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Diagnostic Challenge in Boy with Recurrent Meningitis

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Abstract **Case Report**

Recurrent infections in children ranging from simple condition as upper respiratory tract infection which may be normal in this age to more serious infection as in deep seated infection. Meningitis is one of serious infection. Recurrent meningitis must be taken seriously and looking for causes and appropriate management. The aim of this case report is to present a rare case with serious complication. The other issue is to increase the awareness of cerebrospinal leaks among general pediatrics and general practitioners.

Keywords: Recurrent meningitis, rhinorrhea, head trauma.

INTRODUCTION

Cerebrospinal leak due to a structural defect at the base of the skull exposes the patient to potential risk for intracranial infection. Although it is rare, attention with a high index of suspicion is needed, since this curable condition will result in serious complications if left untreated.

We report the diagnostic challenge in managing a 9-year-old boy with recurrent meningitis and episodes of rhinorrhea but not otorrhoea after trivial head trauma. Performing the proper imaging study is crucial for diagnosing bony defects in these cases.

CASE HISTORY

A nine-year-old boy with a history of recurrent meningitis (eight times during the last three years) was admitted with a fever associated with headache and convulsions for one day. His medical history was significant for episodic attacks of rhinorrhea after trivial head trauma. There was no history ofotorrhea, vomiting, loss of consciousness, chronic diarrhea, recurrent infections or any immunological disorder in the family.

The previous meningitis episodes were all treated in a peripheral hospital with antibiotics for 10 to 14 days each. In one case culture of the cerebrospinal fluid showed a growth of pneumococci. Computed tomography (CT) of the skull showed no abnormality, and the patient was normal apart from these occurrences.

On this admission, the patient was convulsing upon arrival to the emergency department and required one dose of diazepam which was followed by a postictal state. At that time there was no rhinorrhea, otorrhea or lymphadenopathy.

The central nervous system (CNS) examination revealed: nuchal stiffness with negative Brudzinski and Kernig signs. There were no abnormal movements and no muscle weakness with intact tone and power. Other examinations were unremarkable.

CSF chemistry results included: WBC: 200/mm^3, neutrophils 70%, glucose 1.5 mmol/L and protein 2 g/L.

CSF cytology showed leukocytosis and the culture was negative. Immunological workup

(lymphocyte markers, immunoglobulin level, and complements) result was within normal. HIV serology was negative.

Magnetic resonance imaging (MRI) showed a focal area of bony defect at the lower posterior wall of the left frontal sinus associated with mild meningocele formation. On the post contrast images, there was smooth enhancement of the meninges covering the left frontal lobe with no extra-axial collection or parenchymal signal changes. (Figure 1a, b) Complementary CT of the paranasal sinus with sagittal reconstruction clearly demonstrated an abnormal bony defect communicating with the frontal sinus and frontal cranial fossa (Figure 2). The patient improved after treatment with intravenous antibiotics (ceftriaxone and vancomycin) for 14 days.

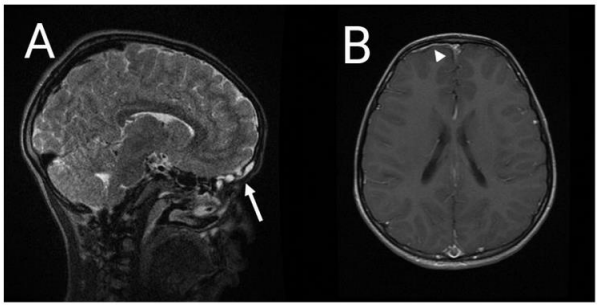

Fig 1: Magnetic resonance imaging (MRI) of the paranasal sinuses

A) Sagittal short-TI inversion recovery (STIR) image shows focal bony defect of the posterior wall of the left frontal sinus with herniation of the meninges through the defect (arrow).

B) Post contrast T1 image shows smooth meningeal enhancement over the left frontal lobe(arrow head).

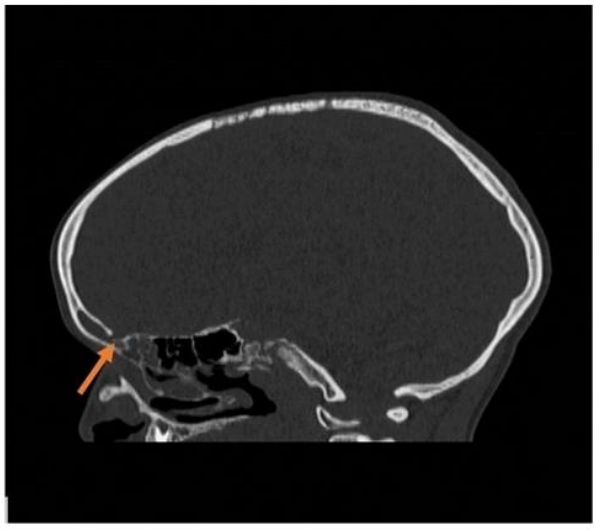

Fig 2: Sagittal computed tomography (CT) scan of the head with bony algorithm CT shows bony defect of the posterior wall of the frontal sinus (arrow) with opacification of the frontal and ethmoid sinuses.

He received a pneumococcal vaccination after discharge and was kept on prophylactic antibiotics. Surgical repair service was not available at our center and the patient was following up with our clinic till he was able to perform the surgery after two years at another hospital. Surgical repair of the defect was done through an endoscopic intranasal approach and the patient is currently stable.

DISCUSSION

Recurrent meningitis is a rare condition in pediatric population. However, it is an important condition to recognize since further complications can be avoided if a cause is found. Known a etiologies of recurrent meningitis include congenital and acquired anatomical abnormalities (which are the most common risk factors), chronic parameningeal infections, recurrent benign lymphocytic meningitis, antibody or complement deficiency, HIV and hyposplenism [1, 2].

Most authors have defined "recurrent meningitis" as being two separate episodes of meningitis that are separated by a period of convalescence and full recovery. Recurrence can occur from reinfection with the same or different organism [2].

When reviewing the literatures, history of previous head injury represents the major group of patients with recurrent meningitis (28%) [2]. CSF leaks can occur in 2% of head injuries and up to 12% of basal skull fractures. Leak sometimes take months or years to discover [2-5]. According to Brodie and Thompson, as well as Friedman et al., CSF fistulas are most commonly associated with fontal sinus fractures, followed by orbital and petrous bone fractures [6, 7]. The majority of these posttraumatic CSF leaks resolve through spontaneous closure within the first 24 hours to 5 days [7].

The most common infectious agent in recurrent meningitis is *streptococcal pneumonia* followed by *Neisseria meningitidis, more commonly in immunodeficient patients* [2, 8].

Imaging studies of the skull base are essential for the evaluation of CSF rhinorrhea. High resolution CT can be used for the initial evaluation with the use of bone algorithm and multiplanar reconstruction to evaluate for the presence of bony defects between the paranasal sinuses and the cranial cavity. The most common locations of bony defects include the cribriform plate, anterior ethmoid, posterior ethmoid, sphenoid and frontal sinus. MRI cisternography is indicated when there is clinical suspicion of an active leak or if there is evidence of fluid near the bony defect on CT. Other findings that can be seen on MRI include sinus mucosal thickening, herniation of the brain or meninges through the bone defect, and dural enhancement on post contrast images [9]. Radionuclide cisternography and contrast-enhanced CT cisternography are usually reserved for those with

active CSF rhinorrhea with questionable initial high resolution CT and MRI [3, 8].

Treatment is usually conservative with intravenous antibiotics and observation for spontaneous resolution. Leaks that do not stop require surgical correction to prevent sequelae. Some authors recommend a 2-3week course of antibiotics before surgery [5].

CONCLUSION

Diagnosis of CSF leak is not usually straightforward. History of trauma may not necessarily be present because late leakage after trauma can occur and it is difficult for parents to recall more distant events. Other possibilities like congenital malformations can present with CSF leaks as well.

High risk patients need to be followed up regarding CSF leaks. High resolution CTis the modality recommended by most authors for evaluation of CSF leakage. Conservative treatment is the first line of management, and surgical repair is required if conservative treatment fails.

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