



Treatment Updates

Assessment and Treatment of Fungal Sinusitis

INTRODUCTION

Fungal infections in the paranasal sinuses are being increasingly blamed for causing many cases of chronic Rhinosinusitis. The evidence though is still controversial. Most fungal infections are benign or non-invasive except when they occur in individuals who are immuno-compromised.

Distinguishing invasive disease from non-invasive disease is important because the treatment and prognosis for each is very different.

PRESENTATION

Fungal infections of the paranasal sinuses can manifest in two distinct ways. Non-invasive fungal infections of the paranasal sinuses are chronic, and usually extend for months and years before they are appropriately diagnosed and treated.

The more serious type of infection commonly occurs in patients with diabetes or in individuals who are immuno-compromised and is characterized by its invasiveness, tissue destruction and rapid progression of symptoms.

Early detection and treatment is vital as these infections are associated with a high mortality rate.

ETIOLOGY

Non-Invasive Fungal Sinusitis

There are two forms of non-invasive fungal sinusitis; allergic fungal sinusitis and sinus mycetoma (fungal ball). Most commonly aspergillus fumigatus and bipolaris species cause allergic sinusitis. Aspergillus fumigatus and dematiaceous fungi most commonly cause a sinus mycetoma.

Invasive Fungal Sinusitis

Invasive Fungal Sinusitis includes the acute fulminant type, which has a high mortality rate if not recognised and treated early and aggressively, and the chronic granulomatous types. Saprophytic fungi of the order Mucorales commonly cause acute invasive fungal sinusitis.

Aspergillus fumigatus is the only fungus associated with chronic invasive fungal sinusitis and Aspergillus flavus is the only fungus that has been associated with granulomatous invasive fungal sinusitis.

PATHO/PHYSIOLOGY

Allergic Fungal Sinusitis

Allergic rhinitis is prevalent in patients with fungal sinusitis and is considered to be the trigger mechanism behind allergic fungal sinusitis. Patients are generally immuno-competent; often have asthma, eosinophilia and elevated total fungal specific immunoglobulin.

Surgery reveals greenish black or brownish material (allergic mucin), which has the consistency of peanut butter mixed with sand and glue. Allergic mucin and polyps may form a partially calcified expansile mass that obstructs the sinus drainage. Growth of the mass may cause pressure-induced erosion of bone, rupture of the sinus wall and occasionally leakage of the sinus contents into the orbit or the brain.

Sinus Mycetoma

This condition is unilateral and involves predominantly the maxillary antrum. Mucopurulent cheesy or clay like material is present at the time of surgery. Patients with sinus mycetoma are immuno-competent. Allergic conditions and fungal specific IgE are less common.

Acute Invasive Fungal Sinusitis

Acute Invasive Fungal Sinusitis is the result of a rapid spread of fungus through vascular invasion into the orbit and the central nervous system. It is common in patients with diabetes and in patients who are immuno-compromised due to other causes.

Typically patients with acute invasive fungal sinusitis are severely ill with fever, cough, nasal discharge, headache and alterations in their mental status. They require immediate



hospitalisation, debridement and intravenous antifungal agents.

Chronic Invasive Fungal Sinusitis

Chronic Invasive Fungal Sinusitis is a slowly progressive fungal infection with low-grade invasive process and usually occurs in patients with diabetes. Orbital Apex Syndrome, which is characterised by a decrease in vision and ocular mobility due to a mass in the superior portion of the orbit, is usually associated with this condition.

Granulomatous Invasive Sinusitis

This condition has been reported almost exclusively in immuno-competent individuals from North Africa. Generally proptosis is associated with granulomatous invasive fungal sinusitis.

CLINICAL PRESENTATION

Allergic Fungal Sinusitis patients present with symptoms of chronic sinusitis, which may include facial pressure headache, nasal stuffiness, discharge and cough. The condition should be suspected in individuals with intractable sinusitis and recurrent nasal polyps. Some may present with proptosis or decreased movement of the eye. These patients usually have atopy and have had multiple surgeries by the time their fungal sinusitis is diagnosed. CT scans of the sinuses reveal opacification of the sinuses with concretion and/or scattered calcification through them.

Sinus Mycetoma

Presentation of patient with Sinus Mycetoma is similar to that of patients with sinusitis. Examination may reveal polyposis with evidence of sinusitis occasionally one-sided. Patients report blowing out gravel-like material from the nose. Usually sinus mycetoma is found incidentally on a CT scan of the brain or paranasal sinuses.

Acute Invasive Fungal Sinusitis

Patients are usually hospitalised and are very sick with fever, cough, nasal discharge, headache and altered mental status. A high index of suspicion for early diagnosis is critical – particularly in immuno-compromised patients. Signs and symptoms may include ulcers on the septum or turbinates or even on the palate. In late stages the signs and symptoms of cavernous sinus thrombosis are present.

Chronic Invasive Fungal Sinusitis

Patients present with symptoms of long-standing sinusitis. Symptoms are usually not acute, without fever and mental status remains unchanged. Orbital apex syndrome is

characterised by a decrease in vision and in ocular mobility due to a mass in the superior portion of the orbit and is usually associated with this condition. Nasal examination is usually normal. Findings from the eye examination tend to be more positive.

Granulomatous Invasive Fungal Sinusitis

Patients present with symptoms of chronic sinusitis associated with proptosis. Examination of the nasal cavity is usually normal. Again findings from eye examination are usually impressive. Laboratory studies elevated serum fungus specific IgE concentrations are often found in patients with allergic fungal sinusitis. These findings are less common in patients with a sinus mycetoma.

IMAGING STUDIES

CT scanning of the paranasal sinuses is essential in the evaluation of patients in whom fungal sinusitis is suspected.

MRI scanning with enhancement may be helpful in patients with allergic fungal sinusitis and in patients in whom invasive fungal sinusitis is suspected. MRI may show low signal intensity suggesting a fungal process versus a solid mass in the allergic fungal sinus. MRI is helpful in evaluating central nervous system venous spread in invasive fungal sinusitis.

MEDICAL THERAPY

The treatment of choice for all types of fungal sinusitis is surgical. Medical treatment depends on the type of infection and the presence of invasion.

Allergic Fungal Sinusitis

The treatment of choice is surgery. Systemic steroids may be indicated once the surgery is performed and diagnosis is confirmed. Some authors suggest a low dose of Prednisone (0.5 mg per kg) and a tapering dose with alternate day dosage over a three month period. Aggressive salt-water douches are recommended. Immune therapy for specific allergens is controversial. There are some reports suggesting benefit of this type of treatment.

Systemic antifungals are not indicated in the absence of invasion.

Fungal Sinus Mycetoma

Treatment of choice is surgical.

Chronic Invasive Fungal Sinusitis

Surgical treatment is mandatory. Medical treatment with systemic antifungals is initiated



once invasion is diagnosed. Amphotericin B is recommended. This can be replaced by Ketoconazole or Itraconazole once the disease is under control.

Acute Invasive Fungal Sinusitis

Emergency treatment is necessary once this condition is suspected. Medical therapy intravenously is initiated after surgical debridement. High doses of Amphotericin (1 mg – 1.5 mg per kg per day) are recommended. Oral Itraconazole (400 mg daily) can replace Amphotericin B once the acute stage has settled. Treatment of the underlying immune deficiency if possible is mandatory.

Chronic Granulomatous Fungal Sinusitis

Surgical debridement is the mainstay of treatment followed by systemic anti-fungal medication. Recurrence of this condition is rare.

SURGICAL MANAGEMENT

Allergic Fungal Sinusitis

Surgery is the treatment of choice. The goals of surgery are conservative debridement of the allergic mucin and polyps from the involved sinuses with restoration of normal sinus aeration. These goals are often achieved endoscopically. An external approach may be considered if the lesion is not accessible completely endoscopically. Adequate ventilation of the sinuses is essential to prevent relapse or recurrence of the disease once the disease is exenterated.

Sinus Mycetoma

Surgical removal of the fungus ball with the erosion of the sinus is the only requirement. Once this is accomplished no further medical treatment is indicated. Endoscopic lesion removal can be performed when the lesion is accessible.

Acute Invasive Fungal Sinusitis

Emergency surgical treatment should be performed once the condition is suspected. Such treatment is radical debridement of the necrotic tissue until normal tissue is reached. Often debridement requires an external approach. In some cases the skull base may be involved.

Chronic Invasive Fungal Sinusitis

This condition is usually less aggressive than the acute stage. Surgical debridement is warranted and can be approached endoscopically in most patients.

Chronic Granulomatous Fungal Sinusitis

Surgical debridement is the treatment of choice.

FOLLOW UP

Allergic Fungal Sinusitis

Long-term follow-up care is required for maintenance of the sinus cavities. This may be achieved by endoscopic examination and debridement in the rooms periodically. A short course of systemic steroids may be administered if any sign of relapse or recurrence is seen. Repeated surgical debridement may be necessary if systemic steroids do not control the disease.

The best single monitor of the patient's progress is total serum IgE levels. Each patient's total serum IgE should be plotted after surgery. If it rises above the normal range (100) systemic oral steroid therapy should be initiated.

CONCLUSION

Fungal Sinusitis occurs more commonly than was previously anticipated.

It most commonly occurs as allergic fungal sinusitis associated with nasal polyposis. Surgical treatment is mandatory followed by long-term follow up and intermittent medical management. Relapse rate and chronic infection rate is higher for fungal sinusitis than it is for bacterial sinusitis.

Any symptoms suggestive of sinusitis in an immuno-compromised patient must be taken seriously. They should be referred to an otolaryngologist sooner rather than later. Appropriate imaging by way of CT scan and/or MRI should be carried out early in the clinical course of the disease. Aggressive appropriate therapy should be instigated if fungal sinusitis is proven.

**If further information is required,
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