

CASE REPORT

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# Sphenoid sinus aspergilloma clinically mimicking as malignancy—a case report



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## Abstract

**Background:** Fungal sphenoid sinusitis mimicking as malignant tumor and invading the pituitary fossa is an uncommon entity. This report aims to highlight radiological salient features to help differentiate fungal lesion from malignant tumor in sphenoidal sinus mass lesions.

**Case presentation:** We intend to report a case of middle-aged female who presented with gradual progressive diminution of vision since 3 years complicated with acute attack of unilateral headache and numbness. Computed tomography (CT) showed hyperdense lesion involving the sphenoid sinus extending into pituitary fossa and bilateral cavernous sinuses with smooth bony remodeling. Lesion appeared hypointense on T2-weighted and hyperintense on T1-weighted images on magnetic resonance imaging (MRI). Surgical excision of the lesion was done and pathological examination showed fungal hyphae and aspergillus fumigatus species on culture after 2 weeks of incubation. Post-operative CT revealed empty sinuses with surrounding bone remodeling.

**Conclusion:** Combination of T1 hyperintensity, T2 hypointensity, and hyperdense sinus is a strong predictor of fungal mass lesion involving sphenoid sinus.

**Keywords:** Fungal, CT, MRI, Sphenoid sinus, Pituitary, Aspergillus

## Background

Mycotic sinonasal disease can be caused by a variety of fungi of which most common are aspergillus infection [1]. Extension of fungal ball into the sella turcica is a life-threatening situation and may clinically and radiologically mimic as sinus neoplasm [2]. Very few cases of isolated sphenoid aspergilloma have been published [3]. The incidence of sphenoid sinus mucocele is less than 1% among all sinuses.

## Case presentation

A 45-year-old lady presented in the Department of Ophthalmology with bilateral gradual painless progressive diminution of vision (D.O.V) since 3 years in left eye and 1 year in right eye along with unilateral left sided headache and numbness of face for 15 days. Headache was diffuse in nature but more prominent in retro-orbital region on left side.

Systemic history was unremarkable with no past history of diabetes mellitus, hypertension, or any other systemic illness. No history of vomiting, fever, or decreased appetite was present. Best corrected visual acuity (BCVA) was 6/60 and perception of light with accurate projection of rays in all quadrants was seen in right and left eye respectively. Ocular movement examination showed bilateral lateral rectus palsy with normal range of movement for rest of extra ocular muscles (EOM). Bilateral grade 4 relative afferent pupillary defect (RAPD) was present. Dilated fundus evaluation showed advanced secondary optic atrophy in the left eye and disc pallor in the right eye. Rest of the fundus evaluation was within normal parameters.

There was decreased sensation over maxillary nerve (V2) distribution on left side of face.

The patient underwent a nasal clinical examination. Nasal endoscopy showed polyps in bilateral sphenoid-ethmoid recesses. A provisional clinical diagnosis of either sphenoid sinus polyposis with invasion into adjacent structures or pituitary fossa lesion involving bilateral cavernous sinuses

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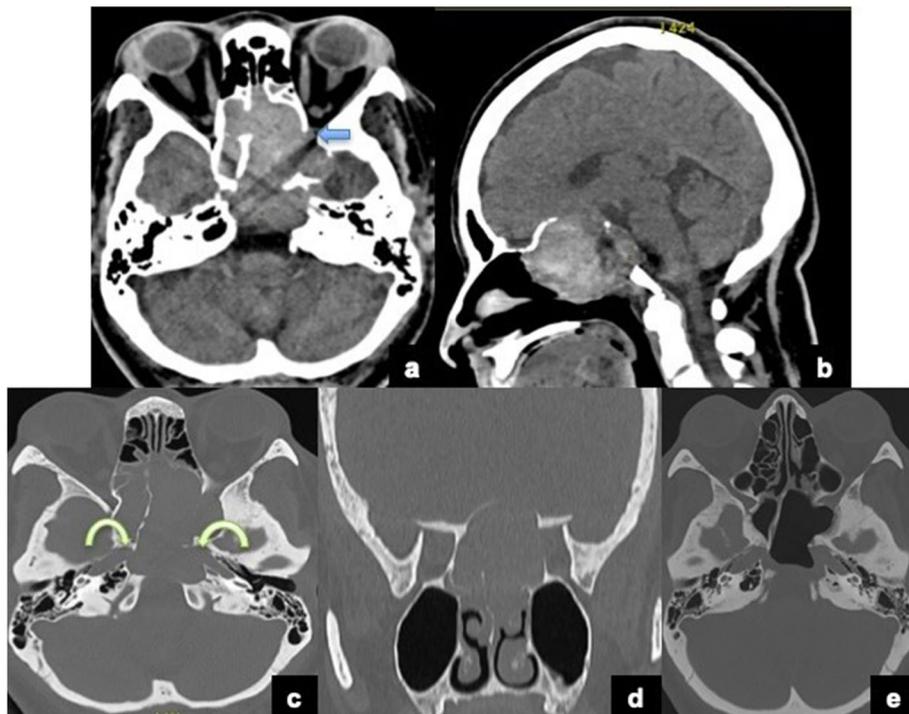
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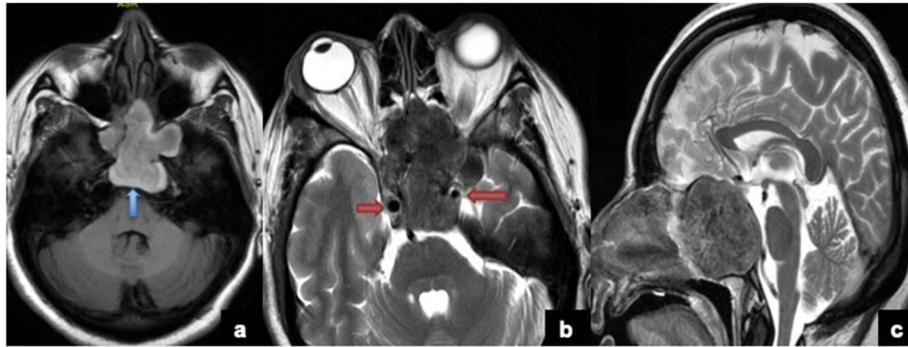
and orbital apex were made. Patient was referred for non-contrast computerized tomography (CT) head study. CT revealed hyper dense soft tissue lesion occupying whole of sphenoid sinus and its pneumatized portion of bilateral greater wing of sphenoid bone causing thinning of bony internal carotid artery canal and obliterating left sided foramen rotundum. Bilateral vidian canal were involved by the lesion. Gross bony remodeling and thinning of walls of sphenoid sinus with rarefaction at places of anterior and posterior clinoid processes, dorsum sella, posterior ethmoid sinus, and clivus were seen. Anterior part of left petroclival fissure was also involved by the lesion. Superiorly, the lesion caused bulging of floor of middle cranial fossa and posterior aspect of anterior cranial fossa (Fig. 1). Thinning of vomer bone was present superiorly. Lesion extended into pituitary fossa eroding the floor of sella and pituitary gland was not seen separately from the lesion (Fig. 1) To further confirm the nature of lesion, contrast enhanced magnetic resonance imaging (CE-MRI) of the brain was done. A large well-defined multilobulated lesion was seen in sphenoid sinus, hyperintense on T1-weighted images (T1WI), hypointense on T2-weighted images, heterogeneously hypointense on FLAIR images,

and showed no significant enhancement following administration of contrast media. No restriction was seen on diffusion weighted images ( $b$  value 1000) or blooming on susceptibility weighted images. The ADC value was around  $1.1 \times 10^{-3} \text{ mm}^2/\text{s}$ . Laterally, extension into bilateral cavernous sinus was seen with lesion abutting bilateral internal carotid arteries (encasing by  $180^\circ$ , left > right) (Figs. 2 and 3) The optic chiasma was superiorly displaced and compressed by the lesion. Bilateral foramen ovale and spinosum and right foramen rotundum were unaffected by the lesion. Bilateral petrous apex was also spared.

Brain parenchyma was normal with no abnormal enhancement noted. Based upon the above findings, possibility of fungal sinusitis with mucocele was considered. Patient underwent functional endoscopic sinus surgery (microdebrider assisted) under general anesthesia. Sphenoid ostium was widened, fungal muck was filling the sphenoid sinus on left side, was removed from the sinus and extradural spread of fungal muck along the floor of anterior, and middle cranial fossa was cleared. Culture of specimen revealed growth of aspergillus species after 2 weeks of incubation. Potassium hydroxide (KOH) wet showed few epithelial cells, plenty of pus cells, and moderate hyaline septate acute angle



**Fig. 1** a, b Computed tomography axial and sagittal images without contrast show hyper dense soft tissue in the expanded sphenoid sinus; its pneumatized portion of greater wing of sphenoid bones, clivus, and posterior ethmoid air cells. There is extension of soft tissue at the left orbital apex (blue arrow). Extension of lesion into sella is seen. Plain CT axial (c) and coronal bone window images (d) show completely thinned out and remodeled surrounding bony walls due to pressure necrosis. Complete rarefied medial wall of bilateral internal carotid artery canals also seen (yellow arrows). e Post-operative axial bone window CT image shows air filled sinus cavity with absence of soft tissue



**Fig. 2** a T1-weighted axial MRI image shows hyper intense lesion filling the sphenoid sinus extending into adjacent greater wing of sphenoid bone, posterior ethmoid air cells, and clivus (blue arrow). The lesion appears hypo intense/dark on axial T2-weighted image (b) and sagittal T2-weighted image (c) confirming the proteinaceous content within the sinus. There is extension of lesion into bilateral cavernous sinus with partial encasement of bilateral cavernous segment of internal carotid arteries (red arrows). Sella is not seen completely separate from the lesion (c).

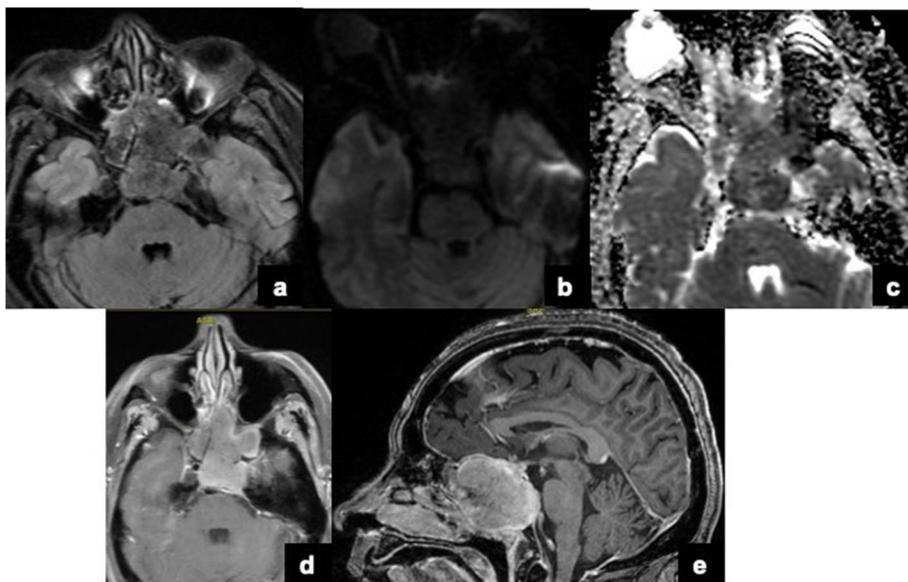
branching fungal hyphae. Post-operative CT done after 4 months showed air filled sinuses with no evidence of any soft tissue thickening or polypoidal component within. The patient was satisfied with the treatment received as it led to resolution of headache, resolution of bilateral lateral rectus palsy, and vision also improved in left eye.

### Discussion

Mycotic sinonasal disease can be caused by variety of fungi of which most common is aspergillus infection. Acute fulminant aspergillus sinusitis occurs in immunocompromised hosts which can spread through

vessels and nerves leading to vascular thrombosis or orbital nerve invasion leading to blindness. Chronic invasive aspergillus sinusitis can be seen in normal hosts in endemic areas. A mycetoma is a fungal hyphal colonization of a cavity or space which may occur due to change in microenvironment due to previous surgery or radiation. In allergic fungal sinusitis, there is history of allergy or asthma, elevated IgE, eosinophilia, and allergic sinusitis [1].

Fungal mucocele result in expanded sinuses with surrounding thin remodeled bones. The outer bony walls may also get eroded leading to compression over surrounding structures. They are most common in frontal



**Fig. 3** MRI images (a) Lesion appears dark on FLAIR image. Lesion appears dark on diffusion-weighted image (b) and apparent diffusion coefficient (c) confirming no restriction. Post-gadolinium fat sat axial (d) and sagittal (e) image shows no significant enhancement

and ethmoid sinuses and least common in sphenoid sinus [4]. The incidence of sphenoid sinus mucocele is less than 1% among all sinuses. Due to their expansile nature, sphenoid mucocele can result in headache, ophthalmic disorders, and sellar extension [4].

The radiological diagnosis in our case was made due to the CT density and signal intensity on MRI despite the lesion was mimicking as mass. Hydrated mucoceles appear hypodense while with increased protein concentration as time progresses result in increased attenuation on CT as in our case [4, 5]. The lesion was hyperintense on T1 and hypointense on T2-weighted images (WI). This signal depends upon the protein concentration within the inflamed sinuses. The normal sinonasal secretions contain 95% water and 5% solid content. Hence, at protein concentration up to 9%, the signal is hyperintense on T2 and hypointense on T1WI. Over time, protein concentration increases progressively in an obstructed sinus (5–25%) leading to progressive high signal on T1WI; however, water content is still sufficiently high to give high signal on T2WI. Above the protein concentration of 25%, T1- and T2-weighted signal intensities decrease as compared to muscle; however, T2 relaxation time is shortened more abruptly, resulting in low signal on T2WI and high signal on T1WI. At 28–34% protein concentration with nearly solid sinuses and least water content, signal is predominantly hypointense on both T1 and T2WI, mimicking like air [1, 6]. Hypointensity on T2-weighted imaging also indicates presence of iron, zinc, magnesium, and manganese required for fungal amino acid metabolism [2, 5].

In our case, there was extension of lesion into sella turcica with pituitary gland not visualized separately likely markedly compressed. Fungal mucoceles can be expansile and erode or compress adjacent structures [4]. Based on history of headache and bilateral visual disturbance with rapid progression, possibility of malignancy of pituitary region/sphenoid sinus with involvement of optic chiasma or bilateral orbital apex was considered. However, characteristic CT and MRI findings helped to reach the diagnosis of fungal mucocele. Since the sinus was expansile and had T1 hyper intensity, other differentials were also ruled out based on imaging findings which have been tabulated in Table 1 [7–9].

Surgical treatment is recommended if there is mass effect on surrounding structures or brain parenchyma which includes transsphenoidal approach to debride the sinus. But, in some cases, antifungal treatment can be effective without surgical treatment or combination of both [10]. In our case, there was decreased vision with involvement of cavernous sinuses, and urgent debridement was required to preserve vision.

**Table 1** Differentials based on T1 hyperintensity of sphenoid sinus [7–9]

Sphenoid sinus aspergilloma in our case	Expansile, T1 hyperintense, T2 hypointense, No restriction on DWI, no enhancement on post-contrast study, hyperdense on CT
Mucocele	Expansile, T1 hyper/hypointense and T2 hyperintense, no post-contrast enhancement.
Melanoma	T1 hyperintense, T2 hyperintense, show enhancement in post-contrast study, generally arise in nasal cavity.
Dermoid	T1 hyperintense, STIR hypointense, fat density on CT
Epidermoid cyst	Usually follow CSF signal but may be T1 hyperintense, show restriction on DWI.
Craniopharyngioma and Rathke's cleft cyst	Usually T1 hypointense and T2 hyperintense. Can be T1 hyperintense, however, the epicenter of the lesion is usually sellar/suprasellar while in our case, it is in sphenoid sinus.
Inverted papilloma	Usually arise in nasal cavity, involve sinuses secondarily, T2 hyperintense

## Conclusion

Isolated sphenoid mucocele are relatively uncommon. Presence of visual disturbance and headache can point towards the diagnosis. The major clinical differential is malignancy. However, characteristic imaging findings on CT and MRI with CT attenuation and signal changes on T1- and T2-weighted images are extremely helpful in diagnosing the fungal mucocele. Surgical debridement is the treatment of choice if there is compression over surrounding structures and to preserve vision.

## Abbreviations

CT: Computed tomography; MRI: Magnetic resonance imaging; WI: Weighted images; D.O.V: Diminution of vision; BCVA: Best corrected visual acuity; EOM: Extra ocular muscles; RAPD: Relative afferent pupillary defect; V2: Maxillary nerve; CE-MRI: Contrast enhanced magnetic resonance imaging

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## Authors' contributions

RG—preparation of the manuscript, AA—editing of the manuscript and literature search, SK—concept, design, and manuscript review, NS—manuscript editing and preparation of bibliography. All authors have read and approved the manuscript.

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## Availability of data and materials

Complete data of the patient can be retrieved from record keeping department of the institute.

## Ethics approval and consent to participate

Since this is a case report and radiological investigations were required for appropriate diagnosis, ethical approval has not been taken. Written informed consent was signed by the patient.

**Consent for publication**

The patient gave written informed consent to publish the data contained within this report.

**Competing interests**

The authors declare that they have no competing interests.

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