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The Eyes see only what the Mind Knows: A Rare Case Report of Scedosporium Apiospermum Brain Abscesses Following Near-Drowning in a Biogas Tank

Case Report

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Abstract

Scedosporium apiospermum is an emerging opportunistic mold that causes invasive infections, particularly central nervous system (CNS) involvement with multiple brain abscesses in near-drowning victims exposed to contaminated water. We describe a 20-month-old immunocompetent boy from rural Maharashtra, India, who developed multiple brain abscesses following accidental near-drowning in a household biogas tank. He presented with aspiration pneumonitis, acute respiratory distress syndrome, refractory seizures, and left hemiparesis. Initial broad-spectrum antibiotics (ceftriaxone, metronidazole, vancomycin, meropenem) failed to resolve lesions on serial neuroimaging. High clinical suspicion, informed by literature on scedosporiosis in polluted-water near-drowning and biogas-related accidents, prompted empirical addition of oral voriconazole. Pus from surgical drainage of a parieto-occipital abscess revealed septate hyphae on calcofluor staining, with culture confirming S. apiospermum. Antifungal susceptibility testing showed low MICs to voriconazole (0.125 µg/mL), posaconazole, and itraconazole. Combination therapy with voriconazole and terbinafine, alongside surgical drainage, led to defervescence, seizure freedom, and gradual neurological recovery over four weeks. This case highlights the critical role of literature-guided suspicion for Scedosporium in atypical CNS infections refractory to antibacterials, especially in settings with household biogas exposure. Early voriconazole initiation and surgical intervention are essential for improved outcomes in this high-mortality infection.

Keywords: Scedosporiosis; Invasive Fungal Diseases; Tropical Infections; CNS Infections

Introduction

Scedosporium apiospermum and its teleomorph (sexual form) *Pseudallescheria boydii* are soil saprophytes that thrive in polluted waters and sewage [1]. These fungal pathogens, although generally harmless, are known to cause highly invasive infections and have emerged as the most common fungal infection in immunocompetent near-drowning victims [2]. Scedosporiosis often manifests as disseminated mycotic infections with frequent spread to the central nervous system (CNS), resulting in multiple brain abscesses and high mortality in near-drowning victims [3]. Biogas, as a renewable energy source, has been traditionally used in Asia for over a century. Harnessing biogas at the household level through anaerobic digestion to convert organic animal waste, especially cow dung, into clean

cooking fuel is a widespread practice, particularly in rural India [4]. Although underreported, accidents involving biogas plants are common in Asia [5]. Pulmonary scedosporiosis following biogas inhalation after falling into manure pits has previously been reported in the literature [6]. We report a case of a 20-month-old boy who developed multiple brain abscesses after near-drowning in a household biogas tank.

Case Details

Our patient was a 20-month-old boy born of a third-degree consanguineous union. He was hitherto developmentally normal, with an uneventful perinatal history, and hailed from Baramati district in Maharashtra, India. One month prior to presentation at our center, he had an alleged history of accidental fall into a household biogas plant. He was immediately rescued, found to be unresponsive with no respiratory efforts, and received mouth-to-mouth breathing by his parents before being taken to a local hospital, where he was resuscitated. He was diagnosed with aspiration pneumonitis post-near-drowning, secondary to inhalation of toxic chemicals and biogas, complicated by acute respiratory distress syndrome (ARDS) with subcutaneous emphysema. He required mechanical ventilation initially but was weaned and extubated by day four of admission. He received intravenous (IV) ceftriaxone and metronidazole. On day ten of admission, he developed multiple episodes of paroxysmal events consisting of left-sided neck version accompanied by tonic-clonic movements of the left upper and lower limbs with secondary generalization. Seizures were controlled with levetiracetam and phenytoin. Magnetic resonance imaging (MRI) of the brain showed multiple scattered round lesions (largest measuring 3 × 2.6 cm) in the bilateral frontal, parietal, temporal, and occipital white matter, bilateral thalami, ganglio-capsular region, and cerebellum, with areas of diffusion restriction and tiny areas of blooming on gradient echo (GRE) sequences, suggestive of multiple brain abscesses (Figure 1). This was on Day 11 after the aspiration. Cerebrospinal fluid (CSF) analysis revealed 300 white blood cells with lymphocytic predominance (76% lymphocytes), normal CSF sugar (68 mg/dL; random blood sugar 79 mg/dL), and protein (24 mg/dL). Aerobic, anaerobic, and fungal cultures of blood and CSF showed no growth. Xpert MTB/RIF assay (Cepheid, Sunnyvale, California, USA) for tuberculosis was negative. Antibiotics were upgraded to IV vancomycin (60 mg/kg/day) and meropenem (40 mg/kg/day). After 21 days of IV therapy with these antibiotics, repeat neuroimaging showed persistence of the lesions with interval increase in the size of the largest lesion to 3 × 3 cm. He was therefore referred to our tertiary care center for further management.

At presentation to our center, his vital parameters were normal. Anthropometric assessment showed weight 8.6 kg (−2SD to −3SD), length 79 cm (−2SD to −3SD), and head circumference 45.5 cm (−2SD to −3SD) according to World Health Organization (WHO) growth charts. On neurological examination, the child was awake but irritable, with no cranial nerve deficits. He had left-sided hemiparesis, with spasticity, exaggerated deep tendon reflexes, and non-sustained clonus in the left upper and lower limbs. No features suggestive of raised intracranial pressure were noted. Developmental assessment revealed regression of motor and speech milestones. Fundus examination was normal with no papilledema. Examination of other systems was unremarkable. Preliminary investigations showed a normal complete blood count (hemoglobin 9.8 g/dL, white blood cell count 9.8 × 10^3/mm^3, platelet count 5.41 × 10^5/mm^3). C-reactive protein (CRP) was 78 mg/L and erythrocyte sedimentation rate (ESR) was 48 mm/hour. His 2D ECHO was normal and showed no evidence of any vegetations. Repeat neuroimaging showed persistence of the lesions with leptomeningeal enhancement in the bilateral parieto-

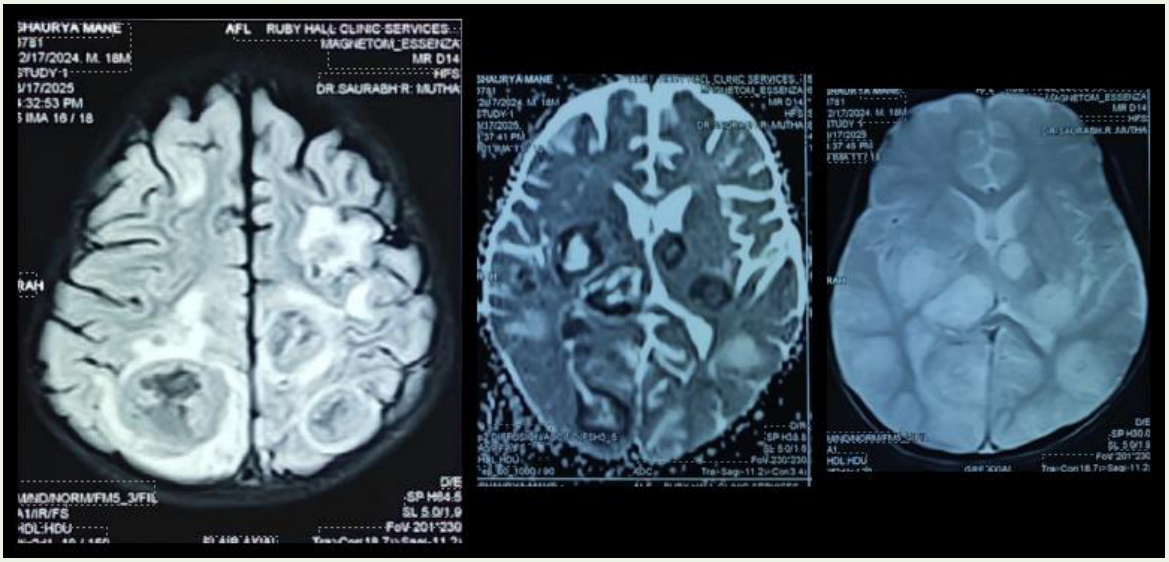

Figure 1: Magnetic resonance imaging (MRI) of the brain showed multiple scattered round lesions (largest measuring 3 × 2.6 cm) in the bilateral frontal, parietal, temporal, and occipital white matter, bilateral thalami, ganglio-capsular region, and cerebellum, with areas of diffusion restriction and tiny areas of blooming on gradient echo (GRE) sequences, suggestive of multiple brain abscesses

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occipital lobes. After a thorough literature search for similar case reports, scedosporiosis was considered in the differential diagnosis. On clinical suspicion, voriconazole (9 mg/kg orally twice daily) was added.

The patient underwent aspiration and drainage of the right parieto-occipital abscess. Fluorescent microscopy and calcofluor staining of the pus revealed septate fungal filaments. Fungal culture confirmed growth of *Scedosporium apiospermum*. Antifungal susceptibility testing (broth microdilution per CLSI M38-A2 guidelines for filamentous fungi [7] showed low minimum inhibitory concentrations (MICs) to posaconazole (0.0625 µg/mL), voriconazole (0.125 µg/mL), and itraconazole (0.125 µg/mL), with higher MICs to isavuconazole (0.5 µg/mL), amphotericin B (>8.0 µg/mL), echinocandins, and other agents (Table 1). Guided by the susceptibility profile, oral voriconazole was continued with monitoring for therapeutic levels and hepatotoxicity. Antibiotics were discontinued, and oral terbinafine was added in view of the severe disease. After surgical drainage and four weeks of combination therapy, the patient remained afebrile, seizure-free, and showed significant clinical improvement, including increased interaction and gradual recovery of lost milestones. At discharge, he was advised to continue prolonged oral therapy with voriconazole and terbinafine, with vigilant clinical and radiological follow-up, and was referred for neuro-rehabilitation to address persisting neurological deficits and sequelae.

Discussion

Scedosporium species are ubiquitous saprophytes and remain a rare cause of invasive fungal disease (IFD) in immunocompetent hosts. However, due to limited therapeutic options and high mortality, it has been categorized as a medium-priority pathogen in the recent World Health Organization Fungal Priority Pathogen List (WHO FPPL) [8]. It is important to note that frequent taxonomy and nomenclature changes over the last decade can make the literature on this pathogen confusing for practicing clinicians. In the past decade, numerous case reports of scedosporiosis have been described in near-drowning victims in polluted waters and, interestingly, in post-tsunami survivors. It is interesting to note, that such cases have been reported in immunocompetent individuals as well. [2,3,8]. On microscopy, these organisms may resemble *Aspergillus*, so definitive diagnosis relies on culture from infected tissue or sterile body fluids. Species-level identification is increasingly performed using matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF MS) and polymerase chain reaction (PCR)-based sequencing of the internal transcribed spacer (ITS) region and β-tubulin gene [8]. Species-level differentiation is critical, as treatment response varies between the *Scedosporium apiospermum* complex and closely related species such as *Lomentospora prolificans* [8]. According to the latest European Confederation of Medical Mycology (ECMM) guidelines [9], voriconazole remains the first-line drug of choice for all forms of scedosporiosis. Monotherapy with amphotericin B is discouraged due to high rates of in vitro resistance and poor clinical efficacy. There is only marginal evidence for the efficacy of posaconazole, itraconazole, and isavuconazole, which have been used in select cases when voriconazole is unavailable or contraindicated [8]. Voriconazole-based combination therapy with terbinafine has been employed in refractory cases, although robust evidence is lacking [8,9]. The optimal duration of treatment remains controversial and should be individualized based on site, severity, response, and immune status. Reported durations of voriconazole therapy in the literature range from several months to even years [10]. Novel antifungal agents such as olorofim and fosmanogepix are in late-stage clinical trials and may expand treatment options for scedosporiosis in the near future [11].

Table 1: Antifungal Susceptibility Profile of the Isolated *Scedosporium apiospermum*

Antifungal Agent	MIC (mcg/mL)*
Posaconazole	0.0625
Voriconazole	0.125
Itraconazole	0.125
Anidulafungin	>2.0
Micafungin	>1.0
5-Flucytosine	>16.0
Fluconazole	>16.0
Amphotericin B	>8.0
Isavuconazole	0.50

This case highlights several important clinical lessons. A thorough literature search is an indispensable tool for clinicians. It enabled us to recognize that scedosporiosis is a common pathogen causing brain abscesses in survivors of near-drowning in polluted waters, especially in Asian countries. This was crucial, as it prompted empirical addition of voriconazole based on high clinical suspicion even before microbiological confirmation. It also underscores the need for pediatricians and intensivists to maintain a high index of suspicion for atypical organisms when brain abscesses are refractory to conventional antibiotic therapy. In complicated and atypical CNS infections, early surgical drainage is often helpful for precise microbiological diagnosis, optimization of antimicrobial strategy, and reduction in therapy duration. Conventional wisdom often favors liposomal amphotericin B or echinocandins for invasive fungal diseases (IFDs); however, rare mold infections such as scedosporiosis respond poorly to both agents. Therefore, clinicians and intensivists must stay updated on existing treatment guidelines or seek expert opinion from infectious disease (ID) specialists when feasible.

Conclusion

Delayed recognition of *Scedosporium Apiospermum* in post-near-drowning CNS infections can lead to mortality and prolonged morbidity. This case illustrates how literature-guided suspicion can avert such delays. Early voriconazole initiation and surgical drainage is critical. Heightened awareness of household biogas-related accidents and polluted-water exposure is essential to improve timely diagnosis and outcomes in pediatric scedosporiosis.

Declaration of patient consent

Appropriate patient consent was obtained.

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