Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Misdirection of a nasopharyngeal SARS-CoV-2 swab: An unexpected complication

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ABSTRACT

Background: The diagnosis of coronavirus disease (COVID-19) is based on detecting viral RNA of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) in the nasal cavities and the nasopharynx. Millions of nasopharyngeal swab tests are currently performed daily worldwide; complications of the procedure are uncommon, but occasionally they occur.

Case report: We describe the case of a 79-year-old man who developed right orbital cellulitis after a nasopharyngeal swab test for SARS-CoV-2. He underwent two surgeries for nasal polyposis 20 and 15 years prior, that probably caused an easy pathway to the medial wall of the orbit. At hospital admission he presented right visual loss, proptosis, palpebral edema, conjunctival chemosis, and limitations in eye movements. Computed tomography showed violation of the lamina papyracea, which appeared related to misdirection of the nasopharyngeal swab. He received intensive antibiotic treatment and achieved complete resolution of the orbital infection. To our knowledge this is the first case report concerning this dangerous complication.

Conclusion: Orbital cellulitis is a serious condition that requires prompt diagnosis and treatment, as it may result in permanent visual loss or life-threatening complications, such as intracranial abscess and cavernous sinus thrombosis, if inadequately treated. This case highlights the importance of providing adequate instruction about nasal anatomy to health care professionals performing nasopharyngeal swab tests to avoid misdirections leading to potentially dangerous complications.

1. Introduction

The diagnosis of coronavirus disease (COVID-19) is based on detecting viral RNA of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) in the nasal cavities and the nasopharynx [1]. Millions of nasopharyngeal swab tests are currently performed daily worldwide, since the global spread of COVID-19 pandemic [1]. Complications of the procedure are uncommon, but occasionally they can have dangerous consequences [2–5].

We describe a patient with orbital cellulitis that developed after a nasopharyngeal swab test for SARS-CoV-2. To our knowledge this is the first case report concerning this complication.

2. Case report

A 79-year-old male presented with a 2-day history of worsening right palpebral edema, conjunctival chemosis, proptosis and limitations in eye movements, originated after a nasopharyngeal swab test for SARS-CoV-2, obtained after a close contact with a relative affected by COVID-19. At the time of the swab the patient was asymptomatic and the test proved negative for COVID-19. He underwent two surgeries for nasal polyposis 20 and 15 years prior. Video nasal endoscopy performed in the emergency room revealed small ethmoidal bilateral nasal polyps, without signs of acute sinonasal infection. Computed tomography (CT) demonstrated a diffuse lack of homogeneity of the right orbital fat, both intraconic and extraconic, diffuse inflammatory soft tissue thickening, poor definition of orbital planes, and inflammatory tissue at the orbital floor encircling the medial rectus muscle. The lamina papyracea had

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Fig. 1. (A,B,C): Computed tomography images
Axial (A) and coronal (B–C) maxillofacial computed tomography images showing fragmentation of the right lamina papyracea (arrows) and the presence of inflammatory tissue in the right orbit. In the axial view (A), right proptosis is evident. In the coronal view (B–C), findings from previous surgeries, especially the partial removal of the middle turbinates and bilateral antrostomy, are observed.

several bone interruptions (Fig. 1). The optic nerve appeared stretched. Bilateral opacification of the frontal and ethmoidal sinuses was evident. Findings related to previous surgeries were partial removal of middle turbinates, maxillary antrostomies, interruption of septal middle third. At hospital admission right visual loss was ascertained, with 6/20 Best-Corrected Visual Acuity. The patient was treated with intravenous ampicillin/sulbactam and steroids for a week. Visual acuity progressively improved and fully recovered in a week, as confirmed by magnetic resonance imaging. The patient was dismissed and assumed amoxicillin/clavulanic acid per os for 7 days, and since then was free of symptoms.

3. Discussion

Violation of the lamina papyracea by misdirection of the nasopharyngeal swab has never been reported to date, at least to the authors' knowledge. The described case indicates that the possibility of this dangerous complication should be considered, especially for patients with "anatomical weakness" deriving from previous ethmoidal surgery. A reasonable hypothesis is that previous ethmoidectomy created an easy pathway to the medial wall of the orbit and might have caused fragility of the lamina papyracea. No CT imaging prior to the nasopharyngeal swab was available, therefore we are not able to exclude that sinus surgery performed many years earlier might have caused a pre-existing disruption of the lamina papyracea on the right side, favoring damage to the eye during the swab procedure. Nevertheless, a cautious and correct direction of the swab towards the nasopharynx – and not pointing high towards the orbit-might have avoided the described dangerous sequela.

Orbital cellulitis is a serious condition that requires prompt diagnosis and treatment, as it may result in permanent visual loss or life-threatening complications, such as intracranial abscess and cavernous sinus thrombosis, if inadequately treated [6,7]. Orbital cellulitis may be caused mainly by infection of adjacent structures, such as paranasal sinuses, or by traumatic injury [6]. In the reported case, a clear relationship was identified between transnasal swab testing that caused acute pain in the right eye and the development of orbital cellulitis.

This report highlights the importance of providing adequate instruction about nasal anatomy to health care professionals collecting the nasopharyngeal swab samples to avoid swab misdirections leading to potentially dangerous complications and, at the same time, to obtain an adequate specimen to reduce false negative results. The direction of the swab should always be along the nasal floor, and excessive force should never be applied [5]. Overall, the reported rate of complications is low worldwide, being as low as 1.24 per 100.000 performed tests [5]. Nose bleeds, foreign body retentions due to broken swabs and cerebrospinal fluid leakage deriving from cranial misdirection causing lesion of the cribriform plate have been described [2–5]. In the reported case, misdirection was both cranial and lateral as the swab entered the ethmoidal cavity and was forced into the orbit.

Although nasopharyngeal swabs are generally safe procedures to diagnose COVID-19, the risk of complications should be considered, especially in patients with a history of sinonasal surgery, as modified anatomical conditions might predispose to potentially life-threatening complications.

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Ethical statement

Hereby, I Giovanna Cantarella consciously assure that for the enclosed manuscript the following is fulfilled:

1) This material is the authors' own original work, which has not been previously published elsewhere.
2) The paper is not currently being considered for publication elsewhere.
3) The paper reflects the authors' own research and analysis in a truthful and complete manner.
4) The paper properly credits the meaningful contributions of co-authors and co-researchers.
5) The results are appropriately placed in the context of prior and existing research.
6) All sources used are properly disclosed (correct citation). Literally copying of text must be indicated as such by using quotation marks and giving proper reference.
7) All authors have been personally and actively involved in substantial work leading to the paper, and will take public responsibility for its content.

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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