



Radio-Diagnosis

SPONTANEOUS CSF RHINORRHOEA SECONDARY TO IDIOPATHIC INTRACRANIAL HYPERTENSION: A RADIOLOGICAL PERSPECTIVE

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ABSTRACT Spontaneous cerebrospinal fluid (CSF) rhinorrhoea is a rare yet increasingly recognized clinical entity, often linked to idiopathic intracranial hypertension (IIH). It results from occult skull base defects due to chronically elevated intracranial pressure in the absence of any pathology causing increased intracranial pressure. Early recognition is crucial, as delayed diagnosis may lead to serious complications, including recurrent meningitis and intracranial infections.

KEYWORDS : CSF Rhinorrhoea, Idiopathic Intracranial Hypertension, Spontaneous Skull Base Defect, CT Cisternogram

CASE REPORT

A 62-year-old female, who is a known case of Type 2 diabetes mellitus, came with complaints of watery nasal discharge from the left nostril for 1 month, associated with fever, headache, giddiness, double vision and few episodes of vomiting for one day. No complaints of neck rigidity, seizures and trauma. On examination, her vitals were stable and systemic examination were within normal limits. Lab investigations revealed an elevated WBC count with neutrophilic predominance and CSF analysis showed elevated RBC, WBC with lymphocytic predominance and increased ADA. However, Gene Expert turned out to be negative. CSF and blood cultures showed no growth.

Imaging Findings

CT brain and paranasal sinuses plain was done initially which showed multiple focal defects in the roof of the left sphenoid sinus, largest of which measured ~2mm with fluid densities within (Figure 1a,b). Further which CT Cisternogram was planned for this patient.

Approximately 10ml of saline diluted iodinated contrast material was injected intrathecally and the patient was maintained in knee-chest position for 5 to 10 minutes. On post contrast images, contrast leak was noted via the bony defects in the roof of left sphenoid sinus and pooling of the contrast material within it (Figure 1c,d). Bilateral cribriform plates were thinned out with mild herniation of the CSF spaces into the nasal cavities with subtle progressive contrast pooling noted within these spaces and hence they were concluded as meningocele (Figure 2a,b). Also imaging clues for idiopathic intracranial hypertension including empty Sella, dilated and tortuous optic nerves bilaterally with mild flattening of posterior sclera posteriorly were noted (Figure 3a,b.). The patient is planned for endoscopic repair.

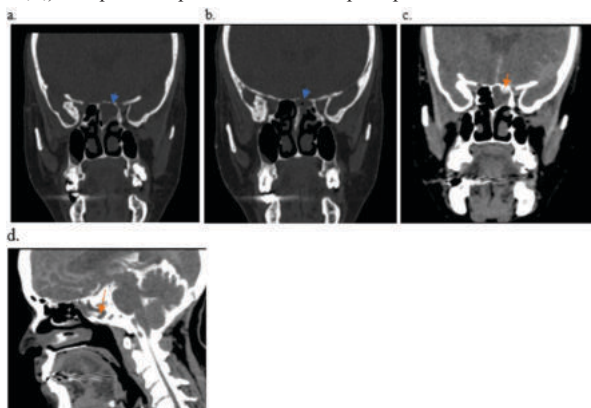


Figure 1: NCCT of the PNS in coronal sections showing the bony defects in the roof of the left sphenoid sinus (blue arrows in a and b) and the corresponding Cisternogram image in coronal (c) and sagittal (d) section showing the contrast leak via these defects and are seen pooling within the left sphenoid sinus (orange arrows in c and d).

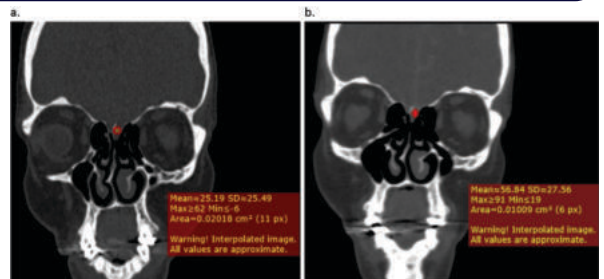


Figure 2: NCCT of the brain (a) and Cisternogram (b) in coronal sections revealed thinning of bilateral cribriform plates with CSF density content into the superior aspect of bilateral nasal cavities with subtle progressive contrast pooling noted within these spaces, indicated by the increasing HU values in Cisternogram (b) and hence they were concluded as meningocele.



Figure 3: Signs of idiopathic intracranial hypertension: NCCT and CT Cisternogram images of the same patient showing dilated and tortuous optic nerves bilaterally (a), mildly enlarged and empty Sella (b) and flattening of the posterior sclera (c).

DISCUSSION**Spontaneous CSF Rhinorrhoea in Idiopathic Intracranial Hypertension**

CSF rhinorrhoea commonly occurs due to a traumatic/iatrogenic cause or rarely it can be a spontaneous CSF leak. The cause of spontaneous CSF leak includes, Congenital skull bases defects, Idiopathic

intracranial hypertension (IIH), dural tear, meningeal diverticulum and CSF venous fistulas. Spontaneous CSF rhinorrhea is a rare yet significant manifestation of IIH, a condition characterized by elevated intracranial pressure without an identifiable cause. While IIH typically presents with symptoms like headache, visual disturbances, and papilledema, some patients may present solely with CSF rhinorrhea. This underscores the importance of recognizing radiological signs indicative of IIH in patients with spontaneous CSF leaks (1).

Radiological Features of IIH

Magnetic resonance imaging (MRI) plays a pivotal role in diagnosing IIH in patients with spontaneous CSF rhinorrhea. Key MRI findings suggestive of IIH include (2):

- **Empty Sella:** A common finding in IIH, observed in a significant percentage of patients with spontaneous CSF rhinorrhea.
- **Flattened Posterior Globe:** Indicative of increased intracranial pressure affecting the optic nerves.
- **Enlarged Meckel's Cave:** Suggests elevated intracranial pressure impacting the trigeminal nerve.
- **Tortuous or Enlarged Optic Nerve Sheath:** Reflects increased CSF pressure around the optic nerve.
- **Vertical Tortuosity of the Optic Nerve:** A specific marker of IIH

MRI is an excellent non-invasive modality which accurately localizes the site of CSF leak, but has the limitation of poor spatial resolution and loss of bony detail. High-resolution computed tomography (CT) scans of the skull base with CT Cisternogram can identify bony defects in the skull base, such as dehiscence in the cribriform plate, which may predispose to CSF leaks. Thus, CT and MRI act as complimentary modalities in diagnosing CSF leaks (3). However, the gold standard lab investigations for diagnosis of CSF rhinorrhea is analysis of $\beta 2$ -transferrin levels although it has its own limitation of high cost.

Diagnostic Challenges

The presence of a CSF leak can potentially mask typical IIH symptoms, leading to diagnostic challenges. Elevated intracranial pressure may not be evident if the CSF leak acts as a "pressure release valve." Therefore, clinicians must maintain a high index of suspicion and consider IIH in the differential diagnosis of spontaneous CSF rhinorrhea (4) (5).

Management Considerations

Addressing the underlying elevated intracranial pressure is crucial in managing spontaneous CSF rhinorrhea associated with IIH. Treatment strategies may include:

- **Medical Management:** Use of carbonic anhydrase inhibitors like acetazolamide to reduce CSF production.
- **Surgical Intervention:** Endoscopic repair of the CSF leak site (4).
- **CSF Diversion:** Placement of ventriculoperitoneal or lumbar-peritoneal shunts in refractory cases.

A multidisciplinary approach involving neurology, radiology, and neurosurgery is essential for optimal patient outcomes.

CONCLUSION

Spontaneous CSF rhinorrhea can be an atypical presentation of IIH. Radiological imaging is instrumental in identifying IIH features and guiding appropriate management. Early recognition and treatment are vital to prevent complications and improve patient quality of life (5).

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