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MUCORMYCOSIS TREATMENT AND DIAGNOSIS: A REVIEW (RELATED TO COVID-19)

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ABSTRACT

In COVID-19 situation recently observed the a fungal infection called as mucormycosis. This mucormycosis that is black fungus, this black fungus commonly observed in those patients who are recovering from COVID-19 in an India**.** Mucormycosis is fungal disease. Mucormycosis is also known as zygomycosis. Refer to many fungal disease in order mucorales. Causative organisms of mucormycosis is a Rhizopus species and other species include Mucor, canninghamella, Apophysomyces, lichtheimia, saksenaea, Rhizomucos etc. An epidemiology of mucormycosis has been seen in recent years with rise in incidence. Due to new causative agents and easy target population the spread in Asian countries is very high. Patients with diabetes mellitus are mostly the victims of mucormycosis. The new risk of mucormycosis is post - tuberculosis and chronic renal failure. In immunocompetent hosts, cutaneous mucormycosis is commonly seen. The intriguing clinical entity, isolated renal mucormycosis In immunocompetent patients is only seen in China and India. The causative agents of mucormycosis depends on the geographical location. Though Rhizopus arrhizals is common agent over world. Apophysomyces variabilis is predominant In Asian countries and Lichtheimia species is observed in Europe. Thamnostylum luchnowense observed in Asia. Mostly Amphotericin B is used in mucormycosis dose of 1-1.5 mg/kg and new antifungal such as Poraconazole.

KEYWORDS: Apophysomyces, lichtheimia, saksenaea, Rhizomucos etc.

INTRODUCTION

Mucormycosis or zygomycosis is also called as phycomycosis. Mucormycosis is an acute disease. Is a fatal infection caused by fungi belonging to family mucorceae. In this disease patients debilitated by immune or metabolic disorder. Patients shown the infection acidosis, uncontrolled diabetes mellitus, leukaemia, lymphoma, AIDS, severe malnourishment, severe burns, cytotoxic therapy and immune suppression from corticosteroid use. Patients observed the renal failure, liver problems, dialysis. Patients on de feroxamine therapy. There are no known susceptibility based on age, race, or sex. Mucormycosis is a fungal disease caused by filamentous fungi belonging to themucorales. Mucormycosis common saprobes originating from rotten matter or solids. In Central nervous system (CNS) mucormycosis are largely published. The CNS mucormycosis largely depends on population. Central nervous system (CNS)Mucormycosis is usually extension of the infection from the sinuses to the eyes and brain. CNS mucormycosis is very rare. In a Meta-analysis of 929 cases. CNS disease was described in 30% cases. In this 30% cases 16% were confined to the CNS. Highly risk mucormycosis in following disease patients.

1. Diabetes mellitus especially with ketoacidosis.
2. steroid therapy.
3. Neutropenic patients.
4. HIV patients.
5. Haemotalogic and solid malignancies.
6. malnourished individuals especially children.
7. BM transplant recipients.
8. persons in renal failure.
9. Intravenous drug abusers.
10. Deferroxamine therapy and all causes of iron overload.

Mucormycosis is aggressive fungal infection. Patients is alter there immunological system. Most human being infected in sparangiospores this are released in air or direct inoculation of disrupted skin or mucosa. Iron is a element to cell growth development. Giving many vital process for obtaining iron from the host. Unbound iron in serum plays a important role in patients who infected with DSK mucormycosis. Mucormycosis is an infection such as trauma. Radiation work of chronic corticosteroids disorder of lipid metabolism in that Gauche disease etc. Mucormycosis is an opportunistic fulminant fungal infection. This is mainly infects immunocompromised patients. This fungi is daily basis, but who people with

there weakened immunity are most easy target of infection. The infection in the nose and para sinuses this inhalation of fungal spores.[1,2,4,6,8]

History

Though first case of Mucormycosis is recently documented, it has accompanied human existence Since a long time. The first Case of upper airway mucormycosis was published by Paltauf in 1885. It was entitled as Mucormycosis mucorina". More typical findings of advanced rhino cerebral Mucormycosis were reported in 1943 by Gregory in patients with diabetic ketoacidosis. As compared to other commonly seen fungal infections Mucormycosis is less reported. In United States of America frequency of mucormycosis has been increasing since last decade. A study has confirmed that Cases in Europe are also on rise.[3,7,9]

Types of mucormycosis[5,7, 8, 9,10, 11]

1 Rhino cerebral mucormycosis.

2 Pulmonary mucormycosis.

3 Cutaneous mucormycosis.

4 Gastrointestinal mucormycosis.

5 Disseminated mucormycosis.

6 Uncommon presentations mucormycosis.

1.Rhinocerebral mucormycosis

Rhino cerebral mucormycosis is a few opportunistic infection of the sinuses, nasal passages, oral cavity, brain caused by spare phytic fungi. The infection can quickly result in death. Rhino cerebral mucormycosis frequently affects individuals with diabetes patients and those in immunocompromised patients.

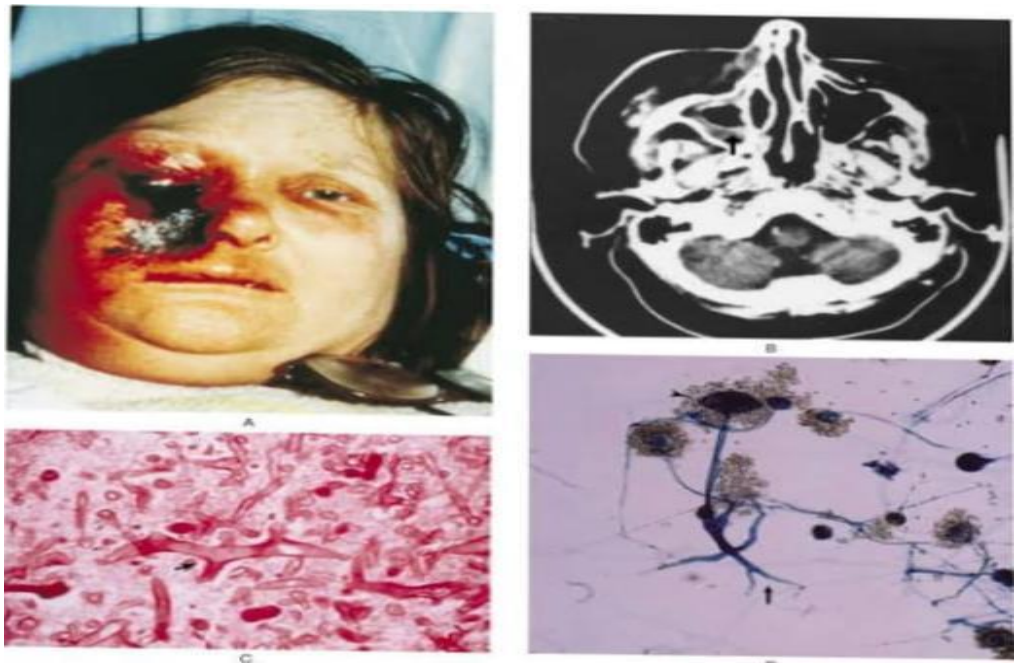

Fig. Rhino cerebral mucormycosis.

2. Pulmonary mucormycosis

Pulmonary mucormycosis is an uncommon fungal infection mostly observed in immunocompromised patients. The fungus grows on rotten food, soil and animal stool. Patients generally becomes infected by inhalation of spores.

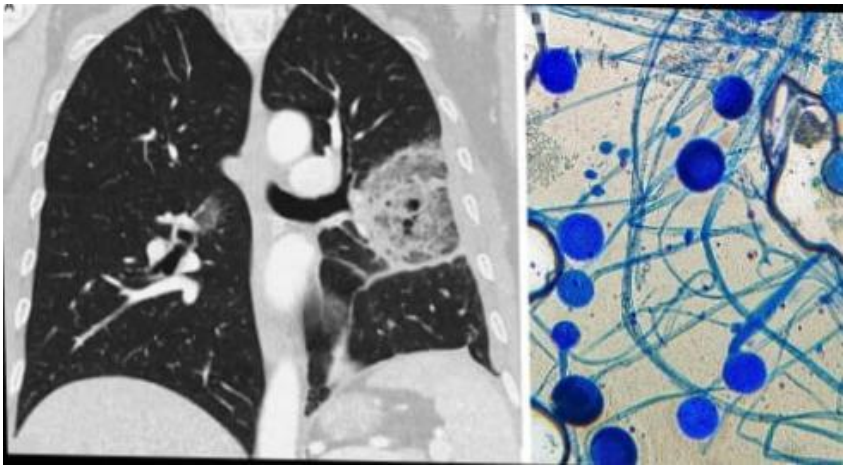

Fig. Pulmonary mucormycosis.

3.Cutaneous(skin) mucormycosis

Cutaneous mucormycosis take place after the fungi enter the body through a break in the skin for example- after surgery, a burn and skin trauma. This is most frequently form of mucormycosis among people who do not have weak immunity.

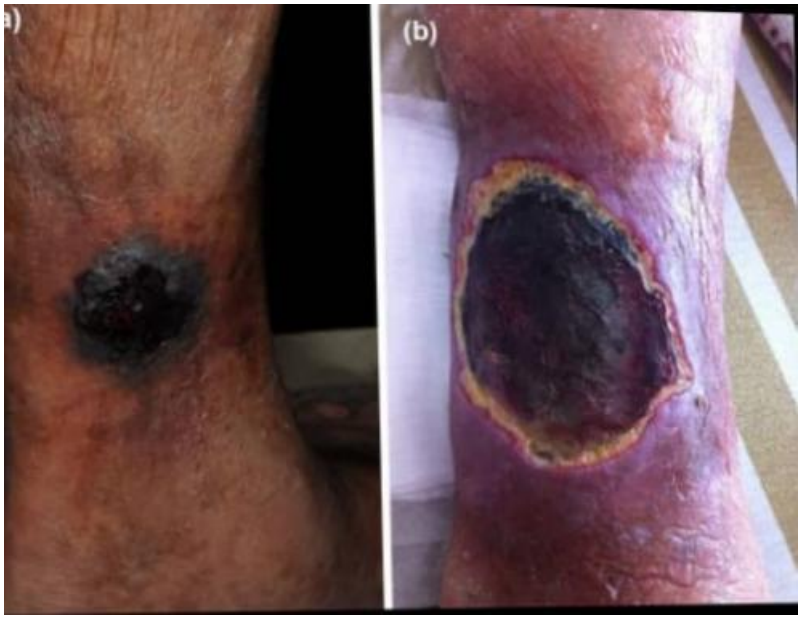

Fig. Cutaneous mucormycosis.

4. Gastrointestinal mucormycosis

Usually among young children than adult, mostly premature and low birth weight infants less than 1 month of age. Who have surgery or medication that lower the body ability to fight against germs and sickness.

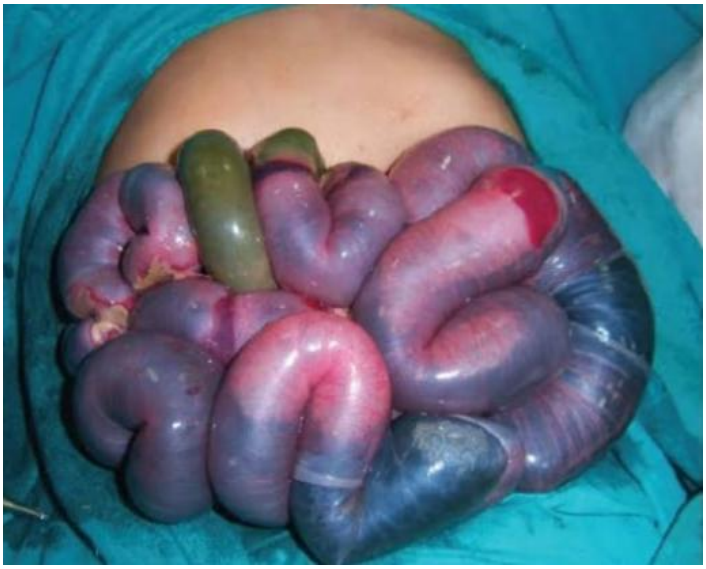

Fig. Gastrointestinal mucormycosis.

5. Disseminated mucormycosis

Disseminated mucormycosis is infected spreads through the blood stream to affect another part of the body. The infection mostly affected in brain but also can affect other organ of body that is spleen, heart and skin.

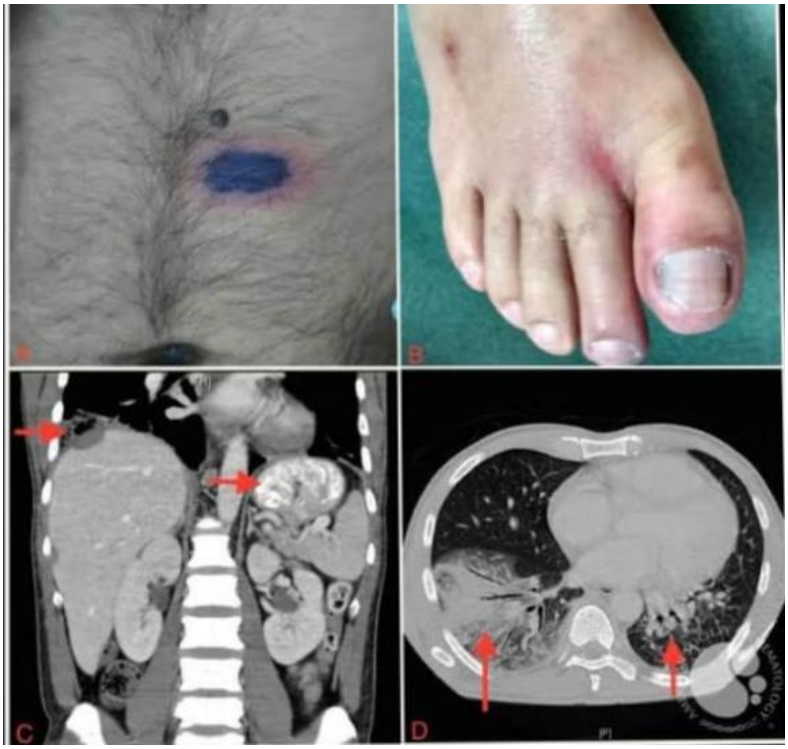

Fig. Disseminated mucormycosis.

Diagnosis

Rapid diagnosis and a ignition of therapy is critical due to the acute, fulminate nature of the infection.1,6-8 diagnosis of the mucormycosis rest upon the presence of the predisposing condition,sign's and symptoms of disease of specific morphology in the materials section and direct smears of materials and to lesser extent, culture results. Direct examination in 10%KOH,of scrapings from the upper turbinate's, aspirated sinus material, sputum, and biopsy material can be valuable. The presence of thick-walled upstate and refractive hyphae 6 to 15 um in the diamter, with some hyphae being swollen and distorted is in inactive of the presence of mucorales fungi. The starting point is to the recognize at increased risk and early signs of infection. Initially, clinical features may be a smiler to those of other invasive mould infection. But it is the consideration of zygomycosis as the diagnosis that may lead to timely confirmation by successful biopsy that is culture of the causative organism early. Diagnosis is important because small focal lesions can be often be surgically excised before they progress to involve critical structure and disseminate, unforunately. There are no serologic and PCR-based tests to allow rapid diagnosis. The patient may complain of a the combination of headache visual disturbance, facial I.e orbital swelling. urgent radiological imaging to localize and determine the extent of the infection is critical. (Although this may initially be fastly negative) should be followed by surgical review to consider a biopsy, or therapeutic

surgical debridement. Diffrence from the Aspergillus and candida must be made of Histological section. Aspergillus and candida don't take H and E stain. Histological section show acute superlative inflammation. With focal area of granulomatomus, inflammation. There are septate hyphae 6 to 50 um in diameter branching at 90degree. Diagnosis is frequently made from tissue section.[2,4,6,9,11]

Treatment

Antifungal drug are available on outside the living organism activity against mucorales. Amphotericin B and lipid formulation and posaconazole is a antifungal drug. The antifungal armamentarium now larged within the development of isavuconazole. The first line antifungal agent are liposomal amphotericin B or L-Amphotericin B and amphotericin lipid complex. Study in mice proposed that the efficacy of L-Amphotericin B and amphotericin B lipid complex is depend on the dose given that 10 mg/kg yield to the best results. A phase II multicancer study ambizygotrial the efficacy and tolerance of high dise10mg/kg/day L-Amphotericin B is combine with surgery when needed for the treatment of 34 mucormycosis. The result is in 45%of patient at week12 the serum creatinine double in 40% of patient but in 63% cases once treatment is completed the creatinine levels normalised after 3 months. The whole study mention that ECMM/ESCMIP and ECH-6 guidelines the use of L-Amphotericin B with daily dosage of at least 5mg/kg /day for mucormycosis and the dose given 10 mg/kg/day are strongly supported by ECMM/ESCMID for cerebral infection. Isavuconazonium sulphate is a water soluble pro-drug is fastly hydrolysed to the triazole Isavuconazole after oral or intravenous administration. Isavuconazole is highest oral bioavailability linear pharmacokinetics and broad antifungal spectrum. The outside the living organism activity of Isavuconazole minimum inhibitory concentration ranges from 0.125 to 4 mg the L.ramosa R. arrhizus high as against mucor Circenelloides (1to16mg/kg). 21 patient are treated with Isavuconazole as first line treatment the 42 day response rate was only 14%and week12 comparable to that in the 45%with 43%deaths. so the finally a cost effectiveness as study demonstrated the positive economic impact of the use of Isavuconazole compared to Amphotericin B in treatment of mucormycosis.

Posaconazole is shown to outside and inside the living organism activity against mucorales but no data for the use of first line posaconazole therapy. posaconazole for prophylaxis or consolidation after induction treatment along with L-Amphotericin B Posaconazole is both formulation tablet or intravenous formulation. So it seems important to note that are no

current validated minimum inhibitory concentration.for any antifungal agent of mucormycosis.[5,6,7,9,10]

Table [5]

	Amphotericin B % with MIC ≤1 μg/mL	Posaconazole % with MIC ≤0.5 μg/mL	Itraconazole % with MIC ≤0.5 μg/mL
Rhizopus sp (101)	100	80	62
Rhizopus arrhizus (20)	100	64	50
Rhizopus microsporus (12)	100	78	60
Mucor sp. (41)	94	70	57
Mucor circinelloides (6)	100	0	0
Rhizomucor sp.(5)	100	67	67
Lichtheimia sp. (3)	100	100	50
Lichtheimia corymbifera (9)	100	100	100
Cunninghamella sp. (13)	63	75	29
Apophysomyces elegans (6)	100	83	80

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CONCLUSION

From these review paper it is clear that mucormycosis is occurs with only corona virus affected patients. We studied its type and treatment. This review article will be helpful in study of various research related to Corona and related mucormycosis.

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