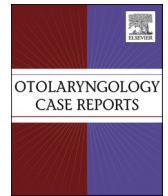




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CSF rhinorrhea after nasopharyngeal swab testing for COVID-19: A case report and review of literature

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ABSTRACT

Background: There are more than 206 million confirmed cases of Covid-19 infection globally. Nasopharyngeal swab testing is one of the widely used diagnostic methods for the initial diagnosis of such cases. With the growing diagnostic testing capacity, it is expected to observe an increased number of adverse events due to nasopharyngeal testing.

Clinical presentation: A middle-aged woman presented with unilateral rhinorrhea, started after nasopharyngeal swab test for Covid-19. She had no prior medical issues. Thorough examination and imaging showed the presence of cerebrospinal fluid leakage.

Conclusion: Nasopharyngeal swab testing may lead to serious complications and taking a brief history might be helpful. Also, patients should be educated on different complications of nasopharyngeal swab testing and their associated symptoms.

1. Introduction

Coronavirus disease 2019 (Covid-19) caused by severe acute respiratory syndrome coronavirus2 (SARS-COV-2) was identified as a global pandemic in March 2020. The number of infected people increases day by day and currently, there are more than 206 million confirmed cases [1]. To detect SARS-COV-2, the Centers for Disease Control and Prevention (CDC) has approved three swab methods for initial diagnostic testing of this virus: nasopharyngeal, nasal mid-turbinate (NMT), and anterior nasal [2]. These procedures are considered safe worldwide and they are currently, the only approved tests for Covid-19. However, many possible adverse events have been either overlooked or not reported. Up to today, there have been 7 adverse events reported in the literature. There are 3 cases that the swab broke during the procedure, 1 case of severe epistaxis needing medical help, and 5 cases of cerebrospinal fluid leak requiring endoscopic surgical repair [3–10]. Herein, we describe the second case of cerebrospinal fluid (CSF) leak after nasal testing for Covid-19. Case reports like this might ultimately unveil the adverse events caused by swab testing.

2. Case presentation

A 47 years old woman presented with unilateral rhinorrhea on the right, progressive headache, and photophobia from a week ago. The patient had recently taken Covid-19 nasopharyngeal swab test as she had contact with a positive Covid-19 patient. Shortly after, she experienced rhinorrhea accompanied by a headache. She had no history of similar symptoms before. Her medical history was also negative for any types of surgery and illnesses. In physical examination, she had no abnormal findings other than clear rhinorrhea from the right side. The drained fluid was positive for beta-2 transferrin, proving that her rhinorrhea was caused by a CSF leakage. She underwent contrast Magnetic Resonance Venography with the suspicion of idiopathic intracranial hypertension but the results were normal and lumbar puncture showed intracranial pressure (ICP) of 11 mmHg. On computed tomography (CT) scan, there was not any obvious finding suggestive of a meningocele or skull base fracture (Fig. 1A). On cisternography, CSF leakage was observed in right anterior ethmoid sinus (Fig. 1B). She was enlisted for an endoscopic surgical repair of the defect. Before the operation, intrathecal fluorescein was infused through a lumbar drain to visualize

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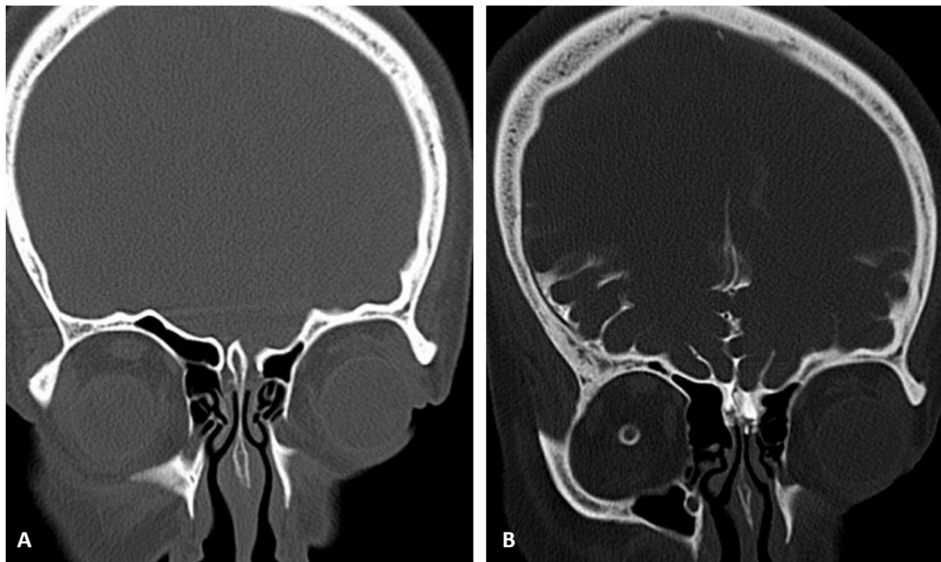


Fig. 1. A) Non-contrast coronal CT scan showing no obvious fracture and clear paranasal sinuses B) Coronal cisternography showing CSF leakage in the right anterior ethmoidal sinus.

the CSF leakage site during the operation. During the operation, the defect was sealed using fat and fascia lata. The patient's ICP was measured two weeks and four weeks after the operation and was normal in both cases. In a follow-up visit two months after surgery, the patient was good and did not have any complaints.

This case report was specifically discussed with the patient and informed consent was obtained.

3. Discussion

To the best of our knowledge, our case is the first case that nasopharyngeal swab itself resulted in a violation of the bony skull base. Iatrogenic CSF rhinorrhea is mostly caused by surgical trauma at the cribriform plate [11]. Up to today, there has been no case of cribriform violation by swab used for nasopharyngeal Covid-19 test. Sullivan et al. have reported a case with an encephalocele extending through the right ethmoid that suffered from CSF rhinorrhea after nasal testing for Covid-19 [4]. They theorized that trauma to the existing encephalocele has developed CSF leakage in the patient. The same scenario was also reported later by Rajah et al. [8] emphasizing the role of previous skull base defect. In three other cases of CSF leak after Covid-19 nasopharyngeal swab, the authors did not state a reason for the observed adverse event [7,9,10]. In our case, the patient only had deviated nasal septum and a nasal spur. We hypothesized that the deviated septum and the nasal spur caused the swab to deviate and encounter the skull base, eroding the cribriform plate, causing a defect in the dura and the corresponding CSF leak.

The diagnostic testing capacity of Covid-19 is expected to increase tremendously, due to the increasing incidence of positive cases and emersion of novel mutants [12]. In most countries, the testing is not only limited to suspicious cases and it is used for travelers, medical procedures' candidates. Our case illustrates that individuals performing nasopharyngeal swab testing should do the test gently and take a brief history from patients regarding prior surgical intervention, or pathology that distorts normal nasal anatomy, before performing the test. This could reduce complications caused by this procedure and lower the risk of skull base erosions [4].

4. Conclusion

Patients should be educated on different adverse events of nasopharyngeal swab testing and their associated symptoms. We also

recommend that when performing a nasopharyngeal swab test, in case of any resistance, the healthcare staff should immediately stop the procedure and consider anatomical anomalies. An alternative test might be needed if nasopharyngeal test seems impossible.

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Consent

This case report was specifically discussed with the patient and informed consent was obtained.

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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