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Case Report

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Respiratory Infection with Saccharomyces Cerevisiae: A Report of 2 Cases Infection Respiratoire A Saccharomyces Cerevisiae: Rapport de 2 Cas

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ABSTRACT

Introduction: Saccharomyces cerevisiae (S. cerevisiae) is a ubiquitous yeast widely used in the food and pharmaceutical industries. Although its involvement in human pathology is rare, it is increasingly recognized as an emerging opportunistic pathogen. The main risk factors include immunosuppression and the presence of intravascular devices. While fungemia is the most common manifestation, infections affecting other sites, particularly the respiratory tract, remain exceptional.

Case Presentation: We report two cases of invasive infections caused by S. cerevisiae diagnosed at the Parasitology-Mycology Department of CHU Hassan II Fès. Both patients presented with known risk factors, including immunosuppressive conditions. Clinical manifestations and microbiological results confirmed the involvement of S. cerevisiae, highlighting its pathogenic potential in unusual sites such as the respiratory tract.

Conclusion: These cases illustrate the importance of considering S. cerevisiae as a potential opportunistic pathogen, even in rare locations like respiratory infections. Better recognition of these infections may enable appropriate management, especially in at-risk patients.

Keywords: Microbiological Diagnosis, Opportunistic Fungal Infections, Intensive Care

Introduction

Respiratory infections caused by yeasts are relatively rare, especially when they involve non-pathogenic species. Saccharomyces cerevisiae (S.cerevisiae) is an occasional commensal yeast of the digestive and respiratory tracts and ubiquitous in plants, fruits, and soils. S.cerevisiae is also widely used in industry for the production of food and beverages and as a nutritional supplement [1] and probiotic, particularly for certain strains of S. cerevisiae var boulardii [2,3]. However, in immunocompromised individuals, this yeast can be implicated in various deep mycoses, whose incidence has significantly increased in recent decades due to the excessive use of broad-spectrum antibiotics and other drugs, which can also contribute to immunosuppression [4].

We reported two cases of respiratory infections caused by S. cerevisiae in two patients hospitalized in an intensive care unit (ICU).

Case Reports

Case 1: a 40-year-old male patient with a history of a digestive infection episode characterized by vomiting and diarrhea, treated with undocumented medication, was initially admitted for paresthesia and progressive muscle weakness that evolved into flaccid paralysis of both lower limbs, then extending to the upper limbs and thorax, leading to acute respiratory failure. Due to this worsening, the patient was first intubated, and additional examinations (computed tomography (CT) scan and lumbar puncture) were performed, revealing no particularities. Subsequently, a tracheostomy was performed, and the patient was transferred to ICU. The progression was marked by the appearance of febrile peaks with thick, whitish bronchial

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secretions in large quantities, leading to respiratory tract sampling (Protected Distal Sampling PDS).

Case 2: a 39-year-old female patient was admitted for the management of chronic right otitis media complicated by mastoid osteitis causing a right temporal abscess complicated by ventriculitis. The patient underwent evacuation of the purulent fluid with broad-spectrum antibiotic therapy (including ceftriaxone, metronidazole, vancomycin) and was then transferred to the ICU for further management. The progression was marked by the worsening of her clinical and biological condition, necessitating a change of central line and removal of the arterial line. Neurologically, after sedation was stopped, the patient showed signs of awakening with spontaneous eye opening and response to stimuli. A few hours later, her respiratory condition worsened, necessitating a tracheostomy. The progression was marked by the appearance of copious mucopurulent bronchial secretions, necessitating respiratory sampling (PDS).

Mycological study of PDS

The samples received at the Parasitology Department were suspended in a small amount of saline solution, vortexed, then used for mycological study, including direct examination and culture. Direct examination revealed the presence of yeast with pseudohyphae in both samples (Figure 1). Cultures were performed on Sabouraud simple, Sabouraud chloramphenicol (SC), and Sabouraud actidione (SA) media. Incubation was done in an incubator at 37°C and 27°C. Two days later, creamy, smooth, and whitish colonies appeared on all three media for both samples (Figure 2). Identification was carried out first by filamentation test, which was negative, followed by the use of biochemical galleries (AUXACOLOR TM 2*), a sugar assimilation-based identification system (Figure 3). After 48 hours of incubation, the code obtained corresponded to S. cerevisiae, identified as responsible for the pulmonary infection in both patients. The first patient was successfully treated with fluconazole for 10 days, resulting in significant improvement. However, the second patient died before receiving the treatment.

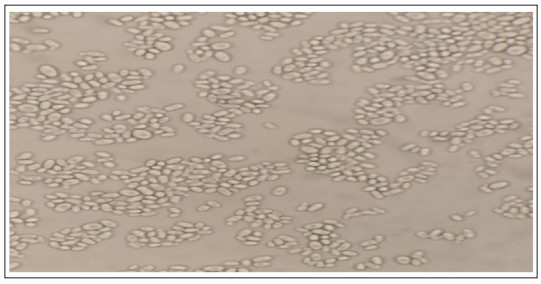

Figure 1: Direct examination showing yeast and pseudofilaments.

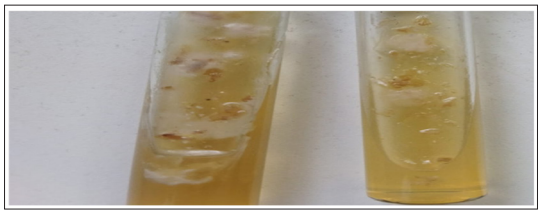

Figure 2: Macroscopic appearance of Saccharomyces cerevisiae (S. cerevisiae) colonies.

Figure 3: Biochemical identification of S. cerevisiae. By the gallery AUXACOLOR TM 2*

Discussion

These cases highlight the potential of S. cerevisiae to act as an opportunistic pathogen, even in uncommon sites such as the respiratory tract. S. cerevisiae is an ascomycete fungus that can be a commensal of the urogenital, digestive, and respiratory tracts, especially after probiotic treatment [5]. However, certain strains of this species can be present in the environment as saprophytes and have pathogenic potential regardless of the host's immune status, including those used as probiotics [6]. The mechanisms that allow S. cerevisiae to transition from a benign state to pathogenicity, as well as its precise role in these infections, remain poorly understood [7].

Infections caused by S. cerevisiae mainly occur in patients with risk factors that favor yeast dissemination, such as immunodeficiency, diabetes mellitus, corticosteroid therapy, chemotherapy, neoplasms, the presence of intravascular devices, antibiotic therapy, abdominal surgery, or prolonged stays in intensive care [5, 8]. Both patients in our study presented at least two risk factors for S. cerevisiae infection: one was diabetic, and the second had been in ICU for over three months with prolonged use of broad-spectrum antibiotics for both. The route of contamination for both patients is likely from colonization, but there are also cases of exogenous transmission during invasive procedures such as intubation or airborne through the use of masks, or by manual handling [8].

The first documented case of Saccharomyces cerevisiae infection dates back to 1970, in a patient with a mitral valve prosthesis who subsequently developed fungal septicemia and a fungal endocarditis caused by Saccharomyces [9]. In Morocco, the first reported case involved a 77-year-old patient suffering from postoperative septic shock following surgery for stenosing metastatic gastric adenocarcinoma with peritoneal carcinomatosis. S. cerevisiae was isolated from the blood and urine, confirming invasive infection [8]. Similar cases have been reported worldwide, including cases of pneumonia and septicemia, often in patients with risk factors such as prolonged hospitalization and prior use of antibiotics [10]. To the best of the authors' knowledge, these are the first reported cases in Morocco of respiratory infection with S. cerevisiae.

Over the past few decades, there has been a significant increase in the number of reported cases since the first documented case in 1970 [8,10], primarily due to the expansion of the group of patients at risk for opportunistic infections since the 1980s with the global human immunodeficiency virus (HIV) epidemic. This situation has allowed colonizing and ubiquitous fungi to become pathogens, contributing to a notable increase in associated morbidity and mortality [11].

Medical advancements in recent years have improved prevention. The use of this probiotic should be evaluated for each patient, as many cases of fungemia associated with S. cerevisiae var. boulardii have been reported in the literature. Special attention should be paid to immunocompromised patients or those exposed to predisposing factors. For instance, Henry et al. presented the case of a 65-year-old man who developed fungemia with S. cerevisiae after undergoing chemotherapy and treatment for diarrhea with oral probiotics of S. cerevisiae var. boulardii. The latter could pass from the gastrointestinal tract into the bloodstream and cause fungemia. However, we should not overlook immunocompetent patients but with cardiac problems subjected to implant grafts [12]. The most common clinical form is fungal sepsis, but other localizations can be found, and respiratory infections are exceptional [11].

Diagnosis is based on clinical signs, the patient's context, and the isolation of the yeast, with rapid identification through auxanogram or molecular biology [5, 7]. The treatment of choice is often based on amphotericin B or flucytosine, although azoles such as fluconazole may also be effective. The prognosis for S. cerevisiae infections often remains uncertain due to the patient's compromised health status. Mortality can reach 50%, but death is generally attributed to underlying conditions rather than the yeast infection itself [11]. In our study, one out of two patients died before being able to receive treatment.

Study limitations

The death of one patient before the initiation of treatment limited the ability to assess the effectiveness of therapeutic interventions.

The diagnosis was based solely on biochemical methods, and the absence of molecular confirmation by PCR reduces the robustness of the results.

Conclusion

Infections with S. cerevisiae are often underestimated and can cause serious illness in immunocompromised patients. Severe infections have been reported in contexts such as severe immunosuppression, prolonged hospitalizations, prior antibiotic treatments, and/or the presence of prosthetic heart valves. The isolation of S. cerevisiae in an immunocompromised patient should raise suspicion of a significant infection. However, as this yeast can also colonize these patients saprophytically, pathological confirmation is essential to establish a definitive diagnosis.

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