

## RECURRENT *STREPTOCOCCUS PNEUMONIAE* MENINGITIS IN CHILDREN : DIAGNOSTIC DILEMMA

### MENINGITE RECURRENTE A *STREPTOCOCCUS PNEUMONIAE* CHEZ L'ENFANT : UN DILEMME DIAGNOSTIQUE

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#### Abstract

Recurrent bacterial meningitis is very rare phenomenon in paediatric age group. Finding the aetiology of recurrent meningitis often poses diagnostic challenge to clinicians. We report the diagnostic dilemma faced while managing a 4-year-old boy with recurrent pneumococcal meningitis. Aetiology could only be found after exclusion of immunodeficiency and performing a series of imaging studies. Intracranial examination revealed lytic maxillary lesion communicating with temporal fossa, a sequela of recurrent parotitis. This case suggests the possibility that underlying disorders may not be apparent in cases of repetitive meningitis and, more proactive investigations are required to prevent further recurrence of meningitis.

**Key-words:** Streptococcus Pneumoniae; Recurrent Meningitis; Child.

#### Résumé

La méningite bactérienne récurrente est une pathologie très rare chez l'enfant. Trouver l'étiologie pose souvent un défi diagnostique aux cliniciens. Nous rapportons les difficultés diagnostiques rencontrées lors de la prise en charge d'un garçon de 4 ans souffrant d'une méningite récurrente à Pneumocoque. L'étiologie n'a pu être trouvée qu'après exclusion du déficit immunitaire et réalisation d'explorations notamment de l'imagerie. L'imagerie cérébrale et du massif facial a révélé une lésion maxillaire lytique communiquant avec la fosse temporale, une séquelle d'une parotidite récurrente. Ce cas suggère que les troubles sous jacents ne soient pas apparents dans le cas d'une méningite à répétition et de ce fait, des investigations plus approfondies sont nécessaires pour ressortir la cause et prévenir une nouvelle récurrence de la méningite.

**Mots-clés :** Streptococcus Pneumoniae ; Méningite récurrente ; Enfant.

#### ملخص

بعد التهاب السحايا الجرثومي المتكرر حالة نادرة جدًا عند الأطفال. غالبًا ما يشكل العثور على المسببات تحديًا تشخيصيًا للأطباء. تُبلغ عن الصعوبات التشخيصية التي تمت مواجهتها في الإدارة الصحية لطفل يبلغ من العمر 4 سنوات يعاني من التهاب السحايا المتكرر بالمكورات الرئوية. لا يمكن العثور على المسببات المرضية إلا بعد استبعاد نقص المناعة وإجراء الاستكشافات الضرورية، بما في ذلك التصوير. كشف تصوير الدماغ والوجه عن وجود آفة في الفك العلوي تتواصل مع الحفرة الصدغية، وهي تكملة لالتهاب الغدة النكفية المتكرر. تشير هذه الحالة إلى أن الاضطرابات الكامنة غير ظاهرة في التهاب السحايا المتكرر، وبالتالي هناك حاجة إلى مزيد من التحقيق لتحديد السبب والوقاية من تكرار الالتهاب السحائي.

**الكلمات المفاتيح:** العقديّة الرئويّة; التهاب السحايا المتكرر; الطفل.

## INTRODUCTION

Bacterial meningitis is a medical emergency, and immediate diagnostic steps must be taken to establish the specific cause so that appropriate antimicrobial therapy can be initiated [1,2].

Recurrence of bacterial meningitis in children may be caused by reasons such as cranial or dural anatomic defect and immunity deficiency [3]. Bacteria migration, along congenital or acquired pathways from the skull or spinal dural defects should be taken into consideration in children with recurrent bacterial meningitis [4]. Here we present the case of a 4-year-old boy with repeated bacterial meningitis within 3 years and further imaging examinations finally proved the cause of bacteria migration which is a lytic maxillary lesion communicating with temporal fossa, a sequela of recurrent parotitis.

## CASE PRESENTATION

A 4-year-old boy born to consanguineous parents with a history of pyogenic meningitis at the age of 6 months, left parotitis and mastoiditis at the age of 30 months presented with a history of high grade fever for the last two days associated with headache, nuchal pain recurrent vomiting and focal seizure. There was no history suggestive of CSF rhinorrhea or otorrhea. Parents had noticed left facial palsy and hearing loss soon after he was diagnosed to have the first episode of meningitis. He did not receive a vaccine for *S.Pneumoniae*. He is a developmentally normal boy with no history of head injury or seizures or recurrent diarrhea or pneumonia. The patient was normal between and after the previous attacks. There was no history of trauma, otorrhea, rhinorrhoea or any history suggestive of recurrent infections involving any other system, blood transfusion or family history of any immunodeficiency disorder.

On admission, the physical exam demonstrated a febrile, lethargic child. The central nervous system examination revealed neck stiffness with positive Kernig's and Brudzinski's sign. The fundus was normal. Examination of spine and cranium was normal. Investigations disclosed neutrophilic leucocytosis. Blood culture grew *Streptococcus Pneumoniae* sensitive to ceftriaxone. Cerebro Spinal Fluid (CSF) analysis was suggestive of pyogenic meningitis (CSF leucocyte count of 6500 cells/high-power field, with predominant neutrophils as 95 %; protein: 3.04 g / L, glucose: 1.39g / L, chlorine: 115 mmol/l).

CSF gram stain showed gram positive cocci in pairs. CSF culture was sterile. He was treated with intravenous ceftriaxone for 2 weeks. Workup for immunodeficiency was done. Serum immunoglobulin profile was normal. The enzyme-linked immunosorbant assay (ELISA) test for HIV was nonreactive. Brainstem auditory evoked response testing showed left-sided sensorineural hearing loss of 50 dB.

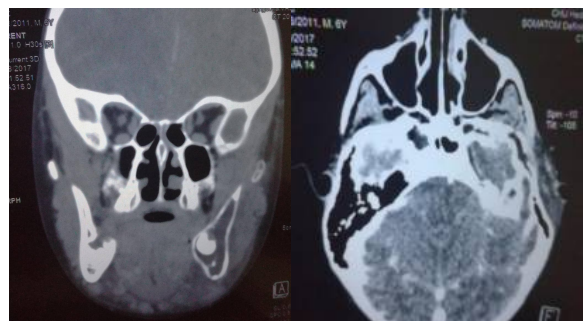
Magnetic resonance imaging (MRI) of the brain showed Arnold Chiari malformation type 1 (Figure 1). A high-resolution computed tomography of the left temporal bone confirmed the presence of : left inferior maxillary temporal sphenoidal osteitis , lytic lesion with cortical destruction and communication with temporal fossa without cribriform plate defect (Figure 2).

Ten months later, the child was re admitted with symptoms and signs of meningitis.

*Streptococcus pneumoniae* was isolated in the CSF culture. The patient was treated with cefotaxime. On follow-up after 1 year; the child has residual paraparesis, with no further episode of meningitis.



**Figure 1:** MRI scans T2-weighted showing Arnold Chiari malformation type 1



**Figure 2:** Computed tomography of the Brain, in axial, and coronal planes showing lytic maxillary lesion communicating with temporal fossa

## DISCUSSION

Recurrence of bacterial meningitis is rare and occurs in around 1% of all pyogenic meningitis cases [5]. It is defined as two or more episodes of pyogenic meningitis separated by a period of convalescence and the complete resolution of all signs, symptoms and laboratory findings [6,7]. Drummond DS et al. observed that out of all the children admitted to a tertiary care hospital with bacterial meningitis over a period of 11 years, only 1.3% suffered from recurrence [8].

In any child with recurrent meningitis, a prompt search for an underlying predisposing factor such as immunodeficiency or a craniospinal defect should be done. The causative organism can lead to a clue in the diagnosis. *Pneumococcus* and *Hemophilus* suggest cranial dural defects, *Escherichia coli* and other gram negative bacilli suggest spinal dural defects, and *Neisseria meningitidis* suggests complement deficiency.

Kline reviewed the world literature from 1978 to 1988 and found 47 patients with recurrent meningitis 70% of whom were children. Predisposing factors included a congenital CSF fistula in 55% of cases, traumatic or surgical CSF fistula in 17%, immunodeficiency in 21%, and unknown causes in 6% [1]. In a literature review encompassing 363 cases of recurrent bacterial meningitis occurring between 1988 and 2007, Tebruegge reported that 214 of these cases were related to anatomical defects, whereas 132 included immuno deficiencies. A full blood count is recommended with a differential and microscopy to detect Howell-Jolly bodies (which may suggest asplenia) as well as lymphopenia or neutropenia. Abnormalities in immunoglobulin levels may point towards immunodeficiency disorders. Assessment of the total serum haemolytic complement (CH50) will detect abnormalities of the classical complement pathway and should be followed with assays for individual complement components if found to be abnormal. An HIV antibody test should also be considered [6].

Bacteria can migrate along congenital preformed pathways or acquired tissue planes to gain entrance into the subarachnoid space. Another well described mechanism of recurrent meningitis includes an undiagnosed immunologic deficiency. According to almost all review articles *Streptococcus Pneumoniae* was found to be the most common infectious agent and *Neisseria Meningitidis* was the second most common organism though it was more common in

immunodeficient hosts [6]. Parameningeal infections, which primarily include sinusitis, otitis media, and mastoiditis, can result in central nervous system infections by continuous spread through bony layers and the periosteum of the skull and, to a lesser extent, via the hematogenous route [9]. The literature search identified 15 cases in which the authors suggested that a chronic parameningeal focus had been the source of recurrent episodes of meningitis [10, 11,12]. This group comprised 11 cases of chronic otitis media and/or mastoiditis, two cases of chronic sinusitis (sphenoidal and maxillary), and two cases of chronic osteomyelitis of the skull. The most commonly isolated organisms in this group with parameningeal infections were *S. pneumoniae* (15 episodes) [13,14].

In our case report, workup for immunodeficiency was done: full blood count, total serum haemolytic complement (CH50) and serum immunoglobulin profile were normal. The ELISA test for HIV was non reactive. temporal bone CT scan showed infiltration of the parapharyngeal space and parotid gland associated with lytic lesions in the left inferior maxillary sphenoidal, zygomatic, temporal, bones with cortical destruction and communication with temporal fossa without a cribriform plate defect. Parameningeal infection in this case was recurrent parotitis which leads to bone defect. Bacteria had probably migrated along this acquired anatomical defect by continuous spread through bony layers and the periosteum of the skull to gain entrance into the subarachnoid space.

## CONCLUSION

Although recurrent bacterial meningitis in childhood is not common, this clinical condition remains a neurological emergency for primary care physicians. This case illustrates that recurrence of meningitis within a short period should be considered as a result of underlying immunologic or anatomic defect.

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