

Orbital Exenteration in COVID associated Rhino-Orbital-Cerebral Mucormycosis – An unique Anaesthetic management

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ABSTRACT

Mucormycosis is a fulminant, opportunistic fungal infection most commonly seen in diabetics and immunocompromised individuals. It is a highly lethal, locally invasive with propensity to involve multiple organs. Successful management of mucormycosis largely depends on early diagnosis, broad surgical debridement of infected tissue and rapid administration of systemic antifungal therapy. Here we present anaesthetic challenges encountered in a 37 year old male, post-covid status patient with rhino-orbital-cerebral-mucormycosis posted for orbital exenteration.

Key words: Rhino-orbito-cerebral mucormycosis, anaesthetic management, mortality nephrotoxicity, systemic amphotericin B

Introduction

Rhino-Orbital-Cerebral Mucormycosis (ROCM) is a relatively rare fungal infection with severe morbidity and high mortality.¹

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Its locally invasive in nature with propensity to involve multiple organs, warrants early diagnosis and multidisciplinary approach of management.^{2,4} The rise in ROCM cases in Covid-19 Pandemic in India is no less than an epidemic.³ We present the anaesthetic management of case of Right ROCM posted for Orbital Exenteration.

Case Report

A 37 year old male patient presented with right sided complete ophthalmoplegia with no light perception for 5 days (Figure 1a, b). Patient had history of COVID-19 infection 6 weeks prior (COVID pneumonia with Corads 5 CT severity Score 9/25), and received 40mg IV Methyl Prednisolone daily for a week (cumulative 280mg).

He was recently diagnosed to have Type II Diabetes and had undergone endoscopic sinus debridement for suspected Sino-Orbital Mucormycosis under general anaesthesia. At presentation, he was on Amphotericin-B 800mg/day. His C-reactive protein was 14.8mg/L, serum potassium was 2.8mEq/L, Serum Creatinine was 2.1mg/dl, HbA1c was 12.7%, and random blood sugar was 368mg/dl. Hemoglobin was 10.9gm/dl, ECG was within normal limits, and 2D Echo was normal with EF 62%. The patient was posted for right eye orbital exenteration (Lid sparing).

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On pre-anaesthetic examination, airway assessment revealed diffuse edema of the oral cavity mucosa, and the mouth opening was 2 fingers, modified Mallampati Grade III. Patient's effort tolerance was poor Grade 3 dyspnea with room air SpO₂ 94-95%.

In view of recent post COVID pneumonia, uncontrolled diabetes and impaired renal parameters with hypokalemia (expected side effects of Amphotericin-B), the patient was considered high risk for general anaesthesia. This was discussed with the primary orbital surgeon, who decided to perform orbital exenteration under tumescent local anaesthesia and peri-orbital nerve blocks. Sedation, if required, was also planned.

All cardiorespiratory monitoring such as pulse oximeter, NIBP and ECG, was utilized, and intravenous access was obtained with 20G cannula. Oxygen was administered through nasal prongs.

Dexmedetomidine 30mcg loading dose was given IV over a period of 10 mins and IV Fentanyl 60mcs were given for sedation and analgesia.

After timeout, painting and draping, the right eye was prepped and the peri-orbital region was given local infiltration with Klein solution covering most of the innervating nerves (supratrochlear, supraorbital, infratrochlear, infraorbital, anterior ethmoidal, zygomaticofacial, and zygomatico-temporal nerves) as shown in Figure 2.

Throughout the procedure, patient hemodynamics were maintained within the normal limits and the patient tolerated the procedure without any discomfort.

Tumescent Anaesthesia

Very few case reports suggest use of intravenous sedation along with Local anaesthesia for Orbital exenteration.⁵ We used Tumescent Anaesthesia- infiltrate as you go technique using Klein solution along with Dexmedetomidine sedation with a bolus dose of 30mcg IV (0.5mcg/kg body weight). The Klein solution is a mixture of local anesthetic, epinephrine and saline. It was prepared by adding a 50 ml of plain 1% lidocaine and 1ml of 1:1000 epinephrine to a standard 1-L bag of sodium chloride solution. The resulting mixture contains 0.05% lidocaine and 1:1,000,000 epinephrine.

To this, 10 mEq of sodium bicarbonate is added to alkalinize the solution. Since deep orbital injection is not possible due to the orbital pathology (in this case mucormycosis), superficial infiltration of upper eyelid, lower eyelid and canthal region along the entire orbital rim was performed with approximately 5-15ml of Klein solution (fig. 2). Surgery was commenced within 15 minutes. As the dissection proceeded beyond the orbital rim (into the orbital cavity), top-up was injected as 2-3 ml of Klein solution until the surgery was completed. The patient tolerated the procedure well with good sedation and stable hemodynamics. Early post-operative recovery and wound healing was uneventful (Figure 1d)

Discussion

The classical features of mucormycosis are angio-invasion, thrombosis, infarction and necrosis.

Rhino- Orbito- Cerebral Mucormycosis though a rare fungal opportunistic infection, has significant morbidity and very high mortality. It is defined as a medical emergency requiring rapid control of underlying disease, early initiation of liposomal Amphotericin B (AmB), and surgical debridement. The definitive early therapeutic intervention curtails the spread.⁶

Orbital exenteration is an extensive surgery causing facial disfigurement involving removal of the entire contents of the orbit with or without removal of eye lids.⁵ Orbital surgeries are universally performed under general anaesthesia, and same is the case for orbital exenteration.

ROCM cases pose unique challenges for general anaesthesia, see Figure 3. Patients present with uncontrolled underlying conditions (diabetes mellitus, malignancies or immunocompromised state) and sepsis leading to hemodynamic instability, difficult airway concerns due to palatal perforation, extensive disease involvement causing mucosal and submucosal edema in and around the airway. Hypokalemia, hypomagnesemia, fever with chills, dyspnea and hypotension are common side effects of Amphotericin B which need much attention as cases have been reported to have arrhythmias and ventricular ectopics immediate post induction.⁴ In addition, the post – COVID-19 status of these patients give rise to various concerns as in the extent of pulmonary involvement, (CT scores) ARDS and multi-organ-dysfunction, the use of steroids per se making control of blood sugars a challenge and use of anticoagulant

in severe Covid also put these patients at a higher risk of bleeding.⁶

The challenges we had to overcome in our patient were

- Difficult airway –mucosal edema with limited mouth opening (2 fingers)MPG-III
- Post Covid pneumonia recovered with Corads 5 CT severity Score 9/25
- Uncontrolled blood sugars (random) 386mg/dl and HbA1c of 12.7
- Hypokalemia with serum potassium 2.8mEq/l
- Renal impairment serum creatinine 2.1mg/dl

Dexmedetomidine is a sedative agent via $\alpha 2$ adrenergic agonist, provides light sleep- like sedation with little respiratory suppression. Dexmedetomidine is an established adjuvant in ophthalmic anaesthesia for peribubar block or for reduction of IOP in glaucoma cases.^{8,9} Its considered beneficial for sedation in Covid patients on ventilator with multiorgan failure due to its neuro, cardio and renoprotection.⁷

Tumescent local anaesthesia has been sparsely reported in ophthalmic plastic surgery.¹⁰ The tumescent technique is associated with less discomfort, allows a more rapid postoperative recovery, avoiding the overall general anaesthesia risk.

Conclusion

The rise in Covid associated ROCM has been a challenge for management. These patients need repeated anaesthesia for multiple sinus debridement and finally facial disfiguring surgeries which requires a multidisciplinary approach.

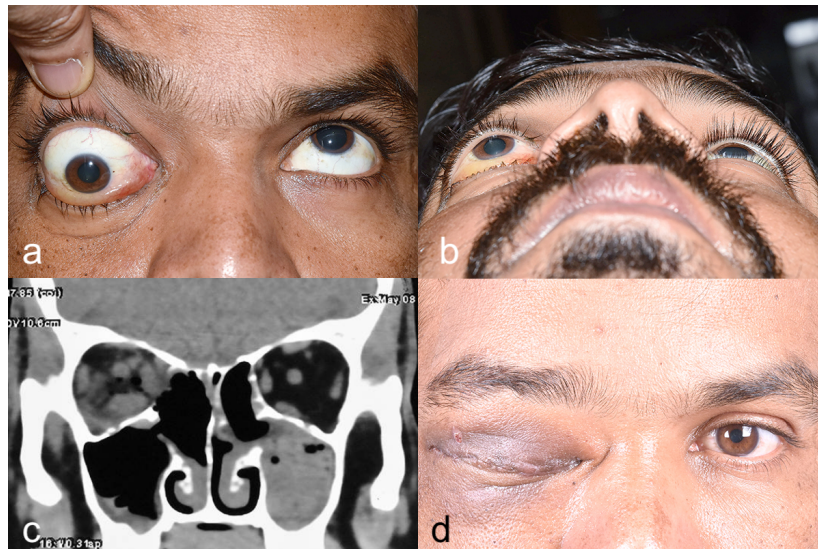


Figure 1. A 37-year-old male with right complete ophthalmoplegia with no light perception since 5 days (a,b). Note the complete ophthalmoplegia and proptosis. Computed tomography scan of the orbit showed clear sinuses (following debridement), and diffuse involvement of the orbital soft tissues (c). Same patient, 2 weeks following an eyelid sparing exenteration performed under tumescent local anaesthesia showing healthy wound(d).

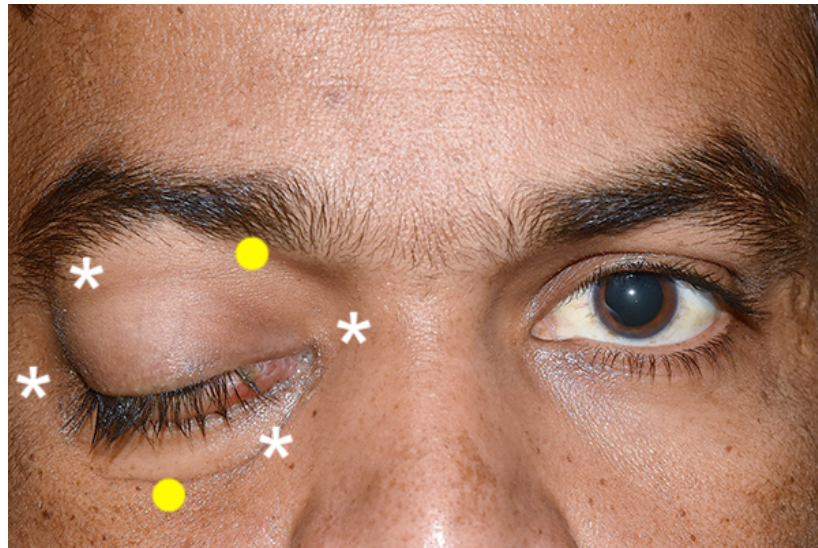


Figure 2. Tumescent Anaesthesia- infiltrate as you go technique for performing Orbital exenteration under local anaesthesia. Supraorbital and infraorbital nerve blocks were given first (yellow dot), followed by multiple periocular sub-cutaneous infiltration of Klein solution (asterix).

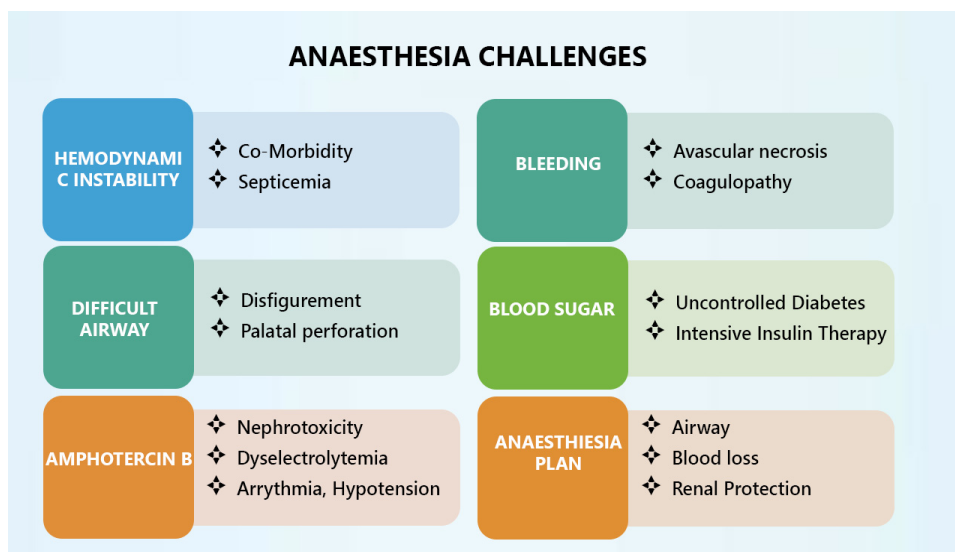


Figure 3. Anaesthesia challenges in a case of ROCM

Ophthalmic anaesthetist involved in anaesthetic management of these patients coming to tertiary eye care center need to consider the risk and benefits of the anaesthesia options available. The Tumescant Anaesthesia and Dexmedetomidine sedation offer a better patient tolerance and surgical outcomes for patients with multiple co-morbidities.

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Conflicts of interest

There are no conflicts of interest.

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