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TO DETERMINE THE VARIOUS CLINICAL PRESENTATIONS, UNDERLYING IMMUNOCOMPROMISED CONDITION, COMPLICATION OF ACUTE INVASIVE FUNGAL RHINOSINUSITIS (AIFRS): AN OBSERVATIONAL STUDY.

Dr. Abhiniti[1], Dr. Pawan Kumar Lal[2]
[1]Senior Resident, Department of ENT, Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar, India.
[2]Associate Professor & HOD, Department of ENT, Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar, India.

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Corresponding author: Dr. Pawan Kumar Lal
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Abstract

Aim: to determine the various clinical presentations, underlying immune-compromised condition, complication of acute invasive fungal rhinosinusitis (AIFRS).

Materials and Methods: The present prospective observational study was conducted in the Department of ENT, Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar, India. Among 40 patients of acute invasive fungal sinusitis that underwent treatment as inpatient basis. Nasal swabs from the middle meatus were subjected to potassium hydroxide mount and if fungal elements were identified, then fungal culture was done. Post-operatively, tissue removed from the sinuses was sent for histopathological examinations.

Results: majority of the patients were male 57.5% and rest 42.5% were female. Patients having Diabetes Mellitus were found to be more susceptible to acute and invasive fungal sinusitis. The common presenting symptoms were nasal obstruction followed by rhinorrhea, epistaxis, headache, fever, facial swelling. Most common complication reported in this study was Cavernous sinus thrombosis 11 (27.5%).

Conclusion: acute invasive fungal sinusitis is most common in immunocompromised patients, with the highest incidence in patients with uncontrolled diabetes mellitus. The most consistent finding of acute invasive fungal sinusitis was mucosal necrosis and black crust/debris.

Keywords: acute invasive fungal sinusitis, diabetes mellitus, cavernous sinus thrombosis

Introduction

Fungal infections are one of the four major microbiological sub-groups. As with bacteria, viruses and parasites, there are many thousand different types of fungi. A much smaller number are commonly clinically relevant micro-organisms (20–25).[1,2] The most commonly encountered fungal species in medical practice are Candida species and Aspergillus species.[3] The less commonly encountered, but known for their invasive potential, are fungi of the Zygomycota order. These fungi are often implicated in immune-compromised individuals, as in the case of Mucormycosis.[4] Fungal spores are abundant in the atmosphere and so readily encounter anatomical structures relevant to ENT surgeons. These fungi, however, only develop pathological potential if the environment is suitable for this.

In normal conditions, fungi that are inhaled form part of the normal sinonasal flora. Fungal infections of the paranasal sinuses are in fact a spectrum of diseases rather than one distinct entity. The shift from the causative organism to the pathology of the disease process occurred in 1965, when Hora described two broad categories. These are invasive or non-invasive, dependent on the potential of the fungal hyphae to invade the tissues through the epithelium (invasive) in comparison to the infection being confined to the superficial epithelium (non-invasive).[5,6]

Acute invasive fungal rhinosinusitis (AIFRS) is a life threatening disease, fungus can invade the nasal mucosa and blood vessels, leading to rapid dissemination into the orbits, palate and the brain.[7,8] For this reason, a systematic review states that the overall survival rate of AIFRS patients is as low as 50%.[8] Early diagnosis and immediate treatment, including antifungal therapy and surgical debridement, are considered vital for better survival rates.[8] Management of invasive fungal sinusitis consists of sinonasal debridement with or without Caldwell luc surgery followed by antifungal therapy. Acute invasive fungal sinusitis requires more aggressive sinonasal debridement (both external and endoscopic) because of high recurrence, mortality and morbidity rate.[9] Hence the present study was undertaken with the aim to determine the various clinical presentations, underlying

immunocompromised condition, complication of acute invasive fungal rhinosinusitis (AIFRS).

Materials and methods

Study Design

The present prospective observational study was conducted in the Department of ENT, Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar, India .Among 40 patients of acute invasive fungal sinusitis that underwent treatment as inpatient basis.

The study protocol was reviewed by the Ethical Committee of the Hospital and granted ethical clearance. After explaining the purpose and details of the study, a written informed consent was obtained.

Inclusion Criteria

- Patients of any age group and either sex
- Patients with immunocompromised status (includes uncontrolled diabetes mellitus, renal impairment, human immunodeficiency virus infection, malnutrition, cancers, long-term systemic steroid therapy and solid organ transplantation)
- Patients who have signed the informed consent

Exclusion criteria

- Patients who has not signed the informed consent

Sample selection

The sample size was calculated using a prior type of power analysis by G* Power Software Version 3.0.1.0 (Franz Faul, Universitat Kiel, Germany). The minimum sample size was calculated, following these input conditions: power of 0.80 and $P \leq 0.05$ and sample size arrived were 40 participants.

Methodology

A detailed history was obtained from all the patients, with emphasis on a history of immunocompromised status. Apart from anterior rhinoscopy and routine clinical examinations, detailed nasal endoscopic examinations were performed in every patient to collect fungal specimen from middle meatus and nasal cavity. Nasal swabs from the middle meatus were subjected to potassium hydroxide mount and if fungal elements were identified, then fungal culture was done. Post-operatively, tissue removed from the sinuses was sent for histopathological examinations.

Statistical analysis

The data was entered in the form of a data matrix in Microsoft Excel® and analysed statistically using IBM® SPSS® version 20.0.0. Descriptive statistics were calculated as frequencies for categorical variables and means and standard deviation for continuous variables.

Results

Table 1: demographic profile of the study population

Gender	N (%)
Female	17 (42.5%)
Male	23 (57.5%)
Total	40 (100.0%)
Age (Mean ± SD)	41.16±2.61

Table 2: Distribution underlying disease in the study population

Underlying disease	N (%)
Diabetes mellitus	21 (52.5%)
Hematological	11 (27.5%)
Malignancy	5 (12.5%)
Renal failure	3 (7.5%)

Table 3: distribution of symptoms in the study population

Symptoms	N (%)
Nasal Obstruction	13 (32.5.0%)
Rhinorrhea	11 (27.5.0%)
Epistaxis	11 (27.5%)
Headache	10 (25.0%)
Fever	8 (20.0%)
Facial swelling	7 (17.5%)
Facial pain	5 (12.5%)
Maxillary toothache	4 (10.0%)
Diplopia	2 (5.0%)
Decreased vision	2 (5.0%)

Table 4: distribution of rhinology findings in the study population

Findings	N (%)
Mucosal Necrosis	24 (60.0%)
Black crust	9 (22.5%)
Pus formation	5 (12.5%)
Ulceration	1 (2.5%)
Septum involved	1 (2.5%)

Table 5: distribution of complications in the study population

Complications	N (%)
Cavernous sinus thrombosis	11 (27.5%)
Orbital cellulitis	8 (20.0%)
Intracranial involvement	5 (12.5%)
Pre-septal cellulitis	3 (7.5%)
Death	1 (2.5%)

Discussion

In the present study majority of the patients were male 57.5% and rest 42.5% were female. This was found in agreement with the study conducted by Parmar BD et al. (66.7% were male and 33.3% were female). Patorn et al. (44.1% patients were male and 55.9% patients were female).[10,11]

In this study, patients having Diabetes Mellitus were found to be more susceptible to acute and invasive fungal sinusitis. In Some patients multiple underlying immunocompromised conditions were observed. Patients, who have had qualitative or quantitative abnormalities such as hematologic malignancy disease, AIDS, hematologic disease, organ transplantation and diabetes mellitus are particularly susceptible to fungal infections.[11]

AIFR is most commonly encountered in those patients with a form of immunocompromise. These broadly fall into two categories and each of these have commonly associated pathogens with them. The first are diabetic patients (roughly 50%), particularly if poorly controlled, and is frequently associated with diabetic ketoacidosis. This subset of patients frequently has Zygomyecetes order isolated.[12] This is due to their affinity for acidotic environments with high glucose concentrations. The second subsets of patients are those who are immune-suppressed for example, with neutropenia, HIV/AIDS, hematological malignancies and patients receiving chemotherapy.[2]

The symptoms of invasive fungal rhinosinusitis are often subtle and initially difficult to diagnosis. We found that the common presenting symptoms were nasal obstruction followed by rhinorrhea, epistaxis, headache, fever, facial swelling. In this study, symptoms were slightly different from the study of Patorn et al.[11] like headache, visual loss, facial pain and fever (59.3, 47.5, 35.6 and 33.9 percent respectively). The physician should keep in mind of this condition especially in immune-compromised patients.

Symptoms and signs such as nose ulceration, black necrotic lesions, and perforation of the hard palate are more specific, but these findings are present only at an advanced stage.[13] Most common complication reported in this study was Cavernous sinus thrombosis 11 (27.5%) this was observed in agreement with the complication registered by Patorn et al.[11] Low mortality in this study might because of sensitized approach of endoscopic examination in all immunocompromised patients, those who either present or refer to ENT department.

Being a single center study, this study cannot reflect all demographic, etiological and clinical aspects of acute invasive fungal sinusitis. One has to do multi-centric comprehensive study regarding acute invasive fungal sinusitis to evaluate various underlying factors, etiology, early clinical features and prognosis.

Conclusion

The present study concluded that acute invasive fungal sinusitis is most common in immunocompromised patients, with the highest incidence in patients with uncontrolled diabetes mellitus. The most consistent finding of acute invasive fungal sinusitis was mucosal necrosis and black crust/debris. For early detection of mucosal changes one has to do endoscopic examination in all immunocompromised patients with symptoms like headache, facial or periorbital pain & swelling, purulent nasal discharge, etc. All clinician should think vigilantly in immunocompromised patients with above symptoms.

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