

# Principles of qualification and surgical treatment of the nose and paranasal sinuses in the era of coronavirus

## Zasady kwalifikacji i leczenia chirurgicznego w obrębie nosa i zatok przynosowych w dobie koronawirusa

Paweł Witkowski, Andrzej Skorek

Department of Otolaryngology, Medical University of Gdansk, Poland; Head: Bogusław Mikaszewski MD PhD

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### ABSTRACT:

**Introduction:** The COVID-19 pandemic is one of the greatest challenges of modern medicine. Despite implemented social and economic restrictions, the epidemiological situation is still dynamic. Otolaryngologists, especially rhinologists, are at particular risk of SARS-CoV-2 infection. In order to reduce the spread of the virus, it is necessary to implement procedures to minimize the risk of transmission between healthcare professionals and patients. Due to the location of the virus, it is very important with regard to rhinologic procedures and surgery.

**Literature review:** We reviewed the literature on the topic and presented effective methods of reducing the likelihood of virus transmission during surgery of the nasal and paranasal sinuses performed in our center. It is important that the restrictions brought about by the pandemic do not affect the length of diagnostic process and delay initiation of oncological treatment. Malignancies of the nasal region and paranasal sinuses are detected relatively late due to the time the symptoms appear, and further delays starting therapy can be extremely unfavorable. We believe that at present rhinologic procedures, especially in people with unknown epidemiological status, should be limited to the necessary minimum – life-threatening conditions and tumor resections. Even in such cases, however, it is necessary to strictly follow the procedures in order to reduce the risk of virus transmission. We hope that implementation of the guidelines presented in this work will help fight against the current pandemic and its subsequent waves.

### KEYWORDS:

COVID-19, otolaryngology, rhinology, SARS-CoV-2

### STRESZCZENIE:

**Wstęp:** Pandemia COVID-19 jest jednym z największych wyzwań współczesnej medycyny. Pomimo wdrożonych restrykcji społecznych i gospodarczych, sytuacja epidemiologiczna wciąż pozostaje dynamiczna. Otolaryngolodzy, a w szczególności rynolodzy, stanowią grupę lekarzy szczególnie narażonych na zakażenie SARS-CoV-2. W celu ograniczenia rozprzestrzeniania się wirusa, należy wdrożyć procedury minimalizujące ryzyko zakażenia personelu medycznego oraz pacjentów. Ze względu na miejsce bytowania wirusa, bardzo istotne jest to w odniesieniu do procedur i operacji rynologicznych.

**Wnioski:** Autorzy dokonali przeglądu piśmiennictwa dotyczącego podejmowanego tematu oraz przedstawili skuteczne metody zmniejszające prawdopodobieństwo transmisji wirusa podczas operacji nosa i zatok przynosowych stosowane w naszym ośrodku. Ważne jest, aby ograniczenia związane z pandemią nie wpływały na czas trwania diagnostyki i rozpoczęcia leczenia onkologicznego. Ze względu na czas pojawiania się objawów, nowotwory regionu nosa i zatok przynosowych są wykrywane stosunkowo późno, zaś dalsze opóźnienia rozpoczęcia procesu terapeutycznego mogą działać wyjątkowo niekorzystnie. Uważamy, że obecnie operacje rynologiczne, szczególnie u osób o nieznanym statusie epidemiologicznym, powinny być ograniczone do niezbędnego minimum – stanów zagrażających życiu oraz resekcji nowotworów złośliwych. Nawet w tych przypadkach konieczne jest jednak ścisłe przestrzeganie procedur zmniejszających ryzyko transmisji wirusa. Mamy nadzieję, że wprowadzenie wskazań przedstawionych w poniższej pracy pomoże w walce zarówno z obecnie panującą pandemią, jak i jej kolejnymi falami.

**SŁOWA KLUCZOWE:** COVID-19, otolaryngologia, rynologia, SARS-CoV-2

### ABBREVIATIONS

**ACE2** – angiotensin converting enzyme 2  
**ARDS** – acute respiratory distress syndrome

**CT** – computed tomography  
**PAPR** – powered air purifying respirator  
**SARS-CoV-2** – severe acute respiratory syndrome coronavirus 2  
**WHO** – World Health Organization

## INTRODUCTION

The coronavirus pandemic is one of the greatest challenges of modern medicine. The virus was first identified on January 12, 2020 and named SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2). The official name of the disease caused by the virus, COVID-19, was given by the WHO (World Health Organization) on February 11, 2020. Since then, despite various attempts to stop the spread of the disease, 76,531,942 people have been infected and 1,689,892 patients have died from the disease (as of 19.12.2020). In Poland, COVID-19 infection was confirmed in 1,194,110 patients, of which 25,254 have died. Despite the implemented social restrictions and the so-called „lockdown” of the economy, the number of new cases remains high (or very high) (about 10 000 infections per day) [1]. This means that it is still necessary to follow certain procedures related to the care of patients treated in outpatient clinics and hospital wards. Otolaryngological procedures, rhinology in particular, are a special case – referred to by many authors as treatments with a high risk of spreading the virus through aerosolization. It is necessary to establish standard operating procedures for dealing with patients in both outpatient specialist clinics and hospitals (including surgical theaters) in order to combat the current epidemic, as well as the expected next waves.

## PATHOGENESIS AND CLINICAL PICTURE

SARS-CoV-2 is a newly diagnosed betacoronavirusvirus with 86.9% homology to a coronavirus found in bats (*Rhinolophus sinicus*), which are considered a reservoir of the SARS-CoV-2 precursor. Currently, patients with COVID-19 constitute the main source of infection. The receptor for SARS-CoV-2, angiotensin converting enzyme 2 (ACE2), is located in the epithelium of lung alveoli. Binding of the virus to the receptor can cause damage to the alveolar epithelium leading to varying degrees of respiratory failure and even death. Virus is sensitive to high temperatures (dies at 30 minutes of exposure to 56°C), it is also inactivated by chemicals, such as 75% ethanol or chlorine disinfectants. Aerosol droplets and direct contact constitute the main routes of infection. The main symptoms include elevated body temperature (usually above 38°C), cough, shortness of breath, fatigue and muscle pain, impaired sense of smell and taste, less frequently headache, hemoptysis and diarrhea. Patients in severe condition most often develop acute respiratory distress syndrome (ARDS), which can be accompanied by arrhythmia, shock, acute renal failure or acute myocardial injury. Diagnosis of COVID-19 is based on a positive PCR result, detecting virus RNA in swabs from the nasal part of the throat and/or the posterior wall of the throat. If a positive result is obtained, it is advisable to perform a repeat examination at least one day later for confirmation [2].

## PREHOSPITAL MANAGEMENT

Already during the diagnosis and qualification of patients for rhinologic treatment, there is a number of methods that can reduce the risk of transmission of infection. Many scientific publications

reiterate the recommendation to increase the role of telemedicine in the diagnosis and treatment of ambulatory patients [3, 4, 6, 7]. It is also recommended to limit endoscopic procedures to the necessary minimum– especially nasal fiberoptic, as there is a high risk of spreading the virus [6]. During the necessary endoscopic procedures, the room should be well-ventilated and only the doctor conducting examination and the patient should be present. Due to the fact that the virus is primarily in the nasal part of the throat, the Stanford University Department of Rhinology has recommended the use of anesthetic-soaked swabs instead of anesthetic aerosols [7]. If possible, endoscopic examination should be replaced by radiological tests, e.g. CT scan of the sinuses or facial bones, as procedures with lower risk of spreading the virus.

## DIAGNOSIS AND ONCOLOGICAL TREATMENT IN THE ERA OF COVID-19

During the COVID-19 pandemic, it is necessary to limit elective surgeries of nasal and paranasal sinuses. In the current situation, only the necessary rhinologic procedures should be performed, such as those on patients with difficult-to-control hemorrhages, abscesses or invasive fungal nasal and paranasal sinusitis. Patients diagnosed with malignant neoplasms of the nasal region and paranasal sinuses should be prioritized [3].

It is very important that the epidemiological situation does not delay oncological diagnostics of cancers of the nasal region and paranasal sinuses. These tumors, especially in highly advanced stages, significantly worsen prognosis when accompanied by SARS-CoV-2 infection. Even before the coronavirus pandemic patients reported to ENT with symptoms of malignancy quite late due to the fact that symptoms present at an advanced stage of the disease. Currently, for fear of coronavirus infection, patients report to the doctor even later. Before commencing the diagnostics (especially biopsies) it is necessary to determine the COVID-19 status of the patient. For this reason, a swab should be taken from the nasal part of the throat for PCR testing and/or a chest CT scan should be performed. It is also important to continue multidisciplinary meetings, which should be conducted as teleconferences.

Identification of oncological patients in whom treatment can be postponed until the end of the pandemic is a very important and difficult problem. This group includes patients with non-malignant tumors, patients whose treatment will have little effect on improving the quality of life and survival, as well as patients with numerous comorbidities and after intensive treatment – as they will be at an increased risk of perioperative infection [4].

Oncological patients who are actively infected with COVID-19 should undergo treatment for a viral infection as soon as possible and, after obtaining negative PCR results, treated oncologically. In patients who recovered, special care should be taken, and they should be treated in the same way as infected patients with the use of full personal protective equipment. On the other hand, if it is not possible to postpone oncological treatment in infected patients, the treatment process should be commenced with radiochemotherapy as a method preferred to surgery [4, 5, 7].

## RHINOLOGIC PROCEDURES

Rhinologic procedures in the pandemic era are associated with a very high risk of infection due to the primary location of the virus – the nasal part of the throat [7]. As we well know, there is currently no effective screening method available for asymptomatic carriers of the virus [2]. Therefore, all patients undergoing rhinologic surgery at the current stage of the pandemic should be treated as potentially infected. Each patient scheduled for surgery should have a detailed medical history taken, be screened for symptoms of COVID-19 and undergo PCR testing for SARS-CoV-2 infection.

If surgical treatment is required in patients with confirmed infection, it is recommended that surgery should be performed in an operating room with negative pressure. Any unnecessary equipment should be removed from the operating theater [2]. The necessary equipment should be protected by plastic covers [5]. The number of persons in the operating room should be limited to the necessary staff [3]. Theater door should remain closed throughout the operation. During induction and intubation, only an anesthesiologist and anesthetic nurse should be present in the room. Staff members responsible for providing additional equipment or necessary medicines should be placed outside the operating theater. Patient should be inducted, anesthetized, operated on and woken up in the operating room in order to avoid contamination of other premises [5]. While patient is under anesthesia, it is advisable to use appropriate muscle relaxing agents, which eliminate the cough reflex and reduce the risk of spreading the virus.

During the procedure, the operating team should be secured with full personal protective equipment – a waterproof medical cap, protective mask (N95 or N99), an impermeable insulating apron, two pairs of latex gloves, shoe covers, anti-fog protective goggles, a full protective visor or a powered air purifying respirator (PAPR) [2]. If possible, drills and microdebriders should be avoided

during surgery and this equipment significantly increases the risk of aerosolization and transmitting infection to staff [6]. If it is necessary to use such tools, they should be turned on and off inside the nasal cavities. Operations should be carried out in two-person teams. Assisting surgeon uses suction close to the operator's tools to limit the spread of aerosol. In case of surgeries involving the base of the skull, extradural and transdural access is indicated – it is associated with the probable neurotropism of the virus [4].

Patient's stay in the operating theater should be as short as possible. The operating room should be disinfected immediately after surgery. Each member of staff should wash thoroughly after the procedure and change into a clean uniform before returning to daily duties. All elements of personal protective equipment must be disposed of in infectious waste bags. The contact data of all persons participating in the procedure should be written down in order to facilitate possible future contact [5].

A patient with COVID-19 may be discharged from hospital or transferred to another ward if he/she meets the following conditions: body temperature returns to normal for more than 3 days, changes observed in the CT scan regress, and two consecutive negative PCR test results for SARS-CoV-2 [2] are obtained.

## CONCLUSION

Despite implemented social and economic restrictions, the COVID-19 pandemic continues to progress. Otolaryngologists, and rhinologists in particular, are especially vulnerable to SARS-CoV-2 infection. In order to carry out the diagnostics and rhinologic treatment safely, it seems necessary to strictly follow the above guidelines. We hope that as our knowledge of pathophysiology and treatment of COVID-19 grows, the information contained in the above manuscript will be systematically updated.

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Corresponding author: Paweł Witkowski MD; Department of Otolaryngology, Medical University of Gdansk, Poland; Smoluchowskiego street 17, 80-214 Gdansk, Poland; E-mail: [pawelwit2@gmail.com](mailto:pawelwit2@gmail.com)

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