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Adjustments of audiological, vestibular and otosurgical management during COVID-19 epidemics

Prilagoditve avdiovestibulološke in otokirurške obravnave med epidemijo covid-19

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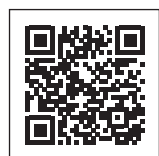
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Abstract

The epidemics of COVID-19 (coronavirus disease 2019), caused by SARS-CoV-2 (sudden acute respiratory syndrome coronavirus 2), was declared in Slovenia in mid-March 2020 and significantly influenced the health care system. To retain the spread of COVID-19, significant adjustments were required in medical institutions, including otorhinolaryngology hospitals. Audiological management (i.e. management of hearing disorders), vestibular management (i.e. management of balance disorders) and otosurgical management (i.e. surgical treatment of ear and temporal bone diseases), which pose a high risk of SARS-CoV-2 transmission, have also been adjusted. The virus is mostly transmitted through the upper aerodigestive tract, but other modes of transmission are also important. Otosurgical procedures can generate an aerosol which may contain SARS-CoV-2. Also, the otorhinolaryngologist is mostly in direct close contact with the patient's potentially infectious secretions during the examination and various medical or surgical procedures. This paper aims to present adjustments of audiological, vestibular and otosurgical management during the COVID-19 epidemic, based on our own experience in a tertiary otorhinolaryngological referral institution and that reported in the available literature. The paper presents indications for the above mentioned management and describes some adaptations of otosurgical techniques based on possible modes of SARS-CoV-2 transmission.

Izvleček

Epidemija covid-19 (*angl.* coronavirus disease 2019), ki jo povzroča virus SARS-CoV-2 (*angl.* SARS coronavirus 2), je bila v Sloveniji razglašena v sredini marca 2020 in je znatno spremenila zdravstveno obravnavo. S ciljem zavezati širjenje covid-19 so bile potrebne prilagoditve v zdravstvenih ustanovah, tudi v otorinolaringoloških. Prilagodila se je tudi avdiovestibulološka obravnavo (tj. obravnavo bolezni sluha in ravnotežja) ter otokirurška obravnavo (tj. kirurška obravnavo bolezni ušes in temporalne kosti), ki predstavljata visoko tveganje za prenos virusa SARS-CoV-2. Virus se namreč v največji meri prenaša preko zgornje aerodigestivne cevi, pomembni pa so tudi drugi načini prenosa. Pri otokirurških posegih nastaja aerosol, ki lahko vsebuje virus SARS-CoV-2. Poleg tega je otorinolaringolog med avdiovestibulološko in otokirurško obravnavo večinoma v neposrednem bližnjem stiku s potencialno kužnimi izločki bolnika. Namen tega prispevka je predstaviti posebnosti avdiovestibulološke in otokirurške obravnave v času epidemije covid-19, ki so nastala na osnovi naših izkušenj v terciarni otorinolaringološki ustanovi, in tudi tuje literature. V prispevku so navedene indikacije za avdiovestibulološko in otokirurško obravnavo ter opisane nekatere prilagoditve otokirurških tehnik, ki temeljijo na poznavanju možnih načinov prenosa virusa SARS-CoV-2.

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1 Introduction

From December 2019, the novel coronavirus, named SARS-CoV-2, has represented a serious threat to the health of the entire global population (1). The disease caused by the virus is called COVID-19 (i.e., the coronavirus disease 2019). In the early stages, COVID-19 is most frequently manifested atypically, with increased body temperature (98%), coughing (76%), and shortness of breath (55%). In a few days, the disease can advance to sudden acute respiratory syndrome, i.e., SARS, and later, in some cases, even to death. The morbidity for COVID-19 is high also because of the efficient transmission methods of the SARS-CoV-2 virus among humans (2).

Morbidity and mortality caused the pandemic scale of COVID-19, which has already taken many lives, including those of medical workers. In Wuhan, China, 30% of all COVID-19 patients in the early stages were healthcare workers (2). Otorhinolaryngologists are especially endangered with COVID-19. The first physician to die from COVID-19 in China was an otorhinolaryngologist (3). The reason for this is that otorhinolaryngology encompasses treating the diseases of the head and neck, making direct contact between an otorhinolaryngologist and the patient unavoidable. An otorhinolaryngologist is also in their day-to-day practice often in contact with patients who require otorhinolaryngological treatment because of increased body temperature, coughing, or shortness of breath, which are, as previously mentioned, the first signs of COVID-19. On the other hand, with some patients, especially with children, COVID-19 is often manifested with just a

mild clinical picture, or the SARS-CoV-2 infection is asymptomatic (so far) (4). Even the absence of proof of SARS-CoV-2 virus from the pharyngeal swab does not mean the absence of infection (2). All of this represents additional risk for an otorhinolaryngologist during this pandemic.

During the COVID-19 epidemic, the treatment of otorhinolaryngologic patients has to be planned carefully. It is essential to separate the patients who require treatment during the COVID-19 epidemic from those whose treatment can be postponed. The objective of this review article is to present the particularities of this audiological, vestibular and otosurgical management during the COVID-19 epidemic based on our own experience, the review of available literature and the practices from other countries. Particularities are the result of the method of transmission of the SARS-CoV-2 virus and the characteristics of audiological, vestibular and otosurgical management.

There are promising developments regarding some types of telemedicine in some segments of otorhinolaryngologic management that have been proven effective during the COVID-19 epidemic (5).

2 Transmission of the SARS-CoV-2 virus

The SARS-CoV-2 virus can be transmitted through excretions of the respiratory system or the digestive tract, as its presence has been proven, as far as it is currently known, in bronchoalveolar lavage, bronchoscopic biopsy material, oropharyngeal and nasopharyngeal swabs,

faeces and blood. Consequently, all bodily fluid excretions, except for sweat, have to be considered potentially infectious (6). The SARS-CoV-2 virus is apparently mostly transmitted through upper respiratory system and digestive tract with the coughing of the infected patient; however, transmission through sneezing, speaking, vomiting, saliva and blood is also important (7). In some medical procedures, aerosol is formed, which may contain the SARS-CoV-2 virus (8).

Consequently, the SARS-CoV-2 virus can be also transmitted through droplets (i.e., directly from the infected patient), through fomites (i.e., objects, contaminated with droplets that include the SARS-CoV-2 virus) or aerogenically (i.e., through aerosol). Even though the presence of SARS-CoV-2 virus was proven in faeces, the faecal-oral method of transmission has not been proven; however, it is not excluded. Transconjunctival transmission is also possible, especially from aerosolized bony microspicules that can penetrate the cornea (9). The presence of the SARS-CoV-2 virus was also proven in tears (10).

Every physician who can come in contact with a patient, infected with the SARS-CoV-2 virus, should know all possible methods of transmission. As there is still not enough research related to the methods of transmission of this virus, it is sensible to follow the results of the studies related to the SARS-CoV-1 virus (11).

3 Audiological and vestibular management

During the COVID-19 pandemic, social isolation is the cornerstone of retaining the spread of the disease by limiting contact between people. This can result in stress, anxiety, depression, insomnia, and even suicidality. Hearing loss can additionally impact mental health and also make communication between a patient with hearing loss and their physician more difficult as they both have to wear masks.

Masks reduce acoustic transmission and prevent lip reading, and make using a hearing aid more difficult. An even bigger problem is communication with hand gestures, as the 1.5 m to 2 m distance of the interpreter means that the gestures are more difficult to recognise. Deaf and hard of hearing people belong in risk groups during the COVID-19 epidemic.

Even with insufficient literature, it has to be emphasised that impairment of hearing and balance is possible in a patient, infected with the SARS-CoV-2 virus. These impairments can occur independently (i.e., independently of the infection), or are directly connected to the infection. With regard to the neurotropism of the SARS-CoV-2 virus and the impairment of the brain stem that can be caused by a different coronavirus, the SARS-CoV-2 virus could directly cause detectable hearing loss or balance impairment. There is currently, as far as we know, only one described case of detected hearing loss in a patient with COVID-19, which was not causally linked to the infection with the SARS-CoV-2 virus (13). There is a higher probability for conductive hearing loss, which can be the result of the Eustachian tube dysfunction when suffering from acute rhinosinusitis from the SARS-CoV-2 infection (14). The causes for vertigo in 65% of cases belong in the field of systemic diseases, in 20% they are due to the impairments of the peripheral vestibular organ, and in 15%, the impairments stem from the central nervous system. We assume that vertigo could be an important symptom of the SARS-CoV-2 infection, as it can result in complications with severe systemic diseases. Therefore, a patient with systemic diseases and accompanying vertigo (as a leading symptom) visits an otorhinolaryngologist as the first specialist (15,16). Nausea with vomiting can also be a starting symptom of the infection with the SARS-CoV-2 virus, which can incorrectly lead to otorhinolaryngologic treatment due to suspected acute vestibular syndrome (17).

Audiological and vestibular manage-

Table 1: Indications for audiological and vestibular management during the COVID-19 epidemic.

Indications for audiological and vestibular management
Idiopathic sudden sensorineural hearing loss.
First attack of Ménière's disease and related syndromes.
Acute vestibular syndrome with a severe clinical picture.
Suspected perilymph fistula.
Management before otosurgical procedures.
Management after injury of temporal bone.

Notes: With perilymph fistula the history of the injury can be negative, so this disease is also described under audiological and vestibular management.

Audiological and vestibular management during the COVID-19 epidemic is performed before certain procedures listed in Table 3.

COVID-19 – the coronavirus disease 2019

ment, which in a narrow scope includes examinations of hearing and balance function, is necessary during the COVID-19 epidemic for the diseases and conditions listed in Table 1. It is recommended to avoid systemic corticosteroids, which can worsen the outcome of the infection with the SARS-CoV-2 virus, even asymp-

tomatic ones. Therefore, for treating idiopathic sudden sensorineural hearing loss and Ménière's disease, we recommend intratympanic corticosteroid administration only. It is important that the patient does not spit during this procedure, so as not to spread the SARS-CoV-2 virus. With Bell's palsy and the late-onset facial nerve palsy following a temporal bone fracture, the use of a systemic corticosteroid is only permitted after excluding an infection with the SARS-CoV-2 virus. During this treatment, the patient should not be in contact with a person who is infected with the SARS-CoV-2 virus (18). With acute vestibular syndrome (AVS), the impairment of the central nervous system has to be excluded first, which requires a thorough medical history and examination. If AVS is suspected, an examination from a neurologist is required because of the impairment of the central nervous system. AVS without suspected central nervous system lesion requires otorhinolaryngological management. With patients with a more severe clinical picture (i.e., the inability of normal food intake because of nausea and vomiting, the danger of systemic complications of vomiting, severe gait instability, comorbidities, etc.) or with patients who become incapable of living alone after the onset of AVS (i.e., absence of home assistance), the patient has to be admitted to the otorhinolaryngology department for a few days of therapy, and for audiological and vestibular management. Hospital admission should be as short as possible. Third stage nystagmus is not a contraindication for performing vestibular examinations; vHIT (video head impulse test) can be performed. With a high clinical suspicion of perilymph fistula, otosurgical therapy is required, while adhering to all the precautionary measures described below. With a temporal bone fracture and before the otosurgical procedure, audiological and vestibular management is key for determining the level of impairment and the prognosis of the disease, and to decide about treatment and hearing reha-

Table 2: Safety measures for audiological and vestibular management during the COVID-19 epidemic.

Safety measures for audiological and vestibular management
Rejecting all patients with signs of respiratory disease.
Appropriate personal protective equipment for the physician and the patient.
The examinations should only be performed by a single audiometrist, the one with the most experience.
No unnecessary waiting between individual audiological and vestibular examinations.
Regular airing of silent chambers.
Vestibular testing in the smallest possible extent.
Priority for examinations that do not provoke nausea or vomiting (vHIT).

Notes: Minimum required personal protective equipment consists of nitrile gloves, booties, cap, water-resistant gown, eyewear and a FFP3 mask. Silent chamber is a space where hearing examinations take place.

COVID-19 – coronavirus disease 2019; vHIT – video head impulse test

bilitation. CT and MRI of temporal bones are almost always added to the functional assessment of the inner ear, which is an obstacle during the COVID-19 epidemic.

Because of the described possible methods of transmission of the SARS-CoV-2 virus, we must adhere to key precautionary measures also during audiological and vestibular management (Table 2).

4 Audiological and vestibular management

The SARS-CoV-2 virus is located in the mucosa of the upper respiratory system; therefore, a nasopharyngeal swab is the cornerstone of diagnosing COVID-19. Unlike other types of coronavirus (19), the SARS-CoV-2 virus has not been found in the middle ear. Its presence in the middle ear is highly likely, as the middle ear is connected with the nasopharynx through the Eustachian tube (4,18). The presence of the virus has also been proven in blood (7). Mere otoscopy (i.e., an ear examination) represents a risk for the virus transmission because of a direct contact with the patient, and a possible cough response to touching the ear canal, therefore it is understandable that otosurgical procedures pose a risk for transmitting the SARS-CoV-2 virus.

The risk for transmitting the SARS-CoV-2 virus during an otosurgical procedure is very high because of the possibility of the so-called aerosolization. An aerosol is a particle with a diameter of $< 10 \mu\text{m}$, traveling with the air currents. It can penetrate beyond the vocal cords, and if its diameter is $< 5 \mu\text{m}$, it can even reach alveoli (20). This means that the virus is transmitted very efficiently via aerosol. Because of aerosol's long range, the virus can even reach more distant locations. This has also been confirmed by studies where aerosolization proved the presence of blood in ventilation ducts of operating rooms (19). Aerosol retains the persistence of SARS-CoV-2 for three hours (21). Otosurgical procedures, which are characterised by

bone drilling and suction, have been proven to cause aerosolization, and are therefore a high risk for aerogenic virus transmission (3).

For every patient, we have to weigh the necessity of further management, and then by using our experience and existing literature, classify them into those who demand urgent, emergent or very fast otosurgical management (Table 3). If management is not required, regular patient monitoring must be ensured, so that we can recognise any exacerbation. Conservative treatment methods and less extensive otosurgical procedures are preferable, when possible. Elective (i.e., planned) management, such as surgical treatment of chronic tympanic membrane perforation without signs of acute inflammation, cholesteatoma with a stable clinical picture, chronic otitis media with effusion, and a suspected otosclerosis are not performed during the epidemic (4).

4.1 Urgent otosurgical management

Urgent otosurgical management is needed for diseases that can immediately cause permanent significant health impairment or death. They must be conducted without waiting during the otorhinolaryngologic management. Having an empty stomach is not a prerequisite. Because of the exceptional urgency, otosurgical procedures are performed without first conducting examinations on the presence of an infection with the SARS-CoV-2 virus, therefore the strictest precautionary measures are in place during otosurgical management.

Urgent otosurgical management is needed in life or health-threatening complications of middle ear infection (intracranial: e.g., otogenic meningitis, cerebral abscess, thrombophlebitis of the cavernous sinus, and systemic, such as sepsis), and the malignancies of the temporal bone (e.g., haemorrhage, advancing impairment of the central nervous system) (18,22).

Complications of otosurgical operations must be managed only when there is risk of death or permanent health impairment (e.g., haemorrhage or post-operative infection) (Table 3) (22).

4.2 Emergent otosurgical management

Emergent otosurgical management is needed for diseases that can emerge quickly and demand urgent management, which results in death or permanent significant health impairment. The patient requires immediate hospitalisation. The otosurgical procedure has to be performed during the hospitalisation, when the patient has an empty stomach, and the results of the SARS-CoV-2 virus test are negative. This should be performed within 24–48 hours of establishing the diagnosis.

The diseases that require emergent otosurgical management include infections, foreign bodies, injuries and complications following surgical treatment (Table 3).

In acute mastoiditis, emergent procedures are the insertion of a tympanostomy tube, and with abscess-causing infection (e.g., mastoid subperiosteal abscess) a cortical mastoidectomy (4,9,18). Acute otitis media demands emergent otosurgical management with myringotomy, and if needed, the insertion of a tympanostomy tube (e.g., with a history of chronic otitis media with effusion), in the event of unresponsiveness or an exacerbation of the disease, even with intravenous therapy (4,9,22). In a facial nerve palsy with a concurrent acute otitis media, an emergent myringotomy is needed, and if needed, an insertion of the tympanostomy tube is performed (18). The same applies to labyrinthitis. For facial nerve palsy with cholesteatoma, the most suitable approach is emergent mastoidectomy and a decompression of the facial nerve (18).

Malignant otitis externa requires emergent debridement of external auditory canal, and the administration of intravenous and topical antibiotic treatment. Hospital

stay should be as short as possible (18). Auricle abscess should be treated otosurgically (e.g., abscess-causing auricular perichondritis, cellulites). With smaller abscesses, puncture aspiration is suitable instead of a drainage incision.

The presence of a foreign body in the external auditory canal requires emergent otosurgical management if the removal of the foreign body is not possible in an outpatient service, or when hospital admission is needed because of a concomitant infection or injury. Special attention should be paid to the button battery in the external auditory canal, as it may cause a chemical injury (4). If a foreign body reaches into the middle ear, in some cases, a tympanoscopy would be required to remove all potential foreign bodies.

Injuries (e.g., stabs, cuts) to the extratemporal part of the facial nerve require emergent exploration and reconstruction of the nerve.

Because of the risk for permanent aesthetic deformation, impairments to the auricle (e.g., othematoma, tear or amputation of the auricle) have to be resolved emergently. Because of the risk for irreversible hearing loss, injuries to the external auditory canal have to be managed emergently. Damage to the middle ear requires emergent otosurgical management, especially when stapes dislocation or perilymph fistula are suspected. (18,22).

The fluctuating swelling in the area of the receiver of the cochlear implant with signs of infection (e.g., infected hematoma) is treated surgically and conservatively (antibiotic). Fluctuating swelling (hematoma, seroma) without signs of inflammation is treated in an emergent otosurgical manner, following failed conservative treatment (cold compresses, sleeping with an elevated head, compression, avoidance of cochlear implant usage) with an increasingly large swelling. In some cases, the removal of the infected cochlear implant from the temporal bone is necessary.

4.3 Very fast otosurgical management

Very fast management is mostly conducted on out-patients with more frequent otosurgical examinations with diseases that are still exacerbating, or with hospital stay, which is intended to prepare the patient for operation (e.g., imaging, additional surgical procedures). An otosurgical procedure is planned between 48 hours and 30 days. The patient is first tested for the presence of the SARS-CoV-2 virus.

With advanced cholesteatoma or a recalcitrant infection, it is reasonable to begin antibiotic treatment (topical and if needed, systemic) and regular cleaning (i.e., site preparation) of the ear before the operation. This can be performed in an outpatient service or during a hospital stay. Because additional imaging (e.g., CT of the temporal bones), audiological and vestibular management and patient isolation (Table 3) are often required before the otosurgical procedure, hospital stay is more reasonable. After appropriate preparations, the otosurgical procedure is performed very fast (4,9).

Hearing rehabilitation after meningitis-induced hearing loss requires insertion of a cochlear implant within 4 weeks of completing meningitis treatment, as at 4 weeks the inner ear begins to ossify, making the insertion of a cochlear implant impossible (4,9,18,22,23).

The paralysis of the facial nerve from fractured temporal bone requires very fast otosurgical treatment (i.e., nerve decompression) (9).

A tumour of the inner ear canal and cerebellopontine angle, which compresses the brain stem, and a temporal bone cancer require multidisciplinary treatment (e.g., otorhinolaryngologists of different subspecialties, neurosurgeon), and an extensive range of examinations before the surgery, as well as preparing the patient, which is not always possible within 48 hours. For that reason, it is recommended that the treatment be very fast or as fast as

possible, within 30 days (9,22). Retrosigmoid approach (18) has priority, as unlike with transmastoid and translabyrinthine approaches, there is no contact with the middle ear mucosa. The middle fossa approach is also reasonable (9).

With high-flow oto-liquorrhea, which is not traumatic or iatrogenic (i.e., spontaneous oto-liquorrhea), the surgical closure should be performed as soon as possible, and the management should be very fast (9). In some cases, it is required to first apply lumbar drainage to lower the intracranial pressure for a better outcome of surgical closure, then introduce appropriate antibiotic prophylaxis for preventing the infection of the central nervous system, and audiological and vestibular management, followed by an otosurgical procedure with the participation of a neurosurgeon (depending on the location of the cerebrospinal fluid leak).

4.4 Adjustments of otosurgical techniques

Otosurgical procedures in patients with known COVID-19 or when the COVID-19 status is unknown (Table 3) should be performed in operating rooms with negative pressure and HEPA filtration (4) or operating rooms with a possibility of regular ventilation. Proper personal protective equipment must be used during an otosurgical procedure. Because of the need to use the otologic microscope, the use of eyewear, face shields or similar protective measures for the eyes is made considerably more difficult (9,22). With patients who require emergent or very fast treatment and who are COVID-19 negative, it is recommended to use a FFP3 mask, thicker or double sterile gloves, water-resistant surgical gown and surgical cap (4,9). In COVID-19 positive patient or in urgent otosurgical treatment, when there is no time to wait for the results of the SARS-CoV-2 virus, using a powered air-purifying respirator (PAPR) is recommended (4,9). If the use of a PAPR is not

Table 3: The most important indications for otosurgical management during the COVID-19 epidemic.

The most important indications for otosurgical management
Urgent management (<i>no waiting during management and no results of the swab for the SARS-CoV-2 virus</i>)
Acute complications of otitis media with risk of death or permanent health impairment (e.g., otogenic meningitis, cerebral abscess, sepsis).
Malignoma of the temporal bone with risk of death (e.g., haemorrhage, advancing impairment of the central nervous system).
Life threatening complications from otosurgical procedures (e.g., haemorrhage, infection).
Emergent management (<i>within 24-48 hours and with a result of the swab for SARS-CoV-2 virus</i>)
Abscess-causing infection of the external ear (cellulitis, perichondritis).
Injury of the external ear (e.g., haematoma and tear of the auricle, injury to the external auditory canal).
Malignant otitis externa.
Foreign body in the external auditory canal after failure of outpatient removal or a concomitant injury or inflammation (e.g., button battery).
Acute mastoiditis.
Haematoma/seroma/abscess in the area of the receiver of the cochlear implant.
Acute otitis media, unresponsive to conservative treatment.
Facial nerve palsy with acute otitis media.
Facial nerve palsy with cholesteatoma.
Facial nerve palsy due to the injury of the extratemporal part of the facial nerve.
Injury of the middle ear (e.g., large tympanic membrane perforation, dislocated stapes, perilymph fistula).
Foreign body in the middle ear.
Labyrinthitis.
Life threatening complications from otosurgical procedures (e.g., haemorrhage, infection).
Very fast management (<i>as soon as possible, between the 2nd and the 30th day, and with a swab result for the SARS-CoV-2 virus</i>)
Cholesteatoma with a persistent infection or advanced cholesteatoma.
Meningitis-induced deafness.
Temporal bone fracture with facial palsy.
Tumour of the inner ear canal and cerebellopontine angle, which compresses the brain stem.
Temporal bone malignoma.
High-flow oto-liquorrhea (not traumatic or iatrogenic).

Notes: Indications are based on our experience and foreign literature (4,9,18,22).

COVID-19 – coronavirus disease 2019; SARS-CoV-2 – sudden acute respiratory syndrome coronavirus 2

possible because of the need to use an operation microscope, headlight, or loupes, it is recommended to use a FFP3 mask, goggles, thicker or double sterile gloves, a water-resistant surgical coat, and a surgical cap (9,24).

Otosurgical procedures should be performed by the most surgically experienced team (18). The number of people in the operating room should be as low

as possible, as all those present in the operating room are susceptible to infection with the SARS-CoV-2 virus. The presence of a surgical team is not permitted until intubation has been performed. The surgeon must alert the anaesthesiology team to use endotracheal intubation in order to reduce the chance of the transmission of the SARS-CoV-2 virus (4,9).

Mastoidectomy should be avoided, if possible (4). If a mastoidectomy is necessary (e.g., with mastoiditis), it should be less extensive (e.g., cortical) and performed with low-rotation drilling (4) of approximately 10,000 rotations per second, if possible. Instead of drilling, a curettage can be performed, or the mass can be chiselled and gouged (9,18,22). In mastoiditis with an inserted cochlear implant, drilling is necessary. During the mastoidectomy irrigation should be performed precisely (i.e., not excessively), while the liquid and bone particles should be suctioned using non-fenestrated suctions (18,25). Because the drilling is an aerosol-generating procedure, a tent was developed to isolate the otosurgeon from the operating field. Aerosol transmission range was shorter when using this tent; however, the study did not perform research of the smallest particles (3). The range of the aerosol still

poses a problem. Thus, if possible, the use of electrocauterization and laser should be avoided, as they are aerosol-generating (19). With fluctuating swellings (seroma, haematoma, or abscess) needle aspiration has the advantage over drainage incision, if possible, as this presents a closed system.

5 Conclusion

This article includes the adjustments of audiological, vestibular and otosurgical management during the COVID-19 epidemic. It is useful for all otorhinolaryngologists and other physicians who are in contact with patients who require otorhinolaryngologic treatment. According to the literature, the measures for managing the COVID-19 epidemic in healthcare institutions that include the use of appropriate personal protection equipment and careful treatment planning are effective and should be adhered to (26,27). Because of the fast development of disaster conditions, there is still a lack of studies; therefore, it will be possible to improve the presented adjustments in the future. This article can be used for planning a treatment during other disaster medicine scenarios (e.g., natural disaster).

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