

Otolaryngology-Head and Neck Surgery Perspective of COVID-19

COVID-19 Salgınında Kulak Burun Boğaz ve Baş Boyun Cerrahisi Perspektifi

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The world faced with a novel form of coronavirus in December 2019. The virus initially named as 2019-Novel Coronavirus (2019-nCoV). Later the virus started to be named as COro-naVirus Disease 2019 (COVID-19) by World Health Organization (WHO) and SARS-CoV-2 from Coronavirus Study Group (CSG) of the International Committee.¹

The sources of infection, the route of transmission between individuals and susceptible hosts are the main transmission dynamics of any infectious disease.² However the potential source(s) and transmission dynamics of COVID-19 was not clearly understood.¹ Human-human transmission may occur due to aerosols transmission, respiratory aspirates, droplets, direct contacts and even feces.³ The basic reproductive values (R0) of COVID-19 at the early stage were reported between 2 to 3.5 which has been found higher than severe acute respiratory syndrome

(SARS) and Middle East Respiratory Syndrome (MERS).⁴ This means any subject can transmit the virus 2 to 3 subjects. The mean incubation period ranges from 0 to 24 days with a mean 6.4 days.³

It is demonstrated that COVID-19 have similar aerosol and surface stability with SARS under experimental conditions.⁵ Analysis of symptomatic subjects indicate that high viral load exists soon after symptoms and the viral load that was detected in nose was higher than the throat. This finding is different from influenza and SARS infection. Most important finding related with COVID-19 is the viral load in asymptomatic subjects is similar with symptomatic subjects which highlights the importance of asymptomatic subjects in COVID-19 transmission.^{6,7} Since asymptomatic subjects are the sources, transmission dynamics of COVID-19 needs to be reassessed from every potential subspecialty.

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Classical symptoms of COVID-19 include fever (84.5-92.9%), cough (40.8-74.4%) and dyspnea (10.9-80.4%).⁸ Anecdotal and self-reports from different institutions indicate that anosmia/hyposmia, and dysgeusia symptoms frequently occurred during the outbreak. However the actual incidence and importance of this finding need further assessment. American Academy of Otolaryngology Head and Neck Surgery (AAO-HNS) screening the situation of COVID-19 for various aspects.⁹ The AAO-HNS also released an anosmia reporting tool for clinicians and gathering the data about this anecdotal evidence.¹⁰

Nosocomial transmission is an important problem for COVID-19. A high number of nosocomial transmission was reported in early phase of the outbreak. There is no preventive vaccine or prophylactic drug for COVID-19 for now. The transmission can only be reduced by isolation and following strict hygiene rules that limits viral transmission. Aerosol generating procedures (AGPs) have a risk of transmission during acute respiratory tract infections (URTI).¹ According to literature; tracheal intubation, tracheotomy, non-invasive/manual ventilation, endotracheal aspiration, bronchoscopy, nebulizer treatment, administration of O₂, manipulation of masks, defibrillation/chest compressions, insertion of nasogastric tube, and collection of sputum were referred as AGPs and studied previously.¹¹ In any URTI including COVID-19, one of the most overlooked examination was done from Otolaryngology-Head and Neck Surgery specialists that may have a significant risk for COVID-19 transmission.^{12,13}

Routine Otorhinolaryngology examination includes otoscopy, rigid/flexible nasopharyngoscopy and laryngoscopy/stroboscopy. All these procedures can produce sneezing and cough that generate aerosols which will lead to viral contamination and transmission. On the contrary to the other invasive procedures such as intubation, bronchoscopy etc., most of these procedures are performed in “healthy” subjects in office based setting. In the current outbreak, subjects that are admitting to health centers were also widely examined by otolaryngologist. The long incubation period of the infection, prolonged shedding of virus after recovery of subjects, carrier

potential of asymptomatic subjects, direct contact with high viral load areas etc. were all related with the increased risk of contamination of Otolaryngology-Head and Neck Surgery specialists, the examination/operating room and equipment.^{3,7} Evidence and anecdotal experience from China, Italy and Iran indicated that Otolaryngology-Head and Neck Surgery specialists carry an increased risk of COVID-19 transmission from several aspects.^{12,13}

ROUTINE OTOLARYNGOLOGY EXAMINATIONS

Since the COVID-19 dynamics were not well established, the standard examinations need to be done in subjects with clear indication and need.¹³ Vukkadala et al. reported that approximately 80% of the office visits decreased according to subspecialty during outbreak.¹² Although routine otolaryngology examinations are made in huge numbers, there may be an underreported risk for the contamination of rigid/flexible endoscopes. For contamination of endoscopes; aerosol dissemination is not needed since they reach to high viral load areas and may become contaminated directly from nasopharynx, oropharynx and the sputum originating from the lower airways. The endoscopes are in steel or plastic structure in which; virus can stay stable for several days. COVID-19 was more stable on plastic and stainless steel surfaces than other ones. For plastic and steel surfaces, the half-life of COVID-19 was 6.8 and 5.6 hours respectively.⁵ Although the virus titers decrease with time; virus was viable even 72 hours after contamination in both plastic and steel surfaces. Direct contact of medical staff with endoscopes may transmit virus to gloves, mask or clothes which all serve additional source of infection in which the transmission can occur in vicious cycle. There is no standardized guideline for endoscope sterilization for current COVID-19 outbreak. If not properly sterilised, a contaminated endoscope itself carry a risk to transmit viral material to directly to the nose and oropharynx. Even the endoscope is properly sterilized, any contaminated otolaryngology specialist can make it contaminated. Besides it is also possible to damage the healthy mucosa during the procedure which breaches the normal mucosal integrity and defense. The risk of contami-

nation significantly increases if the mucosal integrity violated.

Use of appropriate personal protective equipment (PPE) as well as disinfection of equipment and potential surfaces are important issues for otolaryngologists. Public Health England has agreed that interventions related with the upper airway procedures should be regarded as Aerosol Generating Procedures (AGPs).¹⁴ British Association of Otorhinolaryngology-Head and Neck Surgery (ENTUK) suggested to use Filtering Facepiece 3 (FFP3) respirator on any subject that have a potential for AGP's. In the absence of FFP3 respirators, FFP2 or N95 equivalent of the respirator provides adequate protection. However the importance of preserving the respirators is an important issue to preserve stock. For nasal procedures, use of sprays should be avoided and topical anesthesia needs to be achieved with cotton pledgets. For laryngeal examination, use of sprays and maintaining local anesthesia is needed. By using monitor, the physicians, and subjects, face can be kept apart. Office based procedures (e.g. laryngeal injections) need to be delayed if possible.¹³ The decontamination process is also important and use of PPE during decontamination process and use of appropriate solutions are advisable. Decontamination procedure differs according to centers and is beyond the topic of this article. Self-contamination is possible especially when removing or "doffing" the PPE.¹²

TRACHEOTOMY

The actual need for tracheotomy and the appropriate timing for elective tracheotomy in subjects with COVID-19 is not well defined. Rodriguez-Morales et al. included 19 articles (retrieved from 660 articles that published in two months period) and 39 case reports for reporting clinical, laboratory and imaging features of SARS COV-2.⁸ Among 656 subjects, 10.0 to 30.6% of the confirmed subjects needed an intensive care unit (ICU) stay.

However when indicated, tracheotomy needs a special care. Tran et. al reviewed 10 studies related with SARS for aerosol generating capacity and highlighted 4 procedures as high risk procedures includ-

ing tracheal intubation, non-invasive ventilation, manual ventilation and tracheotomy.¹¹

Aerosol can be in the air up to 3 hours. Like routine endoscopes the team should be aware that surgical area directly related with high load areas and direct contamination is possible. The Personal Protective Equipment (PPE) are mandatory however direct contamination of clothes, equipment is possible.¹⁵ The teams not only restrict themselves from aerosol exposure also need to give paramount attention for other transmission of virus infected materials. Since the actual timing of viral clearance do not exists, subjects may still be the source of infection despite treatment.¹⁶

AAO-HNS suggested to perform tracheotomy according to institutional and team policy in subjects with stable pulmonary status. If possible, tracheotomy should be carried out 2-3 weeks after intubation under strict procedure management rules and preferably needs to be done in COVID-19 negative subjects. Minimum number of staff should perform tracheotomy with a special consideration on potential cuff leaks, circuit disconnections and unreported possible risks.¹⁵ ENTUK also suggested to use of cuffed non-fenestrated tracheostomy tubes. ENTUK offered the development of COVID core airway teams that will deal with crisis better and highlight the simulation of tracheotomy from the core team days/weeks before procedure. Step by step planning of tracheotomy (planning-pre procedure preparation-procedure steps and post procedure protocols) need to be developed from core teams according to centers environment. Tracheotomy performing environment also needs to be taken into consideration, for example ceasing laminar flow through the OR and providing a negative pressure/isolation room are the place related factors.¹⁶

OTOLARYNGOLOGY OPERATIONS

Critical healthcare sources need to be preserved for outbreak. This includes equipment, supply and medical staff. Almost all adult elective surgery and medical/surgical procedures were currently limited around the globe.¹⁷

As highlighted previously, data from all around the globe indicates that Otolaryngology-Head and

Neck Surgery specialists carry an increased risk for COVID-19 infection.^{12,13} A high risk of transmission has been reported among otolaryngologists and may result in death. Due to high viral load in nasal cavity and nasopharynx, nasal surgeries including endoscopic sinus surgery, skull base surgery are now accepted as high risk operations. Factors increasing the risk of transmission during surgery were aerosol generating potential of endoscopic examination, the saline irrigation, use of powered instruments and drills. Same precautions need to be taken in transoral surgery and all types of surgeries related with the airway.

The urgency of the procedure, the age and comorbid diseases of the subjects, local condition of COVID-19, the condition of PPE's in the health centers, availability of bed and ventilators, actual situation of intensive care unit, potential transmission of COVID-19 to healthy elective subjects, the situation of the places that subjects stay during recovery all needs to be taken into consideration when planning a surgery.¹⁴

British Society of Otolaryngology and ENTUK also commented on otology operations.¹⁸ Although the risk is low, using drills may be resulted with aerosolisation of the bone.¹³ Some previous reports indicate that some viral material exists in middle ear epithelium during infections however this finding was not showed for COVID-19.^{19,20} The urgency of the otological procedures need to be made on case-by-case basis. The maximum use of PPE's including eye protection during the surgery was outlined. Some specific advices was given from ENTUK. If an otological procedure needs to be done, surgery needs to be performed from the most experienced surgeon with least staff in operating room. The drill may be used in slow speeds under good hypotension. Using microscope and keeping drilling in minimum are the other advices.

According to the data from China, 1% of the subjects were 10 years old or younger.¹² COVID-19 pediatric subjects can also be asymptomatic and their potential role for transmission also needs to be kept in mind when performing these procedures on children.

CONCLUSION

The outbreak resulted with an enormous amount of subjects that were admitted to the hospitals. Despite ultimate efforts, desired sterilization properties and infection control goals may not be achieved. All possible transmission routes needs to be taken into consideration when planning the control of virus transmission. Current literature indicated that asymptomatic subjects are important sources of transmission and these subjects needs to be taken into consideration especially when they are subjected to invasive procedures. Otolaryngology-Head and Neck Surgery procedures were not evaluated in the literature widely but this point can be an underreported way of viral transmission and inoculation. Specific risks of each specialty need to be evaluated separately since these outbreaks will be the most challenging reality of our race in the future.

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

All authors contributed equally while this study preparing.

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