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Case report

Mucormycosis in COVID Pandemic and the Challenge for Anesthesiology and Critical Care: A Case Report

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Abstract

Mucormycosis is a rapidly progressing fungal infection caused by filamentous fungi in the Mucoraceae family and is frequently seen in diabetic and immune-compromised patients. Mucormycosis is categorized as rhino-cerebral, pulmonary, cutaneous, and gastrointestinal or disseminated, depending on organ involvement; the most common form is rhino-cerebral (39%). This form may be divided into subtypes based on which tissues are affected: rhino-nasal, rhino-orbital or rhino-orbito-cerebral.

Rhino-orbital infection begins when fungal spores are inhaled and invade the nasal mucosa, and sinusitis develops as the fungus spreads to the Para-nasal sinuses. Orbital involvement occurs when the infection invades the orbital wall from the Para-nasal sinuses. Symptoms may include pain, chemosis, vision loss, Ophthalmoplegia and proptosis. Ophthalmoplegia arises from infection of the muscles and orbital space or when the third, fourth and sixth cranial nerves are affected. Peripheral seventh cranial nerve paresis or paralysis and hypoesthesia of the face are often observed.

We came across a 51-year-old male with multiple co morbidities suffering from rhino-orbito-cerebral mucormycosis. We present his pre, peri, and post operative management by anesthesiology and critical care department of Subharti medical college Meerut Uttar Pradesh. India.

Keywords: ***Mucormycosis, covid – 19, Anesthesia and critical care.***

Introduction

While every anesthesiologist is battling with the corona virus disease (COVID)-19 as a frontline warrior [1,2], the issue of post-COVID-19 sepsis has opened a new battlefield and emerged as a significant problem. Recently, Mucormycosis has emerged as a serious but rare opportunistic fungal infection that spreads very rapidly causing tissue infarction and necrosis in post-COVID patients [3]. With more patients presenting with post-COVID Mucormycosis, all anesthesiologists must prepare themselves to manage this poorly understood patient population for elective or emergency surgery. Multiple factors including post- COVID systemic effects like residual pulmonary dysfunction, adrenal suppression, myocardial dysfunction, difficult airway due to Mucormycosis and adverse effects of amphotericin B (AmB), can alter the anesthetic outcome in these patients. We are reporting a case of successful anesthetic management in a patient with post-COVID mucormycosis posted for surgical debridement. We aim to highlight the various factors in this post- COVID illness which need to be considered to deliver safe and quality anesthesia services in this population.

Case

51y/M (weight 70 kg) came to our hospital with swelling over right side of face since2 weeks. Patient had rhinorbitalmucormycosis with type 2 diabetes mellitus and hypertension with dilated cardiomyopathy posted for maxillectomy. With ethmoid sinus debridement with dural tear repair. Patient was discussed with surgical team, ophthalmology team and neurosurgery team and risk associated with the patient was discussed in detail including post-operative intensive care management.

Table 1

	Per-op investigations	post operative day 2	post operative day 4
Haemoglobin	13.6	11.2	11.6
TLC	5600	14700	10300
Urea	43	54	68
Creatinine	1.36	2.08	2.13
Sodium	148	147	142
Potassium	4.1	3.2	4.8
Calcium	8.4	7.9	9.8
PT/INR	14.8/1.12		24/1.85
SGOT	47		
SGPT	36		

Albumin	2.5		
ALP	687		
GGT	599		
T.B.	0.6		
HbA1c	18.6		
RBS	120	160	150

Pre anesthetic evaluation was done, ECG- Left ventricle hypertrophy and ST depression (V3-V6), Echo- Global hypokinesia . Ejection fraction 35 -40%, severe concentric left ventricular hypertrophy, grade 2 Mitral regurgitation, mild tricuspid regurgitation. Patient was hepatitis C positive. Patient was accepted as ASA grade 4E. Two units of blood were asked to be arranged and kept ready for surgery. Proper consent was obtained.

Patient was shifted to pre-operative room on the day of surgery. He was having RBS 140 mg/dL.

In operating room, standard monitors were attached and 18 G I.V. Cannula was placed, and central catheterization through femoral line was secured. Arterial cannulation for invasive blood pressure monitoring was done. Mode of anesthesia chosen was general anesthesia.

Table 2: Preoperative vitals

BP	108/69 mmHg
HR	140/min
RR	24/min
SpO_2	98% on room air

We kept infusion pump with nor-adrenaline ready. Along with ampoules of adrenaline and dobutamine on standby. Difficult airway cart with video laryngoscope, fiber-optic bronchoscope was kept ready.

Table 3 Pre induction Vitals

BP	100/80mmHg
HR	146/min
RR	22/min
SpO2	98% on room air

Patient was taken on Noradrenaline infusion @0.22mcg/kg/min before induction. Premedication was started with Inj Midazolam 1mg. Induction was done with Inj Etomidate 14mg and Rapid Sequence Intubation done with the help of Inj Succinylcholine 100mg. 8.00mm ID flexo-metallic endo-tracheal tube was placed in trachea done by laryngoscopy with Macintosh blade no.4 with bougie under direct vision. Endotracheal tube placement confirmed by auscultation and fixed at 22cm mark and connected to automatic anesthesia delivering machine and put on volume controlled mode Ventilator setting VT 400ml, PEEP. 5 cm H2O, Respiratory rate - 14/min.

Anesthesia was maintained with oxygen and sevoflurane and cisatracurium is given as muscle relaxant and analgesia Morphine 6mg and Paracetamol 1gram.

Table 4: Post intubation vitals

BP	130/90mmHg
HR	148/min
RR	14/min
SpO2	100%

After 20 minutes Post intubation patient went into arrhythmias irregular R-R interval? Atrial fibrillation suddenly, with following vitals (table 5).

Table 5

BP	110/70 mmHg
HR	204/min
RR	14/min
SpO_2	100%

Patient was given bolus Inj. Amiodarone 150mg over 10mins and repeat dose of Inj. Amiodarone150mg given.

After 1hr, HR was 140/min and had tachycardia throughout the surgery (Fig.1). Intra operatively 1 PRBC was transfused. Intra operatively RBS was done every hourly and insulin given accordingly.

Fig.1

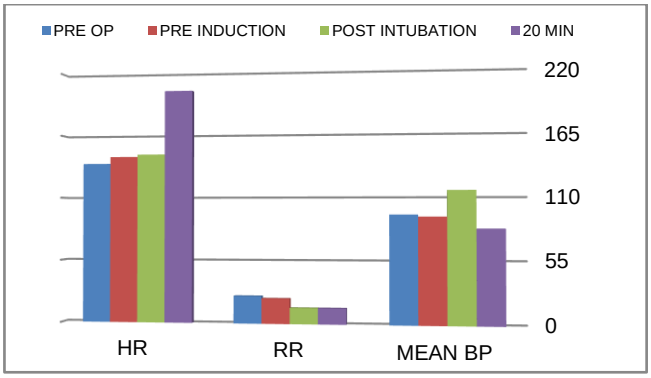

Table 6

Intra-op	**RBS**	**Insulin**
1st reading	211mg/dl	3 Unit insulin
2nd reading	221mg/dl	3 Unit insulin
3rd reading	250mg/dl	5 Unit insulin

After this patient was taken on Insulin Infusion @5ml/hr and RBS was kept between 150 to 250mg/dl.

Patient had tachycardia (arrhythmia) which was managed by Amiodarone and hypotension with Noradrenaline infusion. Urine output was 100ml. Lumbar CSF drain catheter was inserted at the end of the surgery.

After maxillectomy with ethmoidal sinus debridement with dural tear repair (**Fig 2 and 3**) patient was not extubated in OT and shifted to Surgical Intensive Care Unit for further management. On post operative day 2 patients underwent exentration of eye (**Fig 4**) under general anaesthesia, surgery was uneventful, patient not extubated in OT and shifted to Surgical Intensive Care Unit. Percutaneous tracheostomy23 was done as patient was having good respiratory efforts and breathing pattern was normal. Patient was weaned off from mechanical ventilation and taken on T-piece (**Fig 5**).

Fig -2 & 3

Fig 4 & 5

Discussion

Mucormycosis is a condition with a fulminant course and a high mortality risk. The most common predisposing factor is DM (60-80%), though hematologic diseases, neoplasias, chronic renal failure, anti-neoplastic agents, immunosuppressive therapy, corticosteroid use, protein-calorie malnutrition, organ and bone marrow transplantation, and other conditions resulting in immunosuppression such as AIDS also factor in its etiology [3].

With orbital involvement, clinical symptoms and findings include periorbital edema, pain, proptosis, ophthalmoplegia and decreased vision. The early diagnosis and treatment of mucormycosis is very important in terms of prognosis.

Patients who begin treatment within 6 days have a survival rate of 76-81%, while a treatment delay of more than 12 days reduces this rate to 36-42% [8,9]. Amphotericin B has become the gold standard in the systemic treatment of mucormycosis. Before the use of amphotericin B, the survival rate of mucormycosis patients was just 6%, whereas after the introduction of amphotericin B this rate dramatically increased to the 60% range [10,11,12]. Liposomal amphotericin B is the first choice of treatment, as it crosses the blood-brain barrier more effectively [11,13]. Another drug that can be used in systemic treatment is posaconazole. In a large European study, fluconazole was ineffective, itraconazole was found to be partially effective, and posaconazole was effective [14,15,16,17,18]. A critical stage in the treatment of mucormycosis is debridement of necrotic tissue. In our study, all cases underwent surgical debridement of necrotic areas; maxillectomy and hard palate resection were added when deemed necessary. This patient was with extensive orbital mucormycosis invasion and total vision loss underwent exenteration. Exenteration was deemed necessary to reduce the fungal load and prevent cerebral involvement and the fatal progression of the disease. Despite extension to the orbit in the other two patients, close monitoring, medical therapy and local amphotericin B irrigation were preferred due to good visual potential and positive response to treatment. As mucormycosis forms vascular obstruction, it may be difficult for drugs to reach the affected tissues. For this reason, local irrigation of infected areas with amphotericin B is used in conjunction with surgery and systemic therapy. Local irrigation is effective in facilitating socket healing in some patients following exenteration, while, irrigation was used in the maxillary sinus pathways and contributed to the healing of their orbital infection. Orbital involvement in a high-mortality infection like mucormycosis may necessitate the decision to perform exenteration. This difficult decision is made when the extent of the disease and the risk of mortality outweigh the desire to keep the patient's globe in place. Local antifungal therapy in the form of irrigation can be used in addition to systemic treatment and debridement to save the globe. Local use of antifungal agents facilitates their delivery to affected tissues. Patients' general condition, course of the disease and response to treatment should be closely monitored, and exenteration should be performed if there is life-threatening progression of the disease.

Conclusion

We anesthesiologists must prepare ourselves and reframe our anesthetic approach for this new post-COVID mucormycosis disease. Large-scale prospective studies are needed to unfold the anesthetic challenges in these patients.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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