



Original Article

Postoperative Use of Steroid Versus Itraconazole In Cases of Allergic Fungal Rhinosinusitis - A Comparative Study

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ABSTRACT

Background: Allergic fungal rhinosinusitis (AFRS) is a chronic, non-invasive form of fungal sinusitis characterized by hypersensitivity to fungal antigens and a high rate of postoperative recurrence. Adjunctive medical therapy following surgical clearance plays a crucial role in disease control. This study was designed to compare the efficacy of postoperative systemic steroids and itraconazole in patients with AFRS.

Materials and methods: This prospective comparative study was conducted on 52 patients diagnosed with AFRS who underwent functional endoscopic sinus surgery. Patients were randomly divided into two groups: Group A received systemic corticosteroids, while Group B received oral itraconazole. Clinical evaluation, diagnostic nasal endoscopy, absolute eosinophil count (AEC), and serum IgE levels were assessed preoperatively and postoperatively. Patients were followed up to evaluate mucosal healing, symptom improvement, and recurrence.

Results: Both groups showed significant postoperative improvement in AEC and serum IgE levels ($p < 0.001$). However, the steroid group demonstrated a greater reduction in inflammatory markers compared to the itraconazole group ($p < 0.05$). Endoscopic findings revealed better mucosal recovery in Group A, with a higher proportion of patients achieving normal mucosa. Recurrence was significantly lower in the steroid group (11.5%) compared to the itraconazole group (30.8%). Symptomatic improvement was observed in both groups but was more pronounced in patients receiving steroids.

Conclusion: Both systemic steroids and itraconazole are effective in the postoperative management of AFRS; however, steroids show superior efficacy in reducing inflammation and preventing recurrence. Itraconazole may serve as an alternative or adjunct in selected patients.

Keywords: Allergic fungal rhinosinusitis, Functional endoscopic sinus surgery, Corticosteroids, Itraconazole, Absolute eosinophil count, Endoscopic outcomes.

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INTRODUCTION

Allergic fungal rhinosinusitis (AFRS) is a distinct non-invasive subtype of chronic rhinosinusitis characterized by an exaggerated hypersensitivity response to fungal elements present within the sinonasal cavities. It is increasingly recognized as an important clinical entity due to its chronic course, high recurrence rates, and significant impact on quality of life. AFRS is primarily mediated by immunological mechanisms rather than direct fungal invasion, differentiating it from invasive fungal sinus diseases (1, 2). The condition is typically associated with type I and type III hypersensitivity reactions, leading to eosinophilic inflammation and production of allergic mucin containing sparse fungal hyphae (3).

Epidemiologically, AFRS is more commonly observed in young immunocompetent individuals residing in warm and humid climates, with a higher prevalence reported in developing regions. The disease is often associated with atopy, nasal polyposis, and elevated serum IgE levels, reflecting an underlying allergic diathesis (4). Clinically, patients present

with progressive nasal obstruction, nasal discharge, facial pressure, and reduced olfactory function. In advanced cases, expansion of allergic mucin may result in bony erosion and orbital or intracranial complications (5).

The pathophysiology of AFRS involves a complex interplay between fungal antigens and host immune response. Current evidence suggests that an exaggerated type 2 inflammatory response plays a central role, leading to persistent eosinophilic infiltration and chronic sinonasal inflammation (6). This inflammatory cascade results in obstruction of sinus ostia, accumulation of allergic mucin, and a self-perpetuating cycle of inflammation and fungal antigen exposure (7). Despite extensive research, the exact mechanisms underlying disease initiation and progression remain incompletely understood.

Diagnosis of AFRS is based on a combination of clinical, radiological, and histopathological findings. The widely accepted diagnostic criteria proposed by Bent and Kuhn include evidence of type I hypersensitivity, nasal polyposis, characteristic radiological features, presence of eosinophilic mucin, and demonstration of fungal elements without tissue invasion (8). Early and accurate diagnosis is essential to prevent complications and guide appropriate management. The standard management of AFRS involves surgical removal of fungal debris and allergic mucin through functional endoscopic sinus surgery (FESS), followed by postoperative medical therapy. Systemic and topical corticosteroids are considered the mainstay of medical treatment due to their potent anti-inflammatory effects (9). However, long-term steroid use is associated with significant adverse effects, prompting the exploration of alternative therapies such as antifungal agents. Itraconazole, an oral antifungal drug, has shown promising results in reducing fungal load and modulating immune response, but its comparative efficacy with steroids remains a subject of ongoing research.

Given the chronic and recurrent nature of AFRS, optimizing postoperative medical therapy is crucial. Therefore, the present study aims to compare the effectiveness of systemic steroids and itraconazole in preventing recurrence and improving clinical outcomes in patients with AFRS.

MATERIALS AND METHODS

This prospective, comparative, interventional study was conducted in the Department of Otorhinolaryngology at Surabhi Medical College, Siddipet, Telangana, from December 2024 to February 2026, after obtaining approval from the Institutional Ethics Committee. The study included a total of 52 patients diagnosed with Allergic Fungal Rhinosinusitis (AFRS) who underwent Functional Endoscopic Sinus Surgery (FESS). Patients were selected using a consecutive sampling method, and all eligible participants presenting during the study duration were included until the desired sample size was achieved.

Inclusion criteria: Adult patients between 18 and 60 years of age, diagnosed with AFRS based on clinical presentation, diagnostic nasal endoscopy, and radiological findings, and willing to provide informed consent were included in the study.

Exclusion criteria: Patients with invasive fungal sinusitis, immunocompromised states, previous sinonasal surgery, contraindications to steroids and itraconazole therapy, and pregnant or lactating women were excluded.

All patients underwent a detailed preoperative evaluation, including history taking, thorough ENT examination, diagnostic nasal endoscopy, and computed tomography (CT) scan of the paranasal sinuses. Laboratory investigations such as absolute eosinophil count (AEC), serum IgE levels, and routine haematological parameters were assessed. The diagnosis of AFRS was established based on accepted diagnostic criteria, including the presence of nasal polyposis, characteristic radiological findings, eosinophilic mucin, and evidence of fungal elements, consistent with standard diagnostic frameworks.

All enrolled patients underwent FESS under standard operative protocols, which included complete removal of allergic mucin, clearance of fungal debris, and restoration of normal sinus ventilation and drainage pathways. Postoperatively, patients were randomly allocated into two equal groups of 26 each. Group A patients received systemic corticosteroid therapy in the form of oral prednisolone administered in tapering doses over a period of two to three weeks. Group B patients received oral itraconazole at a standard dose, typically 200 mg twice daily, for a duration of four to six weeks. In addition to the assigned interventions, all patients received standard postoperative care, including nasal saline irrigation and topical intranasal corticosteroid sprays.

Patients were followed up at regular intervals, including at 1 week and 6 weeks postoperatively, and additional follow up visits were scheduled as required. During each follow up, clinical symptoms were assessed, and diagnostic nasal endoscopy was performed to evaluate mucosal status, clearance of disease, and any evidence of recurrence. Laboratory parameters, including absolute eosinophil count and serum IgE levels, were reassessed post-treatment to evaluate the biochemical response to therapy. The study outcomes were assessed during follow-up such as recurrence of disease,

assessed endoscopically during follow-up visits, changes in absolute eosinophil count, serum IgE levels, improvement in mucosal condition on endoscopy, and overall symptomatic relief.

The data was collected using a structured proforma and extracted into Microsoft Excel sheet. Statistical analysis was performed using SPSS v.26.0. Continuous variables were expressed as mean with standard deviation, while categorical variables were presented as frequencies and percentages. The chi-square test was used to compare categorical variables between groups, and independent t-test was used for comparison of continuous variables. Paired t-test was applied to assess pre- and post-treatment differences within groups. A p-value of <0.05 was considered statistically significant.

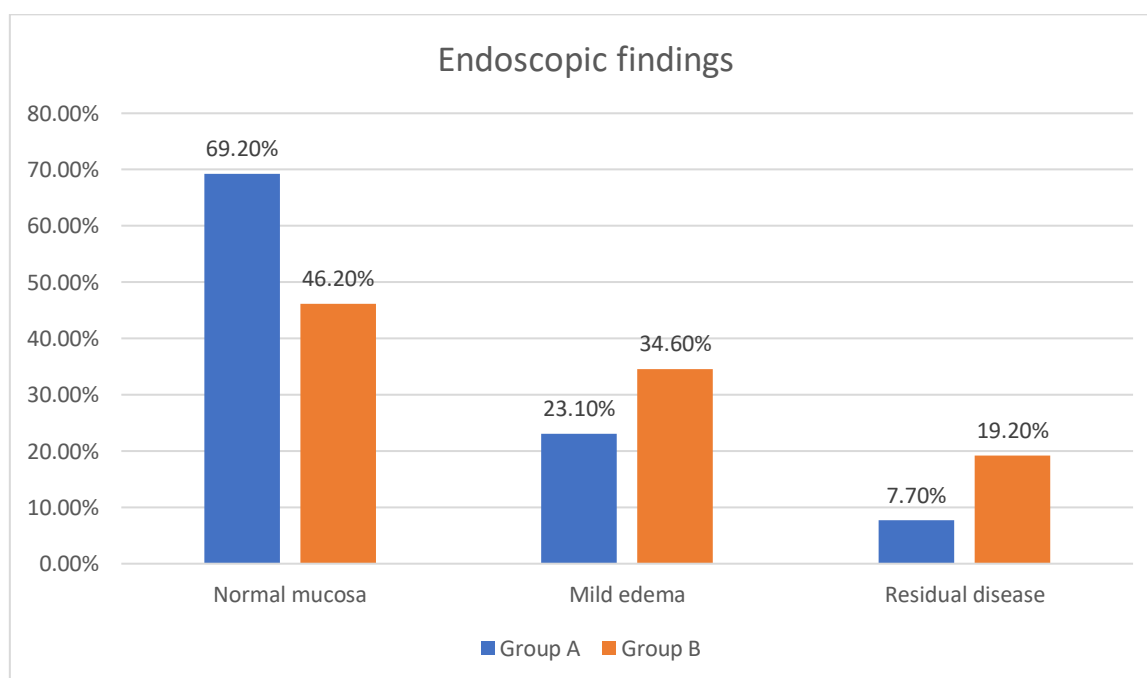
RESULTS

Table 1: Demographic profile of study participants.

Demographic parameters	Group A	Group B	p-value
	Frequency (%)	Frequency (%)	
Age (In years)			
18-30	8 (30.8%)	7 (26.9%)	0.812
31-40	10 (38.5%)	9 (34.6%)	
41-50	5 (19.2%)	6 (23.1%)	
51-60	3 (11.5%)	4 (15.4%)	
Mean Age	36.5±9.2	37.1±9.8	
Gender			
Male	15 (57.7%)	14 (53.8%)	0.782
Female	11 (42.3%)	12 (46.2%)	

Table 2: Comparison of pre operative and postoperative AEC and IgE levels.

Parameter	Pre/post op	Group A	Group B	p-value
AEC (Cells/μL)	Pre-op	820±110	805±120	0.388
	Post-op	410±95.2	560±105.3	0.001
Serum IgE (IU/mL)	Pre-op	980±210	960±200	0.265
	Post-op	520±150.4	680±170.2	0.001



Graph 1: Endoscopic findings at 6 weeks.

Table 3: Details of recurrence rate and symptomatic improvement in study participants.

Outcome	Group A	Group B	p-value
	Frequency (%)	Frequency (%)	
Recurrence rate			
Recurrence present	3 (11.5%)	8 (30.8%)	<0.05
No recurrence	23 (88.5%)	18 (69.2%)	

Symptom Relief			
Complete relief	20 (76.9%)	14 (53.8%)	-
Partial relief	5 (19.2%)	8 (30.8%)	
No improvement	1 (3.8%)	4 (15.4%)	

Table 4: Severity of complications reported in study groups.

Severity	Group A	Group B
	Frequency (%)	Frequency (%)
None	22 (84.6%)	20 (76.9%)
Mild	4 (15.4%)	6 (23.1%)
Severe	-	-

DISCUSSION

Allergic fungal rhinosinusitis is a unique subtype of chronic rhinosinusitis characterized by an exaggerated immunological response to fungal antigens, leading to eosinophilic inflammation, nasal polyposis, and a high tendency for recurrence after surgical management. The mainstay of treatment involves surgical clearance of allergic mucin and fungal debris followed by adjunctive medical therapy. The present study aimed to compare the efficacy of postoperative systemic steroids and itraconazole in preventing recurrence and improving clinical outcomes in AFRS patients. The findings of this study indicate that both treatment modalities are effective; however, systemic steroids demonstrated superior efficacy in multiple outcome parameters.

In the present study, the majority of patients were in the third and fourth decades of life, with a slight male predominance. This demographic pattern is consistent with earlier studies, which have reported that AFRS predominantly affects young to middle-aged individuals and is more common in males, particularly in tropical and subtropical regions (10). The baseline characteristics, including age, gender distribution, absolute eosinophil count (AEC), and serum IgE levels, were comparable between the two groups, ensuring homogeneity and validity of comparison.

Elevated AEC and serum IgE levels observed in both groups prior to treatment are well-established markers of AFRS and reflect the underlying type I hypersensitivity reaction (11). In the present study, both groups showed a statistically significant reduction in AEC and serum IgE levels following treatment. However, the reduction was significantly greater in the steroid group compared to the itraconazole group. This can be attributed to the potent anti-inflammatory action of corticosteroids, which suppress eosinophilic activity, inhibit cytokine release, and reduce IgE-mediated immune responses. These findings are in agreement with previous studies that have consistently demonstrated the efficacy of steroids in controlling the inflammatory cascade in AFRS (12).

Itraconazole, an antifungal agent, acts by reducing fungal colonization and thereby decreasing antigenic stimulation. In the present study, itraconazole also produced a significant reduction in AEC and serum IgE levels, although the magnitude of reduction was less compared to steroids. Similar findings have been reported by Patro et al., who observed that itraconazole reduces disease burden and inflammatory markers but is less effective than steroids in achieving rapid control (11). This suggests that while itraconazole targets the etiological factor (fungal load), steroids primarily target the host inflammatory response, which plays a central role in disease progression.

Endoscopic evaluation revealed that mucosal recovery was significantly better in the steroid group compared to the itraconazole group. A higher proportion of patients in the steroid group achieved complete resolution of mucosal edema and polyps, whereas residual disease was more frequently observed in the itraconazole group. This finding aligns with the known effects of steroids in reducing mucosal inflammation and preventing polyp recurrence (12). However, some studies have reported comparable outcomes between steroids and itraconazole. Rojita et al. found that both therapies produced significant improvement in endoscopic scores, with no statistically significant difference between the two groups (10). This discrepancy may be due to variations in study design, duration of therapy, and patient selection.

The recurrence rate observed in the present study was significantly lower in the steroid group (11.5%) compared to the itraconazole group (30.8%). This indicates that suppression of the inflammatory response is more effective in preventing recurrence than antifungal therapy alone. Similar observations have been reported in previous studies, where postoperative steroid therapy significantly reduced recurrence rates (12). However, recurrence in AFRS is multifactorial and influenced by factors such as environmental exposure, immune status, and adequacy of surgical clearance.

Several studies have highlighted the role of itraconazole as a steroid-sparing agent. Seiberling et al. demonstrated that itraconazole can reduce the need for repeated steroid courses and prolong the disease-free interval in patients with AFRS (14). Furthermore, recent studies have suggested that itraconazole may have comparable efficacy to steroids in certain clinical scenarios, particularly in patients with contraindications to steroid therapy (13). Therefore, itraconazole may serve as an alternative or adjunct in selected cases.

Symptomatic improvement was observed in both groups in the present study, with the steroid group showing a higher rate of complete symptom relief. This is likely due to the rapid anti-inflammatory effects of steroids, which lead to early resolution of nasal obstruction, discharge, and headache. However, some studies have reported better symptomatic improvement with itraconazole, possibly due to its effect on reducing fungal antigen load and improving mucosal healing (10).

The safety profile of both treatments was acceptable in the present study. No major adverse effects were reported. Mild gastrointestinal disturbances were noted in patients receiving itraconazole, while minor systemic effects were observed in the steroid group. These findings are consistent with previous literature, which emphasizes the importance of monitoring liver function during itraconazole therapy and cautious use of systemic steroids due to their potential systemic side effects (14).

CONCLUSION

In conclusion, both systemic steroids and itraconazole are effective as postoperative adjuncts in the management of allergic fungal rhinosinusitis. However, systemic steroids showed superior efficacy in reducing inflammatory markers such as absolute eosinophil count and serum IgE levels, improving endoscopic outcomes, and minimizing recurrence rates. Itraconazole, though less effective in comparison, provided meaningful clinical and immunological improvement and may serve as a useful alternative or adjunct, particularly in patients where steroid therapy is contraindicated. An individualized treatment approach, considering patient profile and risk factors, is essential to optimize outcomes and reduce disease recurrence in AFRS.

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