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Recurrent Meningitis Due to a Persistent Nasal Discharge

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Abstract

Presentation

We report a case of recurrent meningitis in an adult female who had a delayed cerebrospinal fluid leak (CSF), years after a road traffic accident (RTA).

Diagnosis

Taking a thorough history and correlating with test results confirmed the cerebrospinal fluid leak (CSFL). Magnetic resonance imaging (MRI) imaging identified the location of a CSF communication to the ethmoid sinus.

Treatment

Antibiotic treatment for meningitis lead to full recovery on every admission. The site of the CSFL was later treated successfully by endonasal repair.

Discussion

Recurrent meningitis is rare. This case highlights the importance of taking a thorough history, reflecting on signs and symptoms before ordering the right tests to achieve the appropriate treatment.

Introduction

Recurrent bacterial meningitis is defined as two individual episodes of meningitis separated by a period of full recovery with at least 3 weeks apart, together with abnormal CSF [1]. In adults, head injury is the most common non-iatrogenic cause for recurrent meningitis due to a CSFL. This has even been reported several decades post trauma. The most common causative organism in meningitis associated with CSFL is *Streptococcus pneumoniae* [1, 2].

Case Report

A 47-year-old female, not previously known to be immunocompromised, presented to the hospital with severe headaches, confusion, and neck stiffness. Initial assessment revealed photophobia and ongoing agitation. Her past medical history was significant for sinusitis. Microscopy of CSF from a lumbar puncture showed white cell count (WCC) of 3360 with polymorphonuclear cell predominance, increased protein and very low sugar, suggestive of a bacterial aetiology [Table 1]. CSF culture failed to isolate an organism. An external laboratory performed an in-house (non-commercial) polymerase chain reaction (PCR) assay that detected *lytA* gene which is a target specific for *Streptococcus pneumoniae*. She completed 14 days of Ceftriaxone (2grams twice daily).

Five months later she was readmitted with similar symptoms. CSF analysis demonstrated elevated WCC and protein but failed to culture an organism. Broad range bacterial 16s rDNA PCR and PCR for specific targets for *Streptococcus pneumoniae, Neisseria meningitidis, and Haemophilus influenzae,* performed in external laboratories, did not detect any organism. Two months later, she presented for a third time with meningitis, which prompted a consultation by clinical microbiology team. Remarkably she had a history of a regular nasal discharge dating back 5 years. The discharge was a free flow of clear watery fluid whenever she bent down and was substantial enough to stain her pillow on sleeping. She highlighted her involvement in an RTA 20 years ago but sustained no injuries.

The nasal drip sample was confirmed as being CSF after testing positive for beta-2 transferrin protein. MRI identified a communication from the olfactory bulb to the ethmoid sinus. This was sealed with a fat pad taken from her earlobe using a transnasal endoscopic approach. She remains well with no further nasal discharge or signs of intracranial hypertension.

Table 1: Results of CSF analysis on all three admissions.

	Admission 1	Admission 2		Admission 3
Findings	Day 1	Day 1	Day 13	Day 1
WCC (cell/cmm)	**3360**	**25000**	33	**812**
Cell differential (%)				
Polymorphs	**99**	**100**		**98**
Mononuclear	1		100	2
Protein (g/L) *(Normal range 0.15-0.45)*	**6.18**	**3.5**	**0.49**	**0.84**
Glucose (mmol/L) (*Normal range 2.2-3.9)**	**0**	**0.8**	3.0	2.3
Gram stain	No organism seen	No organism seen	No organism seen	No organism seen
Culture results	No growth	No growth	No growth	No growth
PCR results	**Pneumococcal DNA detected**	Not detected	Not detected	Not detected

**No concomitant serum sample available to provide the ratio of CSF to serum glucose. Normal glucometer readings were recorded.*

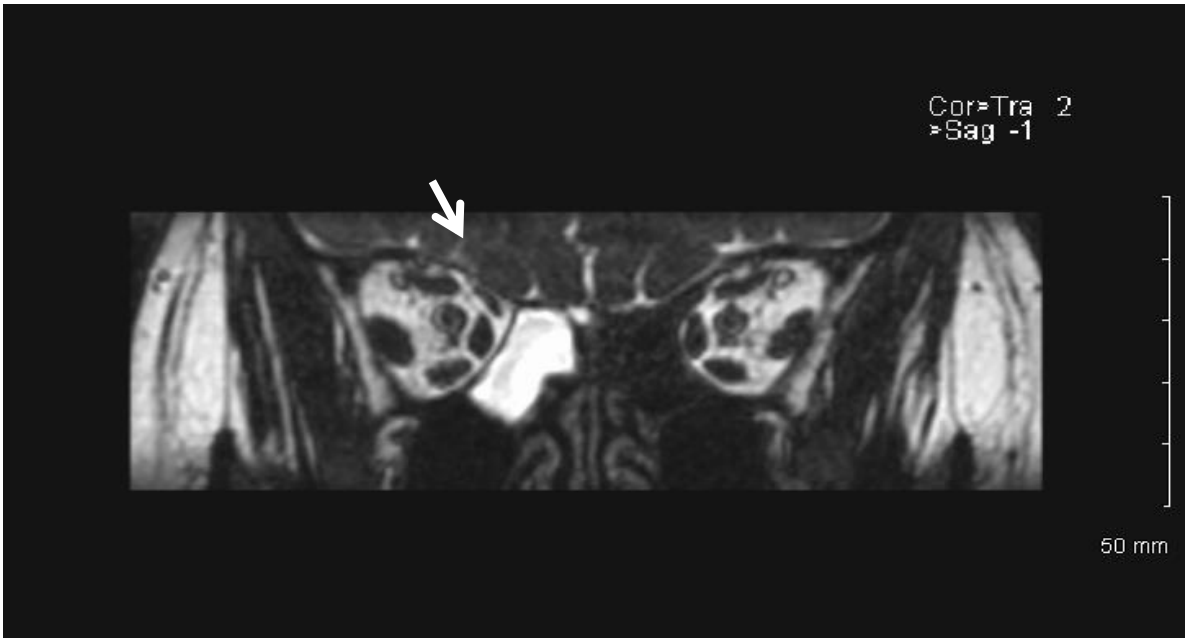

Figure 1: MRI coronal view of the suspected communication of the CSF; descending from the olfactory bulb to the medial wall of the right ethmoid sinus, which is filled with fluid signal. Suspected defect size is approximately 0.8mm.

Discussion

Head injury is the main cause of recurrent meningitis associated with CSFL in adults. CSFL decades after trauma is rare yet has been documented 34 years after head injury. Involutional changes secondary to ageing could possibly contribute to delayed CSFLs[1]. Difficulties in diagnosing a CSFL can lead to multiple episodes of meningitis[2, 3].
Beta-2 transferrin protein is an isoform of transferrin that is produced by neuraminidase in the brain and found exclusively in CSF and vitreous humor, thereby making it a gold standard method for diagnosing a CSFL[3].
For surgical management of CSFL, endonasal repair is the preferred approach as it is very convenient for sphenoid, parassellar and ethmoid regions[2, 3].

In our patient, sinusitis was thought to be the cause of meningitis on her first presentation. Her second presentation prompted further immunological investigations. Clinical microbiology consultation on the third presentation lead to identification and management of CSFL.
The CSFL started about 15 years post RTA. Whether the RTA contributed to the CSFL, is debatable. She had suffered from sinus infections which also could have contributed. However, the follow up scan a few months after surgery showed that the sinuses were clear. Our patient did not suffer further with sinus infections, suggesting that her CSFL could have been the cause of her sinusitis.

In conclusion, this case highlights a multi-disciplinary team approach leading to a successful diagnosis and treatment of a patient with recurrent meningitis resulting in a better quality of life.

Declaration of Conflicts of Interest:
The Authors declare that there is no conflict of interest.

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