



## Clinical Mimic of Intracranial Space Occupying Lesion and Tuberculoma WORSHIM KHAMRANG

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**Abstract :** Fungal sinusitis with intracranial extension requires urgent medical attention as the clinical outcome is usually fatal. Central nervous system fungal infection can present in protean clinical manifestations. It is more common in the immunocompromised, especially poorly controlled diabetic patient. Imaging plays an important role in early diagnosis.

**Keyword :** Fungal sinusitis, intracranial extension, intracranial fungal granuloma.

### INTRODUCTION

Central nervous system fungal infection can present in protean clinical manifestations. Nonspecific symptoms like weight loss, fever, malaise, and fatigue are common. It may present with basal meningitis, hydrocephalus, space occupying lesions (such as cerebral abscess, granulomas), stroke and spinal infections. Fungal sinusitis has a sinister reputation due to infrequent but fatal intracranial extension, irrespective of the etiology, whether invasive or noninvasive. Urgent and aggressive treatment is required as it invariably proves to be fatal. Delay in diagnosis can lead to a disastrous outcome. A number of fungal pathogens can cause CNS infections. The most common are *Coccidioides immitis*, *Aspergillus fumigatus*, *Cryptococcus neoformans*, *Histoplasma capsulatum*, *Candida albicans*, *Blastomyces dermatitidis*, *Bipolaris*, and *Rhizopus*. Fungal sinusitis is broadly classified into following types :

#### 1. Noninvasive

- Allergic fungal sinusitis
- Fungal ball (Mycetoma)

#### 2. Invasive

- Acute
- Chronic
- Chronic granulomatous

These subtypes are distinct entities with different clinical and imaging features. Treatment strategies and prognosis also differ for each subtypes. The intracranial extension is a dreaded complication of fungal sinusitis with high mortality rates.

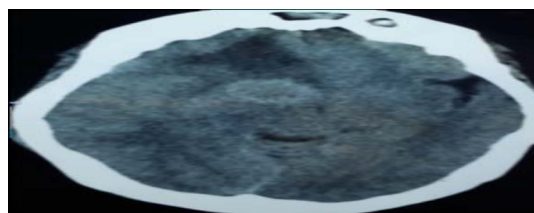
The fungus generally spreads through:

1. Direct extension.
2. Hematogenous route.
3. Perineural invasion of cranial nerves.
4. Cribriform plate of ethmoid bone.
5. Rarely – surgery or blood transfusion.

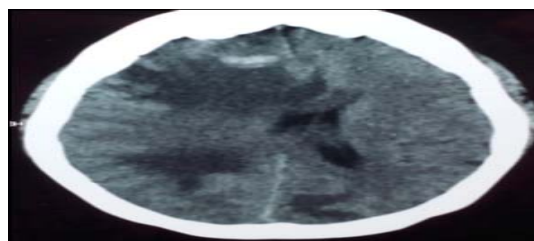
It is more common in the immunocompromised, especially poorly controlled diabetic patient, but it is also prevalent in the immunocompetent population.

### CASE REPORT

A 53 years old female was admitted with complaints of fever, headache and vomiting for past 5 days. Fever was continuous, low grade and not associated with chills or rigor. Headache was diffuse and not localised to one place. Vomiting was non projectile, multiple episodes. No past history of tuberculosis. She is a known case of Diabetes mellitus for the past two years on treatment. a known hypertensive for the past twelve years on medication. On examination during admission, she was afebrile, conscious and oriented. Pulse and BP was normal. CNS examination showed her power was 4/5 in all four limbs, deep tendon reflex was positive and tone was normal. Abdomen, cardiovascular and respiratory systems were found normal. Complete blood count was within normal limits. She had taken CT brain from other institute before admission which was reported as multiple hyperdense lesions in right frontal and parietal lobes with perilesional edema – to rule out malignancy and tuberculoma (Fig. 1). Provisional diagnosis during admission was given as Systemic hypertension with Diabetes Mellitus -2 with Intracranial space occupying lesion (ICSOL) / Disseminated Tuberculosis.



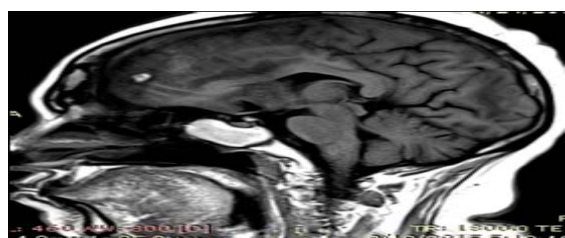
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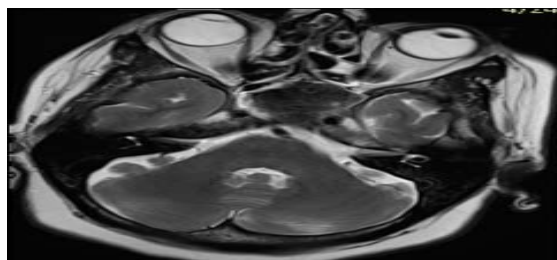
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Figure 1. Computed Topographic axial scan shows multiple hyperdense lesions at right frontal and parietal regions with perilesional edema causing midline shift.

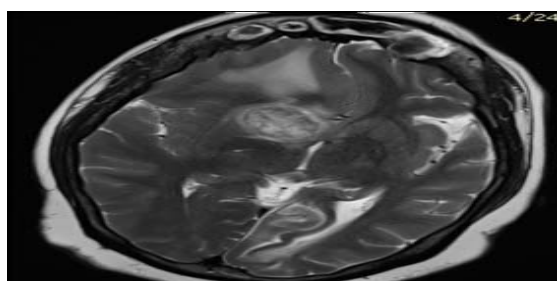
With the above findings and clinical impressions, supportive treatment was given and MRI was done in our department. T 1 weighted MR images shows hyperintensity in sphenoid sinus and frontal sinus, T2-weighted MR images show low signal intensity within the corresponding lesion. Multiple ring enhancing lesions with perilesional edema noted in right caudate, right frontal and bilateral parietal regions. The lesion in the right frontal lobe showed T 1 hyperintense, T 2 hypointense dependent fluid fluid level suggestive of haemorrhage. The lesions do not show diffusion restriction. The roof of sphenoid sinus is eroded and shows intracranial extension limited by the dura Fig. 2 - 3. MRA and MRV appear normal. There is mass effect causing significant midline shift. We gave the final impression as allergic fungal sinusitis of sphenoid and frontal sinuses with intracranial extension and multiple fungal granulomas involving right caudate , right frontal and bilateral parietal regions with significant mass effect. She was promptly started on injection Amphotericin B. A referral to ENT department was done and subsequently sphenoidectomy was done. Intraoperative findings : large amount of fungal debris found occupying the the sphenoid sinus and removed. Specimen was sent for fungal smear and culture. Fungal smear showed thin hyaline septate hyphae.



a



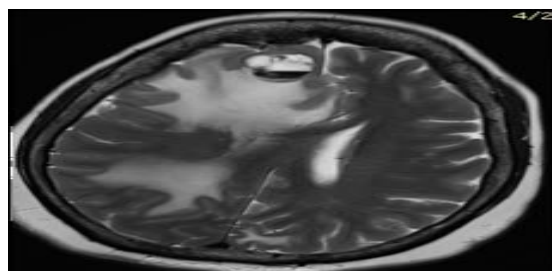
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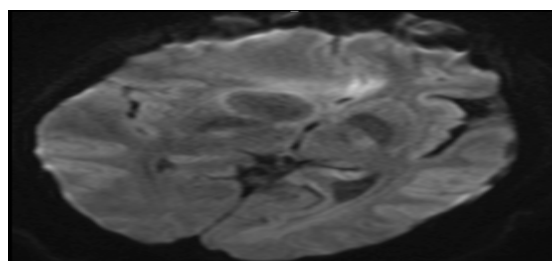


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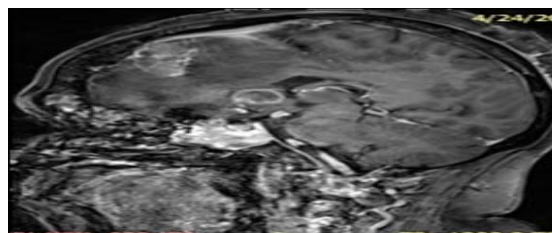


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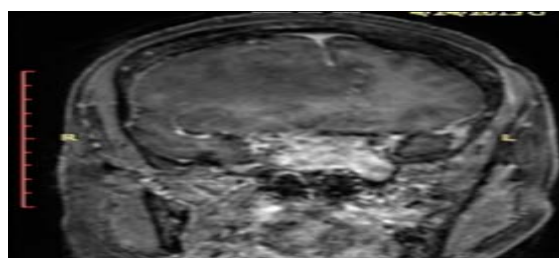
Figure 2. T1 sagittal (a) shows hyperintensity in sphenoid sinus, T 2 axial (b) shows hypointensity of the corresponding lesion. T 2 axial (c) shows heterointense lesion with perilesional edema in right caudate. Also note the involvement of frontal sinus. (d,e) show fluid fluid level in the frontal lesion.



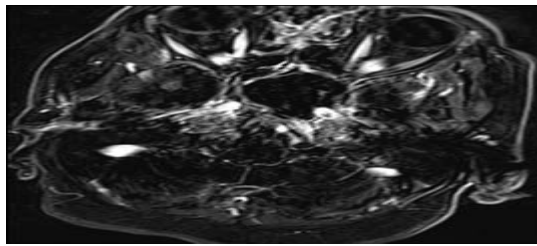
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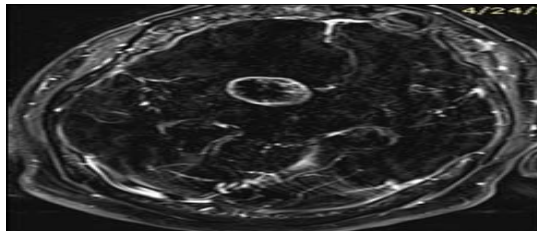
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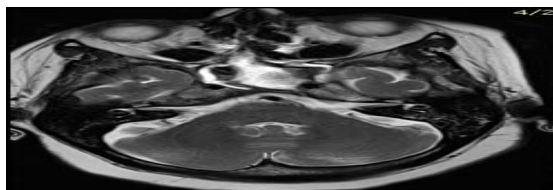


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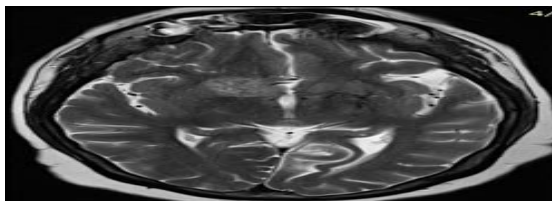


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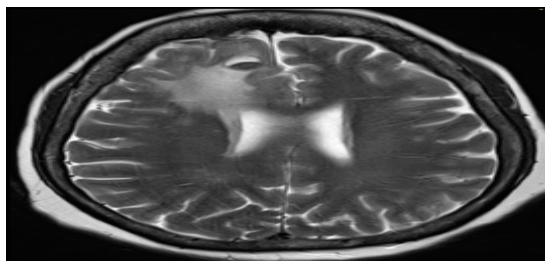
Figure 3. (a) DWI shows no diffusion restriction. (b,c) T 1 sagittal and coronal show enhancement of lesions with intracranial extension limited by the dura. (d,e) Subtraction images show the peripheral ring enhancement of the sphenoid sinus and caudate lesion. Review MRI was done after three weeks after completing a course of injection amphotericin B. There was significant reduction in size of the lesions, surrounding edema and midline shift showing good response to antifungal (Fig. 4). On follow up, fungal culture result showed growth of *Bipolaris* species. Patient was discharged with satisfactory improvements in clinical symptoms.



A



B



C

Figure 4. Axial T 2 weighted images (a, b, c). Compared to previous scan there is significant reduction in size of the lesions, surrounding edema and midline shift. Post operative changes seen in sphenoid sinus (a).

#### DISCUSSIONS:

Fungi are ubiquitous organisms with a widespread distribution. CNS fungal infections are uncommon, but their prevalence is rising as the number of immunocompromised patients increases worldwide. The various intracranial complications are listed below:

- Cavernous sinus thrombosis
- Meningitis
- Intracranial fungal masses (IFM)/granuloma
- Brain abscess
- Cranial nerve palsies
- Cerebritis
- Stroke
- Mycotic aneurysm.

#### Intracranial fungal masses:

In our case, the patient presented with multiple granulomas. These are not very common and generally present as space occupying lesions. Mode of spread tends to be hematogenous, but may also be caused by direct extension from paranasal sinuses and mastoid. They can be of two types : rhino cerebral or pure intracranial masses. The rhino cerebral spreads directly from the infected paranasal sinuses, either from bone erosion in case of sphenoid sinus or extension through the cribriform plate. It occurs in immunocompetent patients in 50% cases, generally caused by *Aspergillus flavus*. The immunosuppressed patients are infected by *A. fumigatus*, and several other species like mucor, cryptococcus, candida, etc. The predisposing factors could be diabetes mellitus, renal transplant, long-term immunosuppressant with steroids, parasitic infections, rampant use of antibiotics, antituberculous therapy, poor nutritional status, HIV infection and rarely surgery.

#### Differential diagnosis

General imaging differential considerations include:

- Other types of CNS infection
  - CNS toxoplasmosis
  - CNS tuberculosis
  - Pyogenic abscesses
  - CNS lymphoma

#### MANAGEMENT

##### Medical

The mainstay of treatment is antifungal therapy with amphotericin B. It combines with the ergosterol in fungal cell membrane and manifests its antifungal properties. Azoles, as they act by blocking ergosterol. Voriconazole is very effective in complicated cases and is less toxic than amphotericin. Fluconazole or itraconazole may be used.

##### Surgical

Endoscopic sinus surgery with removal of all fungal debris should be performed even at the initial stage when sending material for histopathology and microbiologic studies.

#### CONCLUSION

Fungal sinusitis with intracranial extension requires urgent medical attention as the clinical outcome is usually fatal. The protean clinical presentations often leads to delay in specific antifungal treatment. Imaging plays an important role in early diagnosis.

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