

Autochthonous *Emergomyces pasteurianus* subcutaneous infection in an Italian immunocompromised patient: case report and review

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Abstract

We describe the second case of infection by *Emergomyces pasteurianus* in Italy. The patient presented ulcerated nodular lesions primarily in the forehead, beneath the orbital and nasal

areas, but also in the neck and fingers in the early stages. Treatment involved amphotericin B, followed by long-term itraconazole, which resulted in complete clinical resolution. A review of the literature is also included.

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Introduction

Emergomyces pasteurianus is a recently identified dimorphic fungus. It was initially classified in the *Emmonsia* genus but was later transferred to the *Emergomyces* genus.^{1,2} *Emergomyces* species cause disease in immunocompromised hosts, probably infected by inhaling dust-borne conidia. The genus *Emergomyces* includes five described species: *E. africanus*, *E. pasteurianus*, *E. europaeus*, *E. orientalis*, and *E. canadensis*. All *Emergomyces* species differ from the *Emmonsia* genus by the lack of adiaspores.²

The first case in Italy was described in a 40-year-old Italian woman who had never traveled abroad.^{3,4} She was an intravenous drug user who had been HIV-positive for ten years. She developed erythematous, papular, ulcerated cutaneous lesions, emaciation, and vomiting. CD4 counts were at 7/mm³. Skin biopsies indicated that the patient was suffering from histoplasmosis, and she was placed on a short course of amphotericin B before she died without autopsy. Slow-growing cultures were obtained from the last cutaneous biopsy: i) at 25°C on Sabouraud Agar in a mycelial phase with a delicate conidial apparatus similar to that of the two onygenalean dimorphic genera *Blastomyces* and *Emmonsia*; ii) at 37°C on brain heart infusion (BHI) medium in a yeast phase similar to that of the cutaneous biopsy. There were no adiaspores, like those produced *in vivo* by *Emmonsia parva* or *E. crescens*.

Case Report

The patient was a 37-year-old man suffering from AIDS. No trips abroad were reported.

He was hospitalized in the Infectious Diseases Department for the appearance of ulcerated nodular lesions mainly in the forehead, under the orbital and nasal areas, but also, still in the initial phase, in the neck and fingers (Figure 1).

Blood chemistry tests show: HIV-RNA 42090 copies/mL; T helper CD4⁺ 32 cells/mm³; CD4/CD8 ratio 0.15; erythrocyte sedimentation rate (ESR) 35. Double immunodiffusion tests for the detection of antibodies anti-*Aspergillus* and anti-dimorphic fungi (*H. capsulatum*, *C. immitis*, and *B. dermatitidis*) were negative.

The histological examination of the skin biopsy shows rounded intracellular structures, while the culture examination highlighted the growth of filamentous fungi (Figure 2).

The subculture of the skin biopsy on Sabouraud Dextrose Agar allowed the growth of yeast-like, then finely fluffy, white,

yellowish, and restricted colonies in 2 weeks of incubation. The microscopic examination revealed the presence of thin hyphae producing wide, yeast-shaped conidia with uni- and bipolar budding (Figure 3). Genotypic identification (amplification and sequencing of the rDNA internal transcribed spacer, Applied Biosystem, USA) allowed the confirmation of *E. pasteurianus*.

The patient underwent highly active antiretroviral therapy (HAART) therapy for HIV infection and antifungal treatment with amphotericin B 3 mg/kg e.v. for 15 days, followed by itraconazole 200 mg/day for 6 months, with complete clinical resolution of disseminated mycoses. The patient showed no signs of recurrence after five years.

Discussion

Five species belong to the genus *Emergomyces*, all characterized by the absence of adiasporas, classically characterizing the *Emmonsia* genus, in which all the species were previously included. In addition to *E. africanus*, *E. europaeus*, *E. orientalis*, and *E. canadensis*, *E. pasteurianus* was identified for the first time (1998) in the skin biopsy of an HIV-positive Italian woman who had disseminated mycosis.³ Since then, only a few sporadic cases have been reported in the scientific literature: a review of more than 60 cases in the scientific literature shows that adiaspiromycosis is a rare infection, and *Emmonsia* is a difficult-to-grow dimorphic fungus.⁵

Since the 1970s, novel pathogens have emerged with



Figure 1. Nodular lesions ulcerated mainly on the forehead, under the orbital and nasal areas.

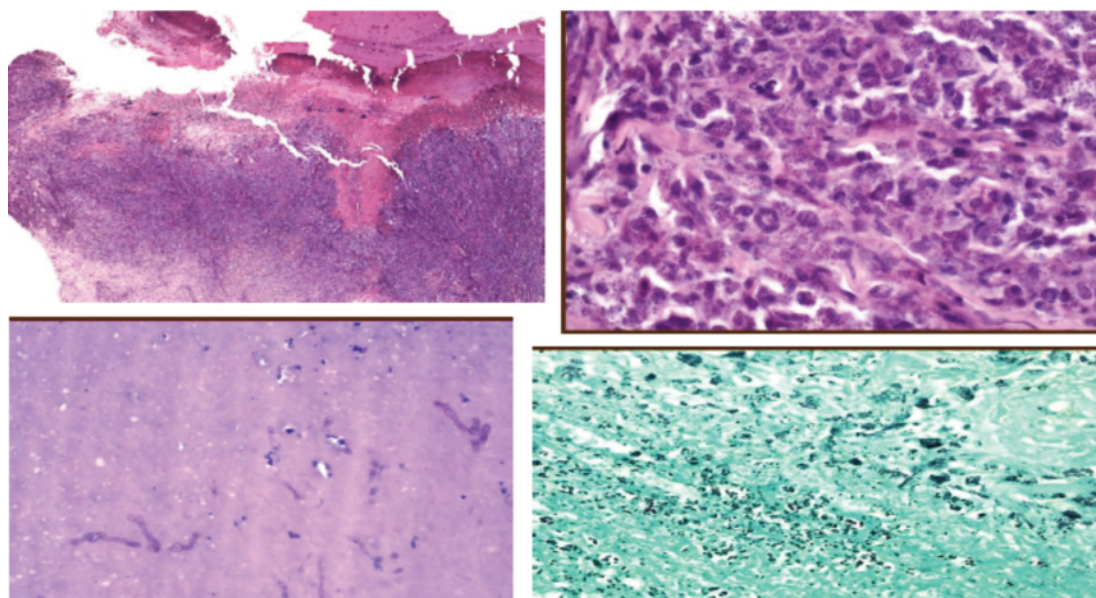


Figure 2. Histological examination of the skin biopsy highlights the presence of round intracellular structures.

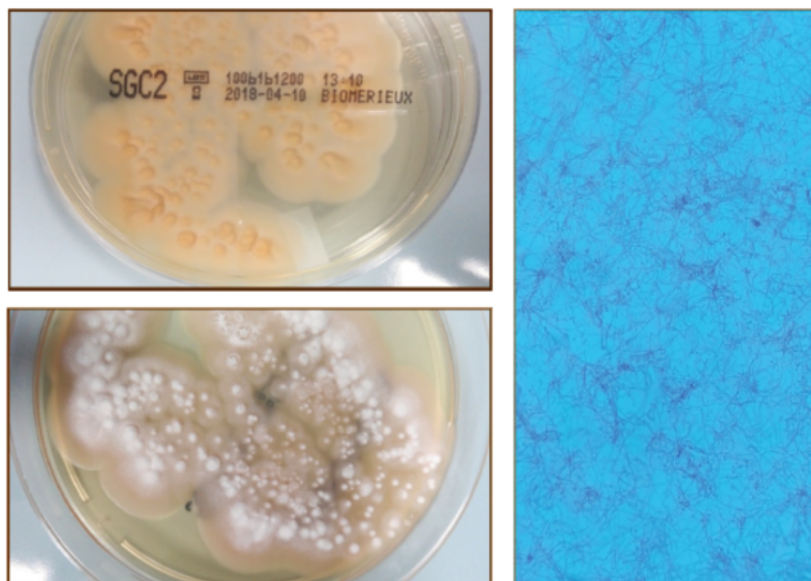


Figure 3. Presence of restricted colonies, initially yeast-like, then finely fluffy, white, and yellowish on Sabouraud Dextrose Agar after 2 weeks of incubation.

phylogenetic, morphological, and clinical similarities to known members of the *Ajellomycetaceae*. Schwartz *et al.* summarized reports of numerous additional human cases due to novel species in the family *Ajellomycetaceae*, most of which remained undescribed. Several of these novel taxa are opportunistic pathogens of immunocompromised hosts, primarily persons infected with HIV. An important emerging species associated with disease in advanced HIV infection was found in South Africa, with at least 56 cases reported since being correctly identified in 2008. The agent causing this mycosis was closely related to *Emmonsia pasteuriana*, which is also known to infect patients with AIDS and patients with other immune disorders.⁶⁻⁸ Between 2015 and 2019, a small number of cases were reported. The patients were always immunocompromised and showed cutaneous lesions, often accompanied by pulmonary involvement.⁹⁻¹⁷

Conclusions

Emergomycosis caused by *E. pasteurianus* is a new fungal pathology that affects immunocompromised people, particularly those with AIDS, but also transplanted patients and those on long-term steroid therapy. The cutaneous presentation occurs in more than 90% of cases, and it is almost pathognomonic because ulcerated nodular lesions are very often present. The diagnosis needs to be confirmed by histology and culture of the skin and all the other tissues. The molecular identification by sequencing the internal transcribed spacer (ITS) region of the rDNA is mandatory to distinguish it from *Histoplasma spp.* and permit the species identification, even if the classical diagnostic approach (direct examination of the sample, histology, and culture) continues to help microbiologists and clinicians to orient diagnosis and treatment.¹⁸ This diagnostic approach is not yet widespread, which is why it is not easy to define the epidemiology of *emergomycosis*. Schwartz and colleagues say that the published case reports represent the “ear of the hippo” in Africa (and in other parts of the world).^{19,20} Therapy with amphotericin B followed by an azole (itraconazole,

voriconazole, or posaconazole) assures the best outcome, even if new drugs, like manogepix, seem to be active.

References

1. Dukik K, Muñoz JF, Jiang Y, et al. Novel Taxa of Thermally Dimorphic Systemic Pathogens in the *Ajellomycetaceae* (Onygenales). *Mycoses* 2017;60:296-309.
2. Jiang Y, Dukik K, Muñoz JF, et al. Phylogeny, Ecology and Taxonomy of Systemic Pathogens and Their Relatives in *Ajellomycetaceae* (Onygenales): *Blastomyces*, *Emergomyces*, *Emmonsia*, *Emmonsiiellopsis*. *Fungal Divers* 2018;90:245-91.
3. Gori S, Drouhet E, Gueho E, et al. Cutaneous Disseminated Mycosis in a Patient with AIDS Due to a New Dimorphic Fungus. *J Mycol Med* 1998;8:57-63.
4. Drouhet E, Gueho E, Gori S, et al. Mycological, Ultrastructural and Experimental Aspects of a New Dimorphic Fungus, *Emmonsia pasteuriana* sp. Nov. Isolated from a Cutaneous Disseminated Mycosis in AIDS. *J Mycol Med* 1998;8:64-77.
5. Pelegrin I, Alastruey-Izquierdo A, Ayats J, et al. A Second Look at *Emmonsia* Infection Can Make the Difference. *Transpl Infect Dis* 2014;16:519-20.
6. Kenyon C, Bonorchis K, Corcoran C, et al. A Dimorphic Fungus Causing Disseminated Infection in South Africa. *N Engl J Med* 2013;369:1416-24.
7. Maphanga TG, Britz E, Zulu TG, et al. In Vitro Antifungal Susceptibility of Yeast and Mold Phases of Isolates of Dimorphic Fungal Pathogen *Emergomyces africanus* (formerly *Emmonsia* sp.) from HIV-Infected South African Patients. *J Clin Microbiol* 2017;55:1812-20.
8. Schwartz IS, Kenyon C, Lehloeny R, et al. AIDS-Related Endemic Mycoses in Western Cape, South Africa, and Clinical Mimics: A Cross-Sectional Study of Adults with Advanced HIV and Recent-Onset, Widespread Skin Lesions. *Open Forum Infect Dis* 2017;4:ofx186.

9. Feng P, Yin S, Zhu G, et al. Disseminated Infection Caused by *Emmonsia pasteuriana* in a Renal Transplant Recipient. *J Dermatol* 2015;42:1179-82.
10. Tang XH, Zhou H, Zhang XQ, et al. Cutaneous Disseminated Emmonsiosis Due to *Emmonsia pasteuriana* in a Patient with Cytomegalovirus Enteritis. *JAMA Dermatol* 2015;151:1263-4.
11. Malik R, Capoor MR, Vanidassane I, et al. Disseminated *Emmonsia pasteuriana* Infection in India: A Case Report and a Review. *Mycoses* 2016;59:127-32.
12. Lavergne R-A, Kandel-Aznar C, Khatchatourian L, et al. *Emmonsia pasteuriana*: une cause rare d'infection fongique chez l'immunodéprimé. *J Mycol Med* 2017;27:e7-e8.
13. Chick KK, To WK. Autochthonous *Emergomyces pasteurianus* Pneumonia in an Immunocompromised Patient in Hong Kong: A Case Report. *Hong Kong Med J* 2020;26:446-8.
14. Capoor MR, Mishra N, Kolte S, et al. Disseminated *Emergomyces pasteurianus* Infection in India: A Case Report and a Review. *Mycopathologia* 2020;185:193-200.
15. Rooms I, Mugisha P, Gambicher E, et al. Disseminated *Emergomyces* in a Person with HIV Infection, Uganda. *Emerg Infect Dis* 2019;25:1750-1.
16. Gast KB, van der Hoeven A, de Boer MGJ, et al. Two Cases of *Emergomyces pasteurianus* Infection in Immunocompromised Patients in the Netherlands. *Med Mycol Case Rep* 2019;24:5-8.
17. Pierce J, Sayeed S, Doern CD, et al. *Emergomyces pasteurianus* in Man Returning to the United States from Liberia and Review of the Literature. *Emerg Infect Dis* 2023;29:635-9.
18. Dellièrre S, Rivero-Menendez O, Gautier C, et al. Emerging Mould Infections: Get Prepared to Meet Unexpected Fungi in Your Patient. *Med Mycol* 2020;58:156-62.
19. Schwartz IS, Govender NP, Sigler L, et al. *Emergomyces*: The Global Rise of New Dimorphic Fungal Pathogens. *PLOS Pathogens* 2019;15:e1007977.
20. Ashraf N, Kubat RC, Poplin V, et al. Re-Drawing the Maps for Endemic Mycoses. *Mycopathologia* 2020;185:843-65.