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**Original Research Article**

# A retrospective study of invasive fungal rhinosinusitis in adults for surgical outcomes at tertiary care hospital

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## ABSTRACT

**Background:** An invasive fungal rhinosinusitis is most lethal form of sinusitis. It includes acute and chronic invasive fungal rhinosinusitis. The most lethal fungi are *Aspergillous* species and mucormycosis, others are *Alternaria*, *P. boydii* and *Sprothrix*. Endoscopic debridement combined with intravenous antifungals are efficacious in management of invasive fungal rhinosinusitis.
**Methods:** Study conducted at department of otorhinolaryngology, GMERS Medical College and Hospital, Sola, Ahmedabad. The period of the study October 2020 to October 2022. Total 100 cases taken. All cases of biopsy proven invasive fungal rhinosinusitis above the age of 18 years are included in this study. Oral and written consent taken from all included patients. A nasal endoscopy followed by KOH mount, magnetic resonance imaging – peripheral nervous system (MRI PNS) done.
**Results:** In our study, 57% patients were surgically treated with functional endoscopic sinus surgery, 23% patients treated with modified Denker's approach debridement. On basis of MRI PNS, nasal endoscopy and symptomatic improvement of the disease, only 10 patients have recurrence of disease and 90 patients are completely recovered after surgical and medical management.
**Conclusions:** Maintaining high index of suspicion in at risk patient populations, followed by prompt evaluation and management is crucial in suspected invasive fungal rhinosinusitis. Early management with antifungal e.g. Amphotericin B intravenous injections, tab Posaconazole, tab Voriconazole and surgical intervention e.g. FESS, modified Denker's approach debridement, FESS with middle meatal antrostomy very efficacious in terms of preventing the recurrence and mortality in patients.

**Keywords:** Mucormycosis, FESS, Modified Denker's approach debridement, Injection Amphotericin B

## INTRODUCTION

A rhinosinusitis is a group of disorders characterized by inflammation of mucosa of nose and paranasal sinuses. It is divided into different types on the basis of duration into acute, subacute, chronic, rhinosinusitis. Fungal rhinosinusitis has two distinct forms: invasive, and non-invasive.[1] Invasive fungal rhinosinusitis is most lethal form of sinusitis. It includes acute and chronic invasive fungal rhinosinusitis.

The most common fungi are aspergillus species and mucormycosis, others are *Alternaria*, *P. boydii* and *Sporothrix*.[1] The immunocompromised patients (diabetic, transplant, leukemia and AIDS) are most at risk for invasive fungus. Two forms are usually described: granulomatous and non-granulomatous based on presence or absence of granulomas within tissues.[2] A clinical presentation include headache, nasal blockage, facial pain, palatal erosion, impairment of vision, nasal and facial anesthesia, nasal septum necrosis. A complete blood count, coagulation profile, blood sugar, staining and

culture, biopsy, should be done. Contrast computed tomography (CT) scan and contrast enhanced magnetic resonance imaging (MRI) is helpful to confirm extension of disease beyond sinuses and bony erosion. A nasal endoscopy, KOH mount, and biopsy are required to confirm diagnosis invasive fungal rhinosinusitis.

Endoscopic debridement combined with intravenous antifungal is efficacious in management of invasive fungal sinusitis, Endoscopic sinus surgery consist middle meatal antrostomy and anterior ethmoidectomy.[1] For extensive disease palatal debridement, exenteration of eye is required.

### *Objective of the study*

Objectives of the study were: to assess effectiveness of various surgical procedure like FESS, modified Denker's approach surgery in invasive fungal sinusitis; and to document clinical features, and extent of the disease.

## METHODS

This study conducted at the department of otorhinolaryngology, GMERS Medical College and Hospital, Sola, Ahmedabad. The period of the study was from October 2020 to October 2022. Ethical approval taken from the college ethical committee before starting the study. All cases of chronic rhinosinusitis that attend the outpatient department, referred patient from other departments, indoor patients and those that fall in the inclusion criteria will be selected for the study. Oral and written consent will be taken from all participant and they will be informed that they can leave the study at any time during the study.

A thorough history and examination will be done on all patients. A Nasal Endoscopy followed KOH mount, and biopsy taken to confirm diagnosis of invasive fungal rhinosinusitis.

### *Inclusion criteria*

All patients of age above 18 years with invasive fungal rhinosinusitis diagnosed clinically and confirmed clinically and with biopsy and /or KOH mount, all patients with written informed consent, and patients irrespective of caste, religion, socioeconomic status, duration and severity of disease will be included in study.

### *Exclusion criteria*

All patients have viral, bacterial rhinosinusitis, all patients below 18 years, and all patients who did not give consent for the study were excluded.

### *Type of study*

It was a cohort study.

### *Sampling technique*

Stratified sampling technique was used.

### *Statistical method and tool*

Statistical package for the social sciences (SPSS) statistical software was used.

## RESULTS

In our study, on the basis of histopathology report, 67% patients had mucor species, 22% patients had aspergillus species in histopathology,6 % patients had both Mucor and Aspergillus species, 4% patients had Rhizopus species, only 1% patients had candida species (Table 1).

**Table 1: On basis of histopathology report, different species.**

| Type of fungus | Patients |
|---|---|
| **Aspergillous** | 22 |
| **Candida** | 1 |
| **Mucor** | 67 |
| **Mucor + Aspergillous** | 6 |
| **Rhizopus** | 4 |

In our study, 77% patients were given injection Amphotericin B + oral Posaconazole, 23% patients were given tablet voriconazole (Figure 1).

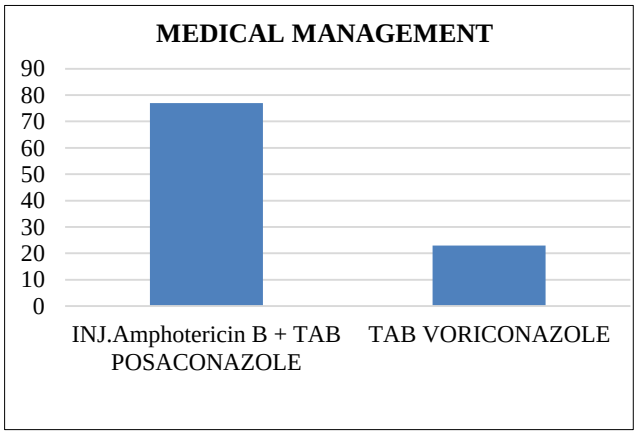


**Figure 1: Age group distribution.**

**Table 2: Recurrence on the basis of symptomatic improvement.**

| Symptomatic improvement | Frequency |
|---|---|
| **No recurrence** | 90 |
| **Recurrence** | 10 |

In our study, FESS was done in 57% patients, modified Denkers approach was done in 23%, modified Denker's with palatal debridement was done in 13 % patients, FESS

with middle meatal antrostomy was done in 7% patients (Figure 2).

In our study, 10 patients have recurrence after surgery (Table 2).

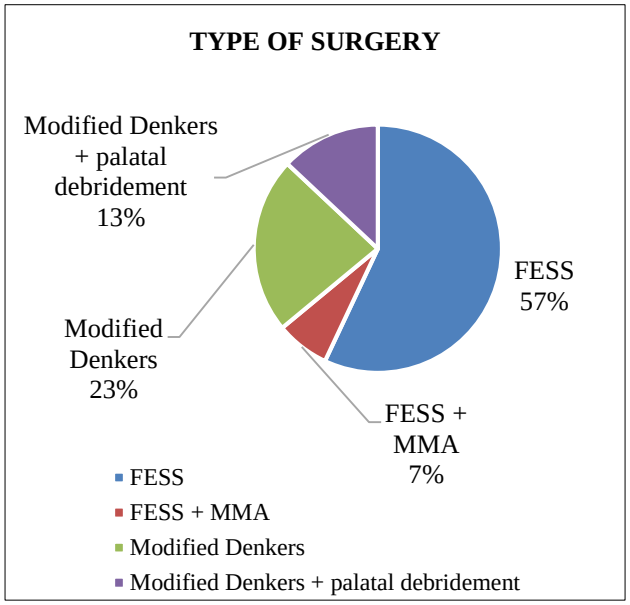


**Figure 2: Type of approach.**

## DISCUSSION

Invasive fungal rhinosinusitis belong to the spectrum of sino nasal disorders caused by fungal organism in human beings. The predisposing factors for invasive fungal rhinosinusitis are immune status of host and co-morbid conditions-diabetes mellitus, hypertension, usage of blood thinner, oxygen therapy, virulence fungi and local anatomical variations in nose and paranasal sinuses. Corona virus disease by SARS-CoV-2 virus aggravate fungal invasive rhinosinusitis.

Invasive fungal rhinosinusitis is lethal form of sinusitis, it divides into acute and chronic invasive rhinosinusitis and organisms responsible for are mucormycosis, Aspergillus species, others are *Alternaria*, *P. boydii* and *Sporothrix*.

Invasive fungal rhinosinusitis patients are identified by clinical examination, nasal endoscopy, radiological investigation including CT scan and MRI with or without contrast.

KOH mount and histopathological report made final diagnostic of disease.

Most of patients required surgical management as a mainstay treatment. After surgery, medical management required to prevent recurrence.

In our study, different surgical approach-FESS, FESS with middle meatal antrostomy, modified Denker's approach nasal debridement with or without palatal debridement were done in most of patients.

Intra operative specimen was sent for KOH mount, fungal culture and histopathological examination. On this basis of septate or aseptate fungal hyphae, inj. Amphotericin B given followed by tab Posaconazole were given (for aseptate hyphae), for septate hyphae -tab voriconazole given. In patients with histopathology report suggest both septate and aseptate hyphae, inj. Amphotericin B were given followed by tab Posaconazole given.

In our study, chronic invasive rhinosinusitis most common occur in old age, most common affected age group is 60–70-year age, in similar study by Biju et al, most common affected age group is 50-60 year. Disease mainly prevalent in male (61%). In similar study by Biju et al, male is affected of about 54%. In other study by Ishaque et al, male was affected by 62% and female was affected by 37%.

In our study, 7% patients are COVID positive and uncontrolled diabetes mellitus is most common associated comorbid condition (57%) followed by hypertension, in similar study by Biju et al, diabetes mellitus is prevalent amongst 52%. In the study of 929 patients by Roden et al, diabetes mellitus was the most common underlying condition 36% (337/929). Chakrabarti et al in his study, concluded, uncontrolled DM (73.6%) as the most significant risk factor in all types.

In our study, 37% patients having headache and 34% patients having facial pain, in similar study by Biju et al, 38% patients having generalized headache and 36% patient having facial pain. In similar study by Zhao et al, 63% patients had complained of headache.

In our study, on basis of histology report, 67% patients having mucor fungi species with angio or tissue invasion. 22% patients having *Aspergillus* fungi species, 6 % patients having both mucor and *Aspergillus* fungi species. In similar study by Biju et al, 58% patients having mucor fungi species and 9% patients having *Aspergillus* fungi species.

In our study, 57% patients with invasive fungal rhinosinusitis are surgically treated with functional endoscopic sinus surgery, 23% patients treated with modified Denker's approach, in similar study by Biju et al, 71% patients were surgically treated by functional endoscopic sinus surgery, 7% patients surgically treated with modified Denker's approach.

In our study, on basis of MRI PNS, nasal endoscopy and symptomatic improvement of disease only 10 patients have recurrence of disease and 90 patients are completely recovered after surgical management as well as medical management.

In similar study by Ishaque et al, 16.5% patients had recurrence of disease.

## CONCLUSION

Maintaining high index of suspicion in at risk patient populations, followed by prompt evaluation and management is crucial in suspected invasive fungal rhinosinusitis. Early management with antifungal e.g. Amphotericin B intravenous injections, tab Posaconazole, tab Voriconazole and surgical intervention e.g. FESS, modified Denker's approach debridement, FESS with middle meatal antrostomy very efficacious in terms of preventing the recurrence and mortality in patients.

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