

PRECAUTIONS FOR ENDOSCOPIC TRANSNASAL SKULL BASE SURGERY DURING THE COVID-19 PANDEMIC

Key Words: COVID-19, coronavirus, transmission, endoscopic surgery, extended endoscopic skull base surgery, personal protective equipment (PPE), Powered Air Purifying Respirators (PAPR)

Zara M. Patel, MD; Juan Fernandez-Miranda, MD; Peter H. Hwang, MD; Jayakar V. Nayak, MD, PhD; Robert Dodd, MD, PhD; Hamed Sajjadi, MD; Robert K. Jackler, MD

Stanford University School of Medicine
Departments of Otolaryngology-Head & Neck Surgery and Neurosurgery

On March 12th 2020 the World Health Organization (WHO) officially announced the COVID-19 outbreak a pandemic, where to date there have been over 300,000 cases resulting in 13,000 deaths worldwide.¹ The COVID-19 pandemic is accelerating within the United States, and any information that we can garner from the experiences of our international colleagues who have already experienced this, or are currently going through it, should be utilized to protect our patients, our hospital teams and ourselves.

In this note we will share reports we have heard from colleagues in China, Italy, and Iran about the high rate of COVID-19 transmissions to otolaryngologists, including a number of deaths, as well as additional media reports from the UK and Greece.

The compilation of information below is anecdotal, based primarily on personal communication with international colleagues reporting their individual experiences, and more data is needed before policies are formalized. However, we feel that this limited information is sufficiently compelling to suggest exercising an abundance of caution until more data accumulates. Our goal with this preliminary, rapid article is to alert surgeons of the need to alter their practices to avoid repeating the unfortunate experience of the early period of the epidemic.

Dr. Xiaoguang Tong, Professor and Chief of Neurosurgery at Tianjin Huanhu Hospital and leader of the Tianjin Emergency Medical Team deployed in Wuhan, China to combat the COVID-19 outbreak, has informed us that the first case with the most widespread infection in Wuhan was an endoscopic pituitary surgery. This has now also been documented via another source in China Newsweek.² Fourteen people involved in that case became infected with COVID-19. He has also shared that a significant number of doctors who died in China were anesthesiologists/critical care doctors, ophthalmologists, and otolaryngologists, possibly due to the high viral shedding from the nasal cavity. This has now been confirmed in the media as well.³

This logically makes sense to us based on data showing higher viral load in the nasal cavity compared to the throat, as well as the knowledge that if the viral particles become aerosolized, they stay in the air for at least 3 hours, if not longer.^{1,5} This is concerning for nasal endoscopy, and even more so for endoscopic surgery.

Transnasal endoscopic skull base surgery involves use of powered debriders and drills, as well as spray from saline irrigation to clear the operative field or for clearing the endoscope – all of

which aerosolize clouds of vapor including any potential infected mucosal elements. It is likely that infectious microdroplets spread throughout the operating room environment, and studies have shown that viable virus may remain in aerosol droplets for several hours.²

Dr. Tong has further counseled and warned that he believes endoscopic endonasal cases are among the highest risk cases for spread of infection when operating on a COVID-19 positive patient. Based on their experience in Wuhan, N95 masks were not enough to control this spread when treating COVID-19 positive patients. Not until PAPRs (Powered, Air Purifying Respirators) were used in the intensive care setting, did the viral dissemination become controlled. This recommendation also appears with reference to “third level protection” for nasopharyngoscopy in a recommendation guideline from China published in February.⁶ He also explained that testing twice appeared necessary, separated by 24 hours in between tests, to truly confirm negativity to COVID-19, based on the potential for false negative results. Of note, as discussed below, it is unclear which exact test was being used at that time and how that test compares to what we are currently using.

From our colleagues in Iran, Dr. Ebrahim Razmpa, Professor of Otolaryngology at Tehran University Medical Sciences, Dr. Saeed Atighechi, Associate Professor of Otolaryngology at Yazd University School of Medicine, and Dr. Mohammed Hossein Baradanfar, Professor and Chairman of Otolaryngology Yazd University School of Medicine, we have additionally heard that at least 20 otolaryngologists in Iran are currently hospitalized with COVID-19, with 20 more in isolation at home. They are testing only people who have been admitted to the hospital, so those twenty at home are not confirmed, but have classic symptoms. A previously healthy 60 year old facial plastic surgeon died from COVID-19 three days ago. A young, otherwise healthy otolaryngology chief resident had a short prodrome, rapidly decompensated and died from what was found to be acute myocarditis and cardiac arrest. It was recently confirmed from these colleagues that he did also test positive for COVID-19.

The British Association of Otorhinolaryngology has now also confirmed that two of its consultants are on ventilator-support and being treated for COVID-19.⁷ In Athens, 21 staff members of the Athens General Hospital “Hippocrates” are quarantined, as a doctor at the Otolaryngology Clinic reportedly tested positive for COVID-19.⁸

Our colleague Dr. Puya Deghani-Mobaraki, in Italy, also reports otolaryngologists being adversely affected, but his information is about the possible loss of smell and taste associated with COVID-19. This is not only a subjective complaint from patients, but they have noticed it within their own ranks, in otherwise healthy asymptomatic doctors, at rates far above what could be considered normal. This observation has also been reported in the media regarding patients, as an under-reported aspect of this disease process.^{9,10} In fact, this symptom has been seen now so commonly in France in association with COVID-19 that the government has issued an official statement instructing citizens with loss of smell to contact their physicians, who may advise self-quarantine or to come in and be tested, depending on individual evaluation.¹¹

Based on this information, and until we know more, we are performing only urgent/emergent surgery at Stanford University at this time. Due to this apparent high risk with endoscopic transnasal surgery, in spite of current limitations in testing capacity, our institution has allowed

testing for COVID-19 in pre-operative patients needing this type of procedure urgently or emergently. This is true even for asymptomatic patients (ie. no cough and/or fever). If the test is negative, we proceed using high level of protective gear (N-95 masks and face shields, gowns, shoe covers, etc.), until the testing rate of false negatives is better determined. If positive, we prefer to defer surgery until the virus is clear, verified by repeat testing, if at all possible. When endonasal surgery cannot be postponed in a COVID-19 positive patient, based on guidelines now being used in China, we have recommended to our institutional officials that we utilize full PAPR (an enclosed powered system with HEPA filter), acknowledging that they have challenging decisions surrounding allocation of limited resources and these may necessitate changes from our recommendations.¹² Alternatively, an open approach should be considered when indicated. Because endonasal surgery creates clouds of droplets and aerosols which may permeate the operating environment, anyone in the operating theater requires the same protection when operating on known COVID-19 positives.

The question of whether two separate negative tests are needed before surgery, or if one is enough, is under active discussion. The test that we are using, developed at Stanford by Benjamin Pinsky MD, is an in-house assay that uses a real time RT-PCR to detect SARS-CoV-2. This test first screens for the presence of viral envelope gene, and if positive then evaluates for the presence of the RNA-dependent RNA polymerase gene for confirmation. Positive results from this test have been demonstrated high sensitivity and specificity, leading to early approval by the FDA. The Chinese CDC test uses different gene targets and primers and thus may, or may not, have a different accuracy profile.

Conservation of precious testing and PPE resources is another reason to limit these operations to the bare minimum at this time.

In the office setting, we have similarly restricted visits to only urgent/emergent patients and have ceased the use of spray anesthetic/decongestants, opting instead for nasal pledgets as needed, but preferably avoiding endoscopy whenever possible. We are using N95 masks, face shields and gowns for all outpatient nasal endoscopies.

To Summarize:

Our recommendations, modeled after guidelines developed in China¹², for endoscopic transnasal skull base surgery at Stanford are:

Elective cases: are cancelled for at least 1 month and will not resume until the epidemic has abated

Urgent cases: COVID-19 testing is done 48 hours before the planned surgery

If COVID-19 positive – surgery is deferred until the patient is COVID-19 negative

If COVID-19 negative – surgery proceeds with N95 masks, face shields, etc (until false negative rates are better determined)

Unavoidable surgery in COVID-19 positive: PAPR for all OR staff is recommended, but as noted above, challenging decisions surrounding allocation of limited resources may need to be made during this pandemic, and these may necessitate changes from our recommendations. Consideration for transcranial surgery instead of endonasal whenever possible.

We also recommend use of the smallest possible OR team and that no trainees or observers be allowed in the room both for reasons of safety and to preserve PPE. As these cases can be digitally captured, training can be done later from the video record or observed from outside of the OR.

* We consider that these recommendations also have relevance for endoscopic sinus surgery for sinonasal disease. **Recommendations/guidelines may change based on scarcity or availability of resources as the pandemic continues.**

Please keep in mind that from the time of this submission, the situation may have evolved, and our policies may have changed. We hope that more hard data becomes available soon upon which to base these important decisions. We thank our international colleagues who have given us this important information and we extend wishes of safety and health to all our otolaryngology and neurosurgery colleagues at this challenging time.

¹ Center for Systems Science and Engineering (CSSE) at Johns Hopkins University. John's Hopkins Coronavirus Center. <https://coronavirus.jhu.edu/map.html> Accessed March 21, 2020

² China Newsweek. view.inews.qq.com/a/20200125A07TT200?uid=&devid=BDFE70CD-5BF1-4702-91B7-329F20A6E839&qimei=bdf70cd-5bf1-4702-91b7-329f20a6e839

³ https://www.bloomberg.com/news/articles/2020-03-17/europe-s-doctors-getting-sick-like-in-wuhan-chinese-doctors-say?fbclid=IwAR2ds9OWRxQuMHAuy5Gb7ltqUGMZNSojVNtFmq3zzcSLb_bO9aGYr7URxaI

⁴ van Doremalen N, Bushmaker T, Morris DH, et al. Aerosol and Surface Stability of SARS-CoV-2 as Compared with SARS-CoV-1. *N Engl J Med.* 2020 Mar 17. doi: 10.1056/NEJMc2004973. [Epub ahead of print]

⁵ Zou L, Ruan F, Huang M, et al. SARS-CoV-2 Viral Load in Upper Respiratory Specimens of Infected Patients. *N Engl J Med.* 2020 Mar 19;382(12):1177-1179. doi: 10.1056/NEJMc2001737. Epub 2020 Feb 19.

⁶ Xu K¹, Lai XQ², Liu Z¹. *Zhonghua Er Bi Yan Hou Tou Jing Wai Ke Za Zhi.* 2020 Feb 2;55(0):E001. doi: 10.3760/cma.j.issn.1673-0860.2020.0001. [Epub ahead of print] [Suggestions for prevention of 2019 novel coronavirus infection in otolaryngology head and neck surgery medical staff]. [Article in Chinese (translated via Google translator); Abstract available in Chinese from the publisher]

⁷ <https://news.sky.com/story/coronavirus-experts-say-new-symptoms-could-be-loss-taste-or-smell-11961439>

⁸ <https://www.euractiv.com/section/politics/news/cracks-appear-in-nordic-response-to-covid-19-crisis/>

⁹ <https://en.radiofarda.com/a/loss-of-sense-of-smell-among-iranians-coinciding-with-coronavirus-epidemic/30478044.html>

¹⁰ <https://www.forbes.com/sites/judystone/2020/03/20/theres-an-unexpected-loss-of-smell-and-taste-in-coronavirus-patients/#48e2a8c85101>

¹¹ <https://www.sortiraparis.com/news/coronavirus/articles/210162-coronavirus-update-on-the-situation-in-paris-and-ile-de-france-controls-reinforc/lang/en>

¹² Lian, Tingbo (Editor). Handbook of COVID-19 Prevention and Treatment. The First Affiliated Hospital. Zhejiang University School of Medicine. Compiled according to Clinical Experience.