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## CNS fungal meningitis to the "Top of the basilar"

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### ABSTRACT

Central nervous system (CNS) infections are a rare complication of epidural steroid injections and without strong clinical suspicion, fungal organisms may be overlooked among the long differential of causes of meningitis. Rare sequela of fungal meningitis is the development of stroke. To our knowledge, we present the first case of post epidural steroid injection (ESI) fungal meningitis leading to a basilar artery stroke, otherwise known as "top of the basilar" syndrome. We present a 49-year-old female with a history of ESIs who presented to the emergency department with headache, neck stiffness, and abdominal pain. She was discharged after her labs and symptoms were deemed inconsistent with meningitis. She was eventually admitted and twelve days after her original ED visit, she was diagnosed with meningitis and started on anti-fungal treatment. She was discharged 88 days later but was readmitted due to left sided weakness and mental status changes. She quickly lost motor and bulbar functions. An MRA showed diminished distal flow through the basilar artery, suggesting near complete occlusion. Although appropriate long term anti-fungal treatment was started, the patient still succumbed to a rare vascular event. Physicians who are treating patients for ESI meningitis should be aware of the potential for vasculitic and encephalitic complications.

## 1. Introduction

Fungal infections of the CNS are relatively uncommon and typically occur in the immunosuppressed patient. As of December 2012, 300 patients nationwide have been diagnosed with post steroid injection CNS fungal meningitis and about 13 534 have been exposed to the contaminated batch and are under surveillance<sup>[1]</sup>.

The complications related to CNS fungal meningitis include, but are not limited to back pain, radicular pain, paresthesias, and in the more severe cases, hydrocephalus, micro-cerebellopontine and cerebral infarcts and vessel wall vasculitis<sup>[2,3]</sup>.

The fungus mostly responsible for this outbreak is *Exserohilum rostratum* (*E. rostratum*), a melanin-producing soil fungus which rarely causes infection

in immunocompetent individuals. The usual clinical presentation associated with *E. rostratum* includes superficial and deep local infections, allergic reactions, and pneumonia<sup>[3]</sup>. However, the organism can become invasive, invading through the cribiform plate and extension into the CNS and causing intracranial mucocoeles<sup>[4]</sup>.

*E. rostratum* is thought to have vaso-invasive properties that lend to vascular inflammation and disease<sup>[3]</sup>. Of the 300 cases of PSI fungal meningitis, 9% of patients developed strokes, 64% ischemic, 18% hemorrhagic and 4% developed both. Of the patients with documented location of the stroke, 96% involved the posterior circulation<sup>[1]</sup>.

Top of the basilar syndrome is mostly caused by emboli and posterior circulation stroke without a cardioembolic source is presumed to be due to meningitis<sup>[1]</sup>.

## 2. Case report

We present the case of a 49-year-old female with a

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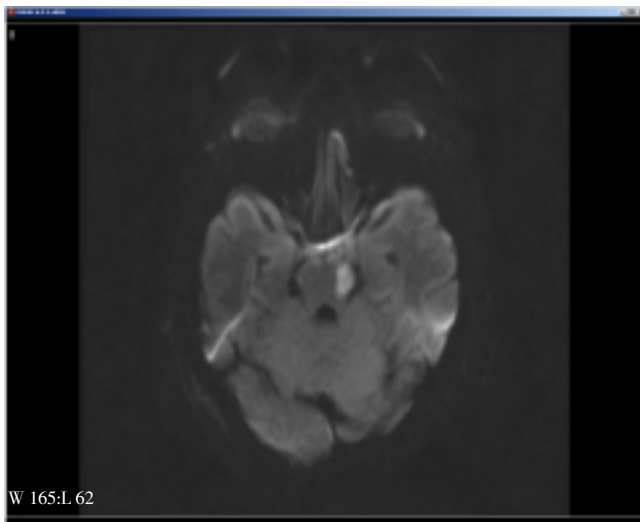
history of two epidural injections who presented to the emergency department with headache, neck stiffness, and abdominal pain.

Laboratory results and imaging at this time were unremarkable and all cultures and stains were negative (Table 1). Four days later, she was admitted for worsening headaches attributed to post lumbar puncture intracranial hypotension. Six days after this admission, an MRI showed signs of meningitis.

**Table 1.**

Lumbar puncture analysis of the patient.

	Initial LP	12 days later
Glucose, CSF	62	27
Protein, CSF	57	96
CSF Neutrophils	49	74
CSF Lymphocytes	45	24
RBC Count, CSF	45445	112
WBC, CSF	13	2505



**Figure 1.** MRI illustrating L pontine infarct.

A repeat LP was drawn and Voriconazole treatment was started. The result of this LP was more consistent with fungal meningitis (Table 1).

Subsequent evaluation revealed evidence of micro cerebellar infarcts as well as progressive hydrocephalus, necessitating placement of a ventriculoperitoneal shunt. The patient was placed on long term antifungals and discharged after 88 days. A week later, she presented to the emergency department with weakness of her left arm, decreased alertness, hallucinations, and decrease in verbal communication abilities.

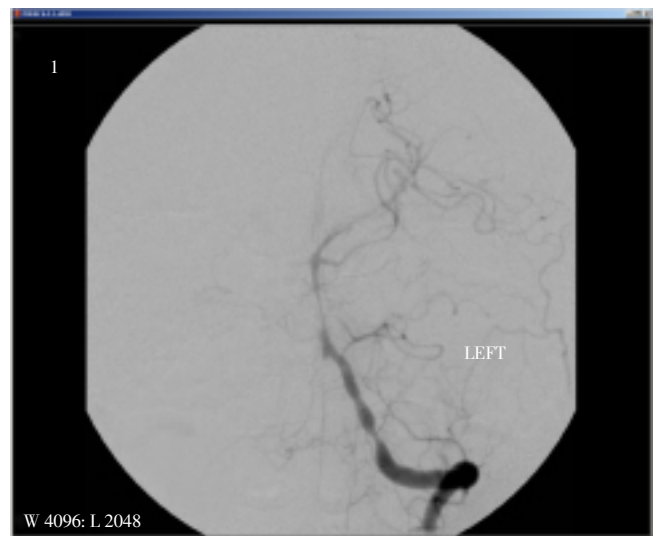
On physical exam, patient was lethargic and oriented only to person. There was noticeable decrease in strength of left upper extremity, she would not move lower extremities, and had left lower extremity clonus. An MRI revealed new acute infarcts involving the left pons and right genu of the corpus callosum (Figure 1) and conventional angiogram demonstrated total occlusion of the distal basilar artery and distal branches (Figure 2).

On day 2, Interventional radiology performed a mechanical thrombectomy followed by stent reconstruction of the basilar artery for restoration of antegrade flow. On day 3, the neurologic exam demonstrated sluggish pupils at 4–5 mm. Visual fields were full and ocular movements were intact.

There was bulbar dysfunction including the inability to protrude her tongue and affected sensorium of the tongue, face, palate, and jaw. Patient had triplegia in her right arm and both legs with brisk withdrawal to painful stimuli in these limbs. She had hyper-reflexia persisting in legs with bilateral upgoing toes. Her neurologic state declines and she became unresponsive to painful stimuli and her pupils were fixed at 6–7 mm without doll's eyes movement.



**Figure 2.** Left vertebral artery with illustration of basilar artery thrombosis and lack of antegrade flow beyond the proximal vertebral artery (catheter based angiography).



**Figure 3.** Partial endovascular re-canalization of the occluded basilar artery.

A CT scan showed that the pontine infarction had progressed. On day 3, the neurologic exam demonstrated the ability to follow commands, movement in left hand, and minimally reactive pupils. On day four, she was able to open her eyes to vocal stimulus, follow simple commands, and moves her left hand and left toes. She still could not move her tongue, lips, or eyes. On attempt of right lateral gaze there was nystagmus to the right. On day five, patient's condition declined due to bleeding in her pelvis and she passed away.

### 3. Discussion

Stroke in CNS fungal infections results from many mechanisms including vasculitis of the basal arteries secondary to basal meningitis, panarteritis secondary to diffuse fungal meningitis, fungal emboli, or direct extension from the cranial bones or sinus infections.

Arterial ischemic strokes associated with fungal infections are very rare in immunocompetent patients. Vasculitic signs and symptoms reported in association with other fungal CNS infections include hemiparesis, cranial nerve palsies, and altered consciousness similar to our patient[6].

It is important for clinicians to anticipate and recognize this rare complication of fungal meningitis. The long term sequelae of EPI fungal meningitis remains unknown and appropriate medical and surgical treatment of rare complications, such as stroke, in relation to this

outbreak requires further study.

### Conflict of interest

We declare that we have no conflict of interest.

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