Curvularia Abscess of the Brainstem

Branko Skovrlj[1], Maryam Haghighi[2], Mark E. Smethurst[3], John Caridi[1], Joshua B. Bederson[1]

Key words
- Brainstem
- *Curvularia* abscess
- Fungal central nervous system infection
- Phaeohyphomycosis

Abbreviations and Acronyms
CNS: Central nervous system
MRI: Magnetic resonance imaging

From the [1]Department of Neurosurgery, Mount Sinai School of Medicine, New York City, New York; [2]School of Medicine, Karolinska Institutet, Hagalund, Sweden; and [3]Department of Pathology, James J. Peters VA Medical Center, Bronx, New York, USA

To whom correspondence should be addressed: Branko Skovrlj, M.D. [E-mail: skovrlj.branko@gmail.com]

Citation: World Neurosurg. (2014) 82, 1/2:241.e9-241.e13. http://dx.doi.org/10.1016/j.wneu.2013.07.014

Journal homepage: www.WORLDNEUROSURGERY.org

Available online: www.sciencedirect.com

OBJECTIVE: **To present a unique case of a brainstem Curvularia fungal infection and review the diagnosis and management of this rare phenomenon.**

METHODS: **A 33-year-old immunocompetent African American male presented with 2 weeks of headache, nausea, and vomiting in a setting of a recent 20-lb weight loss. Neurological examination was positive for multiple cranial nerve palsies, hemisensory loss, and gait instability. Magnetic resonance imaging demonstrated an enhancing medullary lesion.**

RESULTS: **Metastatic and infectious workup revealed a left lung lesion, which on subsequent biopsy was positive for a granuloma yielding no further clues to the etiology of the brainstem lesion. On surgical exploration of the cranial lesion, a puss-filed, encapsulated lesion was encountered that was tightly adherent to the brainstem. Intraoperative biopsy of the lesion capsule was initially negative but on postoperative day 9, fungal hyphae were encountered identified on morphology as *Curvularia* species. The patient was started on triple antifungal therapy but necessitated a second surgery for lesion debulking and drainage. The patient was discharged home 10 weeks after initial presentation. At the 13-months follow-up the patient is doing very well and his neurological examination continues to improve.**

CONCLUSIONS: **This is the first reported case of a brainstem *Curvularia* infection. This case highlights the importance of an aggressive surgical and antibiotic therapy in the treatment of central nervous system *Curvularia* infections. There appears to be a strong relationship between heavy marijuana use and *Curvularia* infection, producing lung granulomas that may extend to other organs such as the central nervous system of immunocompetent patients.**

INTRODUCTION

Curvularia is a filamentous, dematiaceous fungus characterized by melanin pigmentation in the cell walls of its hyphae (22). It is a mold, ubiquitously found in soil around the world, with preference to the tropical and subtropical regions (20). Infections by dematiaceous fungi, also known as phaeohyphomycosis, are rare in humans (25). *Curvularia* was first documented as a human pathogen in 1959 in Africa, when it was isolated from a lung mycetoma (2, 4, 9). The first central nervous system (CNS) *Curvularia* infection was described in 1977 by Lampert et al. (19). Since then, only eight CNS *Curvularia* infections have been documented in the literature (**Table 1**) (4, 8, 11, 14, 15, 19, 23, 26, 29, 30).

CASE REPORT

A 33-year-old African-American man with past medical history of occasional migraine headache presented to the emergency room with worsening right-sided headache and intermittent nausea with unpredictable episodes of severe vomiting. He complained of left-sided paresthesias, gait imbalance, blurry vision, diplopia, and erectile dysfunction for a period of 2 weeks. He described a recent 20-lb weight loss and progressive exercise intolerance. His social history was significant for 20 years of heavy marijuana use as well as significant alcohol use. Physical examination findings included a temperature of 96.8°F, blood pressure of 129/65 mm Hg, and heart rate of 103 beats per minute. Neurological examination disclosed right-sided ptosis, left hemisensory loss, leftward deviation of the uvula, right tongue deviation, nystagmus on rightward gaze, and a positive Romberg sign. Laboratory findings included a normal complete blood count and electrolyte panel. Cerebrospinal fluid examination revealed increased cellularity of polymorphonuclear leukocytes and lymphocytes. The cerebrospinal fluid culture was negative. Magnetic resonance imaging (MRI) of the brain demonstrated a 1.6 × 1.6 × 1.7 cm right-sided, homogeneously enhancing lesion within the right medulla with surrounding mass effect causing expansion of the brainstem at this location and vasogenic edema extending into the pons and upper cervical spinal cord (**Figure 1**). A computed tomography scan of the chest revealed a left lung lesion, which on subsequent biopsy was positive for multinucleated giant cells consistent with a diagnosis of granuloma, yielding no further clues to the etiology of the brainstem lesion. Due to the lack of diagnosis as well as the patient's deteriorating neurological status, a decision was made to perform an open biopsy and lesion resection. A preoperative MRI of the brain performed several days later revealed significant changes,

Table 1. Review of Previously Reported Central Nervous System Infections by *Curvularia* Species

Author/Year	Demographic	Location of CNS Lesion	Pathology	Immune Status	Medical Treatment	Outcome
Lampert et al., 1977 (19) Friedman et al., 1981 (14)	13 y/o Male African American Mentally retarded	Right frontoparietal lobe	*Curvularia pallescens*	Competent	Griseofulvin, amphotericin B, miconazole	Died 3 years after diagnosis
Rohwedder et al., 1979 (26)	25 y/o Male Semiprofessional football player	Left parietal lobe	*Curvularia lunata*	Competent	Amphotericin B, miconazole, flucytosine	Alive 10 years after diagnosis
de la Monte and Hutchins, 1985 (8) Pierce et al., 1986 (23)	42 y/o Male Welder No PMH	Right parieto-occipital lobes	*Curvularia lunata*	Compromised (T-cell abnormality)	Amphotericin B, miconazole, ketoconazole	Alive at 19 months follow-up
Ebright et al., 1999 (11)	46 y/o Female African American Chronic sinusitis	Frontal lobes, skull base	*Curvularia* clavata	Competent	Amphotericin B, fluconazole, itraconazole	Alive at 2 years follow-up
Carter and Boudreaux, 2004 (4)	21 y/o Male African American Marijuana use	Right basal ganglia	*Curvularia lunata*	Competent	Flucytosine, amphotericin B	Died 30 days after admission
Smith et al., 2007 (30)	57 y/o Male Massage therapist No PMH	Sellar, suprasellar	*Curvularia lunata*	Competent	Amphotericin B, voriconazole	Alive at 8 months follow-up
Singh et al., 2008 (29)	35 y/o Male African American	Skull base, sellar, suprasellar	*Curvularia geniculata*	Compromised (plasma cell dyscrasia)	Amphotericin B, voriconazole	Died 4 months after diagnosis
Gadgil et al., 2012 (15)	50 y/o Female Chronic sinusitis Previous sinus surgery	Right inferior frontal lobe	*Curvularia* species	Competent	Voriconazole, minocycline, levofloxacin	Alive at 3 years follow-up

CNS, central nervous system; PMH, past medical history; y/o, years old.

demonstrating a 2.2 × 1.8 × 2.2 cm centrally necrotic, ring enhancing lesion with significantly worsening vasogenic edema and mass effect on the surrounding brainstem (Figure 1). The patient underwent a suboccipital, retrosigmoid craniectomy for lesion biopsy and resection. Intraoperatively, the cerebellum was retracted to expose the lateral brainstem below the entrance of cranial nerve XI into the skull base. Inspection of the lateral brainstem revealed that it was tense and swollen due to the mass. An area of thinning of the brainstem surface was apparent and this region was entered using a Rhoton #6 instrument (Codman, Raynham, Massachusetts, USA). Copious amounts of purulent yellow material exited under increased pressure. Once all purulent material was removed the capsule of the lesion was apparent, which appeared darker than the surrounding brainstem and slightly hypervascular. The capsule was tightly adherent to the brainstem and could not be removed without causing significant trauma to the brainstem. Several very small biopsies of the capsule wall were obtained. The purulent material and one of the capsule wall biopsies were sent for frozen section revealing increased cellularity with lymphocytes, polymorphonuclear leukocytes, and red blood cells. Gram stain of the purulent material was negative. Postoperatively, the patient was not placed on antibiotics. His symptoms improved dramatically, with resolution of headache, nausea, vomiting, and gait imbalance. His vision returned to baseline and his only complaint was improving left-sided parasthesias. Neurological examination was positive only for end-gaze nystagmus. He was ambulating unassisted. On postoperative day 9, cultures from the intraoperative biopsy grew fungal hyphae consistent with *Curvularia* species on morphology (Figure 2). At that time, the patient was started on voriconazole (6.1 mg/kg every 12 hours), flucytosine (500 mg every 6 hours), and liposomal amphotericin B (5.1 mg/kg/day). He continued to do well; however, on postoperative day 13 he became lethargic, was unable to protect his airway, and required emergent intubation. MRI of the brain revealed a postoperative regrowth of the ring-enhancing lesion measuring 2.2 × 1.8 × 2.2 cm with increasing vasogenic edema and mass effect (Figure 3). The patient was taken back to the operating room at which time a reaccumulation of puss was encountered within the lesion, which was washed out, and a more aggressive resection of the lesion capsule was attempted, yielding a subtotal resection. Pathology of the lesion once again revealed *Curvularia* species. Postoperatively, the patient had a tracheostomy placed and was continued on the antifungal therapy. His symptoms improved to only gait imbalance, left hand weakness, left hemisensory loss, and residual rightward tongue deviation. He was transferred to the rehabilitation service and the tracheostomy tube was weaned and eventually removed. The patient was