

## Article

# Treatment COVID-19 virus-positive patients after laryngectomy in a hospital

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**Abstract:** The coronavirus pandemic is spreading rapidly around the world. The health systems of all countries faced extraordinary problems in terms of the creation and distribution of medical resources, including the re-equipment and creation of new hospital beds, and the provision of personal protective equipment. The patients who undergo a laryngectomy are a special category. Given the fact that during the operation they have a separation of the upper and lower respiratory tract, in the context of the COVID-19 pandemic, such patients require special attention from oncologists and otorhinolaryngologists. Purpose of the study is to review the characteristics of patient management after a laryngectomy in a COVID-19 pandemic. Laryngectomy patients represent a unique contingent in conditions of coronavirus infection SARS-CoV-2, it is advisable to focus on providing them with protective equipment. This will significantly reduce the risk of infection with their virus, which can be a deadly threat to them. Infected patients during an epidemic represent a potential source of infection for medical personnel, which requires special protective measures. All procedures associated with the replacement of the prosthesis, endoscopic manipulations, it is advisable to postpone until the normalization of the epidemiological situation. If carrying out such operations is vital, then they should be carried out, observing all necessary precautions for both the patient and medical personnel.

**Keywords:** coronavirus pandemic, COVID-19, laryngectomy

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## 1. Introduction

COVID-19 is caused by the SARS-CoV-2 (Severe acute respiratory syndrome-related coronavirus 2) coronavirus, which is genetically related to the SARS family and the Middle East Respiratory Syndrome (MERS) virus and is a recombinant virus between bat coronavirus and an unknown coronavirus. The genetic sequence of SARSCoV-2 is similar to the SARS-CoV sequence by at least 79% [1, 2].

In the last two years, the SARS-CoV-2 (Severe acute respiratory syndrome-related coronavirus 2) pandemic has been taking place. The transmission of infection is carried out by airborne droplets, airborne dust and contact routes [3]. The leading route of transmission of SARS-CoV-2 is airborne, which is realized when coughing, sneezing and talking at a close (less than 2 meters) distance. The contact route of transmission is carried out during handshakes and other types of direct contact with an infected person, as well as through food, surfaces and objects contaminated with the virus, activation of the hypothalamic-pituitary-adrenal and adrenergic systems, changes in behavioral reactions, as well as the occurrence of anxiety state [4-12]. At the same time, the morphological causes of such reactions are not fully understood [13-14].

## 2. Features of examination of patients after laryngectomy under covid-19 epidemic

The defeat of the pharynx and larynx by a tumor process leads to disabling consequences [4-6]. Moreover, the rehabilitation of such patients is an extremely difficult process [7-10].

Given the presence of a high viral load in the upper respiratory tract, all ENT procedures are high-risk procedures, and otorhinolaryngologists are at risk for COVID-19 infection.

The most common symptoms of coronavirus infection are cough (dry or with little sputum) in 80% of cases; shortness of breath (55%); fatigue (44%); a feeling of congestion in the chest (> 20%).

Testing for COVID-19 is most often done by swabbing the oropharynx and nasopharynx. But given that the breathing of patients after laryngectomy is carried out through a tracheostomy, it is advisable to consider testing for SARS-COV-2 by detecting the virus in tracheal aspirates and from the nasal cavity, which is consistent with the WHO recommendations.

Any diagnostic and therapeutic procedures in the upper respiratory and digestive tracts, as a rule, cause coughing and should be considered as potentially dangerous in terms of aerosol transmission for medical personnel [3]. To limit the transmission of COVID-19 and to maximize the safety of medical personnel, it is shown to use personal protective equipment (PPE), and, if possible, even to cancel or postpone a dangerous procedure (AAO-HNS).

Taking into account the peculiarities of the anatomy, as well as the volume of laryngectomy [3, 5, 9], which is associated with the formation of a tracheoesophageal fistula and voice prosthetics, all medical recommendations should be organized in such a way as to minimize the possibility of transmission of the SARS-COV-2 virus from the patient to the medical staff. In this case, the use of personal protective equipment is relevant.

In patients after laryngectomy, there is no nasal breathing and untreated air through the tracheostomy directly enters the respiratory tract, which, as a rule, is accompanied by severe cough. At the same time, aerosol transmission of viral particles can significantly increase, compared with an ordinary person, when the protective function of the nose is preserved [5, 9]. So, during the outbreak of the SARS epidemic in 2003, a significant concentration of viral particles was determined in tracheal aspirates. Therefore, the issue of care and contact with the patient after laryngectomy, both in inpatient and at home, is extremely important. Based on this, we recommend that any patient after laryngectomy be considered as potentially dangerous and infected with COVID-19.

We recommend a standard set of personal protective equipment for staff in contact with COVID patients to prevent infection of medical personnel when examining all patients after laryngeal surgery. It should be noted that the use of respirator No. 95 and a protective screen for the face in 100% of cases effectively protects the employee from infection [3].

In the case when an in-person consultation is absolutely necessary (examination after surgery, complications, suspicion of a relapse of the disease), it is important to "screen" these patients even before visiting the clinic. It is advisable to take a thorough history and conduct an examination for COVID-19.

It is important to note that a patient with a tracheostomy must use a respiratory heat exchanger with a viral-bacterial hygroscopic filter and cover the tracheostomy with a mask, scarf or clothing during a visit to the clinic [11].

### 3. Treatment of patients with the COVID-19 virus in a hospital.

When a patient is admitted to a hospital and planning treatment, it is extremely important that all medical workers of the department understand the surgical anatomy of the airways in a patient after laryngectomy. The attention of the personnel should be emphasized that the use of oxygen masks and nasal catheters in such a patient will be useless, since the upper respiratory tract is "turned off" from breathing as a result of the operation, and oxygenation occurs only through the tracheostomy. Under ideal conditions, it is advisable to test all incoming patients for COVID-19.

However, if testing is not possible, all patients should be treated as potentially infected and all feasible remedies should be used. It is extremely important for patients to use heat exchangers with viral or bacterial filters attached to the tracheostomy area.

In case of severe coughing and profuse sputum secretion, special tracheotubes with powerful HEPA-filters can be used. And such a patient can be placed in a room with negative pressure and / or a closed ventilation system in order to prevent the spread of viral particles to other rooms. In some cases, it is advisable to use mechanical ventilation in auxiliary modes in order to provide a closed breathing circuit for the patient (even if his oxygenation does not suffer greatly). It is also important to use mechanical barriers over the tracheostomy (transparent blocks with holes for the doctor's hands), which is especially important at the time of intubation and extubation, when caring for the tracheotomy tube. The main thing in this situation is to prevent the spread of aerosol particles of the virus by any possible means.

Each patient after laryngectomy in the ward should have an individual suction, which the patient should be trained to use even before the operation. When caring for such patients, strict use of PPE is necessary, at least until negative tests for COVID-19 are obtained.

In case of a negative COVID-19 status for patients, it is still recommended to use HME with viral and bacterial filters from the very first hours after the operation, as well as wear a mask on the face and neck (which will provide a mechanical obstacle to the spread of the virus).

The patient should be explained that it is not necessary to touch the tracheostomy unnecessarily, and after all hygiene measures have been taken, hands should be thoroughly washed. Caring for the skin around the tracheostomy is very important to reduce airway contamination.

After laryngectomy, self-contamination (contamination with viral particles of one's own airways) is also possible during the use of a voice prosthesis and when closing the tracheostomy with a finger, therefore it is so important to focus the patient's attention on frequent hand washing. During an epidemic, the use of HANDS-FREE systems becomes extremely relevant, which allow the patient after laryngectomy not to touch the tracheostomy with a finger at all during speech load.

#### 4. Conclusions

Considering the fact that patients after laryngectomy are a unique contingent in conditions of SARS-COV-2 coronavirus infection, it is advisable to focus on providing them with protective equipment (filters and heat exchangers). This will significantly reduce their risk of contracting the virus, which could pose a lethal threat to them.

In addition, already infected patients themselves during an epidemic represent a potential source of infection for medical personnel, which requires the use of special protective measures.

It is advisable to postpone all procedures related to the replacement of the prosthesis, endoscopic manipulations until the epidemiological situation normalizes. If the conduct of such operations is vital, then they should be carried out, observing all the necessary precautions for both the patient and the medical staff.

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