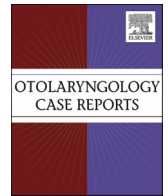




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# Saddle nose deformity: a rare complication of COVID-19 infection

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## ABSTRACT

**Introduction:** Although the effects of SARS-CoV-2 (COVID-19) infection in olfaction have been well established, there is relative paucity of information on possible other complications of COVID-19 in the nasal cavities and nasal function.

**Case report:** We report the unique case of a young female patient, with a remote history of septoplasty and functional endoscopic sinus surgery who developed severe nasal airway obstruction (NAO) and saddle nose deformity two to three weeks after her recovery from COVID-19.

**Conclusion:** This case report illustrates a late septoplasty complication that may be associated with COVID-19. This unusual clinical presentation indicates that structural destabilization of the nose may ensue as a complication of the COVID-19, and requires further investigation of the SARS-CoV-2 effects in vascularity and wound healing in the nasal cavity.

## 1. Introduction

The impact of SARS-Coronavirus 2 (COVID-19) in olfaction and gustatory function has been extensively studied and reviewed, starting early at the course of the pandemic [1]. It also established that the viral infection can lead to multi-system dysfunction and emerging evidence suggests that SARS-CoV-2-mediated endothelial injury is an important effector of the virus [2,3]. This case report illustrates an unusually late onset complication (saddle nose deformity) and nasal airway obstruction (NAO) in a young female patient with history of nasal surgery, a few weeks after her recovery with COVID-19. The clinical presentation described below is suspicious for virus induced direct vascular compromise of the nasal structure either with direct effect to its vascularity or through a potential infectious complication of the disease (e.g. undiagnosed septal abscess).

## 2. Case report

A 44-year-old Caucasian female with unremarkable medical history presented to the senior author's practice complaining of recent onset external nasal deformity and complete nasal airway obstruction. She reported a remote history of uneventful septoplasty and limited functional endoscopic sinus surgery seven years prior to this presentation. She considered her nasal surgery successful and had no postoperative issues with her nasal form or function. Her current complaints were noticed two to three weeks after her recovery from COVID-19 disease,

which was diagnosed approximately two months prior to her presentation to our office. Her COVID-19 lasted approximately three weeks, was diagnosed with a nasal swab and did not require hospital admission. Approximately one week after her COVID-19 diagnosis, the patient visited the local emergency room complaining of severe nasal pain and nasal congestion. In this visit, the patient also reported severe edema and erythema in her nasal dorsum and bilateral periorbital area. The patient confirmed these complaints during her visit to our office, in accordance with the records that we obtained from the emergency room. She was afebrile and with stable vital signs, and no further laboratory tests or imaging were ordered in the emergency room visit. She was treated with reassurance and an outpatient course of azithromycin for her COVID-19 infection.

The patient reports that she noticed the collapse of her nasal bridge approximately two to three weeks after her full recovery from COVID-19. She was electively referred to our facial plastic surgery practice by her primary care physician to explore her options with her cosmetic and functional concerns. The physical examination revealed severe saddle nose deformity (Fig. 1) and an "inverted V" deformity of the nasal pyramid (Fig. 2), reflecting the collapse of the nasal framework. The septum had no obvious perforations, but the bilateral internal nasal valve narrowing was noticed, as well as obstruction of bilateral nasal cavities. The endoscopic examination confirmed these findings (Fig. 3), and also revealed well healed bilateral maxillary anrostomies and partial ethmoidectomies without purulence or significant crusting. Her Nasal Obstruction and Septoplasty Effectiveness (NOSE) scale score

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Fig. 1. Profile view of the patient showing saddle nose deformity.

(Fig. 4) completed routinely in the office was 100 (20/20). The patient was offered a nasal steroid spray, and we extensively discussed the surgical plan to address her functional and cosmetic concerns through an open septorhinoplasty approach, and possible need for auricular or rib cartilage graft harvesting. She decided to adhere to the nasal steroid trial and consider the surgical procedure in the near future at her convenience. Major rheumatological diseases such as granulomatosis with polyangiitis were ruled out.



Fig. 2. a, b: Two views of a patient with an “inverted V” deformity of the nasal pyramid.



Fig. 3. Endoscopic view showing internal nasal valve narrowing and obstruction of the right nasal cavity.

### 3. Discussion

COVID-19 induced vasculopathy is a well-established characteristic of the disease with cardiologic, neurological and peripheral vascular manifestations [4–6]. The exact pathophysiologic mechanism of COVID-19 induced vasculopathy remains obscure, but a cytokine-induced endothelial destruction similar to the one produced by other viruses (influenza) has been theorized in the literature [7,8]. Therefore, it can be hypothesized that COVID-19 can have significant implications for surgical patients, as its vasculopathy can compromise wound healing.

Unlike its effects to olfaction and taste, COVID-19 related complications in nasal structure and nasal airway obstruction are not well studied in the literature. To the best of our knowledge, only one case of delayed septal perforation as a complication of COVID-19 is reported, where the patient developed a symptomatic perforation (whistling) immediately after her recovery from the disease [9]. Interestingly, this patient had also a history of then uneventful, remote septorhinoplasty. This is the only reported case associating COVID-19 with structural collapse of the nasal framework (saddle nose deformity). The patient complained of new, post COVID-19, onset of severe nasal airway



obstruction (NAO), and had a Nasal Obstruction and Septoplasty Effectiveness (NOSE) scale score of 100 (20/20) in her evaluation in the office. She recalled no NAO issues prior to COVID-19 and denied any changes post septoplasty changes to her nasal form. We presume that the structural collapse affecting her internal nasal valve area is the main culprit for the compromise of her nasal function, as it has been studied previously in the literature [10] and as depicted in the nasal endoscopic examination in the office (Fig. 3).

Most septoplasty techniques include submucosal dissection of the deviated quadrangular cartilage, and may render the operated septum vulnerable to perforations, a complication risk that varies among studies from 2.6 to 5% [9,11]. We hypothesize that virus induced vasculopathy in the patient's pre-existing vulnerable background may have resulted in the reported presentation. Additionally, the patient's presentation in the emergency room with severe external nasal pain and nasal dorsal edema, albeit nonspecific, may signify an overlying bacterial infectious complication (e.g. a septal abscess) which may cause secondary cartilage ischemia and subsequent structural collapse. Such a clinical presentation may easily be under-lit in a hectic mid-pandemic, emergency room environment with the inevitable limitations in patient contact and head

and neck physical examination.

4. Conclusion

This case represents the first published report of nasal framework collapse and subsequent severe NAO associated with COVID-19, in line with the established vasculopathic effects of SARS-CoV-2. Our patient was young, without significant medical comorbidities and was satisfied with her nasal form and function after her initial septal surgery. The present report, illustrates the potential impact of COVID-19 in the nose, and emphasizes the need for a thorough physical examination and work up in a COVID-19 patient with acute nasal symptoms and signs. It also highlights the need for preoperative patient education during nasal surgery in the times of the pandemic. Finally, further research in the field of COVID-19 related impaired wound healing will be required.

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### Nasal Obstruction and Septoplasty Effectiveness Scale

Physician AAO-HNS#: 115994 Patient ID: \_\_\_\_\_ Today's date: 10/02/2021

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→ **To the Patient:** Please help us to better understand the impact of nasal obstruction on your quality of life by completing following survey. Thank You!

**Over the past ONE month, how much of a problem were the following conditions for you?**

Please **circle** the most correct response

	Not a Problem	Very Mild Problem	Moderate problem	Fairly Bad Problem	Severe problem
1. Nasal congestion or stuffiness	0	1	2	3	<b>4</b>
2. Nasal blockage or obstruction	0	1	2	3	<b>4</b>
3. Trouble breathing through my nose	0	1	2	3	<b>4</b>
4. Trouble sleeping	0	1	2	3	<b>4</b>
5. Unable to get enough air through my nose during exercise or exertion	0	1	2	3	<b>4</b>

20/20

Fig. 4. Nasal Obstruction and Septoplasty Effectiveness (NOSE) scale score of the patient.

### Ethical approval

This article does not contain any studies with human participants or animals performed by any of the authors.

### Informed consent

Informed consent was obtained from the patient.

### Declaration of competing interest

The authors declare that they have no conflicts of interest.

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