EDITORIAL

Cerebrospinal Fluid Rhinorrhea: Diagnostic Challenges

Cerebrospinal fluid (CSF) rhinorrhea is a type of CSF leakage that occurs when CSF egresses from an abnormal communication formed by the arachnoid and dura mater, as well as defective skull sections leading into the nasal cavity and sinuses, due to a dural and osseous defect at the anterior skull base.1

CSF rhinorrhea can be classified as traumatic or non-traumatic, with craniofacial trauma being the most common cause[2]. A thorough review revealed the most prevalent locations of injury as the ethmoid/cribriform plate (46%), frontal sinus (44%), orbital roof (15%), and sphenoid sinus (11%) [3]. Due to underlying idiopathic intracranial hypertension (IIH), the frequency of spontaneous CSF leaks is increasing, especially among females in areas with high obesity rates [4].

The primary symptom of CSF rhinorrhea, a type of CSF leakage caused by an aseptic abnormal passage between the subarachnoid space and the nearby sinus and nasal cavity due to a cranial dural defect, is persistent and uncontrollable unilateral or bilateral watery nasal discharge that is exacerbated by bending over or performing the Valsalva maneuver [5]. The clinical presentation of CSF rhinorrhea is usually unilateral, clear, watery nasal discharge [6] A persistent and uncontrollable unilateral or bilateral watery nasal discharge that gets worse when you bend over or do the Valsalva maneuver is the primary symptom of CSF rhinorrhea[5].

The clinical history should include information about the nasal discharge's consistency, laterality, duration, onset, timing, aggravating factors like straining or posture, and any bouts of meningitis.[7] Symptoms of elevated intracranial pressure, such as headaches accompanied by visual impairment, should be noted. Patients with an active CSF leak, on the other hand, may exhibit ICP-lowering symptoms such as orthostatic headache and neck stiffness [8]. Special care should be devoted to recognizing IIH, a disorder that can result in considerable morbidity, including irreversible sight loss and persistent headache [3].

Patients with persistent rhinorrhea are at risk of acquiring meningitis due to infection spreading from the nasal cavity. Infection rates range from 19-50%. [9] Bacterial meningitis can result in seizures, dementia, or damage to the cranial nerves and has a mortality rate of up to 33% in people treated with antibiotics [7]. Additionally, there is a high risk of potentially fatal intracranial consequences from CSF rhinorrhea, such as hydrocephalus, pneumocephalus, and epidural abscess 10. In order to avoid severe problems, prompt diagnosis and treatment are crucial.

In order to confirm CSF rhinorrhea, nasal fluid must be tested in a lab for beta-2 transferrin or beta-trace. Imaging tests are necessary to locate the problem after CSF has been verified. The first imaging method of choice is high-resolution computed tomography (HRCT) of the paranasal sinuses and skull base, which provides comprehensive bone anatomy [12]. Magnetic resonance imaging (MRI) with highly T2-weighted sequences and fat suppression is advised for the detection of CSF fistula if the osseous defect is not visible on CT.[13]

CT cisternography with intrathecal dye injection may be more conclusive in situations with active leaks that are not picked up by non-invasive imaging [12]. Intraoperative fistula identification may also be facilitated by intrathecal fluorescein (ITF) injection [14]. However, there are uncommon but potentially dangerous neurological side effects associated with this off-label use of fluorescein [14]. In difficult instances, it is advised to use intraoperative neuronavigation using CT (with or without MRI fusion) to help locate the region of the bony defect and related CSF leak [10].

Recent International consensus guidelines are followed in the diagnostic workup for suspected IIH. An ophthalmology examination to check for papilledema and visual function comes first.[14] When papilledema is seen, an urgent MRI venogram is performed after blood pressure is measured to rule out malignant hypertension.[14] An empty sella, posterior globe flattening, optic nerve tortuosity, optic nerve sheath distention, and expansion of the foramen ovale are radiological signs of IIH[13]. For IIH transverse sinus

stenosis is thought to be the most accurate and sensitive imaging indication marker[15].

To address the current evidence gaps for the diagnosis of CSF leaks, future research should focus on high-quality prospective studies and randomized controlled trials. Habenbacher et al. proposed a diagnostic technique that combines beta trace protein testing, HRCT, and ITF to consistently confirm and localize CSF leaks[16]. In order to better accurately identify these patients, future research should focus on developing and validating diagnostic techniques, such as the use of distinctive radiological findings.

Keywords: Cerebrospinal Fluid Rhinorrhea, CSF rhinorrhea CT cisternography, intrathecal fluorescein (ITF)

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