Original Research Article

# Post covid invasive oppurtunistic fungal infections: A deadly addition to the pandemic

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**Abstract**

**Objective**: To study possible association between invasive fungal infections &corona virus. **Methods**: A prospective observational study was conducted at tertiary covid care centre over two months involving 50 suspected patients of mucormycosis involving paranasal sinuses who have or had history of COVID-19.**Results**: maximum out of 50 patients of COVID-19 with mucormycosis had maxillary sinus involvement followed by ethmoidal sinus. Intraorbital extension was seen commonly with few cases of intracranial extension. Blood sugar was found to be raised in almost all patients with history of excessive steroid use & undistilled water in humidifier and nebulisation. **Conclusion**: The association between COVID-19& invasive fungal infections of paranasal sinus must given special attention. Uncontrolled blood sugar along with excessive use of steroids, undistilled water, poor oral hygiene, immunocompromised status, was the main aggravating factors in illness.

**Keywords:** Mucormycosis, Covid 19, Invasive fungal sinusitis



## Introduction

At the end of 2019 in Wuhan, a large city in Hubei province of china, a novel corona virus severe acute respiratory syndrome coronavirus 2(SARS-COV-2), was considered as the cause of a number of lower respiratory tract infections. The high potential of human to human transmission lead to rapid covid 19 epidemic in china and subsequent global pandemic[1]. Covid 19 is a life threatening, infectious disease, affected patients shows decreased CD4 T &CD8 T cells counts with over expressions of cytokines, are susceptible to fungal co-infections[2].The covid 19 symptoms spectrum has expanded since first day of disease presentation include dry cough, high grade fever and multisystem problem such as breathlessness, anosmia, ageusia, diarrhea, generalized malaise & secondary infections. Early identification of their co-morbidities is essential for optimal treatment and improved outcome. E.N.T has shown relevance right from the starting of the pandemic with nasophyngeal swab sampling, and recently we have observed another association of a more dangerous and potentially life threatening invasive fungal sinusitis especially mucormycosis[3].Mucormycosis is one of the life threatening invasive fungus that affects immunocompromised patients with impaired neutrophillic count, hematological disorder, organ transplant recipient, acquired immunocompromised states, iatrogenic immune-suppression and uncontrolled diabetics[4].Invasive fungal infections has a characteristic features of hyphae invasion of sinus tissue with severe detoriation[5].Symptoms starts from typical nasal blockage, crusting, proptosis, facial pain to atypical chemosis, severe headache, even ophthalmoplegia, and various neurological signs and symptoms if intracranial extension is present[6].

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Corticosteroid therapy i.e., hydrocortisone, dexamethasone, and methyl prednisolone may raise the risk of secondary fungal infections [7]. Thus it seems that, coronavirus infections itself might not increase the risk for fungal infections, but other risk factors might have. Besides, using broad spectrum antibiotics, either empirically or targeted therapy for secondary infections raises the odd of some endogenous fungal infections such as candida species[8].The basis of invasive fungal infections treatments remains a combination of surgical debridement and amphotericin B for 4 to 6 weeks[9]. Although not currently use as first line drug due to its adverse effect on renal other drugs like posaconazole, trazole antifungal seems to be effective against mucormycosis[10].

## Materials and methods

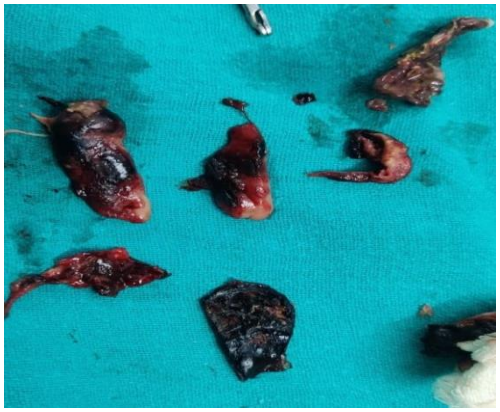
Conducted study is a prospective observational type of study done by ENT and Head & Neck Surgery department, A.B.V Govt Medical College, Vidisha, M.P, India, and Duration of our study is 3 Months.All patients with invasive fungal sinusitis presented to the ENT department, either as an OPD or in an emergency or In COVID wards, were included in the study. Patient's presentation details, imaging finding, co-morbidities, and management and follow up were obtained. Not all patients were operated some of their presented with intracranial involvement were referred to higher centre, keeping with aim as surgical debridement with appropriate antifungal treatment.

## Results

Out of 50 patients, 28 were male and 22 female. (Figure: 1) about 35 patients were recovered from covid around 10 to 14 days and 15 patients were still covid positive for more than 10 days. All patients had a primarily infections involving cheek (maxillary sinus) region (Table:1) presented with maxillary swelling spreading towards orbital region 25/50 patients, followed by ethmoidal region 17/50 patients .sphenoid &frontal sinus were less common. Only 2 patients has involvement of eye at the time of presentation none had any vision loss. Intracranial involvement was seen rarely only in one patients, referred to higher centre for further management.

**Fig 1: Patient with Mucormycosis**

**Fig 2: Patient with Post Covid infection**



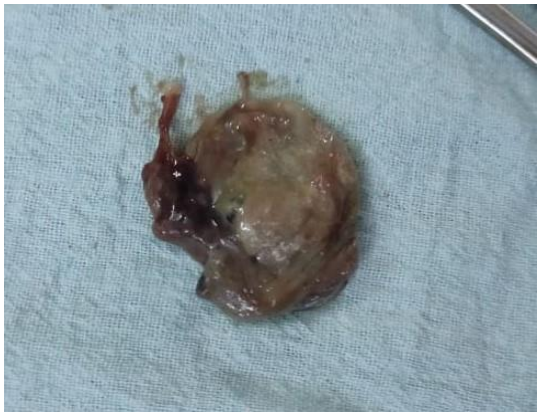


**Fig 3,4:Necrosed tissue removed with FESS**

**Table 1 : Incidence of Sinus Affected**

| S.No. | Sinus affected | Cases (n=50) | Percentage (%) |
|---|---|---|---|
| 1 | Maxillary | 25 | 50% |
| 2 | Ethmoids | 17 | 34% |
| 3 | Frontal | 5 | 10% |
| 4 | Sphenoid | 3 | 6% |

Classically mucormycosis is present in the maxillary region and it spreads towards orbital region along with it is present in nasal cavity also seen on diagnostic nasal endoscopy (DNE), (Table: 2) apart from it whitish patch oral thrush also present in an oral cavity .oral hygiene found to be poor in all patients. Male's patients found to be tobacco & smoking addicted has Leucoplakia patch, stained teeth. Almost all patients had a history of long term steroid intake either intravenously or oral for the management of corona disease

**Table 2 :Spread of Infections to adjacent Sites at time of Presentation**

| Category | No: of patients | Percentage (%) |
|---|---|---|
| Intra-orbital | 5 | 10% |
| Intra-cranial | 01 | 2% |

Around 35 patients were diabetic with uncontrolled sugar with raised HBAIc >7. 6patients Non diabetic and five patients were diabetic plus hypertensive also. (Table: 3)Rest patients are associated with other co-morbidities.

**Table 3:Associated Co-morbidities**

| Co-morbidities | Cases (n) | Percentage (%) |
|---|---|---|
| Diabetes mellitus | 35 / 50 X 100 | 70% |
| DM +HTN | 5 / 50 X 100 | 10% |
| Others | 4 / 50 X 100 | 8% |
| Non-diabetes | 6 / 50 X 100 | 12% |

In KOH mount and fungal culture majority of them were mucor family species some of other fungus is also found like Candida species, aspergillous, cryptococcosis.

**Table 4: KOH mount**

| Category | | Percentage (%) |
|---|---|---|
| Mucormycosis | 35 / 50 X 100 | 70% |
| Candida | 10 / 50 X 100 | 20% |
| Aspergillous | 5 / 50 X 100 | 10% |
| Cryptococcosis | 1 / 50 X 100 | 2% |

**Discussion**

Mucormycosis is lethal fungal disease with rhino cerebral presentation being most common, although low incidence rate but recently increased to a significant level in corona virus pandemic [11].Mucor is a saprophytic fungus, its spores exist widely in nature spread through soil, Food and decaying organic material it is present in human nasal mucosa as a common commensal[12]. When person became immunocompromised fungal spore germinate and spread via Para nasal sinus to nearby structures like orbit and cranium. The National Institute of health, according to the Randomized Evaluation of Covid 19 Therapy (RECOVERY) recommends steroid use only in patients who are on a ventilator or require supplemental oxygen not in milder cases[13].They mentioned earlier about risk of developing secondary infections. In 1885, Paltauf described mucormycosis as an uncommon &aggressive fungal infection which affect patient with altered immune system[14].Mehta & Pandey reported a single case of 60 year old male with rhino-orbital mucormycosis associated with covid 19 in 2020[15].Other studies done by Wethmen et al, White et al[16].Song et al, studied association between covid 19 & invasive fungal infections. There are some other possible reasons for the association between covid 19 &fungal infections were covid induced immunosupression, use of extensive steroids leads to exacerbation of pre-existing fungal disease. All patients were advised non-contrast computed tomography scan of paranasal sinus, after diagnostic nasal endoscopy (DNE), nasal swab for KOH. MRI gadolinium enhanced if intracranial spread were suspected. Bony erosion is pathognomic of fungal infections surgical debridement of the infected area (functional endoscopic sinus surgery), along with intravenous Amphotericin remain the sole treatment of choice, liposomal amphotericin were the treatment of choice if nephotoxicity has been taken into account[17]. In case of refractory cases/ renal failure tab posaconazole, itraconazole were considered as an alternative option. Prognosis remains poor even with surgical &antifungal treatment. We studied on 50 patients of invasive fungal infection especially mucormycosis of paranasal sinus over the period of two months, all patients either covid positive or recovered with covid. Not all patients underwent surgical debridement one patient who had intracranial extension referred to higher centre due to non availability of neurosurgery department, rest cases are operated and followed by the end of study period.

**Conclusion**

Covid 19 is associated with a significant incidence of secondary infections, both bacterial &fungal probably due to immune deregulation, additional by use extensive steroids /monoclonal antibody /broad spectrum antibiotics may lead to development of or exacerbation of pre-existing fungal diseases. Physician should be aware of the possibility of such infections especially in patients with risk factors,so that early diagnosis & treatment reduces the mortality & morbidity .The use of therapeutic drugs dose should be monitored start at lowest dose for short duration .The use of broad spectrum antibiotics, monoclonal antibody use should be re-evaluated.

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**References**

1. Guo YR, HongZS,YangY, ChenSD, TanKS,Wang DY, Yan. The origin transmission and clinical therapies in coronavirus disease 2019 (covid 19) outbreak update on statistic. Mil Med Res.2020; 7(1):1
2. Song G,Liang G,Liu W, fungal co-infections associated with global covid 19 pandemic: a clinical and diagnostic perspective from clinic .Mycopathologia2020;185:599-606.
3. Frazier KM, Hooper JE.SARS-COV-2 virus isolated from mastoid and middle ear ;implication for covid 19 precautions during surgery JAMA otolaryngol Head Neck surgery 2020:146-964-6.
4. Deshazo RD.Fungal sinusitis Am J.Med sci 1998; 316:39-44.
5. Ferguson BJ. Definitions of fungal rhinosinusitis. Otolaryngo-lclin North Am 2000;33:227-35.
6. Chakrabarti A, Ponikau Kita H et al. Fungal rhinosinusitis: a categorization and definitional schema addressing current controversies.Laryngoscope 2009; 119:1809-18.
7. Ni Y-N Chen G, Sun J, Liang, B-M Liang Z-A. The effect of corticosteroid on mortality of patients with influenza pneumonia .a systemic review and Meta analysis crit care 2019; 23(1):99.
8. DUR-H, Liu L-M, Yin W, WangW,Guan L-L,Yuan M-L, et al hospitalisation and critical care of 109 decedents with covid 19 pneumonia in Wuhan china Ann Am Morac Soc. 2020; 17(7):839-846.
9. Godstain B. Spelberg TJ.Wallsh, D.P Kontoyiannis,J.Edwards Jr. Recent advances in the management of mucormycosis from bench to bedside clin infect. Dis 2009;48(12):1743-1751.
10. D. E Adler TH Milhorat J.I Miller treatment of rhinocerebral mucormycosis with intravenous interstitial and cerebrospinal fluid administration of amphotericin B;Case report neurosurgery 1998;42(3) :644-648.
11. Werthman-Ehrenrich A. Mucormycosis with orbital compartm-ent syndrome in a patient with covid 19.Am J.Emerg Med.2021; 42: 264e5-264e8.
12. Ballester DG, Gonzalez Garca R,Garcia CM, L , Gil FM. mucormycosis of head and neck report of 5 cases with different presentation J. craniomaxillary fac surgery 2012;40:584-91.
13. Horby P.Lim WS Emberson JR,Maftan M, Bell J l et al .Dexamethasone in hospitalized patients with covid 19 prelimmary report.N Engl J Med.202.384;693-704.
14. Paltauf A. Mycosis mucornima. Virchows Arch Pathol Anat Physio Klin Med.1885.102:543-64.
15. Mehta S, Pandey A, Rhino orbital mucormycosis associated with covid 19.Curecus.2020;12(9): e10726.
16. White L, Dhillon R, Cordey A, Hughes H, Faggian F, Soni et al .A national strategy to diagnose corona virus disease 2019:Associated invasive fungal disease in the intensive care unit. Clin Infect Dis.2020;1298.
17. Elinav H,Zinhony O, Cohen MJ, Marcovich AL, Benenson S. Rhinocerebral mucormycosis in patients without predisposing med cond a review of literature.Clin microbial infect.2009;15-693-7.

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