



Review Article

# Emergent and urgent otologic surgeries during the SARS-CoV-2 pandemic: a protocol and review of literature

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## KEYWORDS

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**Abstract** *Objective:* To review guidelines for otologic procedures during the SARS-CoV-2 pandemic and to present a protocol for emergent or urgent mastoidectomy at our institution. *Data sources:* Guidelines regarding emergent and urgent otologic procedures from otolaryngologic societies are reviewed. We described a protocol for emergent or urgent mastoidectomy at our institution.

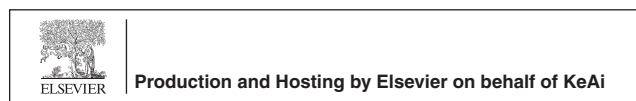
*Conclusion:* Patients requiring urgent or emergent mastoidectomy during the COVID-19 pandemic require prompt treatment. We make the following recommendations: Emergent or urgent otologic procedures should be performed in a contained environment, such as a tent created by the microscope drape. The surgical team should practice using instruments in the tent setup to prepare for real cases. Otologic procedures should adhere to guidelines set for high-risk procedures.

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## Introduction

The SARS-CoV-2 pandemic, which causes COVID-19, has affected every aspect of healthcare. Globally, medical specialties have modified their practices to protect their staff and patients from infection. Limited resources, such as personal protective equipment (PPE) and lack of adequate testing, has led to the postponement or

cancellation of many elective surgeries.<sup>1</sup> Otolaryngologists have unique considerations in the management of patients with head and neck cancer (HNC).<sup>2,3</sup> Otolaryngologists have increased risk of contracting COVID-19 due to aerosol-generating procedures, especially those requiring powered instrumentation around mucosal surfaces.<sup>4</sup> As a result, many otolaryngologists have closed or reduced clinics and cancelled elective cases.<sup>5</sup> Due to the time-sensitive nature of many cases for malignancies of the head and neck, institutions have established guidelines to proceed with cancer cases while minimizing risk to team members. However, little attention has focused on emergent or urgent otologic cases.

There are a variety of situations in which patients might require an urgent or emergent otologic consultation. For example, acute mastoiditis can become complicated by intracranial sinus thrombosis or abscess and result in permanent neurological sequelae or death if left untreated.<sup>6,7</sup> Additionally, patients with HNC are more predisposed to OM than the general patient population and can be more severely affected.<sup>8</sup> Another example of an urgent otologic procedure would be the management of a patient with malignancy involving the ear or temporal bone that is impinging on vital nearby structures, such as the facial nerve.

In the era of COVID-19, it is important for institutions to establish a plan for otologic urgencies or emergencies. Although emergent otologic interventions are rare compared to other procedures performed by otolaryngologists, delayed treatment can lead to profound disability in the long term. Therefore, the purpose of this communication is to present the protocol at our institution for otologic emergencies and review the literature on other recommendations.

## Methods

### Data sources

Protocols relating to otolaryngology practice were identified from webpages of otolaryngology societies, including American Academy of Otolaryngology-Head and Neck Surgery and American Head and Neck Society. We identified one protocol regarding ear surgery during the pandemic.<sup>9</sup> The recommendation regarding PPE is similar to that of our institution, in that the surgical team should wear an N95 mask even if the patient tests negative for COVID-19. However, the author recommended delaying otologic procedures in patients who are COVID-19-positive and did not address emergent cases. We also identified a recently published article that set general practice recommendations for procedures in otolaryngology, including otologic surgery.<sup>10</sup> However, the article did not provide details on surgery setup to reduce exposure to aerosols. Several groups recommended using a barrier to contain aerosol generated from mastoidectomy. Kozin et al<sup>11</sup> on behalf of the American Neurotology Society proposed building a tent to create a contained environment to minimize aerosol release. Another version of a tent was suggested by Hellier et al.<sup>12</sup> Carron et al<sup>13</sup> and Chen et al<sup>14</sup> determined that plastic drapes were effective at containing droplets generated from mastoidectomy performed on cadaveric temporal bones.

## Protocol

General considerations applicable to any COVID-19 unknown or positive surgical cases are to wear proper PPE (gloves, respirator, eye protection, gown),<sup>15–17</sup> use a negative pressure room,<sup>18</sup> and limit attendance to essential personnel.<sup>17,19</sup> All of these guidelines were adopted at our institution. Herein we describe the decision-making process for proceeding with otologic surgeries during the COVID-19 pandemic at the Medical University of South Carolina. The protocol for emergent or urgent mastoidectomy at our institution is shown in Fig. 1.

At our institution, urgent surgery is defined as one in which delay of treatment for one month or longer would harm the patient, while emergent surgery is one that requires immediate surgery. The COVID-19 protocol is applied to all emergent cases. When surgery is considered for urgent cases, the patient and family are asked if they are healthy 7 business days prior to surgery, and to self-quarantine. At least five business days prior to surgery, the case is reviewed by the operating room committee with risk stratification based upon available resources, such as PPE, beds, and blood. If resources are available, the patient is contacted 5 days prior to surgery to schedule a nasopharyngeal swab test for COVID-19. The test is obtained within 48–72 h prior to surgery. The patient and family are checked for symptoms, and the self-quarantine continues. The surgeon must follow-up on the results, and the patient is notified of test results. If the initial test is negative, a point of care COVID-19 test is obtained within 24 h of the surgery to reduce the likelihood of a false negative result. Results are available within 3 h of testing. After two negative results, the surgical team proceeds with standard PPE with N95 masks. COVID-19-positive cases are postponed unless no other alternatives are available, in which case the COVID-19 protocol is undertaken. If resources are limited, the case is postponed and reassessed in 1–2 weeks.

The anesthesia and surgery policy at our institution is determined by two scenarios. The first scenario applies to patients at high risk of COVID-19 infection as well as patients with positive, unknown, or pending result undergoing any procedure. The second scenario applies to COVID-19 negative patients undergoing high risk procedures, which includes otolaryngologic procedures involving mucosal surfaces, especially those in which high-speed instrumentation is used. In both scenarios, all team members must don contact, airborne, and droplet PPE for the duration of case, including N95 masks, double gloves, and face shields. The clean-up team must wait 21 min after the patient exits for room turnover. The wait time was determined by the time required for airborne contaminant removal at 99.9% efficiency in the operating rooms.<sup>20</sup> In the first scenario, the surgical team must also remove PPE in presence of a trained observer and the transport team must remove PPE at the patient's destination. Runners must also don contact and droplet precautions.

Prior to surgery, the surgical team waits outside the operating room for at least 21 min after intubation. The patient is then sterilely draped. The soft tissue work, including harvesting fascia, is then performed. After the

Mastoidectomy Pathway during the COVID-19 Pandemic  
at Medical University of South Carolina

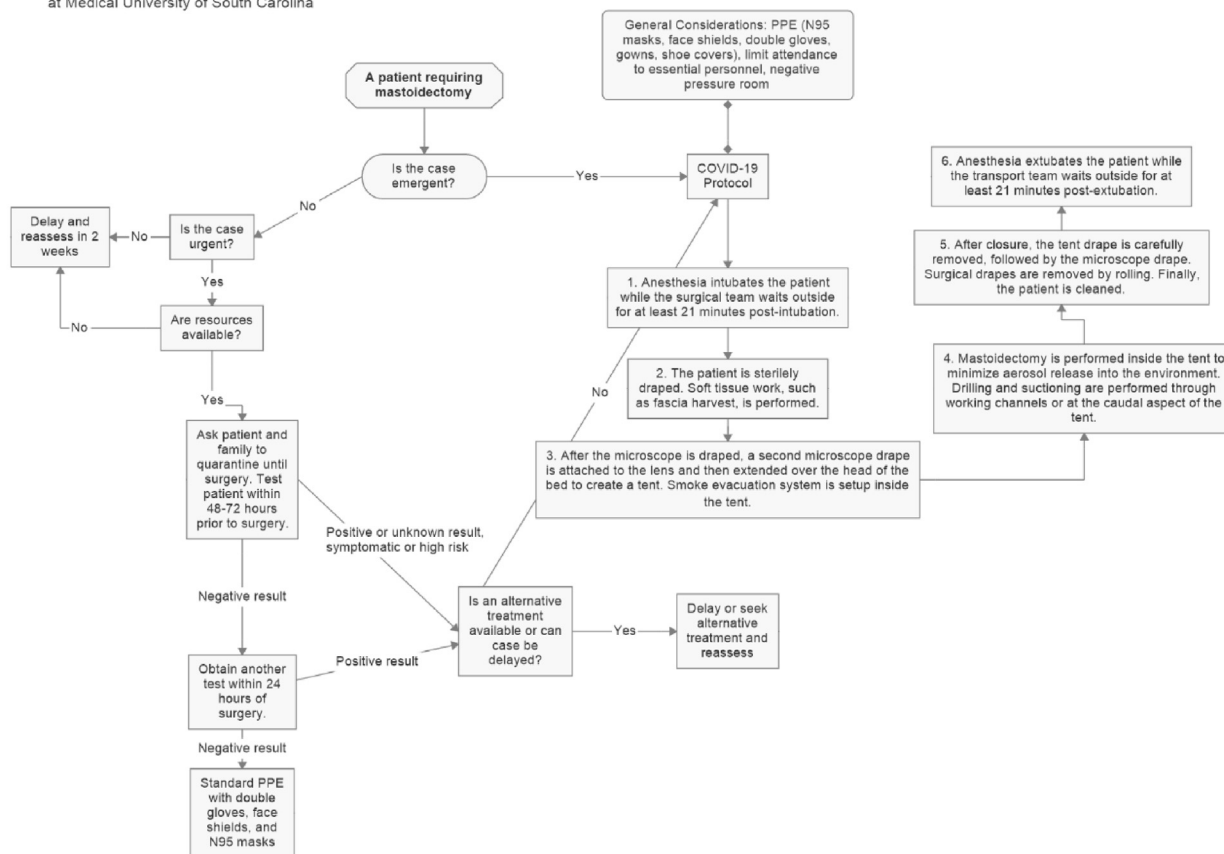


Fig. 1 A protocol for management of mastoidectomy at Medical University of South Carolina.

microscope is draped, an additional microscope drape is attached to the microscope lens. The drape is extended over the head of the bed and used to create a plastic tent over the surgical field. A smoke evacuation system is setup inside the tent. Mastoidectomy and closure are performed under the tent to prevent aerosolization into the environment. Eye piece openings in the tent can be used as working channels or to pass instruments. Drilling and suction are done through working channels or at the caudal aspects of the tent. After case completion, the tent drape is carefully removed, followed by the microscope drape. To reduce staff exposure, the surgical drapes are removed by rolling. Finally, the patient is cleaned. Only anesthesia is present in the room during extubation while the transport team waits outside for at least 21 min.

## Discussion

The COVID-19 pandemic has profoundly impacted health-care, including the practice of otolaryngology. Despite the reduction in number of cases performed, it is important for otolaryngologists to adapt and to continue providing services to patients with critical needs. Emergent and urgent ear surgeries are relatively uncommon compared to many other otolaryngologic procedures. This might explain why guidelines specific to otologic procedures were slower to

emerge in the COVID-19 era. It is difficult to predict when the pandemic will end, when COVID and serology testing will become more widespread, or when therapeutics and a vaccine will be available. Until then, institutions might encounter patients requiring timely otologic procedures. Our goal was to develop a protocol to help care teams expeditiously treat these patients while minimizing risk to providers. It is expected that this protocol will be modified at our institution over time.

The guidelines to stratify otologic cases as emergent, urgent, or non-urgent at our institution are comparable to the recommendations by Kozin et al.<sup>11</sup> However, the authors favored powered air-purifying respirator (PAPR) as the optimal PPE, but this might not be readily available at all institutions and is not used as part of our COVID-19 protocol. In addition, the authors noted that visualization through the microscope may be more difficult while using PAPR. Surgeons that choose to use PAPR should consider practicing under these conditions prior to undertaking real cases.

Some studies have demonstrated that respiratory viruses can exist in the middle ear of patients with otitis media.<sup>21</sup> Mastoidectomy is capable of generating high volumes of aerosolized particulate and was assessed as a high-risk procedure according to one set of safety recommendations.<sup>22</sup> Therefore, it is our recommendation that surgical teams take significant precautions when performing

mastoidectomy during the COVID-19 pandemic. Our institution adopted a 2 drape setup similar to the setup described by Hellier et al.<sup>12</sup> The microscope drape provides a large disposable surface. Working channels can be cut into the drape at locations convenient for the surgical team. Despite the advantages, there are challenges posed by the setup. Of note, the working channels created through the drape might limit mobility. Likewise, surgeons may experience limited mobility when operating under the drape as they must avoid creating an opening for aerosol release. As such, we recommend the surgical staff to practice using instruments in the tent setup to optimize performance in a real case. In addition, proper removal of the tent setup is essential to prevent particle release into the environment. Although PPE protects the surgical team during the procedure, aerosol particles might persist in the operating room long after case completion. Thus, it is also necessary to protect the clean-up team and personnel in subsequent cases. The technical challenges of the tent setup can be mitigated by proper training of staff. Another challenge institutions may encounter is supply availability. Our institution preferred a second microscope drape for the tent setup because it can cover a large area and can be removed in one piece. If microscope drapes are in limited supply, the setup described by Kozin et al, in which smaller sheets of plastic drape are attached to the microscope to form a tent, is an option. Both setups are effective at containing aerosol generated from mastoidectomy. Supply availability and staff preference can determine which setup to choose.

The tent setup in our protocol can be used for a variety of otologic procedures. Malignancies involving the ear or temporal bone are considered urgent cases. It is generally recommended that these patients undergo surgery as primary treatment for the cancer. Temporal bone resection requires use of powered instruments and efforts should be made to contain aerosol generated during surgery. Other urgent procedures involving powered instruments suitable for the tent setup include cholesteatoma of the middle ear with suspected complications and post-meningitis cochlear implantation. Since the middle ear might be involved in respiratory infections, myringotomy and ventilation tube placement should also be performed in a contained environment. Patients with HNC are far more likely to present with OM than the general population.<sup>8</sup> In many cases OM can be alleviated by myringotomy and ventilation tubes. It is our recommendation that vulnerable patients, such as those with HNC, presenting with OM receive urgent tube placement when deemed necessary. As this procedure is more common, we might learn more about our protocol's effectiveness and efficiency as data become available. Factors we will continue to assess to improve the protocol include setup time, cost, ease of performing procedures through working channels, effectiveness at infection control, and patient outcome.

### Limitations

The protocol at our institution was developed after a careful review of guidelines set by societies and literature regarding respiratory virus transmission. However, cases of

emergent mastoidectomy arise infrequently and the situation surrounding COVID-19 continues to evolve rapidly. Therefore, evaluation and modification of our protocol is ongoing. Yet, we believe it is important to have a plan in place to manage patients with COVID-19 who require emergent or urgent mastoidectomy while protecting staff from exposure.

### Conclusion

Patients requiring emergent or urgent mastoidectomy during the COVID-19 pandemic require prompt treatment. As guidelines are currently being developed, we make the following recommendations: Emergent or urgent otologic procedures should be performed in a contained environment, such as a tent created by the microscope drape. The surgical team should practice using instruments in the tent setup to prepare for real cases. Otologic procedures should adhere to general guidelines set for high-risk procedures.

### Declaration of Competing Interest

None.

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