibular folds, can develop without symptoms for an extended period. Considering the low discomfort of laryngeal cancer, particularly in the early stage of the disease, and the media-promoted recommendations to avoid crowds and the necessity to limit interpersonal contact during pandemic period, it can be assumed that at least some patients with the smallest complaints, i.e., with T1 or T2 tumors might have postponed the decision to visit otolaryngologist. This resulted in an increase in the number of patients with more advanced tumors in a later period. A decrease in the number of patients with the least advanced stage of head and neck cancer in the first year of the pandemic was also observed by Hamaguchi et al.¹³

Analysing the patient admission rates to the ED during the pandemic, a decrease of over 27.2% could be observed in the first year of the pandemic. An even larger decrease of 55,8% was observed among otolaryngology patients. This could be due to the specificity of the otolaryngological examination, which was associated with the highest risk of infection transmission during the pandemic.¹⁴ A similarly large decrease in otolaryngological visits was reported by Mannelli¹⁵ in Italy. Sabaa MAE et al.⁴ report a staggering 79% absence at scheduled appointments among patients with oral, throat, and laryngeal cancers in the first few months of the pandemic.

It is noteworthy that the incidence of patients presenting with the least advanced stage of cancer exhibited a significant reduction solely during the initial year of the pandemic, subsequently returning to pre-pandemic levels in the second year. Considering the relatively stable volume of diagnostic and therapeutic procedures within the ear, nose, and throat (ENT) department throughout the analyzed periods, coupled with a pronounced decline in patient presentations exclusively during the first year of the pandemic, it is reasonable to infer that the diminished identification of T1 tumors in the first pandemic year resulted from these patients abstaining from hospital visits.

Undoubtedly, the duration of strict lockdown measures and challenges associated with securing appointments for examinations with general practitioners or visits to ambulatory ENT clinics, particularly during the teleconsultation era in the early months of the pandemic, must have exerted an adverse influence on this

phenomenon. Pietruszewska et al.¹⁶ suggest the need to reorganize the work of primary health care, including ambulatory ENT clinics, during the pandemic. Research by these authors showed a significant increase in the number of urgent tracheostomies performed in patients with head and neck cancer in hospitals in the first year of the pandemic, which could be related to difficult access to specialist outpatient consultations during this period. Fatuzzo et al.¹⁷ also write about the diagnostic delay, especially in the case of rare cancers, during the pandemic.

Not everyone, however, agrees on the significant impact of the pandemic on the diagnostic and therapeutic processes of cancer in otolaryngology departments. Laccourreye et al.¹⁸ reported only about a 10% decrease in the activity of otolaryngology departments in terms of cancer diagnostics and treatment during the pandemic period, which did not translate into differences in surgical treatment strategies for patients compared to the period before the pandemic. Also in our studies, despite a clear decrease in the reporting of otolaryngologic patients to the ED during the first year of the pandemic, this had virtually no impact on the number of diagnostic and therapeutic procedures performed on the larynx and trachea in otolaryngology department.

Laccourreye et al.¹⁸ reported an increase in the number of T3/T4 and T2/T3 tumors already in the first month of the pandemic compared to the period before the pandemic. In our opinion, the potential increase in the advancement of tumors should become more conspicuous a little later, i.e. after about 2 months from the moment of announcing the lockdown. This is the time necessary for the growth and increase in the volume of the tumor. From Jansen's research, it follows that most malignant head and neck tumors double their volume after 1–3 months.¹⁹ Indeed, also in our hospital in the first 1–2 months of the pandemic, that is during the period of total lockdown, the number of patients registered in the ED and otolaryngologic patients as well as the number of procedures performed decreased dramatically (data not presented). However, from the analysis of the entire pandemic year, it appears that despite the decreased number of registered patients during this period, the number of diagnostic and therapeutic procedures performed at otolaryngology department remained stable. Patients with cancer are always treated as a priority in healthcare, so all those referring to the hospital with a cancer diagnosis, even during the lockdown period, were diagnosed and treated almost immediately in most centers. Some minor delays of surgery especially in the first month of pandemic were caused by imple-

mentation of new medical regimes, adjusting operating blocks and providing staff with appropriate personal protective equipment. However, these minor delays did not significantly affect the advancement of the tumor and therefore the method of treatment applied.

Murri et al.²⁰ confirmed that during the pandemic there was an extension of the time from diagnosis to surgery of oncological cases, but during this period they did not record an increase in the number of patients with advanced tumors.

In summary, the results of our research showed that the advancement of laryngeal cancer in patients presenting in our hospital increased during first year of the pandemic, which was mainly manifested by a decrease in the number of patients with the least advanced stage of tumor. Since the number and type of procedures performed before, during the first and the second year of the pandemic remained at the same level, it can be speculated that the delay in treatment occurred as a result of patients with a less advanced tumor and only minor complaints neglecting diagnosis.

Of course, the restricted access to basic health care and basic outpatient specialist care during the pandemic might also negatively influence this delay.

The limitation of our work is the inability to determine the time that has elapsed from the onset of symptoms in our patients to even a preliminary diagnosis, which does not allow us to unequivocally determine at which point the prior the admission to the hospital delay occurred.

6. CONCLUSIONS

The pandemic caused certain delays in laryngeal cancer diagnosis and treatment particularly affecting patients in less advanced stages of the disease. Despite maintained surgical activity in level IV reference hospital, patients with minor symptoms neglected early diagnosis probably due to barriers in basic and specialist outpatient healthcare access during the first year of the pandemic. This resulted in fewer patients being diagnosed in the early stages of the disease.

CONFLICT OF INTEREST

Not declared.

FUNDING

Not declared.

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