Case Report

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A Rare Complication of Acute Otitis Media: Brain Abscess Case Report

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Abstract

While meningitis is defined as inflammation of the pia and arachnoid membranes,brain abscess is defined as suppurative infection occurring in the parenchymal tissue of the brain.The source of brain abscesses are usually middle ear infections, mastoiditis, frontal and nasal sinusitis. A 69-year-old female patient was brought to the emergency room by her relatives with a complaint of confusion.It was learned that the patient had pain in her right ear for 3 days and antibiotic treatment was started the day before due to infection in the eardrum.Infective blood parameters were high.A lesion containing air density was observed in the patient's brain CT scan in the right temporal fossa.Upon this radiological finding, a contrast-enhanced brain MRI was performed and a lesion containing air-fluid leveling was detected in the right temporal lobe.A tube was inserted into the eardrum of the patient by the ear, nose and throat department.She was transferred to intensive care for follow-up and treatment after the procedure. Acute otitis media is an infection that can progress with intracranial complications if not treated properly and if left untreated.It should not be forgotten that meningitis and brain abscess may also occur in a patient with altered consciousness diagnosed with acute otitis media.

Keywords: Acute otitis media, brain abscess, emergency department

Introduction

Otitis media is defined as inflammation of the middle ear. Complications of otitis media arise when infectious agents and their toxic products spread beyond the pneumatized cavities of the temporal bone and the mucosal boundaries that surround these structures. Many of these complications are observed following subacute or chronic infections. Serious intracranial complications most commonly occur during acute exacerbations of chronic purulent otitis media, especially in cases associated with cholesteatoma. Posterior cranial fossa abscesses usually develop via spread through the lateral sinus or labyrinth. Cerebellar abscesses may also occur via direct extension from a perisinusal abscess. Most otogenic brain abscesses originate from venous thrombophlebitic lesions. Direct spread through the dura is rare, as the dura mater is highly resistant to infection. However, localized inflammation may lead to thrombophlebitis in adjacent cerebral or cerebellar veins, which may then rapidly extend into the white matter, an area with minimal resistance to infection. This process results in surface necrosis and subsequent abscess formation. The temporal lobe is the most frequently involved site, followed by the cerebellum.

Meningitis is defined as inflammation of the pia and arachnoid membranes that envelop the brain and spinal cord, while a brain abscess is defined as a suppurative infection within the brain parenchyma. The three most common pathogens responsible for purulent meningitis are Haemophilus influenzae, Streptococcus pneumoniae, and Neisseria meningitidis (1). The primary sources of brain abscesses are typically middle ear infections, mastoiditis, and frontal or nasal sinusitis (2). Brain abscesses may arise as sequelae of meningitis or may coexist with it. Although the incidence of brain abscesses has declined with widespread antibiotic use, their medical management remains challenging. Meningitis is the most frequently reported intracranial complication of acute otitis media, followed by brain abscess and lateral sinus thrombosis (3–5). Over the past 50 years, increased access to healthcare, improved social welfare, and more effective medical interventions have led to a tenfold decrease in mortality rates associated with otitis media complications (6).

This report aims to emphasize the importance of early recognition and intervention in similar clinical scenarios.

Case Report

A 69-year-old woman was brought to the emergency department by her family with complaints of decreased responsiveness,

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Figure 1. BT axial images

speech difficulties, confusion, and failure to recognize familiar people. She exhibited no focal neurological deficits such as hemiparesis, cranial nerve involvement, or seizures. History revealed that the patient had experienced right ear pain for three days and had started antibiotic treatment the previous day due to a diagnosed tympanic membrane infection. She had no known chronic illnesses or history of regular medication use. There was also no prior history of otological disease, tympanic membrane perforation, or otologic surgery.

On admission, her vital signs were as follows: body temperature 38 °C, blood pressure 140/100 mmHg, pulse 100/min, and SpO_2 97%. On physical examination, the patient's general condition was moderate to poor, she was somnolent, disoriented, and uncooperative. Otoscopic examination of the right ear revealed a perforated tympanic membrane with purulent discharge. Laboratory investigations showed WBC: 18,870/mm³, CRP: 311 mg/L, AST: 147 U/L, ALT: 109 U/L, and ALP: 163 U/L.

A non-contrast brain CT scan revealed a lesion with air density in the right temporal fossa and a loss of aeration in the right mastoid air cells (Figure-1). Subsequent contrast-enhanced brain MRI demonstrated a lesion with air-fluid levels in the right temporal lobe, with no significant enhancement after contrast administration. There was also a marked loss of aeration in the middle ear and adjacent mastoid cells (Figure-2,3).

Lumbar puncture was performed after ophthalmologic evaluation, under the clinical suspicion of meningitis and brain abscess, taking into account the risk-benefit ratio. CSF microscopic examination revealed abundant leukocytes, and Streptococcus pneumoniae was isolated in the CSF culture.

No surgical intervention was recommended by the neurosurgery team. However, an ear tube was inserted by the otolaryngology department after a joint evaluation. As the abscess size was borderline for surgical indication, it was decided to proceed with close monitoring following tympanic membrane drainage. The patient was subsequently transferred to the intensive care unit (ICU) for further follow-up and medical treatment.

During ICU follow-up, the patient's condition deteriorated further and elective intubation was performed. After 10 days of intubation, she was successfully extubated, transferred to the general ward, and later discharged with full recovery.

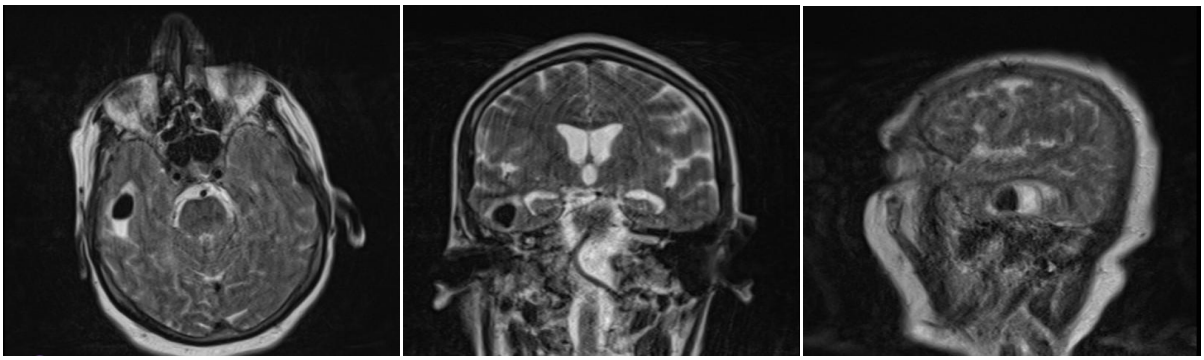

Figure 2. MR-T2 sequence axial, sagittal, coronal section images

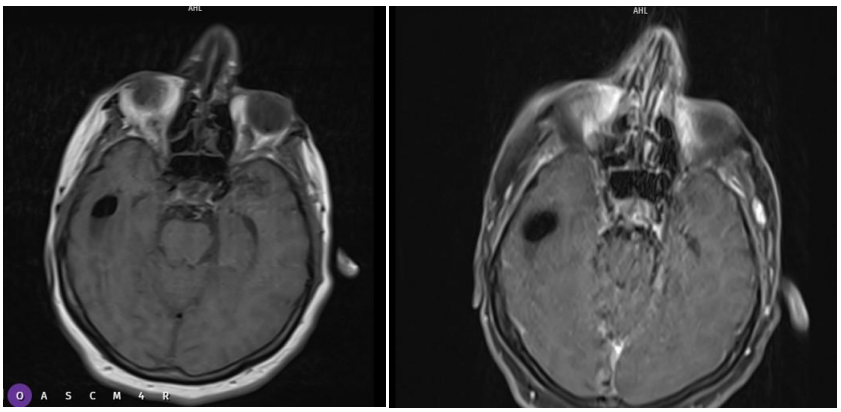

Figure 3. MR-T1 sequence non-contrast and contrast images

Discussion

Meningitis is the most commonly reported intracranial complication of acute otitis media. In more advanced cases, severe complications such as brain abscess and lateral sinus thrombosis may also occur (3–5). In this report, we present a case of acute otitis media complicated by a brain abscess, confirmed by neuroimaging and CSF analysis following a decline in consciousness.

The leading pathogens of purulent meningitis include Haemophilus influenzae, Streptococcus pneumoniae, and Neisseria meningitidis. Purulent meningitis is characterized by inflammation of the leptomeninges and typically results from bacterial infections, posing significant risks if not promptly treated. Clinical manifestations may include high fever, severe headache, and vomiting. Antibiotic therapy is the mainstay of treatment, and early diagnosis is crucial to prevent permanent neurological damage (1,7). In our case, Streptococcus pneumoniae was identified in the CSF culture.

For brain abscess treatment, broad-spectrum antibiotics capable of penetrating the blood-brain barrier are required, and therapy is typically continued for 3 to 6 weeks after clinical and laboratory improvement. Surgical drainage can aid both in microbiological diagnosis and in reducing abscess size. The decision for surgery depends on abscess size and location. Combined medical and surgical treatment has shown favorable outcomes, particularly when the pathogen is identified. However, in small or multiple abscesses, medical management alone may be appropriate. If the abscess enlarges during follow-up, surgical reassessment is warranted (8).

In the present case, surgical drainage via craniotomy was not recommended. Instead, a tympanic membrane tube was inserted for drainage by the otolaryngology team. Antibiotic therapy was guided by culture sensitivity results.

Due to the inability to obtain further information regarding the patient's treatment course following emergency department management, our presentation of the post-emergency clinical and therapeutic process is limited.

Conclusion

Acute otitis media is an infection that may progress to life-threatening intracranial complications if not promptly and adequately treated. In patients with altered mental status and a diagnosis of acute otitis media, clinicians should maintain a high index of suspicion for complications such as meningitis and brain abscess. Early diagnosis and multidisciplinary intervention are critical for improving clinical outcomes.

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