

## > THE PATIENT

55-year-old woman

## > SIGNS & SYMPTOMS

- Unilateral nasal drainage
- Salty taste
- Nasal redness
- Recent COVID-19 nasal swabs



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## > THE CASE

A 55-year-old woman was evaluated in a family medicine clinic for clear, right-side nasal drainage. She stated that the drainage began 5 months earlier after 2 hospitalizations for severe anxiety leading to emesis and hypokalemia. She reported 3 different COVID-19 nasal swab tests performed on the right nare. Chart review showed 2 negative COVID-19 tests, 6 days apart. Since the hospitalizations, the patient had been given antihistamines for rhinorrhea at an urgent care visit. Despite this treatment, the patient reported a constant drip from the right nare with a salty taste. She also reported experiencing occasional headaches but denied nausea/vomiting.

The patient's history included uncontrolled hypertension, treatment-resistant anxiety and depression, obstructive sleep apnea, chronic sinus disease (observed on computed tomography [CT] scans), and type 2 diabetes. She was on amlodipine 10 mg/d for hypertension and was not taking any medication for diabetes.

On examination, the patient's vital signs were within normal limits except for an elevated blood pressure of 158/88 mm Hg. The patient had persistent clear rhinorrhea fluid draining from the right nostril that was exacerbated when she looked down. Right nasal erythema was present.

## THE DIAGNOSIS

The patient's negative COVID-19 tests, lack of improvement on antihistamines, and description of the nasal fluid as salty tasting prompted us to suspect a cerebrospinal fluid (CSF) leak. The clinical work-up included a halo ("double-ring") sign test, a  $\beta$ -2 transferrin test, and a sinus x-ray.

The halo sign test was negative for CSF fluid. Sinus/skull x-ray did not show a cribriform or other fracture. However, a sample of the nasal fluid collected in a sterile container was positive for  $\beta$ -2 transferrin, the gold-standard laboratory test to confirm a CSF leak.

The patient was sent for a maxillofacial CT scan without contrast. Results showed a 3-mm defect over the right ethmoid roof associated with a 10 × 16-mm low-attenuation structure in the right ethmoid labyrinth, suspicious for encephalocele. This defect, in the setting of the patient's history of chronic sinus disease, furthered our suspicion of a CSF leak secondary to COVID-19 testing. Radiology confirmed the diagnosis.

## DISCUSSION

CSF rhinorrhea is CSF leakage through the nasal cavity due to abnormal communication between the arachnoid membrane and nasal mucosa.<sup>1</sup> The most commonly reported risk factors for this include female sex, middle age (fourth to fifth decade), obesity (body mass index > 40), intracranial hypertension, and obstructive sleep apnea.<sup>1,2</sup>

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➤ Endonasal endoscopic repair of CSF leaks has become the standard of care because of its high success rate and lower morbidity profile.

Clear, unilateral rhinorrhea drainage that increases at times of relatively increased intracranial pressure and has a metallic or salty taste is suspicious for CSF rhinorrhea.<sup>3</sup> It can occur following skull-base trauma (eg, cribriform plate, temporal bone), endoscopic sinus surgery, or neurosurgical procedures, or have a spontaneous etiology.<sup>3,4</sup>

■ **Modalities to confirm CSF rhinorrhea** include radionuclide cisternography and testing of fluid for the halo sign, glucose, and the CSF-specific proteins  $\beta$ -2 transferrin and  $\beta$ -trace protein.<sup>3,4</sup> High-resolution CT is the imaging method most commonly used for localizing a CSF leak.<sup>4</sup>

### Treatment is provided in the hospital

Patients with CSF rhinorrhea typically require inpatient management with bed rest, head-of-bed elevation, and frequent neurologic evaluation, as persistent CSF rhinorrhea increases the risk for meningitis, thus necessitating surgical intervention.<sup>3,5</sup> Some cases resolve with bed rest alone. Endonasal endoscopic repair of CSF leaks has become the standard of care because of its high success rate and lower morbidity profile.<sup>4</sup>

The preferred treatment method for encephalocele is surgical removal after diagnosis is confirmed with CT or magnetic resonance imaging.<sup>6</sup>

■ **Our patient** underwent surgery to remove the encephalocele. The surgeons reported no evidence of fracture.

The final cause of her CSF leak is still uncertain. The surgeons felt confident it was due to ethmoidal encephalocele, a form of neural tube defect in which brain tissue herniates through structural weaknesses of the skull.<sup>6-8</sup> While more common in infants, encephalocele can manifest in adulthood due to traumatic or iatrogenic causes.<sup>7,8</sup>

There is a previous report of encephalocele with CSF leak after COVID-19 testing.<sup>9</sup> This case report suggests the possibility of a

nasal swab causing trauma to a patient's pre-existing encephalocele—a probability in our patient's case. It is unlikely, however, that the nasal swab itself violated the bony skull base.

## THE TAKEAWAY

This case exemplifies how unexplained local symptoms, a high index of suspicion, and adequate work-up can lead to a rare diagnosis. Diagnostic strategies employed for cases of CSF rhinorrhea vary widely due to limited evidence-based guidance.<sup>4</sup> Unilateral rhinorrhea with clear fluid that increases at times of increased intracranial pressure, such as bending over, should prompt suspicion for CSF rhinorrhea. With millions of people getting nasal swabs daily during the COVID-19 pandemic, it is even more important to keep CSF leak in our differential diagnosis. **JFP**

### CORRESPONDENCE

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