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# Sphenoid Sinus Fungal Ball, a Tertiary Hospital Experience

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**Abstract:** Objective: To present the different clinical manifestations and diagnostic strategies of isolated sphenoid sinus fungal ball (SSFB), in order to prevent delayed diagnosis and providing early management. Method: This study is a retrospective clinical study, conducted between January 2008 and November 2019. It was done in the ENT department of two institutes: King Fahad specialist Hospital and Qatif Central Hospital, Saudi Arabia. Only patients with sole involvement of fungal ball in the sphenoid sinus were included. Conclusions: The incidence of isolated sphenoid fungal ball is rare. However, it's clinically important because untreated SSFB can cause significant complications. The clinical features of SSFB are ambiguous and nonspecific which make its diagnosis more difficult. Post-nasal discharge and headache refractory to the medical management are the most common symptoms of isolated sphenoid sinus lesion. CT scan is still the cornerstone of radiological diagnosis of SSFB. Endoscopic sphenoidotomy and removal of fungal debris is the standard care of management. Post-operatively, the majority of patient had good results with no complication and recurrence.

**Keywords:** Sphenoid Sinus, Fungal Ball, Non-invasive Fungal Sinusitis, Endoscopy

## 1. Introduction

Histopathological, fungal rhinosinusitis can be divided into invasive and noninvasive infection. Noninvasive fungal rhinosinusitis is further subdivided into fungal ball and allergic fungal rhinosinusitis [1, 2]. Fungal ball (FB) is an accumulation of dense fungal hyphae, most commonly in the maxillary sinus [1]. Sphenoid sinusitis is usually present in concurrent with other sinuses. However, in rare cases isolated sphenoid has been reported, which represent only 2.7% of all sinus diseases [3, 4]. There are several important structures adjacent to sphenoid sinus which vulnerable to injury through any sphenoid sinus lesion, including the pituitary gland, optic nerve and chiasm, middle cranial fossa, internal carotid artery, cavernous sinus, the dura, pterygoid canal and nerve and cranial nerve III, IV, V1, V2, and VI [1, 2]. Even though isolated sphenoid sinus lesion is rare, it's very significant clinically due to its undetectable anatomical location, ambiguous symptoms and the complications associated with injury to the above structures [5]. The main focus of this study is to present the different clinical manifestations and diagnostic strategies of sphenoid sinus fungal ball (SSFB), in order to prevent delayed diagnosis and providing early management. It was conducted at King Fahad Specialist Hospital (KFSHD), and Qatif Central Hospital, Eastern region, Saudi Arabia.

## 2. Method

This is a 11 years retrospective study, from January 2008 to November 2019. It was conducted in the ENT department of two institutes: King Fahad specialist Hospital and Qatif Central Hospital, Saudi Arabia. The inclusion criteria for our patients were: (1) sole involvement of sphenoid sinus fungal

ball confirmed computed tomography (CT) and/or magnetic resonance imaging (MRI); (2) intraoperative evidence of fungal ball within the sphenoid sinus.

## 3. Result

We have diagnosed 8 patients with isolated sphenoid fungal ball. From these 4 males and 4 females and the age was ranging between 14-46 years. Postnasal discharge and headache are the most common symptoms. CT scan was the most valuable tool in the diagnosis. However, the diagnosis of all cases was confirmed intraoperatively or by fungal culture. All the patients were treated surgically with or without medical therapy. Aspergillum is the most common causative organism found in our patients. We have reported some pre-operative complications of the SSFB itself (e.g. cavernous sinus thrombosis) but we didn't report any major complication post operatively. Summarization of all cases found in (Table 1).

***Table 1.*** *Data review of the patients with isolated sphenoid fungal ball.*

| Patient No. | age | Sex | Presenting symptoms | Diagnosis | Culture result |
|---|---|---|---|---|---|
| 1 | 43 | Male | Post nasal discharge | Fungal ball | Aspergillum |
| 2 | 31 | Female | Post nasal discharge | Fungal ball | |
| 3 | 39 | Male | Headache + Post nasal discharge | Fungal ball | |
| 4 | 37 | Female | Cough + Post nasal discharge | Fungal ball | |
| 5 | 35 | Female | Headache + Post nasal discharge | Fungal ball | |
| 6 | 14 | Male | Asypmtomatic | Fungal ball | |
| 7 | 46 | female | Headach+post nasal discarge | Fungal ball | |
| 8 | 35 | male | headache | Fungal ball | |

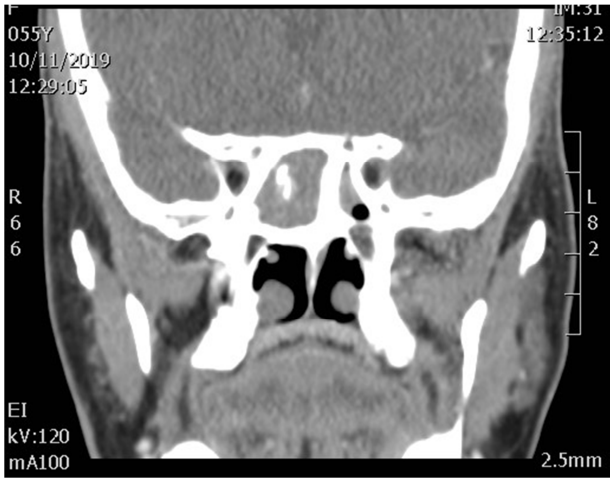


***Figure 1.*** *A computed tomography (CT) scan, coronal view of the paranasal sinuses, showing a hyperdense opacity filling the sphenoid sinus.*

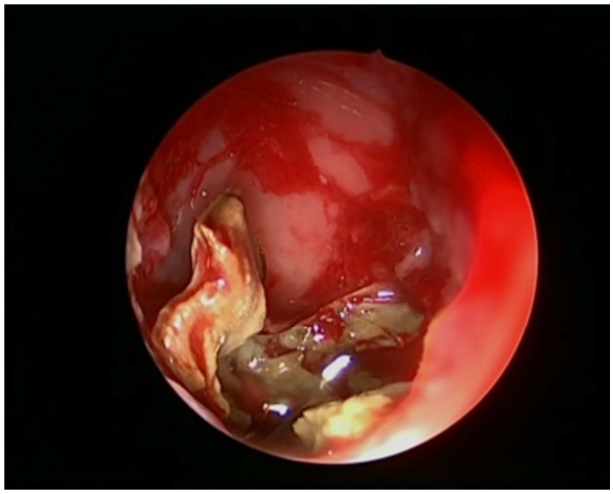

***Figure 2.*** *Endoscopic intraoperative view of The sphenoid sinus after sphenoidotomy showing Fungal material inside sinus cavity.*

## 4. Discussion

Fungal sinusitis is commonly classified into invasive and non-invasive categories [6-7]. Invasive fungal sinusitis is further sub-divided into acute fulminant invasive and chronic invasive categories, the latter including chronic granulomatous and chronic invasive fungal sinusitis. On the other hand, non-invasive fungal sinusitis is divided into allergic fungal sinusitis and fungal ball. The categorization of fungal sinusitis is based on distinctive histopathological features with supportive clinical, radiological and mycological criteria [8-9]. The sphenoid sinus is located within the sphenoid bone deep in the base of skull. Isolated sphenoid lesions are rare, and presented only in 1-2.7% of all sinus lesions [3, 4]. However, sphenoid sinus is surrounded by many vital structures which can be injured by any sphenoid sinus lesion. These includes the pituitary gland, optic nerve and chiasm, middle cranial fossa, internal carotid artery, cavernous sinus, the dura, pterygoid canal and nerve and cranial nerve III, IV, V1, V2, and VI [1, 2]. The exact mechanism of spread of fungal infection only to sphenoid sinus is unknown. It has been hypothesized that ostial closure creates an anaerobic environment favorable for growth of Aspergillus, or that chronic sinusitis predisposes to the development of FB [2]. The clinical presentation of isolated sphenoid sinus lesions are often nonspecific and vague; thus, diagnosis may be delayed in many cases [10]. Up to date, headache refractory to the medical management is the most common symptom of isolated sphenoid sinus lesion; it presents in 70 to 90% of patients [11-13]. In this series of 8 patients, the most presenting feature was post-nasal discharge followed by headache and rarely cough. History and physical examination have little benefit in establishing the correct diagnosis. Imaging studies (CT scanning and/or MRI) and Nasal endoscopy are essential for a thorough evaluation and

management [12, 14]. In this series, all patient did CT scan which provided valuable information regarding the diagnosis of fungal ball and its relation to bony erosion (figure 1). MRI should only provide for patient with suspicion of invasion to surrounding structures. MRI provides more precise information regarding its relationship to the cavernous sinus, dura, optic nerve, carotid artery and pituitary gland [15]. On Nasal endoscopy the most common findings are bone thickening or sclerosis of sinus walls (figure 2). This can be secondary to the inflammatory process associated with the fungal ball and is often reversible after removing it [2, 6]. Microbiology confirms fungal infection and eventually identifies fungal species. The microscopic appearance of Aspergillus on direct smear is that of a conidiophore [16]. On culture, the most frequently isolated fungus is Aspergillus fumigates. One of our fungal ball cases showed Aspergillus but the remaining 7 cases had -ve culture. The surgical management of sphenoid sinus include both endoscopic and open techniques. However, endoscopic surgery has become the fundamental approach for sphenoid sinus lesions. It can be proceeded in a trans-ethmoidal fashion or through the anterior sphenoid sinus wall directly at the site of the natural ostium [17]. It's necessary to open the sphenoid sinus and allowing complete removal of fungal debris by suction and multiple washing. Because all patients had noninvasive fungal ball no post-operative medical treatment was necessary. Post-operative follows up was done for all patient with no complication and recurrence.

## 5. Conclusion

Even though isolated sphenoid fungal ball is rare, it is clinically important because untreated SSFB can cause significant complications. The clinical features of SSFB are ambiguous and nonspecific which make its diagnosis more difficult. Post-nasal discharge and headache refractory to the medical management are the most common symptom of isolated sphenoid fungal ball. CT scan is still the cornerstone of radiological diagnosis of SSFB. Endoscopic sphenoidotomy and removal of fungal debris is the standard care of management. Post-operatively, the majority of patient had good results with no complication and recurrence.

## Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

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There is no financial support and sponsorship.

## Consent

Written informed consent was obtained from the parents for publication of this case report on behalf of the patient.

## Abbreviation

Sphenoid Sinus Fungal Ball (ISFB), Fungal Ball (FB).

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