



COVID-19: AN OTORHINOLARYNGOLOGY PERSPECTIVE

Mohan Bansal

Professor and Head Department of Otorhinolaryngology Head and Neck Surgery, Parul Institute of Medical Sciences and Research, Parul University, Limda, Waghodia, Vadodara, Gujarat, India

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Corresponding author: Mohan Bansal, M.S., Ph.D., F.A.C.S. (ORCID ID: <https://orcid.org/0000-0002-4947-2389>)

Abstract:

Background and Purpose: The otorhinolaryngological manifestations of Corona Virus Disease 2019 (COVID-19) are not much emphasized in the clinical features of COVID-19. Otolaryngologists are at great risk of getting infected with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) while they are managing COVID-19 patients in OPD and/or OR settings. The aim and objective for conducting this study were: (a) to analyze the status of ear, nose, and throat (E.N.T.) symptoms and their significance in the diagnosis of COVID-19; and (2) to highlight the evolving best-practice safety recommendations for otolaryngologists while managing COVID-19 patients.

Methods: Searching PubMed and Web of Science electronic databases.

Results: The most common symptoms of COVID-19 found were fever, cough, fatigue, and short breath. Common E.N.T. manifestations observed were rhinorrhea, nasal congestion, and sore throat. The E.N.T. symptoms which were observed during the asymptomatic phase of the disease were dysfunctions of smell and taste sensations. The otolaryngologists were found at higher occupational risk of contracting COVID-19 than other physicians. The personal protective equipment (PPE) for E.N.T. surgeon is required while they are treating unknown, suspected, or positive COVID-19 patients.

Conclusion: The common E.N.T. clinical features which are not specific for Covid-19 patients are rhinorrhea, nasal congestion, and sore throat. The E.N.T. manifestations which could be specific and indicators of Covid-19 and present when the patients are asymptomatic, are dysfunctions of olfactory and taste sensations. The olfactory and gustative dysfunctions could be the only and presenting symptoms of COVID-19. Otolaryngologists are at great risk of occupational exposure due to their close contact with the patients during their management and are among the most affected healthcare providers. E.N.T. surgeons should maintain high suspicion in asymptomatic patients. Protective strategies such as restriction of nonurgent visits and surgeries, personal protective equipment (PPE), pre-appointment screening, telemedicine and triaging should be implemented.

Keywords: COVID-19; SARS-CoV-2; nasal congestion; sore throat; ageusia; anosmia; rhinorrhea; coronavirus; safety precautions; PPE; otolaryngology; aerosol

Introduction

The novel Corona Virus Disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2 belonging to β -coronavirus), is a highly contagious zoonosis which has human-to-human spread by respiratory secretions. COVID-19 pandemic has become a global health crisis and otolaryngologists are at great occupational risk of contracting SARS-CoV-2 infection. The COVID-19 pandemic can dramatically change the practice of otolaryngologists which have ethical implications and are formidable and distinct from other surgical fields. It has issues of public health stewardship and safety, distributive justice, and non-abandonment.¹

The COVID-19 which has been receiving worldwide attention due to its rapid spread and high mortality, started from Wuhan, Hubei province in China. It has rapidly swept across the world. World Health Organization (WHO) on 30 January 2020 declared COVID-19 epidemic as a public health emergency of international concern.² This highly pathogenic and large-scale epidemic of SARS-CoV-2

of twenty-first century is leading to unprecedented challenges to medical profession and humanity at large.

As of 19 April 2020, a total of 2,324,981 confirmed cases globally, with 159,639 deaths (6.86%) and 591,579 recovered patients (25.44%) had been reported by World Health Organization (WHO). The elderly and people with associated comorbidities usually develop complications and need mechanical ventilation. COVID-19 results in higher mortality in the elderly population in comparison to adults and children.³

The patients with COVID-19 infection usually present with fever, cough, breathlessness, and fatigue and a small population of patients have gastrointestinal infection symptoms.⁴ The elderly people and patients with comorbid disorders are susceptible to infection and prone to serious life-threatening complications, which may be associated with acute respiratory distress syndrome (ARDS) and cytokine storm.²

Ear, nose and throat symptoms though not uncommon in COVID-19 patients, are not highlighted much in the

literature. The present study provides a brief and precise review of the current knowledge regarding the ear, nose and throat manifestations and their significance in the diagnosis of COVID-19 patients.

Because of the rapid spread through respiratory secretions, otolaryngologists head and neck surgeons, who come in close contact with the upper aerodigestive tract during diagnostic and therapeutic procedures, are at higher risk of contracting SARS-CoV-2 infection than other physicians. The first reported physician fatality related to COVID-19 was that of an otolaryngologist. The study aims to highlight set of safety recommendations based on the review of the literature for E.N.T. surgeons who are involved in the management of patients with COVID-19. The provided recommendations would evolve over time. What otolaryngologists need to know and the actions required would be elaborated, emphasizing their safety and the safety of patients and other health workers.

Material and Methods

A literature review was performed for all the published English-language literature reporting on ear, nose and throat symptoms in COVID-19 patients. Author searched PubMed and Web of Science electronic databases without any time limit. These databases were searched using terms "COVID-19 otolaryngology", "SARS-CoV-2 Ear Nose Throat" and "anosmia OR hyposmia OR dysgeusia OR olfaction disorder". An independent search query was also employed with "COVID-19 or SARS-CoV-2". References of related articles were also used. The study reviewed relevant publications and position statements regarding the management of patients with COVID-19 in setting of otorhinolaryngology Head and Neck Surgery. Results were limited to English articles with abstract. After completing the search work, a total list of records was obtained. Duplicate articles were removed. A final list of relevant articles was then generated, and each article was then studied independently.

Results and Discussion

Spread / Transmission

The SARS-CoV-2 is said to spread through droplet, aerosols, direct contact with an infected individual, fecal-oral, and body fluid routes. Human-to-human spread occurs through respiratory secretions. Fecal-oral spread has also been confirmed. The main routes of transmission are droplets and close contact transmission. Asymptomatic pediatric patients are believed to serve as a reservoir for the virus.⁵ Aerosol transmission is reported to occur under the condition of long exposure to high concentrations of aerosols in a relatively closed environment. When an infected patient coughs, sneezes, breathes vigorously, or speaks loudly, the released virus can dissolve with the

aerosol and become the bio-aerosols. The bio-aerosol particles ranging in size from 1.0 to 5.0 μm generally remain in the air, whereas larger particles are deposited on surfaces. Droplets of saliva thrown out during sneezing or coughing, are generally of 1 to 5 mm. They spread in a space of about 1 to 2 m from the source of infection. In contrast aerosols can travel hundreds of meters.⁶

Majority of the patients (70%-80%) with COVID-19 are asymptomatic or mildly ill or have atypical clinical features. These patients can spread SARS-CoV-2 infection with high efficiency. These patients may be seen in otolaryngology OPD with noninfectious disease settings.⁷ Otolaryngologists are reported to be having at higher risk than other specialties in China and other countries. The current study will summarize the evolving best-practice recommendations for E.N.T. surgeons that ensures not only their safety but also their clinical staff, and other patients.

Clinical Features

In fact, ear nose and throat symptoms of COVID-19 have not received the required attention in the literature. Asymptomatic COVID-19 patients, which constitute 70% to 80% of the patients do not have its most highlighted and putative clinical features like fever, cough, fatigue, and breathlessness. Some of the patients may have atypical symptoms such as disturbed smell and taste sensation. These patients pose a high risk to treating doctors especially E.N.T. surgeons who must therefore employ respiratory protective strategies.⁸

COVID-19 patients usually present with fever, cough, fatigue and short breath. The ear, nose and throat (E.N.T.) symptoms, which are common but not specific to Covid-19 patients, are sore throat, nasal congestion and discharge. The atypical E.N.T. symptoms which are said to be specific and indicators of COVID-19 and present in the asymptomatic patients, are anosmia/hyposmia and ageusia. They could be present even before the molecular confirmation of COVID-2. Upper respiratory tract (URT) symptoms were found in the initial stages of COVID-19 and were commonly found in younger patients⁹

The review study of Lovato and Filippis (2020)³ included 5 retrospective clinical studies for a total of 1556 hospitalized COVID-19 patients. Their pooled data showed following symptoms (in descending order of frequency): fever (85.6%), cough (68.7%), and fatigue (39.4%), pharyngodynia (12.4%), nasal congestion (3.7%). The symptoms of rhinorrhea and the dysfunctions of olfaction and gustation were found uncommon. The associated comorbidities found in their study were hypertension (17.4%), diabetes (3.8%), and coronary heart disease (3.8%).

The commonest presenting complaints in COVID-19 patients found in Ganes (2020)¹⁰ study, were fever and new onset dry cough. While the most commonly reported general symptoms in Lechien et al (2020)¹¹ study were cough, myalgia, and loss of appetite. In their study, the commonly reported disease-related otolaryngologic symptoms included face pain and nasal obstruction.

In one review study³, the chest computed tomography findings were seen in 83% of patients. Among them most patients (89.5%) had involvement of both the lungs. Ground-glass opacity was the most common finding (50%). On CBC, lymphopenia and leucopenia were observed in 77.2% and 30.1% respectively.

Chemosensory dysfunctions

The chemosensory dysfunctions (anosmia/hyposmia and ageusia/dysgeusia) was found strongly associated with Covid-19 ambulatory patients and should be considered when screening these patients. In most patients, chemosensory dysfunctions recover within weeks along with the resolution of other symptoms.¹²

Yan et al (2020) observed that identification of early or atypical symptoms (loss of smell and taste) of Covid-19 ambulatory patients was important as their timing and association in patients with Covid-19 can facilitate screening and early isolation of these cases which could prevent spread of the SARS-CoV-2 infection. The impairment of smell and taste were found strongly associated with Covid-19-positivity, whereas, sore throat was associated with Covid-19-negativity. These patients reported resolution of anosmia with clinical resolution of illness.¹²

Gane et al (2020)¹⁰ were also of the opinion that the ^{isolated} sudden anosmia (ISA) should be considered as highly suspicious for COVID-19. These asymptomatic patients may not develop any further symptoms except ISA.

The smell loss may be an early symptom that is associated with COVID-19 pandemic. Patients with viral upper respiratory tract infection (URTI) can have though uncommon associated olfactory loss. The patients with SARS-CoV-2 infection can present to physicians with olfactory dysfunction.¹³ In acute phases of viral URTI (common cold), smell loss usually occurs as a result of nasal inflammation, mucosal edema, and nasal obstruction. These features can impede the airflow into the olfactory cleft.¹⁴ In most cases of URTI, this smell loss is self-limiting and usually resolve with the resolution of URTI symptoms.¹³ However, in some cases of viral URTI, the olfactory dysfunction may persist for long period (months to years) due to a more direct olfactory insult by the virus. It is not yet established whether infection with SARS-CoV-2 causes persistent smell loss. Even if SARS-CoV-

2 causes persistent smell loss in some cases, then the overall prevalence of olfactory loss due to the high volume of the Covid-19 patients, could be quite large.¹³

The sudden anosmia and/or ageusia are important complaints in asymptomatic patients of COVID-19 disease. In the study of Lechien et al (2020)¹¹, olfactory and gustatory dysfunctions were found prevalent symptoms in European COVID-19 patients. In these COVID-19 patients, who did not have nasal discharge and stuffiness, olfactory and gustatory dysfunctions were found most prevalent symptoms. In some of their patients, olfactory dysfunction appeared before the other symptoms. Approximately half of their patients had early recovery olfactory dysfunction. Females were found affected more by dysfunctions of olfactory and gustatory than males.

Audiological Findings

The hearing loss in patients with Covid-19 is uncommon. COVID-19 infection can affect cochlear hair cell functions at an early stage of COVID-19 when patients are asymptomatic. Sriwijitalai and Wiwanitkit (2020)¹⁵ reported one elderly lady patient of COVID-19 who had coincident sensorineural hearing loss (SNHL). No improvement in hearing loss was observed during the recovery. Brainstem involvement has been reported in Covid-19 patient and that could be the cause of SNHL.

Mustafa (2020)¹⁶ compared the amplitude of transient evoked otoacoustic emissions (TEOAEs) and the thresholds of pure-tone audiometry between asymptomatic confirmed positive COVID-19 and normal subjects. The high frequency pure-tone thresholds and the TEOAE amplitudes in his study were observed significantly worse in COVID-19 patients. Further study on the audiological problem in patients with COVID-19 can reveal the exact pathogenesis of hearing loss in COVID-19 patients.

Classification of Symptoms

On the basis of the observations made during the current review of the clinical manifestations of COVID-19, author proposes the following classification of symptoms (Table 1): General, Respiratory, Nonspecific E.N.T., and Specific E.N.T. The nonspecific E.N.T. symptoms are common in other upper respiratory tract infections also however specific E.N.T. symptoms, which may also be called atypical symptoms, can be the indicators of COVID-19 disease.

Risks to Otolaryngologists

The healthcare providers having high risk of contagion are Ear Nose Throat (E.N.T.) Head and Neck surgeons, Anesthetists, Maxillofacial surgeons, Dentists, and Ophthalmologists. Health workers constitute 3.8% to 20% of the COVID-19 patients; 15% of them develop life-

threatening complications and many among them lose their lives.⁸

The otolaryngologists-head and neck surgeons who come in close contact with the upper aerodigestive tract of Covid-19 patients during diagnostic and therapeutic procedures, are at great risk of contracting the infection especially while managing critically ill patients requiring urgent interventions.⁵ The Safety Recommendations for Evaluation and Surgery of the Head and Neck during the COVID-19 Pandemic are evolving over time.¹⁷ Otolaryngologists usually partner with anesthesiologists and front-line health care teams which provide expert services in high-risk situations. Airway management and airway endoscopy, expose E.N.T. surgeons to infectious aerosols.¹⁸ Therefore their protection is of paramount importance.

Safety Recommendations

An N95 (Not resistant to oil) respirator mask is a respiratory protective device which provides a very close facial fit and is 95% efficient in filtering the airborne micro particles (0.3 micron). Filtering Face Piece Particles (FFP3) respirator mask, which has an APF (Assigned Protection Factor) of 20, offers greater protection than FFP2 and FFP1. A powered air-purifying respirator (PAPR), a personal protective equipment (PPE), which safeguards workers against contaminated air, is a battery-operated blower that provides clean air through a tight-fitting respirator.

Healthcare workers who are: over 55 to 65 years of age, pregnant, or having comorbidities like diabetes mellitus, hypertension, chronic obstructive pulmonary diseases (COPD), cardiac disorders, and immunosuppression (such as in organ transplants and chronic inflammatory disorders) should avoid the clinical care of a potentially infected Covid-19 patient.⁸ The additional safety measures, which can minimize direct contact to the patients, are pre-appointment screening, telemedicine and triaging.

The emergency otolaryngology procedures on positive, suspected, or unknown COVID-19 status patients should be performed using PPE, including an N95 / FFP3 respirator mask, eye protection or preferably PAPR, cap, gown, and gloves. Powered instrumentation (drill / Laser) should be avoided as far as possible, and if required, PAPR or sealed eye protection should be employed.¹⁹ While performing OPD procedures like rhinoscopy or flexible laryngoscopy and tracheostomy or rigid endoscopy under anesthesia, E.N.T. surgeons must wear PPE, which would maintain safety of medical and paramedical personnel.⁸ The clinical practice should be limited to emergencies and elective procedures should be postponed indefinitely.²⁰

Cancer patients should be managed on a case-by-case basis. Health workers who are treating COVID-19 infected

patients need isolation in the following settings: (1) Unprotected close contact with patients having COVID-19 pneumonia; (2) Fever, cough, fatigue, breathlessness and other atypical clinical features.⁸

All procedures, which can aerosolize aerodigestive secretions, should be performed only when strongly indicated. The current COVID-19 pandemic requires otolaryngologists to carefully select the operative and diagnostic E.N.T. procedures. However, the nature of many conditions treated by them need urgent operative evaluation and intervention in the airway, oral, and nasal cavities.²¹

Table 1: Symptoms of COVID-19 and their Classification

General Symptoms	Respiratory Symptoms	E.N.T. symptoms Nonspecific for COVID-19	E.N.T. symptoms Specific for COVID-19
Fever ^{2,3,9,10}	Cough ^{2,3,9,10,11}	Nasal congestion /stiffness / obstruction ^{3,9,11}	Anosmia / Hyposmia ^{3,8,9,11,12,13}
Fatigue ^{2,3,9}	Breathlessness ^{2,9}	Rhinorrhea / Nasal discharge ^{3,9}	Ageusia / Hypogeusia ^{3,8,9,11,12}
Myalgia ¹¹		Sore throat / throat pain / pharyngodynia ^{3,9,12}	Sensorineural hearing loss (uncommon) ^{15,16}
Loss of appetite ¹¹		Facial pain ¹¹	

Conclusions

The common E.N.T. clinical features which are not specific for Covid-19 patients are rhinorrhea, nasal congestion, and sore throat. The E.N.T. manifestations which could be specific and indicators of Covid-19 and present when the patients are asymptomatic, are dysfunctions of olfactory and taste sensations. The olfactory and gustative dysfunctions could be the only and presenting symptoms of COVID-19. The international community must be aware about these atypical symptoms (loss of smell and taste sensations) which could be indicators of COVID-19 and important in making early diagnosis so that desired protective measures could be implemented. It is not clear why only some COVID-9 patients develop ENT symptoms while others do not have any E.N.T. features. These issues need further research. Otolaryngologists are at great risk of occupational exposure due to their close contact with the patients during their examination and are among the most affected healthcare providers. E.N.T. surgeons should maintain high suspicion in asymptomatic patients and should prioritize urgent and emergency visits and elective procedures should be postponed. Other protective appliances and strategies include personal protective equipment, FFP3/N95 respirator mask, glasses, fluid resistant gloves and gown, pre-appointment screening, telemedicine and triaging. The safety measures recommended in this study should be employed in conjunction with supporting guidance from the local authorities and further evolving protective strategies.

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