Research Article

Intracranial and Intraorbital Extension of Allergic Fungal Rhinosinusitis in Patients Presenting at Tertiary Care Hospitals, Lahore

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Abstract

Background: Allergic fungal rhinosinusitis is a unique type of disease, which occurs between 5 and 10 percent of all disease patients. It is caused by long term , severe allergic inflammation directed against various fungi. AFRS patients are immunocompetent and exhibit evidence of allergy to one or more species of fungi. Management includes medical treatment and surgical procedure . Diagnosis is confirmed after surgery by histopathology including Fungal cultures

Objective: To determine the frequency of intracranial and intraorbital extension of allergic fungal rhinosinusitis

Methods: Conducted in ENT Department, Mayo Hospital , Lahore during 07 Sep 2021 to 15 Feb 2022. The demographical information included, their name, age, gender, address and contact number for correspondence. Patients between 20-60 years of age, Patients of both gender viz male and female and patients diagnosed with AFRS as per operational definition. The data analysis is carried out using computer based statistical package for social sciences (spss) 20 version.

Result: Mean age of study population was 41.23 year with a standard deviation 9.27 years. Male were dominant with a frequency of 59(59%). Diabetes Mellitus was found in 43(43%). Intra cranial extension was noted in 39(39%) of cases. On the other hand, intraorbital extension was present in 73(73%) cases.

Conclusion: It was noted a high prevalence of intraorbital extension in allergic fungal rhinosinusitis. Recommendations for current practice and future research.

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Introduction

Historically, Allergic Fungal Rhino Sirusitis was considered to be a sinonasal tumor but over time now it is considered to be an allergic reaction to aerosolized environmental fungi, usually of the dematiaceous species, in an immunocompetent host. Allergic rhinitis is mostly found in patients with AFRS but exact time for transition from allergic rhinitis to AFRS cannot be determined accurately. Thick fungal debris and mucin are developed in the sinuses and must be removed surgically so that the allergen is no longer present.[2]

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AFRS is a noninvasive disease with an incidence of between 6 and 9% of all rhinosinusitis who require surgery. Patients with AFRS commonly present with nasal polyposis, inhalant atopy, increases total serum immunoglobulin E, inspissates of a c extramucosal 'peanut butter' visco-elastic eosinophil-rich material called 'allergic mucin' that specific fungal hyphae.[3] CT scan is always characteristic showing double density sign which is hyperattenuation of the area containing fungus due to increase amount of minerals specially Manganese and Iron in the Fungus. This disease is also similar to allergic bronchopulmonary aspergillosis (ABPA). The Allergic mucin typically cultures positive for either dematiaceous fungi such as *Bipolaris spicifera* or *Curvularia lunata*, or *Aspergillus* species such as *A. fumigatus*, *A. flavus* or *A. niger*. Type 1 immediate hypersensitivity is the etiologic factor as both AFRS and ABPA have been found to have association with specific class II major histocompatibility

alleles.[4]

On CT scan there are signs of increase bone remodelling and expansion due the pressure effect of fungas in the nasal and sinus cavities. Aggressive expansion and bone remodeling leads to expansion of the sinonasal cavities, leading to communication between nasal and ophthalmic area and brain via ersion of lamina papyrecea and skullbase. Orbital extension may lead to proptosis, diplopia, epiphora, visual loss, ophthalmoplegia, and orbital abscesses. Intracranial extension may lead to meningitis and other intracranial complications.[5]

In a study it was noted that 15/27 (56%) had intraorbital erosion.[6] while in another study it was noted that 33(27%) had intracranial extension and 85(72%) had intraorbital extension.[7] On contrary to this, it was evaluated that intra orbital extension was seen in 78% and intracranial extension was observed in 9%.[8]

In another study the allergic fungal rhinosinusitis was reason of intraorbital extension in 27(27.6%) patients and intracranial extension in 13(13.6%) of the cases.[9]

Objective of this study is to determine actual frequency of the intraorbital and intracranial extension in allergic fungal rhinosinusitis cases. In the previous published literature there is variability in the results and there are also conducted only two studies in Pakistan. Hence, this study is planned. If we found high frequency of the above mentioned two conditions then related management plans would be observed and executed.

Methods

It was a Cross sectional study conducted in ENT Department unit 1 Mayo Hospital Lahore. It is estimated as 100 cases using 95% confidence interval, 5% margin of error taking an expected percentages of intracranial extension as 13% and intraorbital extension as 27% in cases of allergic fungal rhinosinusitis. Non probability Consecutive sampling Technique was used .Patients between 20-60 years of age, Patients of both gender viz male and female and Patients diagnosed with allergic fungal rhinosinusitis were included in the study. Patients with the history of sinusitis from last six months, Patients who have been operated for nasal procedures, Patients who have been suffered from corneal condition assessed on history, Patients who have been on steroid treatment for nasal or eye infection in last six months and AFRS without erosion of bone, fungal hyphae on staining and other forms of fungal sinusitis invasive and non-invasive were excluded. Patients fulfilling the inclusion criteria was selected from ENT OPD of Mayo Hospital, Lahore who was visiting the hospital for checkup after informed consent and approval from the eithical review committee. Patients was inquired about their demographical information. This demographical information included, their name, age, gender, address and contact number for correspondence.

Patients were accurately diagnosed for AFRS as per operational definition. Once the patient is confirmed that he/she was further inquired for the other related variables, like duration of disease and diabetes mellitus and hypertension (BP>140/90).

Patients was then subjected to the CT scan for the evaluation of the intraorbital and intracranial extension. CT scan report was evaluated and presence of intracranial and intraorbital extension was considered. The data analysis was carried out using computer based statistical package for social sciences (spss) 20 version. Mean standard deviation was calculated for quantitative variable like age and duration of disease. Frequency and % age was calculated for qualitative variable as gender, diabetes mellitus (RBS>200mg/dl), hypertension (BP>140/90mmHg), intracranial and intraorbital extension. Effect modifier was controlled through stratification. Stratification was done for age, gender, DM, hypertension and duration of disease. Post stratification, chi – square test was applied by taking $P \leq 0.05$ as a significant

Result

Mean age of the study population was 41.23 year with a standard deviation 9.27 years (Age range 27-60 year). Male were dominant with a frequency of 59(59%) and female were less 41(41%). Mean duration of disease was 11.9±3.64 months at the time of presentation. Diabetes Mellitus was found in 43(43%) and absent in 57(57%) cases. It was noted that intra cranial extension in 39(39%) of cases while it rejected 61(61%). On the other hand, intraorbital extension presence in 73(73%) cases and 27(27%) were without this.

Stratification was carried out for age and it was noted that there was no significant difference of the age for the intracranial extension (Table#7). But gender has significant impact on the frequency of intracranial extension (p-value=0.03, Table#8). No significant effect was noted of the duration of disease (p-value<0.05, table#9). It was noted that intracranial extension was high in diabetes 26(60.5%) and in lesser in without diabetes 13(22.8%)(Table#10). No significant difference was noted between infraorbital extension for age, gender, duration of diseases and diabetes mellitus (Table#11-14)

Discussion

AFRS affects usually immunocompetent atopic patients who have increased hypersensitivity reaction to fungus. Nasal polyposis and allergic mucin obstructing sinus openings is the hallmark of this disease . Excessive fungus produces

Table 1: *Stratification of Stratification of Intracranial Extension with Respect to Diabetes Mellitus*

		Intracranial Extension		P-value
		Yes	No	
Diabetes Mellitus	Yes	26	17	0.05
		60.5%	39.5%	
	No	13	44	
		22.8%	77.2%	

Table 2: *Stratification of Intra-orbital Extension with respect to Age*

		Intraorbital Extension		P-value
		Yes	No	
Group of Age	<40 year	39	14	0.53
		73.6%	26.4%	
	>40	34	13	
		72.3%	27.7%	

Table 3: *Stratification of Stratification of Intra-orbital Extension with respect to Gender*

		Intra-Orbital Extension		P-value
		Yes	No	
Gender of patients	Male	43	16	0.58
		72.9%	27.1%	
	Female	30	11	
		73.2%	26.8%	

Table 4: *Stratification of Stratification of Intra-orbital Extension with respect to Duration of Disease*

		Intraorbital Extension		P-value
		Yes	No	
Group of duration of disease	<12	36	18	0.17
		66.7%	33.3%	
	>12	37	9	
		80.4%	19.6%	

Table 5: *Stratification of Stratification of Intra-orbital Extension with Respect to Diabetes Mellitus*

		Intraorbital Extension		P-value
		Yes	No	
Diabetes Mellitus	Yes	30	13	0.65
		69.8%	30.2%	
	No	43	14	
		75.4%	24.6%	

a mass effect in the sinonasal cavities ,ultimately leading to hyperemia, inflammation and pressur erosion of Lamina Papyrecea and skull base causing intraorbital and intracranial extension respectively .

Inflammation of the sinonasal mucosa adds to the hyperemia and pressure necrosis caused by fungus .

There is significant evidence of intracranial and intraorbital extension in AFRS as shown by the literature. Proptosis is the most common manifestation while vision loss is a rare complication. Vision loss can gradual or sudden but mostly it is gradual and due to the involvement of optic nerve. The most common cause leading to vision loss is the total erosion of bony optic cannal and the affecting the optic nerve. Optic Neuritis may also occur and lead to visual abnormalities.

Ptosis, diplopia and epiphora are other common manifestation caused by AFRS

CT scan or magnetic resonance imaging (MRI) that correlate with the presence of allergic mucin and positive fungal culture can lead to definitive diagnosis. Classic AFRS CT Findings include central areas of hyper attenuation that correspond to a hypo intense signal on T1-weighted MRI and a signal void with T2-weighted MRI. Areas of sinus expansion and bone erosion add to the evidence. Fungal culture results are often negative mostly because of sampling difficulty.

There are different management startigies used fotr AFRS around the globe most commonly used modalities are systemic steroids , functional endoscopic sinus surgery and immunotherapy. Mostly a combination of these modalities works well depending on the disease extension and host immunologic status.

Conclusion

Hence, it is concluded that patients with fungal rhinosinusitis should be monitored for the intraorbital and intracranial extension so that they could be managed at initial stage. As these comorbidities could lead to life threatening situation.

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