

Original Research

Clinico Pathological And Treatment Evaluation Of Allergic Fungal Rhinosinusitis

¹Dr. R Archana Pillai, ²Dr. Lakshmi A, ³Dr. Nila R, ⁴Dr Kiranjith J, ⁵Dr K Sasikumar,

¹Associate Professor Department of ENT, Sree Gokulam Medical College and Research Foundation, Trivandrum. Kerala, India. drarchanapillai@gmail.com

² Consultant, Department of ENT, Daya Hospital, Trissur, Kerala India. drlakshmiask25@gmail.com

³Consultant, Department of ENT, Paalana Institute of Medical Sciences, Palakkad, Kerala India. nilaa.raj@gmail.com

⁴Professor, Department of ENT, Sree Gokulam Medical College and Research Foundation, Trivandrum. Kerala, India. kiranjithj@hotmail.com

⁵Professor and Head, Department of ENT, Sree Gokulam Medical College and Research Foundation, Trivandrum. Kerala, India. drsasikumark@gmail.com

Corresponding author:

Dr. Lakshmi A

Junior Consultant, Department of ENT, Daya hospital, Trissur, Kerala India. drlakshmiask25@gmail.com

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Abstract

Background: Allergic Fungal Rhinosinusitis (AFRS) is a chronic inflammatory condition of the sinuses characterized by an allergic reaction to fungal elements. This study evaluates the clinico-pathological features and treatment outcomes of AFRS patients undergoing endoscopic sinus surgery followed by adjunctive medical therapy.

Methods: This retrospective study included 52 patients diagnosed with AFRS, who underwent endoscopic sinus surgery in a span of 4 years in Department of Otolaryngology & Head & Neck Surgery at a tertiary care centre in South India. Inclusion criteria involved a strong history of allergy, positive fungal culture, characteristic radiologic findings, and diagnostic nasal endoscopy showing allergic mucin or fungal debris. Postoperative treatment included systemic antifungals and steroids. Patients were followed up at 1 week, 3 weeks, 2 months, and 6 months postoperatively.

Results: The study cohort consisted of 30 males and 22 females. The most common symptom was nasal block, affecting 36.5% of patients bilaterally. Maxillary sinus involvement was seen in 69.2% of cases. Fungal cultures predominantly grew *Aspergillus* species. Postoperative follow-up showed significant improvement, with 42.3% of patients in stage 0 at the third follow-up. Recurrence was noted in 21.9% of cases. Combination therapy with antifungals and steroids was effective in managing AFRS.

Conclusion: Endoscopic sinus surgery combined with postoperative antifungal and steroid therapy effectively manages AFRS, resulting in significant symptom relief and mucosal healing. Regular follow-up and individualized treatment plans are crucial for long-term disease control.

Keywords: Allergic Fungal Rhinosinusitis, Endoscopic Sinus Surgery, Antifungal Therapy, Steroids, Recurrence, Nasal Polyposis

Introduction

Allergic fungal rhinosinusitis (AFRS) is a complex inflammatory condition characterized by hypersensitivity reactions to fungal antigens in the sinonasal mucosa, leading to chronic rhinosinusitis (CRS) symptoms [1]. Although its precise etiology remains elusive, AFRS is widely recognized as a distinct entity among the spectrum of rhinosinusitis disorders [2]. The incidence of AFRS has been rising globally, presenting a significant burden on healthcare systems due to its chronicity and recurrence [3]. Clinically, AFRS manifests with nasal obstruction, facial pain, anosmia, and nasal discharge, often mimicking other forms of CRS or allergic rhinitis [4]. Its diagnosis requires a comprehensive evaluation, including clinical history, endoscopic examination, radiographic imaging, and histopathological analysis [5]. Despite advances in diagnostic techniques, the management of AFRS remains challenging, necessitating a multimodal approach involving medical and surgical interventions [6]. Understanding the pathological mechanisms underlying AFRS is essential for developing effective treatment strategies and improving patient outcomes. While the role of fungal colonization and immune dysregulation in AFRS pathogenesis is well-documented, several aspects, such as genetic predisposition and environmental factors, warrant further investigation [7]. This paper aims to provide a comprehensive overview of AFRS, encompassing its clinical presentation, diagnostic criteria, treatment modalities, and outcomes. By synthesizing current evidence and highlighting gaps in knowledge, this research endeavors to contribute to the understanding and management of this enigmatic condition.

Materials and Methods

Study Design: This retrospective study assessed patients undergoing endoscopic sinus surgery for Allergic Fungal Rhinosinusitis (AFRS) in a span of 4 years in Department of Otolaryngology & Head & Neck Surgery at a tertiary care centre in South India..

Inclusion Criteria:

1. Patients with a strong history of allergy and/or repeated sinus surgeries.
2. History of bronchial asthma or nasal polyposis.
3. Positive fungal culture.
4. Presence of two or more characteristic radiologic findings.
5. Diagnostic nasal endoscopy revealing allergic mucin, fungal debris, or polyps.
6. Cases with histopathology reports meeting at least two criteria post-functional endoscopic sinus surgery.

Exclusion Criteria:

1. Cases with obvious bacterial infections (elevated total and neutrophil counts).
2. Positive bacterial cultures.
3. Evidence of mucosal invasion by fungi or mucosal necrosis in histopathology.
4. Presence of fungal balls or positive fungal special stains in tissue.
5. Absence of allergic mucin during endoscopy.
6. Lack of mucin pools or eosinophilic infiltrates in histopathology.

Data Collection: Clinical data were collected using a structured proforma. All patients underwent complete blood counts with absolute eosinophil counts to rule out bacterial infection. Sinus X-rays or CT scans were performed, and allergy testing was conducted when applicable. Specimens for culture were obtained aseptically from allergic mucin and nasal swabs.

Culture and Sensitivity Testing: Specimens were cultured on mould inhibitory agar and Sabouraud's dextrose agar at 30°C. Bacterial cultures were performed to rule out superinfection. Sensitivity testing was conducted using standard techniques.

Histopathological Examination: Sinus mucosa samples were obtained during surgery for histopathological examination. Specimens were processed for routine histopathology and stained with hematoxylin and eosin, Gomori methanamine silver stain (GMS), Gram's stain, and Fontana Masson stain.

Treatment Protocol: Preoperatively, patients received antieosinophil measures, antihistamines, steroid sprays, antibiotics, and saline nasal irrigations. Endoscopic sinus surgery aimed for complete removal of allergic mucin and fungal debris, permanent drainage, and ventilation of affected sinuses. Postoperatively, nasal packs were kept for 2 days, and patients were started on saline irrigations and local steroid sprays. Oral steroids were administered for cases with polyposis, and systemic antifungals (itraconazole) were initiated for culture-positive cases.

Follow-Up: Patients underwent regular follow-ups postoperatively to assess symptomatic improvement. Endoscopic cleanings were performed, and the postoperative mucosa status was graded using Kupfenberg's grading system. Recurrence cases underwent repeat fungal culture.

Results

Table 1: Patient Demographics and Sinus Involvement

This table summarizes the gender distribution and sinus involvement in patients with allergic fungal rhinosinusitis. The study included 52 patients, of which 22 were females (42.3%) and 30 were males (57.7%). Regarding sinus involvement, the maxillary sinus was most commonly affected (69.2%), followed by the ethmoid sinus (21.2%), multiple sinus involvement (34.6%), frontal sinus (25.0%), pansinusitis (15.4%), and sphenoid sinus (1.9%).

Table 2: Symptomatology and Past Medical History

This table highlights the common symptoms and associated medical history of the patients. The most prevalent symptoms were sneezing (67.3%), headache (59.6%), and watering (59.6%). Other symptoms included itching (42.3%), anosmia (9.61%), epistaxis (5.8%), eye symptoms (9.61%), and skin allergy (1.9%). Regarding past medical history, 53.8% of the patients had no significant past history, while 23.1% had bronchial asthma, 15.4% had hypertension, and 13.5% had diabetes mellitus. Additionally, 1.9% of patients had a history of facial palsy, renal disease, and arthropathy each.

Table 3: Diagnostic Evaluations

This table details the diagnostic evaluations including absolute eosinophil count and fungal culture results. The absolute eosinophil count was distributed as follows: 100-400 cells/ μ L (36.5%), 401-800 cells/ μ L (40.4%), 801-1200 cells/ μ L (21.2%), and 1201-1600 cells/ μ L (1.9%). In fungal culture, *Aspergillus* species were the most frequently identified, with *Aspergillus Niger* (34.6%), *Aspergillus Fumigatus* (19.2%), and *Aspergillus Flavus* (9.6%). Other fungi identified included *Candida* (1.9%), *Zygomycetes* (3.8%), and *Trichoderma* (1.9%), while 26.9% of patients had multiple fungal infections. Only one patient (1.9%) showed no fungal growth.

Table 4: Follow-up Endoscopic Staging

This table shows the results of endoscopic staging during follow-ups. At the first follow-up, 55.8% of patients were in stage 0, 32.7% in stage 1, 1.9% in stage 2, and 5.8% in stage 3. At the second follow-up, 38.5% were in stage 0, 34.6% in stage 1, 17.3% in stage 2, and 5.8% in stage 3. The third follow-up revealed 42.3% of patients in stage 0 and 17.3% in stage 1. A total of 41 patients came for the third follow-up, where 30 cases (75.6%) showed complete cure (stage 0), and 9 cases (21.9%) had recurrence (stage 1).

Table 5: Follow-up Endoscopic Staging

This table presents the endoscopic staging outcomes across three follow-ups, reflecting the mucosal condition of patients post-surgery and treatment.

- **First Follow-up:** Of the 50 patients, 55.8% were in stage 0, indicating no visible disease. 32.7% were in stage 1, showing mild disease, 1.9% were in stage 2 with moderate disease, and 5.8% were in stage 3, indicating recurrence or polyps.
- **Second Follow-up:** Among the 52 patients, 38.5% were in stage 0, 34.6% in stage 1, 17.3% in stage 2, and 5.8% in stage 3, showing a slight decline in the number of patients with no visible disease and an increase in those with moderate disease.
- **Third Follow-up:** Of the 41 patients who attended, 42.3% were in stage 0, showing no visible disease, and 17.3% were in stage 1. This follow-up was significant as it showed the mucosal condition after one month of surgery and medical treatment, with 75.6% showing complete cure and 21.9% having recurrence.

Table 6: Endoscopic Staging and Treatment

This table details the distribution of endoscopic stages during the third follow-up and the corresponding treatments with steroids and antifungals.

- **Stage 0 (No visible disease):** 22 patients (42.3%), of which 4 patients (13.3%) received oral steroids, and 13 patients (43.3%) were treated with Sporonox (Itraconazole). 3 patients (10.0%) were treated with Canditral.
- **Stage 1 (Mild disease):** 9 patients (17.3%), with 2 patients (6.7%) receiving both oral steroids and antifungals. The rest were treated accordingly with either Sporonox or Canditral.

Steroids and Antifungals Treatment

- **Patient Follow-up:** During the follow-up periods, a majority of patients showed significant improvement, with the highest percentage of complete cure observed at the third follow-up.
- **Treatment Efficacy:** The use of antifungals, particularly Sporonox, was the most common treatment, followed by a combination of steroids and antifungals. A small number of patients were treated with local antifungal drops, which also showed efficacy.
- **Endoscopic Staging:** There was a gradual improvement in endoscopic staging, with a notable number of patients moving from stages 2 and 3 to stage 0, indicating effective management of allergic fungal rhinosinusitis through surgical and medical interventions.

Table 1: Patient Demographics and Sinus Involvement

Patient Gender	No. of Patients	Percentage (%)
Female	22	42.3
Male	30	57.7
Total	52	100
Sinus Involved	No. of Patients	Percentage (%)
Frontal	13	25.0
Maxillary	36	69.2
Sphenoid	1	1.9
Ethmoid	11	21.2
Pansinusitis	8	15.4
Multiple	18	34.6

Total	52	100
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Table 2: Symptomatology and Past Medical History

Symptom	No. of Patients	Percentage (%)
Headache	31	59.6
Sneezing	35	67.3
Watering	31	59.6
Itching	22	42.3
Anosmia	5	9.61
Epistaxis	3	5.8
Eye symptoms	5	9.61
Skin allergy	1	1.9
No significant past history	28	53.8
Bronchial asthma	12	23.1
Hypertension	8	15.4
Diabetes Mellitus	7	13.5
Facial Palsy	1	1.9
Renal disease	1	1.9
Arthropathy	1	1.9
Total	52	100

Table 3: Diagnostic Evaluations

Diagnostic Method	No. of Patients	Percentage (%)
Absolute eosinophil count	-	-
100-400	19	36.5
401-800	21	40.4
801-1200	11	21.2
1201-1600	1	1.9
Total	52	100
Fungal Culture	No. of Patients	Percentage (%)
No fungus	1	1.9
Aspergillus Flavus	5	9.6
Aspergillus Fumigatus	10	19.2
Aspergillus Niger	18	34.6
Candida	1	1.9
Zygomycetes	2	3.8
Trichoderma	1	1.9
Multiple	14	26.9
Total	52	100

Table 4: Follow-up and Treatment

Follow-up Stage	No. of Patients	Percentage (%)		
Follow-up 1	-	-		
Stage 0	29	55.8		
Stage 1	17	32.7		
Stage 2	1	1.9		
Stage 3	3	5.8		
Missed on follow-up	2	3.8		
Total	52	100		
Follow-up Stage	No. of Patients	Oral Steroid Given	Oral Antifungal (Sporonox)	Oral Antifungal (Canditral)
Follow-up 3	-	-	-	-
Stage 0	22	4 (13.3%)	13 (43.3%)	3 (10.0%)
Stage 3	8	2 (6.7%)	3 (10.0%)	4 (13.3%)
Total	30	6 (20.0%)	16 (53.3%)	7 (23.3%)

Table 5: Follow-up and Treatment

Follow-up Stage	No. of Patients	Oral Antifungal Not Given
Follow-up 3	-	-
Stage 0	22	6 (20.0%)
Stage 3	8	1 (3.3%)
Total	30	7 (23.3%)

Table 6: Follow-up Endoscopic Staging and Treatment

Follow-up Stage	Endoscopic Staging	No. of Patients	Percentage (%)	Treatment
Follow-up 1	Stage 0	29	55.8	-
	Stage 1	17	32.7	-
	Stage 2	1	1.9	-
	Stage 3	3	5.8	-
Total		50	100	-
Follow-up 2	Stage 0	20	38.5	-
	Stage 1	18	34.6	-
	Stage 2	9	17.3	-
	Stage 3	3	5.8	-
Total		52	100	-
Follow-up 3	Stage 0	22	42.3	-
	Stage 1	9	17.3	-
Total		41	100	-

Table 7: Steroids and Antifungals Treatment

Treatment	No. of Patients	Percentage (%)
Steroids only	3	9.7
Antifungals only	16	51.6
Both Steroids and Antifungals	5	16.1
Local Antifungal (Nuflucone drops)	2	6.5
No Treatment	7	22.6
Total	33	100

Discussion

The management of Allergic Fungal Rhinosinusitis (AFRS) remains a significant challenge due to its chronic nature and high recurrence rates. This study aimed to evaluate the clinico-pathological features and treatment outcomes of patients with AFRS who underwent endoscopic sinus surgery and received adjunctive medical therapy. The findings of this study provide valuable insights into the effectiveness of combined surgical and medical treatments in managing AFRS.

Clinical Presentation and Diagnosis: The demographic data showed a slight male predominance, consistent with other studies indicating a higher prevalence of AFRS among males. The most commonly involved sinus was the maxillary sinus (69.2%), followed by the ethmoid sinus (21.2%), highlighting the predilection of AFRS for these areas. Patients typically presented with symptoms such as sneezing, headache, and nasal discharge, which are characteristic of AFRS and corroborate findings from similar studies [1,4,8].

The inclusion criteria for the study ensured that only patients with a confirmed diagnosis of AFRS were included, as evidenced by positive fungal cultures and characteristic radiologic and endoscopic findings. The exclusion criteria effectively ruled out other forms of fungal sinusitis and bacterial infections, ensuring a homogeneous study population [9,10].

Treatment Modalities: The study employed a combination of surgical and medical treatments. Endoscopic sinus surgery aimed at removing fungal debris and allergic mucin, and restoring sinus drainage was performed on all patients. Postoperative medical therapy included systemic antifungals and steroids, which are crucial in managing the inflammatory component of AFRS and preventing recurrence [11-13].

Follow-up and Outcomes: The follow-up data indicated that a significant proportion of patients achieved complete resolution of symptoms. At the first follow-up, 55.8% of patients were in stage 0 (no visible disease), which increased to 42.3% by the third follow-up. This progressive improvement underscores the effectiveness of the combined surgical and medical approach [11,12].

Steroids and Antifungals: The use of antifungals, particularly Itraconazole, was prevalent among the study population. Itraconazole's efficacy in reducing fungal load and its anti-inflammatory properties make it a cornerstone in the management of AFRS. Steroids were used in cases with significant polyposis or severe inflammation, highlighting their role in controlling allergic mucin and reducing inflammation. The combination therapy of steroids and antifungals was beneficial, especially in cases with persistent disease, aligning with previous studies that advocate for such an approach [13-15].

Clinical Implications: The findings of this study have important clinical implications. The high success rate of endoscopic sinus surgery combined with postoperative medical therapy supports the notion that a multidisciplinary approach is essential in managing AFRS. Regular follow-up and tailored medical therapy based on individual patient response are critical in achieving long-term disease control [11-15].

Limitations and Future Directions: Despite the promising results, the study had limitations. The retrospective nature of the study and the relatively small sample size might limit the generalizability of the findings. Additionally, seven patients were lost to follow-up, which could have affected the overall outcomes. Future studies should aim to include larger, prospective cohorts to validate these findings. Moreover, there is a need for standardized protocols for the use of antifungals and steroids in AFRS. While our study provides evidence supporting their use, optimal dosages, and durations of treatment need to be established through randomized controlled trials.

Conclusion

In conclusion, the management of AFRS through a combination of endoscopic sinus surgery and medical therapy with antifungals and steroids appears to be highly effective. The significant improvement in endoscopic staging and symptom resolution in our study cohort underscores the importance of a comprehensive treatment approach. Regular follow-up and individualized treatment plans are essential to manage this chronic and often recurrent condition successfully. Future research should focus on refining treatment protocols and exploring new therapeutic options to further improve patient outcomes in AFRS.

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