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Case Report

Multiple Brain Abscesses Complicating an Intrathoracic Foreign Body: A Case Report

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Abstract

Brain abscess is a rare but serious complication of chronic pulmonary infection in children. We report the case of a 12-year-old boy who presented with status epilepticus as the initial sign. Neuroimaging revealed multiple cerebral abscesses. Careful reassessment of his history uncovered chest pain and episodes of hemoptysis, which prompted chest imaging. Chest X-ray and CT identified a metallic foreign body in the right lower lobar bronchus, complicated by localized bronchiectasis that served as the infectious focus for hematogenous spread to the brain. The foreign body was successfully removed by bronchoscopy, and the patient received prolonged triple antibiotic therapy. Follow-up MRI six months later confirmed complete resolution of the cerebral lesions. This case highlights the importance of detailed history-taking, vigilance in investigating chronic chest symptoms, and awareness of rare but severe complications of foreign body aspiration.

Keywords: *Brain Abscess; Status Epilepticus; Foreign Body Aspiration; Bronchiectasis; Hematogenous Spread*

Introduction

Brain abscess is an uncommon but life-threatening infection in children. It typically arises from contiguous infections such as chronic otitis media, mastoiditis, sinusitis, or meningitis, and less frequently from distant sources including cyanotic congenital heart disease, chronic pulmonary infections, or after a head trauma, or neurosurgical procedures [1]. Foreign body aspiration represents an important cause of morbidity and mortality in the pediatric population. While a retained foreign body most often leads to recurrent pneumonia or, more rarely, pulmonary abscesses [2], brain abscess secondary to foreign body aspiration remains exceptionally rare [2]. Here, we report the case of an 11-year-old boy who developed multiple brain abscesses following a chronic intrathoracic foreign body.

Case Report

A 12-year-old boy, with no significant past medical history, was referred to our hospital for the management of febrile status epilepticus. The history of illness dated back two weeks prior to admission, beginning with chest pain and cough, followed by headache, vomiting,

and fever, for which he received amoxicillin-clavulanate. The condition progressively worsened with the onset of generalized tonic-clonic seizures and diplopia.

On admission, the patient was afebrile and presented with an ataxic gait and meningeal signs, including neck stiffness, and positive Kernig and Brudzinski signs. Neurological examination revealed horizontal nystagmus and right-sided hemiparesis with muscle strength graded 3/5. Cardiovascular, respiratory, and abdominal examinations were otherwise unremarkable.

Emergency cranial CT scan revealed multiple hypodense lesions surrounded by hyperdense halos with perilesional edema. Cerebral MRI confirmed the presence of 27 well-demarcated abscesses of varying sizes in both hemispheres, appearing hypointense on T1, hyperintense on T2, with ring enhancement after gadolinium injection, and surrounded by perilesional edema. Laboratory investigations showed mild leukocytosis (13,500/mm^3) with neutrophil predominance (9,000/mm^3) and an elevated C-reactive protein level (23 mg/L). Renal function and electrolyte panel were within normal limits.

Further search for an underlying cause for brain abscess included a transthoracic echocardiography which was normal, excluding congenital heart disease, valvular lesions, or infective endocarditis. CT scan showed no sinusitis or mastoiditis. Immunological screening was normal. It was the chest pain reported by the patient and the careful reassessment of history revealing hemoptysis that led us to perform a chest X-ray, followed by a CT scan, which identified a metallic foreign body in the right lower lobar bronchus complicated by focal bronchiectasis. This localized bronchiectasis focus constituted the origin of the infection that spread to the brain. The detailed medical history investigation revealed an episode of choking at the age of 8 years, followed by minor episodes of hemoptysis that were never investigated. Flexible bronchoscopy was performed and successfully extracted a small metallic thorn.

The patient was started on a triple intravenous antibiotic regimen for three months including ceftriaxone, metronidazole, and vancomycin, followed by oral antibiotic therapy for 3 months. The clinical course was favorable, with progressive resolution of fever, meningeal signs, and neurological deficits. Follow-up MRI at six months demonstrated complete resolution of the cerebral lesions.

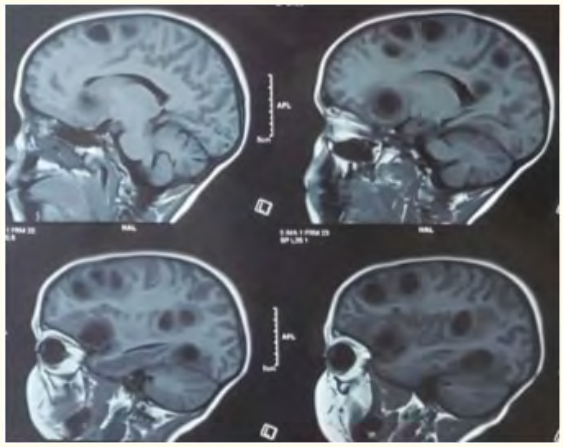

Figure 1: *Brain MRI sagittal section showing multiple cerebral abscesses hypointense in T1.*

Figure 2: *Brain MRI showing multiple cerebral abscesses hyperintense on T2 (left), with ring enhancement after gadolinium injection (right).*

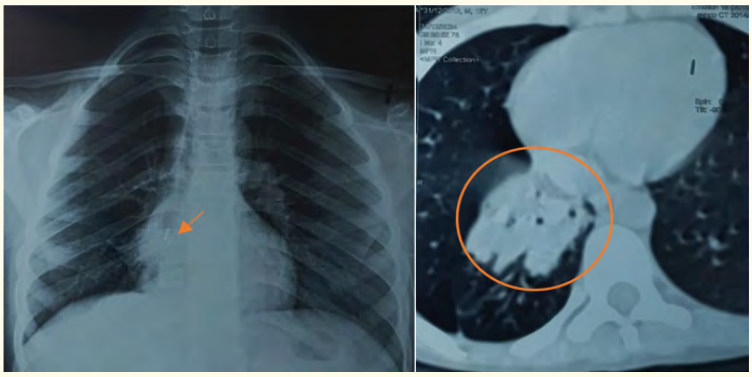

Figure 3: *A chest X-ray and CT scan showed a foreign body in the right lower lobar bronchus (arrow), complicated by focal bronchiectasis (circle).*

Discussion

Brain abscess is an uncommon but severe and potentially life-threatening condition in children, despite improvements in diagnostic and therapeutic approaches [1]. Moreover, survivors face a high burden of long-term sequelae, with up to 54% experiencing permanent neurological impairments such as cognitive deficits, seizures, and focal neurological deficits [4].

Foreign body aspiration represents a major cause of morbidity and mortality in young children, particularly during the second year of life, when protective swallowing reflexes are not fully developed [3,4]. Clinical presentation is often variable and nonspecific: approximately one-third of cases may be asymptomatic, while others manifest with cough, wheezing, or recurrent pneumonia that can mimic other pulmonary conditions. Subacute symptoms such as vomiting, poor feeding, or failure to thrive may further delay diagnosis [8]. Given this clinical heterogeneity, foreign body aspiration should always be considered in children presenting with unexplained or persistent respiratory symptoms [8,9].

Historically, brain abscesses most often arose from the direct extension of infections in adjacent ear, nose, or throat structures. Trauma and cyanotic congenital heart disease each account for roughly 20% of cases. Notably, in nearly one fifth of affected children, no underlying

condition or infectious source can be identified, and these are considered idiopathic. The remaining 20% of cases are distributed evenly among post-meningitis complications, iatrogenic causes, hematogenous spread, and pulmonary origin [5]. Metastatic inoculation of the brain from distant extracranial sources (pulmonary infection, endocarditis) tends to provoke multiple cerebral abscesses with a distribution that reflects the regional cerebral blood flow of the area affected [6].

The mechanism linking foreign body aspiration to brain abscess formation probably involves disruption of the bronchial mucosal barrier. A retained bronchial foreign body causes local inflammation and injury, compromising the pulmonary capillary filter and allowing pathogens to disseminate hematogenously to the brain. Consequently, foreign body aspiration should be considered in the differential diagnosis of pediatric brain abscess, particularly when the etiology is unclear. Flexible bronchoscopy can be a valuable diagnostic tool in such cases.[10] Notably, abscesses may develop months or even years after the initial aspiration event [11].

The clinical presentation of pediatric brain abscesses is often nonspecific and depends on the size, location, and stage of the lesion [7]. The classic triad of headache, fever, and focal neurological deficit is found in less than one-third of cases. Early symptoms may include irritability, lethargy, or poor feeding, while progression leads to headache, vomiting, altered consciousness, and signs of raised intracranial pressure. Seizures occur in up to half of children. Focal deficits such as hemiparesis or cranial nerve palsies reflect lesion location, and systemic signs of infection may be absent [2,7].

The treatment of brain abscesses in children combines prolonged antimicrobial therapy with surgical intervention. Empiric regimens usually include a third-generation cephalosporin plus metronidazole, with vancomycin added in settings with methicillin-resistant *Staphylococcus aureus* [3]. Small sized lesions (<2.5 cm), multiple abscesses, and deep-seated lesions are treated buy antimicrobial therapy alone under close monitoring. CT- or MRI-guided stereotactic aspiration has replaced open craniotomy in most cases due to its lower morbidity [13]. A 2024 study by Lu., *et al*. [13] emphasized that the current standard of care includes neurosurgical interventions and high-dose prolonged antibiotic therapy. Additionally, the European Society of Clinical Microbiology and Infectious Diseases (ESCMID) guidelines recommend a duration of 6-8 weeks for intravenous antimicrobial treatment [13] and many authorities recommend 2 to 3 months of additional oral antimicrobial therapy to prevent relapses [1]. Adjunctive therapy may include anticonvulsants, and corticosteroids are reserved for severe cerebral edema [1].

A few case reports have described brain abscesses secondary to airway foreign bodies in children, mostly between 2 and 5 years of age, with one case reported in a 10-year-old. The aspirated objects included seeds such as watermelon and sunflower [4,5], as well as metallic items like needles and safety pins/push pins [3,4].

Our case shares several similarities with those previously reported. Roberts., *et al*. [4] described two children who developed brain abscesses secondary to aspirated sharp metallic objects lodged in the bronchi, with pathogens of oropharyngeal origin isolated both from the brain and lung cultures. Likewise, Shachor-Meyouhas., *et al*. [14] reported a 2.5-year-old boy who developed a temporoparietal abscess associated with a retained sunflower seed, again highlighting the role of chronic pulmonary infection and hematogenous spread. Compared with these reports, our patient was older at presentation and had an exceptionally long latency of nearly four years between the initial aspiration event and the onset of neurological symptoms. In addition, the extraordinarily high number of cerebral abscesses [27] distinguishes our observation from previously described cases, which typically involved single or a few lesions. Despite this severity, our patient responded favorably to bronchoscopic removal of the metallic foreign body combined with prolonged triple intravenous antibiotic therapy, without the need for neurosurgical drainage. These differences underscore the variable clinical spectrum of this rare entity and emphasize the importance of considering occult foreign body aspiration in children presenting with unexplained respiratory symptoms followed by neurological complications.

Conclusion

Brain abscess remains a rare but severe condition in children, associated with significant morbidity and long-term neurological sequelae. Early diagnosis is essential to improve outcomes. Management requires a multidisciplinary approach combining prolonged, targeted antimicrobial therapy with surgical intervention when indicated. The awareness of unusual etiologies, such as foreign body aspiration, highlights the need for vigilance in clinical practice. Intrabronchial foreign body should be considered as a source when no other source can be found.

Competing Interests

Authors have declared that no competing interests exist.

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