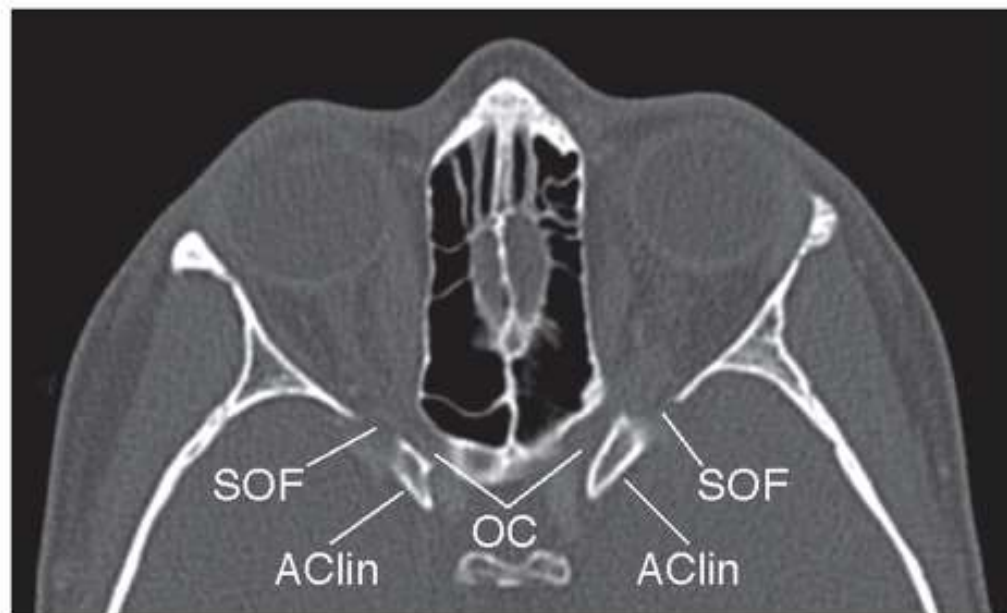


Mucormycosis

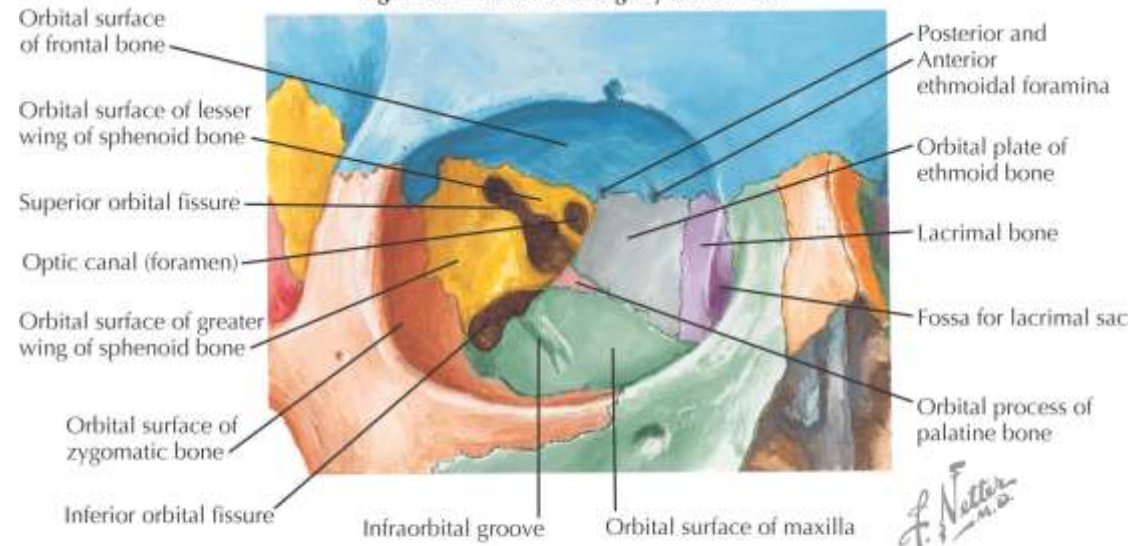
Hamed Sianati

Ophthalmic Plastic Reconstructive surgeon

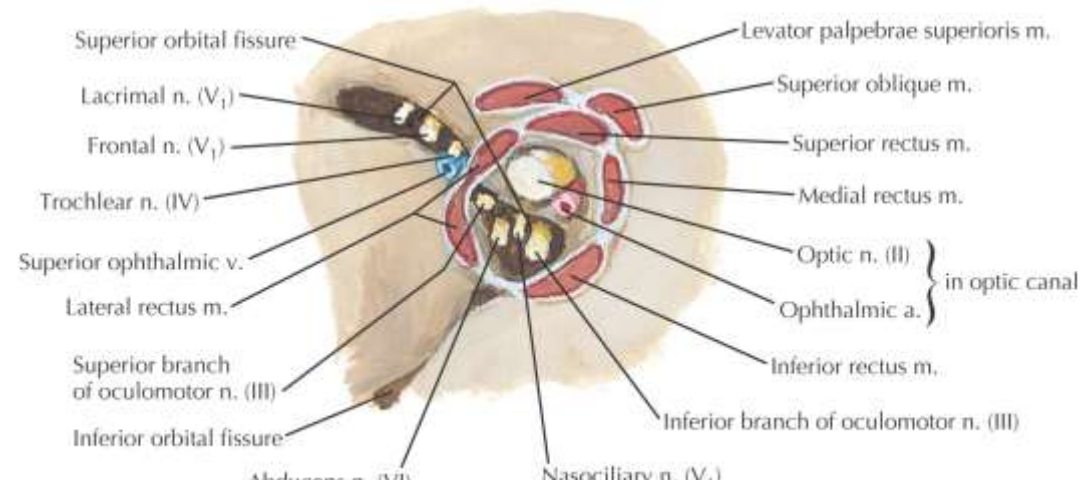
- Rhino-orbito-cerebral mucormycosis (ROCM) is the most common type of mucormycosis accounting for nearly one-third to one-half of all cases of mucormycosis which defined as nasal, paranasal sinuses and orbital infection with possible spread to the brain
- Mortality rate of mucormycosis has been reported from 15% to 85%. Diabetes mellitus is considered a risk factor for patients' survival. Other reported risk factors for patients' survival are delayed diagnosis and treatment, hemiparesis or hemiplegia, bilateral sinus involvement, leukaemia, renal disease, deferoxamine therapy, spread of infection outside the sinus-nasal cavity, high erythrocyte sedimentation rate and neutrophil count (in patients with diabetes), and involvement of skin, palate and orbit



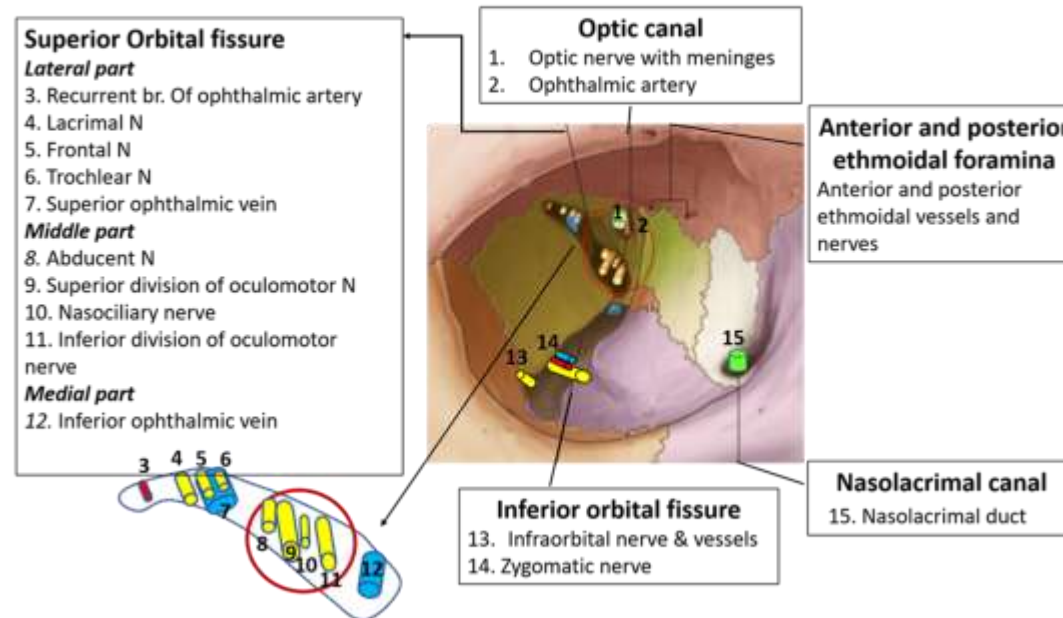
Right orbit: frontal and slightly lateral view

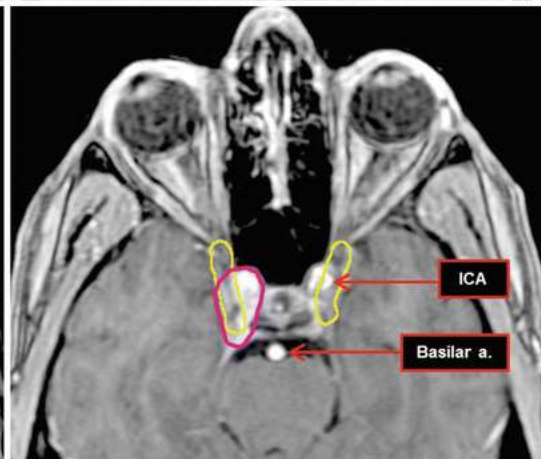
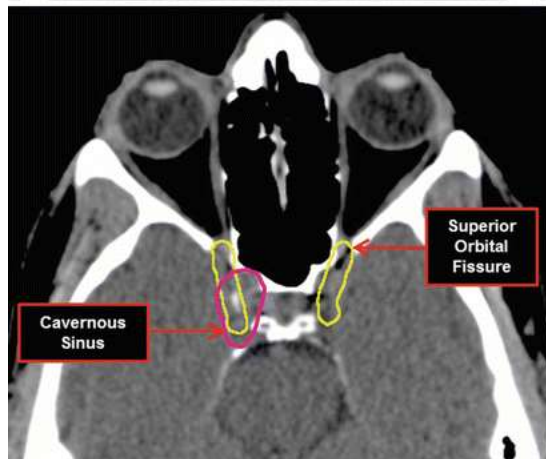
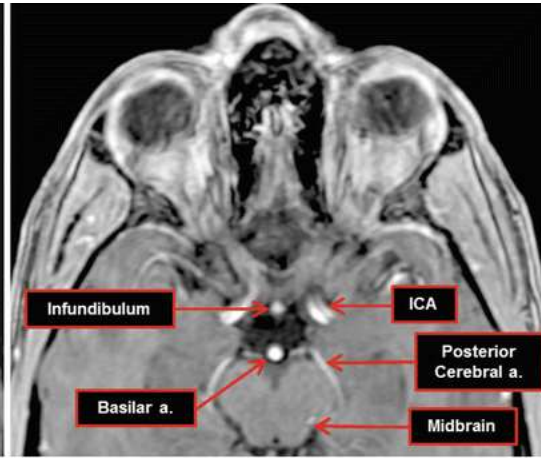
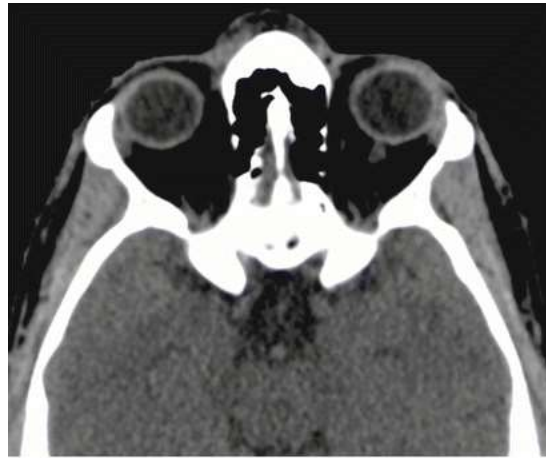


Muscle attachments and nerves and vessels entering orbit



Q. Name the structures passing through the foramina and fissures of orbit.





6 nerve palsy

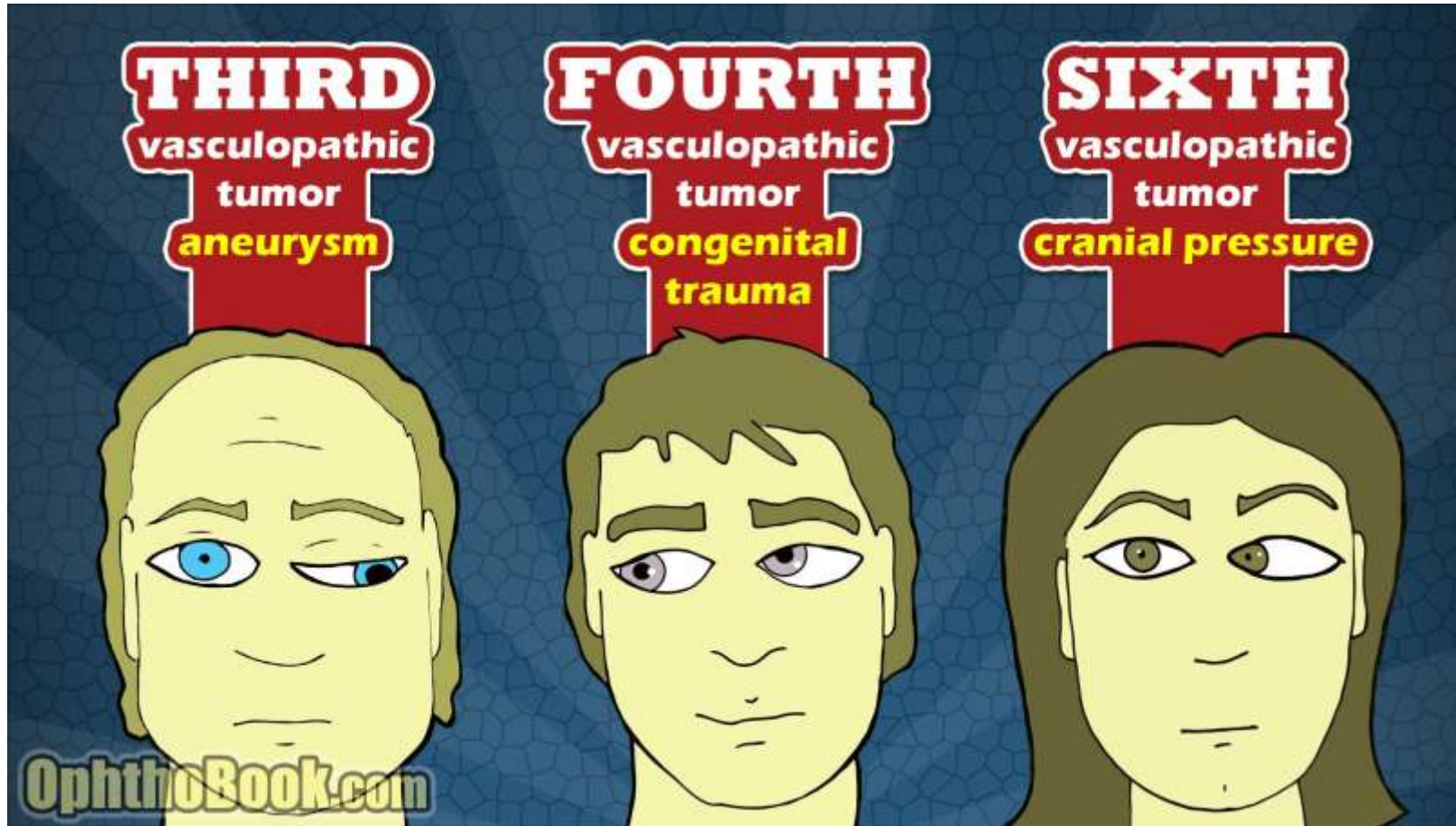


3 nerve palsy



4 nerve palsy





Frozen Eye



- Mucormycosis is known to affect immunocompromised patients especially those with diabetes mellitus, prolonged corticosteroid use, solid organ transplant recipients, neutropenia and haematological malignancies. It is an opportunistic infection leading to invasion of blood vessels by fungal hyphae, causing infarction and necrosis of a variety of end-organ host tissues. Rhino-orbital infection with the mucorales species of fungus portends a poor prognosis with a mortality rate reaching 50%, even with appropriate treatment. Given that the current pandemic continues to be a significant public health issue globally, there needs to be a heightened awareness about mucormycosis among patients with COVID-19, since both conditions in combination may lead to significant morbidity and mortality

- Patients' survival Reported mortality rate of ROCM was between 15% and 85%. Poor prognostic factors in adults include delayed diagnosis and initiation of treatment, cerebral involvement, orbital involvement increased number of involved sinuses, sphenoid or frontal sinus involvement, bilateral involvement, palatal involvement, skin necrosis, uncontrolled underlying disease, ketoacidosis, renal disease, non-malignant haematological disease, lymphopenia and active malignancy

- Orbital involvement occurs by spreading of infection from ethmoid and maxillary sinuses and or extensions via the nasolacrimal duct. Exenteration is the most difficult decision in the management of orbital mucormycosis and should be made by the multidisciplinary team caring for the individual patient. In general, the indications for orbital exenteration are ophthalmoplegia, proptosis, cranial involvement and ocular involvement (eg, central retinal artery occlusion)

- Progressive vision loss and ultimately blindness may result from either arteriolar invasion especially central retinal artery or cavernous sinus thrombosis. More than 30% of survived globes ended up with visual acuity of NLP

- Coronavirus disease 2019 (COVID-19), attributed to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was declared a global pandemic by the World Health Organisation (WHO) in March 2020.^{1–4} The pandemic continues to be an ongoing public health concern with more than 162 million cases recorded, and more than 3 million deaths globally

- The immune dysregulation associated with COVID-19 is further aggravated by concomitant medical conditions such as diabetes mellitus, and the widespread use of immunosuppressive agents and broad-spectrum antibiotics. In addition, COVID-19 patients are more susceptible to develop secondary infections if they have decompensated pulmonary functions or require invasive mechanical ventilation

- The mean time interval between the diagnosis of COVID-19 and the appearance of symptoms suggestive of mucormycosis was 12.1 ± 4.6 days. All patients initially presented with nasal congestion with or without discharge consistent with sinusitis
- The majority of patients with mucormycosis experienced a non-descript localised or generalised headache (n = 35, 74.5%). Other reported symptoms include diplopia, visual disturbances, facial weakness or numbness. Features of ophthalmoplegia, partial third nerve palsy, proptosis and long-tract signs were also observed in a proportion of patients

- Imaging investigations revealed that almost all patients had features of pan-sinusitis. Extension of the infection beyond the paranasal sinuses was observed in 78.7% (n = 37), orbital invasion (n = 19, 40.4%) being most common. Involvement of the central nervous system (ischaemic stroke, carotid-cavernous fistula, cerebral abscess and cavernous sinus thrombosis) was experienced in a small proportion of subjects

- Poor glycaemic control, moderately severe pneumonia, mechanical ventilation and non-receipt of COVID-19 vaccine were the commonest predisposing factors for mucormycosis
- A delay in diagnosis of 6 days has been associated with doubling of the 30-day mortality rate from 35% to 66%
- Fungal spores gain entry via inhalation and subsequently enter the paranasal sinuses. Spores may also be acquired by the ingestion of contaminated food. Affected individuals usually present with acute sinusitis, fever, nasal congestion, purulent nasal discharge and headache. If not treated early, contiguous spread to adjacent structures may occur, resulting in various clinical symptoms. The orbital cavity is accessible through the ethmoid bone via the lamina papyracea, infratemporal fossa, inferior orbital fissure or orbital apex. Contiguous intracranial extension can occur through the ethmoid cribriform plate, supraorbital fissure and perineural route.

- Depending on the affected organ, the infection can be classified as sino-orbital rhino-cerebralpulmonary, cutaneous, gastrointestinal and disseminated
- SARS-CoV-2 virus has been found to impair cell-mediated immunity due to a decrease in CD4+ and CD8+ cell counts, increasing the vulnerability to fungal infections. Concomitant medical problems including diabetes mellitus, acute respiratory distress syndrome, and the use of corticosteroids and broad-spectrum antibiotics are additional predisposing factors.

- The first step in the management of mucormycosis is to have a high index of clinical suspicion especially in those with COVID-19 who have diabetes mellitus, and who have received systemic corticosteroids. The mean duration between the diagnosis of COVID-19 and the appearance of mucormycosis in our study was 12.1 ± 4.6 days,

- a low threshold for investigation and imaging is critical to avoid the impending complications and higher mortality. All of our subjects had presented with symptoms of sinusitis, and the extension beyond the paranasal sinuses occurred in nearly 79% of our subjects. These findings imply that physicians should examine the cranial nerves, assess vision, and evaluate for sinus tenderness regularly, especially for diabetic patients who received systemic corticosteroids. Any new symptoms should prompt further investigation for mucormycosis since eschar formation, the hallmark of mucormycosis, is often a late sign. Serial radiological investigations (CT and/or MRI) may help in assessing the extent and progression of the disease

- The definitive diagnosis of fungal infection can be easily made based on direct microscopy of nasal swab or surgical/ naso-endoscopic specimens with potassium hydroxide (KOH) mount and microbiological/histological confirmation

- A multidisciplinary team approach involving an internist, otolaryngologist, ophthalmologist, infectious diseases specialist, neurologist and/or neurosurgeon is often necessary. The mainstay of treatment are antifungals and surgical debridement of affected tissues.
- Amphotericin B (liposomal) or posaconazole oral suspension are first-line antifungal monotherapy options. Isavuconazole (intravenous or oral) is regarded as salvage therapy. Posaconazole may be administered in combination with liposomal amphotericin B for refractory cases or in those who cannot tolerate amphotericin B. Surgical exploration and debridement help to limit the spread and allow better penetration of intravenous drugs into infected tissues.



Take Home Message

- ROCM is a rapidly progressive disease with an average mortality of
- around 40%.
- The unprecedented rise in cases of C-ROCM may be related to either
- agent-related or host-related factors.
- Diabetes, historically, and inadvertent use of corticosteroids, in the current scenario, appear to be the commonest predisposing factors for the development of C-ROCM.
- Prevention of C-ROCM essentially revolves around judicious use of corticosteroids and managing hyperglycaemia effectively.
- A high index of suspicion should be there to diagnose C-ROCM.
- Diagnostic nasal endoscopy forms the first step in diagnosing CROCM. Prompt transport of the specimen obtained helps in initiating an early treatment.

Take Home Message

- The primary drug of choice in managing patients with C-ROCM is Amphotericin B, preferably liposomal, followed by isavuconazole and posaconazole. More data on itraconazole and terbinafine is required to recommend its usage. Management of mucormycosis is incomplete without an effective debridement strategy depending on the region involved. Follow up surgeries directed towards rehabilitation and reconstruction should be undertaken to improve long-term outcome

Take Home Message

- Any diabetic patient who develops new cranial nerves palsy and
- 1.Proptosis
- 2.pain
- 3.Decreasing in vision
- 4.Any sign of new sinusitis

Should be evaluated carefully for mucormycosis

