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Case Report

Asymptomatic COVID-19 infection in a child with nasal foreign body

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ABSTRACT

While children, particularly infants, are susceptible to severe and critical COVID-19 disease, over 55% of pediatric cases are present in asymptomatic or mildly symptomatic children. Aerosolized SARS-CoV-2 viral particles remain viable for up to 3 hours, raising concern about risk to healthcare workers during aerosol generating procedures (AGPs) in the airway and nasopharynx. Herein we describe the first case of a nasal foreign body in an asymptomatic child with SARS-CoV-2 infection. We discuss management of this child and highlight the importance of considering asymptomatic infection and preoperative testing when planning procedures of the airway in the COVID-19 era.

1. Introduction

SARS-CoV-2, the novel coronavirus responsible for COVID-19, first emerged in late 2019 in China. Over the past several months, infections have spread throughout the globe, resulting pandemic designation by the World Health Organization (WHO) on March 11, 2020 [1]. Because most reports of COVID-19 have focused on severe respiratory illness in adult populations, data on the manifestation and extent of disease in children is limited [2]. Children comprise the minority of symptomatic patients, with < 1% of reported infections occurring in children < 10 years of age [3]. Several recent studies of COVID-19 in the pediatric population in China demonstrate a large portion of cases are asymptomatic or minimally symptomatic. In a study of 8 infected families, 9 positive children were identified, but asymptomatic infection occurred in 66.7% of pediatric cases [4]. Qiu et al. noted that in 36 children with infection, 47% were asymptomatic or exhibited mild acute upper respiratory illness symptoms [5]. Dong et al. found that in 731 children with confirmed SARS-2-CoV infection, 12.9% were asymptomatic and 43.1% demonstrated only mild symptoms [6]. This raises concern that the infection rate in children, and in particular the true rate of asymptomatic infection, is underreported because children without symptoms are unlikely to undergo testing [2].

Emerging data suggests that asymptomatic patients may carry and spread infection [7]. Viral RNA has been identified in nasopharyngeal and throat swabs from an asymptomatic patient, with viral loads comparable to those recovered from symptomatic patients [8]. Further studies have confirmed detectable viral RNA in patients with mild or

prodromal symptoms; additionally, within the first week of illness, virus was isolated from these samples [9]. Thus asymptomatic and minimally symptomatic patients may potentially transmit the virus.

In symptomatic patients, SARS-CoV-2 viral load is higher in the nose than the throat [8]. Aerosolized SARS-CoV-2 viral particles have been shown to remain viable for up to 3 hours [10], raising concern about risk of exposure for healthcare workers during aerosol generating procedures (AGPs), including endoscopy, in the nasal cavity, nasopharynx and upper airway.

Here we present the case of an asymptomatic child with a nasal foreign body who was found to be infected with SARS-CoV-2. We discuss the importance of preprocedural testing and considerations of personal protective equipment, particularly while caring for children, in the COVID-19 era.

2. Case report

A 4-year-old girl and child of a healthcare worker presented to a tertiary care otolaryngology practice with a one-week history of unilateral nasal obstruction. Approximately one-week prior to presentation, her mother reported that the patient placed a green sponge into the right nasal cavity during bath time. This foreign body could be visualized in the nasal cavity. The patient was evaluated at urgent care, where several fragments of foreign material were removed with forceps, however residual debris was visualized in the nasal cavity and the patient subsequently developed mild epistaxis. Several hours later she was evaluated in the emergency department. At that time, she had

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Abbreviations

SARS-CoV-2	severe acute respiratory syndrome coronavirus 2
COVID-19	2019 novel coronavirus disease
PPE	personal protective equipment
APG	aerosol generating procedure
WHO	World Health Organization
RT-PCR	real-time reverse transcriptase polymerase chain reaction assay

ongoing mild oozing from the right nare and some swelling of the anterior nasal cavity; no foreign body could be visualized. Several maneuvers were attempted to remove any remaining material, including nose blowing, blowing into the mouth with occlusion of the contralateral nostril, and two insertions of a Katz extractor without yield of extraneous debris. The patient was discharged home. Over the course of the following week, the patient's mother noted sneezing, unilateral nasal obstruction with clear mucoid drainage, and a foul odor.

Prior to scheduling an appointment in the otolaryngology clinic, and again at the time of arrival to the clinic, the patient and her mother were screened for COVID-19 symptoms (cough, fever, malaise, myalgias, sore throat, nausea, diarrhea, anosmia), recent travel, and contact with anyone confirmed or suspected to have COVID-19; screening was negative.

The patient was seen by a pediatric otolaryngologist and medical assistant wearing full personal protective equipment (gown, gloves, N95 facemask, and face shield) given concern for exposure to aerosolized nasal secretions during foreign body extraction. A green foreign body was identified in the nasal cavity. Several fragments were removed with forceps, but the material could not be removed completely due to location in the mid nasal cavity and patient cooperation. Further attempts were aborted.

Prior to bringing the patient to the operating room, COVID-19 testing was pursued given concerns about the potential for asymptomatic infection in the pediatric population, and generation of aerosolized respiratory secretions during nasal endoscopy, suctioning and foreign body removal, in order to optimize protection of the perioperative care team and surgical staff. At our institution, test processing can be expedited for select cases. The patient underwent RT-PCR testing of a nasopharyngeal swab the following day and SARS-CoV-2 RNA was detected. Due to concerns for potential infection and risk of aspiration, the decision was made to proceed with foreign body removal even though the patient tested positive for COVID-19.

The day following detection, the patient was brought to the operating room for nasal endoscopy with foreign body removal. Prior to the procedure, a team meeting was conducted with surgical, nursing, anesthesia and respiratory therapy to discuss perioperative procedures, the anesthesia plan, and personal protective equipment requirements. To minimize exposures, the patient and her mother wore face masks and were immediately placed in a negative pressure isolation room upon arrival to the hospital. Verbal consents were obtained. Operating room personnel was minimized (surgeon, attending anesthesiologist, certified nurse anesthetist, circulating nurse, surgical technician) and all wore battery powered air-purifying respirators (PAPR) in addition to standard precaution attire (surgical gown, gloves, surgical caps and shoe covers).

The patient was not premedicated prior to induction of general anesthesia to facilitate achievement of discharge criteria more quickly at the conclusion of the case. With a parent present, mask induction was performed prior to IV placement to minimize patient vocalization, and a tight mask seal was ensured to minimize aerosol generating maneuvers. After IV placement, Propofol was given to obtain intubation conditions. No positive pressure breaths were given prior to obtaining the airway.

For intubation, a uescope was utilized in order to increase the distance between the intubating provider and the patient's oropharynx. A 5.0 low pro cuffed endotracheal tube was placed and the cuff inflated to minimize leak around the tube. Albuterol and suctioning catheters were readily available due to concern about increased risk for bronchospasm, however ultimately these were not needed.

The nose was then decongested with drops of oxymetazoline. Nasal endoscopy was carefully performed using a 2.7mm 0° rigid endoscope taking care to minimize disruption of the nasal mucosa or secretions. 3 fragments of green spongeiform foreign material were identified in the nasal cavity and removed with forceps. Secretions were managed using neuro patties and suctioning in the nasal cavity and nasopharynx was avoided. Following the procedure, prior to extubation, the patient was spontaneously ventilating for approximately 5 minutes with good tidal volumes. During extubation, staff remained greater than 6 feet away from the patient with the exception of the extubating provider. A mask was then immediately placed over the patient's nose and mouth once respirations were deemed adequate.

The patient then completed perioperative recovery in the operating room, rather than being transported to the post-anesthesia care unit. She was discharged home from the operating theater with her mother, both wearing masks. One week after foreign body removal, both the patient and her mother remain asymptomatic.

3. Discussion

This case represents the first report of an asymptomatic child with SARS-CoV-2 infection requiring high risk instrumentation of the upper airway. During procedures such as suctioning, bag-mask ventilation, laryngoscopy, and endoscopy, aerosolized viral particles can develop, increasing the risk of spread. Extensive environmental contamination has been demonstrated in negative pressure rooms from airborne SARS-CoV-2^[11]. Even in the absence of cough and AGPs, viral shedding may occur in expired aerosols, contaminating personal items, isolation rooms and the hallways outside of patient treatment areas [12].

Health care workers exposed to APG of the upper airway may be at increased risk for COVID-19. There are reports of multiple (> 14) team members becoming ill following exposure to a mildly symptomatic patient during transphenoidal pituitary surgery in early January 2020 [13,14]. Around the world, including in China, Iran, and Italy, many of the physicians infected by COVID 19 are specialists exposed to the nasopharynx and oropharynx, including anesthesiologists, critical care physicians, ophthalmologists and otolaryngologists [14].

Recognizing the unique high risk that otolaryngologists face with evaluation and management of patients potentially harboring COVID-19 infection, many otolaryngology departments and practices worldwide are deferring elective procedures of the upper airway which might aerosolize tissue, including sinus procedures, tonsillectomy, mastoid drilling and other procedures involving the airway [13,15,16]. For procedures that cannot be delayed, preoperative testing should be considered prior to manipulations of the upper airway, even in asymptomatic patients [14]. When testing cannot be performed, patients in all age groups should be handled as though they are positive for COVID-19, and appropriate precautions taken [15]. At Stanford University, even when preoperative testing is negative, surgeons are proceeding with N95 facemasks and face shields due to limited data regarding false negative rates, and when SARS-CoV-2 infection is present, emergent procedures are performed utilizing PAPR [14].

Limiting preoperative testing to symptomatic and hospitalized patients has the potential to result in disastrous consequences for perioperative personnel. Preoperative planning and SARS-CoV2 testing is of particular importance for the pediatric population given the high proportion of SARS-CoV-2 infected children who are asymptomatic or exhibit minimal symptoms of COVID-19, but who may harbor significant viral loads in the nasopharynx and upper airway, placing healthcare workers at particular risk. When testing is not possible, either because it

is not available, or because a potentially AGP is emergent, at a minimum full PPE with use of N95 masks is required for all healthcare workers present in the operating room.

Contributors' Statement

Dr. Diercks designed the study, drafted the initial manuscript, and reviewed and revised the manuscript. Drs. Park, Myers and Kwolek designed the study and reviewed and revised the manuscript. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

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Gillian R. Diercks: Conceptualization, Methodology, Data curation, Formal analysis, Writing - original draft, Writing - review & editing. **Brian J. Park:** Writing - original draft, Writing - review & editing. **Laura B. Myers:** Methodology, Formal analysis, Writing - review & editing. **Christopher J. Kwolek:** Methodology, Writing - review & editing, Supervision.

Declaration of competing interest

The authors have indicated they have no conflicts of interest relevant to this article to disclose.

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