Case Report

Mucormycosis an avoidable complication of COVID-19: a case report

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ABSTRACT

Mucormycosis is caused by the fungi belonging to the order Mucorales. There has been an increasing trend of rising fungal infection during the second wave of COVID in India, seen among patients recovering from COVID-19. A 37-years-old middle-aged adult, with the diagnosis of left paranasal sinus mucormycosis, left side pneumothorax (intercostal drainage tube in-situ) with COVID pneumonia reported to the emergency department (ED) during the COVID-19 pandemic in our hospital in India. The patient presented in the ED on oxygen support via a non-rebreathing mask at rate of 10 l/min with a history of progressive left eye redness, pain, and tenderness, periorbital swelling, sudden onset, and mild shortness of breath from 8 days. The patient had a history of taking steroids during the management of COVID-19, also had left intercostal drainage tube (ICD) in-situ, and underwent post endoscopic sinus surgery in the private hospital. The patient was clinically examined by multispeciality experts and subjected to laboratory investigations. The patient was diagnosed with left PNS mucormycosis and planned for debridement. The patient developed renal failure secondary to antifungal therapy had sudden deterioration and could not be saved. The mortality rate of mucormycosis is very high due to delayed presentation, toxicity associated with the antifungal therapy, etc. There is a need to identify risk factors, perform specific laboratory tests, and initiation of prompt treatment. Monitoring and competent nursing care are required during antifungal therapy and prolonged hospital stay.

Keywords: Mucormycosis, COVID-19, Nursing management, COVID complication

INTRODUCTION

While the country is fighting with all its strength to prevent and cope with COVID-19, there has been an increasing trend of rising fungal infection in the last few weeks seen among patients recovering from COVID-19.¹ Mucormycosis is caused by the fungi belonging to the order Mucorales. Humans acquire the infection predominantly by inhalation of sporangiospores, occasionally by ingestion of contaminated food or traumatic inoculation.² The severity and the frequency have increased during the second wave, compared to some cases during the first wave last year.³ It is declared as a notifiable disease, noting that the fungal infection is

leading to prolonged morbidity and mortality amongst COVID-19.⁴ Similarly, a healthy 37-years-old man during COVID-19 disease developed clinical characteristics of mucormycosis. Herein, we presented a case report and nursing management of a patient recovering from COVID-19 with mucormycosis.

CASE REPORT

A 37-years-old middle-aged adult, a resident of Hisar, Haryana with the diagnosis of left paranasal sinus mucormycosis, left side pneumothorax [Intercostal drainage (ICD) in situ], COVID pneumonia reported to our emergency department (ED) of the hospital after being

referred from a private hospital. He complained of progressive left eye redness, pain, and tenderness, periorbital swelling sudden in onset, and mild shortness of breath in the last 8 days. On examination patient was conscious, Glasgow coma scale (GCS) E₄V₅M₆, SPO₂ 88% on oxygen support via non-rebreather mask (NRBM) mask at rate of 10 l/min, respiration rate (RR)- 20 breath/ min, pulse rate (PR)-110 beats/min, blood pressure- 146/109 mm Hg. On admission, the patient was tested COVID-19 positive with RT-PCR. The patient had a history of fever for 3-4 days. He was tested COVID positive after 9 days of symptoms and treated in a private hospital for COVID-19. During the hospital stay, the patient received steroids injection methylprednisolone (for 9 days, dose not known) for COVID-19. Swelling on the left periorbital region and cheek was noticed after 9 days. The KOH scraping was done which tested positive for fungal hyphae. Non-contrast CT paranasal sinus (PNS) showed mucosal thickening in the left ethmoid, maxillary sinus, and left nasal cavity, and a sign of left maxillary sinusitis. His serum ferritin was raised (1580 ng/ml). The patient underwent functional endoscopic sinus surgery

(FESS) and partial surgical debridement within 3 days of his diagnosis of paranasal mucormycosis from CT scan. He received tablet posaconazole 600 mg for 1 day before FESS followed by two doses of 300 mg and referred to the higher facility as debridement was not successful.

The course of hospitalization

The patient was examined by an ENT and oculoplastic experts at the emergency department. Old nasal bleed present, nasal pack in situ, and no palatal discoloration. After admission, the patient underwent a set of investigations (Table 1), and contrast-enhanced computerized tomography (CECT) PNS and left orbit, and CECT chest. The CECT PNS showed opacification of left maxillary, ethmoid, sphenoid frontal sinus along with soft tissue and fat streaking in left orbital region, thickened optic nerve s/o fungal sinusitis with distal cellulitis. No intracranial extension. CECT chest indicated diffused crazy paving pattern in bilateral lung parenchyma with mild left pneumothorax, pneumomediastinum, subcutaneous emphysema on the left side, suggestive of COVID related changes with CT severity score of 24/25.

Table 1: Investigation reports and breathing status of the patient.

Investigation	17.05.21	18.05.21	19.05.21	20.05.21	21.05.21	22.05.21
Hb (g/dl)	14.2	-	13.5	11.5	11.7	11.5
TLC (10 ³ /μl)	20.62	-	19.84	17.19	25.82	28.03
Neutrophils (%)	88.1	-	87.3	90.8	90.1	90.5
Lymphocytes (%)	5.8	-	7.7	4.9	6.2	4.7
Monocytes (%)	4.5	-	3.0	2.4	3.3	4.6
Eosinophils (%)	1.5	-	1.7	1.8	0.2	0.1
Basophils (%)	0.1	-	0.3	0.1	0.2	0.1
Nucleated RBC (%)	0.0	-	0.1	0.1	0.1	0.0
RBC count 10 ⁶ /μl	5.09	-	4.82	4.04	4.15	4.02
Haematocrit (%)	42.3	-	41.1	33	34.7	32.3
Platelet counts 10 ³ /μl	341	-	153	80	90	95
MCV (fL)	83.1	-	85.3	81.7	83.6	80.3
MCHC (g/dl)	33.6	-	32.8	34.8	33.7	35.6
RDW CV (%)	14.3	-	15.3	14.7	15.6	15.8
MCH (pg)	27.9	-	28	28.5	28.2	28.6
PT/INR	-	-	12.8/1.1	12.8/1.1	11.1/0.9	11.7/1
aPTT (sec)	-	-	26.2	27.7	-	25.5
Na/K (mmol/l)	142.5/4.6	142.5/4.3	143.1/4.57	133/4.6	142/very high	144.3/4.8
Urea/cr (mg%)	36.7/1.1	36/1.1	46.48/1.21	46/1.0	102/2.7	132.3/3.5
TSB (mg%)	1.08	-	1.07	1.4	1.2	2.3
Ca (mmol/l)	1.61	-	1.33	1.35	1.32	1.4
Cl (mmol/l)	110.7	-	105.5	105	109.1	112.2
ABG	17.05.21 (venous)	18.05.21	19.05.21	20.05.21	21.05.21	22.05.21 (6/11am)
pH	7.37	7.34	7.41	7.17	7.07	7.28/7.05
PaO ₂ (mmHg)	30.2	27	43.9	86.3	76.8	79.5/33
PaCO ₂ (mmHg)	37.1	37.2	72.4	52.7	59.3	28.9/55.6
HCO ₃ (mEq/l)	21.8	20.2	27.8	19.4	17.4	14/15.8
BE	-3.6	-5.8	2.9	-9.3	-	-12.8/-14.8
RBS (mg/dl)	174	214	132	173	198	148/142

Continued.

Investigation	17.05.21	18.05.21	19.05.21	20.05.21	21.05.21	22.05.21
Breathing status	On NRBM at rate of 10 l/min	On NRBM at rate of 10 l/min	On NRBM at rate of 8l/min, Awake proning	Intubated (3 pm) via ET tube on ventilator VCAC, FiO ₂ -45%, PEEP-8, VT-360, sedation fentanyl at rate of 50 mcg/hr, cisatracurium at rate of 8 mg/hr	On ventilator via ET tube mode-VCAC, FiO ₂ -40%, PEEP-6, VT-400, sedation fentanyl at rate of 50 mcg/hr	Weaned off, kept on T piece and extubated (5 am) Kept on HFNC, started desaturating after 6 hours SPO ₂ -75%, kept on NIV and then reintubated, injection heparin 25000IU given, resuscitation done, left ICD placed.
Issue of the day				Mild left pneumothorax, pneumomediastinum, left fungal sinusitis, left orbital cellulitis	Type2 respiratory failure, acidosis, nonfunctional ICD, AKI due to amphi-B	Persistent hypoxia and cardiac arrest. Pt could not be revived and declared dead after best resuscitative efforts.

Chest X-ray showed bilateral opacities more in the right upper lobe with a reticular interstitial pattern (Figure 1). Post-CT scan patient was planned for sinus debridement and medial orbit debridement.

The treatment provided to the patient was inj. Liposomal Amphotericin B 400 mg with avil, hydrocortisone, emset, and paracetamol (PCM) coverage, random blood sugar (RBS) monitoring 4 hourly and insulin according to sliding scale. He was also started on syrup potassium chloride 15 ml TDS in half glass of water, tablet vitamin C 500 mg TDS, tablet zinc 50 mg PO OD, tablet clonazepam 0.5 mg HS. Prone ventilation was done to improve oxygenation and ventilation. Later antibiotics cefaperazone and sulbactam 2 g and teicoplanin (400 mg stat followed by 200 mg OD) were added. The patient was intubated in view of impending type 2 respiratory failure and put on volume cycled assist-controlled mode at the rate of FiO₂- 45%, positive end-expiratory pressure (PEEP) -10 mmHg, RR-30/min, tidal volume (VT)- 350 ml, and sedated and paralyzed with inj. Fentanyl 50 mcg/hour, and injection cisatracurium 8 mg/hour respectively. The patient was weaned off from a mechanical ventilator and put on a T piece within 38 hrs of intubation. The patient-maintained saturation nearly for 6 hours after extubation and started suddenly desaturating. Because of suspected pulmonary embolism, he was re-intubated and resuscitated. The patient had developed significant hypoxia and cardiac arrest. Despite best resuscitative efforts he could not be

revived and was declared dead due to respiratory failure and hypoxic arrest. Antecedent causes leading to death were severe COVID-related acute respiratory distress syndrome and subsequent left PNS mucormycosis with iatrogenic left pneumothorax.

Nursing management of patient of COVID with mucormycosis

Patients with mucormycosis are either immunocompromised or are affected by several comorbid illnesses. Nursing care of this patient included the care related to respiratory support, hemodynamic monitoring, and strict maintenance of intake and output chart, blood glucose monitoring. Ventilation in a prone position was preferred for better oxygenation of lungs for 16 hours in a day. Pre-proning care such as securing ET tube, oral and ET suctioning, close suction catheterization, the bolus of muscle relaxant, securing CVP line, eyes lubrication and taping, general hygiene care, loosening and clamping of ICD tube and foleys was done. During proning, securing ET tube, care of pressure points, eye padding, face resting on a ring with absorbent padding, chest, and thighs resting on a pillow, abdomen freely hanging and all lines were ensured. ICD was checked for oscillations, kept below the level of the chest, and output monitored daily. After giving a supine position and stopping sedation, the GCS of the patient was assessed once in 24 hours for identification of early signs of stroke and intracranial extension. Nasal

packaging, oral care, monitoring for respiratory compromise for epistaxis while the patient was on oxygen support was done. Antibiotics and antifungal treatment were given ensuring strict asepsis. Though mucormycosis is not contagious, the infection control practices were strictly adhered to, to prevent hospital-acquired infections. The patient was hydrated before giving antifungal, given oral potassium supplements via Ryles tube, and closely watched for acute kidney injury and liver dysfunction secondary to the side effects of antifungal and antibiotic drugs. Fluid was administered carefully to avoid the development of congestive heart failure (CHF). Hemodynamic monitoring including cardiac and saturation monitoring was done for pulmonary embolism. Nursing care also focused on meticulous mouth care, change of position, and skincare using emollient to minimize skin discomfort, frequent mouth care helped to relieve oral mucosal inflammation. The patient was nursed in a quiet environment for promoting rest. Psychological support was provided to the family members and were kept informed about the condition of the patient.

Figure 1: Chest X-ray of the patient.

DISCUSSION

The patient presented with mucormycosis in the post-COVID phase, after receiving steroids for treatment of COVID-19, which is one of the predisposing factors of mucormycosis. The indication for the steroid use in this patient is not known but we assume that it has been according to the available guidelines based on clinical evidence for judicious steroid usage as in moderate to severe COVID with dose modification and then tapering.⁵ Patient was presented with the clinical signs and symptoms of redness in the eye, pain, tenderness, periorbital and cheek swelling which is similar to known signs and symptoms of mucormycosis as seen in previous studies.⁶ The line of action for the diagnosis of mucormycosis is history taking, physical examination, KOH scrapping for fungal identification, and CT scan of the affected part, for identifying involvement of area and to plan for the

treatment and surgery. The patient had undergone all of these and was diagnosed with paranasal mucormycosis. Raised serum iron level, which was present in our patient also, which acts as a major regulator of fungi virulence.⁷

The management of patients with mucormycosis requires multispecialty experts as per the area involvement. In our case, ENT, ophthalmic, surgery, and anesthesia experts were involved. The treatment given to the patient was antifungal medication, and surgical removal of infected portion as soon as possible which is according to the evidence of different studies and the available guidelines.² The patient developed toxicity related to the antifungal therapy, an expected complication of antifungal drugs administration, which should be identified by daily monitoring of the patient. The patient's condition deteriorated suddenly, despite improvement in his respiratory functions as evident by stable vital signs. Unfortunately, we could not save the patient.

The observant and meticulous nursing care such as hourly-2 hourly vitals monitoring, careful proning, nasal and oral care, random blood sugar (RBS) monitoring, antifungal therapy administration with monitoring of side effects, provided to the patient is necessary for the management of mucormycosis as per various clinical studies and care plans.⁸

CONCLUSION

this was an unusual but preventable case of mucormycosis seen in the patient during his recovery from COVID-19 infection. The condition could have been averted with the judicious use of steroids which is an important cause of immunosuppression in COVID patients. Sinuses and lungs of COVID patients get affected after the inhalation of fungal spores. The management of Mucormycosis includes antifungal for longer duration and debridement requiring prolonged hospitalization. So, Quality nursing care including individualized patient care, observing strict sepsis, and closed monitoring plays a pivotal role in the management of COVID-19 patients receiving corticosteroids or having comorbid illnesses.

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