

testing of sputum samples or samples obtained by nasopharyngeal or oropharyngeal swabs, bronchoscopy and lung biopsy [2]. Due to wide usage of steroids such as methylprednisolone and dexamethasone during the treatment of COVID-19, the glycaemic control of the patients is been neglected which paves way for the secondary infections into the body. Mucormycosis is known to be the most fulminant form of zygomycosis. It's a well-known lethal infection found among immunocompromised cases and can be found among patients of diabetes mellitus, lymphomas, AIDS and leukemia [3].

Globally, mucormycosis has been reported to have an incidence from 0.005 to 1.7 per million populations. The prevalence of mucormycosis is reported to be 0.14 per 1000 in Indian population, which is nearly 80 times that of developed countries. Globally, the fatality rate of mucormycosis was reported to be 46% [4,5]. Diagnosis of mucormycosis is difficult thereby delaying the treatment and leading to poor prognosis. Timely diagnosis and appropriate management is essential to reduce mortality. Despite aggressive combination therapy, the prognosis is poor [6].

CASE PRESENTATION

A 61 years old male reported to a private hospital on 28th April 2021 with history of fever for 2 days. He presented with high grade fever, cough and cold. RT-PCR report of nasopharyngeal swab was positive and COVID-19 was confirmed. Patient had no history of diabetes, hypertension, bronchial asthma or tuberculosis but was a chronic tobacco chewer, also no significant family history. Initially HR-CT showed score 3 but after 5 days the oxygen requirement of patient increased from 8 lit to 10 lit and repeat HR-CT was done which revealed that the score was 18 and patients was shifted to ICU for 7 days and following treatment was started.

Earlier started on intravenous Piptaz 4.5 gm, methylprednisolone 40 mg BD, tablet favipiravir, low molecular weight heparin. After increased CT score antibiotics were stepped up, intravenous meropenem 1 gm TDS, linezolid 600 mg BD and pulse therapy for methylprednisolone. Total duration of stay was about 12 days and patient was discharged on 12th May 2021.

10 days after recovery patient was admitted to the hospital on 22 May 2021 with complained of pain over upper jaw *i.e.* bilateral sinus region, toothache and persistent headache for past 4-5 days. Following laboratory investigations were done.

Patient's Hb was 9.9 gm%, total leucocyte counts were 3,900/m³, erythrocytic sedimentation rate was 62 mm/hr, bleeding time was 1 min 15 sec, clotting time was 3 min 5 sec, platelet count was 2.26 lac/m³, RBC counts were 3.73 million/m³ and he had a positive blood typing.

Kidney function test: Patient's S creatinine was 0.9 mg/dl, S urea was 17 mg/dl, S sodium was 141 mg/L, S potassium was 4.3 mg/L, HbsAg and HCV were non-

reactive, APTT was 30.80, PT was 14.60, CRP was 42.73 and ferritin was 23.9 ug/dl.

Liver function test

Patient's S bilirubin: Total was 0.3 mg/dl, unconjugated was 0.2 mg/dl, conjugated was 0.1 mg/dl, SGOT, SGPT and alkaline phosphate was within normal range, blood sugar random was 108 mg/dl. In urine test albumin was positive and sugar was nil.

MRI and CT Scan PNS contrast showed bilateral involvement of sinus *i.e.* bilateral maxillary sinusitis, other diagnostic procedures includes direct nasal endoscopy and MRI brain and orbit both plain and contrast to see extension of mucormycosis in a particular region. On general examination patient was stable and afebrile with pulse rate 82/min, blood pressure 130/80 mm Hg and SPO₂ 99%, in respiratory system bilaterally air enters with more in right than in left side, in per abdominal examination patients abdomen was soft and in central nervous system examination patient was conscious and oriented to time and place (Figure 1).

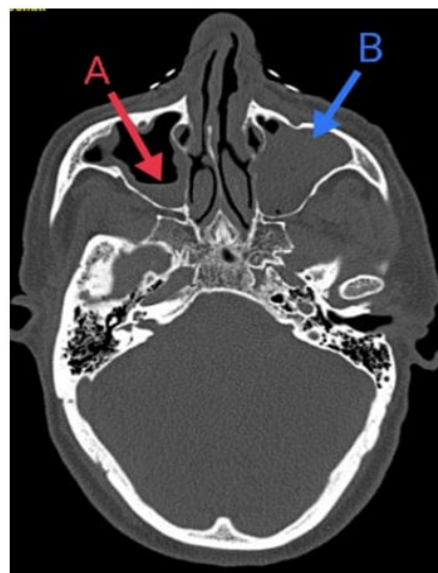


Figure 1: CT scan showing involvement of maxillary sinus region.

Management and follow up: Initially the patient was started on tablet posaconazole 300 mg BD for one day, followed by 300 mg OD as amphotericin was not available. But postoperatively he was started on intravenous liposomal amphotericin B 3 mg/kg/day.

Under AAP and SPP, patient sedated with midazolam and propofol. Oro endotracheal intubation carried out and GA was induced. Patient was maintained on O₂+N₂+sevoflurane. Patient was prepared and draped according to standard surgical protocols. Vestibular incision was given over maxillary region from 16-26. Full thickness mucoperiosteal flap raised. Maxillary sinus cavity was exposed of both the sides by Caldwell Luc procedure. Maxillary sinus mucosal lining of both the sides were removed. Thorough debridement and curettage was done of maxilla and maxillary sinus region. Sinus lining sent for histopathological and

microbiological examination. Surgical defect packed with betadine ointment soaked ribbon gauge, haemostasis was achieved, closure done mucosa 3-0 vicryl. Patient reversed and shifted to OS ICU for further management. Repeat direct nasal endoscopy on tenth day of I.V. amphotericin B was done, with clear and no mucor in the mucosa. Seven days after the discharge patient had to come for follow up, at that time he underwent repeat CT-PNS. There were certain diagnostic challenges such as earlier it was thought that he had periodontitis but on operation table it was found that he had all his teeth and hard palate necrosed filled with pus. As this patient was a chronic tobacco chewer, instead of his orbital region dental region got involved with destruction of whole hard palate, thus making this case unique and special in its own. There were no complications as such during the therapy and patient was satisfied and convinced with the treatment.

DISCUSSION

To treat mucormycosis effectively it is important to stop further progression of the diseases towards orbital and intracranial structures and this can be achieved by combined drug therapy and surgical management. As cerebral involvement increases mortality and leads to poor prognosis of the disease with additional complications, immediate treatment with anti-fungal drugs such as liposomal amphotericin B with posaconazole is considered effective. Sometimes the tissue involved get necrosed due to thrombosis of the vessels around it, hence surgery is the ultimate treatment of choice to save patients life, with this approach survival rate increases up to 80% and patient might experience certain amount of difficulty to do day to day work. At times when the infection reaches orbit, doctors have to make a quick decision of removing the eye as to stop further progression of infection into brain. Making these kinds of calls can be most difficult for doctors, due to concerns about disability and disfigurement, hence before doing any such surgery it is important for the doctors to counsel their patients and family members as patient might go into depression and psychiatric therapy needs to be advised.

Hyperbaric oxygen helps in treatment by reducing tissue hypoxia and acidosis caused by vascular invasion of the fungus [7,8]. Even drugs like rifampin and anticoagulants have contributed their use towards the treatment of rhino cerebral mucormycosis and lead to a better outcome [9,10].

CONCLUSION

Best treatment for rhino cerebral mucormycosis is administration of drugs such as liposomal amphotericin

B and posaconazole with hyperbaric oxygen therapy. Due to constant rise in COVID-19 cases patients are been administered with corticosteroids without even checking their HR-CT score and blood glucose levels. Patients having low score with or without diabetes should be restrained from steroids and only those patients who have high CT score with or without diabetes should be treated with steroids. Because irrational use of steroids can pave way for secondary infections such as mucormycosis which can be life threatening but, in unavoidable situation it should be administered judiciously with continuous monitoring of patients' blood glucose level. This can lead to better control and prevention of the infection with good prognosis and outcome.

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