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PERIOPERATIVE ANAESTHETIC CHALLENGES IN CORONAVIRUS DISEASE ASSOCIATED MUCORMYCOSIS: A RETROSPECTIVE STUDY

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ABSTRACT

Background & Aim: Mucormycosis is a life-threatening fungal infection that occurs in immune-compromised patients. There were large number of mucormycosis cases reported during COVID pandemic (2019-21) mainly as post COVID sequelae. In the present retrospective study we aimed to evaluate the perioperative challenges faced in the anaesthetic management of Coronavirus disease associated Mucormycosis (CAM) patients who underwent surgery under general anesthesia. **Methods**: The perioperative records of CAM patients who underwent surgery from May 2021-July 2021 for mucormycosis were reviewed and evaluated in terms of difficult bag mask ventilation, difficult intubation and other intraoperative and post-operative complications. **Observation and Results**: The incidence of CAM and its associated surgery was significantly more in males than females and the mean age of the patients was 50 years. In 39.8% patients we encountered difficult bag mask ventilation. and in 17.5% patients more than two attempts for intubation were required. **Conclusion**: Mucormycosis patients posted for surgery may pose various anesthetic challenges especially in airway management and anesthesiologists must be well prepared for it

INTRODUCTION

The outbreak of coronavirus disease (COVID-19) spread rapidly worldwide from 2019-2021 with various post COVID sequelae. Secondary infections were reportedly common in hospitalized, severely ill COVID-19 patients, encompassing between 10 and 30% of cases, fungal being 10 times more common. Mucormycosis is a life-threatening fungal infection that occurs in immunocompromised patients. There were increasing number of mucormycosis cases during COVID pandemic and as post COVID sequelae. Various causative factors leading to increased incidence of mucormycosis in COVID patients is a matter of debate. Mucormycosis is amongst the most fulminant form of Zygormycosis caused by Mucorales species of the phylum Zygomycota. The incidence rate of mucormycosis globally varies from 0.005 to 1.7 per million population. Whereas, in Indian population its prevalence is 0.14 per 1000, which is about

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80 times higher than developed countries. The fatality rate of mucormycosis is 46% globally. However, factors like intracranial or orbital involvement, irreversible immune suppression increases fatality to as high as 50% to 80%. Effective management consists of high index of suspicion, cytological diagnosis, optimization of comorbidities, systemic antifungal therapy with prompt surgical debridement of infected tissue. The first case of mucormycosis from India was reported in 1963 [1]. The fungal invasion of nasal cavity or paranasal sinuses of susceptible host causes consistent symptoms of sinusitis, periorbital cellulitis and facial numbness, followed by conjunctival congestion, blurry vision, soft tissue swelling, eschar formation and necrosis of naso-facial region. Advancing infection spreads from ethmoid sinuses to orbit causing proptosis, chemosis and can quickly result in cavernous sinus thrombosis, carotid or jugular vein thrombosis (Lemeirre syndrome) and death. Amphotericin B (AmB) is the cornerstone of antifungal therapy in mucormycosis. Hence, managing these patients in operating room pose various challenges to the attending anesthesiologists. Difficulty in securing airway in mucormycosis patients have been reported in various case reports in the literature in the form of patalatal perforation, significant airway edema especially during second debridement [2-6]. There is still a paucity of literature and recommendations regarding the anaesthetic management of Corona virus Associated Mucormycosis (CAM). There are only few case reports and case series [7-8] from India describing the perioperative challenges faced by anesthesiologists in these patients. Looking at the lacunae, we aimed to conduct the present study to describe the perioperative challenges faced by us as anesthesiologists in managing these cases at our tertiary care institute.

Our primary objective was to find the incidence of difficult mask ventilation and difficult intubation (required >2 attempts at intubation, used stylet and or bougie, used videolaryngoscope or fibreoptic for intubation.) and to evaluate the recorded intraoperative hemodynamic parameters (Heart rate, NIBP and Spo2). We also planned to determine the proportion of cases who developed intraoperative hemodynamic complications and postoperative airway morbidity as our secondary objectives.

MATERIAL AND METHODS

After obtaining approval from institutional review board and ethics committee all the medical and operating room records of CAM patients who underwent surgery from May 2021-July 2021 for mucormycosis were reviewed and evaluated. In this Single Centre, Hospital based, Retrospective study the patients who underwent surgery for Corona virus Associated Mucormycosis (CAM) under general anaesthesia of either sex of ASA grade I – III with Confirmed COVID positive status were included and the patients with incomplete medical records, age less than18 years and pregnant females were excluded from the study. The entire perioperative records (preoperative, intraoperative and postoperative till 24 hours post-surgery) from the OT register and patient files were evaluated and the following study variables were recorded;

- Demographics
- Preoperative presence of any comorbidities
- Preoperative any significant data related to COVID signs, symptom duration and treatment
- Proportion of cases with recorded difficult mask ventilation (Obvious facial anatomical distortion, Guedels Airway required for mask ventilation, two persons needed or episode of desaturation (SpO2<90%)
- Proportion of cases with recorded difficult intubation (required >2 attempts at intubation, used stylet and or bougie, required video laryngoscope or fibreoptic intubation.)
- Mean heart rate, Mean systolic blood pressure, Mean Diastolic blood pressure
- Proportion of cases who developed intra-operative arrhythmia or hypotension
- Proportion of cases who had delayed recovery and requiring post-op ICU stay with need of ventilator or oxygen therapy
- Proportion of cases that were shifted with endotracheal tube in situ or tracheostomy from the OT.

STATISTICAL ANALYSIS

All the data were entered on Excel Sheet and with quantitative data being expressed as Mean and SD and qualitative data was expressed as proportions with p value < 0.05 considered significant.

RESULTS

A total of 103 patients who underwent CAM surgery under general anesthesia between May 2021 to July 2021 were recruited in the study. In the study (Table -1) we found that the mean age of patients was 50.92±12.09 years and 68.9% patients were males and 31.1 % patients were females. Hence the

incidence of CAM and its associated surgery was significantly more in males than females. The incidence of smoking was 33% and 21.4% patients were obese. The incidence of diabetes and hypertension was 61.2% and 30.1% respectively. There was low incidence (<2%) of cardiac and renal disease. None of our patients were reported to be on immunosuppressants, malignant or post-transplant surgery.

Table 2 shows that in 41 patients we encountered difficult bag mask ventilation during airway management intraoperatively which was managed using guedels airway and/or 2 person technique. In 18 patients more than two attempts for intubation were required. The difficulty in intubation was managed with using stylet in 32 patients and bougie in 6 patients. All our patients were hemodynamically stable intraoperatively without any desaturation (figure 1-2). In 16 patients (15.5%) we experienced difficult extubation out of which 13 patients required mechanical ventilation in intensive care unit and 3 patients received oxygen therapy via T piece with ET tube in situ. Overall 24 patients (23.3%) required post-operative oxygen therapy support via face mask, non-rebreathing face mask or T piece.

DISCUSSIONS

There are only few cases and case series reported in the litreture describing the anesthetic management and perioperative challenges faced by anaesthesiologists in CAM patients. Oures is a case series of 103 patients who underwent CAM surgery during 2021. COVID pandemic began from year 2019 and continued in 2021-22 with three waves, second wave was the deadliest in our country causing maximum morbidity and mortality. The various post COVID sequlae were also reported in large numbers after the second wave.

Mucormycosis is an opportunistic fungle infection which usually occur in patients with low immunity. Hence many post COVID patients developed rhinoorbitocerebral mucormycosis and underwent surgery for the same after the second wave of the COVID pandemic. We describe our experience in CAM patients who underwent surgery in otorhinology operating room in our institute and thereby discussed the perioperative anesthetic challenges faced by us. Perioperative records of 103 patients were evaluated and we observed that the mean age of our patients were 50.92±12.09 years. The incidence of CAM and its associated surgery was significantly more in males than females in our study. Most common comorbidity was DM (*61.2%*), followed by hypertension (*n*=30.1%), obesity (*n*=21.4%), and cardiac and renal disease (<2%). The incidence of smoking was 33%. None of our patients were reported to be on immunosuppressants, malignant or post-transplant surgery. Our observation were similar to Singh *et al.* [9] who also found that mucormycosis was predominant in males 78.9% and pre-existing diabetes mellitus was present in 80% of cases.

Difficult bag mask ventilation was observed in 41 patients during airway management. It was mainly because of difficulty in placement of the mask due to abnormal facial anatomy with outgrowing lesion. Difficult ventilation was contributed by obstruction of the upper airway due to the lesion which increased intraoperatively after induction of anesthesia which was managed using either guedels airway or 2 person techniques or both.

Table 1: Demographic and Clinical profile of study participants (n=103)

SNo	Characteristics	Mean±SD	Frequency	%
1	Age	50.92±12.09		
2	Sex			
	Male		71	68.9
	Female		32	31.1
3	Place of residence			
	Urban		44	42.7
	Rural		59	57.3
4	Comorbidity			
	Smoking		34	33.0
	Obesity		22	21.4
	Hypertension		31	30.1
	Cardiac disease		2	1.9
	Renal disease		2	1.9
	Diabetes Mellitus		63	61.2

Table 2: Incidence of difficult mask ventilation and difficult intubation among study participants (n=103)

SNo	Indices	No.	%
1	Difficult bag and mask	41	39.8
2	Use of Guedel airway	9	8.7
3	>2 attempts at intubation	**18**	**17.5**
4	Use of stylet	32	31.1
5	Use of bougie	6	5.8

Table 3: Perioperative events among study participants (n=103)

S No.	Events	No.	%
1	**Intraoperative complications**		
1a	Hypotension	1	1.0%
1b	Arrythmia	**2**	**1.9%**
2	**Postop airway morbidity**		
2a	Difficult Extubation	**16**	**15.5**
2b	1. Need for oxygen therapy	**24**	**23.3**
2c	2. Delayed recovery	**16**	**15.5**
2d	3. Postop ICU stay	**13**	**12.6**

In 18 patients more than two attempts for intubation were required. There was difficulty in intubation due to restricted mouth opening, stiffness of the TM joints, abnormal dentition, and presence of growth in oral cavity. The difficulty in intubation was managed with using stylet in 32 patients and bougie in 6 patients.

Karaaslan [10] *et al.* have also reported that patients with ROC mucormycosis may present with difficult mask ventilation and endotracheal intubation as a result of epiglottitis and supraglottic oedema associated with fungal debris. So, a difficult airway cart with the backup of tracheostomy must be kept ready. Satish D *et al*. [11] in their case series have discussed the challenges in treatment of mucormycosis coinfection associated with COVID-19 and they found a significant delay in the surgical management of moderate to severe COVID patients due to their lack of fitness for general anaesthesia hence they were given IV Amphotericin-B for preoperative stabilisation.

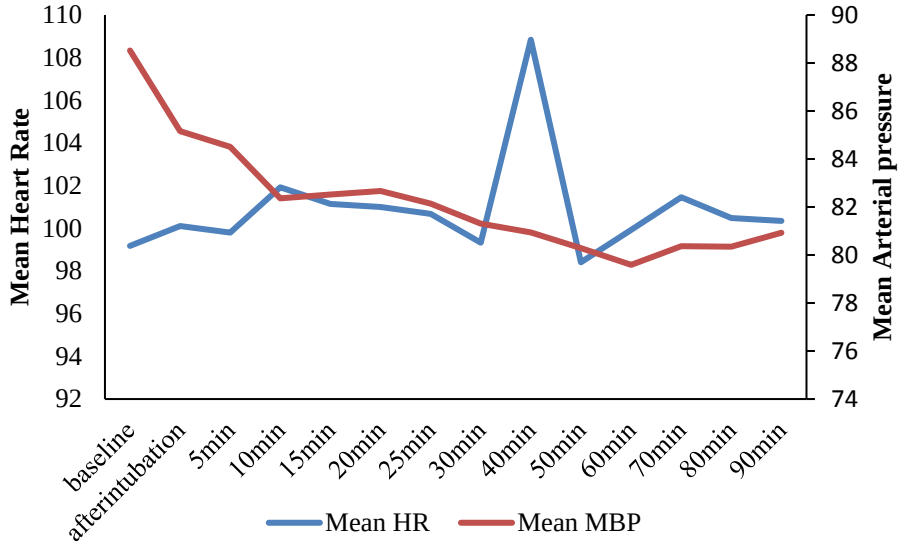

Figure 1: Intraoperative hemodynamic parameters of study participants

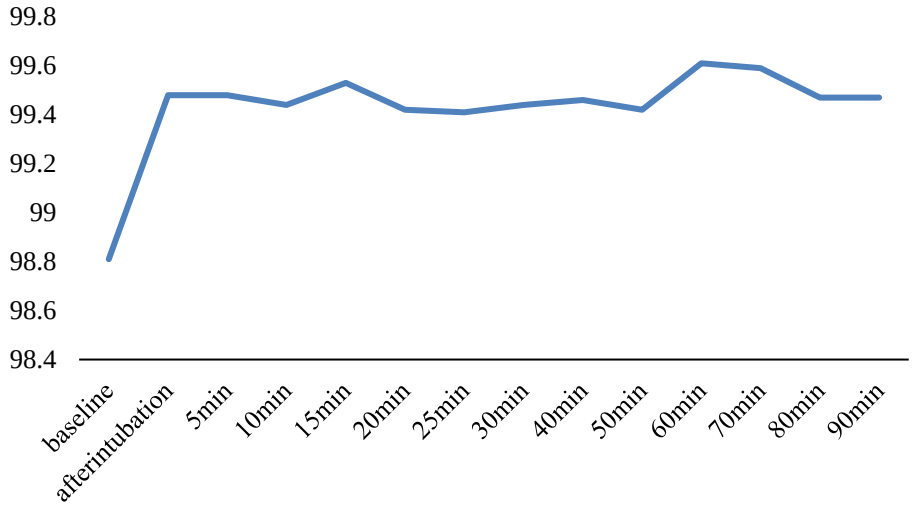

Figure 2: Intraoperative SPO_2 of study participants

Malhotra *et al.* [12] in their advisory in have discussed that anaesthesiologists are involved in the multidisciplinary management of mucormycosis in COVID-19 patients. The COVID-19 patients suffering from mucormycosis often have coexisting comorbidities such as diabetes mellitus (DM), own pathologies and immunosuppression therapies. Meticulous attention must be paid to glycaemic control. Apart from these comorbidities, mucormycosis may make the airway management difficult. In addition, administration of injection amphotericin B (AmB) can have significant adverse effects which must be considered before surgery.

We observed that all our patients were hemodynamically stable intraoperativelly and maintained oxygen saturation within normal range throughout procedure. After completion of surgery 16 patients could not be extubated and were shifted with ET tube in situ 13 patients required mechanical ventilation in intensive care unit and 3 patients received oxygen therapy via T piece with ET tube in situ. Some of these patient had extensive oral and nasal surgery and airway patency could only be maintained with the endotracheal tube. Few patients who were already on oxygen therapy preoperatively required the same post operatively. Overall 24 patients received post-operative oxygen therapy support via face mask, non-rebreathing face mask or T piece as per need.

Hence from the present retrospective study we highlighted the difficulty in airway management in CAM patients experienced by us so that these challenges can be anticipated in future by anesthesiologists facing mucormycosis patients. However the limitation of this study was all that are usually seen in all retrospective studies and also we reviewed only three months data which could be a limiting factor.

CONCLUSION

Surgery in mucormycosis patients imposed various periopertive anesthetic challenges with difficult bag mask ventilation and difficult intubation. Anesthesiologists must anticipate and be well prepared to face these challenges for successful outcome.

FINANCIAL ASSISTANCE

Nil

CONFLICT OF INTEREST

The authors declare no conflict of interest

AUTHOR CONTRIBUTION

Mamta Khandelwal and Sunita Meena designed the work and revisions in the manuscript. Sanjay Morwal and Priyanka Jain provided maximum effort in the correction, collect documents, makes proper format. Both did a proper literature survey and designed the manuscript. The manuscript was checked and reviewed by Yogesh Modi. The final draft was checked and reviewed by all the authors.

REFERENCES

[1] Kulkarni PK, Reddy NB, Shrinivas B, Takkalki VV. Anesthetic considerations in the management of mucormycosis. *Int J Med Public Health*,**5**, 387 – 390 (2015)

[2] Pahade A, Chowdhury I, Mittal A, Mowar A. Functional Endoscopic Sinus Surgery for Rhino-orbital mucormycosis in a pediatric patient with Acute Lymphocytic Leukemia-Anaesthetic considerations. *Journal of Anaesthesia and Critical Care Case Reports*, **5(3)**, 13-15 (2019)

[3] Cornely OA, Alastruey-Izquierdo A, Arenz D, Chen SCA et al. Mucormycosis ECMM MSG Global Guideline Writing Group. Global guideline for the diagnosis and management of mucormycosis: an initiative of the European Confederation of Medical Mycology in cooperation with the Mycoses Study Group Education and Research Consortium. *Lancet Infect Dis*., **19 (12)**, e405-e421 (2019)

[4] Garg D, Muthu V, Sehgal IS, Ramachandran R, Kaur H, Bhalla A, Puri GD, Chakrabarti A, Agarwal R. Coronavirus Disease (COVID-19) Associated Mucormycosis (CAM): Case Report and Systematic Review of Literature. *Mycopathologia* **186**, 289-98. (2021).

[5] Saldanha M, Reddy R, Vincent MJ. Paranasal Mucormycosis in COVID-19 Patient. *Indian J Otolaryngol Head Neck Surg*., **22**, 1-4 (2021).

[6] Maini A, Tomar G, Khanna D, Kini Y, Mehta H, Bhagyasree V. Sino-orbital mucormycosis in a COVID-19 patient: A case report. *Int J Surg Case Rep*., **82**, 105957 (2021)

[7] Gupta KK, Singh A, Kalia A, Kandhola R. Anaesthetic considerations for post-COVID-19 mucormycosis surgery-A case report and review of literature. *Indian J Anaesth*., **65(7)**, 545-547 (2021)

[8] Solanki NM, Solanki RN, Madaliya AV, Jasoliya RH, Upadhyay DT. COVID-19-associated mucormycosis: an update of anesthetic management. *Ain-Shams Journal of Anesthesiology*., **14**, 16 (2022)

[9] Singh AK, Singh R, Joshi SR, Misra A. Mucormycosis in COVID-19: A systematic review of cases reported worldwide and in India. *Diabetes Metab Syndr*., **15(4)**, 102146 (2021).

[10] Karaaslan E. Anesthetic management of rhino orbito cerebral mucormycosis: Focus on challenges. *J Mycol Med*, **29**, 219-222 (2019)

[11] Satish D, Joy D, Ross A, Balasubramanya. Mucormycosis coinfection associated with global COVID-19: a case series from India. *Int J Otorhinolaryngol Head Neck Surg*, **7**, 815-820 (2021)

[12] Malhotra N, Bajwa SJ, Joshi M, Mehdiratta L, Kurdi M. Second wave of COVID-19 pandemic and the surge of mucormycosis: Lessons learnt and future preparedness: Indian Society of Anaesthesiologists (ISA National) Advisory and Position Statement. *Indian J Anaesth*, 65, 427-33 (2021)