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Non-Invasive Fusarial Sinusitis in a Covid 19 Patient with an Immunocompromised Status: A Very Rare Case

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Abstract

Rhinosinusitis (RS) is one of the most common health care problems emerging across the globe approximately 20% of people experience this disease in their life. The most common form of RS is chronic rhinosinusitis (CRS). Although several factors are implicated in the incidence of CRS, the aetiopathogenesis of this disease has not been established completely and still has lacunae in our understanding. Recent studies have shown the role of airborne fungi in the pathogenesis of CRS. Many fungi have been associated with fungal sinusitis, most commonly the Aspergillus species, followed by Rhizopus, Mucor, Cladosporium, Candida, Cryptococcus species, etc. The non-invasive ones are generally dematiaceous moulds like Curvularia, Bipolaris, Alternaria, Fusarium species, etc. but they are known to cause intra-cranial complications in around 20% of patients. The spectrum of fungal sinusitis ranges from acute or chronic duration with allergic, invasive or non-invasive in nature. Chronic invasive fungal rhinosinusitis has a chronic course, often associated with immunocompromised patients, such as those with diabetes mellitus, corticosteroid treatment, receiving chemotherapy, chronic kidney failure patients requiring dialysis. With covid 19 pandemic, it was seen that the disease per se or its treatment, patient had a tendency of developing a temporary immune-compromised status.

Keywords: Rhinosinusitis; Immunocompromised; Fusarial Sinusitis; Covid 19

Abbreviations

RS: Rhinosinusitis; CRS: Chronic Rhinosinusitis; SDA: Sabouraud Dextrose Agar; LPCB: Lactphenol Cotton Blue.

Introduction

Rhinosinusitis (RS) is one of the most common health care problems emerging across the globe Approximately 20% of people experience this disease in their life [1,2]. The most common form of RS is chronic rhinosinusitis (CRS) [1]. Although several factors are implicated in the incidence of CRS, the aetiopathogenesis of this disease has not been established completely and still has lacunae in our understanding. Recent studies have shown the role of airborne fungi in the pathogenesis of CRS [3-6]. Many fungi have been associated with fungal sinusitis, most commonly the Aspergillus species, followed by Rhizopus, Mucor, Cladosporium, Candida, Cryptococcus species, etc. The non-invasive ones are generally dematiaceous moulds like Curvularia, Bipolaris, Alternaria, Fusarium species, etc but they are known to cause intra-cranial complications in around 20% of patients [7]. The spectrum of fungal sinusitis ranges from acute or chronic duration with allergic,

invasive or non-invasive in nature. Chronic invasive fungal rhinosinusitis has a chronic course, often associated with immunocompromised patients, such as those with diabetes mellitus, corticosteroid treatment, receiving chemotherapy, chronic kidney failure patients requiring dialysis. With covid 19 pandemic, it was seen that the disease per se or its treatment, patient had a tendency of developing a temporary immune-compromised status.

Fusarium species may cause allergic sinusitis or chronic non-invasive or invasive sinusitis in immunocompetent host. In immunocompromised host, it is always the invasive type. The clinical manifestations of fusarial sinusitis are indistinguishable from those caused by Aspergillus species. Necrosis of the mucosa is a hallmark and is a consequence of the angio-invasive nature of these mycoses [8]. Cavernous sinus thrombosis is a rare consequence of invasive fungal sinusitis. In invasive form, immunocompromised patients can allow the organism easy access into mucosal structures, infiltrating orbital and intracranial structures via hematogenous spread. We report a case of non- invasive fusarial fungal sinusitis in an immunocompromised patient who was suffering from covid 19 pneumonia along with diabetes mellitus, hypertension, chronic kidney disease requiring haemodialysis, and hypothyroidism.

Case Report

A 59-year-old female patient with type 2 diabetes mellitus, hypertension, hypothyroidism and chronic kidney disease requiring haemodialysis thrice a week was admitted in our intensive care unit i/v/o desaturation with tachypnoea and tested positive for covid 19 antigens positive. Treatment was initiated for covid 19 pneumonia with oxygen support by non-invasive ventilation and high flow nasal canula (50L/min flow with FiO2 of 35%). Later, patient developed altered sensorium, severe headache, nasal bleeding from right nostril and blackish crusting in the left nostril. Blood investigation revealed presence of Sepsis (high WBC counts, elevated procalcitonin levels, raised CRP levels, worsening in renal function tests). Examination was done by otolaryngologist and ophthalmologist both in view of suspected mucor mycosis. Blackish crusting was seen in the left nasal cavity with maxillary tenderness. No loosening of teeth or vision disturbances was noted. Nasal smear for potassium hydroxide mount (KOH mount) to detect presence of fungal elements was sent but no fungal elements were detected. Patient underwent both Plain and contrast enhanced Computed tomographic scan for para-nasal sinuses and non-contrast enhanced magnetic resonance imaging of orbit and brain study as per the current guidelines and protocol established for suspected Mucor mycosis in a covid 19 patient in our hospital. Contrast enhanced MRI was not performed as per suggestion of nephrologist. CT scan (Figure 1) suggested of ill-defined soft tissue opacification of the anterior right half of nasal cavity, extending in middle meatus, deviated nasal septum to right and inflammatory mucosal hypertrophy in bilateral maxillary, sphenoid and ethmoid sinuses with hyper-attenuation in a non- contrast scan. Provisional diagnosis of fungal sinusitis was established and patient was posted for surgery for debridement and confirmation of diagnosis. No evidence of cavernous sinus thrombosis or intra-cranial extension of fungal sinusitis was noted on MRI study.

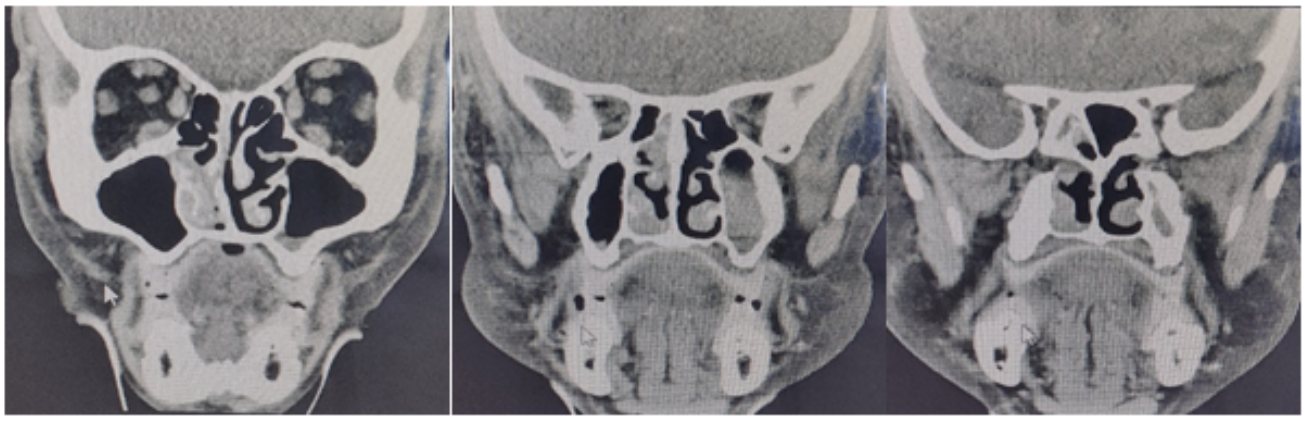

Figure 1: CT scan PNS coronal cuts: showing mucosal thickening in maxillary, ethmoid and sphenoid sinuses with heterogenous densities s/o fungal sinusitis.

Functional endoscopic sinus surgery was performed. Fungal debris was seen in bilateral maxillary sinuses, right sphenoid sinus which was sent for KOH mount and fungal culture. Polypoidal mucosal changes were noted in other sinuses.

Microbiological Examination

Fungal debris was sent to the Microbiology laboratory for KOH mount and fungal culture and processed for same. Sample was inoculated on Sabouraud dextrose agar (SDA) and incubated in two slants at two different temperatures (28 0C and 37 0C). The remaining sample was put in 10% KOH solution and incubated for ten minutes and observed for fungal elements. KOH mount preparation showed branching, septate hyphae under high power magnification (400X). SDA slants, after one week of incubation, both slants had shown fungal colonies. Colonies were cotton woolly, flat and white producing aerial mycelium with a pinkish centre (Figure 2) and turned purplish pink on prolonged incubation. Lactphenol cotton blue (LPCB) mount showed hyaline, branched septate hyphae, branched conidiophores and boat shaped macroconidia. Slide culture showed three to five septate, fusiform, cylindrical, curved macro-conidia (Figures 3 & 4). No microconidia were seen. Therefore, on the basis of KOH mount, colony morphology, microscopic picture on LPCB and slide culture, it was identified as Fusarium species (SOP - ICMR) [9].

Figure 2: Fungal growth on Sabouraud dextrose agar (SDA).

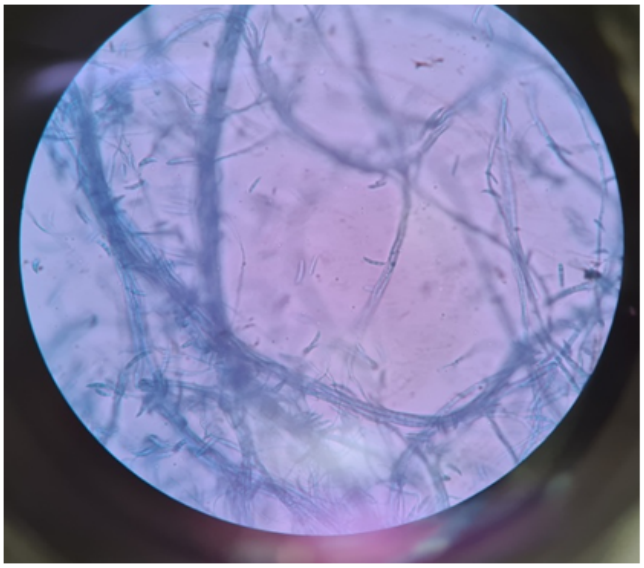

Figure 3: Branched conidiophores with boat shaped macroconidia.

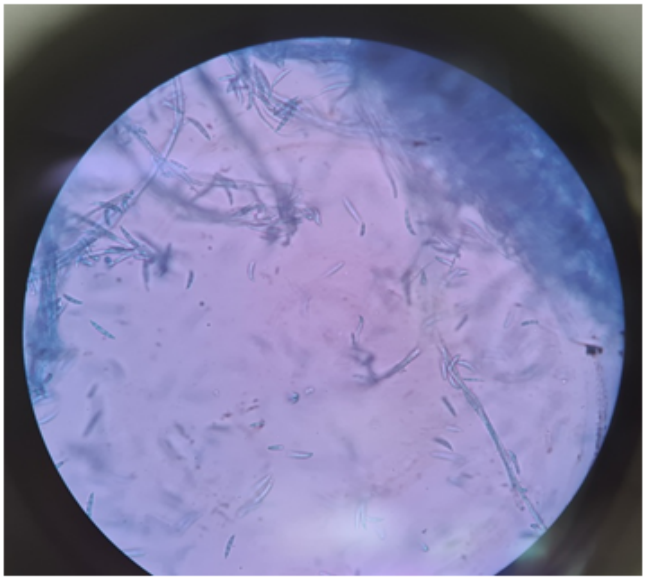

Figure 4: Lacto-Phenol Cotton Blue microscopy (400X) showing three to five septate, fusiform, cylindrical curved macroconidia.

Treatment: The patient was started on IV Amphotericin B emulsion in a dose of 5mg/kg body weight/ day for 2 weeks, Tab Posaconazole 300mg, one tablet twice a day on first day as loading dose followed by 300mg 1 tablet once daily along with nasal decongestants, alkaline nasal douching and other medical treatment as suggested by treating physician and nephrologist for covid 19 pneumonia and sepsis. There was drastic improvement in the general condition along with recovery of sensorium of the patient with combined surgical and medical management.

Repeat CT scan and MRI study was suggestive of post-operative changes of FESS with no new involvement or regrowth of fungus in the sinuses. The patient was discharged after covid 19 treatment was completed and tested negative for covid 19 infection with oral Posaconazole, medications for post covid care, strict blood sugar control and alkaline nasal douching and is on serial follow up. The patient is symptomatically doing well after 2 months of discharge and ongoing anti-fungal treatment. Due to paucity in availability of Posaconazole, patient was shifted to oral voriconazole.

Discussion

Fungal sinusitis is one of the otolaryngology diseases which is on a higher prevalence. Depending on the type of fungus, patient's immune status, it can be allergic, non-invasive or invasive variant with acute or chronic course. A variety of fungus species have been isolated in fungal CRS cases including Aspergillus, Alternaria, and Fusarium, which can

produce infection and toxin-related diseases. Fusarium genus is seen predominantly in soil and dead debris in environment and frequently causes disease in plants such as crown rot, head blight, and scab on cereal grains [10], and they may occasionally cause infection in animals [11]. In humans, Fusarium species cause a broad spectrum of infections, including superficial (such as keratitis and onychomycosis), locally invasive, or disseminated infections, with the last occurring almost exclusively in severely immunocompromised patients [12]. Fusarium species may also cause allergic diseases (sinusitis) in immunocompetent individuals [13] and mycotoxicosis in humans and animals following ingestion of food contaminated by toxin-producing Fusarium species. The most common isolated Fusarium from clinical specimens is Fusarium solani, followed by Fusarium oxysporum and Fusarium moniliforme. This genus of mold produces various characteristic diffusible pigments. The microscopic examination of the fungi reveals narrow septate hyphae with acute angle branching which are indistinguishable for Aspergillus genus. Fusarium produces fusiform septate macroconidia and microconidia, hence the name. Similar findings were seen in our case and hence, diagnosis of fusarium sinusitis was established. The mortality rate with Fusarial infection ranges from 50 to 80%. In the immunocompromised host, disseminated disease may follow a superficial localized infection through lymphatic and/or haematological spreading because of the strong propensity of Fusarium for vascular invasion, thrombosis, and tissue necrosis.

With the global pandemic Covid 19, mucor mycosis in otolaryngology became an evolving pandemic due to immunocompromised status, high dose steroid treatment, increased oxygen usage (both in days and in flow rates) in hospital settings, deranged and uncontrolled blood glucose level, compromised kidney function. Being one of the apex covid 19 tertiary level hospitals, we too had many cases and established a mucor mycosis protocol. The patient described had checked for all high-risk factors for mucor with altered mental status (no evidence of cavernous sinus thrombosis on imaging or clinical findings) and thus, underwent endoscopic debridement. Intra-operative no blackish necrotic tissue was seen, rather fungal debris were seen in sinuses. These were sent for microbiology laboratory for species identification. On reporting of fusarium species, literature was read up and treatment started with iv amphotericin B and Posaconazole. Patient condition started improving and once treatment was completed for covid 19 pneumonia, patient was discharged on oral anti-fungal treatment and is on regular follow up. Very few cases are available have been reported regarding Fusarial fungal sinusitis. Kurien M, et al. from India [14], Pino Rivero V, et al. [15] and Macedo DPC, et al. [16] have reported cases of rhinosinusitis caused by Fusarium species. Rajmane VS, et al. [17] has described a Fusarial fungal sinusitis with cavernous sinus thrombosis in an immune-compromised patient. Our case is a very rare case of non-invasive fusarium sinusitis in an immunocompromised patient. Hence, we have reported this case. Also, fusarium species need to be kept in mind while investigating fungal sinusitis especially in covid 19 and post covid 19 sequelae.

Ethical Approval

Ethical approval from the hospital's ethical committee has been taken.

Informed Consent

Written informed consent from the patient has been taken explaining the rarity of disease, the need to publish the case. Also, the patient was assured that no images, pictures or any information revealing the patient's identity will be published.

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