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Invasive fungal sinusitis in an ENT subunit of a tertiary care facility in Sri lanka

Samaranayake RPGMD[1], Jayawardana WATT[2], Thelikorala SM[3], Sheriff AMM[4]

[1-]Faculty of Medicine, University of Colombo

[2-]Faculty of Medicine, University of Colombo

[3-]Senior Registrar in ENT, National Hospital of Sri Lanka (NHSL), Sri Lanka

[4-]Consultant ENT Surgeon, National Hospital of Sri Lanka (NHSL), Sri Lanka

Abstract

Invasive fungal sinusitis is a life-threatening condition encountered in ENT practice which has a significant morbidity and mortality to the patient while the treatment itself consists of potential risks. The pathology carries a high economic burden on the healthcare infrastructure. This case series presents a series of six patients diagnosed and managed for invasive fungal sinusitis at an ENT subunit of the National Hospital Sri Lanka within a three-month duration.

Key words: Invasive fungal sinusitis, mucormycosis, aspergillosis

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Correspondence: Mithun Samaranayake (mithundiyumantha@gmail.com)

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Case series

Case	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
Age	38	55	72	38	56	48
Sex	Female	Male	Male	Male	Male	Female
Defined comorbidities[1]	Diabetes mellitus CBS: 416 mg/dl	Diabetes mellitus CBS: 380 mg/dl	Diabetes mellitus CBS: 345 mg/dl	Diabetes mellitus CBS: 400 mg/dl	Post kidney transplant	Diabetes mellitus CBS: 400 mg/dl
Presentation	Right sided facial pain, swelling and numbness, ptosis, loss of vision	Severe right-side headache followed by facial asymmetry	Left side facial pain, swelling and peri-orbital oedema, ptosis, loss of vision	Right side facial pain, swelling and numbness, loss of vision in the right eye	Cough,fever, and left-side headache.	Right-side facial swelling, right-side complete ptosis, and ipsilateral facial swelling
Cranial nerves involved	Right II, III, IV, VI, VII (lower motor), XII	Left VII (lower motor)	Left II, III, IV, VI,	Right II, VII (lower motor)	-	Right II, III, IV, VI, VII (lower motor)
Key surgical interventions	Right-side full house FESS and orbital decompression	Endoscopic right-side middle meatal antrostomy and anterior ethmoidectomy	Left-side full house FESS with left orbital decompression	Right-side full house FESS and orbital decompression	Left-side full house FESS	Left-side full house FESS
Sinuses involved	Maxillary, anterior ethmoid	Maxillary, anterior ethmoid	Sphenoid, anterior, and posterior ethmoid	Maxillary, anterior ethmoid	Maxillary, anterior, and posterior ethmoid	Maxillary, frontal, sphenoid, anterior and posterior ethmoid
Medical treatment	IV liposomal amphotericin B for 50 days	IV conventional amphotericin B 150 mg daily for given 25 days followed by IV liposomal amphotericin B 50 mg daily for 42 days	IV conventional amphotericin B was given for 15 days	Initially treated with IV conventional amphotericin B 50 mg daily for 15 days followed by IV liposomal amphotericin B for 45 days	IV liposomal amphotericin B for 48 days	intra-orbital injections of amphotericin B, IV conventional amphotericin B for 40 days
Side effects	Hypomagnesaemia, nausea, vomiting	Elevated serum creatinine, nausea, vomiting	Persistent hyponatremia and hypomagnesaemia, nausea, vomiting	Elevated serum creatinine, nausea, vomiting	Nausea, vomiting	Nausea, vomiting

Table 1: Key details of the cases

[1] CBS level on admission

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Introduction

Invasive fungal sinusitis is known for its high morbidity and mortality as well as heavy burden on the healthcare infrastructure. This is an opportunistic infection which is predominantly associated with immunocompromised hosts. The first case of invasive fungal sinusitis was reported in 1953 simultaneously with the introduction of cytotoxic chemotherapy and corticosteroid therapy1. There is a surge of reported invasive fungal sinusitis cases following COVID-19 infection during the post pandemic period2. Histology stays as the mainstay of diagnosis while the angioinvasion of the fungal septate is the hallmark of invasive fungal sinusitis.

Discussion

Basic Socio-demographic characteristics

Our case series consisted of six individual cases which were diagnosed and managed for invasive fungal sinusitis at an ENT subunit of a tertiary care facility. Basic socio demographic profile of the case series is depicted below

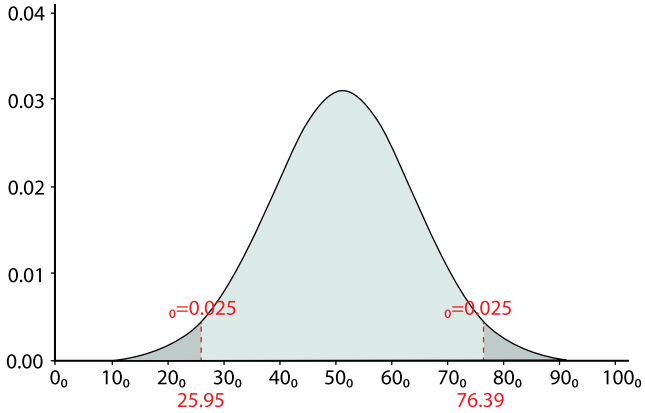

Chart 1: Age distribution of the cases

Distribution of the cases based on sex

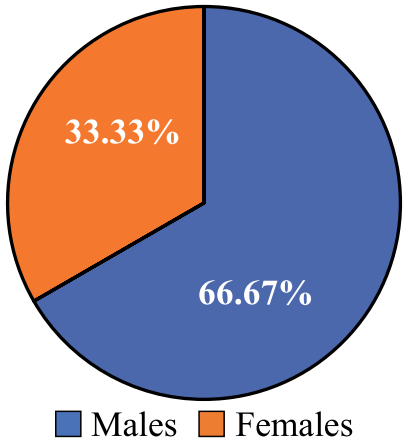

Chart 2: Sex distribution of the cases

There was a majority of males (66.67%, n=4). The six individuals were ranging in age between 38 and 72 years, with a mean age of 51.17± 12.87 years.

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Risk factors

All the cases have shown possible risk factors as below.

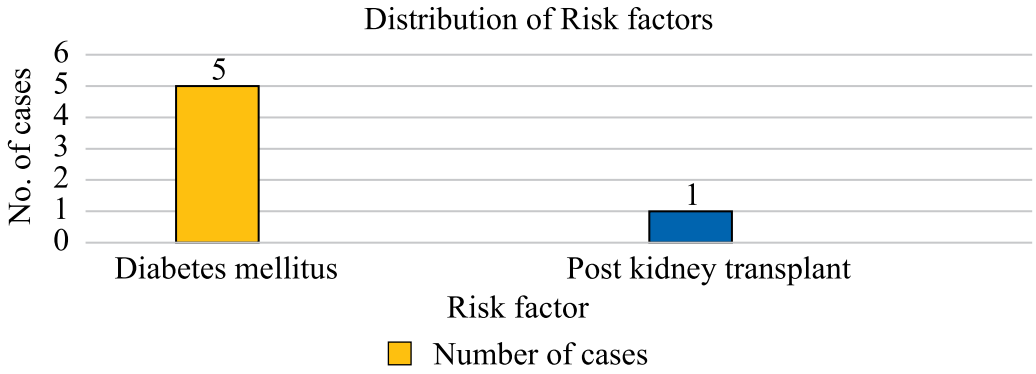

Chart 3: Distribution of prevailing risk factors for invasive fungal sinusitis

Invasive fungal infections are highly associated with immunocompromised status of the host. Specially rhinocerebral mucormycosis develops more commonly among patients with poorly controlled diabetes mellitus, chronic malnutrition, iron overload and iatrogenic immunosuppression followed by transplant etc. As shown in the graph above 83.33% (n=5) were diagnosed with poorly controlled diabetes mellitus. All the patients had elevated capillary blood sugar levels on admission, ranging from 345 to 410 mg/dl and the mean CBS level was 388.2±27.31 mg/dl. The remaining case had a previous kidney transplant. Similar cases associated with renal transplant were described in the case series done by M. Coutiel et al. in 2020[1].

Symptom analysis

Cases based on the affected laterality	
Laterality	Number of cases
Right	4
Left	2
Cases based on symptoms	
Symptom	Number of cases
Unilateral facial pain	3
Unilateral facial swelling	3
Facial numbness	2
Drooping of the eyelid	3
Unilateral headache	2
Facial asymmetry	1
Peri-orbital oedema	1
Cough	1
Fever	1
Loss of vision	2

Table 2: Distribution of cases based on symptoms

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According to the table above, most of the cases of this case series initially presented with facial swelling, facial pain, and ptosis. Case 2 was presented with facial asymmetry and case 5 presented with cough, fever and headache resembling a clinical picture of a lower respiratory tract infection with pulmonary manifestations. Compared to the other studies, initial symptomatology is similar in aspects such headache, sudden loss of vision and proptosis but features like nasal obstruction, aphasia, and diplopia were not evident[1,3,5]. Mean time duration taken to access a medical care facility from the onset of the symptoms is 7.83±7.03 days. The following charts illustrate the symptomatologic profile of the case series.

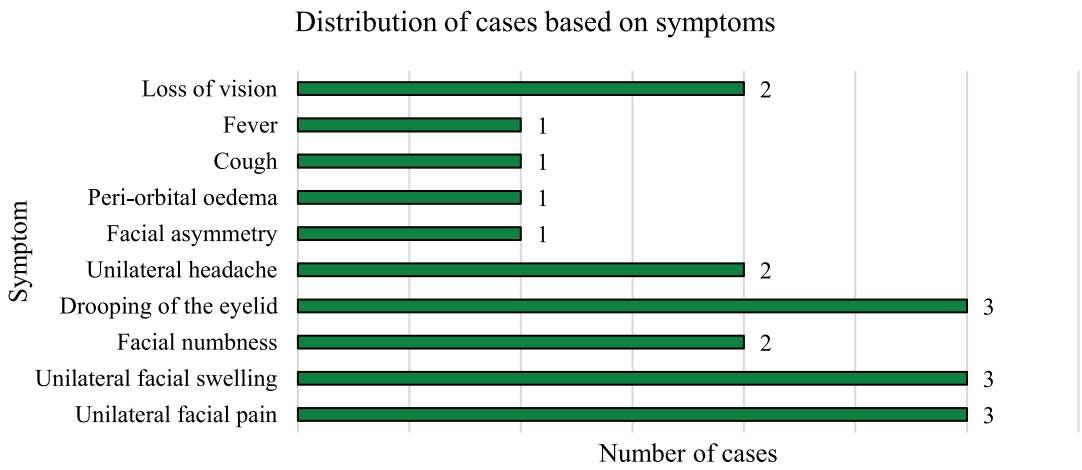

Chart 4: Distribution of cases based on symptoms

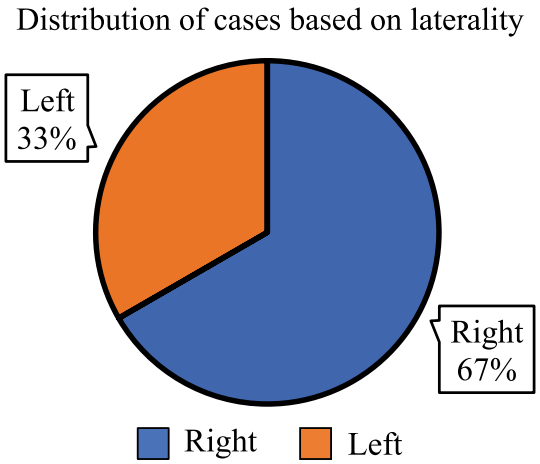

Chart 5: Distribution based on laterality

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Involvement of the cranial nerves

Case No.	Cranial nerves involved	Interventions
1	II, III, IV, VI, VII, XII	Orbital decompression, FESS
2	VII	FESS, endoscopic MMA
3	II, III, IV, VI	Orbital decompression, FESS
4	II, VII	Optic nerve decompression, FESS
5	-	FESS for symptom relief
6	II, III, IV, VI, VII	Intra-orbital amphotericin B injection, FESS

Table 3: Involvement of cranial nerves

Cranial nerve involvements of the cases are summarised in the table above. Three cases presented with total ophthalmoplegia. Three cases presented with lower motor neuron type CN VII palsies. In case 1, MRI brain showed focal areas with diffuse restriction to the right sided pre and post central gyri, posterior to post central gyri and right anterior centrum semi ovale possibly representing septic emboli, right side proptosis and evidence of right-side optic neuritis but, in case 2 and case 4 intracranial radiological evidence were normal. In the case 5, the patient was given intra-orbital amphotericin B due to the suspicion of intra-orbital extension of the disease. The following chart illustrates distribution of the cases based on the involvement of cranial nerves.

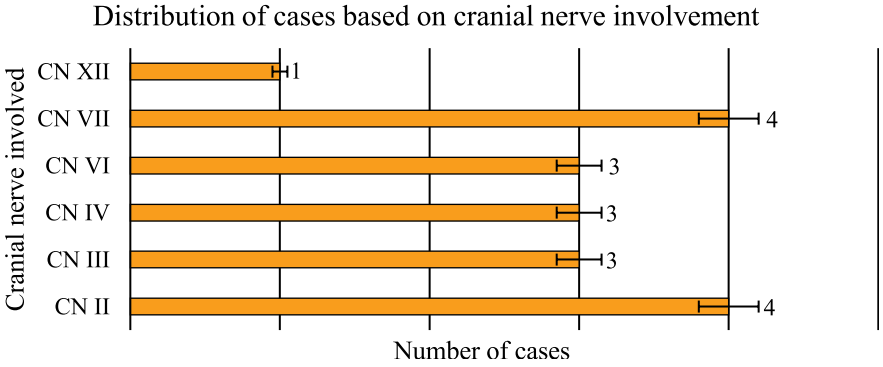

Chart 6: Distribution of cases based on involvement of the cranial nerves

In most of the cases, CN II and CN VIII were affected. In 50% of the cases, total ophthalmoplegia was observed due to combination of CN III, CN IV and CN VI palsies.

Microbiological diagnosis

Direct microscopic examination of the tissue specimen on wet KOH mounts from all the cases were suggestive of aseptate fungal filaments which suggestive of zygomycotic infection. In 33.33% (n=2) of the cases culture on Sabouraud dextrose agar were positive for *Mucor spp*. Rhizopus was isolated in the cultures of 66.67% (n=4) cases. Simultaneously Aspergillus flavum was isolated in 33.33% (n=2) of the cases.

Pharmacological management

Two of the cases were initially managed as bacterial sinusitis. In the case 2, the patient was treated with IV ceftriaxone and IV metronidazole for 6 days. In the case 4, IV meropenem, vancomycin, and

co-amoxiclav for 3 days. In both cases, patients had initial electrolyte imbalances and optimization was required prior to commence the anti-fungal therapy. Amphotericin B remains as the first line of medication of choice due to its broad coverage on *Mucor* species and *Aspergillus*[4]. Conventional amphotericin B is known for its nephrotoxic side effect profile and liposomal amphotericin B has an improved toxicity profile comparatively[5]. The following chart shows the anti-fungal treatment that which received by the cases in this case series.

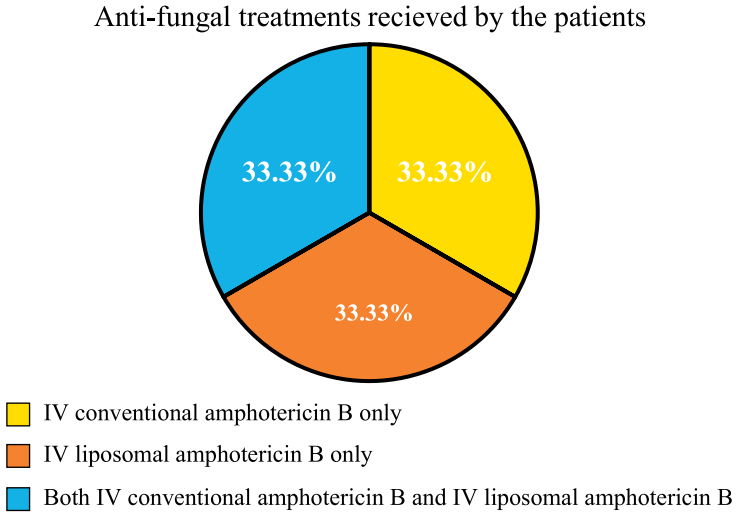

Chart 7: Distribution of anti-fungal treatment received by the patients

IV liposomal amphotericin was received by the patients for a mean duration of 45.0±4.12 days ranging from 40 to 50 days. IV conventional amphotericin B was received for mean duration of 18.33±5.78 days within the unit. Intra-orbital amphotericin B was given in the case 6. Usage of intra-orbital amphotericin B to treat the orbital extension of the invasive fungal sinusitis was reported in case several case studies[7]. Intra-orbital amphotericin B is reported as a globe sparing treatment for orbital fungal infections[8]. In case 3, the treatment had to be withheld and recommenced due to an electrolyte imbalance. 50.0% of the cases had a significant elevation of the serum creatinine level. Hyperkalemia was present in 16.67% (n=1) and hyponatremia was present in 16.67%(n=1) of the cases. Hypomagnesaemia was detected in 33.33%(n=2) of the cases and corrected with IV magnesium sulfate. All the patients experienced severe vomiting and nausea. The following chart shows the profile of the side effects in the case series.

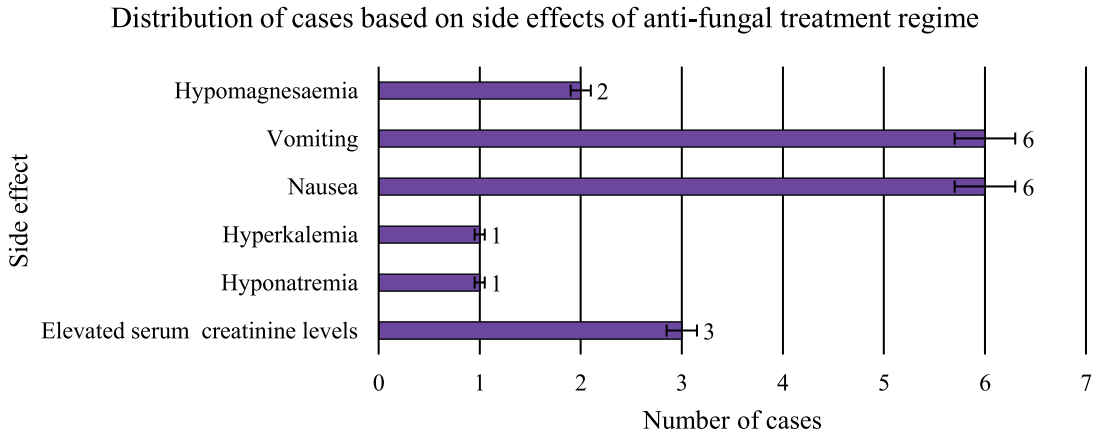

Chart 8: Distribution of cases based on side effects of anti-fungal treatment regime

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Summary

This case series elaborates on six individuals who were diagnosed and treated for invasive fungal sinusitis in the background of immunocompromised state predominantly due to poor glycaemic control. They were presented with a variety of symptoms and a majority of the cases had a cranial nerve involvement. Majority of the cases were confirmed for isolated mucormycosis while a few had concomitant aspergillosis. The management of the cases were a combination of both surgical interventions and prompt and adequate pharmacological therapy which is associated with positive outcomes.

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