A case of fungus ball type pansinusitis caused by *Schizophillum commune*

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ABSTRACT

*Schizophillum commune* has been increasingly reported from allergic bronchopulmonary mycosis (ABPM) as well as fungus ball, brain abscess and several cases of maxillary or allergic fungal sinusitis. In the present study, we reported a case of fungus ball type pansinusitis from a 32-year-old woman in Iran. According to computerized tomography (CT) scan, fungus ball type pan-sinusitis was likely to be the first diagnosis. Mycological examination revealed hyaline hyphae with small projection and also clamp connection structures on PDA medium. To identify the obtained isolate properly, molecular analysis of the internal transcribed spacer region was performed and indicated that the causing agent of the infection is surely *Schizophillum commune*. The patient completely recovered after surgical endoscopic operation and consequent post-operation MRI revealed clearance of sinuses.

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1. Introduction

*Schizophillum commune* (*S. commune*) is one of the most widely distributed fungi in nature and belongs to the Order Agaricales containing fungi which colloquially known as mushrooms. This fungus is ubiquitous in nature and often found on dead and decaying materials [1]. However, it has been known as a human pathogen since 1950 when Kligman reported it from a case of onychomycosis [2,3].

Several species of fungi have been documented to be responsible for causing both acute and chronic rhinosinusitis, such as the members of the genuses; *Aspergillus*, *Pencillium*, *Alternaria* and *Mucor* [4,5]. In addition, the species *S. commune* is a rare basidiomycetous fungus and reported as a causative agent of allergic fungal rhino-sinusitis (AFRS), invasive type of fungal sinusitis as well as allergic bronchopulmonary mycosis (ABPM) [6]. This fungus has also been reported from cases suspected of onychomycosis and basidio-neuromycosis [2,3]. Besides, other *S. commune*-associated diseases such as fungus ball in the lung [7], ulcerative lesion of the hard palate [8], brain abscess [9], and maxillary as well as allergic fungal sinusitis have been described by far [7,10–14]. In the present study, we have reported a case of fungus ball type pansinusitis from a 32-year-old woman in Iran.

2. Case

On June 2011 a 32-year old woman referred to otolaryngologist with a history of frontal 6-month headache, nasal obstruction, and mucopurulent nasal discharge (Day 0). However, there was no abnormal finding in the first routine examinations. She had a history of head trauma in the age of 14 and underwent a long period of antibiotic therapy. While taking this medication, she was feeling very severe pain on the posterior aspect of her right orbit. Despite this medication, the symptoms were not resolved and a proptosis was gradually formed on the same side. The characteristic of computed tomography (CT) scan finding included a diffuse soft tissue density in right ethmoidal sinuses as well as obstruction of osteomeatal complex (OMC) at the same side (Day 4). Diffuse hyper dens materials involved most of sinus cavity which indicate the fungus ball type; pansinusitis, as the early diagnosis (Fig. 1). Surgical endoscopic operation performed in such a way that the whole mentioned sinuses were opened and
cleaned transnasally. The obtained specimens were subjected to direct examination as well as culture and histopathologic evaluation. Post-operation MRI revealed clearance of right side sinuses (Fig. 2), which could be seen, post operatively, in multiple endoscopic examinations (Day 56).

The biopsied tissue was submitted to laboratory for mycological as well as histopathological examination (Day 14). Direct examination with KOH (10%) revealed thin hyaline septate hyphae (Fig. 3a). Some portions of tissue samples were inoculated both on multi points of Sabouraud Dextrose Agar (biolife, Italy) supplemented with chloramphenicol (0.5 μg/ml) and on Brain Heart Infusion Agar (Merck, Germany) and incubated at 30 °C. After 6 days, a white woolly colony with compact appearance was obtained (Day 20). Microscopically features revealed the presence of hyaline, septate, and branched hyphae which varied in widths. Due to the presence of sterile filaments and lack of specific structures in early stage of identification, the newly obtained isolate was grown on potato dextrose agar (PDA) (Difco, USA) as well as czapekdox agar (CDA) (Difco, USA) for induction of sporulation (Day 20). The culture media were then incubated at 30 °C in different environmental condition (dark, light and UV exposure). No sporulation yielded from the applied media.

Fig. 1. Coronal CT-scan of paranasal sinuses of the patient. Unilateral involvement and expansion of frontal, anterior and posterior ethmoid as well as maxillary sinuses with space occupying mass including inflammatory polyp and fungal material are observed.

Fig. 2. Axial & Coronal MRI of paranasal sinuses after six weeks post-operation. There is some mucosal edema in ethmoid and maxillary sinus.
However, microscopic investigation revealed some hyphae with small projection in PDA medium. In addition, there was also clamp connection structures observed along with mycelia. Besides, some cup-shaped fruiting bodies were developed in the mentioned medium (Fig. 3b and Fig. 4). Based on described morphological features, the obtained isolate seemed to be a member of Basidiomycetes fungi. Moreover, pathological staining such as hematoxylin and eosin (H&E) and Periodic Acid Schiff (PAS) revealed an inflammation consisting of mixed inflammatory cells and hyphae structures in involved tissue (Day 21) (Fig. 5). To perform molecular investigation, the isolate was grown (Day 20) on 4% Sabouraud dextrose agar plates for 10 days and fungal DNA was extracted using a conical grinder according to the previously described protocol (Day 30) [15]. Primers ITS1-F (5'-TCCGTAGGTGAACCTGCGG-3') as forward and ITS4-R (5'-TCCTCCGCTATTGATATGC-3') as reverse were designed on the basis of the sequence of the rDNA regions. Polymerase chain reaction (PCR) was carried out in a thermal cycler (PeQLab, Germany) with the following temperature profile: 1 cycle of 5 min denaturation at 94 °C; 35 cycles of 45 s denaturation at 94 °C, primer annealing 45 s at 54 °C, primer extension 1.5 min at 72 °C; Final 10 min extension at 72 °C. Each amplification products was loaded onto 1% agarose gel and run in TBE buffer at 80 V for 1 h. The products were detected by staining with ethidium bromide (0.5 μg/ml) and photographed. A single banding pattern with approximate size of 580-base pairs has been visualized after performing electrophoresis. The PCR product was then directly subjected for DNA sequencing. The obtained sequences were analyzed in GenBank database and revealed high identity with *Schizophyllum commune*.

The obtained Nucleotide a sequence of this strain has been submitted to the National Centre for Biotechnology Information GenBank and is available for public access under the accession number: JQ993416.

### 3. Discussion

Although fungal rhinosinusitis have been considered as a rare disorder, in recent years, the frequency of recognition and reports of these disorders are increasing worldwide [16]. Since many years, non-invasive fungal rhinosinusitis has been divided into fungus ball and allergic fungal rhinosinusitis [17]. In this regard, *S. commune* was an infrequent pathogenic agent for fungal sinusitis. Nevertheless, respiratory tract is the major target to be involved with *S. commune*. Thirty one percent of all reported respiratory cases due to *S. commune* are mentioned as sinusitis [3]. Concerning the country distribution, Japan is on the top of the list with 46% of the mentioned cases, followed by Iran (10%), USA (9%), and a lower prevalence of 1.4–6% for the other countries [3]. Seven pulmonary mycoses cases due to *S. commune* were reported from Iran [18]. However, these reported cases were described as other forms of pulmonary mycoses except from sinusitis [3].
Fungus ball is usually reported from immunocompetent patients with a history of surgery or atopy [16]. In the present study, the mentioned patient neither was atopic nor underwent a surgery. However, as unspecific treatment, she was prescribed with different kinds of antibiotics in order to recover her nasal discharge and constant headache. Due to the few reported cases of sinusitis caused by this fungus, the optimal treatment for infections caused by *S. commune* is not well established. It is difficult to determine the definite therapy. Some cases indicated the effectiveness of surgical procedure; while others reported the effectiveness of combination of surgery with applying antifungal agents such as amphotericin B or fluconazole [14,19]. However, the patient mentioned here completely recovered after surgery, so that no fungal elements were observed in post-operation MRI without taking antifungal medication.

Conflict of interest

There are none.

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References