

Cerebrospinal fluid leak as a complication of intranasal COVID-19 swabbing following remote transsphenoidal surgery

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Abstract

In the setting of the COVID-19 pandemic, there has been enhanced testing in the community and hospitals for the virus. As there have been no previously documented complications from nasal swabbing described in the literature, we report a case of cerebrospinal fluid leak in a patient who underwent intranasal testing for COVID-19 approximately two years after transsphenoidal surgery. We recommend checking for a history of transsphenoidal surgery before undergoing nasal swabbing, and using alternative methods of testing in this patient population.

Keywords

COVID-19; coronavirus; transsphenoidal surgery; cerebrospinal fluid leak.

Abbreviations

WHO: World Health Organization; COVID-19: Coronavirus 2019; RT-PCR: Reverse-transcription polymerase chain reaction; CSF: Cerebrospinal fluid; VP: Ventriculoperitoneal shunt; TSS: Transsphenoidal surgery; WHO: World health organization; EBV: Epstein - barr virus.

Introduction

On March 11, 2020, the World Health Organization (WHO) officially announced the COVID-19 outbreak a pandemic [1]. As of July 24, 2020, there have been more than 15,000,000 cases reported worldwide resulting in over 628,240 deaths [1]. Of these statistics, the United States accounts for approximately 4 million cases with 143,868 deaths according to the CDC [2].

The preferred initial diagnostic test for COVID-19 is the use of nucleic acid amplification testing with reverse-transcription polymerase chain reaction (RT-PCR) to detect SARS-CoV-2 RNA [3].

According to the Centers for Disease Control and Prevention, optimal anatomic sites of testing include nasopharyngeal, nasal mid-turbinate, anterior nares, oropharyngeal, tracheal and bronchoalveolar lavage specimens [4]. The Infectious Disease Society of America suggests nasal specimens rather than oropharyngeal specimens since there is lack of data on sensitivity and accuracy of saliva specimens [5]. However, in the neurosurgical patient population, there are factors which may limit the ability to safely perform nasal testing including patients with facial or skull base fractures. This case highlights the potential complication of Cerebrospinal Fluid (CSF) leak when performing intranasal COVID-19 testing in patients with a history of endoscopic endonasal Transsphenoidal Surgery (TSS).

Case Report

A 37-year-old woman with a past medical history of migraine and chronic sinusitis, initially presented to the hospital with headaches and vision changes. She was found to have a suprasellar mass (Figure 1A,1B) for which she subsequently underwent an endoscopic endonasal Transsphenoidal (TSS) resection of an epidermoid cyst on July 13th, 2017 (Figure 1C,1D). Post-operatively the patient developed diabetes insipidus and hypopituitarism. Following hospital discharge, she presented two weeks later with episodes of cerebrospinal fluid rhinorrhea for which the patient underwent primary endoscopic endonasal repair of the CSF leak with the placement of a lumbar drain (Figure E). Following this, her symptoms resolved; however, her symptoms recurred eventually requiring another endoscopic endonasal repair and subsequent placement of a Ventriculoperitoneal Shunt (VPS). Following the placement of shunt the patient's leak resolved and she remained medically and surgically stable over the next two years.

In February 2020, she presented with severe, holo-cranial headache associated with sensation of gait instability. Her workup was significant for a left frontal mass, with no evidence of other primary disease. The patient underwent a craniotomy for biopsy of the lesion that revealed Epstein - Barr Virus (EBV) positive diffuse large B cell lymphoma (Figure 2). There was no evidence of intraocular involvement of lymphoma and Human Immunodeficiency Virus (HIV) testing was negative. Her post-operative course was uncomplicated. Chemotherapy was initiated in late February 2020 with a regimen consisting of rituximab, methotrexate and vincristine, which was well-tolerated.

Approximately two weeks later, she was admitted with abdominal pain and signs of systemic inflammatory response syndrome. CT abdomen showed a subcapsular fluid collection of the right hepatic lobe prompting removal of the VPS. Cultures at that time were negative. Due to persistent fever and in the setting of the pandemic, intranasal swabbing for COVID-19 was performed and the result was negative for the virus. The patient then underwent bronchoscopy due to worsening pulmonary infiltrate. Bronchoalveolar lavage specimen testing was positive for COVID-19. Patient improved clinically with supportive care and was discharged home on April 22nd after a prolonged hospital stay.

Upon routine preadmission COVID-19 testing for scheduled chemotherapy, she underwent intranasal swabbing for screening per hospital protocol on May 4th. This, however, immediately provoked CSF rhinorrhea. Beta-2 transferrin was detected in the nasal discharge. She was admitted and a lumbar drain was placed. She continued to have CSF leak and subsequently underwent endoscopic endonasal repair of

the cerebrospinal fluid leak. Ultimately, her symptoms resolved, and she was discharged home in stable condition.

As of July 23rd, she has received a total six cycles of chemotherapy, with plans for continued treatment. She has not had any further episodes of CSF leak.

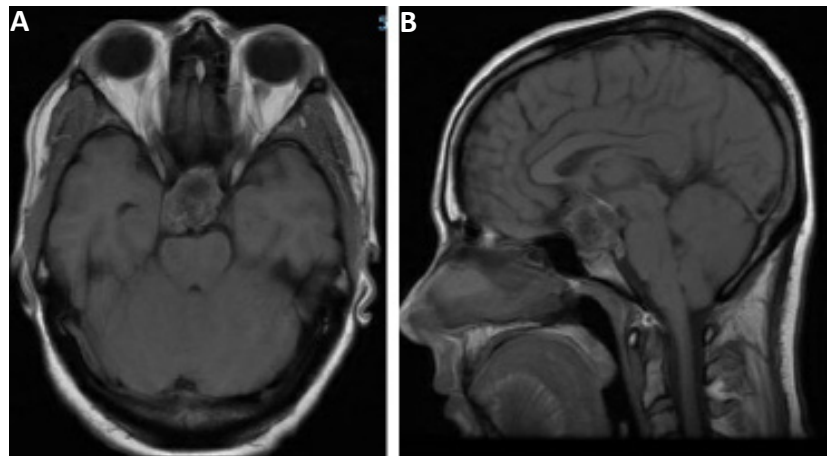


Figure 1 (A&B): Preoperative non contrast MRI showing the large sellar mass on axial and sagittal imaging with supra and retrosellar extension. This is a non enhancing lesion visualized here on these non contrast T1 images.

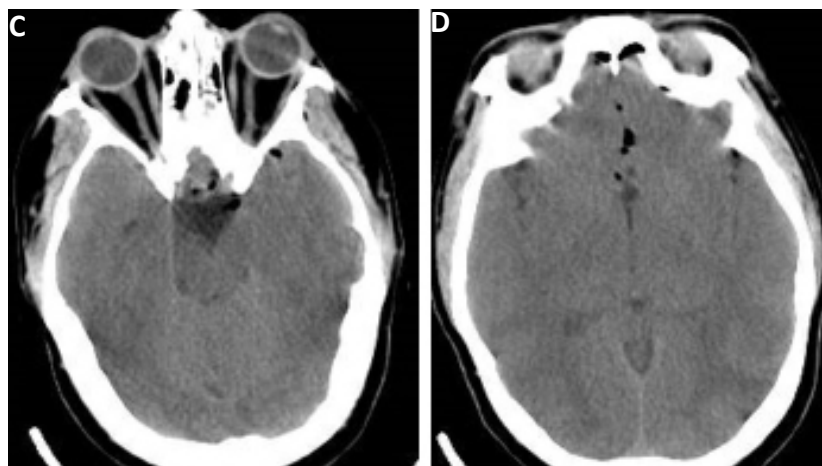


Figure 1 (C&D): Post operative axial non contrast CT showing complete resection of lesion with post operative changes.



Figure 1 (E): Non contrast axial CT after the endoscopic endonasal repair of postoperative CSF leak

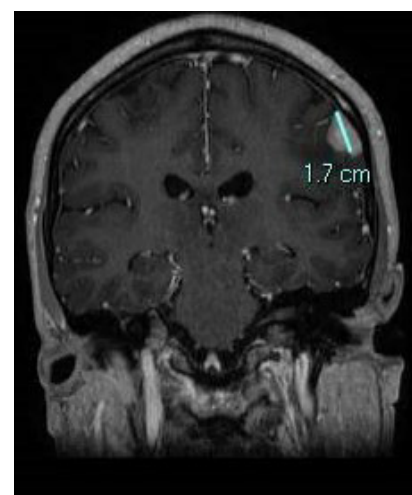


Figure 2: Showing the newly diagnosed B cell lymphoma. Coronal contrasted T1 MRI showing the superficial enhancing mass, found to be B cell lymphoma.

Discussion & Conclusion

The recent outbreak of SARS-CoV-2 (COVID 19) has led to the frequent testing of patients presenting to physicians' offices, urgent care centers, and hospitals throughout the world. It is primarily a respiratory virus causing flu like symptoms and in some cases severe lung injury. The WHO and various other entities have established nasal swabs and subsequent reverse transcriptase polymerase chain reaction for the detection of viral RNA and diagnosis of the disease. The nasal swab maintains a relatively high false negative rate of up to 30% making proper swab technique a priority. The swab must be inserted to the posterior wall of the nasopharynx for optimal testing. This is considered a very low risk procedure with, to most, patient discomfort being the only significant concern. However, here we report the first ever case of cerebrospinal fluid leak after nasopharyngeal swab for COVID 19 detection.

This was a case of a patient who previously underwent endoscopic endonasal treatment of an epidermoid. The approach that is taken in removing skull base tumors depends on several factors including pathology, the origin and extension of the lesion, consistency, severity of vision changes and presence of vascular involvement among other factors [6]. A transcranial (pterional) approach is preferred for lesions that have significant lateral extension as it allows for more optimal access. However, TSS has gained popularity for the treatment of these anterior skull base lesions. It allows for enhanced visualization and complete resection. Lesions amenable to this approach include epidermoid tumors, craniopharyngiomas, and pituitary adenomas with suprasellar extension [6]. The indications for TSS in this case was based on surgeon's preference based mostly on lesion anatomy. In a published case series by Bobeff et al of fifty six patients with suprasellar epidermoid cysts, twenty eight underwent TSS, while the remaining twenty eight underwent a transcranial approach. It was found that the TSS group allowed for a more complete resection (either a gross total resection or near total resection). A similar number of recurrences was seen in both groups after any degree of resection [7].

CSF rhinorrhea characterized by drainage of clear fluid from the nose has been reported in approximately 0.5 to 4% of cases during or following TSS surgery [5]. It is confirmed biochemically by the presence of beta-2 transferrin in the nasal discharge [6]. Due to the risk of meningitis, CSF leaks require urgent management with placement of an external lumbar drain, VP shunt, or endoscopic repair [8,9]. Furthermore, great caution is taken to prevent CSF leaks post operatively including avoiding the use of intranasal devices such as nasal cannula prongs, avoiding the use of positive pressure devices such as bi-level positive airway pressure machines, and any other maneuvers that may increase pressure at the transsphenoidal surgical site including use of incentive spirometry and drinking straws [10]. This patient had a challenging post-operative course complicated by recurrent CSF leak requiring multiple repairs. After a long recovery period with no recurrent CSF leaking the patient underwent nasal swabbing for COVID 19 RT-PCR which was complicated by a CSF leak. Based on this case report, to reduce morbidity and mortality for patients who underwent transsphenoidal surgery regardless of remoteness of the procedure, intranasal testing for COVID-19 is cautioned. In such patients, an alternative method of testing such as oropharyngeal specimen should be considered. Furthermore, a detailed surgical history with an emphasis on prior skull base procedures, and perhaps a review of previous brain imaging should be done prior to intranasal testing for COVID-19.

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