

# Outcome of Surgical Treatment of Invasive Fungal Rhino sinusitis

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## ABSTRACT

**Background:** Efficacy and outcome of external frontoethmoidectomy with sphenoidotomy and clearance of maxillary sinus in patients with invasive fungal rhinosinusitis in terms of recurrence and mortality is not known for our local population.

**Aim:** To determine the outcome of external frontoethmoidectomy with sphenoidotomy and clearance of maxillary sinus in patients with invasive fungal rhinosinusitis.

**Methods:** This descriptive case series study was conducted in ENT Departments of Akhtar Saeed Medical College, Continental Medical College and Central Park Medical College Lahore over a period of 18 months from 1<sup>st</sup> September 2011 to 28<sup>th</sup> February 2013. One hundred and fifteen patients with invasive fungal rhinosinusitis were included. All patients underwent frontoethmoidectomy with sphenoidotomy and clearance of maxillary sinus by a single surgical team. They were followed for one year after surgery for recurrence and mortality.

**Results:** One hundred and fifteen patients with mean age of 32±7.6 years were included in the study. Seventy two (62.6%) were male while 43 (37.4%) were female. Recurrence of fungal rhinosinusitis was observed in 19 (16.5%) patients. Thirty (26%) patients died within six months after surgery. Mortality and recurrence was independent of age and gender.

**Conclusion:** Surgery for invasive Rhinosinusitis is efficacious in terms of preventing the recurrence and mortality in patients.

**Keywords:** Invasive rhinosinusitis, Recurrent fungal rhinosinusitis, Frontoethmoidectomy

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## INTRODUCTION

Fungal rhinosinusitis is not a rare disease now-a-days (incidence ranges from 4.4% to 6.7% worldwide)<sup>1</sup>. Fungal rhinosinusitis is divided into two diagnostic categories: noninvasive form (fungal ball and allergic fungal sinusitis) and invasive form (acute invasive, granulomatous invasive and chronic invasive fungal sinusitis)<sup>2</sup>. *Aspergillus fumigatus* is the most common organism found in both forms of fungal rhinosinusitis<sup>3</sup>. Invasive fungal rhinosinusitis has always been a diagnostic and therapeutic challenge for the otorhinologist due to its high mortality (up to 50% with treatment and it was upto 90% without treatment), morbidity, and resistance to treatment<sup>4</sup>.

The incidence of invasive fungal rhinosinusitis ranges from 4.3% to 38.7%<sup>5,6</sup>. The clinical presentations of fungal rhinosinusitis included nasal stuffiness (27.9%), nasal discharge (27.9%), facial pain (27.9%), fever (24.3%) and headache (19.8%).

CT scan and MRI helps showing the extent of disease but definitive diagnosis is established by histopathologic demonstration of hyphal forms in mucosa, submucosa, blood vessels, or bones of the sinuses and cultures of biopsy materials.

Treatment is offered with surgical debridement, Amphotericin B and oral corticosteroid therapy<sup>3,7</sup>. Surgical options include external ethmoidectomy and endonasal sinus surgery. Previously, the mortality rates were as high as 90% and now with combined use of surgery and amphotericin-B, the mortality rates have been reduced to 15 to 50 percent<sup>4</sup>. In a recent clinical trial conducted by Kasapuglu et al<sup>4</sup>, which was conducted for surgical treatment of invasive fungal sinusitis, the mortality was seen among 13 out of 26(50%) patients. This was lower than that without treatment i.e., 90%. In another study by Gupta<sup>8</sup>, 74 patients with invasive fungal sinusitis were treated surgically and the following results were found: the overall residual disease was seen in 14 patients (18.9%) and recurrence was seen in six patients (8.1%). Twenty four (32.4%) patients died of the disease. These patients were followed up clinically, endoscopically and radiologically from a period ranging from 9 months to 7 years.

Currently in our unit we offer surgical debridement to all patients suspected of having invasive fungal disease, apart from patients with

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massive intracranial extension followed by intravenous amphotericin B or oral itroconazole depending upon compliance of patient. In literature, the outcome of surgical treatment for invasive fungal rhinosinusitis is variable. Moreover, in Pakistan, the studies that have determined its outcome are lacking. So, I want to conduct this study to know the outcome in our clinical setup. This will guide us in establishing the treatment policies. This will also help us compare the treatment efficacy of our clinical set up with internationally reported recurrence and mortality rates.

**PATIENTS AND METHODS**

This descriptive case series study was conducted in ENT Departments, Akhtar Saeed Medical College, Continental Medical College and Central Park Medical College Lahore over a period of 18 months from 1<sup>st</sup> September 2011 to 28<sup>th</sup> February 2013. Both male and female with age 20-45 years and cases of invasive fungal sinusitis were included. Patients refusing from surgery, unable to take enteral treatment and renal (raised creatinine >1) or hepatic dysfunction (bilirubin >2) were excluded. All the patients were treated with surgery i.e. (frontoethmoidectomy with sphenoidotomy and clearance of maxillary sinus) followed by intraveonous Amphotericin B and corticosteroids for 2 weeks followed by oral itraconazol The follow up of the patients was done for six months for mortality and one year for recurrence. At each follow up visit detailed history and examination in regard to recurrence of disease or residual disease was undertaken and three monthly endoscopy and/or radiology i.e. CT scan or MRI to access recurrence. All the collected data was analysed by SPSS vr 21.0

**RESULTS**

One hundred and fifteen patients were included in the study. 72 (62.6%) were male while 43 (37.4%) were female with mean age was 32±7.6 years. Recurrence of fungal rhinosinusitis was observed in 19 (16.5%) patients while 96 (83.5%) patients has not suffered recurrence of fungal rhinosinusitis. 30 patients were died. There were 40 (34.8%) patients with acute invasive fungal rhinosinusitis, 55 (47.8%) chronic invasive fungal rhinosinusitis and 20 (17.4%) with granular invasive fungal rhinosinusitis (Table 1). Recurrence was independent of age distribution of the patients as the mean age was non-significantly different among patients with and without recurrence (Table 2). Similarly, mortality was not significantly different in patients with increased age. Gender was equally distributed among patients with recurrence

and without recurrence. Similarly, mortality was also found independent of gender of the patient. Type of fungal infection has no effect on recurrence of fungal Rhinosinusitis and on the mortality of the patients (Tables 3-5).

Table 1: Demographic information of the patients

Variable	No.	%
<b>Gender</b>		
Male	72	62.6
Female	43	37.4
<b>Recurrence of fungal rhinosinusitis</b>		
Yes	19	16.5
No	96	83.5
<b>Mortality</b>		
Yes	30	26.1
No	85	73.9
<b>Type of Fungal Invasion</b>		
Acute invasive fungal rhinosinusitis	40	34.8
Chronic invasive fungal rhinosinusitis	55	47.8
Granulomatous invasive fungal rhinosinusitis	20	17.4

Table 2: Comparison of recurrence and mortality

	Yes	No	P value
Recurrence of fungal rhinosinusitis	33.95±7.96	32.60±7.55	0.48 (NS)
Mortality	33.97±8.34	32.42±7.33	0.34(NS)

Table 3: Comparison recurrence of fungal rhinosinusitis and mortality according to genders

	Yes	No	P value
<b>Recurrence of fungal rhinosinusitis</b>			
Male	12	60	0.957 (NS)
Female	7	36	
<b>Mortality</b>			
Male	22	50	0.158 (NS)
Female	8	35	

Table 4: Comparison type of fungal invasion with recurrence of fungal rhinosinusitis

Type of fungal invasion	Recurrence of fungal rhinosinusitis	
	Yes	No
Granulomatous invasive rhinosinusitis	6	14
Chronic invasive fungal rhinosinusitis	8	47
Acute invasive fungal rhinosinusitis	5	35

P Value 0.19(NS)

Table 5: Comparison type of fungal invasion with mortality

Type of fungal invasion	Mortality	
	Yes	No
Granulomatous invasive rhinosinusitis	5	15
Chronic invasive fungal rhinosinusitis	14	41
Acute invasive fungal rhinosinusitis	11	29

P Value 0.96(NS)

## DISCUSSION

Fungal rhinosinusitis encompasses a wide variety of fungal infections that range from merely irritating to rapidly fatal. Fungal colonization of the upper and lower airways is a common condition, since fungal spores are constantly inhaled into the sinuses and lungs<sup>9</sup>. However, colonization is distinct from infection, and most colonized patients do not become ill with fungal infections. "Fungal rhinosinusitis" is the most appropriate term to describe fungal infection of the paranasal sinuses since concomitant involvement of the nasal cavity is seen in most cases<sup>10,11</sup>.

The pathogenesis of relapsed invasive aspergillosis is thought to be due to reactivation of a latent, subclinical infection that had not been fully eradicated. This may be secondary to the angio-invasive nature of the organism or due to lack of sterilization secondary to poor drug penetration (e.g. foreign bodies, vegetation, or lung or bone sequester)<sup>12,13</sup>. Factors that predispose patients to relapsing invasive aspergillosis include site of infection, use of systemic glucocorticoids, lack of remission of underlying hematologic malignancy, duration of neutropenia, and receipt of an unrelated hematopoietic stem cell transplant<sup>14</sup>.

The recognition that certain variations in innate immunity increase the risk of invasive aspergillosis suggest that at least some of these infections may represent reinfection due to ongoing high risk of disease; examples include polymorphisms in the genes encoding toll-like receptor-4, dectin-1, and mannose-binding lectin.<sup>15-18</sup> Recurrence was common in our population with invasive fungal rhinosinusitis showing almost 16% individual suffered recurrence. The recurrence can be secondary to chronic nature of the disease and involvement of multiple sinuses.

Secondly, mortality is quite high showing effect on lymphatic system and draining sinuses may have involve the brain parenchyma as mostly in our patients chronic invasive fungal rhinosinusitis was common. The important thing is age presentation. Patients are young with a mean age of 32. The mortality and recurrence of age and gender of the patients showing that it was equally affecting both the male and female. So, we should emphasize on earlier diagnosis and treatment.

## CONCLUSION

It is concluded that surgery for invasive rhinosinusitis is efficacious in terms of preventing the recurrence

and mortality in patients. Further studies should be encouraged in this regard.

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