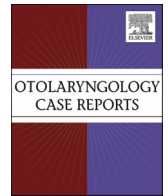




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## Sudden anosmia and ageusia in a child: A COVID-19 case report

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### ABSTRACT

**Objective:** COVID-19 in children has a spectrum of clinical presentations ranging from asymptomatic infection to severe illness and death. The recognition of COVID-19 in children has been challenging due to overlap with symptoms of common respiratory and gastrointestinal tract infections. We describe isolated sudden anosmia and ageusia as an uncommon clinical presentation of a child with COVID-19.

**Methods:** Chart of a 17-year-old male referred to a tertiary care pediatric hospital for assessment of anosmia and ageusia was reviewed. Data included relevant history and physical examination, diagnostic work up, and management.

**Results:** The child presented with sudden anosmia and ageusia for 3 months. The patient did not have symptoms of upper respiratory tract infection or gastrointestinal infection. There was no history of trauma. Examination of the ears, nose, and throat were all unremarkable. Magnetic resonance imaging documented the presence of both olfactory bulbs and olfactory sulci. SARS-CoV-2 IgG test was positive. Anosmia was confirmed by The University of Pennsylvania Smell Identification Test with a score of 27.5%.

**Conclusions:** The clinical picture of our patient represents a non-classical presentation of COVID-19 in a child. Clinicians should be cognizant about uncommon presentations of COVID-19 in previously asymptomatic children.

### Introduction

Coronavirus disease 2019 (COVID-19), caused by SARS-CoV-2, has been increasingly documented among children [1]. COVID-19 in children has a spectrum of clinical presentations ranging from asymptomatic infection to severe illness and death [1–5]. A wide variety of constitutional, respiratory, and gastrointestinal symptoms has been documented in children with COVID-19 [2–6]. The majority of symptomatic children with COVID-19 has mild symptoms of fever, fatigue, myalgia, dry cough, nasal congestion, rhinorrhea or headache. Gastrointestinal symptoms in children with COVID-19 include nausea, abdominal pain or discomfort, vomiting, and diarrhea. The recognition of COVID-19 in children has been challenging due to overlap with symptoms of respiratory and gastrointestinal tract infections commonly seen in children. Better understanding of the clinical features of COVID-19 in children potentially improves the diagnosis and treatment.

Olfactory and gustatory abnormalities have been reported as the first or only symptoms in adults with COVID-19. The prevalence of anosmia,

loss of smell, and ageusia, loss of taste, ranged from 43% to 70% in adults with COVID-19 [6–11]. Simultaneous olfactory and gustatory abnormalities occurred in 24% of adults with COVID-19 [7]. Olfactory and gustatory abnormalities along with constitutional, respiratory, and gastrointestinal symptoms have been documented in children with COVID-19; however, to date, isolated-simultaneous anosmia and ageusia in children with COVID-19 has not been reported. The aims of this report are to describe isolated sudden anosmia and ageusia as an uncommon clinical presentation of a child with COVID-19 and draw attention to an atypical presentation of a child with COVID-19.

### Case report

A 17-year-old male presented with a 3-month history of sudden loss of smell and taste. He noticed sudden loss of smell and taste after he had epistaxis from the right nasal cavity. The patient had no nasal congestion, facial pressure, rhinorrhea, sinus infection, postnasal drip, allergy symptoms, fever, cough, dyspnea, myalgia, fatigue, headache, upper

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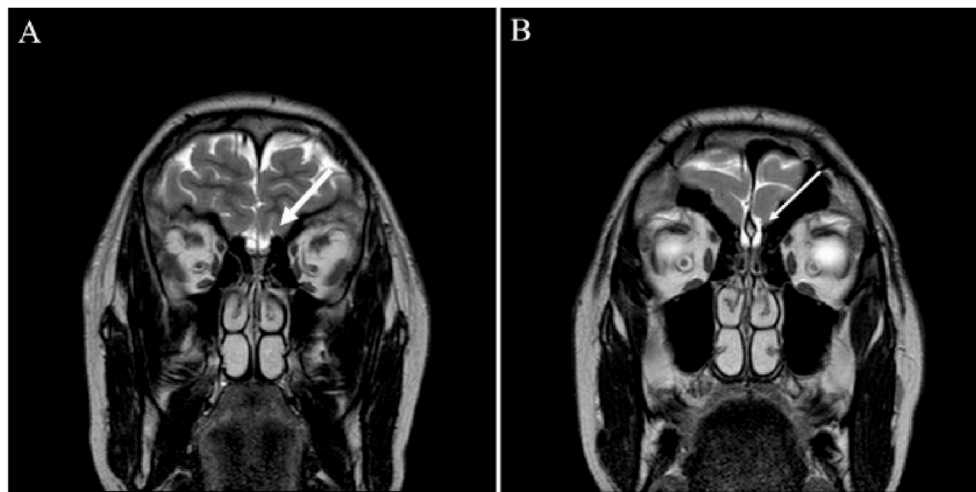


Fig. 1. Coronal magnetic resonance image showing presence of both olfactory bulbs (A) and olfactory sulci (B).

respiratory tract infection, gastrointestinal symptoms, or trauma. Three episodes of unilateral epistaxis occurred in 6 weeks. The patient attributed anosmia and ageusia to epistaxis. He was referred to the pediatric otolaryngology clinic when anosmia and ageusia persisted after resolution of epistaxis.

The patient had an appendectomy five years ago and was not taking any medications. He has never consumed tobacco or alcohol. He had no known contact with confirmed COVID-19 patients. He was afebrile and vital signs were within normal limits. On examination, the patient appeared health and well. Examination of head and neck were all unremarkable. Magnetic resonance imaging documented the presence of both olfactory bulbs and olfactory sulci (Fig. 1). The corpus callosum, remainder of the midline structures, pituitary gland and stalk, the brainstem and vermis were normal in morphology. SARS-CoV-2 IgG test was positive. Anosmia was confirmed by The University of Pennsylvania Smell Identification Test with a score of 27.5%.

## Discussion

Better understanding of the clinical presentation of children with COVID-19 potentially reduces the rate of disease transmission and improves the early detection and treatment outcomes. The present study documented objective assessment of anosmia, and isolated sudden anosmia and ageusia as the only presenting complaints in a child who had COVID-19. In previous studies, anosmia has not been objectively assessed in patients with COVID-19. The University of Pennsylvania Smell Identification Test was used to document anosmia in our patient. Sudden anosmia and ageusia was recently reported in 3 children who traveled to Hong Kong from the United Kingdom [6]. Unlike the isolated sudden anosmia and ageusia seen in our patient, these children exhibited other COVID-19 symptoms in addition to sudden anosmia and ageusia. Our patient did not seek immediate medical help because he presumed epistaxis was the cause of his symptoms. Late presentation of the patient to the pediatric otolaryngology clinic, simultaneous occurrence of sudden anosmia and ageusia, and presence of epistaxis in the absence of common COVID-19 clinical manifestations were the features of an uncommon presentation of COVID-19 in our patient.

Clinical manifestations of COVID-19 in children include fever, cough, shortness of breath, rhinorrhea, myalgia or fatigue, diarrhea, vomiting, and headache. Fever and cough have been consistently noted as the most common presenting symptoms in multiple studies across several countries [12,13]. In a meta-analysis of studies on the clinical characteristics of children with COVID-19, symptoms of fever and cough were present most commonly at 48% and 39%, respectively, while gastrointestinal symptoms such as vomiting and diarrhea were much

less common at 7% and 6%, respectively. The majority of pediatric patients generally have mild symptoms [12]. Anosmia and ageusia are seldomly reported as presenting symptoms of COVID-19 in the pediatric population.

The etiology of anosmia encompasses a wide variety of abnormalities including head trauma, aging, viral infections, autoimmune diseases, neurodegenerative diseases, toxic exposures, cystic fibrosis, allergic rhinitis, chronic sinusitis, Kallman syndrome, CHARGE syndrome and 22q11 deletion syndrome [14]. Idiopathic congenital anosmia occurs due to absence or hypoplasia of the olfactory bulbs without associated delayed puberty. The loss of ability to smell has social, emotional, behavioral and safety consequences [15]. Eating habits and nutritional status may change due to the change in the way the food tastes. The risk of having a hazardous event such as exposure to smoke, gas and spoiled food is increased in patients with anosmia.

Indications for imaging in olfactory dysfunction are not well established [14]. While computerized tomography (CT) is commonly used to evaluate anosmia caused by paranasal sinus disease and trauma, magnetic resonance imaging (MRI) is recommended to evaluate an intracranial mass in adults. In children with anosmia, the utility of CT and MRI has not been systematically assessed. MRI is recommended to evaluate the olfactory bulbs and sulci in children with a history of olfactory dysfunction since birth. Children with olfactory anomalies on MRI lost smell function later in life [14]. Therefore, we obtained MRI to evaluate olfactory bulbs and sulci in our patient. MRI did not document any abnormality in our patient who presented 3 months after developing anosmia and ageusia.

The symptoms of anosmia and ageusia were first recognized as clinical manifestations of COVID-19 in February 2020, and have since been added to the list of early presenting symptoms of the virus by Centers for Disease Control and Prevention (CDC). The prevalence of olfactory and gustatory dysfunction may be close to half of patients with COVID-19 [10]. Early studies have recognized olfactory dysfunction as the primary or isolated presenting symptom in 17%–26% of cases [10, 16–18]. A recent meta-analysis demonstrated one-seventh of its patients presented with olfactory and gustatory abnormalities as their initial symptoms [17]. The majority of adults with acute anosmia or ageusia recovered within 3 weeks. The median time to recovery olfactory and gustatory abnormalities was 7 days [19].

Coronaviruses are a known etiology for viral olfactory dysfunction; however, the pathogenesis of smell and taste dysfunction in COVID-19 has not been established [20]. Two key genes, cellular angiotensin converting enzyme 2 (ACE 2) and TMPRSS2 are involved in the entry of SARS-CoV-2. Upper airway expresses high levels of ACE2 and TMPRSS2, hence, respiratory epithelium cell types have been suggested to serve as

a viral reservoir during SARS-CoV-2 infection [21]. Olfactory epithelium and tongue expresses ACE2. Plausibly, SARS-CoV-2 causes olfactory and taste disturbance via infecting neural as well as non-neural cells [21,22].

Limitations of the present study include the lack of COVID-19 testing at the time of onset of isolated-simultaneous anosmia and ageusia and the unidentified etiology of epistaxis. The possibility of presence of SARS-CoV-2 IgG antibodies prior to the onset of anosmia and ageusia cannot be excluded. We considered presence of SARS-CoV-2 IgG antibodies as the evidence for COVID-19 as the cause isolated-simultaneous anosmia and ageusia as our patient had no other etiology of anosmia and ageusia. The etiology of epistaxis was unidentified, we cannot exclude COVID-19 as a cause of epistaxis in the absence of digital trauma or other etiologies of epistaxis.

In conclusion, otolaryngologists and pediatricians should be cognizant about sudden anosmia and ageusia as a presentation of COVID-19 in otherwise healthy children. Early recognition and management of uncommon presentations of COVID-19 will enhance the efforts to mitigate COVID-19 in children.

#### Ethical statement

The authors declare that the case report described has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for experiments involving humans.

#### Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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