International Journal of Otorhinolaryngology and Head and Neck Surgery
Kelkar PA et al. Int J Otorhinolaryngol Head Neck Surg. 2019 Jan;5(1):45-49
http://www.ijorl.com
pISSN 2454-5929 | eISSN 2454-5937

Original Research Article

DOI: http://dx.doi.org/10.18203/issn.2454-5929.ijohns20184732

Study on management of fungal infections of nose and parnasal sinuses

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Received: 22 October 2018
Revised: 10 November 2018
Accepted: 13 November 2018

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ABSTRACT

Background: From last few years, the fungal infection has been increasing due to greatly enhanced international traffic and as opportunistic infections in consequence of use of powerful cytotoxic drugs. The disease invariably occurs in diabetics, usually with ketoacidosis, immune compromised patients. Hence, we planned to undertake the present study to evaluate a standard method of management of fungal infections of nose and paranasal sinuses.
Methods: A detailed examination of the nose and pranasal sinuses was carried out in the department of ENT. The patients were continuously monitored with pulse oximetry and ECG monitor. In all patients, nasal endoscopy was performed.
Results: In this study, fungal infections of the nose and paranasal sinuses were found to be common between 20 and 50 years of age. Aspergillosis was the commonest sinonasal fungal infection followed by allergic fungal sinusitis, rhinosporidiosis and mucormycosis.
Conclusions: Early detection, proper and adequate dose of antifungal agents, timely surgical intervention in the form of debridement and sphenoethmoidectomy and orbital exenteration improve the survival rate in the disease of sinonasal fungal infections.

Keywords: Fungal infection, Paranasal sinus, Aspergillosis, Nose

INTRODUCTION

Management of fungal infections of the nose and paranasal sinuses has been an issue of debate for a long time. Different otorhinolaryngologists have tried different methods of treatment fungal infections of the nose and paranasal sinuses.

Mycology is study of fungi, a diverse group that comprises of molds, yeast, mushrooms and related organisms. Over 1,00,000 species are recognized of which 100 are recognized as pathogenic for humans and animals.

However, from last few years, the fungal infection has been increasing due to greatly enhanced international traffic and as opportunistic infections in consequence of use of powerful cytotoxic drugs which plays an important factor in illness and also steroids and antibiotic therapy.[1-3]

It has been reported that, at any given time, fungal infection of nose and paranasal sinuses can affect about 20% of the population during their lives.[4]

Fungi are eukaryotic organism that differ from bacteria and other prokaryotic organisms in many ways i.e. each fungal cell has a nucleus (defined by a nuclear membrane), endoplasmic reticulum, mitochondria and other organelles.

Most fungal cells possess a rigid cell wall. The cytoplasmic membrane of fungi contains sterols, a

property that distinguishes them from virtually all bacteria except the mycoplasma.

Mycosis, an infection caused by fungi, generally depends on the state of the host defence system, the route of exposure, and the virulence of the fungus.

On the basis of the portal of entry and the major site of infection, mycoses are classified into four major categories, superficial, subcutaneous, and systemic and opportunistic mycoses.

The disease invariably occurs in diabetics, usually with ketoacidosis, immunocompromised patients– especially those with leukemias, tymphomas, disseminated neoplasmas and those on long term corticosteroid treatment.

Endoscopic surgery is a safe and effective treatment for paranasal sinuses fungus ball.[5]

The incidences of nose and paranasal sinus fungal infections are increasing and it required early detection and proper management. Hence, we planned to undertake the present study to evaluate a standard method of management of fungal infections of nose and paranasal sinuses.

Objectives

- To assess the types of fungal infections involving the nose and paranasal sinuses
- To study the age and sex pattern of fungal infections of the nose and paranasal sinuses.
- To study the symptomatology of fungal infections of the nose and paranasal sinuses.
- To evaluate a standard method of management of fungal infections of the nose and paranasal sinuses.

METHODS

The present prospective study design conducted during study period from 2016 to 2017 who attended the ENT department, ARMCH and RC were included in the study. A total of 30 patients who had clinical features suggestive of fungal infection of nose and paranasal sinus were included in the present study. A detailed clinical evaluation was done as per proforma prepared for the present study. A detailed examination of the nose and paranasal sinuses was carried out in the department of ENT. The other systems like respiratory system, cardiovascular system, nervous system and abdomen were examined in detail whenever necessary.

Selection criteria

The patient who had clinical features suggestive of fungal infection of nose and paranasal sinus was evaluated and underwent the following investigate procedures systematically as and when needed.

The required investigations were done in all cases, and some special investigation whenever necessary.

Anesthesia: Patients were assessed pre-operatively for fitness

Pre–medication: All patients were premedicated with IV atropine 0.6 mg, diazepam, 0.2 mg/kg body weight and pentazocine 0.3–0.5 mg/kg body weight.

Induction: Patients were pre–oxygenated and induced with 2.5%, 4-5 mg/kg body wt. of thiopentone sodium given IV till the eyelash reflex was abolished succinyl choline 1-2 mg/kg was administered IV.

Intubation: A red rubber endotracheal tube (4-5 children and 8 to 9 in adults) was introduced. Patients were ventilated with a mixture of 50% nitrous oxide + 50% oxygen+10% halothane.

The patients were continuously monitored with pulse oximetry and ECG monitor.

Instruments: 0^0 4 mm nasoendoscope (Kari Storz) was used, along with routine nasal instruments.

Procedure: In all patients, nasal endoscopy was performed. Two patients were treated with exenteration with total ethmosphenoidectomy. Rest 19 patients were treated by nasoendoscopic sinus clearance.

Statistical analysis

Data were expressed in terms of mean, SD and percentage to present the data. Data analysis were done by Microsoft excel.

RESULTS

In the present study, the fungal infections of nose and paranasal sinuses were more common in males (51.14%) as compared to female (42.86%).

Table 1: Age distribution.

Age range (in years)	Number of patients	Percentage (%)
11 to 20	02	9.52
21 to 30	06	28.50
31 to 40	07	33.25
41 to 50	03	14.28
51 to 60	03	14.28

From the above table it is evident that the fungal infection of the nose and PNS is more common in 3rd decade i.e. 33.25%.

Table 2 shows that the common complaints were orbital and nasal and few patients presented with intracranial complications with cranial nerve palsy.

Table 2: Presenting symptoms.

Nasal complaints	Number of patients	Percentage (%)
Nasal obstruction with Rhinorrhoea	4	19.04
Swelling of nose	4	19.04
Diplopia	2	9.52
Proptosis	8	38.09
Loss of vision	2	9.52
Intracranial complications with cranial nerve palsy	2	9.52

Table 3: Etiologic categories.

Type of fungus	Number of patients	Percentage (%)
Aspergillosis	8	38.09
Mucormycosis	4	19.04
Allergic fungal sinusitis	5	23.80
Rhinosporidiosis	4	19.04

From the above table it is clear, that the most common fungal infections of nose and paranasal sinuses is aspergillosis followed by allergic fungal sinusitis, mucomrmycosis and rhinosporidiosis.

Table 4: Radiological findings.

Radiological findings	Number of patients n=21	Percentage (%)
Clear	2	9.52
Clouding of one or more sinuses	5	23.80
Mucosal thickening	5	23.80
Bone erosion	8	38.09
Unspecified	6	28.05

The above table shows that clouding of one or more sinuses and mucosal thickening were common. In few cases bone erosion was present.

Table 5: Drug–treatment modalities employed.

Drug	No. of patients	%	Duration of treatment
Amphotericin B (liposomal)	10	47.60	1 to 2% months
Tetracycline	5	23.80	15 days
Dapsone	4	19.04	6 months to 1 year
Steroid	8	38.09	1 month

Amphotericin is the drug of choice in fungal infection of nose and paranasal sinuses. We used tretracycline in few patients as antibiotic, and dapsone in rhisporidiosis along with surgical treatment.

Table 6: Surgical modalities employed.

Type of surgery	No. of patients	Percentage (%)
Nasal clearance with maxillary antrostomy	11	52.38
Enucleation of eye ball with removal of lateral wall of nose and hard palate	2	9.52
FESS with sphenoethmoidectomy	8	38.09

Table 7: Medical and surgical line of treatment.

Modality	No. of patients	Percentage (%)
Drug treatment alone	3	14
Combined surgical + medical	8	86

The above table shows that combination of medical with proper surgical intervention was required in 86% of patients in our study:

DISCUSSION

In the present study studied the clinical profiles and management of fungal infections of nose and paranasal sinuses.

The mean age of the patients was 38 years, with an age group ranging from 19 to 60 years. Andrew Blitzer et al studied 9 cases of fungal infection of nose and paranasal sinuses in which age range was 14 to 61 years and mean age was 46 years which is comparable with our present study.[6]

The incidence of fungal infections was found to be more in males. The male: female ratio was 2:1. In a study by Folker et al, M:F ratio was 1.5: 1, whereas Manning et al found a ratio of 1.6:1 (M:F).[7,8]

Nasal symptoms such as nasal obstruction with rhinorrhoea, headache was present in 66% patients. Manning found that headache and congestion of nasal mucosa and nasal obstruction were common symptoms i.e. in 90% of patients.[9]

Proptosis of eye were found in 38% in the present study, whereas Manning found proptosis of eye in 50%, Daghistani et al found it to be presenting symptom in 100% of cases of allergic aspergillus sinusitis.[10,11] Loss of vision and cranial nerve palsy was present in 9.50%. Pillsburry et al, found decreased vision in 92% of cases

and cranial nerve palsy in 77% of cases of rhinocerebral mucormycosis.[12]

Allergic fungal sinusitis was bilateral. Allphin et al found involvement of multiple sinuses and polyposis in 90% of cases that were associated with asthma in 30% of cases.[2] In our study 60% had involvement of multiple sinuses, and polyposis, and 20% of cases had history of asthma.

In the present study, Aspergillosis was most common fungal infection of nose and paranasal sinuses seen in 38% followed by allergic fungal sinusitis in 23%, rhinosporidosis in 19.04% and mucormyucosis in 19.4% of patients.

Lewis et al reported aspergillus to be most common fungal pathogen in nose and paranasal sinuses, most commonly affecting maxillary antrum.[13] Jaharstoerfer et al have noted maxillary involvement in 44% and multiple sinuses involvement in 42%.

Nathan et al reported mucormycosis to be a well – established entity.[14] Price and Stevens recently reported a severe case of rhinocerebral mycomycosis involving the maxilla, orbit temporal bone and skull base.

Blitzer et al reviewed retrospectively a total of 170 cases of cephalic mucormycosis reported earlier in the literature, and added 9 cases of their own.[6] The overall survival rate of their disease was 50%.

Allergic fungal sinusitis is also a well described entity and recognized apart from other fungal and nonfungal sinus disease as has been quoted by Folker et al.[7]

Rhinosporidiosis is fairly common problem for the otolaryngologist in many parts of the world, because of its prompt recurrence after surgical excision. Though not fatal disease, it inflicts various kinds of social and economic strain on the patients and their families, as has been appreciated by Nair et al.[15]

Radiological findings were mucosal thickening and clouding of sinuses in 23% of cases, bone erosion in 38.09% of cases, and clear sinus in 9.52% of cases.

Blitzer et al had observed clouding in 17%, mucosal thickening in 8%, bone erosion in 12%, clear sinuses in 6% and unspecified findings in 28% of cases.[6]

For the drug treatment of fungal infections of nose and paranasal sinuses, we used amphotericin B as the drug of choice. The starting dose of amphotericin B was 1 mg to 10 mg daily escalated to 1 mg/kg body weight for a total dose of 2 gm, which were administered over a period of 2 months. During this administration kidney functions were monitored.

Amphotericin B proved to be the best antifungal agent in our study, and was used in 10 cases. It was also applied locally to the postoperative cavity. Maniglia et al had used amphotericin B in 8 cases of cephalic phcomycosis, where it was shown to be an effective antiphycomycotic agent (although fungostatic), in both experimental models and in clinical situations. The combination of 5 fluorocytosine (F-FC) with amphotericin B may lead to less kidney toxicity.[16]

Weber et al, have reported that amphotericin B should be the main stay of therapy for invasive and disseminated fungal infections, although it has significant systemic side effects, that may limit its administration.[17]

The use of amphotericin B in a lipophillic drug carrier (liposomes) had been shown to the effective and less toxic than amphotericin B in the treatment of amphotericin B refractory disseminated fungal infection in patients with cancer.

Carpentier et al have reported use of amphotericin B in the spray form as prophylaxis against, aspergillosis in patient with neulropenia.[18]

Nair et al has shown use of dapsone (diaminodiphenyl sulfone) to be very useful in preventing recurrence of rhinosporidiosis. Under treatment with dapsone 61.4% of the patients remained free of rhinosporidiosis.[19]

In the present study maxillary antrostomy and debridement was performed in twelve patients of which two patients expired. The success rate was 84% which is comparable to 85%, the result of Peterson et al.[20]

Two patients who died were having diabetes mellitus both of them presenting with diabetic ketoacidosis. These two patients were diagnosed to be rhinocerebral – mucormycosis cases. In present study 50% survival rate was found is rhino cerebral mucormycosis, which is comparable with results of Peterson et al, i.e. 60%.[20]

Pillsbury et al had excellent result in rhino–cerebral–mucormycosis, i.e. 85% with the procedure of lynch operation.[12]

80% survival rate was observed in the present study with amphotericin B as compared with 79% survival rate quoted by Blitzer et al.[6]

Weber et al reported excellent result with liposomal amphotericin B. i.e. 71% in cases of invasive sinonasal aspergillosis.[17]

In our study we had about 50% survival rate with medical and surgical line of treatment comparable with 84% survival rate reported by Pillsbury et al, for rhinocerebral mucormycosis. Blitzer et al reported 78% survival rate in paranasal mucormycosis.[6]

Peterson et al reported 75% success rate with rhinocerebral mucormycosis.[20] Allphin et al reported that

treatment should be aimed at surgical removal of disease and postoperative use of topical intranasal steroid.[2]

CONCLUSION

The most common radiological findings were opacities and mucosal thickening in the sinuses. Rhinosporidiosis has a high tendency to recur and medical treatment was found to be ineffective. Mucormyosis was the most aggressive among the sinonasal fungal infections. It was commonly seen in immunocompromised and immunosuppressed patients.

Combination of medical and surgical line of treatment improved the prognosis significantly. Early detection, proper and adequate dose of antifungal agents, timely surgical intervention in the form of debridement and sphenoethmoidectomy and orbital exenteration improve the survival rate in the disease of sinonasal fungal infections.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Kelkar PA, Hirekerur JV. Study on management of fungal infections of nose and parnasal sinuses. Int J Otorhinolaryngol Head Neck Surg 2019;5:45-9.