Case report

**Candida famata mediastinitis. A rare complication of open heart surgery. Case report and brief review**

Alfredo Alonso Sanchez Betancourt\textsuperscript{a,*,} Pablo Sibaja Alvarez\textsuperscript{b,c}, Rolando Arguedas Camacho\textsuperscript{d}, Edward Guevara Espinoza\textsuperscript{e,f}

\textsuperscript{a} Universidad San Judas Tadeo, San Jose, Costa Rica
\textsuperscript{b} Surgical ICU, Hospital Mexico, Mexico
\textsuperscript{c} Universidad San Judas Tadeo, Costa Rica
\textsuperscript{d} Hospital Mexico, Mexico
\textsuperscript{e} Hospital Mexico, Mexico
\textsuperscript{f} Universidad San Judas Tadeo, Costa Rica

**ARTICLE INFO**

Article history:
Received 20 May 2016
Received in revised form 30 June 2016
Accepted 1 July 2016

**ABSTRACT**

*Candida* mediastinitis is a rare complication of open heart surgery with high mortality and morbidity usually associated with *C. albicans*. We are reporting the case of a 57 year old male who after having a triple coronary artery bypass graft procedure, had mediastinitis caused by *Candida famata*, a yeast, that had only been reported once before as the causal agent of this condition. It is of vital importance, that future cases be reported, due to the fact that both reported cases have led to patient demise.

\[\text{ã}2016\text{ Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).}\]

**Introduction**

*Candida famata* (*Candida fareri*) is a riboflavin overproducing [1], high osmotolerant yeast [2] that produce white to cream colored colonies on yeast extract peptone dextrose (YPD) medium (Fig. 1). This organism was considered to be a telemorph of *Debaryomyces hansenii* [3] but was reclassified via rRNA gene intergenic spacer fingerprinting as a unique phylogenetic entity [4].

This organism is isolated from many sources, mainly related to food production. It has been detected in the teats of dairy cows [5], various types of cheese [6], prawns [7], feral pigeons [8], wild birds [9] and albino rats [10] among others (Fig. 2).

Infections by this agent are mainly observed in patients with depressed immune response, it has been identified as the cause of neonatal sepsis in a low weight preterm infant [11], oral thrush in patients with chronic kidney disease [12], peritonitis in patients with continuous ambulatory peritoneal dialysis [13], invasive infection in stem cell transplant patients [14], candidemia in pediatric cancer patients [15]. This pathogen has also been described as an atypical cause of vaginitis [16], onychomycosis of the hands and feet [17] and cholecystitis [18].

\[\text{̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̊̀ \text{IDCases 5 (2016) 37–39}

Contents lists available at ScienceDirect

**IDCases**

journal homepage: www.elsevier.com/locate/idcr

ELSEVIER

http://dx.doi.org/10.1016/j.idcr.2016.07.001
2214-2509 / © 2016 Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).
Further complicated by acute kidney injury. The patient received a course of vancomycin and piperacillin-tazobactam, which was later switched to imipenem. An obvious thickening of the mediastinum was observed in a chest X-ray and the diagnosis of post-surgical mediastinitis was made. The patient had multiple cultures and a chest computerized tomography (CT) was ordered. The CT revealed small amounts of fluid in the superior mediastinum, fat stranding (Figs. 3 and 4), as well as reactive inflammation of the precarinal and prevascular lymph nodes, therefore, surgical drainage via sternotomy was performed.

The patient grew two different species of fungi from different sources. *Candida parapsilosis* was identified in the patient’s urine and central venous catheter, and *Candida famata* was retrieved from the mediastinal drain and the sternotomy wound. Antimicrobial sensitivity test was not performed. The patient was given amphotericin B for 2 days, and after the final cultures were obtained, a course of caspofungin was begun. Unfortunately, the patient had poor therapeutic response, went into multiorgan failure and expired on day 81 of his stay.

**Discussion**

*Candida* mediastinitis is a rare complication of open heart surgery [20] with high mortality and morbidity. We were able to identify one previous case report of mediastinitis by *C. famata*, that patient shared multiple similarities with our patient: coronary artery bypass grafting, a prolonged hospital stay and a fatal outcome to the infection.

There are multiple chemotherapeutic agents that can be utilized to treat *C. famata* infections. In vitro studies have shown that many agents are active against this yeast. The echinocandin anidulafungin [21] flucytosine, amphotericin B, caspofungin [22] and posaconazole [23] show the greatest antimicrobial activity. Resistance to fluconazole [24,25] make it a poor choice as first line treatment. The underlying condition and the source of contamination play an important role in the natural progression of the infection. In the case of mediastinitis, surgical drainage and wound debridement are critical components to managing this condition [20].

Due to the rarity of this particular surgical complication, we yet don’t have a clear understanding as to whether or not this species of *Candida* requires a different therapeutic approach than the more common *C. albicans*. Hopefully in the future, we will have a clearer picture as to what measures will help reduce mortality in these patients.

**Author participation statement**

The roles of the authors involved in the elaboration of this paper are as follows:

Dr. Alfredo Sanchez Betancourt: wrote the article, took part in the literary review, and took part in obtaining and processing the information necessary for the writing process.

Dr. Pablo Sibaja Alvarez: was the main reviewer of the manuscript, also helped procure some of the information related to the publication.

Dr. Rolando Arguedas Camacho: took part in editing and review of the manuscript.

Dr. Edward Guevara Espinoza: took part in editing and review of the manuscript.

---

**Fig. 1.** *C. famata* growth on YPD medium.

**Fig. 2.** *C. famata* observed under light microscopy at 40x via KOH staining.

**Figs. 3 and 4.** Fluid level observed on chest CT with thickening of the anterior portion of the superior mediastinum.
References

[1] Voronovsky AV, Abbas CA, Dmytruk KV, Ishchuk OP, Kshanovska BV, Sybirna KA, et al. Candida famata (Debaryomyces hansenii) DNA sequences containing genes involved in riboflavin synthesis. Yeast 2004;21(November 15):1307–16.

[2] Dmytruk KV, Sibiry AA. Candida famata (Candida florieri). Yeast [Internet] 2012;29(November 11):453–8.

[3] Nakase T, Suzuki M. Taxonomic studies on Debaryomyces hansenii (Zopf) Lodder et Kreger-van Rij and related species. I. Chemotaxonomic investigations. J Gen Appl Microbiol 1985;31:49–69.

[4] Nguyen HV, Gaillardin C, Neveuglise C. Differentiation of Debaryomyces hansenii and Candida famata by rDNA gene interspecific spacer fingerprinting and reassessment of phylogenetic relationships among D. hansenii, C. famata, D. fabryi, C. florieri (=D. subglabulosus) and D. prosopidis: description. FEMS Yeast Res 2009;9(4):641–62.

[5] Wawron W, Bochniarz M, Szczubia M. Enzymatic activity of yeasts isolated from the inflamed mammary secretion in dairy cows. Pol J Vet Sci 2011;14(1):85–8.

[6] Desnos-Ollivier M, Ragon M, Robert V, Martin J-C, Dromer F. Antifungal agents against uncommon clinical agents: a review. J Antimicrob Chemother 2003;51(1):163–6.

[7] Brilhante RSN, Paiva MAN, Sampaio CMS, Teixeira CEC, Castelo-Branco DSCM, Leite IG, et al. Yeasts from Macrophacus amazonicum: a focus on antifungal susceptibility and virulence factors of Candida spp. FEMS Microbiol Ecol 2011;76(2):268–77.

[8] Jang YH, Lee SJ, Lee JH, Chae HS, Kim SH, Choe NH. Prevalence of yeast-like fungi and evaluation of several virulence factors from feral pigeons in Seoul. Korea Lett Appl Microbiol 2011;52(4):367–71.

[9] Mendes JF, Albano APN, Coimbra MA, de Ferreira GF, Gonçalves CL, Nascente P, et al. Fungi isolated from the excreta of wild birds in screening centers in pelotas, RS, Brazil. Rev Inst Med Trop Sao Paulo 2014;56(6):525–8.

[10] Nawange SR, Singh K, Naidu J, Singh SM. Naturally acquired systemic fungal infection caused by Candida famata (Debaryomyces hansenii) and Candida catenulata in albino rats bred for sale in the market at Jabalpur (Madhya Pradesh), India. Mycoses 2010;53(2):173–5.

[11] Ratnuri S, Chandran S, Viswanathan R. A case of Candida famata sepsis in a very low birth weight infant successfully treated with fluconazole following antifungal susceptibility testing. Med J Di DV Patil Univ 2012;8(4):528.

[12] Rosa-García LA ED, Miramontes-Zapata M, Sanchez-Vargas LO, Mondragon-Padilla A. Colonización e infección bucal por Candida sp. en pacientes diabéticos y no diabéticos con enfermedad renal crónica en dialisis. Nefrologia 2013;33(6):764–70.

[13] Kerr CM, Perfect JR, Craven PC, Jorgensen JH, Drutz DJ, Shelburne JD, et al. Fungal peritonitis in patients on continuous ambulatory peritoneal dialysis. Ann Intern Med Am College Physicians 1983;99(September 3):334.

[14] Wagner D, Sander A, Bertz H, Fink J, Kern WV. Breakthrough invasive infection due to Debaryomyces hansenii (teleomorph Candida famata) and Scopulariopsis brevicaulis in a stem cell transplant patient receiving liposomal amphotericin B and caspofungin for suspected aspergillosis. Infection 2005;33(5–6):397–400.

[15] Devrim I, Demirag B, Yaman Y, Bayram N, Ozdemir F, Kara A, et al. A 7-year study of the distribution of nosocomial candidemia in children with cancer. Turk J Pediatr 2015;57(3):225–9.

[16] Luis J, Benavides I, Rodríguez DS, Menchaca RT, González G, González EG, et al. Especies de Candida no albicans en la consulta de ginecologia. Med Univ 2007;9(37):161–5.

[17] Manzano-Gayosso P, Méndez-Tovar UJ, Arenas R, Hernández-Hernández F, Millán-Chiu B, Torres-Rodríguez JM, et al. Levaduras causantes de onicomicosis en cuatro centros dermatológicos mexicanos y su sensibilidad antifúngica a compuestos azólicos. Rev Iberoam Micol 2011;28(1):32–5.

[18] Sergio P, De Araujo R, Medeiros Z, De Melo FL. Case Report Candida famata-induced fulminating cholecystitis. Rev Soc Bras Med Trop 2013;46(August):795–6.

[19] Ahmed IM, Gupta A, Gould K, Clark SC. A fatal fungus. Ann Thorac Surg 2005;80(2):723–4.

[20] Glower DD, Douglas JM, Gaynor JW, Jones RN, Oldham RN. Candida mediastinitis after a cardiac operation. Ann Thorac Surg Thorac Surg 1990;49(1):157–63.

[21] Acévalo MP, Carrillo-Muñoz AJ, Salgado J, Cardenes D, Broi S, Quindós G, et al. Antifungal activity of the echinocandin anidulafungin (VER002, LY-303366) against yeast pathogens: a comparative study with M27-A microdilution method. J Antimicrob Chemother 2003;51(1):163–6.

[22] Beyda ND, Chuang SH, Jahangir Alam M, Shah DN, Ng TM, McCaskey I, et al. Treatment of Candida famata bloodstream infections: case series and review of the literature. J Antimicrob Chemother 2013;68(2):438–43.

[23] Pfaffer MA, Diekema DJ, Messer SA, Boyken L, Hollis RJ, Jones RN, et al. In vitro activities of voriconazole, posaconazole, and four licensed systemic antifungal agents against Candida species infrequently isolated from blood. J Clin Microbiol 2003;41(1):78–83.

[24] Barchiesi F, Tortoraio AM, Falconi Di Francesco L, Cogliati S, Scalise G, Viviani MA. In-vitro activity of five antifungal agents against uncommon clinical isolates of Candida spp. J Antimicrob Chemother 1999;43(2):295–9.

[25] Zuluaga Rodriguez A, de Bedout Gomez C, Agudelo Restrepo CA, Hurtado Parra H, Arango Arteaga M, Moreno Angela Restrepo, et al. Sensibilidad a fluconazol y voriconazol de especies de Candida aisladas de pacientes provenientes de unidades de cuidados intensivos en Medellin, Colombia (2001–2007). Rev Iberoam Micol 2010;27(3):125–9.