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Case Report

Mucormycosis in an Immunocompetent Child: An Unusual Presentation

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Abstract

Mucormycosis is an uncommon disease caused by fungus of the order Mucorales. The disease has an aggressive course with high morbidity and mortality. It usually affects immunocompromised patients with some systemic debility or some inciting factor like trauma or some invasive procedure. Rhinoorbitocerebral type is a common variety with a typical order of system involvement. The disease has diagnostic challenges due to non-specific presenting picture, non-specific radiological changes and non- specific diagnostic tests. Biopsy and histopathological examination form the definitive diagnosis. Early institution of systemic antifungal therapy with surgical debridement are the cornerstones in management. Particular rise in number of mucormycosis cases has been noted during COVID-19 pandemic. We present a case report of an immunocompetent child who presented during the early phase after first wave of COVID-19 pandemic, with an atypical presentation, with a progressive course, delayed diagnosis but an appropriate management and satisfactory outcome.

Keywords: mucormycosis, immunocompetent child, atypical, orbital, COVID-19, debridement.

INTRODUCTION

Mucormycosis is a dreaded disease with high morbidity and mortality.(Skiada et al., 2011)(Spellberg et al., 2005) (Petrikkos et al., 2012) (Nucci et al., 2019) (Binder et al., 2014) It is commonly caused by fungus of the order Mucorales with more than 25 species known to affect humans.(Nucci et al., 2019) (Dannaoui, 2017) The fungus is ubiquitous in nature. It leads to angioinvasion by interaction of fungal hyphae with endothelial cells resulting in thrombosis leading to tissue infarction and necrosis, (Ilharco et al., 2019) (Shatriah et al., 2012) which leads to characteristic eschar formation. The disease usually affects uncontrolled diabetics, immunocompromised patients, those on steroids, those with hemotological malignancies, HIV or patients with increased serum ferritin levels on desferrioxamine therapy.(Prakash & Chakrabarti, 2019) (Ambrosioni et al., 2010) It can rarely affect the immunocompetent also, mainly following burns or trauma. (Spellberg et al., 2005) (Ibrahim et al., 2012) (Prakash & Chakrabarti, 2019)

The usual mechanism of acquisition of spores is inhalation, ingestion or inoculation in traumatized skin. The commonest involvement is rhino-orbitocerebral, seen in 40% patients, others being pulmonary, cutaneous, gastrointestinal, isolated renal, disseminated and some unusual presentations.(Navarro-Perea et al., 2019) In the rhinorbitocerebral variety, usually involvement of nose and paranasal sinuses occurs first followed by orbit and lastly cerebral involvement occurs.(Gupta et al., 2020) Mucormycosis poses a diagnostic challenge because of non-specific presentation and radiological features besides histological markers. Many cases of the disease have been reported during COVID-19 pandemic, (Sarkar et al., 2021) (Mehta & Pandey, 2020) (Mekonnen et al., 2021) the exact reason not being certain. Proposed hypotheses include COVID-19 disease in itself, systemic conditions like diabetes and history of use of systemic steroids.

We report case of a young immunocompetent child, who presented to us during the initial period after first wave of COVID-19 pandemic in India with very atypical features and order of tissue involvement, progressive disease refractory to treatment for long and late orbital involvement.

CASE REPORT

A 2 years old female child weighing 8 kg and having no systemic illness, reported to the OPD in August 2020, with history of swelling right upper and lower lids for seventeen days. There was history of mild nasal discharge few days before the onset of swelling. There was no history of trauma, fever, cough or breathing difficulty. There was no history suggestive of COVID-19 infection in the child or any contacts. RT PCR test for COVID-19 testing had never been done at the time of presentation. The child was following objects with both the eyes at a distance of 4m. There was inflammation in right upper and lower lids leading to periorbital oedema. (Figure 1). The swelling was woody hard to feel, non-compressible, non-fluctuant and non-tender. Both the globes appeared normal with full ocular movements and no proptosis, conjunctival congestion or chemosis. The pupils were round, normal size and reacting to light, fundal glow was good with a normal posterior pole of both eyes.

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Fig-1: Periorbital oedema at presentation

The patient was started on broad spectrum intravenous antibiotics but no response was noted following three days of antibiotics. Blood investigations revealed anemia with raised total leucocyte count. Other blood investigations and ultrasound abdomen were normal. Otorhinolaryngologist consultation suggested clear nasal passages and sinuses. There was an erythematous area in buccal vestibule.

Ultrasound imaging of orbit was suggestive of diffuse subcutaneous thickening with internal vascularity in preseptal region extending to infraorbital compartment with possibility of infective or inflammatory mass. CT imaging was suggestive of mild maxillary sinus roof thickening with an illdefined lesion indenting the globe from inferonasal side. Clinically bacterial cellulitis being the first differential in mind, an attempt of incision and drainage was done but, only blood was noted with no evidence of pus. Contrast enhanced MRI brain with orbits report raised suspicion of neoplastic process, possibly rhabdomyosarcoma (Figure 2).

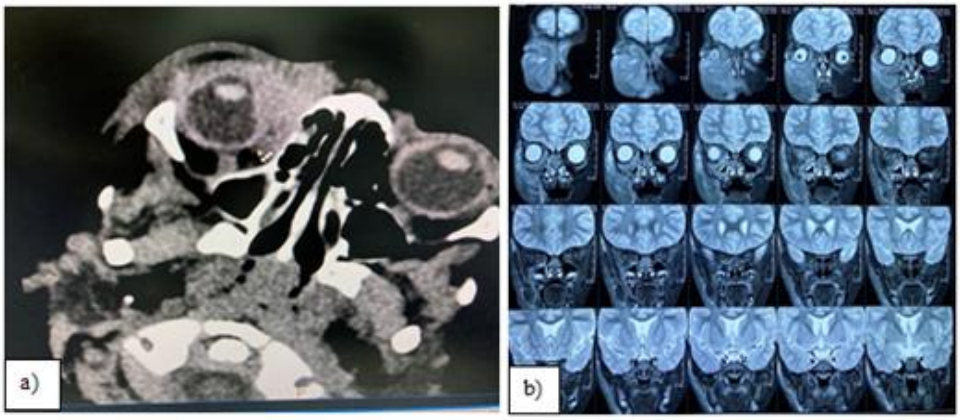

Fig-2: Imaging studies a) CT scan, axial sections b) MRI coronal sections, revealing mass in inferonasal orbit and extending to maxillary region

Incisional biopsy (Figure 3) was done on day seven and sent for histopathological examination and bacterial and fungal culture. HPE was suggestive of fibrocollagenous tissue revealing infiltration by inflammatory exudates and fungal colonies with closest resemblance to mucormycosis.

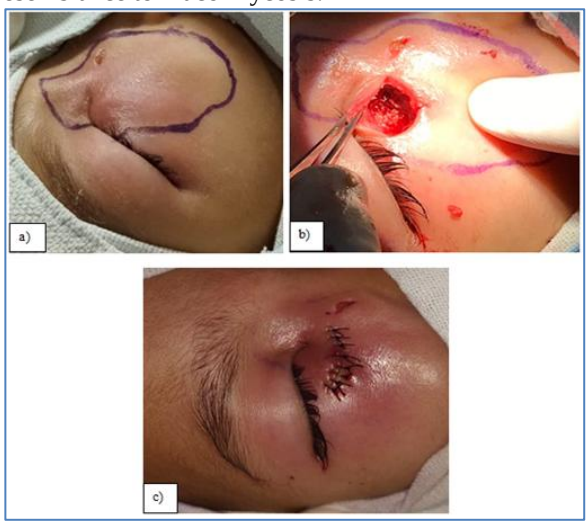

Fig-3: a) Marking of woody hard inflammatory area b) Incisional biopsy done c) Sutured biopsy site

Paediatrician's consultation was taken for ruling out any immunosuppressive state but except for her weight being less for her age and anemia, no other abnormalities were found. Following suspicion of fungal growth, intravenous amphotericin B in required dose was started under paediatrician's observation. But the condition remained static for a day or two followed by increase in edema in maxillary region (Figure 4). Meanwhile, blood transfusion was given in view of anemia. RT PCR test was also done to rule out COVID and it came out to be negative.

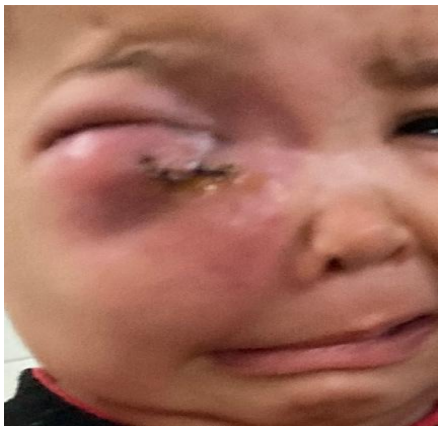

Fig-4: Increase in swelling post incisional biopsy

Debulking of the mass was planned and done in collaboration with maxillofacial surgeon (Figure 5).

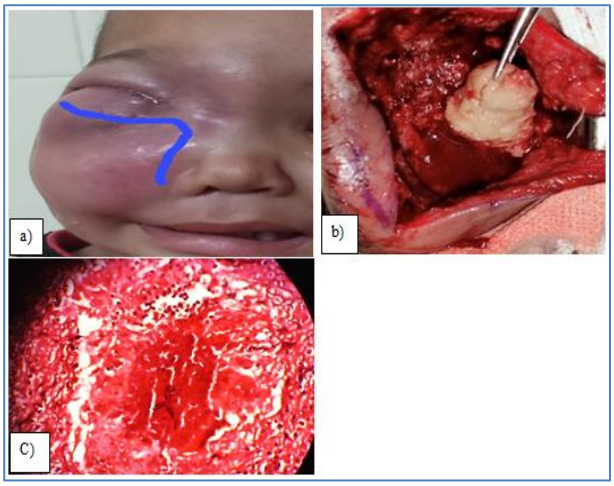

Fig-5: Debulking of mass done. a) Marking of site of incision b) Skin flap raised and debulking done c) HPE with special stains revealed rubbery, creamish white masses with histological appearance of broad, aseptate hyphae

Intravenous antibiotics were added for superadded pseudomonas infection. HPE with special stains revealed broad, aseptate hyphae suggestive of mucormycosis with severe necrosis. (Figure 5c). Meanwhile mass increased further leading to deviation of nose to other side. (Figure 6) Condition of the child remained static on systemic treatment for a fortnight following which the disease showed relentless progression. The edema further increased to forehead glabellar region and upper lip crossing the midline. (Figure 7) Syrup posaconazole was also added followed by substitution by voriconazole for few days, keeping the remote possibility of aspergillosis in mind. With increased proptosis there was lagophthalmos leading to mild exposure keratitis despite taking all prophylactic measures to prevent it. Moist chamber was also given to the eye.

On repeat imaging, there was involvement of posterior orbit now. The ocular movements in involved eye showed mild restriction in all gazes and the child no more cooperated for assessment of vision. A second surgical debridement was planned and done. Third biopsy was again suggestive of fibrocellular connective tissue with multiple granulomas with central necrosis showing non-septate fungal hyphae (positive PAS and GMS stain). The fungal culture however showed no growth even after four weeks. Intravenous Amphotericin B was continued for more than a month with her haematological parameters being monitored regularly. Gradually the child showed improvement in swelling with decrease in the periorbital oedema. (Figure 8) Visual evoked potential revealed normal optic nerve function. The child was discharged after a month of second surgical debridement on syrup posaconazole and kept on regular follow up. The child after 3 months of discharge was maintaining a stable

condition systemically and a visual status of perception of light positive in the involved eye till now with mild corneal haze in the inferior quadrant of cornea. (Figure 9) The ocular movement restriction has also shown improvement in all gazes.

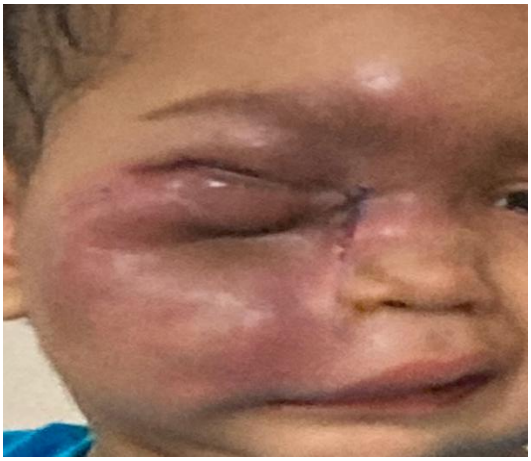

Fig-6: One week post first surgical debridement

Fig-7: Progressive deterioration fortnight following debridement

Fig-8: One month following second surgical debridement

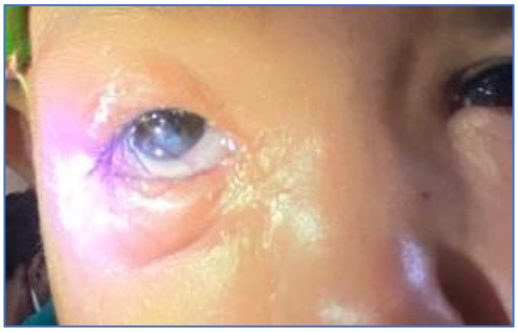

Fig-9: Follow up after 3months of discharge

DISCUSSION

Mucormycosis, caused mostly by fungus of the order mucorales, has the most common variety as rhinorbitocerebral type. (Navarro-Perea et al., 2019) There have been few reported cases of mucormycosis in young children. In a review by Amanati et al, (Amanati et al., 2020) young immunocompetent children presented with findings of nasolacrimal duct obstruction, watering or swelling in inferonasal region around canthal area or frank signs of periorbital cellulitis, with only few of them having history of cold or exposure to fodder. Mucor was diagnosed late and along with systemic treatment, surgical debridement was done where needed. Case reported by Badiee et al (Badiee et al., 2012) was of mucormycosis in a 2 year old child who presented with features of periorbital cellulitis, not responding to battery of systemic antibiotics given for significant duration and diagnosis of mucormycosis was made following biopsy and histopathological examination.

Many cases have been published reporting mucormycosis in immunocompetent adults. As reported by Rahman et al, (Rahman et al., 2013) a young male with history of long duration (hemifacial numbness and pain with headache) developing proptosis and loss of vision for 3 months, not found to have any immunosuppressive condition was diagnosed with mucormycosis. Another case has been reported by Shatriah et al, (Shatriah et al., 2012) where a young healthy male with no systemic illness or antecedent trauma or any invasive procedure with a history of 2 weeks presented with bacterial cellulitis like picture and was diagnosed later to be harbouring mucormycosis. There have been reported case of rhinorbital variety in elderly immunocomptent patient also.(Ilharco et al., 2019) There have been some reports of mucormycosis in isolated organs in immunocompetent hosts. (Devana et al., 2019) Cases have been reported of immunocompetent patients developing mucormycosis following trauma(Badin et al., 2019) and dental infections or procedures (Venkatesh et al., 2018) or with mixed history (following hurricane irma and dental procedure). (Ayoade et al., 2019).

The disease was misdiagnosed initially in our case as bacterial cellulitis and empirical treatment with systemic antibiotics was started. This is because the disease did not follow the usual order of presentation. Here, there was orbital involvement at the very onset with no sinus involvement and not history of any inciting factor like trauma besides absence of any black eschar. Second reason for not suspecting the disease was absence of any factors that pointed towards systemic immunosuppression, diabetes or any other factor except for mild malnutrition. The child was having anaemia that was again against the common presentation, as it occurs in those with raised serum ferritin levels. The disease was diagnosed late because of non- specific symptoms and in absence of any specific tests. Histological identification of fungus is required and biopsy is the chief modality for diagnosis. (Spellberg et al., 2005) Once diagnosed, the chief modalities of management of mucormycosis are systemic amphotericin B and surgical debridement of affected tissue. (Spellberg et al., 2005) (Parfrey, 1986) (Bullock et al., 1974)

In our case, systemic amphotericin B was started on suspicion of the fungus and later on posaconazole was also added to the drugs. Surgical debridement was carried out twice; for the first time in maxillofacial and inferior orbital region and second time for the involvement of the posterior orbit.

There has been a surge in mucormycosis cases during COVID-19 pandemic. The common factors amongst most of them have been COVID-19 disease, uncontrolled diabetes, use of systemic steroids and the disease has resulted in variable degrees of damage in them.(Sarkar et al., 2021) (Mehta & Pandey, 2020) (Werthman-Ehrenreich, 2021)

CONCLUSION

Mucormycosis is a rare disease which is seen usually amongst immunocompromised patients but can be seen in immunocompetent too. The disease has usually very aggressive course. Diagnosis is usually delayed due to non-specific clinical picture. High index of suspicion, early diagnosis and early initiation of antifungal therapy besides surgical debridement is required for preventing the otherwise poor outcome.

Author Contribution

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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