ISSN: 2634 - 8861

Journal of Infectious Diseases & Case Reports

SCIENTIFIC Research and Community

Case Report

Open Access

Pediatric Acute Otitis Media Complicated by Group a Streptococcus Pyogenes Meningitis: A Clinical Case Report

Mahmud Omar[1,2*], Ghassan Kish[1], Siwar Eid[2], and Doua Bakry[1,3]

[1]Ziv Medical Centre, Department of Pediatrics, Israel

[2]Sackler Faculty of Medicine, Tel Aviv University, Israel

[3]Azrieli Faculty of Medicine, Bar-Ilan University, Safed, Israel

ABSTRACT

Background: Streptococcus pyogenes (S. pyogenes) is a known cause of invasive infections, but meningitis resulting from S. pyogenes is rare. Early recognition and appropriate management are crucial for improved patient outcomes, particularly in pediatric cases where complications can arise rapidly.

Case Presentation: We report the case of a 7.5-year-old girl who was initially diagnosed with acute otitis media (AOM), which later deteriorated to S. pyogenes meningitis. The patient initially presented with otalgia, headache, and fever, which rapidly progressed to include meningeal signs. Laboratory tests, including cerebrospinal fluid analysis and cranial imaging, confirmed the diagnosis of acute meningitis. Intravenous antibiotic treatment with a combination of Ceftriaxone, Vancomycin, and Dexamethasone, followed by adjustments based on culture results, led to significant clinical improvement and partial recovery of hearing function.

***Corresponding author**
Mahmud Omar, Ziv Medical Centre, Department of Pediatrics, Israel.

Received: May 11, 2023; **Accepted:** May 17, 2023; **Published:** May 25, 2023

Keywords: Streptococcus Pyogenes, Meningitis, Acute Otitis Media, Antibiotic Therapy

Introduction

Bacterial meningitis remains a significant cause of morbidity and mortality in children worldwide, despite advances in diagnostics, vaccine development, and antibiotic therapy [1]. Acute otitis media (AOM), a common childhood infection often caused by bacterial pathogens, is usually self-limiting; however, complications can arise. Group A Streptococcus (GAS), considered a rare cause of AOM, can occasionally lead to meningitis, a rare but serious consequence [2,3]. Early detection and treatment of meningitis are crucial to reduce morbidity and mortality [1]. This case report presents the clinical course, diagnosis, and treatment of a 7.5-year-old girl with AOM induced by GAS complicated by meningitis. It emphasizes the importance of vigilance in recognizing and managing complications associated with a rare and serious complications of AOM, as well as the need for a high degree of suspicion when encountering cases of GAS AOM.

Case Presentation

Patient History

A previously healthy 7.5-year-old girl presented to the Emergency Department (ED) with a five-day history of otalgia and purulent otorrhea, which began the morning of her admission. On the day of her presentation, the patient experienced a diffuse headache and unmeasured fever; however, she had no associated vomiting, loss of consciousness, seizure activity, or behavioral changes. The child had received all recommended vaccinations and reported no additional complaints.

Initial Examination

Upon admission, the patient was alert and responsive, showing no signs of meningeal irritation. Vital signs were within normal limits. Examination of the right ear revealed signs of AOM, including purulent discharge. Cardiopulmonary and abdominal examinations were unremarkable, and no focal neurological manifestations or cutaneous lesions were present.

Diagnostic Tests

A comprehensive blood analysis, including a complete blood count (CBC) and blood chemistry panel, was performed upon arrival at the ED. Notable findings included a leukocyte count of 15,000 per microliter and a C-reactive protein (CRP) level of 298 mg/L; no electrolyte imbalances were observed. An otolaryngologist examined the patient and confirmed a diagnosis of AOM, recommending admission to the pediatric department for intravenous administration of Augmentin.

Six hours post-admission, the patient reported worsening headaches and gastric content vomiting. Examination revealed a lethargic, pallid, and somnolent patient who remained responsive, able to follow simple commands and communicate effectively. A subsequent physical examination demonstrated nuchal rigidity, positive Kernig and Brudzinski signs, and no lateralizing findings. Neurovascular function remained intact, with unrestricted

movement in all four extremities, and preserved gross motor function. Cranial nerve function appeared normal.

A blood culture was promptly obtained, and the antibiotic regimen was modified to include intravenous administration of Ceftriaxone (in meningeal dosage), Vancomycin, and Dexamethasone for two days. A cranial computed tomography (CT) scan revealed mild gyral effacement in the form of leptomeningeal plaques, primarily within the frontal lobes. No abscess formation was detected.

A lumbar puncture was performed, and cerebrospinal fluid (CSF) analysis yielded the following findings: turbid appearance, 2,015 white blood cells per microliter with 80% polymorphonuclear cells, normal glucose and protein levels, negative Gram stain, and sterile culture results. Broad-range 16S ribosomal RNA (rRNA) gene polymerase chain reaction (PCR) testing of a CSF sample returned a positive outcome for GAS.

Treatment and Response

A culture of secretions from the patient's right ear indicated Group A Streptococcus (GAS) growth. Given this finding and the absence of suspicion for methicillin-resistant Staphylococcus aureus, Vancomycin administration was ceased. An otolaryngologist examined the patient again one day after symptom onset and performed a hearing evaluation, diagnosing conductive hearing loss in the right ear up to 30 dB with a normal hearing test result in the left ear.

Two days after initiating the revised treatment regimen, the patient showed significant clinical improvement, with symptoms such as headache, fever, vomiting, and behavioral changes abating. A subsequent physical examination revealed no meningeal symptoms or ear secretions.

Follow-Up

A follow-up hearing evaluation demonstrated conductive hearing improvements compared to the initial assessment, although a mild hearing decline in the right ear, commencing from 6 kHz, was observed. Laboratory tests conducted two days after treatment initiation revealed reductions in inflammatory markers and CRP levels.

Following a multidisciplinary meeting held ten days after the initiation of treatment, the decision was made to conduct a follow-up magnetic resonance imaging (MRI) scan. The MRI revealed opaque extra-axial content at the level of the incisura and tentorium, corroborating the diagnosis of meningitis. Additionally, an infectious or inflammatory process was identified involving the right petrous apex, accompanied by enlargement and a small collection extending from the bone to the underlying fossa on the right in a medial aspect, with focal thickening of the membranes.

After completing 14 days of Ceftriaxone treatment, the patient was discharged with a recommendation to continue oral Augmentin therapy for another 7 days. Further recommendations included follow-up appointments with a community otolaryngologist, a repeat hearing evaluation, a subsequent ear-directed MRI to elucidate the nature of observed findings, and consultation with a community neurosurgeon.

Discussion

Recent reports indicate an increase in the rates of invasive diseases associated with GAS [4]. GAS meningitis, particularly when secondary to acute otitis media (AOM), is a less frequent complication, with only a limited number of case reports and series available [2]. According to data from the Centers for Disease Control and Prevention in the United States, it constitutes fewer than 1% of invasive GAS cases [5]. This case report highlights a rare but serious case of this complication after AOM initial diagnosis in a 7.5-year-old girl, emphasizing the rapid development of symptoms and complications associated with GAS AOM. Consequently, it is essential to conduct regular physical examinations and closely monitor patients. Promptly adjusting the antibiotic regimen to include intravenous administration of appropriate antibiotics when meningitis is highly suspected, particularly in cases of AOM accompanied by significantly elevated inflammatory markers such as CRP, may prove crucial and lifesaving [3]. The existing literature strongly asserts that early diagnosis and treatment of bacterial meningitis are essential to minimize complications and improve patient outcomes [6].

AOM is commonly caused by bacterial pathogens; however, GAS is a rare causative agent among them [3]. The presence of GAS in this case emphasizes the importance of identifying the causative agent to guide appropriate treatment and maintaining awareness of the complications it can cause. Moreover, the patient's conductive hearing loss and subsequent improvement following treatment highlight the potential impact of GAS meningitis on hearing and the need for thorough follow-up evaluations. Imaging plays an important role in the diagnosis and management of meningitis, particularly in the evaluation of complications such as brain abscesses, mastoiditis, or sinus thrombosis [7]. Computed tomography (CT) and magnetic resonance imaging (MRI) are useful tools in identifying these complications, guiding treatment decisions, and monitoring patient progress [8]. The findings of the imaging tests performed in this case suggest that imaging should be considered when suspecting GAS meningitis, to rule out abscesses and other intracranial complications.

A limitation of this case report is the relatively short follow-up period, which does not allow for a comprehensive understanding of the long-term effects of the infection on the patient. While the report provides valuable insights into the clinical course, diagnosis, and treatment of S. pyogenes meningitis resulting from AOM, it is unable to fully assess the long-term consequences and possible complications that may arise later in the patient's life, such as persistent hearing loss or neurological sequelae. A longer follow-up period or additional studies with extended follow-up times would be necessary to better understand the long-term outcomes.

In conclusion, this case underscores the significance of maintaining a high index of suspicion for complications associated with GAS AOM, especially acute meningitis, to ensure timely intervention and reduce morbidity in pediatric patients. Future research could focus on identifying risk factors for complications in AOM patients to facilitate early diagnosis and improve patient outcomes. Furthermore, investigating the role of Dexamethasone treatment in preventing hearing loss in GAS meningitis, as well as the significance of recurrent imaging in GAS meningitis, could help establish a structured protocol for clinicians to follow during patient follow-up.

Conclusion

This case highlights the significance of early recognition and appropriate antibiotic therapy for S. pyogenes meningitis. It is crucial to increase awareness of S. pyogenes as a potential etiological agent in pediatric meningitis and maintain a high level of suspicion for complications in AOM cases, especially when accompanied by significantly elevated inflammatory markers such as CRP. This vigilance ensures early diagnosis and timely

initiation of appropriate treatment, ultimately leading to improved patient outcomes. Future research should focus on identifying risk factors for complications in AOM patients and the role of adjuvant therapies such as Dexamethasone in preventing hearing loss in S. pyogenes meningitis.

References

1. Thigpen MC, Whitney CG, Messonnier NE, Zell ER, Lynfield R, et al. (2011) Bacterial meningitis in the United States, 1998-2007. N Engl J Med 364: 2016-2025.
2. Fanella S, Embree J (2008) Group A Streptococcal Meningitis in a Pediatric Patient. Canadian Journal of Infectious Diseases and Medical Microbiology 19: 306-308.
3. Lieberthal AS, Carroll AE, Chonmaitree T, Ganiats TG, Hoberman A, et al. (2013) The diagnosis and management of acute otitis media. Pediatrics 131: 964-999.
4. Cunningham MW (2000) Pathogenesis of Group A Streptococcal Infections. Clin Microbiol Rev 13: 470-511.
5. O'Loughlin RE, Roberson A, Cieslak PR, Lynfield R, Gershman K, et al. (2007) The Epidemiology of Invasive Group A Streptococcal Infection and Potential Vaccine Implications: United States, 2000-2004. Clinical Infectious Diseases 45: 853-862.
6. Tunkel AR, Hartman BJ, Kaplan SL, Kaufman BA, Roos KL, et al. (2004) Practice Guidelines for the Management of Bacterial Meningitis. Clinical Infectious Diseases 39: 1267-1284.
7. Brouwer MC, Tunkel AR, Van De Beek D (2010) Epidemiology, Diagnosis, and Antimicrobial Treatment of Acute Bacterial Meningitis. Clin Microbiol Rev 23: 467-492.
8. Aronin SI, Peduzzi P, Quagliarello VJ (1998) Community-acquired bacterial meningitis: risk stratification for adverse clinical outcome and effect of antibiotic timing. Ann Intern Med 129: 862-869.

Copyright: ©2023 Mahmud Omar, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.