RESEARCH PAPER

Invasive Fungal Sinusitis Mimicking Pituitary Macroadenoma: A Case Report

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ABSTRACT
Invasive fungal sinusitis is a rare but life-threatening condition that typically affects immunocompromised individuals. Its presentation can occasionally mimic other pathologies, leading to diagnostic challenges. We report an unusual case of invasive fungal sinusitis in an 82-year-old female who presented with headache, blurring of vision, diplopia, and generalized tremors. Laboratory investigations revealed elevated inflammatory markers including procalcitonin, leukocytosis, and raised C-reactive protein. Neuroimaging demonstrated a well-defined sellar and suprasellar lesion measuring approximately 2.8 × 2.3 × 2.8 cm with expansion of the sella turcica and inferior extension into the sphenoid sinus. A focal hyperdense area within the lesion raised suspicion for fungal concretions, hemorrhagic component, or proteinaceous material. The differential diagnosis included invasive fungal sinusitis and pituitary macroadenoma. Endoscopic transnasal sphenoidectomy revealed the sphenoid sinus cavity completely filled with thick, inspissated, grayish-brown to black necrotic material with friable fungal debris. Histopathological examination confirmed fungal infection. Complete debridement was performed, and the patient showed significant postoperative improvement. This case highlights the importance of considering invasive fungal sinusitis in the differential diagnosis of sellar masses, particularly in elderly patients with elevated inflammatory markers, and demonstrates the crucial role of surgical intervention in both diagnosis and management.

Keywords: Invasive fungal sinusitis, pituitary macroadenoma, sellar mass, sphenoid sinus, endoscopic sphenoidectomy
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INTRODUCTION

Invasive fungal sinusitis is a severe infectious condition characterized by fungal hyphal invasion into mucosal tissues, often extending beyond the sinuses into adjacent structures including the orbit, cavernous sinus, and intracranial cavity [1]. The condition most commonly affects immunocompromised individuals, including those with diabetes mellitus, hematological malignancies, or prolonged corticosteroid use, though cases in immunocompetent hosts have been reported [2]. The most common causative organisms include Aspergillus species and fungi of the order Mucorales [3].

The clinical presentation of invasive fungal sinusitis varies depending on the extent of disease involvement. Early symptoms may mimic routine bacterial sinusitis with fever, nasal congestion, and headache [4]. As the disease progresses, more specific signs may emerge including facial pain, periorbital swelling, proptosis, and cranial nerve palsies. Intracranial extension can produce altered mental status, seizures, and focal neurological deficits [5].

The sphenoid sinus is an uncommon site of isolated fungal disease, representing approximately 2-3% of all paranasal sinus pathologies [6]. When involvement does occur, the proximity of the sphenoid sinus to vital structures including the pituitary gland, optic nerves, optic chiasm, and cavernous sinuses creates potential for significant morbidity. Lesions arising in this region can clinically and radiographically mimic pituitary tumors, leading to diagnostic confusion .

Pituitary macroadenomas are benign neoplasms arising from the anterior pituitary gland, defined as adenomas measuring greater than 10 mm in diameter [7]. These tumors commonly present with mass effect symptoms including headache, visual field deficits, and hypopituitarism [8]. On imaging, pituitary macroadenomas typically appear as solid sellar masses with variable enhancement patterns and frequent suprasellar extension [9].

The radiographic overlap between invasive fungal sinusitis involving the sphenoid sinus and pituitary macroadenoma creates potential for misdiagnosis, with important therapeutic implications [10]. While pituitary adenomas may be managed conservatively or surgically depending on symptoms and size, invasive fungal sinusitis requires prompt aggressive surgical debridement and systemic antifungal therapy [11].

This case report describes an elderly patient with invasive fungal sinusitis that closely mimicked pituitary

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macroadenoma on initial clinical and radiographic evaluation, highlighting the importance of maintaining a broad differential diagnosis and the critical role of surgical intervention in establishing the correct diagnosis.

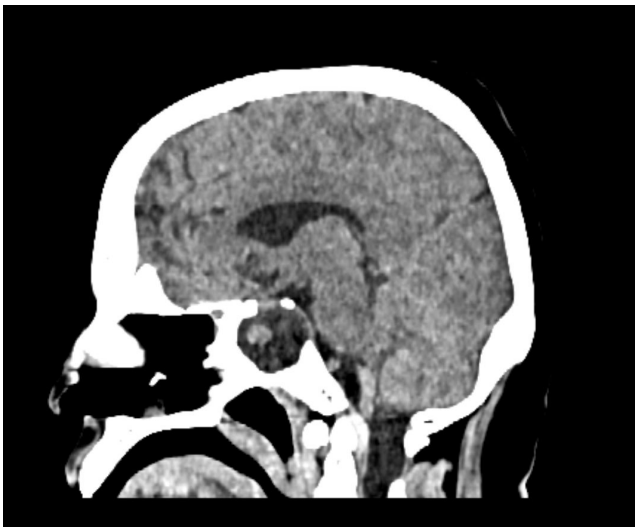
Case Presentation

An 82-year-old female presented to the emergency department with complaints of progressive headache of one week duration. The headache was generalized, continuous, and gradually increasing in severity. Two days prior to presentation, she developed blurring of vision associated with diplopia. She also reported intermittent fever for one week and a history of generalized tremors for one month. There was no history of nasal discharge, facial pain, or previous sinus disease. Her past medical history was unremarkable, and she was not known to be diabetic or immunocompromised. No history of corticosteroid use or immunosuppressive therapy was reported.

Laboratory Investigations: Initial laboratory evaluation revealed significantly elevated inflammatory markers. Procalcitonin levels were elevated at 2.5 ng/mL (reference range <0.5 ng/mL). Complete blood count demonstrated leukocytosis with white blood cell count of 14,800/μL (reference range 4,000-11,000/μL) with neutrophilic predominance. C-reactive protein (CRP) was markedly elevated at 120 mg/L (reference range <5 mg/L). Routine biochemical parameters including renal function tests, liver function tests, and electrolyte panel were within normal limits. Endocrine evaluation including thyroid function tests and random cortisol were normal.

Imaging Findings: Non-contrast computed tomography (CT) of the brain was performed as the initial imaging study. Axial and sagittal images (Figures 1 and 2)

Figure 1: Plain CT brain axial image showing a well-defined hypodense soft tissue density lesion measuring approximately 2.8 × 2.3 cm in the sellar and suprasellar region. A focal hyperdense area (arrow) is seen in the anterior right lateral aspect, suggestive of fungal concretions, hemorrhagic component, or proteinaceous material.



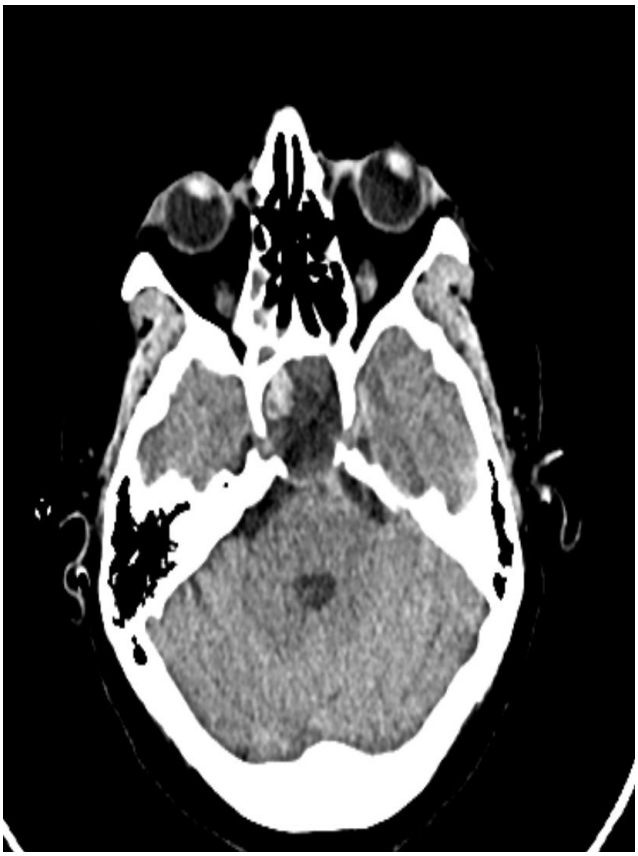
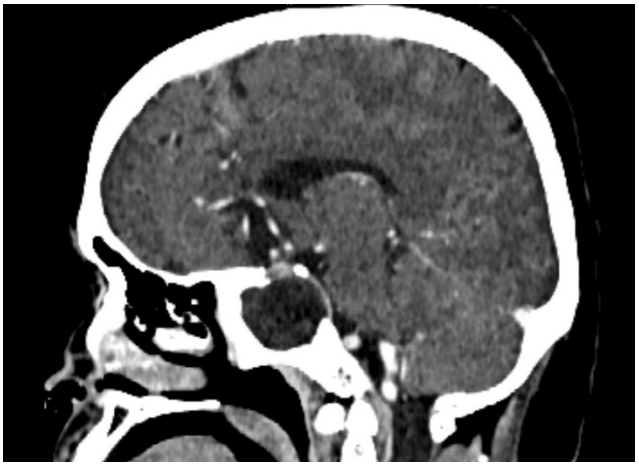


Figure 2: Plain CT brain sagittal image demonstrating the sellar and suprasellar lesion with inferior extension into the sphenoid sinus. Note the expansion of the sella turcica and mild mass effect with superior displacement and indentation of the optic chiasm

demonstrated a well-defined hypodense soft tissue density lesion measuring approximately 2.8 × 2.3 × 2.8 cm in anteroposterior, transverse, and craniocaudal dimensions, located in the sellar and suprasellar region. The lesion caused expansion of the sella turcica with inferior extension into the sphenoid sinus. Associated remodeling and possible erosion of the sellar floor were noted. Within the lesion, a focal hyperdense area measuring approximately 1.1 × 1.1 × 0.9 cm was visualized in the anterior right lateral aspect, demonstrating attenuation of approximately 56 Hounsfield units (HU). This hyperdense focus raised consideration for fungal concretions, hemorrhagic component, or proteinaceous material. Mild mass effect was evident over the optic chiasm, with indentation and superior displacement. Separate visualization of the normal pituitary gland and sphenoid sinus mucosa was suboptimal.

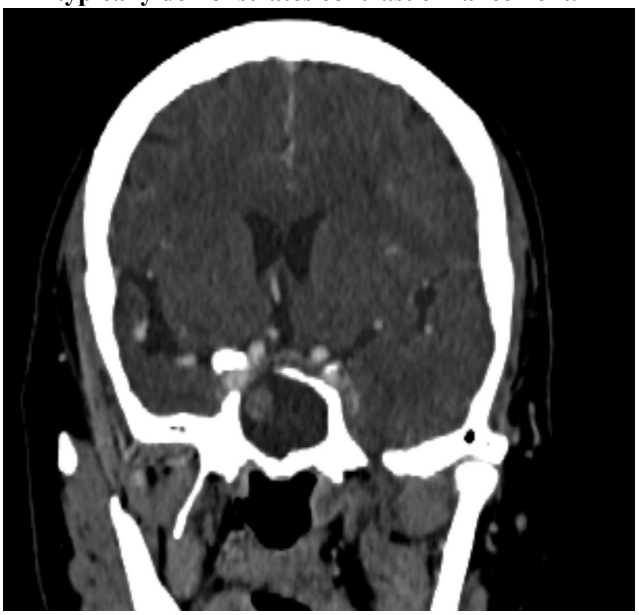
Bone window CT images (Figure 3)

Figure 3: Plain CT brain bone window image showing associated remodeling and possible erosion of the sellar floor (arrow), suggesting an aggressive process



confirmed associated remodeling and possible erosion of the sellar floor, raising concern for an invasive process.
Contrast-enhanced CT was performed for further characterization. Post-contrast sagittal and coronal images (Figures 4 and 5)

Figure 4: Post-contrast sagittal CT image revealing no obvious internal enhancement within the lesion, a finding atypical for pituitary macroadenoma which typically demonstrates contrast enhancement.



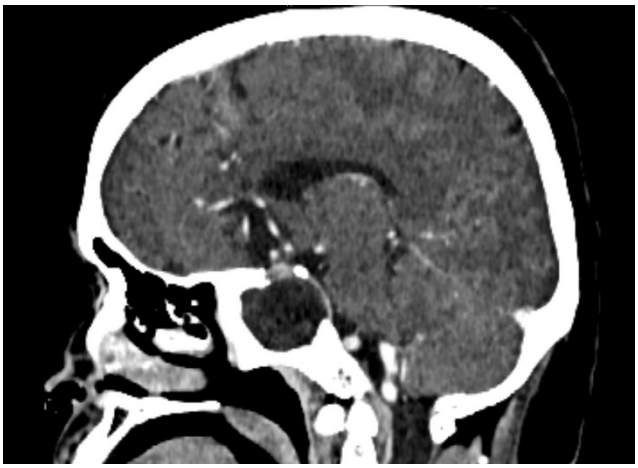
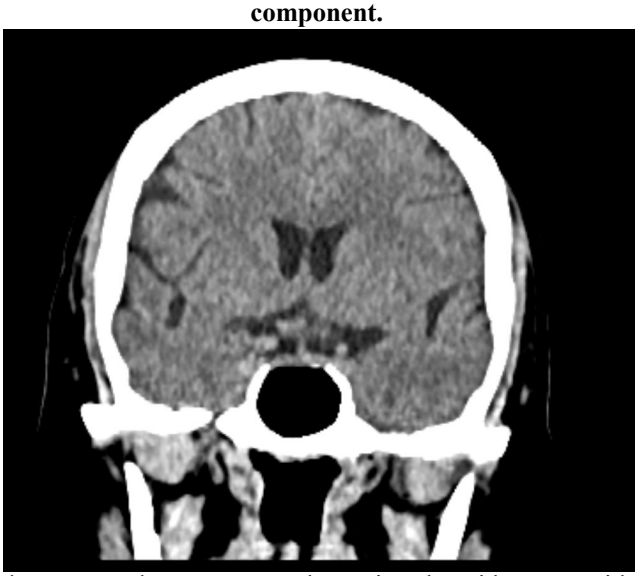


Figure 5: Post-contrast coronal CT image confirming the absence of internal enhancement within the lesion. The focal hyperdense area remains non-enhancing

revealed no obvious internal enhancement within the lesion, a finding atypical for pituitary macroadenoma which typically demonstrates contrast enhancement.
Based on the imaging findings, two primary differential diagnoses were considered: (1) invasive fungal sinusitis with sellar extension, and (2) pituitary macroadenoma with possible hemorrhagic or proteinaceous components. The absence of internal enhancement and the presence of elevated inflammatory markers favored an infectious process, though pituitary pathology could not be definitively excluded.
Surgical Management: The patient underwent endoscopic transnasal sphenoidectomy under general anesthesia. On widening the sphenoid ostium, the sphenoid sinus cavity was found to be completely filled with thick, inspissated, grayish-brown to black necrotic material with friable fungal debris. The material was densely adherent to the sinus walls. The sphenoid sinus mucosa appeared inflamed and edematous. Extensive bony erosion of the sellar floor was noted intraoperatively, with focal exposure of the sellar dura. Importantly, the dura was intact, and no cerebrospinal fluid leak was identified. The pituitary gland was visualized superiorly, appearing compressed and bulging upward but grossly intact, with no evidence of direct invasion. No extension into the cavernous sinus was noted.
Complete debridement of fungal debris and necrotic tissue was performed. Adequate hemostasis was achieved. Tissue samples and fungal debris were sent for histopathological examination.
Histopathology: Histopathological examination of the surgical specimens revealed broad, aseptate fungal hyphae with right-angle branching, characteristic of mucormycosis, invading through the mucosal tissue. Necrotic debris and inflammatory infiltrate consisting predominantly of neutrophils were present. There was no evidence of malignancy or pituitary adenoma.
Postoperative Course: The patient's postoperative recovery was uneventful. Her headache resolved completely within 48 hours, and visual symptoms including blurring and diplopia showed gradual improvement over the following week. The generalized tremors also subsided.

Postoperative plain CT brain (coronal section) performed at one week (Figure 6)

Figure 6: Postoperative plain CT brain coronal section showing status post endoscopic sphenoidectomy with aerated sphenoid sinus. The previously noted sellar lesion is no longer visualized. The pituitary gland appears intact with no residual mass or hyperdense component.



demonstrated status post endoscopic sphenoidectomy with aerated sphenoid sinus. The previously noted sellar lesion was no longer visualized. The pituitary gland appeared intact with no residual mass or hyperdense component.

The patient was started on systemic antifungal therapy with liposomal amphotericin B and was referred for further evaluation of potential underlying immunodeficiency. At four-week follow-up, she remained symptom-free with complete resolution of visual symptoms and no evidence of recurrence.

DISCUSSION

Invasive fungal sinusitis represents a diagnostic challenge, particularly when it involves the sphenoid sinus and presents with sellar mass effect mimicking a pituitary tumor [12]. This case illustrates the critical importance of maintaining a broad differential diagnosis when evaluating sellar region pathologies, especially in elderly patients presenting with systemic symptoms and elevated inflammatory markers.

The sphenoid sinus is an uncommon location for isolated fungal disease, representing only 2-3% of all paranasal sinus mycoses [7]. However, when involvement does occur, the anatomical proximity to critical structures creates potential for significant morbidity [8]. The clinical presentation in this patient—headache, visual disturbances, and diplopia is consistent with mass effect on the optic chiasm and cranial nerves, findings that are equally compatible with either a pituitary macroadenoma or an expanding infectious process [13].

The radiographic features in this case provided important diagnostic clues that, in retrospect, favored fungal infection over pituitary adenoma. The presence of a focal hyperdense area measuring approximately 56 HU within the non-enhancing lesion is characteristic of fungal concretions, which contain calcium phosphate and calcium sulfate deposits that produce high attenuation on CT [14]. This finding, combined with the absence of internal contrast enhancement, is atypical for pituitary macroadenoma, which typically demonstrates homogeneous or heterogeneous enhancement following contrast administration [10]. Pituitary adenomas may occasionally show hemorrhagic components or cystic degeneration, but the pattern observed in this case was more consistent with fungal disease [15].

The elevated inflammatory markers provided another critical piece of clinical information. Procalcitonin elevation, leukocytosis, and markedly raised CRP are characteristic of systemic infection and should raise suspicion for an infectious process, even when imaging suggests a neoplastic lesion [16]. Pituitary apoplexy, which can present with acute headache and visual symptoms, may also produce elevated inflammatory markers, though typically to a lesser degree [20]. The presence of fever further supported an infectious etiology.

Bony changes observed on CT imaging deserve special consideration. While pituitary macroadenomas may cause sellar expansion and remodeling over time, they rarely produce the degree of bony erosion observed in this case [13]. The finding of sellar floor erosion on bone window CT (Figure 3) suggested an aggressive process more consistent with invasive fungal disease than with a benign pituitary neoplasm [17].

Intraoperative findings confirmed the diagnosis, with the sphenoid sinus cavity completely filled with characteristic black necrotic material typical of mucormycosis [18]. The extensive bony erosion with exposed but intact dura demonstrated the invasive nature of the process while explaining the absence of cerebrospinal fluid leak. The grossly intact pituitary gland compressed superiority explained why endocrine function remained preserved despite the impressive mass effect.

Histopathological confirmation of broad, aseptate fungal hyphae with right-angle branching established the diagnosis of mucormycosis [19]. This aggressive fungal infection requires prompt surgical debridement combined with systemic antifungal therapy, as delayed treatment is associated with high mortality rates. The favourable outcome in this patient reflects timely surgical intervention and appropriate postoperative medical management.

Several previous case reports have documented fungal sinusitis mimicking pituitary tumors. These reports emphasize that fungal disease should remain in the differential diagnosis for sellar masses, particularly in immunocompromised hosts or when imaging reveals atypical features such as hyperdense foci, bony erosion, or absent enhancement [20]. The presence of systemic symptoms and elevated inflammatory markers should further raise suspicion for infection rather than neoplasm [21].

This case has important clinical implications. First, it reinforces that invasive fungal sinusitis can occur in elderly patients without known immunodeficiency, as was the case in our patient. Second, it highlights that sellar region masses

with atypical imaging features warrant consideration of fungal etiology. Third, it demonstrates that elevated inflammatory markers provide valuable diagnostic information that should be integrated with imaging findings. Fourth, it confirms the essential role of surgical intervention in both establishing the diagnosis and providing definitive treatment.

Limitations of this report include the lack of preoperative endocrine evaluation beyond basic testing, and the absence of long-term follow-up to assess for recurrence. Additionally, despite extensive investigation, no clear immunocompromising condition was identified in this patient, raising questions about potential unrecognized risk factors for fungal disease in the elderly.

CONCLUSION

Invasive fungal sinusitis involving the sphenoid sinus can clinically and radiographically mimic pituitary macroadenoma, presenting a diagnostic challenge. This case demonstrates that careful attention to imaging features—particularly the presence of hyperdense foci, absence of contrast enhancement, and bony erosion—combined with clinical evidence of systemic infection (elevated inflammatory markers, fever) can suggest the correct diagnosis preoperatively. Endoscopic surgical exploration with histopathological confirmation remains essential for definitive diagnosis and treatment. Timely surgical intervention combined with appropriate antifungal therapy can achieve excellent outcomes even in elderly patients with extensive disease. Clinicians evaluating sellar region masses should maintain a high index of suspicion for fungal disease, particularly when clinical and radiographic features deviate from the typical presentation of pituitary adenoma.

Clinical Message: Invasive fungal sinusitis should be considered in the differential diagnosis of sellar region masses, especially in elderly patients with elevated inflammatory markers and atypical imaging features including hyperdense foci, bony erosion, and lack of contrast enhancement. Prompt surgical intervention is both diagnostic and therapeutic...

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