



ORIGINAL RESEARCH PAPER

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INCIDENCE OF FUNGAL INFECTION IN SINONASAL POLYPOSIS

KEY WORDS: sinonasal polyps, fungal sinusitis

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ABSTRACT

Aims

1. To study the incidence of fungal infection in sinonasal polyposis.
2. To correlate clinical, microbiological and histopathological characteristics of nasal polyps.

Material and Methods Prospective non-randomized cohort study was conducted in 60 patients with nasal polyps [unilateral or bilateral] and nasal debris along with tissues were examined for the presence of fungus.

Conclusion Incidence of fungal rhinosinusitis is on the rise in this era of antibiotics and diagnostic facilities. As the incidence is rising, more and more researches are taking place in this field and debates linger over its classification, diagnosis and management. Nasal polyps are associated with fungal sinusitis. In our study, the incidence of fungal infection in patients with sinonasal polyposis was 63%.

INTRODUCTION

Fungal rhinosinusitis is being increasingly recognized in persons of all age groups, resulting in great socioeconomic effects, including both direct and indirect costs to the society. The patients have high morbidity and even may have high mortality especially those having acute invasive fungal rhinosinusitis.¹⁻⁵

Nasal polyposis, which is regarded as the ultimate form of chronic inflammation, is in strict sense, not a nasal but a sinonasal disease. Etiology in the large majority of cases is unknown and the pathogenesis poorly understood.⁶ The reported prevalence of nasal polyposis seems to vary between 0.2 and 4.3 percent of the population.⁷⁻¹⁰ Many theories and hypothesis concerning its pathogenesis have been proposed. But fungal infection in nasal polyposis is still a challenge for otolaryngologist.

Incidence of fungal rhinosinusitis has been increasing due to technical advances in mycology, serology, histopathology and radiology,¹¹ fungal overgrowth as a result of alteration in the normal bacterial flora by the increasing use of broad spectrum antibiotics and topical nasal preparations.

Although, fungal rhinosinusitis has become increasingly recognized but the classification and treatment are still under debate and much remains to be learnt about its optimal management.¹²⁻¹⁴ Depending on the nature of environment, some fungi have the ability to change their enzymatic pathways for growth, morphology and method of reproduction. As such, some fungi can exhibit striking differences in appearances that can occur with temperature changes {room temperature versus body temperature}. Therefore, unless proper culture environment is used it can be very difficult to accurately speciate a fungus. As they require only organic material and moisture, it is not surprising that fungi might be identified in the nasal passages of normal individuals. Thus, it is the ubiquitous and elusive nature of fungi that demands a high index of suspicion in order to diagnose fungal rhinosinusitis. Furthermore, fungal disease should be considered in the differential diagnosis of all patients with unexplained, recalcitrant, or aggressive disease afflicting the nose and paranasal sinuses.

Despite the availability of medical and surgical treatments, the recurrence rate is extremely high, and patients require years of follow-up. "When I take on a fungal sinusitis patient, I expect to be married to that patient for the rest of my professional life," said Frederick Kuhn, MD, Director of the Georgia Nasal and Sinus Institute in Savannah.

MATERIAL AND METHODS

We made an attempt to evaluate the patients of nasal polyps in

view of fungal infection and to study the nasal polyps of different etiologies.

Design and setting of study

This prospective non-randomized cohort study was conducted in the Department of E.N.T, M.G.M. Medical College and Hospital, Kamothe, Navi Mumbai from June 2008 to May 2009.

Sample size

60 patients with nasal polyps [unilateral or bilateral] were taken. Samples were collected by complete enumeration method.

Study period

1 year

Inclusion criteria

1. Cases clinically diagnosed as having unilateral or bilateral nasal polyp(s)
2. Patients with recurrent nasal polyps.

Exclusion criteria

Patients with age less than 15 years.

Data collection

All the patients with nasal polyps were examined clinically followed by diagnostic nasal endoscopy. Routine blood investigations were done. All the patients underwent NCCT PNS except patients with recurrences for whom CECT was done. Medical management was done for each patient in the form of nasal steroids for 3 months. Oral steroids were added in patients with massive and recurrent nasal polyps. Those patients found resistant to medical treatment, were managed surgically [Functional Endoscopic Sinus Surgery]. For identification of fungus, nasal swab was sent for KOH mount and fungal staining (L.P.C.B. Lacto Phenol Cotton Blue and Gram stain) & culture and sensitivity. Debris were looked for Charcot Leyden crystals. For histopathological examination, H & E and PAS stains were used and debris were looked for allergic fungal mucin. Due to financial constraints, immunological (serological) evaluation of the patients could not be done.

RESULTS

1.Incidence of fungal infection in sinonasal polyposis was calculated.

NEW CASE—newly diagnosed case of nasal polyp with fungal infection within the duration of study.

OLD CASE—previously diagnosed case of nasal polyp with fungal infection before starting the study.

Total no of new cases / new and old cases
 21/21+12 = 63%

2. Varied presentation of nasal polyps with their histopathological and microbiological features

	Allergic fungal rhinosinusitis	Fungal ball	Ethmoidal polyps	Others [inverted papilloma, carcinoma, angiofibroma]
Allergic mucin	+	-	-	-
Luminal fungal hyphae	+	+	-	-
Inflammatory cells	+	+	+	-
Multinucleate giant cell granuloma enclosing fungal hyphae	-	-	-	-
Angioinvasion by fungi	-	-	-	-

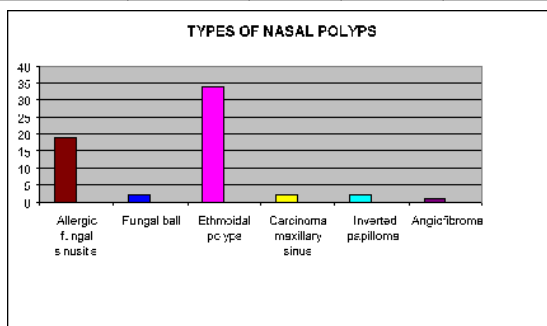


Figure-1 Varied presentations of nasal polyps

3. Different types of fungus found in patients with fungal sinusitis

Fungal culture	Aspergillus fumigatus	Others [other Aspergillus sp. and dematiaceous fungi]	No growth
	38%	4%	58%

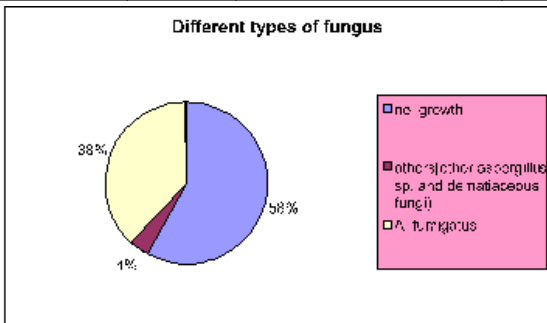


Figure-2 Fungal species isolated from nasal polyps

CONCLUSION

Incidence of fungal rhinosinusitis is on the rise in this era of antibiotics and diagnostic facilities. As the incidence is rising, more and more researches are taking place in this field and debates linger over its classification, diagnosis and management. Nasal polyps are associated with fungal sinusitis. In our study, the incidence of fungal infection in patients with sinonasal polyposis is 63%.

All our patients were immunocompetent. So, the association of invasive fungal sinusitis with sinonasal polyposis could not be assessed.

Invasive fungal sinusitis parallels the explosive increase in the immunocompromised patient population, and are characterized

by diagnostic difficulties and extreme mortality. Current strategies need considerable improvement, yet ongoing collaborative efforts will have a positive impact on our understanding of the fungus-host interaction and ultimately our ability to offer better care to the patients.

DISCUSSION

Nasal polyps, which are one of the commonly encountered entities for an otorhinolaryngologists are still under debate in reference to its etiology and pathogenesis. The relationship between nasal polyposis and chronic rhinosinusitis is much debated but in its broadest sense nasal polyposis should probably be regarded as one form of chronic inflammation in the nose and sinuses, i.e. part of the spectrum of chronic rhinosinusitis. Fungal infection in nasal polyposis is also common but still its classification, pathogenesis and its association with nasal polyps is under debate. Most of the work is taking place for allergic fungal sinusitis which is, perhaps, the most common of all fungal sinusitis. The incidence of polyposis in allergic fungal rhinosinusitis is almost 100%.

It is the inflammatory response to the fungus, rather than the mere presence of fungus, that is the primary manifestation of the disease. In these forms, small amounts of fungi result in clinically significant disease, demonstrating the ability of fungal exposure to initiate a cascade of events.

In our present study performed in a selected cohort of 60 patients with nasal polyps, all the patients resistant to medical treatment were subjected to functional endoscopic sinus surgery and debris & tissues were sent for microbiological and histopathological examination. Immunological evaluation could not be done due to financial constraints. The total number of patients of nasal polyps with fungal infection were 21, out of which 19 patients were diagnosed as allergic fungal sinusitis and 2 patients as of fungal ball. Ethmoidal polyps were diagnosed in 34 patients, carcinoma maxillary sinus and inverted papilloma in 2 patients each and angiofibroma in 1 patient.

Venn Ewald et al¹⁵ in 1999 described that microscopic fungal colonization of the nose and paranasal sinuses may be a common finding in both normal and diseased states. Disease manifestations depend upon the immune status of the individual. Chakrabarti, Das and Panda¹⁶ in 2008 described the controversies surrounding the categorization of fungal sinusitis and divided it into two types i.e. invasive and non-invasive fungal sinusitis. Klossek¹⁴ in 1997 suggested the involvement of single sinus in most cases of fungal ball. In 10% of the cases, it was associated with nasal polyps. Hyphae could be seen in the fungal ball but fungal culture was positive only in 23-50% of cases.

Manning and colleagues¹⁷ in 1989 described allergic fungal rhinosinusitis as a nasal correlate of allergic bronchopulmonary aspergillosis. Dhiwaker et al¹⁸ in 2003 studied 20 cases of allergic fungal rhinosinusitis with an age group of 15-40 years and found the mean age to be 24.9 years which is 32 years in our study with an age group ranging from 15-80 years.

Manning and Holman et al¹⁹ in 1998 found the incidence of fungal infection to be more in males with the ratio of 1.6:1 which is comparable to our study where the ratio is 1.7:1. Nasal symptoms such as nasal obstruction with rhinorrhea and headache were present in 100% of patients in our study which is comparable to Scott C. Manning et al¹⁹ study in which these were present in 80% of patients.

Rugina et al²⁰ in 2002 reported the prevalence of asthma in patients with nasal polyps to be as high as 45%. In our study, asthma was associated in 43.3% of patients with nasal polyps. Allergy has been assumed to be the underlying cause of nasal polyps. Indeed polyps removed at surgery continue to be labelled as 'allergic type polyps' by histopathologists. The presence of eosinophilia, mast cell degranulation and high levels of IgE suggest an allergic basis of nasal polyps. This has been challenged by a number of clinically based studies which found objective measures of atopy {i.e. skin prick testing} to be no more common in polyp

patients than the general population.^{21,22} Nasal polyps are also no more common in atopic individuals.^{21,23,24} The high level of IgE in polyp tissue,²⁵ even in the absence of other markers of atopy (such as skin prick testing), may indicate local production. It remains possible therefore, that local allergic mechanisms could play a role in the pathogenesis of polyps.²⁶

Cody et al²⁷ in 1994 found raised eosinophil counts in 65% of patients. In our study, eosinophils were raised in all patients of allergic fungal rhinosinusitis. Schubert and Goetz²⁸ in 1998 found the incidence of polyposis to be 100% in allergic fungal sinusitis.

Nasal polyposis is a non-specific indicator of chronic nasal inflammation, and patients undergoing functional endoscopic sinus surgery for polypoid rhinosinusitis are expected to be afflicted with allergic fungal rhinosinusitis in 5-10% of such cases.²⁹ Preoperative steroids reduce the nasal polyposis and facilitate identification of surgical landmarks, but may obfuscate the diagnosis of allergic fungal rhinosinusitis.³⁰

Morpeth³¹ in 1996 proved the variable yield of fungal cultures [64% -100%] which renders allergic fungal rhinosinusitis in the presence of a negative fungal culture possible. Conversely, a positive fungal culture fails to confirm the diagnosis of allergic fungal rhinosinusitis, because it may merely represent the presence of saprophytic fungal growth. It is for this reason that the histological appearance of allergic mucin remains the most reliable indicator of allergic fungal rhinosinusitis. In our study, fungal hyphae as well as allergic fungal mucin were seen in all patients of allergic fungal sinusitis.

Endoscopic evaluation of all patients was done preoperatively and immediate postoperatively, at 6 months and 1 year. Most of the patients with nasal polyps were of endoscopic grade 2 preoperatively and recurrence was found in 6% of the patients after 1 year of follow up. Recurrences can be because of the non-compliance of the patients. Further follow up is required to assess the actual recurrence of nasal polyps.

The present study done at our institution in 60 patients, has shown the incidence of fungal infection in nasal polyps to be 63%.

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