



Case Report

Isolated Sphenoid Sinus Fungal Ball: A Case Report

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ABSTRACT

Abstract

Background: Fungal rhinosinusitis is an inflammatory condition of the paranasal sinus mucosa caused by fungal infection. It is classified into invasive and non-invasive forms. Non-invasive fungal rhinosinusitis includes fungal balls and allergic fungal rhinosinusitis. Fungal rhinosinusitis accounts for approximately 10% of cases of chronic rhinosinusitis. Although a fungal ball in the sphenoid sinus is uncommon, it can present a diagnostic challenge because its clinical manifestations may mimic those of other sinonasal conditions.

Objective: To understanding the diagnosis and management of fungal balls in sphenoid.

Case Report: A 32-year-old woman presented with nasal congestion that had persisted for 2. She also reported an unpleasant odor from the nose for 2 months and recurrent headaches for 1 month. Nasal endoscopic examination revealed necrotic tissue involving approximately one-third of the inferior turbinate in both the right and left nasal cavities. Computed tomography of the paranasal sinuses demonstrated a hyperdense lesion within the left sphenoid sinus. The patient was diagnosed with post-ablation of the inferior turbinate nasal cavity and sphenoid rhinosinusitis. Endoscopic sinus surgery was performed. Histopathological examination revealed chronic rhinosinusitis with acute exacerbation associated with fungal infection consistent with *Aspergillus* spp. At the 9-week postoperative follow-up, there was no evidence of recurrence.

Conclusion: Fungal balls of the sphenoid sinus may present with nonspecific symptoms, including nasal congestion, anosmia. Endoscopic surgery is the primary treatment for sphenoid sinus fungal balls.

Keyword: fungal balls, sphenoid, functional endoscopic sinus surgery

Abstrak

Pendahuluan: Rinosinusitis jamur adalah merupakan suatu peradangan pada mukosa sinus paranasal akibat infeksi jamur. Rinosinusitis jamur diklasifikasikan menjadi bentuk invasif dan non-invasif. Bentuk non-invasif meliputi bola jamur dan rinosinusitis alergi. Rinosinusitis jamur menyumbang sekitar 10% kasus rinosinusitis kronis. Bola jamur di sinus sfenoid, meskipun jarang terjadi, merupakan tantangan diagnostik karena gejalanya sering kali menyerupai kondisi lain.

Tujuan: Memahami diagnosis dan atatalaksana bola jamur di sphenoid

Laporan Kasus: Seorang wanita 32 tahun datang dengan keluhan hidung tersumbat sejak 2 bulan. Ia juga melaporkan adanya bau tidak sedap dari hidung selama 2 bulan dan sakit kepala berulang selama 1 bulan. Pemeriksaan endoskopi hidung menunjukkan adanya jaringan nekrotik pada sepertiga konka inferior di kedua rongga hidung. Pemeriksaan *Computed tomography* sinus paranasal memperlihatkan lesi hiperdens di dalam sinus sfenoid kiri. Pasien didiagnosis pasca-ablasi konka inferior dan rinosinusitis sfenoid. Tindakan bedah sinus endoskopik kemudian dilakukan. Pemeriksaan histopatologi menunjukkan rinosinusitis kronis dengan eksaserbasi akut yang berkaitan dengan infeksi jamur *Aspergillus* spp. Pada pemeriksaan tindak lanjut 9 minggu pascaoperasi, tidak ditemukan tanda-tanda kekambuhan.

Simpulan: Bola jamur sinus sfenoid dapat menunjukkan gejala yang tidak spesifik, termasuk hidung tersumbat, anosmia. Bedah endoskopi merupakan penanganan utama untuk bola jamur sinus sfenoid.

Kata kunci: bola jamur, sphenoid, bedah sinus endoskopi fungsional

What is already known about this topic?

Sphenoid sinus fungal ball is an uncommon form of non-invasive fungal rhinosinusitis. Its clinical presentation is often nonspecific.

What does this study add?

This study provides an clinical description of sphenoid sinus fungal ball and surgical management.

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Introduction

Chronic rhinosinusitis (CRS) is an inflammatory disorder of the mucosa of the nose and paranasal sinuses associated with various predisposing factors, including genetic factors, anatomical abnormalities, allergies, and bacterial and fungal infections.¹ Fungal rhinosinusitis (FRS) is an inflammatory condition of the paranasal sinus mucosa caused by fungal infection. FRS can be classified as non-invasive when the fungus is confined to the sinus lumen and as invasive when the fungus penetrates the epithelium, mucosa, or underlying connective tissue. Non-invasive FRS comprises two major forms: fungal ball (FB) and allergic fungal rhinosinusitis (AFRS).^{2,3}

FB is a chronic, non-invasive accumulation and dense conglomeration of fungal hyphae within the paranasal sinuses. Fungal balls typically occur unilaterally, with the maxillary sinus being the most commonly affected site.⁴ The European Position Paper on Rhinosinusitis and Nasal Polyps (EPOS 2020) classifies CRS into primary and secondary forms, with each further subdivided into localized and diffuse disease based on anatomical distribution. In primary CRS, the disease is further classified according to the predominant endotype as either type 2 or non-type 2 (Figure 1).⁵

Case Report

A 32-year-old woman presented to the Ear, Nose, and Throat (ENT) outpatient clinic at Dr. M. Djamil Hospital with a 2-month history of nasal

congestion. She also reported nasal pain and an unpleasant nasal odor for the past 2 months, as well as recurrent headaches for 1 month. She denied nasal discharge, forehead or cheek pain, postnasal drip, and a sensation of facial fullness.

The patient had a history of conchotomy 3 months earlier for nasal obstruction. She also reported frequent use of antibiotics for episodes of acute rhinitis. In addition, she experienced sneezing more than five times when exposed to dust or cold temperatures. There was no history of epistaxis, toothache, neck mass, or facial trauma.

Physical examination reveals the general condition was moderate ill, compost mentis, vital signs within normal limits. Examination of the right ear, ear canal was wide, tympanic membrane was intact, there was cone of light. Examination of the left ear, ear canal was wide, tympanic membrane was intact, there was cone of light. Examination of right nose, nasal cavity was wide, there was necrotic tissue involving approximately one-third of the inferior turbinate, middle turbinate was eutrophic, there was no septal deviation, meanwhile in the left nose, nasal cavity was wide, there was necrotic tissue involving approximately one-third of the inferior turbinate, middle turbinate was eutrophic, there was no septum deviation. Throat examination was within normal limit. On regional examination of the right and left maxilla there was no pain on pressure. Oral cavity examinations were good, no pushing of the palate.

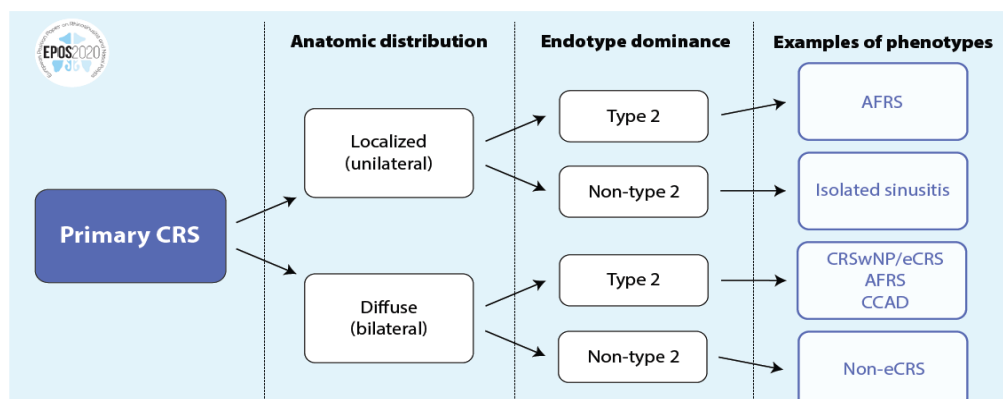


Figure 1. Classification of primary CRS⁵

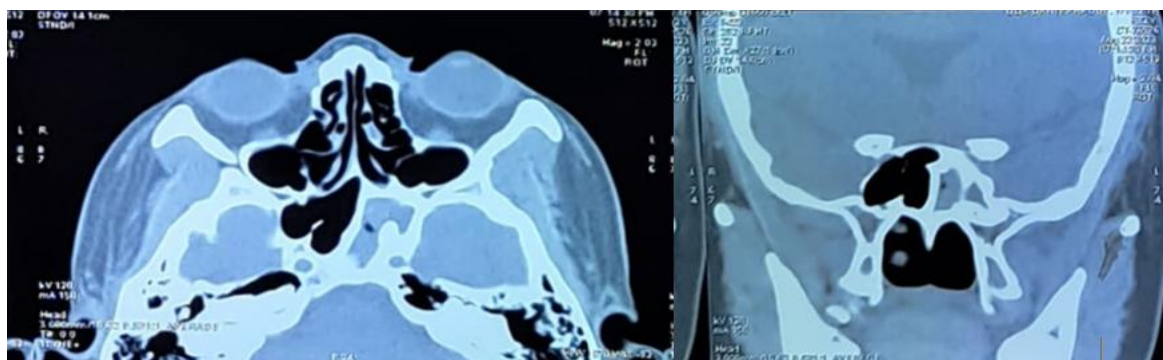


Figure 2. Coronal and axial slice of CT-Scan paranasal sinuses

Laboratory investigations revealed a hemoglobin level of 12.2 g/dL, a leukocyte count of $7,550/\text{mm}^3$, a platelet count of $307,000/\text{mm}^3$, and a hematocrit level of 37%. The prothrombin time (PT) was 10.3 seconds, and the activated partial thromboplastin time (aPTT) was 29.1 seconds. The differential leukocyte count showed basophils 0%, eosinophils 7%, neutrophils 50%, lymphocytes 35%, and monocytes 7%, indicating mild eosinophilia.

A skin prick test (SPT) was positive for house dust. Computed tomography (CT) of the paranasal sinuses demonstrated a hyperdense lesion within the left sphenoid sinus, along with rightward deviation of the nasal septum. These findings were consistent with left sphenoid sinusitis (Figure 2).

The patient was diagnosed with post-ablation of the inferior turbinates and left sphenoid rhinosinusitis. Endoscopic sphenoidotomy was planned to treat the sphenoid sinus lesion. The patient was evaluated by the anesthesiology department and was deemed fit for surgery, with no contraindications to the planned procedure.

The patient underwent endoscopic sphenoid surgery under general anesthesia. The patient was placed in the supine position on the operating table, and the head was secured in a head holder. The eyes were protected, and standard aseptic and antiseptic procedures were performed. Nasal gauze soaked in a solution of lidocaine and epinephrine at a ratio of 4:1 was inserted into both nasal cavities and left in place for 10 minutes.

The nasal gauze was subsequently removed, and the nasal cavities were evaluated endoscopically. The right nasal cavity was wide, with necrotic tissue involving the inferior turbinate and exposure of the underlying turbinate bone. The middle turbinate was eutrophic, the middle meatus was patent, and septal deviation was present. In the left nasal cavity, the cavity was wide, with

necrotic tissue involving the inferior turbinate. The middle turbinate was eutrophic, the middle meatus was patent, and no septal deviation was observed.

A conchotomy was performed. Bilateral inferior turbinate conchotomy was subsequently performed, and the exposed turbinate bone was removed. The left sphenoid sinus ostium was identified, followed by endoscopic sphenoidotomy. Yellowish, clay-like debris was encountered within the sphenoid sinus. The debris was completely removed, and tissue samples were obtained for histopathological examination. Hemostasis was achieved, and the surgical field was carefully inspected. Bilateral anterior nasal packing was then placed. The procedure was completed without complications.

Postoperatively, the patient received intravenous Ringer's lactate infusion 500cc every 8 hours. Ceftriaxone 1g twice daily, ketorolac 30mg three times daily, dexamethasone 5mg twice daily, and ranitidine 50mg twice daily were administered intravenously. The anterior nasal packing was removed after 3 days. Examination of both nasal cavities revealed patent nasal passages without active bleeding, blood clots, or nasal discharge. The patient was subsequently prescribed oral cefixime 200mg twice daily and paracetamol 500mg three times daily. The patient was advised to return to the outpatient clinic for follow-up 7 days later.

The patient returned to the ENT outpatient clinic for a follow-up visit 7 days after surgery. The patient reported nasal pain, nasal discharge, and headache. Nasal endoscopy revealed a patent right nasal cavity. The inferior turbinate showed post-ablation changes, while the middle turbinate was eutrophic. Mucoïd discharge and crusting were observed. Similar findings were noted in the left nasal cavity, with post-ablation changes of the inferior turbinate, a eutrophic middle turbinate, and the presence of mucoïd discharge and crusting.

The patient was prescribed nasal irrigation with 0.9% sodium chloride solution, methylprednisolone with a tapering regimen, mefenamic acid 500mg three times daily, and fluticasone furoate 27.5µg nasal spray.

Histopathological examination revealed tissue fragments partially lined by respiratory epithelium. The underlying connective tissue stroma contained dense inflammatory cell infiltrates consisting predominantly of lymphocytes, plasma cells, and polymorphonuclear (PMN) leukocytes, along with hyperemic capillaries and areas of hemorrhage. Numerous fungal hyphae were identified within the tissue, characterized by hyaline, septate hyphae, consistent with *Aspergillus* spp. The histopathological findings were consistent with chronic rhinosinusitis with acute exacerbation associated with fungal infection (aspergillosis).

At the 9-week postoperative follow-up, the patient reported no nasal pain, nasal discharge, or headache. Nasal endoscopy revealed patent nasal cavities bilaterally. The inferior turbinates showed post-ablation changes, while the middle turbinates were eutrophic. No nasal discharge or crusting was observed in either nasal cavity. The patient was advised to continue nasal irrigation.

Discussion

A 32-year-old patient was diagnosed with post-ablation of the inferior turbinates and sphenoid rhinosinusitis. CRS is a heterogeneous inflammatory disease with various phenotypes, including FRS, infectious rhinosinusitis, aspirin-exacerbated respiratory disease-associated rhinosinusitis, pediatric rhinosinusitis, and rhinosinusitis associated with systemic diseases. FRS is broadly classified into invasive and non-invasive forms. Non-invasive FRS comprises fungal ball and allergic fungal rhinosinusitis, whereas invasive FRS includes acute invasive, chronic invasive, and granulomatous forms.⁶

The patient was a 32-year-old woman with no history of immunodeficiency. This finding is consistent with a previous study reporting a mean age of 32.8 ± 14 years among patients with FRS.⁶ In addition, FB have been reported to occur more frequently in women than in men, with a female-to-male ratio of approximately 2:1.⁷ The higher prevalence of FB among women may be partly attributable to the longer life expectancy of women in the general population. However, previous

studies have also suggested that environmental and hormonal factors may contribute to the pathogenesis of fungal balls.⁸

The etiology in this case remains unclear; however, inappropriate or frequent antibiotic use may have contributed to the development of rhinosinusitis in this patient. The incidence of FRS has increased over the past few decades, which has been attributed to the widespread use of antibiotics, corticosteroids, and immunosuppressive agents.⁹ In contrast to invasive fungal rhinosinusitis, fungal balls typically occur in immunocompetent individuals and have been reported to be more common among middle-aged women. The pathogenesis of fungal ball formation, however, remains incompletely understood.¹⁰

The patient presented with a 2-month history of nasal congestion, nasal pain, and an unpleasant nasal odor, as well as a 1-month history of intermittent headache. She denied nasal discharge, forehead or facial pain, and postnasal drip. Patients with fungal balls typically present with non-specific and variable rhinological symptoms that may develop gradually and remain asymptomatic for an extended period.⁴ Previous studies have reported nasal congestion, anosmia, and mucin production as common symptoms. Other symptoms that may develop gradually include rhinorrhea and postnasal drip.¹¹ Headache, postnasal discharge, and cough have also been commonly reported in patients with sphenoid sinus fungal balls.¹²

CT of the paranasal sinuses in this patient demonstrated a hyperdense lesion within the left sphenoid sinus, along with rightward deviation of the nasal septum. These findings were consistent with left sphenoid sinusitis. CT is the imaging modality of choice for the evaluation of fungal balls. Typical CT findings include complete or partial opacification of the affected sinus, intralesional calcifications, bony sclerosis, and erosion of the sinus walls.¹⁰ In addition, CT may demonstrate mucosal thickening of the sphenoid sinus with areas of increased intraluminal density.¹³ Magnetic resonance imaging (MRI) may demonstrate an intrasphenoidal polypoid lesion.¹⁴

Histopathological examination in this patient identified fungal hyphae consistent with *Aspergillus* spp. Fungal balls are characterized by dense, extramucosal accumulations of degenerating fungal hyphae, typically occurring

within chronically inflamed paranasal sinuses. *Aspergillus* spp. are the most commonly reported fungal organisms associated with fungal ball formation, although other fungal pathogens, such as *Candida* spp. and *Aureobasidium* spp., have also been reported in some cases.⁸

This case was consistent with a fungal ball based on the radiological, intraoperative, and histopathological findings. The diagnosis of a fungal ball is based primarily on characteristic radiological and histopathological features. According to the diagnostic criteria proposed by DeShazo et al., the key features include sinus opacification with or without calcifications, the presence of mucopurulent, cheesy, or clay-like material within the sinus, a dense conglomeration of fungal hyphae separate from but adjacent to the respiratory mucosa, and a variable chronic inflammatory response in the adjacent mucosa. Importantly, there should be no histological evidence of fungal invasion into the mucosa, blood vessels, or underlying bone.⁴ Further suspicion toward a diagnosis of fungal ball can be made intraoperatively. The classical signs on nasoendoscopy are: 'cheesy' and 'clay-like' inspissated mucous. This is highly sensitive (100%) and specific (99%).¹⁰ In this patient, intraoperative examination of the left sphenoid sinus revealed yellowish, clay-like debris, which was subsequently removed and submitted for histopathological examination. The results of histopathological examination was numerous fungal hyphae were identified within the tissue, characterized by hyaline, septate hyphae, consistent with *Aspergillus* spp. Fungal balls are characterized by the presence of fungal hyphae within the sinus cavity without invasion of the surrounding mucosa, blood vessels, or bone, and represent one of the most common forms of non-invasive fungal rhinosinusitis.¹⁵

In this patient, endoscopic sphenoidotomy was performed, and the fungal debris was completely removed. Functional endoscopic sinus surgery (FESS) is the treatment of choice for fungal balls, with the surgical approach directed toward the affected sinus.⁸ FESS provides definitive treatment with high success rates and low morbidity.⁴ The primary objectives of surgery are complete removal of the fungal debris, thorough debridement and irrigation of the affected sinus, and restoration of adequate sinus ventilation and drainage.¹⁶ In selected cases, fungal debris can be

removed using suction and irrigation following sinusotomy, with careful debridement and lavage of the affected sinus.

At the follow-up evaluation, the patient reported no symptoms, and nasal endoscopy revealed no abnormal findings. The patient was advised to continue regular nasal irrigation as part of postoperative care. Recurrent or persistent disease is most commonly detected during postoperative follow-up, particularly within the first 2–4 years after surgery, and may present with symptoms such as postnasal discharge.⁴

Conclusion

Fungal ball is a chronic, non-invasive accumulation and dense conglomeration of fungal hyphae within the paranasal sinuses. Patients with fungal balls typically present with non-specific and variable rhinological symptoms, including nasal congestion, anosmia, and mucin production. Diagnosis is based on characteristic radiological and histopathological findings. Functional endoscopic sinus surgery is the definitive treatment for fungal balls and is associated with high success rates and low morbidity.

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