

A Case of CSF Rhinorrhoea Presenting as Recurrent Meningitis

Deepthi V¹, Nanda Gopal¹, Sriharsha T^{1*}, Kannan R¹, Bharath, S¹, Maghimaa Mathanmohun²
¹Department of General Medicine, Saveetha Medical College and Hospital, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai-602 105, Tamil Nadu, India
²Centre for Global Health Research, Saveetha Medical College and Hospital, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai-602 105, Tamil Nadu, India

Abstract

This case report describes a 40-year-old male patient who experienced recurrent meningitis with a history of CSF rhinorrhoea. The first episode of meningitis caused by Streptococcus pneumoniae was successfully treated with antibiotics. MRI cisternography confirmed the presence of CSF rhinorrhoea, demonstrating CSF leakage from the subarachnoid space through defects in the left fovea ethmoidalis and lateral lamella into the left frontal sinus and left anterior ethmoidal sinus. The patient was referred to a neurosurgeon for repair of the CSF leak, which was successfully performed via bifrontal craniotomy and anterior cranial fossa (ACF) base repair through an eyebrow approach. The patient recovered fully following antibiotic and steroid regimens, and subsequent follow-up after one year revealed no recurrence of the meningitis symptoms. This case highlights the importance of considering CSF rhinorrhoea as a potential cause of recurrent meningitis, and the need for prompt diagnosis and treatment to prevent complications.

Keywords: Cerebrospinal Fluid, Rhinorrhoea, Recurrent Meningitis.

Introduction

Recurrent meningitis manifests when an individual undergoes two or more episodes of meningitis caused by distinct pathogens or experiences a subsequent episode by the same organism, which occurs more than three weeks after completing treatment for the initial episode. This necessitates comprehensive exploration of the underlying predisposing conditions. Such conditions may encompass anatomical anomalies leading to abnormal connections between the Cerebrospinal Fluid (CSF) and integumentary, auditory, or nasal structures, as well as immunodeficiency states or infections close to the meningeal space [1-4]. Disrupted communication between the subarachnoid and sinonasal spaces can give rise to Cerebrospinal fluid (CSF) rhinorrhoea, with trauma or skull base surgery being the

predominant causes [5]. A delay in diagnosing recurrent meningitis increases the risk of developing bacterial meningitis, which has a mortality rate of approximately 14% [6]. Given its infrequency, recurrent meningitis presents a substantial challenge to clinicians. Below, we describe a case in which CSF rhinorrhoea was identified as the underlying aetiology for recurrent meningitis.

Case Presentation

A 40-year-old male presented to the emergency room (ER) with a one-day history of headache, fever, and altered sensorium. The fever was high-grade and intermittent with associated chills. The headache was localised to the occipital region and described as throbbing in nature. Upon examination, his body temperature was recorded as 101.4 °F. Central nervous system examination revealed a

Glasgow Coma Scale (GCS) score of E4V4M5, normal fundus, muscle tone, and reflexes, along with positive signs of meningeal irritation. Other systemic examinations were unremarkable, except for tachycardia.

The patient reported a similar episode occurring three months prior, during which *S. pneumoniae* was isolated from the cerebrospinal fluid (CSF) analysis and successfully treated with antibiotics. Additionally, he disclosed a history of a head injury sustained in a road traffic accident two years prior, associated with recurrent watery discharge from the bilateral nostrils.

Therefore, a clinical diagnosis of recurrent acute meningitis was established. Lumbar puncture revealed CSF with a slightly turbid appearance, decreased glucose levels (20 mg/dL), elevated protein levels (152.8 mg/dL), and pleocytosis (1141 white blood cells/cubic millimetre, predominantly neutrophils). *S. pneumoniae* was isolated from both the CSF

and blood cultures. The patient was administered high-dose ceftriaxone in conjunction with dexamethasone.

Given the recurrent episodes of acute meningitis, history of watery rhinorrhoea, and head injury, cerebrospinal fluid (CSF) rhinorrhoea was suspected to be the underlying cause. MRI cisternography confirmed the presence of CSF rhinorrhoea, demonstrating CSF leakage from the subarachnoid space through defects in the left fovea ethmoidalis and lateral lamella into the left frontal sinus and left anterior ethmoidal sinus (Figure 1).

The patient recovered fully following antibiotic and steroid regimens. He was subsequently referred to a neurosurgeon for repair of the CSF leak, which was successfully performed via bifrontal craniotomy and anterior cranial fossa (ACF) base repair through an eyebrow approach. Subsequent follow-up after one year revealed no recurrence of meningitis symptoms.

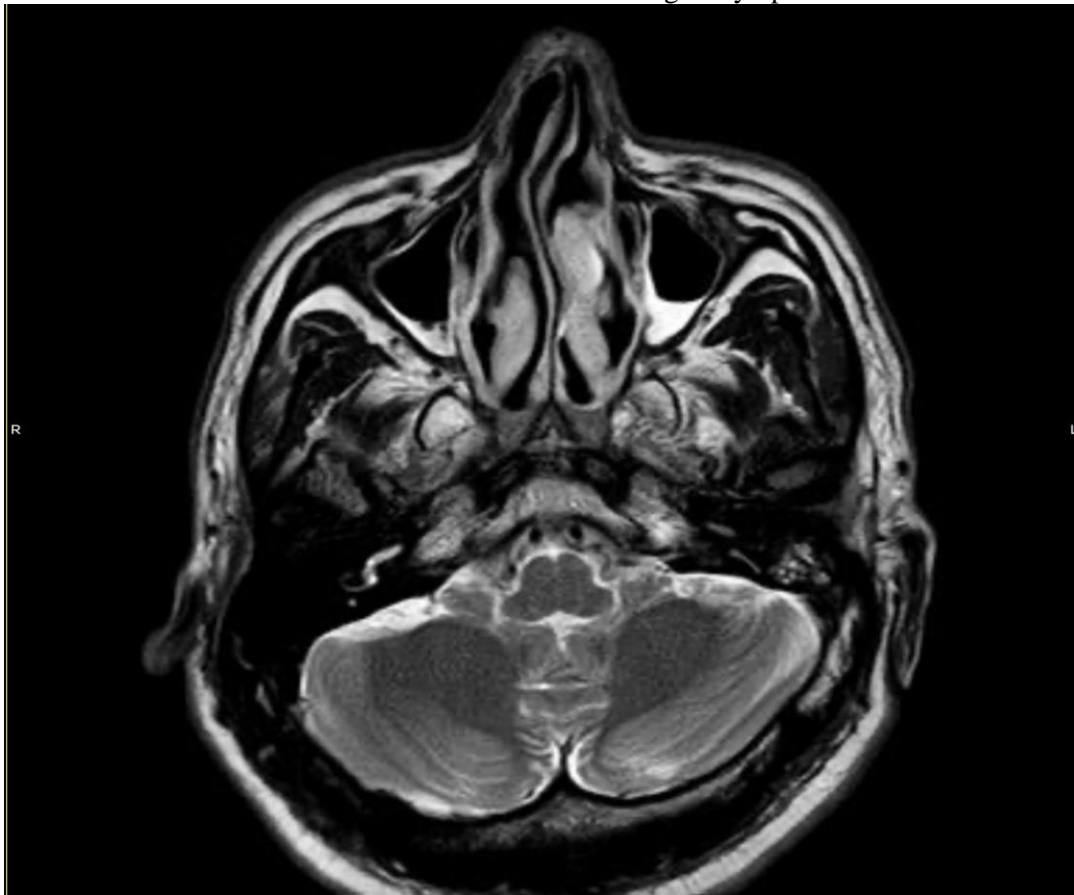


Figure 1. MRI of the Patient Confirming CSF Rhinorrhoea

Discussion

Recurrent meningitis presents a considerable challenge to clinicians owing to its potential association with various predisposing factors. The most frequently implicated conditions contributing to recurrent bacterial meningitis include ear or sinus infections (37%), cerebrospinal fluid (CSF) leakage (32%), and immunocompromised status (14%) [7].

CSF, a vital physiological fluid, circulates actively at a rate of 125–150 ml per day [8]. CSF rhinorrhoea arises from acquired communication between the central nervous system and the external environment and often results from trauma. Left untreated CSF rhinorrhoea can lead to ascending meningitis and other complications [9].

CSF leaks predominantly occur post-trauma (80–90% of cases), with most instances presenting within the initial three months. Other aetiologies include postoperative defects (10%), spontaneous leaks (3–4%), and tumour- and inflammation-related occurrences. Traumatic CSF rhinorrhoea typically manifests within the first 48 hours, with delayed presentations beyond three months noted in approximately 5% of patients; occurrences beyond one year are exceedingly rare [10].

Tebruegge and Curtis advocate for a systematic tiered approach to investigate recurrent meningitis, emphasising detailed history taking and examination as fundamental primary steps. The presence of beta-2 transferrin in watery nasal discharge serves as a diagnostic marker of CSF. MRI cisternography is the gold standard for diagnosing CSF rhinorrhoea. Surgical repair is recommended to prevent meningitis from ascending infection [11]. Additionally, CSF rhinorrhoea warrants vaccination with pneumococcal conjugate vaccines (PCV13 and PCV23) [12].

Most cases of traumatic CSF rhinorrhoea can be managed conservatively using

acetazolamide, laxatives, and prophylactic antibiotics. Lifestyle adjustments such as maintaining bed rest with an elevated head position and avoiding actions that increase intracranial pressure are also effective. Surgical intervention is necessary if conservative measures cannot prevent complications [13].

Our case underscores the significance of long-term follow-up and counselling in patients with traumatic skull base fractures. Regardless of the initial presentation of CSF rhinorrhoea, these injuries predispose individuals to delayed complications including meningitis, which may emerge years after the incident. Although many traumatic CSF leaks resolve spontaneously, the potential for delayed complications underscores the importance of considering surgical repair when selecting fractures and leak sites, even in the absence of active rhinorrhoea.

Conclusion

In conclusion, patients with recurrent meningitis require a comprehensive evaluation of predisposing conditions. Our case emphasises the consideration of underlying anatomical defects as potential contributors to recurrent meningitis and underscores the lifesaving potential of prompt surgical intervention.

Acknowledgement

We would like to acknowledge the Department of General Medicine and Center for Global Health Research, Saveetha Medical College and Hospitals, Saveetha Institute of Medical and Technical Sciences for providing the necessary facilities.

Conflict of Interest

The authors hereby declare that there is no conflict of interest in this study.

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