



Brain abscess as an otorhinolaryngological complication: A case report.

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Abstract

Introduction: A brain abscess can be fatal if not diagnosed or treated promptly. It is more common in children than in adults and has a high mortality rate. Respiratory infections, such as otitis and sinusitis, usually precede brain abscesses. In most cases, double treatment, antibiotics, and surgery are necessary. Complications can be fatal even with proper treatment.

Clinical case: This was a 3-year-old girl with a history of respiratory infection. His parents took her to the emergency room due to a severe headache and a seizure episode. Clinical examination revealed left ear otalgia associated with pain and sensitivity to palpation of the mastoid region. Laboratory tests revealed leukocytosis of 18,770/MMC with neutrophilia, thrombocytosis of 628,000/MMC, elevated C-reactive protein of 8.35 mg/dl (average value 0.10-0.30 mg/dl) and elevated ferritin of 250.20 ng/dl (standard value 7-140 ng/dl). Due to the patient's history and clinical findings, the skull's computed tomography (CT) was performed, revealing an image of evident hypodensity in the left hemisphere. MRI was also performed and revealed that the lesion was previously associated with left breast thrombosis. She received antibiotics and low-molecular-weight heparin with neurosurgical therapy, which produced good results.

Evolution: Despite the extent of the injury, he had two episodes of seizures. He promptly received appropriate antibiotic therapy and surgical treatment, which produced good results. Three months later, during the follow-up, he looked normal and had no long-term complications.

Conclusions: Complications of brain abscess, even with adequate treatment, can be severe and include epilepsy or death. Early treatment minimizes lethal risks.

Keywords:

MeSH: Brain Abscess; Otitis Media, Suppurative; Mastoiditis, Case Reports, Child.

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Introduction

Respiratory infections in children are prevalent worldwide, but intracranial infections such as brain abscesses are less common [1]. Bacterial brain abscesses have been reported to range between 0.3 and 1.3 per 1,000,000 people. Unlike in the pediatric population, the incidence of NAFLD is 0.5 per 100,000 children [2]. Social and economic income directly impact the prevalence of brain abscesses. Children with low socioeconomic income are more likely than those with high socioeconomic income to suffer from this type of disease [3]. In recent years, the incidence of brain abscesses has decreased because the COVID-19 pandemic has caused confusion and could have been the cause of possible concealment of the actual incidence; however, several reports have revealed an increase in incidence in high-income countries [4, 5]. Different factors predispose patients to brain abscesses, such as respiratory diseases such as otitis, mastoiditis, and sinusitis. Non-respiratory factors such as heart disease, gastrointestinal procedures such as esophageal dilation, and immunosuppression are associated with a greater risk of developing this infection than are other factors [1, 3, 6, 7]. The spectrum of causative microorganisms depends on factors such as age, immunocompetence, location, social income, culture, and other essential factors when approaching a patient suspected of having a brain abscess. Several studies since the 20th century have shown that the main microorganisms are *Streptococcus*, *Staphylococcus*, and gram-negative enteric bacteria [2, 8–10]. The location of the brain abscess can be intracranial or extracranial, such as subdural or epidural, and is essential in eligible treatment, such as antibiotics alone or with neurosurgery [8, 9].

Case report

Clinical history

A 3-year-old girl with a history of chronic rhinitis was admitted to our hospital with a three-day history of headache. On the day of admission, she had clonic

seizures, one previously at home and another at the hospital. Her clinical symptoms began seventeen days before admission, and she presented with fever and left otalgia and was treated with cefuroxime for seven days. Once the treatment was completed, she began to experience rhinorrhea and halitosis and was still feverish. The doctor treating her requested a urine sample and culture in which *E. coli* was grown. She was treated for seven days with amoxicillin/clavulanate plus nitrofurantoin and five days with intramuscular amikacin. Even so, she remained less febrile but developed a headache and seizures the hour before she arrived at this hospital.

Diagnostic and treatment workshop

She went to the emergency room without response to horizontal nystagmus, symptoms of sucking, salivation, or clonic movements of the right hand; she received oxygen, a dose of diazepam, and a loading dose of phenytoin (20 mg/kg) with maintenance (5 mg/kg).

Clinical examination revealed otalgia of the left ear associated with pain and tenderness upon palpation of the mastoid region. Laboratory tests revealed leukocytosis of 18,770 u/uL with neutrophilia, thrombocytosis of 628,000 u/uL, elevated C-reactive protein (CRP) of 8.35 mg/dL (standard value 0.10–0.30 mg/dL), and elevated ferritin level of 250.2 ng/dL (standard value 7–140 ng/dL). The patient was promptly started on antibiotics, such as ceftriaxone (100 mg/kg/day) and vancomycin (60 mg/kg/day). The infectious diseases, neurology, and neurosurgery services evaluated the patient and ordered some examinations.

A contrast-enhanced computed tomography (CT) scan of the head showed irregular hypodensity in the left hemisphere, possible thrombosis of the left sigmoid sinus, and hyperdensity associated with inflammatory symptoms related to osteomastoiditis (Figure 1).

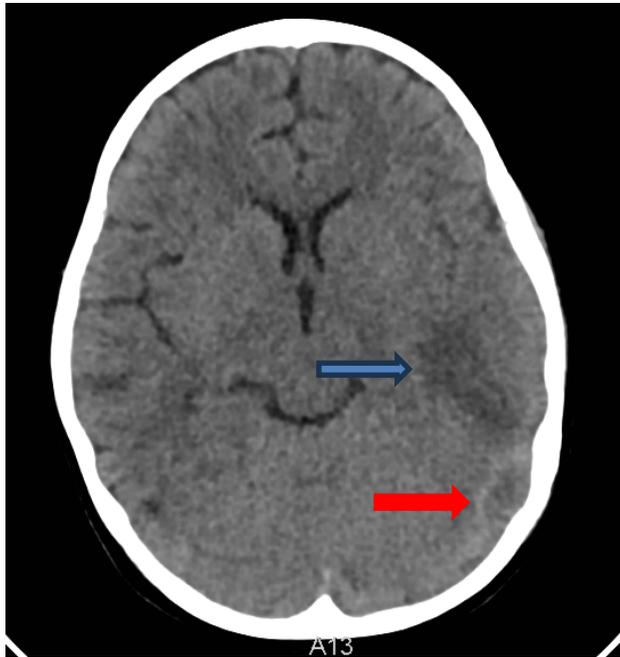


Figure 1. Brain computed tomography (CT) image showing hypodensity in the left temporal lobe (blue arrow) and thrombosis of the left sinus (red arrow).

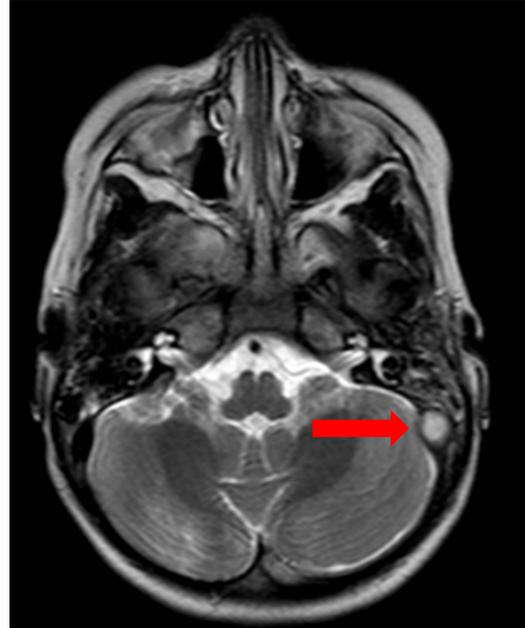
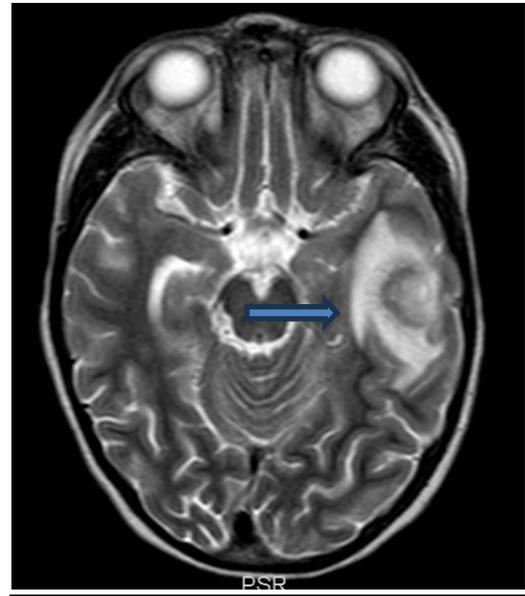


Figure 2. Magnetic resonance imaging (MRI) of the brain was performed with a contrast agent. A. Hyperintense density in the left temporal lobe surrounding the edema (blue arrow). B. Thrombosis of the left transverse sinus (red arrow).

Based on these findings, contrast-enhanced magnetic resonance imaging (MRI) was performed ([Figure 2](#)), and magnetic resonance venography ([Figure 3](#)) demonstrated that the abscess was located in the left temporal lobe and was surrounded by perilesional edema and an

absence of flow. - Related signals in the left transverse and sigmoid sinuses.



Figure 3. 3D contrast-enhanced cerebral magnetic resonance venography (3D-CEMRV) The right transverse and sigmoid sinuses were present (blue arrow), but the left (red arrow) was not present.



Figure 4. Brain computed tomography (CT). Resolution of the brain abscess (blue arrow) with cerebrospinal fluid previously occupying the lesion.

Treatment

After obtaining the images, low-molecular-weight heparin (LMVH) was administered twice daily at the standard 1 International Unit (IU/kg) dose to treat sinus thrombosis. After 25 days, drainage of the abscess was performed by craniotomy with favorable results for a total of 4 weeks with antibiotics and 30 days with LMVH. Before discharge, a CT scan was performed, revealing a reasonable resolution of the lesion (Figure 4).

Discussion

A brain abscess is a closed infection caused by a focal lesion close to the brain. The leading cause is otogenic (approximately 25% in children and 55% in adults), similar to our patient. Other factors, such as local trauma, chronic sinusitis, or bacterial meningitis, can cause this brain infection [11, 12]. The incidence of brain abscess worldwide is very low, with one case per 100,000 people; similar to that in Latin America, which has high mortality rates [13], and more common in low- and middle-income countries, although the COVID-19 pandemic may misdiagnose some cases [1, 3, 5]. More often, acute otitis media is related to brain abscess, and appropriate antibacterial agents may prevent its development; however, sometimes, they may fail, and even the management of AOM is correct [12].

Similarly to what happened in this case, even the previous treatment was insufficient to prevent complications such as brain abscess. Most pathogens, such as *S. pneumoniae*, group B streptococci, *S. aureus*, *H. influenzae*, and *N. meningitidis*, are encapsulated in gram-positive and gram-negative microorganisms [3, 9]. Less frequent organisms are gram-negative or anaerobes, such as *Proteus mirabilis*, methicillin-resistant *S. aureus*, *Peptostreptococcus*, and *Fusobacteria spp.*, similar to the findings of some reports from Latin America [9, 14]. Acute complications of mastoiditis can be fatal if treated promptly. One of the most feared complications is sinus thrombosis with brain abscess, regardless of its location: intracranial, subdural, or epidural abscess [15]. In general, brain abscesses should

be treated quickly; some factors may delay initial treatment with antimicrobial agents; low-income countries have delayed treatment because some factors affect the way to the hospital, and it is more common in rural areas, where the access route is sometimes complicated, unlike in our patients. Combined treatment involving antimicrobial and surgical management has achieved excellent results. The antibiotic of choice depends on the sensitivity of each culture obtained. The treatment regimen should last 4 to 6 weeks [1]. The use of anticoagulants in patients with sinus thrombosis has good clinical results in contrast to those who do not use anticoagulants [16]. Unlike when anticoagulant initiation was delayed, fatal complications of cerebral vein thrombosis were not observed in this patient, even though mortality rates increase if the anticoagulant is not administered promptly.

A brain abscess is a frightening disease that should be treated as soon as it is diagnosed; initial treatment with the antibiotic of choice should not be delayed, and surgical management should be used to obtain good results.

Conclusions

Complications of brain abscess, even with proper treatment, can be severe and include epilepsy or death. Early treatment minimizes lethal risks.

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Abbreviations

MRI: Magnetic resonance imaging.
CRP: C-reactive protein.
CT: computed tomography.

Supplementary information

No supplementary materials are declared.

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Author contributions

Miguel A. Hernández Cedeño: Conceptualization, critical analysis, argumentation, bibliographic review, preparation, and article writing.
Mildred P. Zambrano Leal: Scientific advice, critical analysis, supervision, and editorial corrections.
All the authors read and approved the final version of the manuscript.

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The data were collected from medical archives and are not publicly available due to patient confidentiality but are available through the corresponding author upon reasonable academic request.

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Approval from an ethics committee is not required for clinical cases. The authors obtained the permission of the tutors to publish this case.

Publication consent

The authors obtained written permission to publish images, X-rays, and specific studies from the patient's guardians.

Conflicts of interest

The authors declare that they have no conflicts of interest.

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