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(CASE REPORT)

# Nasal septal perforation in fungal rhinosinusitis: A case report

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## Abstract

**Background:** Fungi are ubiquitous in our environment, they can be found in healthy or diseased mucus. Symptoms of fungal rhinosinusitis are different depending on their immunological status. Diagnostic based on history, physical examination, CT scan and histopathological findings.

**Objective:** To report a case of fungal rhinosinusitis with complications.

**Case Report:** A man, 56-year-old with a chief complaint of bad odor in the nose in the last 3 months. CT scan showed bone erosion in the maxillary sinus. Intraoperative found fungus ball in nose cavities and perforated nasal septal.

**Clinical question:** What is the management of nasal septal perforation in fungal rhinosinusitis?

**Methods:** Evidence-based literature study of nasal septal perforation in fungal rhinosinusitis.

**Result:** Treatment for fungal rhinosinusitis is surgery. Antifungal and steroid therapy can be added to reduce recurrence.

**Conclusion:** Debridement surgery is needed for fungal rhinosinusitis. A radiologic test is important to find extra sinuses expansion and bone erosion. Nasal septal perforation is treated by eliminating the cause, applying ointment, saline solution spray, and surgical.

**Keywords:** Nasal septal perforation; Fungal; Rhinosinusitis; Histopathological

## 1. Introduction

Fungi are ubiquitous in our environment and with dedicated assessments, they can be found in nasal mucus from almost all healthy and diseased sinuses. However, there are several forms of sinus disease that are associated with fungi as pathogens. In these situations, rather than the fungi determining the disease process, it is usually the host immune state that determines the clinical presentation.[1] Invasive fungal rhinosinusitis (IFRS) is almost always associated with immunocompromise, of which diabetes (50%) and hematologic malignancy (40%) account for 90% of the immunosuppression reported. In immunocompetent patients, fungal infections can become fungus balls and allergic fungal rhinosinusitis (hypersensitivity immune). The most encountered fungal species in medical practice are Candida species and Aspergillus species.[2] These fungi, however, only develop pathological potential if the environment is suitable. In normal conditions, fungi that are inhaled form part of the normal sinonasal flora. These fungi are then destroyed by normal functioning immunological cascades. However, following the prolonged use of antibiotics, poor ventilation, dark and moist environments as well as immunocompromise, these immunological pathways are disrupted,

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making fungal infections more likely.[2] There are two broad categories of fungal rhinosinusitis, invasive or non-invasive, dependent on the potential of the fungal hyphae to invade the tissues through the epithelium (invasive) in comparison to the infection being confined to the superficial epithelium (non-invasive). Diagnosis of fungal rhinosinusitis is based on histopathological evidence. The radiologic finding will be helpful to show an extra sinus extension and bone erosion.2 We were interested to report a case of a 56-year-old man with fungal rhinosinusitis with complications of nasal septal perforation. However, following the prolonged use of antibiotics, poor ventilation, dark and moist environments as well as immunocompromise, these immunological pathways are disrupted, making fungal infections more likely.2 There are two broad categories of fungal rhinosinusitis, invasive or non-invasive, dependent on the potential of the fungal hyphae to invade the tissues through the epithelium (invasive) in comparison to the infection being confined to the superficial epithelium (non-invasive). Diagnosis of fungal rhinosinusitis is based on histopathological evidence. Radiologic finding will be helpful to showing an extra sinus extension and bone erosion.[2] We were interested to report a case of a 56-year-old man with fungal rhinosinusitis with complication of nasal septal perforation.

## 2. Case report

A man, 56-year-old, came to outpatient clinic with chief complaint of smell bad in the nose for 3 months. The smell just like a rotten egg. Start from 2 weeks ago, the smell was getting worse until disturb his activity. Patient also complained sneezing and runny nose in the morning and got better during the day. History of any systemic disease was denied. The is no history of teeth cavities. the nose for 3 months.

From general appearance was good. Vital signs were in normal limit. On the anterior rhinoscopy, both nasal cavities were narrow filled by inferior turbinate hypertrophy with mucosal surface. Nasoendoscopy was performed and showed bilateral inferior turbinate hypertrophy, polyp in right nose as high as middle turbinate and right middle turbinate had pneumatized with mucoid discharge. CT scan has been done with results, there is mucosal thickening in right maxillary sinus, right ethmoidal sinus and right nose with erosion of medial wall right maxillary sinus (Figure 1). Based on history taking, physical examination, and investigation, the patient was diagnosed with right maxillary sinusitis, right ethmoidal sinusitis, nasal polyp and inferior turbinate hypertrophy. Patient was treated with Caldwell Luc operation in right maxillary sinus, ethmoidectomy, polypectomy, and radiofrequency reduction of the inferior turbinate (Figure 2). In intraoperative, there were fungus ball in both noses that founded as high as right medial turbinate which perforated nasal septal to the left nose, in the size of 1 cm.

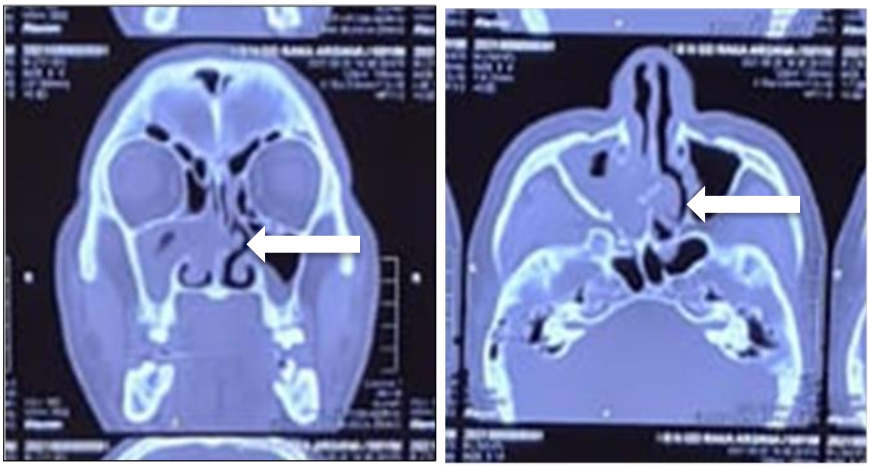

**Figure 1** CT scan revealed mucosal thickening in right maxillary sinus, right ethmoidal sinus and right nose with erosion of medial wall right maxillary sinus (arrow).

Mucosal tissue from right maxillary sinus was send to pathology anatomy laboratories with results chronic suppurative inflammation with a focus of fungal colonies tending to Aspergillus. Nothing founded in culture of secret in nose and sinuses. After surgery, patient was given cefixime 2 x 200 mg, fluconazole 1 x 150 mg, pseudoephedrine 2 x 60 mg, and nasal irrigation with normal saline. 1 week after surgery, there is no more bad odor in nose. 2 months after surgery, in endoscopic evaluation, there is no growth of fungal and secret. The perforation remaining smaller than when the surgery been done. Patient also didn't have any complaint.

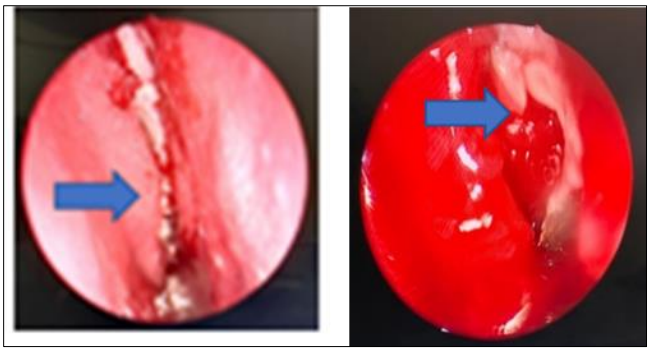

**Figure 2** Fungus ball and nasal septal perforation intraoperative (arrow)

### 2.1. Clinical question

What is the management of nasal septal perforation in fungal rhinosinusitis?

## 3. Review method

Literature search was performed with keywords "fungal rhinosinusitis" AND "nasal septal perforation" AND "anti-fungal" through 4 search engines: PubMed, Clinical Key, Cochrane, and Google Scholar. The selection of literatures was based on inclusion criteria, which were: 1) nasal septal perforation in fungal rhinosinusitis. 2) anti-fungal treatment in fungal rhinosinusitis. 3) nasal septal perforation treatment. The exclusion criterion was inconsistent with study design. The critical review was conducted on 25 literatures, before applying inclusion and exclusion criteria.

## 4. Result

The literature search obtained scientific publications which were released in the last 10 years, relevant with the topics and the complete academic scripts were available.

Luo et al (2022), A 57-year-old female with poorly controlled diabetes present orbital swelling and decreased visual acuity for 10 days. From physical examination and imaging, they found that there showed unilateral space occupying lesions with bone destruction in the paranasal sinus and orbit. The patient underwent endoscopic surgery and intraoperative biopsies showed that there is fungal infection and after debridement, they gave voriconazole and the patient recovered with no recurrence during follow-up.[3]

Other case, Widhiono and Sutikno (2021) found a 63-year-old man presented right nasal congestion which is persistent and worsened over three months. In laboratory examination showed increase of total immunoglobulin E (IgE). The patient underwent functional endoscopic sinus surgery (FESS). Patient was diagnosed with allergic fungal rhinosinusitis (AFRS) and negative in fungal culture. Patient was given prednisone tablet for 2 weeks before FESS.[4]

## 5. Discussion

Fungal rhinosinusitis is a fungal infection in the nose and paranasal sinuses. Fungal rhinosinusitis will show different symptom in patient based on their immunity status. That range merely from irritating the sinuses (allergic fungal sinusitis) to rapidly fatal disease (invasive fungal rhinosinusitis).[5]

Nasal septal perforation (NSP) refers to an abnormal communication between nasal cavities via defect in the nasal septum. Most cases of NSP are asymptomatic. Clinical symptoms include bleeding, crusting, sensation of nasal obstruction and whistling noise during inhalation. Etiology of NSP varies such as inhalational, inflammatory, autoimmune, traumatic, infection and iatrogenic causes.[6]

Deutsch et al (2019) mention that the most encountered fungal species which founded in human are Candida species and Aspergillus species. Presentation of fungal infection usually non-specific and indeed it can be asymptomatic. Some symptoms include facial pain, postnasal drip and cacosmia. In physical examination, there is mucosal change such as pale or edematous mucosa.[2] Aspergillus and Mucor were the most fungal species that cause fungal rhinosinusitis that founded by Dr. Nilam U Sathe et al.[7]

In this case, CT scan has been done. We found mucosal thickening in right maxillary sinus, right ethmoidal sinus and right nose with erosion of medial wall right maxillary sinus. Although the diagnosis of fungal rhinosinusitis is based on histopathological evidence, imaging is important in patient in whom complicated sinusitis is suspected. Radiologic finding will be helpful in advanced cases that showing extra sinus extension and bone erosion. CT scan will show a hypo attenuating mucosal thickening or an area off soft-tissue attenuation. It also showed retroantral fat pad inflammation, bone erosion, and orbital or intracranial invasion.[5] CT scan often show unilateral or asymmetrical involvement of the sinuses. The CT scan showed multiple opacities of the sinuses with central hyperattenuating. Allergic mucin causes a heterogeneous intensity characteristic of AFRS, although it is not specific for AFRS. This heterogeneity was initially thought to be related to the accumulation of hemosiderin in mucins, but a recent theory suggested that the heterogeneity is caused by deposition of heavy metals such as iron and manganese.[4]

Patient in this case was treated with Caldwell Luc surgery in right maxillary sinus, ethmoidectomy, polypectomy, and radiofrequency reduction of the inferior turbinate. After the surgery, patient was given systemic anti-fungal. In EPOS 2020, the main treatment for fungal rhinosinusitis is surgery. The goal of the surgery requires surgical debridement to remove of all fungal and eosinophilic mucin from the site of infected area. Voriconazole or newer Azoles can be used for anti-fungal therapy that can be used by systemic or topical. Corticosteroid systemic also recommended for fungal rhinosinusitis especially for AFRS because its decreased symptom score and recurrency after surgery.[1] In Widhiono and Sutikno case, patient was given prednisone 20 mg daily for one week and followed by 10 mg daily on the following week before FESS.[4] Alotaibi et al (2021) reported a forty-year-old female with persistent AFRS. She had undergone four times FESS. The post-operative period was uneventful until seven months post-operation when she presented to the clinic with a decreased sense of smell, rhinorrhea, and frontal headache – all of which manifested after an upper respiratory tract infection. She was treated with Dupilumab, drug that inhibits the effect of IL-13 and IL-4 through blocking IL-4Rα. Before the treatment, the SNOT-22 score was 21 and the smell diskettes test score was 4/8. After the treatment, the smell diskettes test score was 7/8.[8]

In this case, perforation occurred in nasal septal and involved middle turbinate. In research that published by Dr. Nilam U Sathe et al, mentioned that in the case of fungal infection, nasal septal is the most common site of the infection followed by middle turbinate and middle meatus.[7] Patient in this case didn't do the surgery treatment to close the nasal septal perforation. He also didn't complaint of nose block sensation or whistling noise during inhalation. Lee et al mentioned that pathophysiology of a septal perforation in a patient with fungal sinusitis might involve the presence of a large aspergilloma in the nasal cavity that compresses the septal mucosa and causes an obstruction of the blood supply to the septal mucosal epithelium. Most symptomatic perforations are large, and they involve the anterior portion of the septum. A posterior perforation tends to be less symptomatic because of the rapid humidification of the inspired air by the nasal mucosal lining and the protection provided by the turbinate.[9,10] Taylor et al gave treatment for nasal septal perforation. The main treatment by eliminate etiology of nasal septal perforation and ruling out causes that may preclude surgical treatment. Medically, nasal septal perforation can manage by saline solution spray and ointment with or without antibiotic, which hydrate mucosa and prevent crusting. Surgical management of NSP is primarily achieved with a mucosal nasal septal flap. There are many different techniques for this procedure, which involves the elevation of healthy nasal mucosa to cover the defect.[6]

## 6. Conclusion

Fungus ball can happen in people with immunocompetent. CT scan examination is important to find extra sinuses expansion and bone erosion. We found a case of fungus ball formation which perforated nasal septal and undergo surgery for extracted fungal material from nasal cavity. Nasal septal perforation can be treated by eliminating the cause, applying ointment, saline solution spray, and surgical. This suggest that fungus ball needs to be extracted before it make other complication.

## Compliance with ethical standards

### *Disclosure of conflict of interest*

No conflict of interest to be disclosed.

### *Statement of informed consent*

Informed consent was obtained from all individual participants included in the study.

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