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CASE REPORT

Mixed Skin and Soft Tissue Infection Caused by *Rhodotorula glutinis* and *Enterococcus faecalis* in a Diabetic Patient: A Case Report

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ABSTRACT

Rhodotorula *is a widely distributed fungus that has evolved as an important pathogen, especially in immunocompromised individuals, causing fungemias, central nervous system infections, peritoneal dialysis-associated peritonitis and keratitis. Even though there are a few reports of skin and soft tissue infections caused by* Rhodotorula*, all these cases involve immunocompromised individuals.* Enterococcus faecalis *is a Gram-positive bacterium known to cause several infections such as bloodstream, urinary tract and skin and soft tissue infections. We report a mixed* Rhodotorula glutinis *and* Enterococcus faecalis *skin and soft tissue infection in a 63-year-old woman with well controlled type 2 diabetes mellitus and no other known history of immunosuppression, suffering from skin and soft tissue infection of the right lower extremity. The patient did not respond to treatment with broad spectrum antimicrobials, but had a successful outcome with fluconazole, after* Rhodotorula glutinis *was isolated from pus of the skin ulcer. The antifungal treatment led to eradication of the infection, while no recurrence was observed during a follow-up period of two years. Clinicians should be aware that* R. glutinis *can cause infection even in immunocompetent patients.*

Keywords: *Rhodotorula*, yeast, skin and soft tissue infection, mixed infection.

INTRODUCTION

Rhodotorula species are widely distributed fungal organisms found in soil, water, milk and air samples. It belongs to the phylum *Basidiomycota*, produces red to pink colonies and forms unicellular spherical to elliptical blastoconidia (1). It can be found in the normal flora of the human upper respiratory, gastrointestinal and genital system as well as in moist areas of the skin (2). For decades, it had been considered non-pathogenic, but there is growing evidence that it can be an important pathogen, most times in immunocompromised individuals, causing a variety of infections such as fungemias, central nervous system (CNS) infections, peritoneal dialysis-associated peritonitis and keratitis (1, 3).

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Enterococcus faecalis is a Gram-positive bacterium known to cause several kinds of infections, including bacteremias, infective endocarditis, urinary tract and skin and soft tissue infections (4, 5). On the other hand, the effect of bacterial and yest mixed infections has not been adequately explored (6).

Herein we describe a case of a patient with well controlled type 2 diabetes mellitus suffering from a mixed skin and soft tissue infection (SSTI) caused by *Rhodotorula glutinis* and *E. faecalis*. ❑

CASE PRESENTATION

A 63-year-old female presented complaining of edema, redness and pain of the right lower extremity for the last five days. Her past medical history was notable for well controlled type 2 diabetes mellitus, hypothyroidism, chronic obstructive pulmonary disease (COPD), heart failure with preserved ejection fracture, arterial hypertension, and deep venous thrombosis of the left lower extremity four years ago. The clinical examination was notable only for redness, edema, tenderness and warmth of the right calf, while there was a purulent ulcer in the center of the inflamed area. Laboratory examination revealed an increased erythrocyte sediment rate (ESR) of 45 mm/hour (normal range 1-15 mm/hour) and an increased C-reactive protein (CRP) of 5.6 mg/dL (normal range 0.08-0.8 mg/dL). An ultrasound ruled out deep venous thrombosis and presence of a fluid collection. The patient was hospitalized in the Internal Medicine Department and was started on intravenous tedizolid 200 mg once daily and piperacillin/tazobactam 4.5 gr three times daily. However, she did not improve during the following days. A computed tomography (CT) scan of the lower extremity was negative for osteomyelitis or any significant arterial disease. On the 13th day of hospitalization, while on antimicrobials, she suddenly developed fever, respiratory wheezing, respiratory distress and hypoxemia and was intubated and transferred to the Intensive Care Unit (ICU) with a working diagnosis of a COPD exacerbation due to hospital acquired pneumonia. In the ICU she received intravenous diuretics, meropenem 2 gr three times daily and vancomycin 1 gr twice daily. She responded with reduction of oxygen requirements and was eventually extubated. Her blood cultures remained negative during the whole period. However, the infection of her right calf had not shown any significant improvement. Thus, purulent material produced from the ulcer on the inflamed calf was taken for culture in an effort to possibly identify resistant microorganisms. The culture grew *Enterococcus faecalis* sensitive to aminopenicillins, tedizolid, daptomycin and vancomycin and *Rhodotorula glutinis* sensitive to all antifungal agents tested. For the identification of the yeast, the strain was cultured on Sabouraud dextrose agar plate (BioMérieux, Marcy l'Etoile, France) that yielded coral-red pigmented colonies after aerobic incubation for 72 hours at 36°C. Microscopy revealed spheroidal to oval budding cells without formation of hyphae. On the basis of its macroscopic and microscopic morphology, urease production, and assimilation tests performed by API 20C AUX (BioMérieux), the yeast was identified as *R. glutinis* (7). Figure 1 shows the fungus identified on Saubouraud dextrose agar.

Hence, intravenous fluconazole was added to the antimicrobial treatment at a dose of 400 mg once daily for the next four days and the patient slowly responded with reduction of the inflammation at the right calf and subsequent decrease of ESR and CRP. After seven days of ICU stay, she became clinically stable and returned to the Internal Medicine Department, where she received intravenous daptomycin

FIGURE 1. Result of the skin culture grown on Saubouraud dextrose agar

500 mg once daily, meropenem 2 gr three times daily and fluconazole 400 mg once daily for a total of eight days. She was discharged after 28 days of hospitalization in excellent condition, with no signs or symptoms of infection. No recurrence of the SSTI was noted during a two-year post-hospitalization follow-up. ❑

DISCUSSION

Yeast and bacteria live side by side as commensals in healthy individuals. Since many of them can be opportunistic pathogens, it is no surprise that they might be both isolated from sites of infection, without being always clear which one is responsible for the initial infection and which represents a secondary contributor. Herein, we report a case of a patient with well controlled type 2 diabetes mellitus, who was otherwise immunocompetent, suffering a SSTI episode that had failed treatment with broad spectrum antimicrobials, but had a successful outcome with fluconazole, since *Rhodotorula glutinis* was isolated from pus of the skin ulcer. The antifungal treatment led to eradication of the infection, while no recurrence was observed during the follow-up period of two years.

Rhodotorula spp is a widely distributed yeast previously considered of low virulence but the last decades it has emerged as an important pathogen, more importantly for immunocompromised individuals (1, 8). Even though rare, there have been reports of *Rhodotorula* SSTI; however, these reports involve infections in immunocompromised individuals (9, 10).

The present patient had well controlled type 2 diabetes mellitus, but did not have any other cause of immunosuppression; however, she suffered an episode of SSTI of the lower right extremity. Differential diagnosis could include an underlying osteomyelitis, which was ruled out as the CT scan of the area did not show any signs supporting this diagnosis. Another cause could be the possibility of a diabetic foot. However, her diabetes was well controlled, she developed infection of the calf, not the foot, and the CT angiography was negative for any macroangiopathy. Thus, even though the possibility of insufficient blood supply due to occult diabetic microangiopathy remains a possibility, probably it is not the case, since one would expect the SSTI to recur after the end of treatment.

A drawback in the present case was that the fungus was identified with culture of pus, and not from skin biopsy, that was not performed in this case, even though it represents the gold standard for diagnosis. However, one would expect the SSTI not to improve or to recur if *R. glutinis* was simply a skin contaminant. Furthermore, the SSTI would have improved with the antimicrobial treatment, while the infection had shown steady improvement and was finally eradicated only by adding fluconazole to the regimen.

The presence of the *E. faecalis* did not necessarily mean that this organism was the reason for the absence of improvement, since the patient was receiving potent antimicrobials against this organism according to the antibiogram results from the beginning of her hospitalization. Thus, *E. faecalis* was either a bystander or it could be acting synergistically to *R. glutinis*.

To conclude, we report a case of *R. glutinis* isolation from pus of a patient with well controlled type 2 diabetes mellitus, and otherwise immunocompetent, suffering a SSTI that did not respond to treatment with broad-spectrum antimicrobials. The underrecognized yeast was most probably the main, and perhaps the only, reason of the infection, while *E. faecalis* could be either only a bystander or a contributor. Hence, we come to the conclusion that *R. glutinis* can cause infection even in immunocompetent patients, a knowledge that clinicians should keep in mind when they face such infections. ❑

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