

Outcome of External Frontoethmoidectomy with Sphenoidotomy in Invasive Fungal Rhinosinusitis

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ABSTRACT

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

Methods: In this study, 40 patients with invasive fungal rhinosinusitis diagnosed by CT scan 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: Forty patients with mean age 33.05±7.6 years were included and randomly assigned. Fifteen (37.5%) were females and 25(62.5%) were males. Recurrence of fungal rhinosinusitis was observed in 11(27.5%) patients. Twelve (30%) patients died within six months after surgery. Mortality and recurrence was independent of age and gender.

Conclusion: It is concluded that external frontoethmoidectomy with sphenoidotomy for invasive rhinosinusitis is efficacious in terms of preventing the recurrence and mortality in patients.

Keywords: Invasive rhinosinusitis, Recurrent fungal rhinosinusitis, Frontoethmoidectomy,

INTRODUCTION

Fungal rhino sinusitis is not a rare disease now a days (incidence ranges from 4.4% to 6.7% worldwide).¹ Fungal rhino sinusitis 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^{2,3}. *Aspergillus fumigatus* is the most common organism found in both forms of fungal rhinosinusitis^{4,5}. 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 treatment⁶.

The incidence of invasive fungal rhinosinusitis ranges from 4.3% to 38.7%^{7,8}. 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%)⁹. 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.^{4,10} Surgical options include external ethmoidectomy and

endonasal sinus surgery. Previously, the mortality rates were as high as 90 percent and now with combined use of surgery and amphotericin-B, the mortality rates have been reduced to 15 to 50 percent⁶. In a recent clinical trial conducted by Kasapoglu et al⁴ 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%.

Currently in our unit we offered surgical debridement to all patients suspected of having invasive fungal disease, apart from patients with 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^{8,10,11}. 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

A randomized control trial was carried out in the ENT Department, Ch. Rehmat Ali Memorial Trust Hospital Lahore from 1st January 2014 to 30th June 2014. Using non-probability consecutive sampling, 40 cases with invasive fungal rhino sinusitis were offered to be enrolled in study. Both male and female patients with age ranging from 21 to 45 years presenting were included. Patients refusing from

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surgery, unable to take enteral treatment and with renal (raised creatinine >1) or hepatic dysfunction (bilirubin >2) were excluded. After approval from ethical committee, 40 cases fulfilling inclusion criteria were registered. Informed consent was obtained. Demographics i.e. age (in years) and sex (male or female) was noted. All the patients were treated with surgery i.e. (frontoethmoidectomy with sphenoidotomy and clearance of maxillary sinus) followed by intravenous Amphotericin B and corticosteroids for 2 weeks followed by oral itraconazole. The follow up of the patients was done for six months for mortality (yes/ no) and one year for recurrence (yes/ no). All the information was collected on a specially designed proforma (attached). 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 assess recurrence.

Data collected was entered and analyzed in the SPSS version 17. The descriptive statistics like age, Satisfaction Score and BMI were presented in the form of mean + standard deviation while sex, current smoking as frequency and percentage. Student t-test will be applied for hypothesis for outcome variable and to determine statistical difference in Satisfaction Score in both groups. Data was stratified for current smoking and BMI. T-test was also used post-stratification. A value of $p < 0.05$ was considered as significant.

RESULTS

Forty patients with mean age 33.05 ± 7.653 years were included. 15 (37.5) were female and 25(62.5%) were male. Recurrence of fungal rhinosinusitis was observed in 11(27.5%) patients. Twelve (30%) patients died within six months after surgery (Table 1). Sample population (n=40) were stratified into three types of fungal invasion. 17 patients (42.5%) were included in acute invasive fungal rhinosinusitis, 16 (40%) were in chronic invasive fungal rhinosinusitis whereas rest of 7 patients (17.5%) were in granulomatous invasive fungal rhinosinusitis. When these types of fungal invasion cross tabulated with recurrence and mortality, results were non-significant on fisher's exact test for both recurrence and mortality ($p = 0.603$ & 0.272) respectively. Out of 17 patients of acute invasive fungal rhinosinusitis 4 showed recurrence while 4 died within 6 month of surgery. Among 16 patients of chronic invasive fungal rhinosinusitis 4 showed recurrence whereas 7 died with it. In granulomatous invasive fungal rhinosinusitis 3 showed recurrence however 1 died with it. (Table 2) When we cross tabulated gender with recurrence and mortality with fungal invasion the

results were non-significant on fisher exact test ($p=0.927$ & 0.722) respectively. 7 male and 4 female patients showed recurrence while 8 male and 4 female died with fungal invasion. Mortality and recurrence was independent of age and gender (Table 3)

Table 1: Frequency distribution of sampled population

Group	No.	%
Male	25	62.5
Female	15	37.5
Mortality	12	30.0
Recurrence of rehinosisinusitis	11	27.5

Table 2: Type of Fungal Invasion and cross tabulation with recurrence and mortality

Type of Fungal	No.	%	Recur-rence	Morta- lity
Acute invasive fungal rhinosinusitis	17	42.5	4	4
Chronic invasive fungal rhinosinusitis	16	40.0	4	7
Granulomatous invasive fungal rhinosinusitis	7	17.5	3	1
Total	40	100.0	11	12
Using Fisher's exact test			0.603	0.272

Table 3: Cross tabulation between gender & recurrence and mortality of fungal invasion

Group	Group	
	Recurrence	Mortality
Male	7	8
Female	4	4
Total	11	12
Using Pearson Chi-square, P value	0.927	0.722

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. 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^{1,2,4,6}.

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). 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.^{7,8,11}

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. 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.

Gupta¹¹ reported that 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.

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 effecting 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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