

Fungal Pan-sinusitis with Severe Visual Loss in Uncontrolled Diabetes

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Abstract

Introduction: Invasive fungal pan-sinusitis can present atypically with severe acute visual loss with minimal anterior orbital inflammation. We describe 2 such cases with a background of uncontrolled diabetes. **Clinical Picture:** Respective clinical presentations of orbital apex and cavernous sinus syndromes were associated with isolation of *Aspergillus galactomannan* and *Rhizopus*. **Treatment:** Urgent extensive surgical debridement and systemic antifungal is necessary. **Outcome:** Clinical improvement of the ocular motor nerves can be expected within 2 months of treatment but visual loss is usually permanent. **Conclusion:** Underlying pansinusitis is an important differential for acute visual loss, especially in uncontrolled diabetics. Early treatment determines outcome.

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Key words: Cavernous sinus syndrome, Optic neuropathy, Orbital apex syndrome

Introduction

Fungi are known opportunistic organisms, which potentially invade and infect a host with depressed immunity. Fungal pan-sinusitis complicated with orbital apex syndrome or cavernous sinus syndrome has been described in immunosuppressed patients.¹⁻⁴ Saprophytic fungi responsible for pan-sinusitis include *Aspergillus* spp. and those of the Mucorales order such as *Rhizopus*. The typical presentation of rhino-orbital fungal infection is that of anterior orbital inflammation, severe visual loss, external ophthalmoplegia and fever. We describe 2 cases with atypical quiescent orbital apex and cavernous sinus syndromes secondary to fungal pan-sinusitis.

Case Reports

Case 1

A 41-year-old Sri Lankan woman, with poorly controlled diabetes (HbA1c 10.7%), presented with a constant headache and left orbital pain of 1 month's duration. Ophthalmic examination was normal, with 20/20 visual acuity in both eyes. Computed tomography (CT) of the paranasal sinuses revealed pan-sinusitis, involving the left maxillary, bilateral ethmoid and sphenoid sinuses, without orbital involvement. She subsequently underwent septoplasty and functional endoscopic sinus surgery in Sri Lanka.

On the second postoperative day, she developed an acute visual loss in her left eye. Her left visual acuity deteriorated to hand movements only. Right visual acuity remained 20/20. There was a left relative afferent pupillary defect. No anisocoria was noted. External ophthalmoplegia present was in keeping with paralyzes of the left third (with complete ptosis) (Fig. 1a-d), fourth and sixth cranial nerves. There were also left corneal hypoesthesia and 3-mm left proptosis. Both anterior and posterior segment ocular examinations were otherwise normal. Both optic discs appeared healthy and the intraocular pressures were normal. Systemic examination was also normal. Magnetic resonance imaging (MRI) of the brain and orbits showed persistent pan-sinusitis with involvement of the left orbital apex and increased signal intensities of the left extraocular muscles on T2-weighted images (Fig. 2a and b). No abnormality was noted in the brain. The chest X-ray was normal.

The patient underwent left ethmoidectomy with endoscopic removal of the left ethmoidal tissue, followed by postoperative systemic therapy with flugyl, augmentin and amphotericin for 2 weeks. Chronic inflammatory changes were seen on histology examination. *Pseudomonas aeruginosa* was isolated on tissue culture, while *Aspergillus galactomannan* antigen was positive in the blood (GM index 2.2). The total white cell and differential counts were within normal range and ANCA was negative.

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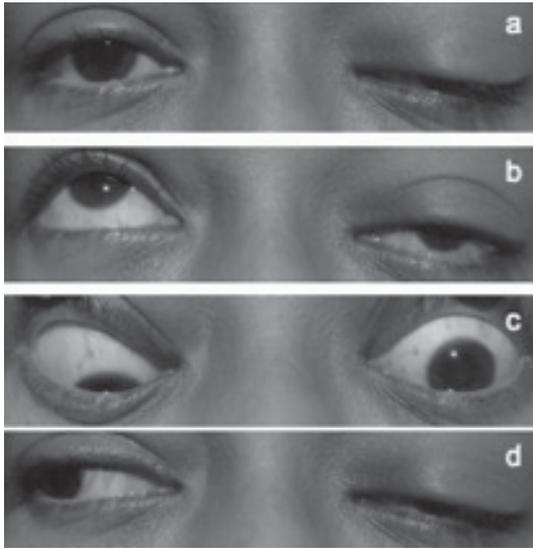


Fig. 1. Left orbital apex syndrome involving left third nerve palsy, with limitations in (a) primary position with left ptosis, (b) upgaze, (c) downgaze and (d) horizontal right gaze; absence of left exotropia in primary position likely due to coexisting left sixth nerve palsy.

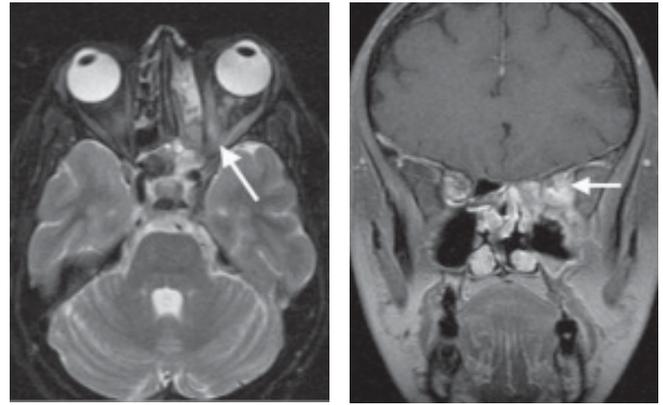


Fig. 2a.

Fig. 2b.

Fig. 2. (a) MRI T2-weighted image (axial cut) of brain and orbits showing increased signal intensities of the left extraocular muscles (indicated by arrow). (b) MRI of brain and orbits (coronal cut) showing persistent pansinusitis with involvement of the left orbital apex (increased signal intensities; indicated by arrow).

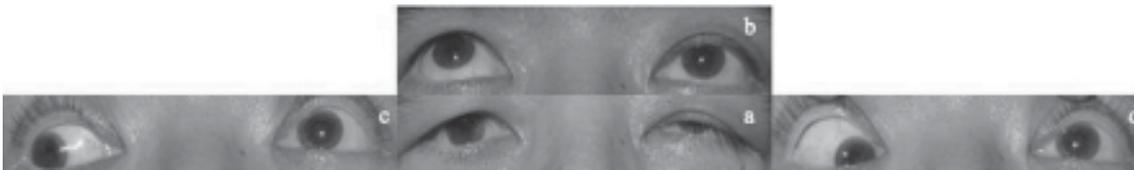


Fig. 3. Left cavernous sinus syndrome showing left third and sixth nerve palsies (a) left incomplete ptosis in primary gaze, with limitations on (b) upgaze, (c) horizontal right gaze and (d) horizontal left gaze.



Fig. 4. CT of brain, orbit and paranasal sinuses revealed pansinusitis (indicated by arrow) involving left ethmoid (anterior and posterior) and left maxillary sinuses, with obstruction of the left ostio-meatal unit and sphenothmoidal recess.

Complete resolution of all ocular motor nerve palsies and corneal sensation were observed 2 months later. However, her vision remained light perception with consequent optic atrophy.

Case 2

A 56-year-old Chinese man, a poorly controlled diabetic (HbA1c 12.8%) with hyperosmolar non-ketotic acidosis,

presented with a 4-day history of headache and acute loss of vision in the left eye. His left vision had no light perception (NPL). Vision in the right eye was 20/20. A left relative afferent pupillary defect was noted. Examination of other cranial nerves was normal. Anterior and posterior segment ocular examinations were unremarkable and both optic discs appeared healthy. A diagnosis of left posterior ischaemic optic neuropathy was made. Progressive development of left pupil-involved partial third nerve palsy (Fig. 3), left sixth nerve palsy, 3-mm left proptosis and hypoesthesia of the left second dermatome of the trigeminal nerve was noted 2 days later. There was apparently no history of a previous sinus disease. CT of the brain, orbit and paranasal sinuses revealed pansinusitis involving bilateral sphenoid, left ethmoid (anterior and posterior) and left maxillary sinuses, with obstruction of the left ostio-meatal unit and sphenothmoidal recess (Fig. 4). MRI of the brain showed a prominent left cavernous sinus.

The patient underwent a left uncinectomy, anterior and posterior ethmoidectomy as well as sphenoidectomy, followed by postoperative systemic therapy with flagyl, augmentin and amphotericin for 2 weeks. Histopathology examination revealed the presence of broad septate hyphae

consistent with chronic invasive mycosis. *Rhizopus* species was isolated on ethmoid tissue culture. Blood cultures were negative.

Recovery of both third and trigeminal nerve palsies were observed 2 months later. No improvement was noted in both the sixth nerve function and her vision remained at NPL.

Discussion

A common complication of pan-sinusitis is orbital and/or cavernous sinus involvement(s) because of the close relationships between the orbit, cavernous sinus and adjacent paranasal sinuses. While the cavernous sinuses are anatomically related to the sphenoid sinuses, the optic canal and orbital apex are likewise related to both the posterior ethmoid⁵ and sphenoid sinuses.^{6,7} Involvement of the cavernous sinus or orbital apex is potentially debilitating, due to the close proximity of numerous cranial nerves within these confined spaces. DeLano et al⁶ reviewed CT findings of 300 optic nerves and found that the majority (76%) lie just adjacent to the lateral wall of the sphenoidal sinus without any indentation. Yeoh et al⁵ demonstrated the close relationship between the optic nerve and posterior ethmoid air cells rather than to the sphenoid sinus, on dissection of 51 Asian cadaveric heads, and that the intervening wall may be as thin as 0.25 mm. These findings support the findings in numerous case reports on sinusitis-related optic neuropathy in the literature.^{1-3,8-10}

We report 2 such cases with fungal pan-sinusitis in the presence of poorly controlled diabetes. The first case presented with an orbital apex syndrome while the second with a cavernous sinus syndrome. The clinical picture was that of precipitous visual loss and external ophthalmoplegia, in the absence of anterior orbital inflammation.

Fungal pan-sinusitis commonly occurs in immunosuppressed patients. Cases of rhino-orbital mucormycosis and aspergillosis have been associated with poorly controlled diabetes mellitus, human immunodeficiency virus infection, Hodgkin's disease and chronic corticosteroid therapy.¹⁻⁴ Early diagnosis with urgent surgical debridement and systemic antifungal therapy is the key to the management of this rhino-orbital infection.

However, a diagnostic dilemma leading to delayed treatment is not uncommon, either because of the absence of previous sinus disease, delayed progression of clinical signs or due to the atypical presentation of fungal infections with the lack of visible orbital inflammation. The initial misdiagnosis of a posterior ischaemic optic neuropathy in our second case is an example. Sanborn et al¹¹ described cases of sinusitis-related optic neuritis, which were initially misdiagnosed as idiopathic papillitis or demyelinating optic neuritis, leading to consequent mistreatment with

systemic corticosteroids in the presence of an underlying sinus infection.

We recommend that a high index of suspicion of an undiagnosed sinusitis should be kept in mind and appropriate radiological investigations performed in the presence of an immunosuppressed patient with acute visual loss and ophthalmoplegia. A normal sinus X-ray does not exclude an underlying sinusitis. This is due to sub-optimal visualisation of the sinuses, especially that of the ethmoid sinuses, as a result of radiological overlapping of the nasal bone and turbinate. A CT of the paranasal sinuses, orbits and brain is thus essential to confirm the diagnosis of pan-sinusitis and evaluate the extent of orbital and brain involvement. Prompt surgical drainage with tissue culture and histology is vital to the clearance of primary infection as well as in the guidance of subsequent anti-microbial therapy. A complete and thorough sinus drainage is necessary as our first case illustrates an incomplete initial sinus drainage procedure with subsequent orbital involvement. It is also worth noting that polymicrobial infection of the sinuses can occur, as illustrated in our first case, and hence appropriate antibiotics and antifungal treatment need to be instituted.

Prognosis of such cases is variable. Although there have been cases of reported reversible visual loss following aggressive sinus treatment,^{9,12} optic neuropathy can be permanent. On the other hand, ocular motor nerve palsies tend to recover. Lee et al¹⁰ evaluated the outcome of isolated sphenoid sinus disease post endoscopic sinus surgery and found a significant improvement in the function of ocular motor nerves compared to visual acuity, with a mean recovery time of 5.1 months. The poor outcome of the optic neuropathy is usually due to ischaemic vasculitis, where certain types of fungi like *Mucor* spp. have the propensity of invading blood vessels with consequent thrombosis and ischaemia.

In conclusion, fungal pan-sinusitis with orbital or cavernous sinus involvement can present insidiously, resulting in an irreversible optic neuropathy. Diagnostic imaging of the anterior visual pathway and the paranasal sinuses is indispensable and the importance of prompt surgical debridement and drainage cannot be over-emphasised.

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