



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.

Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

American Journal of Otolaryngology–Head and Neck Medicine and Surgery

journal homepage: www.elsevier.com/locate/amjoto

Reduction in healthcare services during the COVID-19 pandemic: Patient screening based on symptoms is an effective strategy for avoiding delayed laryngeal cancer diagnosis

Domenico Murri^a, Cecilia Botti^{b,*}, Edoardo Bassano^a, Martina Fornaciari^a,
Francesco Maria Crocetta^a, Angelo Ghidini^a

^a Otolaryngology Unit, Azienda USL-IRCCS di Reggio Emilia, Italy

^b PhD Program in Clinical and Experimental Medicine, University of Modena and Reggio Emilia, Italy

ARTICLE INFO

Keywords:

COVID-19
Head and neck cancer
Delayed diagnosis

ABSTRACT

Objective: Restriction in healthcare services during the COVID-19 pandemic caused delays in the diagnosis and treatment of several diseases. To overcome the risk of missed diagnosis of head and neck cancers, before deleting the scheduled appointments, we have introduced a selection of the patients by examining the clinical presenting issue and previous medical history. The aim of this study is to show the effects of the abovementioned strategy on the diagnosis and management of laryngeal cancer.

Methods: Data were extracted from the Hospital software regarding the new diagnosis of laryngeal SCC in the periods from March 2020 to December 2020 during the pandemic (study group) and from March 2019 to December 2019 (control group) were collected. Data were compared regarding: TNM stage, time from first medical examination to histological diagnosis (*Time-1*), and time from histological diagnosis to beginning of treatments (*Time-2*).

Results: The final study group was composed by 19 laryngeal cancers, the control group by 25 cases. No significant differences were found in the tumour stage between the groups. In the study group, *Time-1* was shorter (24 days versus 43 days, $p = 0.012$), while *Time-2* in surgically-treated patients was longer (20 days versus 9 days, $p = 0.012$).

Conclusion: During the pandemic, there was a dramatic lack of medical and nurse staff needed for surgical procedures. As consequence, the time between the diagnosis of malignancy and surgical treatment increased. In our unit, an efficient patient selection strategy to reschedule medical appointments avoided a dangerous shift toward higher laryngeal cancer stages.

1. Introduction

Coronavirus disease 2019 (COVID-19) generated an impressive and unexpected pandemic, caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The virus was first identified in December 2019 in Wuhan, China. The World Health Organization declared a Public Health Emergency of International Concern regarding COVID-19 on 30th January 2020, and later declared a pandemic on 11th March.

During the first months of the pandemic, Italy represented one of the most affected countries worldwide, and the north of the country was the mostly hit. Total lockdown was announced and many restrictive measures were adopted since 9th March. Due to the lack of availability of

personal protective equipment, the national health system was unable to carry out the regular amount of work. Therefore, patients' admission to the hospital and outpatient examinations were restricted to serious diseases or urgencies. Any scheduled visits and elective surgeries were postponed. People were strongly recommended to go to the hospital only for very serious health problems.

All these factors, together with the patients' fear to get infected inside the hospital, could have led to a delay in the diagnosis and treatment of several diseases. This could have affected also head and neck cancer, with a potentially dangerous shift toward more advanced cancer stages, as reported by previous studies [1]. Laryngeal squamous cell carcinoma (SCC) is the most frequent head and neck cancer. Advanced stages are

* Corresponding author at: Otolaryngology Unit, Azienda USL-IRCCS di Reggio Emilia, Reggio Emilia, Italy.

E-mail address: bottecci@gmail.com (C. Botti).

<https://doi.org/10.1016/j.amjoto.2021.103162>

Received 21 June 2021;

Available online 24 July 2021

0196-0709/© 2021 Elsevier Inc. All rights reserved.

the strongest negative prognostic factors and requires more aggressive treatments [2]. Therefore, it is imperative to early diagnose and promptly treat it. International guidelines recommend to perform oncologic surgeries within 8 weeks during the COVID-19 pandemic [3].

In our operative unit, scheduled appointments were deleted for months. To overcome the risk of missed diagnosis, we introduced a selection of the scheduled appointments by examining the clinical presenting issue and previous medical history, before deleting them.

The aim of this study is to show the effects of the COVID-19 pandemic and the abovementioned strategy in use in our unit on the diagnosis and management of laryngeal SCC.

2. Methods

Data were extracted from the Hospital software regarding the new diagnosis of laryngeal SCC in the periods from March 2020 to December 2020 (study period) and from March 2019 to December 2019 (control period) were collected. The pandemic occurred in the study period. Criteria for inclusion in the present study were: new histological diagnosis of laryngeal SCC. Exclusion criteria were: tumour recurrence and lack of information. Two groups were identified according to temporal criteria: group 1 (study group) was composed by laryngeal SCCs diagnosed during the study period; group 2 (control group) was composed by laryngeal SCCs diagnosed during the control period. Data were collected about: number of new diagnosis of laryngeal SCC, TNM stage, type of treatment, time from first medical examination to histological diagnosis (Time-1), time from histological diagnosis to beginning of treatments (Time-2). Cancers treated by (chemo-)radiation therapy were analysed separately from SCCs treated surgically (\pm adjuvant treatments).

In our unit, a selection of the scheduled appointments was made, before deleting them, by critically examining the clinical presented issues and previous medical history, available on the Hospital's software. The patient was called for the fiberoendoscopic examination in case of: anamnestic history of malignant tumours, persistent dysphonia \geq 3 weeks, dysphagia, cervical masses, dyspnoea, and/or recent body weight loss.

The primary aim of the study was to evaluate if patient screening based on symptoms was effective in avoiding a delay in diagnosis of laryngeal SCCs during the COVID-19 pandemic. In particular, we evaluated if a shift toward advanced cancer stages occurred during the pandemic period. Secondary aim was to evaluate if the logistic difficulties related to the pandemic influenced Time-1 and/or Time-2.

2.1. Statistical analysis

Continuous variables were expressed as mean \pm standard deviation (SD) or median and range, according to the normality of distribution. Comparison between groups was performed by Pearson's Chi square or Fisher's exact test as appropriate. Student *t*-test was used for continuous variables with normal distribution, Mann-Whitney *U* test was used for continuous variables without normal distribution. A *p* value less than 0.05 was considered the cut-off for statistical significance.

2.2. IRB approval/exemption

The Ethics Committee of Area Vasta Emilia Nord (Emilia-Romagna region, Italy) does not perform formal ethical assessment for clinical audits.

3. Results

Fifty-two cases of laryngeal SCC were diagnosed during the study period. Seven cases were excluded because recurrences, one case was excluded for lack of information regarding Time-2. The final study group was composed by 44 laryngeal SCCs, 19 cases belonged to the study group and 25 cases to the control group. Mean age was 69.31 years

(\pm 14.43) in group 1 and 69.24 years (\pm 10.94) in group 2. The male to female ratio was 3.75 for group 1 and 24.0 for group 2. Numbers of T1–2 and T3–T4 were respectively 12 and 7 for group 1, 12 and 13 for group 2 (*p* = 0.487). Numbers of N0 and N+ were respectively 17 and 2 for group 1, 20 and 5 for group 2 (*p* = 0.663). Number of stage I–II and III–IV were respectively 11 and 8 for group 1, 12 and 13 for group 2 (*p* = 0.729).

No significant differences were found in the tumour stage between the groups. Median *Time-1* was 24 days (range 8–139) for group 1 and 43 days (18–137) for group 2 (*p* = 0.012). The number of patients treated surgically was 16 for group 1 and 16 for group 2, with a median *Time-2* of 20 days (0–48) for group 1 and 9 days (0–27) for group 2 (*p* = 0.012). The number of patients treated with radiation or chemo-radiation was 3 for group 1 and 9 for group 2; due to the limited number of cases in this category, no statistical analysis was performed for what concerns *Time-2*. The results with percentage and *p* values are summarized in Table 1.

4. Discussion

Since March 2020, the sanitary emergency caused by the COVID-19 pandemic has progressively overloaded Italian hospitals, precipitating a burden for the whole Italian national healthcare system. The most involved regions were *Lombardia*, *Veneto* and *Emilia-Romagna* in northern Italy. The government imposed a total lockdown and, to redirect resources to the units most affected by the pandemic, abruptly reduced most of the elective services for months.

Some authors [4] found a notable reduction in outpatient and surgical services in the most critical period (9th March –20th April 2020) in otolaryngology units, with unavoidable effects on the health status of the population. Despite emergency and oncologic procedures were the only services allowed, the same authors [4] showed a 10% decrease of oncologic activities. This could be related to many contributing factors, including the patients' fear to apply to the hospital, and the lack of routinary outpatient clinic activities, that represent an occasion for malignant tumour diagnosis. In our personal experience, the necessity to redistribute the nursing staff and anaesthesiologic teams to intensive care units caused serious reductions of routinary activities, especially regarding surgical activities which were cut up to 80%. The reduction in outpatient clinics occurred in the period from March to May 2020, followed by progressive return to normal conditions. In contrast, the reduction of elective surgical activities still goes on.

To reduce the risk of missing oncological diagnosis, in the period

Table 1
Data regarding laryngeal SCC.

Laryngeal SCC		Group 1 (study covid)	Group 2 (control group)	P value
All patients	Pt No.	19	25	
Demographics	Age	69.31 \pm 14.43	69.24 \pm 0.94	0.984
	M to F ratio	3.75	24	
Primary tumour stage	T1–2	12 (63.15%)	12 (48.00%)	0.487
	T3–4	7 (36.85%)	13 (52.00%)	
Regional lymphnodes stage	N0	17 (89.47%)	20 (80.00%)	0.663
	N+	2 (10.53%)	5 (20.00%)	
Cancer stage	I–II	11 (57.89%)	12 (48.00%)	0.729
	III–IV	8 (42.11%)	13 (52.00%)	
	Time-1	24 (8–139)	43 (18–137)	0.012
All patients Surgery \pm adjuvant	Pt No.	16 (84.21%)	16 (64.00%)	
	RT	Time-2 20 (0–48)	9 (0–27)	0.012
RT or CTRT	Pt No.	3 (15.79%)	9 (36.00%)	
	Time-2	34 (16–38)	46 (20–122)	–

Data are reported as number (percentage), mean \pm standard deviation, or median (range). *Pt*, patient, *No.*, number, *RT*, radiation treatment; *CTR*T, chemo-radiation treatment.

characterized by severe reduction of outpatient clinics, we decided to perform an accurate patient selection, before indiscriminately deleting all the scheduled appointments for videoendoscopic examination. We introduced a selection of the scheduled appointments by examining the symptoms reported and previous medical history, available on the Hospital's software. The patient was called for the fiberoendoscopic examination in case of: anamnestic history of malignant tumours, persistent dysphonia ≥ 3 weeks, dysphagia, cervical masses, dyspnoea, and/or recent body weight loss.

This strategy allowed to discriminate urgent from deferrable symptoms, with effects on the management of malignant tumours in our operative unit. Before the COVID-19 pandemic, no selection was performed.

The present study focused on laryngeal SCC to obtain a homogeneous study group. The results showed no significant differences between group 1 and group 2 regarding tumour size, nodal metastasis and stage. Some Authors [5,6] found a significant upstaging of malignancies in the pandemic period. We think that the strategy in use in our department could have prevented this phenomenon. The time from first medical examination to histological diagnosis was significantly shorter (24 vs 43 days) in group 1. This could be related to a reduction of the workload in the pathology unit during the pandemic period. The time from diagnosis to the beginning of the treatments was longer (20 days vs 9 days) in group 1. This could be ascribed to the strong cut of surgical sessions per week in the pandemic period. Guidelines recommend to perform oncologic surgeries within no more than 8 weeks during the COVID19 pandemic [3]. We think that the slight delay of treatment did not influence the prognosis. Clearly, this hypothesis will remain unconfirmed until we will have long follow-up of these patients. In comparison with tumours of other sites, laryngeal cancers are earlier symptomatic; this fact could also explain the absence of upstaging in our study [7]. We decided to analyse laryngeal SCC data because in our unit was the most frequent malignancy in the last two years.

The strengths of this study are the consistency of the sample and the uniformity of management of the patients in the same institution.

The weaknesses of this study are represented by its retrospective nature and bias selection, that could have limited the quality of this study. In addition, data about the onset of the patient's symptoms were not available, and consequently differences in time from first symptom to the specialist visit could not be investigated.

5. Conclusion

During the pandemic, anaesthesia personnel was involved in the care

of severe COVID-19 patients. This caused a dramatic lack of the medical and nurse staff needed for surgical procedures. As consequence, the time between diagnosis of malignancy and surgical treatment increased. In our unit, an efficient patient selection strategy to reschedule medical appointments during the pandemic avoided a dangerous shift toward higher laryngeal cancer stages. Indiscriminate delete of all the scheduled appointments should be avoided.

Funding disclosures

No funding is reported for the present study.

Declaration of competing interest

The authors declare no conflict of interest.

Acknowledgments

None.

References

- [1] Werner MT, Carey RM, Albergotti WG, Lukens JN, Brody RM. Impact of the COVID-19 pandemic on the management of head and neck malignancies. *Otolaryngol Head Neck Surg* 2020;162:816–7. <https://doi.org/10.1177/0194599820921413>.
- [2] Nachalon Y, Reicher Y, Alkan U, Levi L, Bachar G, Popovtzer A. Prognostic factors for survival and nonfunctional larynx in patients with squamous cell carcinoma of the larynx. *Laryngoscope* 2020;130:1202–5. <https://doi.org/10.1002/lary.28173>.
- [3] Mehanna H, Hardman JC, Shenson JA, Abou-Foul AK, Topf MC, AlFalasi M, et al. Recommendations for head and neck surgical oncology practice in a setting of acute severe resource constraint during the COVID-19 pandemic: an international consensus. *Lancet Oncol* 2020;21:e350–9. [https://doi.org/10.1016/S1470-2045\(20\)30334-X](https://doi.org/10.1016/S1470-2045(20)30334-X).
- [4] Mannelli G, Ralli M, Bonali M, Capasso P, Guarino P, Iannini V, et al. Impact of COVID-19 pandemic on Italian otolaryngology units: a nationwide study. *Acta Otorhinolaryngol Ital* 2020;40:325–31. <https://doi.org/10.14639/0392-100X-N0832>.
- [5] Maringe C, Spicer J, Morris M, Purushotham A, Nolte E, Sullivan R, et al. The impact of the COVID-19 pandemic on cancer deaths due to delays in diagnosis in England, UK: a national, population-based, modelling study. *Lancet Oncol* 2020;21:1023–34. [https://doi.org/10.1016/S1470-2045\(20\)30388-0](https://doi.org/10.1016/S1470-2045(20)30388-0).
- [6] Tevetoglu F, Kara S, Aliyeva C, Yildirim R, Yener HM. Delayed presentation of head and neck cancer patients during COVID-19 pandemic. *Eur Arch Otorhinolaryngol* 2021;6:1–5. <https://doi.org/10.1007/s00405-021-06728-2>.
- [7] Kompelli AR, Li H, Neskey DM. Impact of delay in treatment initiation on overall survival in laryngeal cancers. *Otolaryngol Head Neck Surg* 2019;160:651–7. <https://doi.org/10.1177/0194599818803330>.