Temporal Lobe Abscess in a Patient With Isolated Fungal Sphenoiditis

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Introduction

Isolated sphenoid sinusitis accounts for 2-3% of all sinus infections evaluated by radiologic imaging. Fungal sphenoiditis is present in approximately 5% of isolated sphenoiditis. The most common presenting symptom is frontal or retro-orbital headache; this occurs in roughly 70% of cases. Nasal obstruction is the next most common symptom presenting in 30% of cases. Noninvasive fungal sphenoiditis rarely presents with serious complications. However, diplopia and/or transient vision loss have been the most severe reported complications and have been seen in up to 3% of cases. Intracranial extension and cerebral abscess is another serious complication of fungal sphenoiditis, and to our knowledge has not been reported until now. Intracranial extension from sinusitis is a rare but potentially fatal disease characterized by bony erosion of the skull base and fungal extension into the adjacent cavities, such as the orbit or cranial vault. It is usually associated with acute fulminating invasive fungal sinusitis (IFPS) in the immunocompromised population, such as patients who have undergone hematopoietic stem cell transplantation or solid organ transplant, those with HIV/AIDS or diabetes mellitus, or those who are undergoing treatment with chemotherapy or immunosuppressants. However, this complication has now been seen to very rarely occur in immunocompetent individuals as well, and seems to be increasing in frequency in this population.4

Of the approximately twenty pathogenic fungi, the most common fungal infections in the nasal sinuses are the opportunistic genera of Aspergillus, Mucor, and Candida of which Aspergillus is the most prevalent organism.6,7 While rare, each of these can invade the adjacent structures, with Mucor being the most invasive and requiring the most aggressive surgical treatments. Intracranial extension and abscess formation most commonly occurs from the frontal sinus to the frontal and frontoparietal areas of the brain. The rarest occurrence of invasive fungal sinusitis is seen in the sphenoid sinus, due to only 2.7% of all sinus infections occurring there.8 The rarity of this infection in comparison to other sinuses is because of both the anatomical orientation of the sphenoid sinus receiving little direct airflow, and because the sinus mucosa is lined by relatively few glands, producing less mucus to serve as a reservoir for infection.9 When invasion does occur from the sphenoid sinus, it can occur through one of two mechanisms: retrograde thrombophlebitis through diploic veins of the skull, or by direct extension through normal anatomic pathways or wall erosion.10 The fungus can either enter the frontoparietal areas of the brain similar to extension from the frontal and ethmoid sinuses, or it can extend into the cavernous sinus, causing visual defects secondary to destruction of cranial nerves III, IV, V, and VI.

Another potential site of invasion is the temporal lobe, which has rarely been documented.9,10

Case Report

A 74-year-old immunocompetent male with history of chronic hypertension and COPD was admitted with severe retro-orbital headache. A CT scan revealed isolated sphenoiditis. The patient was subsequently scheduled for sinus surgery as an outpatient. At the time of surgery, the patient presented with mild obtundation, confusion and receptive aphasia. The patient was subsequently transferred to the university hospital for further workup. A head CT with contrast revealed two lobulated, rim enhancing lesions with surrounding edema and local mass effect in the left temporal lobe, suggestive of brain abscesses.

The patient underwent a left temporal craniotomy using frameless image-guided stereo surgery for drainage of the abscess. Concurrently, the patient underwent a bilateral endoscopic sphenoid sinusotomy using endoscopic transnasal approach with image-guided navigation. The sphenoid sinus was widened with a microdebrider and was found to be impacted with gross fungal debris. Tissue from the sinus was removed along with the gross fungal debris, which was sent for culture. Sphenoid irrigation and a posterior ethmoidectomy were then performed, creating a wide opening for the sphenoid sinus to drain. The pathology report suggested characteristics of Candida spp. The patient made a full recovery postoperatively, with resolution of abscess and sinus findings on subsequent imaging.

Radiographs

Diagnosis is made by CT or MRI showing cystic lesions.

Fig 2. H&E; 5x. Gross slide of fungus ball debrided from sphenoid sinus.

Fig 4. Head CT showing multiple brain abscesses within the left posterior parietal and temporal lobes, prominent vasogenic edema causing regional sulcal effacement.

Fig 5. MRI with contrast; sphenoid sinusitis; rim enhancing lesions with surrounding edema and local mass effect in the left temporal lobe.

Fig 6. Follow up MRI 4 months post-operative. Surgical changes consistent with left temporal craniotomy and underlying left temporal encephalomalacia. Otherwise resolved sphenoiditis and fluid collections.

Discussion

While intracranial extension of fungal sinusitis is rare, an index of suspicion should be maintained because of its severe morbidities and up to 30% mortality rate. This is compounded by the fact that the most common early presentation of isolated sphenoiditis is retro-orbital headache, often misdiagnosed as a more benign process as the disease course continues untreated, increasing the likelihood of eventual progression into an intracranial complication.9,10 Careful attention should be paid to the course of symptoms in the patient, as the initial cerebritis causes a headache followed by an asymptomatic phase due to coalescence of the abscess.11 This is often followed directly by seizures or focal neurologic deficits, both directly correlating with long-term morbidities.4 With subsequent rupture of the abscess, death commonly results. Diagnosis is made by CT or MR showing cystic lesions.

The treatment of choice for isolated fungal sinusitis with intracranial abscess is surgical drainage of the affected sinus with concurrent broad-spectrum antifungal agents, along with neurosurgical consultation for steroidic aspiration or craniotomy.4 Though early intracranial abscesses may resolve with medical therapy, a low threshold for aggressive intervention must be maintained as most cases will eventually require a neurosurgical procedure.11

Conclusion

Temporal lobe abscess secondary to non-invasive isolated sphenoid sinusitis is a rare, previously unreported occurrence. This is particularly unusual in this case of an immunocompetent patient. The case presented is unique in regards to the location of intracranial invasion, as well as the diagnosis of Candida infection causing direct extension, a phenomenon much more highly associated with Aspergillus and Mucor. With early diagnosis and immediate surgical drainage, survival with a low chance of long-term morbidities significantly increases.

References