

A Case Study on Mucormycosis and Its Clinical Outcomes

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ABSTRACT:

Mucormycosis is a lethal opportunistic infection caused by a fungus of the order Mucorales. It is characterized by tissue necrosis, which is frequently a late symptom and is caused by angio invasion and vascular thrombosis. This deadly fungal infection is caused by zygomycotic and mucorales species, hence this infection is known as zygomycosis. The most crucial elements in determining prognosis in the treatment of mucormycosis are early suspicion, diagnosis, and beginning of proper treatment. Here we present a case of 63 year old male patient with multiple comorbidities with rhino-orbital-cerebral mucormycosis infection and had discussed the observed clinical outcomes based on the treatment given to the patient. This study shows that early clinical diagnosis and initiating appropriate treatment regimens help to improve the clinical outcomes, quality of life and reduce the length of stay of affected patients.

KEYWORDS: Fungal infection, rhino-orbital, loss of vision, vascular thrombosis, Amphotericin B

I. INTRODUCTION

One of the phycmycetes, which are big, thin-walled, and nonseptate fungi that causes an acute, deadly infection called mucormycosis¹. This lethal fungal infection is caused by zygomycotic and mucorales species, hence this infection is also known as zygomycosis². R. D. Baker, an American pathologist, coined the term "Mucormycosis"³. He discovered it in 1956 in an autopsy. Globally, it's incidence rates ranges from 0.005 to 1.7 per million people⁴. Inhaling spores, eating contaminated foods and fungus invading wounds or abrasions on the skin are the main routes through which the infections occur. In healthy individuals, by polymorphonuclear phagocytes mechanism the fungi get rid of the body without causing infection. Therefore, persons with abnormalities in this

process typically have fungal growth⁵. The nasal turbinates are the first site of infection, which then quickly spreads to affect the sinuses, palate, orbit and brain. Ophthalmic vessels, carotid arteries that travel through the gaps between the nerves, bone, cartilage, and meninges are the main pathways for intracranial spread². There are many forms of mucormy cosis depending on the organ affected. The most common type of mucormycosis in India is rhino-orbital-cerebral mucormycosis, which also has the highest incidences in the pulmonary, cutaneous, renal, gastrointestinal, sino-orbital, and disseminated forms. Patients with a fungal infection frequently have headaches, runny and bloody noses, eye pain and swelling, drooping eyelids, blurred vision, and in severe cases, loss of vision and moreover around the nose, the skin may also darken in a patchy manner. In one research study it was found that, a one-week delay in diagnosis caused a death rate that frequently doubled from 33% to 66%⁶. The most crucial elements in determining prognosis in the treatment of mucormycosis are early suspicion, diagnosis, and beginning of proper treatment⁷. Here we present a case of a 63 year old male patient with mucormycosis and had discussed the observed clinical outcomes based on the treatment given to the patient.

II. CASE DESCRIPTION

A 63 year old male patient went to Hospital A with complaints of loss of vision and ophthalmoplegia over right eye and undergone FESS & Sinus debridement and treated with **Inj. Liposomal Amphotericin B** (11 days course completed now) and then discharged. Again 8 days back the patient was admitted in the same hospital with complaint of altered sensorium and left side weakness for past three days and shifted to our hospital for further management with the complaint of noisy breathing and altered mental status. He was a chronic alcoholic and smoker for the past 20

years and also had a past medical history of Type 2 Diabetes Mellitus for the past 13 years and was recently diagnosed with hypothyroidism. The patient was on irregular treatment of Tab. Sitagliptin + Metformin (50/500 mg) BD, Cap. Multivitamin- BD, Tab. Thyroxine (12.5 mcg) - OD. The imaging study report shown that

• **MRI – BRAIN PLAIN**

- Fungal invasion of brain and right orbit – **ZYGOMYCOSIS**
- Mucosal thickening in B/L Maxillary, B/L ethmoid. S/o residual pain sinusitis & orbital cellulitis.

• **MRI - BRAIN ANGIOGRAPHY**

- Focal narrowing in cavernous segment of right internal carotid artery- **CVA**

Treatment given to the patient were as follows:

In Hospital A

- **Day 1** - C/o loss of vision & right ophthalmoplegia for more than one week.
- **Day 2**- Underwent FESS & Sinus debridement.
- **Day 7** - Patient discharged.
- **Day 12** - Again went to hospital with the complaint of altered sensorium & left side weakness for 3 days.
- **Day 13** - Inj. Liposomal Amphotericin B started (total 30 dose ,11 dose completed)

In Hospital B (Table 1)

- **Day 24** -Patient came to our hospital with complaint of **noisy breathing and altered mental status**. On admission, patient was drowsy oriented, unable to move upper and lower limb (**Neuroglycopenia**), not arousal to pain. After administration of 25 % Dextrose in 100 ml, he regained consciousness and was able to move limbs. Right eye Ptosis (+) and restricted right eye movement.

DRUGS	DOS E	FRE Q	RO A	BEGU N	STOPP ED
Inj. Liposomal Amphotericin B	50mg	OD	IV	Day 13	Day 39
Inj.Cefeperazone + Sulbactam	1.5 g	BD	IV	Day 24	Day 22
Inj. Piperacillin + Tazobactam	4.5g	TDS	IV	Day 23	Day 35
Inj. Pantoprazole	40mg	OD	IV	Day 24	Day 34
Inj. Ondansetron	4mg	BD	IV	Day 24	Day 35
Inj.Dexamethasone	8mg	OD	IV	Day 24	Day 28
Tab. Metformin	500 mg	OD	Oral	Day 26	Day 35
Inj. Calcium Gluconate	10 mg	OD	IV	Day 29	Day 31
Tab. Levetiracetam	500 mg	BD	Oral	Day 24	Day 35
Tab. Aspirin	150 mg	OD	Oral	Day 24	Day 35
Tab. Atorvastatin	40 mg	OD	Oral	Day 24	Day 35

Table 1: Treatment given to the patient in hospital B

The improvement in patient’s laboratory parameters were found after the treatment. (Table 2)

Table 2: Improvement in patient’s laboratory parameters

LABORATORY INVESTIGATION	PARAMETERS	DAY - 24 Hospital B	DAY – 39 Discharge day	NORMAL VALUE
Complete Blood Count	Total WBC	15,2000	8500	4,000 - 11000 million/ml
	Neutrophils	85	61	40 – 80 %
	Lymphocytes	12	25	20 – 40 %
	Platelet	3.36	2.55	1.40 – 4.50 lakhs/cu.mm
	ESR	70	30	0 – 20 mm/hr
Blood Glucose Level	Random Blood Sugar	306	168	70 -170 mg/dl
Urine Analysis	Sodium	143	137	135 -145 mg/dl
	Potassium	3.7	3.9	3.5 - 4.5 mg/dl
	Sugar	Positive	Negative	Negative
	Pus	3-5	0-5	0-5/ hpf
	Epithelial	8-10	< 10	< 10 / hpf
	Blood	Negative	Negative	Negative
TFT	TSH	0.493	-	0.35-5.5 mIU/L

On Day 30 - Patient was stable. Hence discharged.

III. DISCUSSION

As we know a fungus of the order Mucorales causes the serious opportunistic infection known as Mucormycosis⁷. The gold standard for the clinical diagnosis of mucormycosis was established in 1950 by Smith et al. It includes characteristics such as black, necrotic turbinates, same-sided facial pain, peri-orbital or peri-nasal swelling with discoloration and induration, ptosis with proptosis of the eyeball and complete ophthalmoplegia, and multiple cranial nerve palsies unrelated to documented lesions⁸. Similarly the patient had experienced loss of vision and ophthalmoplegia. A common risk factor for rhino-orbital-cerebral mucormycosis is diabetes mellitus. According to a recent Indian study, people with diabetes accounted for 77% of incidents with rhino-cerebral-orbital mucormycosis⁶. Hence from this we can confirm that patient’s diabetic history and poor adherence to medications were also one of the risk factors that resulted in rhino orbital mucormycosis in this patient. The newest

publication of international recommendations for the diagnosis and treatment of mucormycosis recommends radiology in the form of a CT scan or an MRI of the nose, paranasal sinuses, brain, and orbit in a diabetic or immune compromised patient with facial pain or numbness, sinusitis, proptosis, ophthalmoplegia, or newly diagnosed amaurosis⁸. MRI scan was done to the patient which shown that fungal invasion of brain and right orbit – zycomycosis and mucosal thickening in bilateral maxillary, bilateral ethmoid and S/o residual pain sinusitis & orbital cellulitis. Moreover the patient had altered sensorium and left side weakness MRI - Brain Angiography was done and result shown that focal narrowing in cavernous segment of right internal carotid artery- CVA. It was shown that mucormycosis is characterized by tissue necrosis, which is frequently a late symptom and is caused by angioinvasion and vascular thrombosis⁹.It confirm that the patient might developed vascular thrombosis that resulted in CVA so to manage this condition the patient was treated with drug such as antiplatelet and HMG CO A reductase inhibitor. The first step of treatment for mucormycosis is to

start of antifungal medications such as liposomal Amphotericin B and doing so improves the outcome. It is typically administered at larger doses (5–10 mg/kg), and using the liposomal formulation lowers the risk of nephrotoxicity. Mechanistically, it is known to damage the fungal cell wall². Similarly this patient was treated with injection liposomal Amphotericin B. The fungal cell death results from the mechanism by which this polyene binds to ergo sterol and generates ion channels in the fungal cell membrane and causes loss of membrane integrity and leakage of essential cytoplasmic components through these channels¹⁰. This drug was given to the patient and it shown improved clinical outcome in this patient.

IV. CONCLUSION

This study concludes that early clinical diagnosis and following appropriate treatment regimen for mucormycosis helps to improve the clinical outcomes, quality of life and reduce the length of stay of the affected patients.

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