

# A Unique Case of Bilateral Frontal Lobe Abscesses in a Young Male

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**Abstract** A brain abscess is a serious complication that may arise from a source of infection from within the cranium or from an extracranial source. We discuss a unique case of a 36 year-old male with a history of heroin abuse who presented with pan-sinusitis and bilateral frontal lobe abscesses. The patient presented with the symptoms of prolonged drowsiness and a left eyelid infection for which he was already receiving treatment. He had a normal neurological exam upon admission. CT scan of the head was performed which showed left orbital cellulitis, pan-sinusitis, and bilateral frontal lobe abscesses. A follow-up MRI was performed as well which showed cerebral edema. The patient was started on broad spectrum antibiotics, and neurosurgical aspiration and drainage of the abscesses was performed. Microbiological culture results enabled us to narrow the spectrum of the antibiotics. The patient completed his course of antibiotics. At a follow up exam 6 weeks later, the patient had no neurological deficits, and the abscesses seemed to be improving as seen in the imaging.

**Keywords:** brain abscess, pan-sinusitis, frontal lobe, bilateral, stereotactic, intraparenchymal, heroin abuse

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## 1. Introduction

A brain abscess is a focal intraparenchymal accumulation of encapsulated purulent material and inflammation which originates from an infection. [1] The incidence of brain abscesses in the developed world is approximately 1500-2500 cases per year; that number is increased in developing countries. [2] Abscesses constitute roughly 1-2% of all space occupying brain lesions in developed countries, while they account for roughly 8% of space occupying brain lesions developing countries. [3]

There are several populations that are at risk and several risk factors for the development of brain abscesses. Patients who are immunocompromised such as HIV positive patients, transplant patients and patient with neutropenia have an increased risk for infections in general, and likewise, have an increased risk for brain abscesses. Patients who have had head trauma or neurosurgery as well as patients with otitis media or sinusitis are at risk for brain abscesses from contiguous spread of the infection to the brain. Patients with lung abscesses, bacterial endocarditis, congenital heart disease and dental infections are at increased risk for brain abscesses though hematogenous spread. [4] Multiple abscesses are less common than singular abscesses, these typically occur through hematogenous spread. Risk factors for multiple abscesses include AIDS, organ transplantation, and IV drug use. [2]

We describe a rare case of bilateral frontal lobe abscesses in a patient with a history of sinusitis and intranasal heroin abuse.

## 2. Case Report

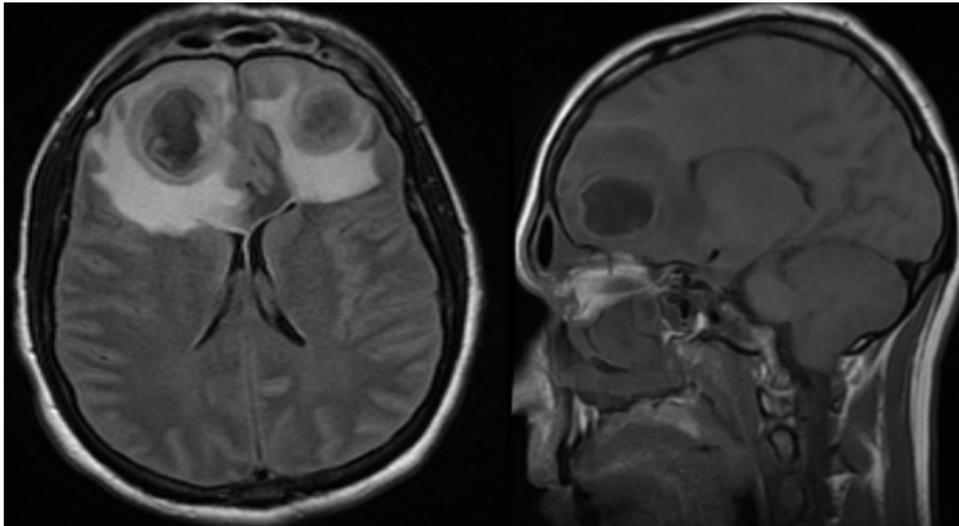


**Figure 1.** CT scan of bilateral orbits and sinuses indicating pan-sinusitis and bilateral frontal lobe abscesses

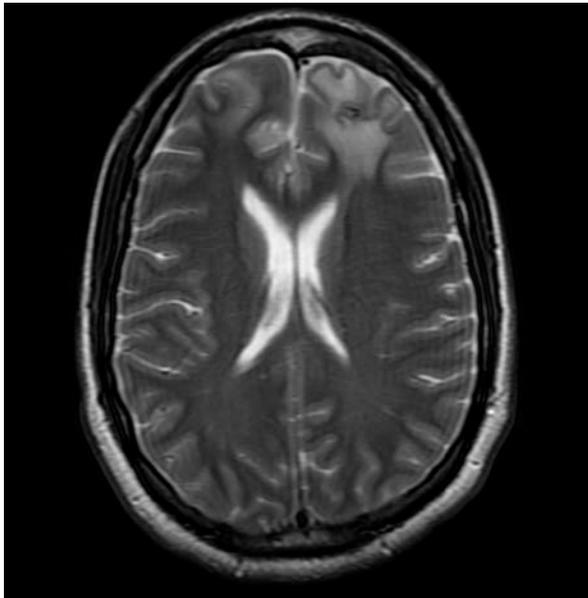
A 36-year-old Hispanic Male presented with a 3 week history of prolonged periods of drowsiness. He was recently treated as an outpatient with antibiotics for a left eyelid infection 2 weeks prior. Our patient also reported

that he snorts heroin occasionally, although he denied any recent use. On physical examination, the patient had an abscess located on left upper eyelid which was actively draining. The rest of physical exam including the neurological exam were within normal limits. A CT scan of the orbits (Figure 1) revealed left preseptal orbital cellulitis with abscess formation and infection extending into the left post-septal orbit. Extensive pan-sinusitis with air-fluid level suggesting acute sinus disease and bifrontal brain abscesses were also noted. A subsequent MRI of the brain (Figure 2 A, B) further revealed the bifrontal brain abscesses with extensive surrounding vasogenic edema and a mild midline shift to the left. Also noted was a diffuse sulcal flair hyperintensity and abnormal enhancement consistent with meningitis. A broad spectrum intravenous

antibiotic regimen was started, followed by bilateral burr holes under stealth neuronavigational guidance with aspiration of the brain abscesses. He also underwent bilateral endoscopic ethmoidectomy, antrostomy, sphenoid sinusotomy and frontal sinusotomy, along with incision and drainage left upper eyelid abscess. Surgical pathology revealed acute on chronic inflammation with hemorrhagic fibrinopurulent exudates of brain tissue. Microbiology revealed many *Staphylococcus aureus*, *Streptococcus constelatus* and *Prevotellamelaninogenica*. Our patient improved well clinically with no neurological deficits and was able to return to work. A follow up MRI (Figure 3) was done 6 weeks after discharge which showed a decrease in both the size of the bilateral abscesses and the surrounding edema.



**Figure 2.** A,B. MRI of the brain, sagittal and coronal images indicating bilateral frontal lobe abscesses with vasogenic edema and mild midline shift



**Figure 3.** MRI of the brain 6 weeks after initial presentation depicting remarkable decrease in size and edema of bilateral frontal lobe abscesses

### 3. Discussion

Sinusitis is a common source of brain abscesses through contiguous spread as discussed previously. Other risk factors include immunocompromised states, lung and heart

infections (such as empyema or endocarditis) which can lead to hematogenous spread of the infection to the brain. [4] Our patient presented with pan-sinusitis and an addiction to snorting heroin. These risk factors most likely led to the development of brain abscesses secondary to contiguous spread. There have been very few case reports in medical literature with similar presentations and risk factors as our patient. In order to better understand the correlation between inhalational drug abuse and the risk of developing brain abscesses we plan on further discussing these cases.

The case report by Rana et al. describes a patient with a history of sniffing cocaine who developed a left frontal lobe abscess. The patient initially presented with progressive confusion and fever, as well as focal neurological deficits. CTs of the brain showed a left frontal lobe abscess as well as left maxillary sinusitis. The roofs of the left extra-orbital frontal and sphenoidal sinuses were eroded and there was evidence of extension of the infection in the sinuses into the intracranial space. The patient eventually required a craniotomy as part of the treatment course. [5]

Similarly, a case discussed by Rao recognizes the connection between cocaine inhalation and frontal sinusitis, and the connection between frontal sinusitis and frontal lobe abscesses. The patient in this case presented with a 2 week long headache and a history of snorting cocaine. The patient was febrile upon examination. He also had a right facial palsy. An initial CT scan did not

show any intracranial findings. The headaches did not abate. Lumbar punctures were performed and the patient was started on antimicrobials, however his condition continued to deteriorate. The brain became edematous and this ultimately led to compression of the brainstem and midbrain structures. The patient eventually expired on day 13 in the hospital. The autopsy showed left frontal sinusitis and acute abscess in the left frontal lobe. [6]

Lastly, a case describing a frontal lobe abscess in conjunction with inhalational abuse of cocaine is the case report of Sousa and Rowley described in an article by Villa. [7] This case report discusses a patient with significant obstruction and destruction of the nasal septum, palate, sinuses and other nasal structures caused by abuse of inhalation of cocaine. The patient presented with meningitis, and imaging showed a frontal lobe abscess for which an emergency craniotomy was performed. The patient expired on hospital day 15 as a result of *Pseudomonas pneumonia*. [7]

In general the clinical presentation of brain abscesses varies depending on the location of the abscess, but there are some common signs and symptoms regardless of the location of the abscess. Frequently, patients reported headache, nausea, vomiting, altered mental status, fever, focal neurological deficits, and nuchal rigidity. Abscesses in the pons can cause obstruction of CSF flow leading to hydrocephalus. Occipital lobe abscesses can rupture into the ventricles and cause ventriculitis, or they can cause thrombophlebitis of the transverse sinus and lead to increased intracranial pressure, seizures, and other serious symptoms. Frontal lobe abscesses tend to be less dramatic in their clinical presentation, and have more general symptoms such as headache, fever, and nausea early on, with altered level of consciousness becoming more apparent in later stages of the disease. [8] Although there are common presentations of brain abscesses that are site specific for each region of the brain, patients may still present with symptoms that don't strictly fit the typical presentation. This can be seen in a case by Friedlander et. al. who discuss a patient with a right frontal lobe abscess with the symptoms of sinusitis and left-sided hemiparesis. [9]

In a patient with suspected brain abscess, a CT scan should always be performed. The CT scan is a very rapid way of quantifying abscesses in the brain. An MRI can then be performed in order to distinguish the lesion from a brain abscess or other source of enhancement such as a tumor or cyst. Once an abscess is found on imaging; neurosurgical management is important. Stereotactic aspiration and drainage of the abscess should be performed in order to determine the source of the infection and the organism that caused the infection, and also to decompress the area of inflammation. Broad spectrum antimicrobials that cover the organisms most likely to cause the infection should also be promptly initiated, although preferably after aspiration of the abscesses so that adequate cultures can be obtained, assuming the patient is stable enough to allow this. Once the organism is determined, treatment should be modified to antimicrobials more specific to those isolated. [4]

In the management of our patient, the current guidelines were followed. Both CT and MRI were ordered to determine the nature of the abscess. The patient underwent drainage of both of the brain abscesses as well as the

eyelid abscess. He was initially started on a broad spectrum antibiotic regimen of intravenous cefepime, metronidazole, and vancomycin. When the organisms and their susceptibility were determined to be *Staphylococcus aureus*, *Streptococcus constellatus*, and *Prevotellamelaninogenica*, we modified the treatment to the IV antibiotic regimen of ampicillin-sulbactam and metronidazole for a duration of 6 weeks. He was discharged home with an additional two weeks of augmentin and metronidazole.

The prognosis of patients who receive the current standard in diagnostic methods and treatment (imaging, neurosurgical drainage, and antimicrobials) has become substantially better over the last several decades. The current fatality rate is roughly 10%, and the rate of full recovery is 70%. [1] We can see from the case report of Zaffiri et. al. describing a patient that expired after the standard diagnostic imaging using CT and MRI scans and treatments using antimicrobials and neurosurgical evacuation of the abscess, that since brain abscesses are dangerous infections, the patient may still not survive, even with the standard treatment. [11] Additionally, the case report by Paul et. al. shows a case where the patient was treated successfully for a brain abscess, however the patient subsequently developed left sensorineural hearing loss as a result of the intracranial complications of the infection. [12] In our case, we followed up with our patient 6 weeks after discharge and our patient was found to have no neurological deficits with radiographic evidence of decreasing edema and almost complete resolution of the bilateral frontal brain abscesses (Figure 3).

In conclusion, brain abscesses are a very serious form of infection that must be treated quickly and appropriately. We recommend that physicians hold a high index of suspicion especially in individuals with predisposing risk factors presenting with an altered mental status. As discussed in our case report, the early use of proper imaging techniques, neurosurgical interventions, and antimicrobials play a pivotal role in substantially lowering the associated morbidity and mortality. However, even with these treatment modalities, some patients may not respond successfully.

## Conflict of Interest

None.

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