A rare case of invasive sino-orbital aspergillosis arising from isolated frontal sinus infection

Sino-orbital aspergillosis is an uncommon condition that occurs when infection of the paranasal sinuses extends into the orbit. Infection most frequently originates from the maxillary sinus, followed by the ethmoid and sphenoid sinuses. The frontal sinus is rarely involved, and is largely infected secondary to adjacent sinuses. Isolated aspergillosis of the frontal sinus is extremely uncommon, with approximately 30 cases reported in the literature.[1–3] Here, we present a case of invasive sino-orbital aspergillosis arising from isolated frontal sinus infection in an immunocompromised patient.

Case report

A 78-year-old male presented with a 3-week history of painful left upper eyelid swelling. His past medical history included multiple myeloma for which he had stem cell transplantation, and was maintained on oral lenalidomide. He also had a history of a moderately differentiated squamous cell carcinoma (SCC) excised from his left forehead 3 years previously. There was extratumoral perineural invasion, and the patient was treated with adjuvant radiotherapy.

On examination, best corrected visual acuity was 20/20 (right) and 20/30 (left) with no relative afferent pupillary defect. There was left upper lid swelling and numbness in the distribution of the ophthalmic branch of the trigeminal nerve. There was limitation of supraduction, abduction, and adduction on the left side. Anterior and posterior segments were otherwise unremarkable. He was apyrexic.

Complete blood examination showed anemia (hemoglobin, 10 g/dL; RBC count, 3.13 x 10^{12}/L) with thrombocytopenia (Platelets, 73 x 10^{9}/L) and neutrophil predominant leukocytosis (WCC, 15.7 x 10^{9}/L; neutrophils, 85.2%). Inflammatory markers were elevated (C-reactive protein, 41 mg/L). Computed tomography (CT) demonstrated a heterogeneous soft tissue mass in the superolateral left orbit, which had a hypodense area laterally (Fig. 1). Magnetic resonance imaging (MRI) showed mild changes of left-sided frontal sinusitis without bony breech of the roof of the orbit, and detected the orbital mass extending towards the apex, demonstrating enhancement and superolateral areas of hypointensity (Fig. 2).

An orbital biopsy was performed via a skin crease incision. Histopathology showed mixed inflammatory cell infiltrate including mononuclear and plasma cells; however, there was no evidence of fungal hyphae or malignancy. Due to equivocal findings, a further biopsy was performed via a lateral orbitotomy to access deeper tissue. The sample from this biopsy demonstrated broad fungal hyphae that were both septating and non-septating and no evidence of malignancy (Fig. 3). The patient started on intravenous amphotericin B (5 mg/kg daily), and proceeded to exenteration within 72 hours.

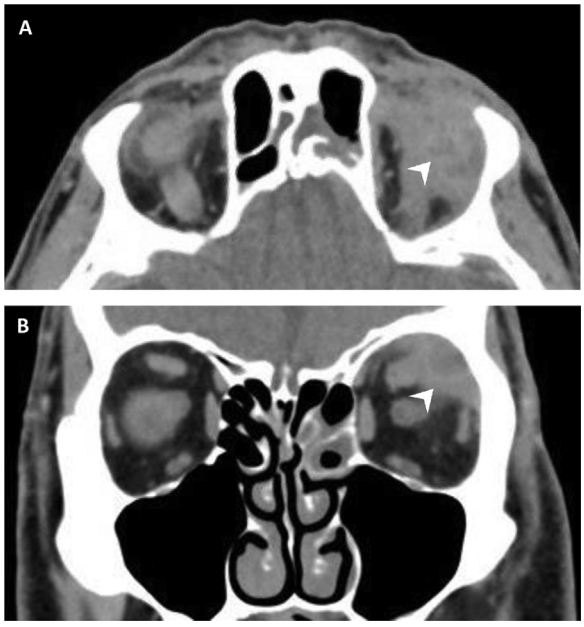

Fig. 1—Computed tomography scans showing a left superolateral orbital lesion (arrowheads). (A) Axial image showing heterogeneous mass in left lateral orbit. (B) Coronal image showing superolateral orbital mass with hypodensity peripherally, correlating with an area of abscess.

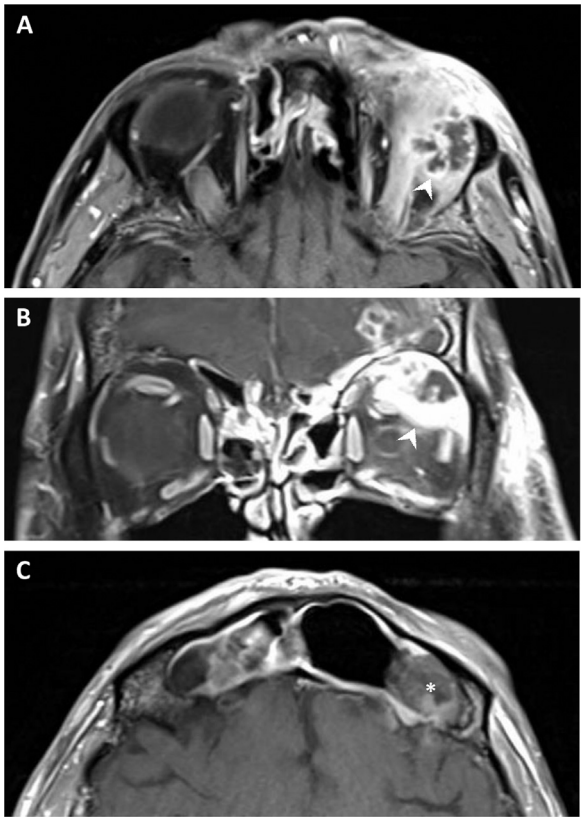

Fig. 2—Magnetic resonance imaging. (A) Axial image showing a left-sided enhancing lateral orbital lesion (arrowhead) with central hypointensity correlating with an area of abscess. (B) Coronal image showing superolateral mass with peripheral enhancement (arrowhead). (C) Axial view of the left frontal sinus with mucosal enhancement and a hypointense mass (*).

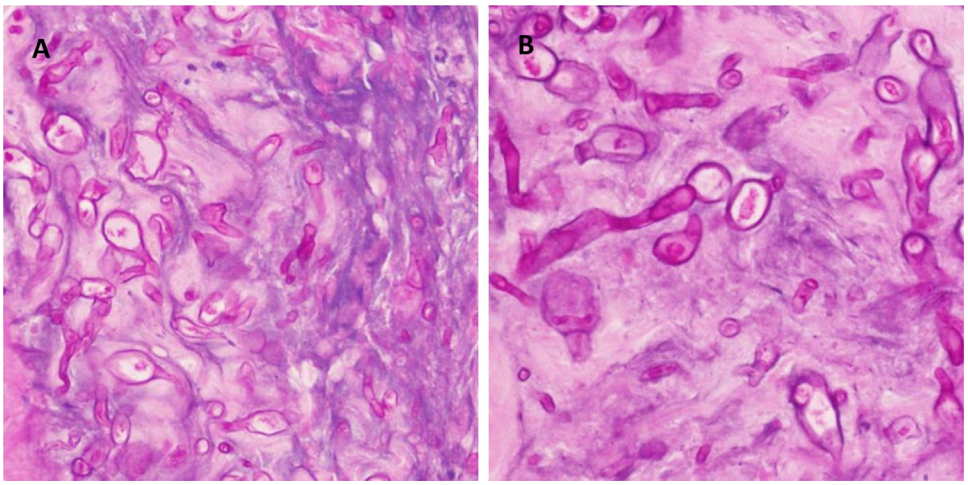

Fig. 3—Histological sections of orbital tissue stained with Periodic acid-Schiff stain demonstrating acute angle branching fungal hyphae and necrotic material. Magnifications are (A) 20x, and (B) 40x.

Investigation of the paranasal sinuses at the time of exenteration found macroscopic evidence of left frontal sinus disease. The mucosal linings of the frontal and ethmoid sinuses were removed directly with a curette. This tissue was sent for analysis and the cavity was packed with a gelatine-thrombin haemostatic matrix. Aspergillus fumigatus was identified in the frontal sinus tissue, and medical treatment was changed to voriconazole based on sensitivities. The patient deteriorated despite treatment, and repeat MRI identified an intracranial abscess. The patient died 3 months after initial presentation.

Discussion

Aspergillus infections cause a spectrum of invasive and non-invasive disease in humans. Aspergilloma and allergic rhinosinusitis constitute non-invasive disease, while acute or chronic invasive infections may be either limited or fulminant.[4] The maxillary and ethmoid are the most frequently affected paranasal sinuses in aspergillus-related disease.[5–7] Infection of the frontal sinus by Aspergillus mostly occurs secondary to spread from adjacent sinuses by focal bony erosion.[7,8] The anatomical protection of the frontal sinus ostium in the anterosuperior part of the nasal cavity makes it unusual for isolated aspergillosis of the frontal sinus to occur.[9,10]

Large case series have previously found frontal sinus disease resulting from aspergillus infection to be rare. In 100 patients with allergic fungal sinusitis, Alaraj et al. identified the ethmoid and maxillary sinuses as most frequently involved.[7] Another series of 109 patients with chronic fungal infections of the paranasal sinuses reported only 2 cases involving the frontal sinus.[5] Dufour et al. reported a single case of frontal sinus disease from a review of 175 patients treated for aspergilloma of the sinuses.[6] Invasive fungal infections of the frontal sinus are even less common; a series of 25 patients reported involvement of the frontal sinus in only one patient.[4,11] Aspergillus infection was confirmed only to involve the left lateral frontal sinus in our patient, with relatively minimal disease when considering the extent of orbital involvement.

Initial presentation of invasive aspergillosis is often after the orbit or cranial vault have been invaded. Bony erosion allows the spread of fungal infection to these structures, and is thought to result from increased pressure, demineralisation of bone, or expansion of fungal mass.[3,7] Intracranial involvement may occur by direct extension through the superior orbital fissure, haematogenous spread, or erosion through the affected sinus.[7] In the current case, the posterior frontal sinus remained intact intraoperatively, and although we postulate intracranial abscess arising from either extension through the superior orbital fissure or haematogenous spread, it is not possible to be certain.

Radiographic features of sino-orbital aspergillosis may include heterogeneous masses within the paranasal sinuses, bony erosions, and heterogeneous masses within the orbit that attenuate with contrast.[12,13] Biopsy and culture remain the definitive diagnostic investigations; however, difficulty obtaining a satisfactory sample is widely reported, and multiple biopsies are frequently required.[8,14,15] The orbital lesion seen in the current case appeared cystic on imaging, yet was found to contain central areas of necrosis with a cyst-like histological appearance. Multiple biopsy samples were required before a definitive diagnosis was established, but due to extensive orbital involvement, it was thought that a combination of anti-fungal therapy and surgical debridement was necessary to prevent further spread. Adjunct treatments may include the use of anti-fungal agents administered locally by injection or soaked into packing materials following debridement.[16]

Conclusion

We present a rare case of invasive sino-orbital aspergillosis originating from an isolated frontal sinus infection.

The first presentation of invasive aspergillosis is frequently with ophthalmic or neurological symptoms following intraorbital or intracranial invasion, with early disease presenting vaguely. Sino-orbital fungal disease should be considered when evaluating all orbital lesions as it frequently mimics many neoplastic and non-neoplastic pathologies, and is rapidly fatal if left untreated.

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Orbital metastasis from a primary salivary duct carcinoma: importance of long-term follow-up

Primary salivary duct carcinoma (SDC) of the parotid gland is a relatively uncommon tumour. Amongst the noted cases in the literature, metastasis of the primary SDC is known to involve the lungs, liver, bones, lymph nodes, gingiva, vagina, and rarely the orbit.[1–4] The reported cases of orbital metastasis from a primary SDC have shown a good prognosis, whenever appropriate intervention was instituted at the earliest. In this report, we describe the clinical difficulties, investigations, and management of a metastatic SDC of the orbit that presented prior to manifestations at the primary location.

Case Description

A 56-year-old male patient presented with history of pain, redness, and congestion along the left medial canthus for the past four weeks. Past history revealed a presumptive diagnosis of extraocular muscle cysticercosis that was based on prior clinical and equivocal ultrasonographic findings.

However, there was no prior history of any ocular trauma, surgery, or any known systemic illness. Examination done in our oculoplastic clinic revealed severely restricted extraocular motility in all the gazes (Fig. 1). Visual acuity was 20/20 OD and light perception with accurate projection of rays in the left eye. There was evident congestion involving the left caruncle, bulbar, and forniceal conjunctiva. However, the cornea remained clear with minimal anterior chamber distortion or inflammation. Using Goldmann applanation tonometry, intraocular pressures were noted as 16 mm Hg OD and 32 mm Hg OS. Dilated fundus examination revealed prominent chorioretinal folds along the nasal retina in presence of a healthy disc and macula.

Routine haematological investigations including complete hemogram and liver and kidney function tests were essentially within normal limits. Orbital B scan ultrasound revealed a fairly well defined homogenous soft tissue mass lesion occupying the medial orbital space; however, the