



SEPTIC THROMBOSIS OF CAVERNOUS SINUS SECONDARY TO RHINO-ORBITAL MUCORMYCOSIS

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ABSTRACT

Mucormycosis is characterized by mycotic infiltration of the mucous membrane of the nasal cavity and/or the paranasal sinuses. It occurs commonly in immunocompromised patients with a fatal outcome if not treated. One possible intracranial complication of Mucormycosis is the Cavernous Sinus Thrombosis which is a rare and fatal infective disease. Herein, we share our experience with four cases of acute fulminant invasive fungal sinusitis with cavernous sinus syndrome to show that CST is not that uncommon and the management of such cases. Cavernous sinus thrombosis is a medical emergency and the treatment consists of aggressive debridement of the disease and simultaneous use of antifungal therapy.

KEYWORDS : Cavernous sinus thrombosis, Magnetic resonance imaging, fungal sinusitis

INTRODUCTION

Acute fungal sinusitis is most commonly found in immunocompromised patients with conditions such as diabetes mellitus, malignancies and acquired immune deficiency syndrome. The most common presenting symptoms of patients with invasive fungal sinusitis as documented in a recent study were facial swelling (64.5%), fever (62.9%), and nasal congestion (52.2%) [1]. It may be associated with nasal ulcerations that occur in 38 to 74% of the patients with painful black eschar on the palate or nasal mucosa, which is considered a classical but nonspecific sign. The most frequent sites of involvement are near the middle turbinate, the septum and more rarely the inferior turbinate. They appear to have a marked predilection for vascular invasion; leading on to infarction and necrosis, which is the pathological hallmark of mucormycosis [2]. Orbital extension is generally indicated by pain, proptosis, ophthalmoplegia or trigeminal nerve sensory loss. One potential intracranial complication of mucormycosis is the cavernous sinus thrombosis (CST). The first description of this condition was made by Duncan in 1821 [3]. A CT scan, the most commonly used imaging modality, is used to identify invasion but MRI is considered superior to CT in delineating the intracranial extension. The accepted mode of treatment is a combination of antifungal therapy, aggressive surgical debridement and reversal of the underlying immunocompromising condition whenever possible [2]. The prognosis is poor.

CASE REPORT

Case 1:

A 21yr old male patient was referred to our ENT outpatient department from the neurosurgery department with complaints of swelling over left side of face, decreased vision in the left eye and deviation of mouth towards right side since 5 months. He gave associated history of intermittent fever, nasal discharge, nasal obstruction on the left side and headache. The patient also had a medical history of insulin dependent diabetes mellitus for 10 years for which he was taking regular treatment. He did not give history of smoking, alcohol or drug abuse.

On examination the patient was afebrile with a pulse rate of 96 per minute, blood pressure of 134/80mm Hg and respiratory rate of 16 breaths/min. Systemic examination of the cardiovascular and respiratory systems revealed nothing significant. An examination of his nose and paranasal sinuses showed a deviation of the nasal septum to the right, hypertrophied middle turbinate and mucopurulent discharge in the left middle meatus

and tenderness of left frontal and maxillary sinuses. A nasal endoscopy was done which revealed black eschar formation and exposed bone in the roof of the left nasal cavity. The biopsy report indicated chronic sinusitis with areas of necrosis and fungal elements in the form of clusters of broad aseptate hyphae consistent with mucorales.

Ophthalmological examination revealed left sided periorbital edema, ptosis with chemosis, fixed pupil not responding to light (direct and consensual light reflexes were absent), no perception of light on vision testing and restricted extraocular movements that revealed affection of III, IV & VI cranial nerves.

On fundoscopic examination, there was a pale disc and central retinal artery occlusion was suspected. A detailed neurological examination showed the patient's higher mental functions and level of consciousness to be normal with no meningeal signs, hypoesthesia in the distribution of ophthalmic and maxillary divisions of trigeminal nerve and no other localizing signs or other cranial nerve involvement. The patient was admitted and started on broad spectrum antibiotics covering gram positive, gram negative and anaerobic organisms while he was further evaluated. A complete hemogram was done which showed all parameters to be within normal limit. His blood sugars and renal functions were significantly deranged. Chest X-ray was normal. A CT scan of the nose and paranasal sinuses that had already been done before the patient was referred to our department showed polypoidal mucosal thickening involving all the sinuses on the left side. MR Angiography of the brain showed an abscess involving the left medial aspect of temporal bone, left middle cerebellar peduncle with adjacent leptomeninges thrombosis along with left ICA thrombosis (Fig 1). Patient was already on injection amphotericin B which was continued along with I.V. antibiotics and fixed insulin infusion.

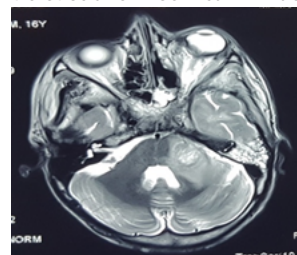


Fig 1. Axial cut MRI T2 weighed image showing involvement of left cavernous sinus

Patient was planned for total maxillectomy. Intraoperatively the fungal debris was seen involving all the sinuses. Pus was seen coming out of the floor of the orbit and necrosed tissue was found involving till the infratemporal fossa. Postop period was uneventful. Patient's amphotericin B dose was completed and the patient was discharged and referred for orbital exenteration to ophthalmology department.

Case 2:

63 year old male presented to ENT OPD with complaints of nasal obstruction on the right side since 4 months. It was associated with decreased vision on the right side. Patient reported of having endoscopic debridement done from some private hospital 6 months back. He did not have any supporting documents. Patient had past history of stroke 5 years back and was on tab ecosprin and atorvas. Patient was a known case type 2 diabetes mellitus. Anterior rhinoscopy revealed crusts in bilateral nasal cavity. Diagnostic nasal endoscopy was performed for a detailed assessment. Greenish color thick crusts were seen in right nasal cavity which were sent for fungal smear and culture. Mucormycosis was confirmed on histopathology report. MRI brain with contrast was ordered to see intraorbital extension of the disease and to rule out cavernous sinus involvement. Sphenoidal sinusitis with involvement of the meningeal margin of right temporal lobe including involvement of right cavernous sinus was seen (Fig 2). Patient was planned for debridement under general anaesthesia and was started on injection amphotericin. Patient unfortunately expired due to sudden cardiorespiratory arrest having completed 4000mg of amphotericin.

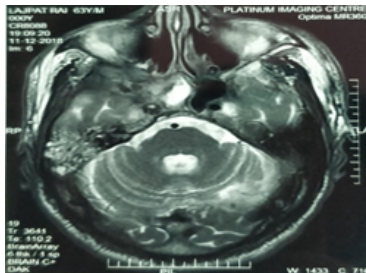


Fig 2. Axial cuts show hyperintense signal at right sphenoid sinus and involvement of right cavernous sinus

Case 3: 50 year old female, known case of hypertension and type 2 diabetes, was admitted in ENT emergency with blackish discoloration of left side of cheek since 1 month. It was associated with high grade fever. The swelling according to the patient had rapidly progressed to involve the eye and nasal framework on the left side. On examination foul smelling discharge could be seen coming out of the necrotic area that was involving the left maxillary, zygomatic region along with left naso maxillary groove and left eye. The eschar was immediately debrided in the emergency. Tissue was sent for histopathology which revealed broad septate hyphae with acute angle branching suggestive of mucormycosis. Ophthalmological examination was done. The mass seemed to be involving the upper and lower eyelid. Perception of light was negative. Patient was started on liposomal amphotericin. CECT nose and para nasal sinus showed left ethmoid sinusitis with destruction of its lateral wall with displacement of left eyeball laterally and involvement of left medial rectus. Left total maxillectomy and orbital exenteration was done under general anaesthesia (Fig 3). Patient suffered from stroke 4 days postoperatively and developed left hemiparesis. NCCT head showed ill defined hypodense areas in left centrum semiovale and corona radiata in left cerebral parenchyma. Neurosurgery referral was taken in view of hemiparesis. CT angiography revealed non opacification of intracranial left ICA. MRI brain showed multiple ring enhancing lesions in left basi frontal region & anterior

temporal lobe along with left cavernous sinus thrombosis. Patient was started on tab ecosprin and atorvas. She will continue with conservative management of hemiparesis and physiotherapy. Patient's wound has healed well postoperatively and dose of amphotericin has been completed.

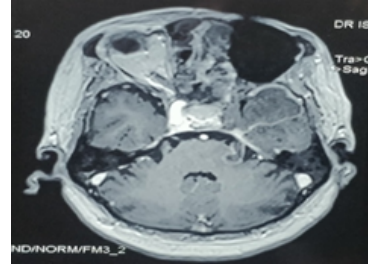


Fig 3. Axial cut MRI shows septic thrombosis of left cavernous sinus and involvement of left ICA.

DISCUSSION

Fungal sinusitis is an inflammation of the sinuses that is caused by many fungi. It can be divided into invasive and non-invasive. Invasive fungal sinusitis can be further categorized as acute fulminant, chronic and granulomatous invasive fungal sinusitis based on the clinical manifestation of the infection. Acute fulminant invasive fungal sinusitis occurs most frequently in immunocompromised patients; such as those with diabetes mellitus, malignancies, neutropenia, and acquired immune deficiency syndrome. Mucoraceae and Aspergillus are the most common organisms found in acute fulminant invasive fungal sinusitis [4]. The incidence of morbidity and mortality among patients with complications arising from rhinosinusitis has been reported to range from 5 to 40 percent. The incidence was significantly higher when fungal invasion was detected, ranging from 20 to 80 percent [5]. The early clinical symptoms of acute fulminant invasive fungal sinusitis include: nasal obstruction, rhinorrhea, facial pain, headache, proptosis, and diplopia. However, these symptoms are not specific and are also observed in acute bacterial sinusitis. This may lead to misdiagnosis or delayed treatment. Fungal invasion often occurs within the nasal cavity, most commonly at the middle turbinate. It manifests by sequentially involving the nasal cavity, sinuses, orbit and eventually the brain [6]. This makes our patients atypical subjects as they first manifested with ophthalmological symptoms with no symptoms indicative of nose or paranasal sinus involvement by the fungi such as fever or rhinorrhoea which are some of the most common presenting symptoms. Loss of vision as an initial symptom is an atypical manifestation of this condition. Chopra et al have reported this feature in 22% of the patients reviewed in their study [7]. The diagnosis of invasive fungal rhinosinusitis requires histopathological evidence of fungi invading nasal tissue; hyphal formations within the mucosa, the submucosa, the blood vessels or the bones present around the sinus area [5]. Nasal mucosal findings are considered to be the most consistent findings and endoscopic examination is recommended in all high risk patients [6]. The poorly controlled diabetes of the patient could be a significant contributing factor in the rapid and fulminant progression of the disease with the atypical manifestations. Poorly controlled diabetes with acidosis impairs cellular immunity. This predisposes patients to develop mucormycosis as their neutrophils have reduced ability to phagocytose and adhere to the endothelial lining. The acidosis and hyperglycemia provide an ideal environment for fungal growth [2]. As delay in diagnosis is one of the causes for high mortality, a high index of suspicion is needed and appropriate use of imaging and histopathological examination with prompt treatment can be life saving in these patients.

Radiography can be used to help with the differential

diagnosis. A unilateral nidus, severe nasal mucosal edema, or extrasinus invasion such as bony erosion may be noted on the computed tomography of the sinuses. In the pre-antibiotic era, the mortality rate of acute fulminant invasive fungal sinusitis was 50 - 80% [8]. However, the prognosis has improved because of greater recognition and improved treatment. Sinusitis resulting in orbital, bony, or intracranial complications is uncommon. The orbital complications include preseptal cellulitis, orbital cellulitis, subperiosteal abscess, and orbital abscess. Intracranial complications include epidural or subdural abscess, brain abscess, meningitis, encephalitis, and cavernous sinus thrombosis.

Most of these complications are a result of acute exacerbation of chronic sinusitis. However, fungal sinusitis complicated by inflammation of the cavernous sinus is unusual. The cavernous sinuses are complex structure of the venous plexus that are located on either side of the sphenoid bone, posterior to the superior orbital fissure and anterior to the apex of petrous temporal bone. The internal carotid artery with its periaarterial sympathetic plexus passes through the sinus. The oculomotor nerve, trochlear nerve, ophthalmic division, and maxillary division of the trigeminal nerve are located in the lateral wall of the sinus from above to below. The abducens nerve is located inferolateral to the internal carotid artery. When the cavernous sinus is involved in a neoplasm, vascular lesion, non infectious inflammation, or infection, multiple neuropathies occur that are referred to as the cavernous sinus syndrome. The early ocular involvement with periorbital edema, chemosis, loss of vision and restriction of movements of extraocular muscles commonly occurs in cavernous sinus thrombosis as was seen in our patients.

If fungal sinusitis results in intracranial extension, the mortality rate increases. In one study the overall survival rate was 49.7%, poor prognosis being associated with renal or liver failure and intracranial extension[1]. Magnetic resonance imaging of the brain is an important instrument used to evaluate intracranial lesions. In our patient, hyper-signal intensity over the right cavernous sinus on T2-weighted images of the brain on MRI was observed in both cases. This allowed for early detection of the intracranial lesion caused by fungal sinusitis. The treatment of acute fulminant invasive fungal sinusitis with cavernous sinus syndrome should include antifungal medications and drainage of the infected sinus by surgery[4]. Surgical management of the cavernous sinus may not be necessary. The principal antifungal medication used is Amphotericin B. In addition, debridement of the infected sinus by functional endoscopic sinus surgery is also essential. Necrotic soft tissue should be removed until a bleeding border is noted. Control of the underlying condition is important in the immunocompromised patient.

CONCLUSION

Cavernous sinus thrombosis secondary to fungal sinusitis should be treated as a medical emergency, as the outcome is fatal in majority of cases. The treatment is essentially a combination of medical and surgical procedure. With the evolution of endoscopes and emergence of newer and better drugs, the treatment aspects have improved, however one has to be extremely cautious and careful while dealing with such cases as the prognosis remains guarded, despite the progress in medical technology.

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