



# Otolaryngology in the COVID-19 pandemic era: the impact on our clinical practice

Andreas Anagiotos<sup>1</sup> · Georgios Petrikkos<sup>2,3</sup>

Received: 10 April 2020 / Accepted: 19 June 2020 / Published online: 23 June 2020  
© Springer-Verlag GmbH Germany, part of Springer Nature 2020

## Abstract

**Purpose** To give an overview of the current knowledge about COVID-19 pandemic and its impact on otolaryngology clinical practice.

**Methods** Recent findings about SARS-CoV-2 virus and the COVID-19 infection it causes are reviewed. In addition to international databases and in the absence of hard scientific data, literature search included reports published online from scientific societies and other institutions.

**Results** The role of anosmia as a COVID-19-related symptom is presented. Further, considerations about steroid administration in ENT-related conditions are also discussed. Due to the close work with mucosa surfaces of the upper aerodigestive tract, otolaryngologists and surrounding staff are considered high risk for coronavirus transmission. Hence, staff protection measures for ENT examinations, surgeries and other procedures during COVID-19 pandemic are recommended.

**Conclusion** Knowledge and evidence about the impact of COVID-19 infection on otolaryngology clinical practice are accumulating rapidly. Additionally to patient's management, safety of health care professionals should be a main goal right now by following strict safety guidelines.

**Keywords** SARS-CoV-2 · COVID-19 · Pandemic · Otolaryngology · Clinical practice guidelines

## Introduction

The SARS-CoV-2 virus (severe acute respiratory syndrome coronavirus-2) is rapidly expanding around the globe [1] and the World Health Organization (WHO) declared COVID-19 (coronavirus disease) outbreak a global pandemic on March 11, 2020 [2]. SARS-CoV-2 virus is mainly transmitted between people through respiratory droplets and contact routes. Infected respiratory droplets enter the human body through the nose and mouth. Conjunctiva is also considered

to be a potential entrance point, although clear data proving this are not sufficient. Contact transmission by hands occurs through surfaces on which the virus is deposited. Aerosol transmission of the virus is plausible as well; however, doubtful evidence of this is still lacking. For healthcare workers, attention must be paid to all possible modes of transmission by taking appropriate protective and hygiene measures [3–5].

Otolaryngologists and surrounding staff are a high-risk group for COVID-19 infection, since they are particularly exposed to viral transmission directly through mucus and aerosolized particles during clinical examination, surgeries, or other interventions in the head and neck area. Evidence from China, Italy, and Iran and recently from the United Kingdom suggests that otolaryngologists are among the highest risk group of contracting the SARS-CoV-2 virus, especially when their examinations and procedures are performed without using appropriate personal protective equipment (PPE). Unfortunately, many of our ENT colleagues worldwide are victims of the pandemic [6–10].

The rapid evolution of the pandemic adds new data on the virus and its action almost daily. Our knowledge has initially

---

✉ Andreas Anagiotos  
andreas.anagiotos@gmail.com

<sup>1</sup> Department of Otorhinolaryngology, Nicosia General Hospital, 215 Nicosia – Limassol Old Road, 2029 Nicosia, Cyprus

<sup>2</sup> School of Medicine, European University Cyprus, Nicosia, Cyprus

<sup>3</sup> Infectious Diseases Research Laboratory, Fourth Department of Internal Medicine, University General Hospital Attikon, Medical School, National and Kapodistrian University of Athens, Athens, Greece

derived from anecdotal reports and subjective or empirical assessments, but has gradually evolved and now is based on reliable scientific data. Numerous online scientific publications are coming out, whereas scientific societies publish their recommendations about the otolaryngology practice in the COVID-19 era.

This paper aims to give a brief overview of the current knowledge about the impact of COVID-19 pandemic on otolaryngology using the best available evidence. Special focus is given on how this knowledge has changed or should change our daily medical practice. As our knowledge about the virus is rapidly increased, it is more than likely that these recommendations will be reviewed in the future.

## Anosmia and COVID-19

Over the last 3 months, there have been increasing reports that anosmia and to a lesser extent dysgeusia are significantly linked to COVID-19 disease. In April 2020, WHO added loss of smell and taste to the official lists of COVID-19 symptoms [11]. In particular, anosmia rates in SARS-CoV-2 positive patients vary significantly among studies and are in the order of 30–70%, while in some of the patients anosmia may be the only present symptom [12–16]. For example, new data arrive from a recently conducted European multicenter study in which patients with laboratory-confirmed COVID-19 infection completed olfactory and gustatory questionnaires. The results showed that 85.6% and 88.0% of patients reported olfactory and gustatory dysfunctions, respectively. Olfactory dysfunction (OD) appeared before the other symptoms in 11.8% of cases, whereas the early olfactory recovery rate was 44.0% [17]. In addition, results from the first 237 entries of the COVID-19 Anosmia Reporting Tool for Clinicians, developed by the American Academy of Otolaryngology-Head and Neck Surgery, revealed that anosmia was noted in 73% of patients prior to COVID-19 diagnosis and was the initial symptom in 26.6% [18]. There is a very high heterogeneity among studies, with proportions ranging from 5 to 98% [16]. Differences in clinical work-up, specific regional patient characteristics or viral strains might be possible explanations for these rate variations [15]. The COVID-19-related anosmia is reported to be different from the well-known post-viral loss of smell, which follows rhinitis or other upper respiratory tract infections. Interestingly, most patients report a sudden and almost complete loss of smell i.e. anosmia, which is rarely accompanied by other nasal symptoms, such as nasal obstruction, secretions, or rhinorrhea [19].

## Impact on otolaryngology practice

Anosmia (and dysgeusia) in the absence of other diseases of the upper respiratory tract (e.g. allergic rhinitis, acute and chronic rhinosinusitis) should raise the suspicion of COVID-19 infection. This should lead medical and paramedical staff to take the necessary measures for personal protection and warrant consideration for testing and self-isolation of these patients [12–14, 17, 20, 21]. Regarding changes on the therapy of anosmia during the pandemic see below at the “Medical treatment with steroid” section.

## Otolaryngological clinical examination

ENT clinical examination is considered a high-risk medical procedure for the transmission of the SARS-CoV-2 virus [7, 8, 22–25]. Particularly endoscopic examinations of the nose, sinuses, pharynx, and larynx are considered aerosol-generating procedures [26]. The virus appears to be present in the upper aerodigestive tract, with very high concentrations in the nasal cavity and nasopharynx compared to the rest of the pharynx [27]. It has also been shown that viral aerosol particles may remain in the air for three, if not more, hours [4]. Therefore, it is recommended that the precautions adopted for endoscopic examinations of the head and neck should be the same as for other aerosol-generating procedures [28].

## Impact on otolaryngology practice

Depending on the local circumstances, routine, nonurgent appointments should be postponed to limit the chance of virus infection of patients or healthcare professionals. Hence, otolaryngologists should limit their medical care activities to patients with time-sensitive, urgent, and emergent medical conditions [6, 28] such as head and neck cancers, airway emergencies, head and neck abscesses, acute otitis media, acute mastoiditis, complicated sinusitis, sudden hearing loss, facial paralysis or facial trauma [29]. In any case, the clinical examination should be limited to the absolute necessary diagnostic procedures [22]. Endoscopic examinations should be avoided if possible and should only be indicated if absolutely needed (e.g. increased suspicion or risk of malignancy, airway obstruction) [9, 24, 30, 31]. Regarding rhinologic examination, not only endoscopy but even anterior rhinoscopy should be performed only when absolutely indicated, according to a recommendation [10].

The use of high level PPE is mandatory when examining a patient confirmed or suspected for COVID-19, in particular during nasal and laryngeal endoscopy (Table 1). The appropriate PPE in such cases should include high

**Table 1** Recommended staff protection measures for otorhinolaryngology examinations and procedures during COVID-19 pandemic

Staff protection measures	Comment
Appropriate personal protective equipment (PPE)	High-level PPE: Scrubs, high protection mask (FFP2 or FFP3/N95), goggles or face shield, gown, surgical cap, and (double) gloves [3, 8, 14, 16, 19] Additional: PAPR [20] and a full protection suit [15] are less commonly suggested
Avoid local decongestants and anesthetics in form of sprays, use of carefully placed pledgets instead [8, 16, 17]	
Perform endoscopy with video monitoring [17, 20]	
Most experienced professional to perform the procedure [17, 20]	
Negative pressure room for the procedure [17, 20]	
Only necessary personnel in the room [17, 20]	

protection mask (FFP2 or FFP3/N95, depending on the source of recommendation), goggles or face shield, gown, surgical cap, and (double) gloves [3, 9, 22, 24, 25, 28, 29]. Physicians are also advised to wear theater clothes (scrubs) [24], whereas a full protection suit is less commonly suggested [22]. The patient himself should wear a mask in such cases [19, 28, 29].

Local decongestants and anesthetics in form of sprays should be avoided, to avoid sneezing and coughing. Instead carefully placed pledgets should be used [9, 23, 24]. In addition, endoscopy should be performed by video monitoring rather than use of eyepiece, to keep the patient's and health care worker's faces apart [24, 28].

Additional recommendations indicate that the examination should be performed by the most experienced professional and that the examination should take place in a negative pressure room and only the necessary personnel should be present [24, 28]. If a negative pressure isolation room is not available, endoscopic procedures can be

performed in a designated room equipped with a high-performance air cleaning system [29].

## Otolaryngology procedures

For the reasons analysed in the previous section, many ENT procedures are considered high risk due to the exposure of airway and mucosal surfaces that could generate contaminating droplets and aerosols.

### Impact on otolaryngology practice

#### Procedures in the examination room

A variety of emergency or not avoidable procedures performed in the ENT examination room are considered high risk and are summarized in Table 2 [23, 24, 28–30, 32]. During these procedures, the rules described above about staff protection (e.g. PPE) must be followed.

**Table 2** High risk for SARS-CoV-2 transmission procedures performed in the ENT examination room

Procedure	Comment
Nasal and laryngeal endoscopy	Avoid using local decongestants and anesthetics in form of sprays. Instead carefully placed pledgets should be used, as recommended for nasal endoscopy [8, 15, 16] Use video monitoring rather than the eyepiece [17, 20]
Tracheostomy care	See section “Tracheostomy”
– Routine suctioning	
– Post-operative tracheostomy tube changes	
– Speaking valve changes	
Epistaxis management	Avoid using local decongestants and anesthetics in form of sprays. Instead carefully placed pledgets should be used [8, 16, 17]
– Evaluation	
– Cauterization	Avoid electrical cauterization if possible (possible virus transmission via smoke), use chemical cauterization instead [24]
– Nasal packing placement, removal, or manipulation	
Peritonsillar abscesses management	Consider avoiding open drainage, use of antibiotic management or needle drainage instead [20]
Foreign body removal	If the removal is challenging (e.g. due to location, intolerant person), performing the removal under general anesthesia may be necessary [20]

## Procedures in the operating room

There is broad international consensus that not urgent/emergent and not time-sensitive (e.g. concerning malignancies) surgeries should be avoided during the pandemic [6, 9, 10, 29, 31]. Particularly, endonasal endoscopic sinonasal surgery and laryngological surgery (especially jet ventilated) appear to be the riskiest procedures [31]. Ideally, COVID-19 status should be determined preoperatively [28]. In case of an elective but time-sensitive surgery, advice should be given to all COVID-19-negative patients for social distancing and hand hygiene between the testing time and the time of surgery [7].

During the pandemic, all recommended staff protection measures described in Table 1 must be implemented. In particular, full PPE should be used not only in COVID-19 positive or high suspicious patients, but in COVID-19 negative or asymptomatic patients as well. In some reports, PAPR system (powered air purifying respirators) is recommended [28]. High-risk operations or operations in COVID-19-positive patients should be performed in a designated operating room with negative pressures [28], in which the smallest possible surgical team should be used both for reasons of safety and to preserve PPE [9, 19] (Table 1).

When performing the surgery, the use of powered devices (eg., drills, microdebriders) or ultrasonic shears should be avoided, since they may cause aerosolization of blood and other tissues [28, 33]. Even the use of electrocautery may be a risk factor for transmitting the virus via surgical smoke, although the infectiousness of aerosolized blood with SARS-CoV-2 is not yet known. Hence, it is advisable to keep the power settings of electrocautery as low as possible [28, 33].

## Rhinologic procedures

Nasal and transnasal endoscopic operations are very high-risk procedures for SARS-CoV-2 transmission, because of the high viral titers in nasal and nasopharyngeal mucosa. In addition, the use of powered instruments (eg., drill, microdebrider) and the frequent rinsing of the endoscope during the procedure may be a source of droplets and aerosolized viral particles [7–9, 27, 34, 35]. Recent experimental data suggest that cold surgical instrumentation and microdebrider use pose significantly less aerosolization risk than a high-speed drill [36].

## Impact on otolaryngology practice

In patients positive to COVID-19, the surgery should be postponed [9, 28]. In case that the surgery cannot be postponed, then the use of PAPR (Powered Air Purifying Respirators) additional to the appropriate PPE (Table 1) by all the

surgery room staff is recommended. Alternatively, an external approach is chosen if possible [9, 37]. If the patient is COVID-19 negative, the appropriate staff protection measures are needed (Table 1) [9, 28]. The same applies to the surgical management of epistaxis [32]. The use of powered instruments like shaver and/or drill should be limited or even avoided whenever possible [35].

## Head and neck oncology

Patients with head and neck cancer are obviously “time-sensitive” cases. Therefore, head and neck surgery will still be imperative and indicated in the care of these patients [23, 29]. The importance of surgical manipulation on mucosa surfaces is analyzed in the ENT examination section. Procedures without exposure of the mucosa, like neck or thyroid surgery, are lower risk. However, the use of electrocautery can result in aerosolization of the virus from the bloodstream and caution is needed, e.g. by keeping the power settings of electrocautery as low as possible [28].

## Ear surgery

Although not yet known whether the middle ear and mastoid are involved in COVID-19, it appears likely that the mucosa of the Eustachian tube, middle ear, and mastoid cells are contaminated. The involvement of the adjacent epithelium of the nose and nasopharynx in the disease and the fact that the middle ear mucosa is affected in other viral respiratory infections of the upper respiratory tract (including infections by other coronaviruses) makes this scenario possible. The surgical step that significantly increases the risk of virus transmission is drilling through the mastoid. During mastoidectomy, viral particles spread in the air in the form of droplets and aerosols and may be present there for several hours. Therefore, mastoidectomy is considered a high-risk procedure for all the operating room staff [28, 38, 39].

## Impact on otolaryngology practice

As with every ENT surgery during the pandemic, any patient undergoing any otologic surgery should be tested for COVID-19 preoperatively. In case of a positive result, surgery should be postponed until the patient has cleared the disease [28, 38]. In COVID-19-negative patients, it is imperative that not only the surgeon but all operating room staff takes protection measures as described above. According to the British Society of Otolaryngology, life-threatening urgent otological situations in which surgery cannot be delayed include acute mastoiditis, otogenic intracranial sepsis, and operable temporal bone malignancy. Moreover, a vestibular

schwannoma with life-threatening brainstem compression should be regarded as urgent as well. Surgery for cholesteatoma and implantation of auditory devices, adult and pediatric, should not be regarded as urgent [39].

An unavoidable mastoidectomy should be kept to a minimum or even be carried out with curettage rather than with drilling if possible (e.g., subperiosteal abscess). If drilling cannot be avoided tips for reducing aerosolization include drill speed and irrigation volume reduction, effective suctioning and good hypotension to minimize bleeding [39]. Moreover, various techniques of covering the surgical field and performing the drilling procedure under a drape have been described [40].

## Tracheostomy

Due to the amount of droplets and aerosols produced, tracheostomy and tracheostomy postoperative care (tracheostomy evaluation, suctioning, wound and tube changes, etc.) in COVID-19 patients is associated with a very high transmission risk to the entire health care team [31, 40, 41]. Except in extremely urgent cases, it is essential to determine the COVID-19 status of the patient preoperatively [42].

Comparing surgical with percutaneous tracheostomy, no concrete evidence exists about the less aerosol-generating procedure [43]. It is reported that percutaneous tracheostomy is associated with higher aerosolization risks compared with open tracheostomy, because of more extensive airway manipulation, such as bronchoscopy and/or serial dilations during trachea entry. Moreover, patients with high ventilatory settings may also require repeated connection and disconnection from the ventilatory circuit [44].

## Impact on otolaryngology practice

In COVID-19 patients, tracheostomy should be indicated by a multidisciplinary team and only if absolutely necessary [28, 31, 40, 41]. Based on the available data, the advantages of an early tracheostomy in severe COVID-19 patients have not been clarified [42, 43]. The nature of the COVID-19 disease is such that tracheostomy in ICU COVID-19 patients is of less importance. This is first due to the interstitial pneumonia caused with few secretions and second due to the fact that COVID-19 rarely leads to actual long-term intubations [19]. The possibility of tracheostomy may be considered in patients with stable lung condition; however, it should not occur earlier than 2–3 weeks after intubation and preferably with negative COVID-19 testing. On the other hand, it should be avoided during periods of respiratory instability or high respiratory dependence [42, 43].

When planning for open tracheostomy in an infected patient, there are several important perioperative

considerations that should be taken into account, as widely recommended [29, 41–44]:

1. Use of appropriate PPE: Table 1.
2. Location of the surgery: perform at the bedside in the ICU in negative-pressure rooms, the presence of adjacent anterooms is ideal. If performed in the operating room (OR), preferably in negative pressure ORs in special areas within the OR complex.
3. Use of suitable tracheostomy tube: nonfenestrated, cuffed.
4. Minimization of time of exposure to aerosolized secretions intraoperatively: ensure complete patient paralysis throughout the procedure to prevent coughing, stop mechanical ventilation just before entering into the trachea, reduce the use of suction, if suction needed this should be within a closed system with a viral filter.
5. Dedicated and experienced tracheostomy team, with preestablished communication plans.
6. Careful waste disposal and decontamination of equipment after the procedure.

Postoperatively, important considerations that should be taken into account include [28, 41–43]:

1. The tracheal tube cuff should be kept inflated and care should be taken to avoid leaks.
2. Tracheostomy tube changes should be delayed until COVID-19 testing is negative or until viral load is as low as possible. Subsequent scheduled tracheostomy tube changes should be also delayed.
3. Tracheostomy suctioning should be performed using a closed suction system with a viral filter. Circuit disconnection must be generally avoided.
4. During weaning, a heat moisture exchanger (HME) should be used to prevent virus spread or reinfection of patients.

## Pediatric otolaryngology

Crying and/or coughing is very common during pediatric ENT examination. Therefore, pediatric airway procedures or even simple examinations are considered highly likely to generate droplets or aerosols and health professionals should maintain a high level of precaution using appropriate PPE [29].

As in adult otolaryngology, all planned surgeries including operations on the adenoids and tonsils should be postponed unless there are extremely special indications. Indications for performing a pediatric ENT surgery during the COVID-19 pandemic include not only life-threatening emergencies, but also procedures that may reduce the need

for visiting the physician or prevent complications (e.g., ear tubes in young children with raging infections) [37, 45].

During the pandemic, newborn hearing screening, diagnosis, and treatment of hearing loss should be continued. ABR and/or other diagnostic audiological testing should be considered essential patient care. However, genetic testing, eye exam, or other testing could be delayed unless they directly impact patient management in the short-term [47].

## Medical treatment with steroids

According to the present knowledge, high doses of steroids are associated with worse outcome of the COVID-19 infection [46]. This information should be taken into account when we manage patients with conditions requiring steroid administration as a treatment option during the pandemic.

## Neurootological disorders

It is advisable to avoid high doses of corticosteroids for the treatment of Meniere's disease or sudden hearing loss in a COVID-positive patient. Intratympanic steroid injection could be an alternative management approach, although no data exist to support this [39].

## Bell's facial palsy

For COVID-19-positive patients, it is reasonable to avoid steroids, since Bell's facial palsy has a high rate of spontaneous recovery [39].

## Rhinologic diseases

A reasonable consideration concerns the use of topical nasal corticosteroids for the treatment of allergic rhinitis (AR) and chronic rhinosinusitis (CRS). So far there is no indication that their use may be a risk factor for SARS-Cov-2 virus infection or that they may negatively affect an existing COVID-19 infection. Therefore, adults and children undergoing treatment with nasal corticosteroids should continue their treatment and not modify or discontinue the therapy without consulting their doctor. Ceasing intranasal steroids could lead to more sneezing and thus easier transmission of the virus. Systemic steroids in patients with AR or CRS should be administered with caution and only in the absence or failure of other alternative therapies (e.g., patients with CRS in whom surgical therapy is not possible due to the pandemic, or patients with CRS with polyps in whom biological therapy with Dupilumab was not effective) [15, 47, 48].

## Anosmia

During the pandemic oral corticosteroids should be avoided in new cases of anosmia in the absence of an obvious cause (e.g., head trauma, nasal polyps), since recovery can occur in the first weeks after onset [14, 15, 20, 49]. Topical nasal corticosteroid application is controversial. Oral corticosteroids could be optionally recommended for patients with loss of smell more than 2 weeks as an isolated symptom or following resolution of any other COVID symptoms [50]. Despite existing recommendations against their use in patients with olfactory and gustatory dysfunction without nasal obstruction [20], the use of intranasal corticosteroids can be considered, in the form of spray formulation with a long applicator so the olfactory cleft can be reached to minimize potential viral spill. The controversy about corticosteroids brings attention to other treatment options for smell disorders, such as olfactory training, omega 3 supplements, topical vitamin A, and zinc [15, 50].

## Education

Given the recommendation that as long as the pandemic lasts, the smallest possible surgical team should be used, the presence of trainees and observers in the OR should be avoided. Training could be enhanced by recording the procedure digitally and share it with trainees at a later time [9, 38].

## Conclusion

The COVID-19 pandemic is an extraordinary challenge for the medical community. Since the SARS-CoV-2 virus has already expanded in the community in many countries of the world, each patient in which COVID-19 status cannot be confirmed should be managed as positive. Even if in many countries the pandemic is slowing down and medical practice is been adapted to new normality, a new pandemic wave in the upcoming winter is a possibility. Therefore, the way we practice medicine during the present or a new COVID-19 pandemic has to be based on scientific data and evidence. Otolaryngologists and surrounding staff are particularly at risk for COVID-19 infection. As with all health care professionals, their protection is essential for avoiding collapse of the health care system. As knowledge about COVID-19 infection rapidly evolves, we need to keep ourselves up to date and follow the respective recommendations. The need for future revisions of these recommendations based on more data and randomized controlled trials is imperative.

**Author contributions** AA: conceived the idea of the paper, performed literature research, and drafted the manuscript; GP: performed literature research, provided scientific revision of the manuscript.

**Funding** Not applicable.

**Data availability** Not applicable.

## Compliance with ethical standards

**Conflicts of interest** Not applicable.

**Ethics approval** Not applicable.

**Consent to participate** Not applicable.

**Consent for publication** Not applicable.

## References

- Bedford J, Enria D, Giesecke J et al (2020) COVID-19: towards controlling of a pandemic. *Lancet* 395(10229):1015–1018
- WHO, WHO Virtual press conference on COVID-19 (2020). <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/media-resources/press-briefings>. Accessed 11 March 2020
- DGHNO-KHC, BVHNO (2020) Aktuelle Informationen zum Thema Pragmatischer Personalschutz“ durch Schutzmasken/Visiere außerhalb von krankenhausspezifischen Covid-19-Isolations- und OP-Bereichen von Seiten der DGHNO-KHC und des BVHNO [https://cdn.hno.org/media/Corona-Ticker/Pragmatischer\\_Personalschutz\\_Info\\_DGHNO\\_BVHNO\\_30-03-20.pdf](https://cdn.hno.org/media/Corona-Ticker/Pragmatischer_Personalschutz_Info_DGHNO_BVHNO_30-03-20.pdf). Accessed 31 May 2020
- van Doremalen N, Bushmaker T, Morris DH et al (2020) Aerosol and Surface Stability of SARS-CoV-2 as Compared with SARS-CoV-1. *N Engl J Med* 382:1564–1567
- World Health Organization (2020) "Modes of transmission of the COVID-19 virus. Geneva: World Health Organization, Vols. <https://www.who.int/news-room/commentaries/detail/modes-of-transmission-of-virus-causing-covid-19-implications-for-ipc-precaution-recommendations>. Accessed 31 May 2020.
- American Academy of Otolaryngology–Head and Neck Surgery (AAO-HNS) (2020), New Recommendations Regarding Urgent and Nonurgent Patient Care, <https://www.entnet.org/content/new-recommendations-regarding-urgent-and-nonurgent-patient-care>. Accessed 31 May 2020
- The Australian Society of Otolaryngology Head and Neck Surgery (ASOHNs) (2020) Australian Guidance for ENT surgeons during the COVID-19 pandemic, <https://asohns.org.au/about-us/news-and-announcements/latest-news?article=78>. Accessed 31 May 2020
- American Academy of Otolaryngology–Head and Neck Surgery (AAO-HNS) (2020) Otolaryngologists and the COVID-19 Pandemic. <https://www.entnet.org/content/otolaryngologists-and-covid-19-pandemic>. Accessed 31 May 2020
- Patel ZM, Fernandez-Miranda J, Hwang PH, et al., (2020) Precautions for endoscopic transnasal skull base surgery during the covid-19 pandemic., [https://www.entnet.org/sites/default/files/uploads/covid-19\\_endosb\\_lettertoeditor\\_neurosurgery\\_updat\\_e3.23.20.pdf](https://www.entnet.org/sites/default/files/uploads/covid-19_endosb_lettertoeditor_neurosurgery_updat_e3.23.20.pdf).
- DGHNO-KHC, BVHNO (2020) Gemeinsame Empfehlungen der DGHNO-KHC und des HNO-BV - Warnung der Präsidien der HNO-Verbände, <https://www.hno.org/de/corona> Accessed 21 March 2020
- World Health Organization, Questions and Answers on coronavirus (COVID-19) (2020) <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/question-and-answers-hub/q-a-detail/q-a-coronaviruses>, Accessed on 08 June 2020
- American Academy of Otolaryngology–Head and Neck Surgery (AAO-HNS) (2020) Anosmia, Hyposmia, and Dysgeusia Symptoms of Coronavirus Disease, <https://www.entnet.org/content/aao-hns-anosmia-hyposmia-and-dysgeusia-symptoms-coronavirus-disease>, Accessed 01 June 2020
- Sociedad Española de Neurología (SEN) (2020) Recomendaciones de la Sociedad Española de Neurología (SEN) en relación con la pérdida de olfato como posible síntoma precoz de infección por CoVID-19, <https://www.sen.es> Accessed 01 June 2020
- ENT UK, Loss of Sense of Smell as Marker of COVID-19 Infection (2020) <https://www.entuk.org> Accessed 21 March 2020
- Vroegop AV, Eeckels AS, Van Rompaey V, et al. (2020) COVID-19 and olfactory dysfunction—an ENT perspective to the current COVID-19 pandemic. *B-ENT 1:1 (Epub Ahead of print)*
- Nunan D (2020) Loss of smell and taste as symptoms of COVID-19: what does the evidence say?, *The Centre for Evidence-Based Medicine*, Vols. <https://www.cebm.net/covid-19/loss-of-smell-and-taste-as-symptoms-of-covid-19-what-does-the-evidence-say/> Accessed 02 June 2020
- Lechien JR, Chiesa-Estomba CM, De Siati DR, et al. Olfactory and Gustatory Dysfunctions as a Clinical Presentation of Mild to Moderate forms of the Coronavirus Disease (COVID-19): A Multicenter European Study. *Eur Arch Otorhinolaryngol.* 1-11 (**published online ahead of print, 6 Apr 2020**)
- Kaye R, Chang CWD, Kazahaya K, et al. (2020) COVID-19 anosmia reporting tool: initial findings, *Otolaryngol Head Neck Surg*, (**published online ahead of print, 28 Apr 2020**).
- Lüers JC, Klußmann JP, Guntinas-Lichius O (2020) The Covid-19 pandemic and otolaryngology: what it comes down to? *Laryngo-Rhino-Otol.* <https://doi.org/10.1055/a-1095-2344> (**Online published: 26.03.2020**)
- European Rhinologic Society (2020) Information for rhinologists on COVID-19, Vols. [https://www.europeanrhinologicsociety.org/?page\\_id=2143](https://www.europeanrhinologicsociety.org/?page_id=2143). Accessed 2 June 2020
- Eliezer M, Hautefort C, Hamel AL, et al. (2020) Sudden and Complete Olfactory Loss Function as a Possible Symptom of COVID-19, *JAMA Otolaryngol Head Neck Surg* (**Published online April 8, 2020**)
- DGHNO-KHC (2020) Stellungnahme HNO Verbände: Atemschutzmasken für HNO-Ärzt\*innen sowie Phoniater\*innen besonders wichtig. [https://cdn.hno.org/media/Corona-Ticker/Stellungnahme\\_HNO-PP-Verb%C3%A4nde\\_zu\\_Atemschutzmaske\\_n\\_23-3-20.pdf](https://cdn.hno.org/media/Corona-Ticker/Stellungnahme_HNO-PP-Verb%C3%A4nde_zu_Atemschutzmaske_n_23-3-20.pdf). Accessed 31 May 2020
- American Head and Neck Society (AHNS) (2020) How COVID-19 is Affecting our Head and Neck Community: AHNS COVID-19 Bulletin. <https://med.uth.edu/orl/wp-content/uploads/sites/68/2020/03/AHNS-statement-on-COVID-19-2020-03-23.pdf>. Accessed 31 May 2020
- ENT UK (2020) Nasal endoscopy and laryngoscopy examination of ENT patients. <https://www.entuk.org>. Accessed 31 May 2020
- Krajewska J, Krajewski W, Zub K (2020) COVID-19 in otolaryngologist practice: a review of current knowledge. *European Archives of Oto-Rhino-Laryngology.* 1-13 (**published online ahead of print, 2020 Apr 18**).
- US Centers for Disease Control and Prevention (2020) Interim infection prevention and control recommendations for patients with suspected or confirmed coronavirus disease (COVID-19) in healthcare settings

27. Zou L, Ruan F, Huang M et al (2020) SARS-CoV-2 viral load in upper respiratory specimens of infected patients. *N Engl J Med* 382(12):1177–1179
28. Givi B, Schiff BA, Chinn SB, et al. (2020) safety recommendations for evaluation and surgery of the head and neck during the COVID-19 pandemic, *JAMA Otolaryngol Head Neck Surg* (Published online March 31, 2020)
29. Cho RHW, Yeung ZWC, Ho OYM et al (2020) Pearls of experience for safe and efficient hospital practices in otorhinolaryngology-head and neck surgery in Hong Kong during the 2019 novel coronavirus disease (COVID-19) pandemic. *J Otolaryngol Head Neck Surg* 49:1 (Published 15 Mai 2020)
30. ENT UK (2020) COVID-19 Tonsillitis and Quinsy Guidelines. <https://www.entuk.org/covid-19>. Accessed 31 May 2020
31. CEORL-HNS (2020) Confederation of the European Otorhinolaryngology and Head and Neck Surgery CEORL-HNS Statement to COVID-19. <https://www.ceorlhns.org/covid-19>. Accessed 31 May 2020
32. ENT UK (2020) COVID-19 Epistaxis Management. <https://www.entuk.org/covid-19>. Accessed 31 May 2020
33. Zheng MH, Boni L, Fingerhut A (2020) Minimally invasivesurgeryandthenovelcoronavirus outbreak:lessonslearnedinChinaand Italy. *AnnSurg* 272(1):e5–e6
34. American Academy of Otolaryngology–Head and Neck Surgery (AAO-HNS) (2020) Academy supports cms, offers specific nasal policy. <https://www.entnet.org/content/academy-supports-cms-offers-specific-nasal-policy>.
35. Van Gerven L, Hellings PW, Cox T et al (2020) Personal protection and delivery of rhinologic and endoscopic skull base procedures during the COVID-19 outbreak. *Rhinology* 58(3):289–294
36. Workman A, Bradley Welling D, Carter B et al (2020) Endonasal Instrumentation and Aerosolization Risk in the Era of COVID-19: Simulation, Literature Review, and Proposed Mitigation Strategies, *International Forum of Allergy and Rhinology*. p 1–8
37. ENT UK - British Association for Paediatric Otolaryngology (BAPO) (2020) BAPO statement on SARS Cov2 and Paediatric Otolaryngology Provision. <https://www.entuk.org/covid-19> Accessed 26 March 2020
38. Jackler RK (2020) COVID-19 and Ear Surgery, <https://med.uth.edu/orl/wp-content/uploads/sites/68/2020/03/COVID-19-Ear-Surgery-Jackler-2020-03-23.pdf>. Accessed 31 May 2020
39. ENT UK (2020) Guidance for undertaking otological procedures during COVID-19 pandemic. *British Society of Otolaryngology*. <https://www.entuk.org/guidance-undertaking-otological-procedures-during-covid-19-pandemic>. Accessed 31 May 2020
40. Kluge S, Janssens U, Welte T et al (2020) AWMF: S1-Empfehlungen zur intensivmedizinischen Therapie von Patienten mit COVID-19. AWMF - <https://www.awmf.org/leitlinien/detail/ll/113-001.html>. Accessed 31 May 2020
41. ENT UK (2020) Guidance for Surgical Tracheostomy and Tracheostomy Tube Change during the COVID-19 Pandemic. <https://www.entuk.org/tracheostomy-guidance-during-covid-19-pandemic>. Accessed 31 May 2020
42. American Academy of Otolaryngology–Head and Neck Surgery (AAO-HNS) (2020) Tracheotomy Recommendations During the COVID-19 Pandemic. <https://www.entnet.org/content/tracheotomy-recommendations-during-covid-19-pandemic>. Accessed 31 May 2020
43. ENT UK (2020) Framework for open tracheostomy in COVID-19 patients. <https://www.entuk.org/covid-19>. Accessed 31 May 2020
44. Tay JK, Khoo ML-C, Loh WS (2020) Surgical considerations for tracheostomy during the COVID-19 pandemic: lessons learned from the severe acute respiratory syndrome outbreak. *JAMA Otolaryngol Head Neck Surg* 146(6):517–518
45. A. S. o. P. O. (ASPO) (2020) Message from the President, March 23, 2020. [https://www.entnet.org/sites/default/files/uploads/asp0\\_03-23-20.pdf](https://www.entnet.org/sites/default/files/uploads/asp0_03-23-20.pdf). Accessed 31 May 2020
46. Russell CD, Millar JE, Baillie JK et al (2019nCoV) Clinical evidence does not support corticosteroid treatment for 2019nCoV lung injury. *Lancet* 20:30317–30322
47. DGHNO-KHC (2020) Stellungnahme Zur Anwendung von Glukokortikosteroiden bei entzündlichen Erkrankungen der oberen Atemwege bei COVID-19 [https://cdn.hno.org/media/Corona-Ticker/Positionspapier\\_Glukokortikosteroide\\_COVID-19\\_30-03-2020.pdf](https://cdn.hno.org/media/Corona-Ticker/Positionspapier_Glukokortikosteroide_COVID-19_30-03-2020.pdf).
48. Bousquet J, Akdis C, Jutel M, et al. (2020) Intranasal corticosteroids in allergic rhinitis in COVID-19 infected patients: An ARIA-AEACI statement. *Allergy* (In press)
49. Hopkins C, Surda P, Whitehead E (2020) Early recovery following new onset anosmia during the COVID-19 pandemic—an observational cohort study. *J Otolaryngol Head Neck Surg* 49(26):1–6
50. Hopkins C, Davies E, Alanin E et al (2020) Guideline for management of COVID-19 anosmia. ENTUK. <https://www.entuk.org/guideline-management-covid-19-anosmia>. Accessed 8 June 2020

**Publisher's Note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.