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Evaluation of cases of fungal infections of nose and paranasal sinuses reported in Nalanda Medical College and Hospital Patna

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Abstract
Fungal sinusitis is a common specific infectious disease with an increasing incidence and is being increasingly recognized to occur in all age groups. It has been reported that fungal infection of nose and paranasal sinuses (i.e., fungal rhinosinusitis) can affect about 20% of the population at any given time during their lives. Additionally, fungal infections of nose and paranasal sinuses generally have a protracted course with frequent relapses and recurrences. Logically Quality of life is likely to be affected in fungal infections of the nose and paranasal sinuses. However to the best of our knowledge, there is no published literature on QOL in fungal infection of nose and paranasal sinuses from India. Hence the present study was planned to distinguish clinicopathological features of non-invasive fungal sinusitis from invasive fungal sinusitis and accordingly manage them and prevent recurrence.
Total 20 cases diagnosed with the infections were enrolled in the present study. The present study was planned in the Department of ENT, Nalanda Medical College and Hospital Patna, Bihar from Feb 2018 to Feb 2019. The Consultant from ENT department made the clinical diagnosis of nasal fungal infection, which was confirmed using microbiological tests by the Consultant Microbiologist. Thereafter, the Consultant ENT directed the patient to the principal investigator for administration of tests within the ENT department.
The data generated form the present study and the reported literature suggests that combination of medical and surgical line of treatment improved the prognosis significantly. Early detection, proper and adequate dose of antifungal agents, timely surgical intervention improve the survival rate in the disease of sinonasal fungal infections.

Keywords: fungal infection, paranasal sinus, aspergillosis, fungal sinusitis

Introduction
Fungal sinusitis is the inflammation of the lining mucosa of the paranasal sinuses due to fungal infection [1]. It occurs in people with reduced immunity. The maxillary sinus is the most commonly involved. Fungi responsible for fungal sinusitis are Aspergillus fumigatus (90%), Aspergillus flavus, and Aspergillus niger. Fungal sinusitis occurs most commonly in middle-aged populations. Diabetes mellitus is the most common risk factor involved [2]. The most common causes of sinus infections are linked to viral and bacterial infections. However, a fungal sinus infection differs in that it refers to an infection of any or all of the four paranasal sinuses caused by a fungal growth inside the body.
Fungi can be found both in nature, in your home and work environments, and in the air. Sometimes when fungal material or debris is inhaled into the nose and lungs, it may cause an infection. There are two forms of fungal sinus infections: invasive and non-invasive. Non-invasive infections do not spread anywhere besides the sinuses, and occur in patients who have normal immune systems. However, invasive fungal sinus infections can occur n in those patients whose immune systems are not as strong as the average person. An invasive sinus infection can become life-threatening in a very short amount of time, meaning that immediate treatment is critical.
The most common type of fungal sinus infection is Allergic Fungal Rhinosinusitis (AFRS). This form is characterized by a chronic non-invasive sinus infection lasting over 12 weeks. Patients suffering from this condition often notice a thick, yellowish-brown mucus draining from the sinuses, and complain of severe nasal congestion, difficulty smelling, sinus pressure, and headaches. Many AFRS patients also report being asthmatic or having the sensitivity to aspirin. AFRS suffers may also have nasal polyps. The five types of fungi that doctors cite as recurring causes of AFS include Cladosporium, Aspergillus, Alternaria, Curvularia, and Bipolaris.
Saline irrigations and anti-inflammatory medications are the mainstays of treatment for these patients. Endoscopic sinus surgery may be needed to rid the sinuses of nasal polyps and fungal material. The majority of patients report relief from surgery although for most the symptoms will return in some form.
The second form of a fungal sinus infection is Acute Fulminant Fungal Rhinosinusitis (AFFR). This type of sinus infection involves the invasion of fungal debris into the sinus tissues of an immunosuppressed patient. Most patients suffering from this form are either diabetic or have undergone chemotherapy radiation (two conditions that create immune suppression). This form of fungal sinus infection is particularly harmful because of its ability to spread rapidly to the eye and brain, in addition to the vast amount of dead tissue that the fungus creates. Those diagnosed with AFFR require emergency surgery to remove the dead tissue and stop the fungus from spreading.
The third form of fungal sinus infection is a Chronic

Invasive Fungal Rhinosinusitis (CIFR). Unlike AFFR, the spread of the fungus is not rapid but rather occurs over weeks or a succession of months. This form of sinus infection is fairly rare and affects those both with and without identifiable immune system disorders (i.e. diabetes, steroid-users). In addition to the normal symptoms of a fungal sinus infection, patients might also experience eye-swelling and decreased vision. Surgical evaluation is needed to remove the infected tissue. Post-operatively, patients may be encouraged to use anti-inflammatory and antifungal treatments to ensure that the fungus does not return.

The cause of fungal sinus infections depend are twofold. The first and most common is believed to be the immune system seeing fungus that is inhaled as a foreign substance and fighting the fungal spores by increasing the immune response. The damage is mostly done in this case by our own bodies. The second type of fungal sinusitis is when the fungus actually reproduces in our sinuses. The fungus can replicate in place, or spread into the surrounding tissues especially when the immune system is compromised.

The root cause of fungal sinus infections is the exposure to fungus and mold spores in the air. Once inhaled, the fungi can become lodged in the mucosal lining of the paranasal sinuses. If you are particularly susceptible to chronic sinus infections, then your immune system will respond in the form of classic fungal sinusitis symptoms.

Fungal sinus infections can be dangerous, because as your immune system attempts to kill the fungus inside your body, your sinus membranes can become inadvertently damaged. This damage is what evokes the common symptoms of a sinus infection [3].

Fungal sinusitis is a common specific infectious disease with an increasing incidence and is being increasingly recognized to occur in all age groups. It has been reported that fungal infection of nose and paranasal sinuses (i.e., fungal rhinosinusitis) can affect about 20% of the population at any given time during their lives. Additionally, fungal infections of nose and paranasal sinuses generally have a protracted course with frequent relapses and recurrences. Logically Quality of life is likely to be affected in fungal infections of the nose and paranasal sinuses. However to the best of our knowledge, there is no published literature on QOL in fungal infection of nose and paranasal sinuses from India. Hence the present study was planned to distinguish clinico-pathological features of non-invasive fungal sinusitis from invasive fungal sinusitis and accordingly manage them and prevent recurrence.

Methodology

Total 20 cases diagnosed with the infections were enrolled in the present study. The present study was planned in the Department of ENT, Nalanda Medical College and Hospital Patna, Bihar from Feb 2018 to Feb 2019. The Consultant from ENT department made the clinical diagnosis of nasal fungal infection, which was confirmed using microbiological tests by the Consultant Microbiologist. Thereafter, the Consultant ENT directed the patient to the principal investigator for administration of tests within the ENT department.

All the patients were informed consents. The aim and the objective of the present study were conveyed to them. Approval of the institutional ethical committee was taken prior to conduct of this study.

Following was the inclusion and exclusion criteria for the present study.

Inclusion Criteria: Clinical features suggestive of fungal infection of nose and paranasal sinus.

Exclusion Criteria: Cases not willing to participate in study.

Results & Discussion

The fungal diseases of the nose and paranasal sinuses encompass not one disease entity but a multitude of an entire spectrum of different diseases. We have studied different disease causes, namely allergic A. sinusitis (50 cases). Although the treatment of these diseases is vastly different, the presentation and clinical features are quite similar and thus they could be studied together. The authors have attempted to study these diseases under the common heading highlighting the important difference whenever required [4-6].

Table 1: Age & Symptoms Observed

Parameters	No. of Cases
Age Group	
5 – 15 years	3
15 - 25 years	5
26 - 35 years	4
36- 45 years	6
56 -65 years	2
Symptoms Observed	
Nasal obstruction with Rhinorrhoea	3
Swelling of nose	3
Diplopia	2
Proptosis	7
Loss of vision	3
Intracranial complications with cranial nerve palsy	2

Table 2: Etiological & Radiological Parameters

Parameters	No. of Cases
Etiological Parameters	
Aspergillosis	7
Mucormycosis	3
Allergic fungal sinusitis	5
Rhinosporidiosis	5
Radiological Parameters	
Clear	3
Clouding of one or more sinuses	4
Mucosal thickening	6
Bone erosion	5
Unspecified	2

Table 3: Drug Treatment & Surgical Treatment to Cases

Parameters	No. of Cases
Drug Treatment	5
Drug + Surgical Treatment	15

The particular varieties of invasive fungal sinus disease have been most stringently divided into two forms: chronic indolent fungal sinusitis (CIFS) and (granulomatous invasive fungal rhinosinusitis) GIFS. The diagnosis of allergic fungal rhinosinusitis (AFS) was developed for patients with recurrent nasal polyps and asthma in mind [7], but there is still not a clear definition and/or panel of criteria. Nasal endoscopy may be normal or show mucosal oedema, or polyps with or without allergic mucin (thick yellow–green mucus plugs) on one or both sides. Sinus CT scan may reveal heterogeneous and serpiginous sinus opacities, with or without pseudo calcifications and bone lysis on one or both sides. Pathology consists of allergic

mucin with detection of hyphae, eosinophils and Charcot-Leyden crystals. Mycology involves identification of various species on mucus fungal culture. Serum hyper-eosinophilia may be present.

Lewis *et al*. reported aspergillus to be most common fungal pathogen in nose and paranasal sinuses, most commonly affecting maxillary antrum [8].

Nathan *et al*. reported mucormycosis to be a well – established entity [9]. Price and Stevens recently reported a severe case of rhinocerebral mucormycosis involving the maxilla, orbit temporal bone and skull base.

Blitzer *et al*. reviewed retrospectively a total of 170 cases of cephalic mucormycosis reported earlier in the literature, and added 9 cases of their own [10]. The overall survival rate of their disease was 50%.

Allergic fungal sinusitis is also a well described entity and recognized apart from other fungal and nonfungal sinus disease as has been quoted by Folker *et al*. [11].

Rhinosporidiosis is fairly common problem for the otolaryngologist in many parts of the world, because of its prompt recurrence after surgical excision. Though not fatal disease, it inflicts various kinds of social and economic strain on the patients and their families, as has been appreciated by Nair *et al*. [12].

The distinction between CIFS and granulomatous invasive fungal rhinosinusitis (GIFS) is based on pathologic findings. Histopathologic study of GIFS identifies the familiar exuberant fungal proliferation with tissue invasion and a variable inflammatory infiltrate; however, the presence of multinucleated giant cell granulomas distinguishes GIFS from CIFS [13]. Das *et al.*, in their retrospective study on cases of fungal rhinosinusitis over a period of 5 years in Chandigarh, reported 48 cases of granulomatous invasive fungal rhinosinusitis (16.9%) among 284 cases of fungal rhinosinusitis [14].

The most common radiological findings were opacities and mucosal thickening in the sinuses. Rhinosporidiosis has a high tendency to recur and medical treatment was found to be ineffective. Mucormyosis was the most aggressive among the sinonasal fungal infections. It was commonly seen in immunocompromised and immunosuppressed patients.

Conclusion

The data generated form the present study and the reported literature suggests that combination of medical and surgical line of treatment improved the prognosis significantly. Early detection, proper and adequate dose of antifungal agents, timely surgical intervention improve the survival rate in the disease of sinonasal fungal infections.

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