Basidiobolus omanensis, an emerging pathogen to watch out for?

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Introduction: Basidiobolus species can be found in amphibian, reptile, lizard, insectivorous bat, and soil, as well as decaying vegetables, and fruits. Basidiobolus species infect both adults and children, with the majority of cases reported from the Middle East, including Oman. Basidiobolomyces is a chronic subcutaneous infection of the trunk and limbs that typically transforms to subcutaneous or gastrointestinal lesions with only a few cases of systemic involvement. Basidiobolus haptosporus, B. heterosporus, B. magnus, B. microsporus, B. omanensis and B. ranarum are the seven species in the genus Basidiobolus. Four of these species have been linked to gastrointestinal infections in humans. Basidiobolus ranarum is the most commonly reported species from humans, followed by B. omanensis. We recently described B. omanensis as a novel species from a patient in Oman. It was isolated from a boy with type 1 diabetes who died as a result of basidiobolomyces complications. Four more fatal human cases have been documented since then (unpublished data), but little is known about its role as a pathogen in humans.

Objective: The goal of this paper is to present four cases of basidiobolomyces caused by B. omanensis in young children and adults, each with unique diagnostic and treatment challenges.

Methods: We collected four cases of basidiobolomyces caused by B. omanensis from various tertiary hospitals in Oman. All identifications were based on ribosomal DNA gene sequencing of the internal transcribed spacers (ITS) and partial large subunit (LSU). The CLSI method was used for testing the antifungal drug susceptibility in vivo.
Background: We present four new cases of Basidiobolus infection in humans (two from children and two from adult). The underlying condition, site of infection, clinical presentation, treatment, and outcomes are all summarized in Table 1. Basidiobolus omanensis strains isolated from these cases were molecularly identified using ITS and LSU gene sequencing. The minimum inhibitory concentration (MIC) for amphotericin B (AMB) is 1 μg/ml, voriconazole (VRC) is 1 μg/ml, itraconazole (ITC), posaconazole (PSC), and voriconazole (VRC) is > 16 μg/ml respectively. These were the first cases of the fungus B. omanensis ever diagnosed globally at various hospitals in Oman. All of the cases presented diagnostic and treatment challenges. Despite the atypical nature of the disease, clinical response was obtained following surgical excision and antifungal treatment, and the mortality rate among the four cases was 10%.

Conclusion: This new species may cause problems with identification and antifungal susceptibility, which is why clinicians should be aware of infections with uncommon mold species and consider DNA sequencing for confirmation. Any fungus can cause infection in an immunocompromised host and should never be dismissed as a contaminant out of hand.

### Table 1. Basidiobolus omanensis infections in 4 patients (Adult & pediatric) including underlying condition, site of infection, clinical presentation, treatment, and outcome.

| Patient | Age | Sex | Underlying conditions | Site of infection | Surgery | Positive culture | Positive biopsy | Antifungal susceptibility (MIC) | Antifungal Treatments |
|---------|-----|-----|-----------------------|------------------|---------|-----------------|----------------|-------------------------------|----------------------|
| 1       | 20y | M   | IBD, diabetes mellitus | Pelvic/ileum/hepatic lesions | Yes     | Yes             | Yes            | AMB: 1 μg/ml, ITC: 16 μg/ml, VRC: 16 μg/ml | Liposomal amphotericin B/itraconazole/voriconazole |
| 2       | 3y  | M   | Acute lymphoblastic leukaemia | Skin/intracranial lesion | Yes     | Yes             | No             | AMB: 1 μg/ml, ITC: 16 μg/ml, VRC: 16 μg/ml | Liposomal amphotericin B/itraconazole/voriconazole |
| 3       | 12y | M   | No underlying diseases | No site noted | No      | Yes             | Yes            | AMB: 1 μg/ml, ITC: 16 μg/ml, VRC: 16 μg/ml | Liposomal amphotericin B/itraconazole/voriconazole |
| 4       | 21y | M   | Pneumonia/hypertension | ileum, cecum and ascending colon | Yes     | Yes             | No             | AMB: 1 μg/ml, ITC: 16 μg/ml, VRC: 16 μg/ml | Liposomal amphotericin B/itraconazole/voriconazole |

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Successful treatment of breakthrough invasive aspergillosis in an immunocompetent individual based on therapeutic drug monitoring: A case report

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Background: Invasive aspergillosis (IA) is an opportunistic fungal infection in immunocompromised patients with high mortality. Aspergillus flavus is the second pathogen of IA. Breakthrough IA was defined as any IA occurring during exposure to an antifungal drug.

Case presentation: A 22-year-old female college student was admitted severely unwell with dizziness and left limb weakness. She was healthy previously and did not take any medication. Magnetic resonance imaging showed a right intracranial space-occupying lesion. The postoperative pathological and morphological examinations suggested Aspergillus flavus. The anti-fungal medication, voriconazole, was administered immediately. Unfortunately, her condition deteriorated, and the intracranial area was observed to have increased after 1 month of antifungal treatment. The emergency craniotomy revealed a large amount of pus and the culture of pus confirmed Aspergillus flavus. Antifungal regimen was changed by infectious disease specialists, and drug concentration was monitored continuously. This patient received antifungal treatment for 2 years. No recurrence was observed after 6 months of antifungal drug withdrawal, and she can take care of herself.

See Figures below.

Conclusion: Breakthrough IA occurs in patients who lack high-risk factors, making diagnosis more difficult and leading to a higher risk of mortality. Therapeutic drug monitoring is crucial for therapeutic success. Meanwhile, multidisciplinary therapeutics can improve the survival rate.