

## Review Article

**Fungal sinusitis clinical presentation, latest management: A Review Update**Bithi Bhowmik<sup>1</sup>**Abstract**

Fungal sinusitis is a relatively common, often misdiagnosed disease process involving the paranasal sinuses. It is a serious condition, as certain forms of fungal sinusitis are associated with a high rate of mortality. Successful treatment requires a prompt diagnosis and frequently relies on radiologic imaging, specifically computed tomography (CT) and magnetic resonance (MR) imaging. The classification of fungal sinusitis is ever changing, but under the most current and widely accepted classification fungal sinusitis is broadly categorized as either invasive or noninvasive. Invasive fungal sinusitis is defined by the presence of fungal hyphae within the mucosa, submucosa, bone, or blood vessels of the paranasal sinuses. Invasive fungal sinusitis is subdivided into acute invasive fungal sinusitis, chronic invasive fungal sinusitis, and chronic granulomatous invasive fungal sinusitis. Conversely, noninvasive fungal sinusitis is defined by the absence of hyphae within the mucosal and other tissues of the paranasal sinuses. Noninvasive fungal sinusitis is subdivided into allergic fungal sinusitis and fungus ball (fungal mycetoma). [Journal of Science Foundation, 2014;12(1):16-19]

**Keywords:** Fungal sinusitis; clinical presentation; management

**1.0. Introduction**

Chronic sinusitis is a very common problem, and occurs even more frequently in people with allergies. A large number of people with chronic sinusitis are actually suffering from fungal sinus infections, which would not get better with typical antibiotics (Ferguson et al., 2000). Fungal infections of the sinuses have recently been blamed for causing most cases of chronic rhinosinusitis. The evidence is still controversial. Most fungal sinus infections are benign or noninvasive, except when they occur in individuals who are immunocompromised. Several reports are available that have shown invasive fungal infections in immunocompetent individuals (Ferguson 2000).

**2.0. What is a fungus?**

Fungi are plant-like organisms that lack chlorophyll. Since they do not have chlorophyll, fungi must absorb food from dead organic matter. Fungi share with bacteria the important ability to break down complex organic substances of almost every type (cellulose) and are essential to the recycling of carbon and other elements in the cycle of life. Fungi are supposed to "eat" only dead things, but sometimes they start eating

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when the organism is still alive. This is the cause of fungal infections; the treatment selected has to eradicate the fungus to be effective. In the past 30 years, there has been a significant increase in the number of recorded fungal infections. This can be attributed to increased public awareness, new immunosuppressive therapies (medications such as cyclosporine that "fool" the body's immune system to prevent organ rejection) and overuse of antibiotics (anti-infective). When the body's immune system is suppressed, fungi find an opportunity to invade the body and a number of side effects occur. Because these organisms do not require light for food production, they can live in a damp and dark environment. The sinuses, consisting of moist, dark cavities, are a natural home to the invading fungi. When this occurs, fungal sinusitis results (Stringer and Ryan 2000).

### 3.0. Clinical Types

It is broadly classified into invasive and non-invasive types. Simplified classification (Manrin-Rains and Mineck 2003) of fungal sinusitis is as follows:

#### 3.1. Non-invasive fungal sinusitis

- Fungus ball
- Allergic fungal sinusitis
- Non-allergic fungal sinusitis

#### 3.2. Invasive fungal sinusitis

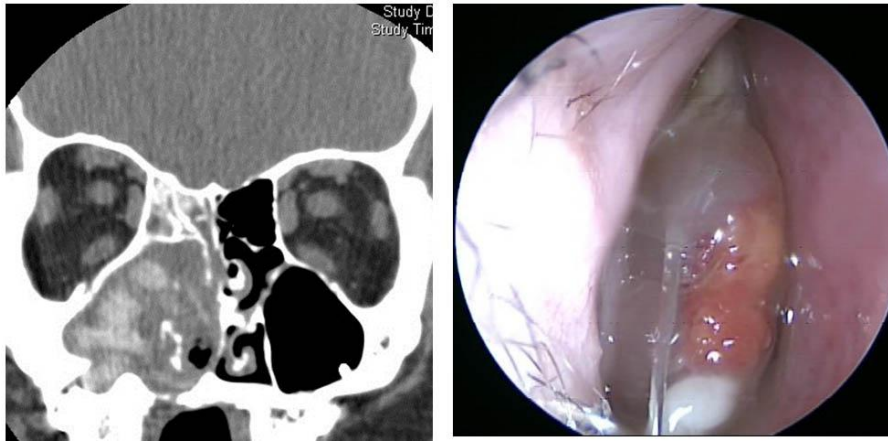
- Acute invasive fungal sinusitis
- Chronic invasive fungal sinusitis
- Granulomatous invasive fungal sinusitis

### 4.0. Non-invasive fungal sinusitis (Manrin-Rains and Mineck 2003)

**4.1. Fungus Ball:** This is a non-invasive form of fungal sinusitis. In essence, there is an overgrowth of fungal elements in the sinuses. Most commonly molds such as *Aspergillus* are responsible. The most commonly involved sinuses are the maxillary and the sphenoid sinuses, where the fungus finds favorable conditions such as warmth and humidity for growth. Sometimes, bacteria can cause super-added infection in the sinus affected by the fungus ball. Typically, only a single sinus is involved, and the disease has a classic appearance on CT or MRI scans. Treatment involves removal of the fungus ball through endoscopic sinus surgery. Usually a peanut-butter like appearance of the fungal ball is noted. Most patients have excellent results from surgery, and may not require any further treatment.



**4.2. Allergic Fungal Sinusitis (AFS):** Patients with allergy to certain fungi may develop allergic fungal sinusitis. Common fungi belonging to the Dematiaceous family are usually involved in AFS. These include *Alternaria*, *Bipolaris* and *Curvularia* species. The presence of fungus in the sinuses elicits an allergic response, resulting in production of allergic mucin and nasal polyps. Usually, the disease affects more than one sinus on one side. However, all sinuses on both sides may be involved in severe cases. Patients have a typical appearance on nasal endoscopy with the presence of allergic mucin and polyps. Allergy testing to fungi is positive. Sinus CT scans also have a typical appearance. Tissue examination under the microscope shows allergic mucin containing fungal elements without tissue invasion (Manrin-Rains and Mineck 2003).



**4.3. Non-allergic fungal sinusitis:** In some instances, mucin and fungus may be identified in patients with sinusitis in the absence of any allergy to fungus. Fungus may also be found in the sinuses of patients that have had previous surgery. Whether these fungi are innocent bystanders or are the cause of sinus disease is currently under investigation and a subject of great debate (Manrin-Rains and Mineck 2003).

### 5.0. Invasive Fungal Sinusitis

**5.1. Acute Invasive Fungal Sinusitis:** This is the most dangerous and life-threatening form of fungal sinusitis. Fortunately, it is very rare, and usually afflicts severely immunocompromised patients. These include patients with depressed immunity such as those with leukemia, aplastic anemia, uncontrolled diabetes mellitus, and hemochromatosis. Patients undergoing anti-cancer chemotherapy or organ/ bone-marrow transplantation are especially susceptible. *Aspergillus* or members of the class *Zygomycetes* (*Mucor*, *Rhizopus*) are the most frequent causative agents. The disease has an aggressive course, with fungus rapidly growing through sinus tissue and bone to extend into the surrounding areas of the brain and eye. Endoscopically, areas of dead tissue and eschar are noted. Microscopic examination shows invasion of blood vessels by the fungus (Dufour et al., 2006).

**5.2. Chronic invasive fungal sinus:** Unlike acute invasive fungal sinusitis whose typical course is less than 4 weeks, chronic invasive fungal sinusitis is a slower destructive process. The disease causes rare vascular invasion, sparse inflammatory reaction and limited involvement of surrounding structures. It is usually seen in patients with AIDS, diabetes mellitus or chronic corticosteroid treatment. The disease most commonly affects the ethmoid and sphenoid sinuses, but may involve any sinus. The typical time course of the disease is over 3 months. Tissue cultures show fungus in over half the patient, and *Aspergillus fumigatus* is the most commonly grown fungus (Dufour et al., 2006).

**5.3. Granulomatous invasive fungal sinusitis:** It is usually seen in patients from Sudan, India, Pakistan and Saudi Arabia. Patients have normal immune status. The disease has a relatively slow time course over 3 months, and patients present with an enlarging mass in the cheek, orbit, nose, and sinuses. Microscopically, it is characterized by formation of granulomas, and this differentiates it from chronic invasive fungal sinusitis. *Aspergillus flavus* is usually the causative organism (Dufour et al., 2006).

### 6.0. Symptoms of sinusitis include

Running nose, nasal congestion, thick colored nasal discharge, cough, post nasal drip, facial pain or swelling, head congestion, fatigue, toothache, diminished sense of smell and taste, fever and headache (Thakar et al., 2004). Investigations for fungal sinusitis includes X-Ray PNS( OM view), CT scan of nose & paranasal sinuses and Nasoendoscopy.

### 7.0. Treatment

Some general measurement may be taken to prevent fungal infection that is fungal sinusitis. Make the body less hospitable for fungus by avoiding sugar and grains, consuming fish or cod liver oil, using coconut oil and avoid eating top 10 mycotoxic food. Physical activity causes the sinuses to expand and stimulates air circulation and cleansing mucus to move through the sinuses. This will help to clear out any particles that are contributing to the irritation (Granville et al., 2004).

**7.1. Regular clearance of sinuses:** To help clear sinuses that are congested, you can consider washing the nasal cavities with a solution of salt and room temperature purified water (Sohail et al., 2001).

## 7.2. Specific treatment

**7.2.1. Fungal ball:** Treatment involves removal of the fungus ball through endoscopic sinus surgery. Usually a peanut-butter like appearance of the fungal ball is noted. Most patients have excellent results from surgery, and may not require any further treatment (Schubert 2004).

**7.2.2. Allergic fungal sinusitis:** Endoscopic sinus surgery to clear polyps and allergic mucin, and to restore the ventilation and drainage of sinuses. This has to be combined with aggressive medical therapy with corticosteroids which can be used nasally and/ or systemically. Patients may also benefit from treatment of allergy with immunotherapy and antihistamines. Anti-fungal treatment is usually not required, as it is the reaction to the fungus that needs to be modulated. However, in severe recurrent disease, anti-fungal therapy may be needed (Schubert 2004).

**7.2.3. Acute invasive fungal sinusitis:** Treatment is a combination of aggressive surgical and medical therapy. Repeated surgery may be necessary to serially remove all dead tissue. Medications such as anti-fungal drugs and those that help restore the immune status of the patient are key to improving survival, as this disease is frequently fatal (Schubert 2004).

**7.2.4. Chronic invasive fungal sinusitis:** Treatment comprises of surgery in combination with medical therapy (anti-fungal drugs and measures to restore the patient's immune system (Sohail et al., 2001).

## 8.0. Conclusion

There are many forms of fungal sinusitis. A complete evaluation by otorhinolaryngologist will help to determine if one have a form of fungal sinusitis and how it needs to be treated, as some forms of fungal sinusitis have distinctly different medical and surgical treatments. The definite surgery for fungal sinusitis that is endoscopic sinus surgery has been done in many centers in Bangladesh since 1998.

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