

Fungemia caused by *Pichia kluyveri*: An uncommon yeast infection

François De Greef¹, Marie-Pierre Hayette² and Camelia Rossi¹

1) Division of Infectious Disease, Centre Hospitalier Universitaire Ambroise Paré, Boulevard Kennedy 2, 7000 Mons, Belgium and 2) Department of Clinical Microbiology, Centre Hospitalier Universitaire de Liège, Domaine Universitaire, 4000 Liège, Belgium

Keywords: Catheter-related bloodstream infection, fungemia, *Pichia kluyveri*, uncommon yeast

Original Submission: 20 June 2022; **Revised Submission:** 18 July 2022; **Accepted:** 19 August 2022

Article published online: 29 August 2022

Corresponding author: François De Greef, Bd John Fitzgerald Kennedy 2, 7000, Mons, Belgium.
E-mail: francois.de.greef@ulb.be

Dear Editor,

In recent decades, the epidemiology of yeast infections has evolved rapidly, and non-*albicans* *Candida* species and other rare yeasts have emerged as major opportunistic pathogens, thereby becoming a growing concern [1]. *Pichia kluyveri* (*P. kluyveri*) is non-Saccharomyces yeast, which is widely found in nature and has been separated from fruits, such as grapes or peaches. In human medicine, *P. kluyveri* is poorly documented. This species has been identified in oral infections in cancer patients [2]. It is also being studied as a potential probiotic [3].

We are reporting on the case of a 38-year-old female patient was admitted to the infectious diseases department with isolated fever and asthenia for five days.

The patient's main medical history reports vascular Ehlers–Danlos syndrome (vEDS) and a history of right lower limb amputation performed for severe pains, a gastrostomy tube, and a suprapubic bladder catheter for severe digestive and bladder hypotonia.

The first time the patient was admitted to our hospital, two months before, was for abdominal pain and severe undernutrition for which a team of gastroenterologists decided on the implementation of a peripherally inserted central catheter (PICC line) for transient parenteral nutrition at home.

On admission, pyrexia at 39.5°C was noted. Blood pressure was 104/75 mmHg, heart rate 69 bpm, and peripheral saturation 96%. The clinical examination revealed a pale, listless, sweating, but awake and oriented patient. Diffuse abdominal tenderness was present on palpations associated with chronic constipation, and the skin around the PICC line appeared inflammatory. The anamnesis revealed manipulations of this catheter without rigorous asepsis. The rest of the physical examination did not show any other infectious focus.

Lab results revealed a white blood cell count of 1920/mm³ (neutrophil 1360/mm³, lymphocyte 380/mm³), hemoglobin 9.8 g/dL, platelet count 83,000/mm³, CRP 82.1 mg/L.

Repeated blood cultures taken from intact peripheral upper arm veins demonstrated the presence of *P. kluyveri*.

An abdominal CT scan with contrast, a urine analysis and a chest x-ray were performed and returned negative.

PICC line removal and cultivation revealed the presence of > 100 CFU of *P. kluyveri*, identified by MALDI-TOF mass spectrometry and which had already been isolated in blood cultures.

The patient was given a treatment of intravenous fluconazole which, after a few days, resulted in complete clinical improvement, with resolution of pyrexia and blood cultures coming back negative.

Then, a transesophageal echocardiogram was performed and showed no concern for the heart valves.

Furthermore, a PET scan was performed and did not reveal any secondary infectious foci. The *P. kluyveri* isolates were sent to the national reference center for mycoses (NRC mycoses) for *in vitro* susceptibility testing. The results were available after the patient's condition improved and revealed high MIC to fluconazole (128 mg/L). Echinocandins had the lowest MICs among the antifungals tested (anidulafungin <0.015 mg/L, caspofungin 0.03 mg/L). Amphotericin B and voriconazole showed a MIC of 0.25 mg/L and 0.5 mg/L, respectively.

The presence of a catheter, and total parenteral nutrition, are major risk factors for fungemia [4]. This is therefore the probable starting point for infection. However, *P. kluyveri* contamination of the PICC line could also be a consequence of the fungemia. Translocation of pathogens from the digestive tract could not be excluded.

In our patient, both antifungal therapy with fluconazole and early intravenous catheter removal were performed. The *in vitro* susceptibility testing of this rare yeast to antifungals had already been reported by Aslani et al. and Noni et al., with diverging results [2,5]. According to the study by Aslani et al., *P. kluyveri* showed low MICs to fluconazole, amphotericin B, and anidulafungin and a MIC at 4 mg/L to caspofungin [2]. In the study of Noni et al., the yeast showed resistance to

fluconazole (MIC at 64mg/L), while it showed low MICs to other antifungal agents [5]. In our case, the NRC Mycoses obtained results similar to Noni et al. It confirmed high MIC to fluconazole and low MICs to other antifungals. The favorable evolution with resolution of the *Pichia* fungemia would then have been independent of the antifungal agent used. It is indeed probable that this yeast is weakly pathogenic, and that, in our case, the removal of the catheter was sufficient to control the fungemia.

Beyond treatment, prevention is a priority, with the adequate management of risk factors which includes strict aseptic handling of catheters, especially central catheters, and their use limited to situations without alternatives [4].

Although there are guidelines for rare invasive yeast infections, *P. kluyveri* is currently not included [1]. Despite an increasing occurrence, uncommon yeast invasive infections remain poorly documented in the literature. Larger studies would be necessary in order to better identify these infections of increasing importance, as well as better define their characteristics and know how to appropriately manage them.

Transparency declaration

None.

References

- [1] Chen SC, Perfect J, Colombo AL, Cornely OA, Groll AH, Seidel D, Albus K, de Almedia Jr JN, Garcia-Effron G, Gilroy N, Lass-Flörl C, Ostrosky-Zeichner L, Pagano L, Papp T, Rautemaa-Richardson R, Sal-manton-García J, Spec A, Steinmann J, Arikan-Akdoglu S, Arenz DE, Sprute R, Duran-Graeff L, Freiburger T, Girmenia C, Harris M, Kanj SS, Roudbary M, Lortholary O, Meletiadis J, Segal E, Tuon FF, Wiederhold N, Bicanic T, Chander J, Chen YC, Hsueh PR, Ip M, Munoz P, Spriet I, Temfack E, Thompson L, Tortorano AM, Velegriaki A, Govender NP. Global guideline for the diagnosis and management of rare yeast infections: an initiative of the ECMM in cooperation with ISHAM and ASM [published correction appears in Lancet Infect Dis. 2021 Dec;21(12):e363]. Lancet Infect Dis 2021;21(12):e375–86.
- [2] Aslani N, Janababaei G, Abastabar M, Meis JF, Babaeian M, Khodavaisy S, Boekhout T, Badali H. Identification of uncommon oral yeasts from cancer patients by MALDI-TOF mass spectrometry. BMC Infect Dis 2018;18(1):24.
- [3] Splechtna B, Nguyen TH, Steinböck M, Kulbe KD, Lorenz W, Haltrich D. Production of prebiotic galacto-oligosaccharides from lactose using beta-galactosidases from *Lactobacillus reuteri*. J Agric Food Chem 2006;54(14):4999–5006.
- [4] Luzzati R, Cavinato S, Giangreco M, Granà G, Centonze S, Deiana ML, Biolo G, Barbone F. Peripheral and total parenteral nutrition as the strongest risk factors for nosocomial candidemia in elderly patients: a matched case-control study. Mycoses 2013;56(6):664–71.
- [5] Noni M, Stathi A, Velegriaki A, Malamati M, Kalampaliki A, Zachariadou L, Michos A. Rare invasive yeast infections in Greek neonates and children, a retrospective 12-year study. J Fungi (Basel) 2020;6(4):194.