The first Croatian pediatric patient with *Geotrichum capitatum* respiratory infection

Prvi hrvatski pedijatrijski bolesnik s *Geotrichum capitatum* respiratornom infekcijom

**Joško MARKIĆ**\(^1,3\)
**Branka POLIĆ**\(^1\)
**Tanja KOVACIĆ**\(^1\)
**Daniela VELJANČIĆ**\(^1\)
**Ivana GOIĆ-BARIŠIĆ**\(^2,3\)
**Marija TONKIĆ**\(^2,3\)

\(^1\)University Hospital of Split, Department of Pediatrics, Spinciceva 1, 21000 Split, Croatia
\(^2\)University Hospital of Split, Department of Clinical Microbiology, Spinciceva 1, 21000 Split, Croatia
\(^3\)University of Split, School of Medicine, Soltanska 2, 21000 Split, Croatia

**Key words**
*Geotrichum capitatum*
pneumonia
 treatment
invasive fungal infection

**Case report**

*Geotrichum capitatum* can cause infections in humans and its importance has recently been recognized in patients with immunosuppressive conditions. In this report we present the first Croatian pediatric patient with pneumonia in whom *G. capitatum* was isolated in three sequential bronchoalveolar lavage and tracheal aspiration specimens.

**Introduction**

*Geotrichum capitatum* is a filamentous yeast-like fungus formerly known as *Trichosporon capitatum* or *Blastoschizomyces capitatus*. Although it can be a part of the normal microbiota it can also cause both superficial and invasive infections in humans [1, 2]. It forms creamy, wrinkled colonies that grow on conventional media such as Sabouraud dextrose agar [1]. It is occasionally encountered in clinical laboratories and its importance as systemic pathogen has recently been recognized in patients with immunosuppressive conditions [3]. Studies have shown that there is a significantly higher frequency of infections caused by *G. capitatum* in Europe, with majority of them occurring in Italy, Spain, and France [4]. Since most cases were located in central and southern Europe, it seems that the epidemiology of *G. capitatum* infections could be influenced by climatic factors. The mortality in patients with *G. capitatum* infections is high (60 %) [5].

In this report we present, to our knowledge, the first pediatric patient from Croatia in whom the *Geotrichum capitatum* was isolated in three sequential bronchoalveolar lavage and tracheal aspiration specimens.
Case report

A 6-year-old boy was referred to the University Hospital of Split with a two and a half week intermittent fever duration. He was born after an uneventful pregnancy and soon after the birth was diagnosed with multimalformation syndrome (frontal bossing, low posterior hairline, dysplastic ears, flat nasal bridge, gingival hypertrophy, irregular dentition, high-arched palate) and early epileptic encephalopathy (seizures with delayed psychomotor development – unable to walk, minimal visual contact, severe speech impairment). His previous hospitalization in our Department was a year before due to pneumonia and respiratory insufficiency. During that hospitalization he was mechanically ventilated for 9 days. He was discharged home with his regular anticonvulsive therapy and the parents were educated to administer noninvasive ventilatory support. His present illness started 17 days prior to hospitalization with fever and upper respiratory tract infection symptoms. The boy was examined by his primary care physician who prescribed amoxicillin oral suspension. After eight days of antimicrobial treatment his condition improved. However, three days before the hospital admission he became febrile up to 40.0 °C with increased respiratory effort. He was clinically reexamined by his primary care physician the day later. Laboratory blood tests were done (L 14.5 G/L, CRP 67.0 mg/L) and ce-
and Candida albicans were confirmed in BAL and fluconazol was administered. BAL specimens were cultured on blood agar, Sabouraud agar (Merck KgaA, Darmstadt, Germany) and CHROMagar Candida (CHROMagar Orientation, Paris, France). After 24 hours of incubation on two temperature conditions (25 °C and 36 °C) two types of colonies were revealed. The total number of growing colonies was > 10^5 colony forming units (CFU)/ml of BAL. On the CHROMagar Candida media green colonies of Candida albicans were positive in germ tube formation, confirming Candida albicans identification. On the Sabouraud agar different type of cream coloured dry and wrinkled colonies were observed. These colonies showed no germ tube formation. Microscopic view and microcultivations on cornmeal agar (25 °C and 35 °C) revealed abundant thin, septate filaments with multiple rectangular arthroconidia and the absence of blastoconidia and chlamydospores. The isolate was identified as G. capitatum according to the biochemical patterns obtained by the VITEK 2 System (bioMerieux, Marcy-l’Etoile, France) using YST card. Gradually, his condition improved and inotropic support was discontinued. Candida albicans and Geotrichum capitatum were again isolated in the second BAL taken two days later. Therefore, fluconazol was replaced with intravenous amphotericin B and voriconazole. At the same time, coagulase negative Staphylococcus sp. was isolated from the blood culture and teicoplanin was administered as well. The patient’s condition continued to improve but we were not able to wean him of the mechanical ventilation. By the end of the second week of treatment he again became hemodynamically unstable with symptoms and laboratory signs (L 15.7 × 10^9/L; CRP 299.4 mg/L; procalcitonin 3.95 ng/mL) of sepsis requiring inotropic support. Eight days after initiation of amphotericin B and voriconazole treatment, G. capitatum was isolated again, this time from tracheal aspirate specimen. Blood culture was sterile. Amikacin and micafungin were added to the treatment regime. However, his condition continued to deteriorate with further increase of inflammatory biomarkers (CRP 377.1 mg/L, procalcitonin 81.65 ng/mL). Despite all intensive treatment and therapy, on the 18th day, he developed bradycardia leading to asystole and death.

Discussion

In this report we describe the first Croatian pediatric non-hematologic patient with pulmonary infection caused by Geotrichum capitatum. Prior to hospitalization the patient was treated with oral antibiotics and admitted to PICU requiring mechanical ventilation and intensive treatment.

Fungi are part of normal microbiota and some of them are considered nonpathogenic. However, they can cause systemic infections in patients that are severely immunocompromised due to illness or therapy with immunosuppressive drugs [6]. Most fungal infections are caused by Candida spp., but the frequency of other rare molds and unusual yeasts is increasing. Risk factors for fungal infections include hospitalization in ICU, prolonged therapy with broad-spectrum antibiotics and steroids, central venous catheter, total parenteral nutrition, neutropenia and previous colonisation [6, 7, 8].

Geotrichum capitatum has emerged as a fungal pathogen in recent years. Invasive fungal infections caused by this agent are often characterized by a multiorgan involvement with a fatal course despite antifungal therapy. Numerous studies have shown increased occurrence of Geotrichum capitatum infection in patients with impaired immune response to infection [3, 4, 9]. In a study that involved 353 immunocompromised patients over a 37 months period, colonisation and infection by G. capitatum was found in 3.7% of them [3]. Most of the studies published so far have described the infection caused by G. capitatum in adult patients, but some of them also described infection with this pathogen in immunocompromised children [9, 10]. Infection is also possible in immunocompetent patients. Usually it will affect middle to older-aged males with underlying lung pathology (chronic obstructive pulmonary disease, tuberculosis) or with risk factors like smoking or previous transplantation [11].

The pulmonary localization is commonly reported in G. capitatum septicemia and the radiological signs resemble those found in invasive pulmonary aspergillosis [4].

In our patient, laboratory and clinical signs strongly suggest that G. capitatum and C. albicans were cause of respiratory tract infection. They were not isolated from blood cultures. Since the susceptibility testing of G. capitatum has not yet been established due to the absence of breakpoints, the treatment of these infections is based on empirical therapy according to limited available literature data.

Currently, there are no official guidelines concerning the most effective antifungal therapy for G. capitatum infection. The therapy with azoles is widely used as effective in the treatment of yeast infections. It is also suggested that azoles should be used as first-line agents in patients like ours [11]. However, our initial antimicotic therapy with fluconazol seemed to be inefficient. This may be due to resistance or decreased susceptibility of G. capitatum to fluconazol. Therefore, fluconazol was replaced with voriconazol and amphotericin B combination therapy. Based on limited clinical data available, amphotericin B and voriconazol are also recommended to be used, alone or in combination. Same authors reported poor susceptibility of some strains to flucytosine, fluconazol and itraconazol [4]. However, in our patient, this combination therapy eradicated C. albicans, but G. capitatum remained positive in tracheal aspiration specimen. There-
fore, further studies evaluating optimal treatment, dosage and duration of therapy are warranted. It may be possible that failure of antifungal treatment, combined with other factors, such as underlying diseases, hospitalization in PICU and concomitant bacterial sepsis, could be the reasons for undesirable outcome.

A retrospective study and review published in 2005 has shown that the majority of infections caused by *G. capitatum* occurred in Europe, mostly in the Mediterranean area to which Croatia belongs [4]. Therefore, physicians practicing in this area have to consider *G. capitatum* as a possible cause of infection if an immunocompromised or even immunocompetent patient shows signs of persistent infection despite the broad spectrum antibacterial therapy.

Although this is, to our knowledge, the first described case of *G. capitatum* infection in a pediatric patient from Croatia, pediatricians should take into consideration this filamentous yeast-like fungus as a possible cause of infection as well.

**Conflict of interest**

The authors declare no conflict of interest.

**References**


