A Case of Opportunistic Skin Infection with *Saccharomyces*

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***Saccharomyces* is an ascospore-producing yeast that is commonly employed in the brewery and bakery industries.**

We report a case of opportunistic skin infection with *Saccharomyces* in a 62-year-old female whose defense was impaired by immunosuppression.

Previously reported cases have been treated with amphotericin B or ketoconazole and our patient responded to fluconazole. (Ann Dermatol 9:(1)41~45, 1997).

Key words : Opportunistic skin infection, *Saccharomyces species*

Saccharomyces colonize in the human respiratory, gastrointestinal and urinary tracts in the setting of chronic underlying disease[1]. *Saccharomyces* is an ordinary microorganism we encounter through ingestion and inhalation ; yet this has quite rarely been associated with serious human infection. Serious *Saccharomyces* infections have been associated with the administration of antibiotics, severe burns, a history of surgical operations, AIDS, cancer, multiple trauma and renal failure[2-14]. We report in this paper a case of *Saccharomyces species* infection where skin nodules developed during the course of high dose prednisolone administration. Our reported case is noteworthy for the evidence of the involvement of the skin.

CASE REPORT

A 62-year-old female had a 5-year history of diffuse interstitial lung disease. During the course of the disease systemic corticosteroids were administered. In January 1991, her dyspnea was aggravated and she was admitted to our hospital (Table 1). A physical examination revealed a moon face, buffalo hump and central obesity which suggested iatrogenic Cushing's syndrome. A chest radiograph showed bilateral interstitial infiltrates throughout the entire lung fields, and an electrocardiogram revealed paroxismal supraventricular tachycardia, atrial premature contraction, ventricular premature contraction and left ventricular hypertrophy.

Laboratory findings were as follows : hemoglobin level, 15.2g/dl ; hematocrit, 43.8% ; white blood cell count, 16900/mm^3 with 92% neutrophils, 3% lymphocytes, 1% monocytes, 4% band forms ; erythocyte sedimentation rate, 7mm/hour ; platelets, 250,000/mm^3.

With a suspected diagnosis of diffuse interstitial lung disease, the patient was treated with high-dose prednisone. After 8 days of the treatment, she developed a fever of 38.7℃ and two soft nodules (1.5 × 1.8cm, 1.8 × 2.5cm) without tender sensation on the lateral (Fig. 1A) and posterior aspects(Fig. 1B) of the left thigh. There was significant erythema and induration, without ulceration. A biopsy specimen was obtained from the lesion on the posterior aspect of the left thigh. Histopathological

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Table 1. Clinical course of steroid administration and admission

1987. 6	90. 4. 10	4. 28	7. 4
DM, cough	cough, fever		
PDL* 15-30mg	MPL** 250-125mg or PDL* 80-60mg	Tapering(PDL* 60-20mg)	

90. 7. 4	8. 31	91. 1. 9	1. 17	1. 24	2. 27
cough		cough	skin lesion		expire
MPL** 250-125mg or PDL* 70-20mg	PDL* 20-60mg		MPL** 750-125mg	Fluconazole	

* Prednisolone
** Methylprednisolone
═══ Admission

Table 2. Results of special stain

	PAS	Alcian blue	Mucicarmine
Candida albicans	+	+	+
Cryptococcus	-	+	+
Saccharomyces	+	+	-
Present case	+	+	-

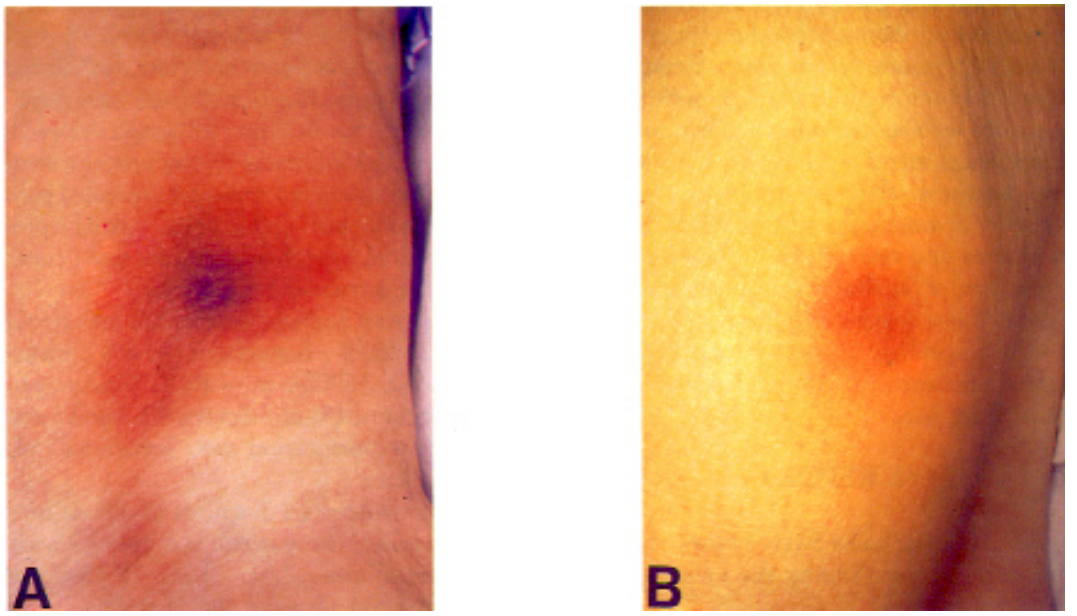

Fig. 1. Relatively well defined erythematous soft nodules on the lateral (A) and the posterior (B) aspect of the left thigh.

findings revealed a large sized (1.2 × 1.7cm) abscess containing numerous microscopic spores in the deep dermis (Fig. 2, 3).

The patient was treated with fluconazole (150mg/day) for fourteen days, and the skin lesions almost disappeared. Twenty days later, how-

Table 3. Yeast identification system : API 20C AUX

Glucose 2-keto-D-Gluconate Xylitol Saccharose/Sucrose Trehalose Raffinose	Positive

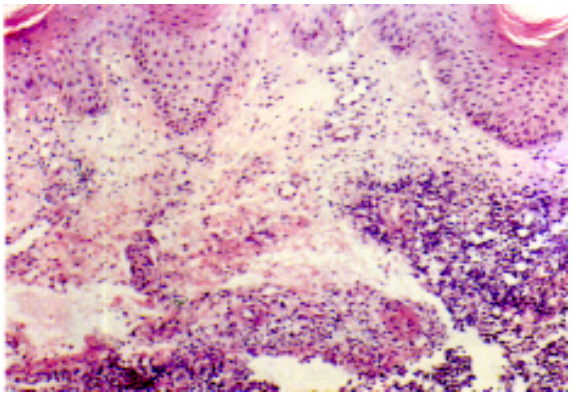

Fig. 2. Granulation tissues composed of many spores, polymorphonuclear cells are present in the deep dermis (H&E stain, ×100).

ever, paroxismal supraventricular tachycardia worsened and the patient died.

MYCOLOGIC EXAMINATION

The following fungus-specific stains revealed that the spore-formed element was positive for PAS (Fig. 4A), the alcian blue (Fig. 4B) stain, but negative for the mucicarmine (Fig. 4C) stain. The skin biopsy specimen and blood of the patient were inoculated onto Sabouraud dextrose agar without chloramphenicol and gentamicin for fungal cultures, and incubated. The gross appearance of the resulting cultures from the biopsy specimen showed a white to cream colored, velvety colony(Fig. 5). Growth was rapid. Microscopically multilateral budding yeast cells were round to oval, and short rudimentary pseudohyphae were formed. Fungal cultures of the blood were negative.

Saccharomyces species was identified by means of carbohydrate assimilation tests(API 20C AUX, BIO MERIEX SA, Lyons, France). The API 20C is provided with disposable plastic strips containing 20 cupules. The first cupule is a negative control, while the second contains glucose and serves as a positive control. The remaining each 18 cupules contain a specific substrate for the assimilation tests by the test organism. All testing with the API 20C was done according to the direction of the usage of the kit. The strips were incubated at 30℃ and read at 24, 48, and 72 hours. From the profile of the strips, identification of the isolated yeast were carried out with reference to the API Analytical Profile Index (Table 3).

DISCUSSION

Some strains of genus *Saccharomyces* are used in the production of baked goods, beer and wine and is occasionally used for health-oriented foods. Some species of genus *Saccharomyces* have been isolated as a part of the normal flora of the mouth and gastrointestianl tract and is rarely pathogenic in man[1,2]. Greer et al[3] reported in their study on patients with tuberculosis, that this yeast may be a harmless saprophyte. Kiehn et al[1] reviewed 3,340 yeast cultures from cancer patients over a 15 month period and isolated *Saccharomyces* from 19 sputum aspirates and one lung tissue culture.

In cases of fugemia, *Saccharomyces* yeasts have been detected in the blood of patients with endocarditis who had undergone prosthetic valve surgery[4-6], in a burns patient receiving total parenteral nutrition[7], in an AIDS patient who had undergone peritoneal dialysis[8], in cancer patients with indwelling catheters[9], in a patient who suffered from multiple trauma[10] and in a patient with chronic renal failure who had an indwelling catheter for use in hemodialysis[11]. In the majority of cases, the fungus was identified as *Saccharomyces cerevisiae*. Apart from fungemia, *S. cerevisiae* were isolated from two cases of peritonitis in patients who had undergone surgery for pancreatic cancer[12,13]. *S. cerevisiae* was associated with poly-microbial fatal pneumonia in an AIDS patient[14].

Experimental systemic *Saccharomyces* infections

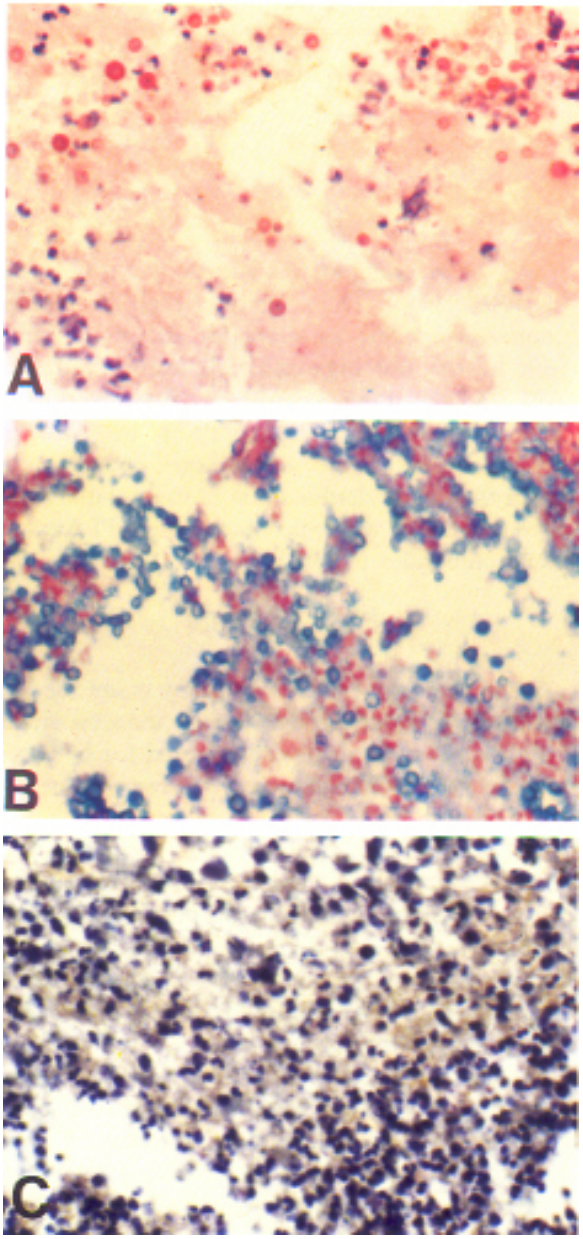

Fig. 3. Special stains on spores show positive findings with PAS (A, ×400), alcian blue (B, ×400) and negative with mucicarmine (C, ×400).

in the mouse have shown this yeast to be of low pathogenecity. Live *Saccharomyces* can be found in multiple deep organs in both normal and cortisone-treated mice 6 days after an intravenous inoculation. However, 30 days later, both the normal and cortisone treated mice had cleared the yeast[15]. These results are consistent with the low pathogenecity of this organism. However, based on the rise

Fig. 4. White to cream colored, velvety colonies on Sabouraud dextrose agar (25℃, 4 days later).

in number of the more severely immunosuppressed patients, patients suffering from less pathogenic fungi have also increased[16].

Saccharomyces species can be isolated from the throats and gastrointestinal tracts[1,2] of apparently healthy persons. Their pathogenicity and the relationship to disease remains unestablished. In the case of our patient, systemic corticosteroids administration for a prolonged period prior to her development of the *S. species* infection. Steroid induced immunosuppression is thought to have an important influence on the precipitation of these infections.

Sites of isolation in serious *Saccharomyces* infection have included blood[4-6], urine, pleural fluid, the esophagus[2], peritoneum[12,13], heart, kidney[9] and lungs[9,13]. In our case *S. species* was found in erythematous nodules on the lateral and the posterior aspects of the left thigh.

Possible portals of entry for invasive *Saccharomyces* infection are not clear. Normal sterile sites can become coloized and provide access for invasive *Saccharomyces* infection[2]. In the instance of *Saccharomyces* endocarditis, no portals of entry may be evident[4-6]. The gastrointestinal tract is postulated as a silent portal of entry in these cases. The observation that broad-spectrum antibiotics

were administered over a prolonged interval to the majority of patients prior to their development of *Saccharomyces* infection suggests that changes in normal microbial flora of the bowel may precede invasive infection[9]. The route of *S. species* to cause the skin nodules in our patient is not clear. Hematogenous spread from gastrointestinal tract or direct invasion into the skin was suspected.

The ability of *Saccharomyces* to grow at 37℃ is a very important characteristic. Most pathogenic species grow readily at 25 and 37℃ , whereas saprophytes usually fail to grow at the higher temperature. The antifungal agent of choice for *Saccharomyces* infections remains to be determined, but the limited data available suggests that amphotericin B is preferable for the use[4-6]. Ketoconazole therapy for *Saccharomyces* infection has been successful in some cases[12]. Our patient was treated with fluconazole (150mg/day) for fourteen days.

Saccharomyces, when found in culture material, can no longer be confidently dismissed as a nonpathogen, especially in debilitated patients. Howener, because *Saccharomyces* can also be a common saprophytic colonizer in these patients, biopsy and microbiological identification are necessary for a definitive diagnosis.

REFERERNCES

1. Kiehn TE, Edwards FF, Armstrong D:The prevalence of yeasts in clinical specimens from cancer patients. Am J Clin Pathol 73:518-21, 1980.
2. Eng R, Drehmel R, Smith SM, et al:*Saccharomyces cerevisiae* infections in man. Sabouraudia 22:403-7, 1984.
3. Greer AE, Gemoets HN:The coexistence of pathogenic fungi in certain chronic pulmonary disease:with especial reference to pulmonary tuberculosis. Disease of the Chest 9:212-24, 1943.
4. Rubenstein E, Noriega ER, Simberkoff MS, et al:Fungal endocarditis:analysis of 24 cases and review of the literature. Medicine 54:331-44, 1975.
5. Stein PD, Folkens AT, Hruska KA:*Saccharomyces* fungemia. Chest 58:173-5, 1970.
6. Noriega ER, Rubinstein E, Simberkoff MS, et al:Subacute and acute endocarditis due to Pseudomonas cepacia in heroin addicts. Am J Med 59:29-36, 1975.
7. Eschete ML, West BC:*Saccharomyces cerevisiae* septicemia. Arch Intern Med 140:1539-40, 1980.
8. Sethi N. Mandell W:*Saccharomyces* fungemia in a patient with AIDS. N Y state J Med 88:278-9, 1988.
9. Aucott JN, Fayen J, Grossnicklas H, et al:Invasive infection with *Saccharomyces cerevisiae*:report of three cases and review. Rev Infect Dis 12:406-411, 1990.
10. Manzella JP, Shaffer S, Agarwal N, et al:*Saccharomyces cerevisiae* fungemia in a multiple traumatized patient. J Trauma 29;129-30, 1989.
11. Cimolai N, Gill MJ, Church D:*Saccharomyces cerevisiae* fungemia:case report and review of the literature. Diagn Microbiol Infect Dis 8:113-7, 1987.
12. Canafax DM, Mann HJ, Dougherty SH:Postoperative peritonitis due to *Saccharomyces cerevisiae* treated with ketoconazole. Drug Intell Clin Pharm 16:698-9, 1982.
13. Dougherty SH, Simmons RL:Postoperative peritonitis caused by *Saccharomyces cerevisiae*. Arch Surg 117:248-249, 1982.
14. Tawfik OW, Papasian CJ, Dixon AY, et al:*Saccharomyces cerevisiae* pneumonia in a patient with acquired immune deficiency syndrome. J Clin Microbiol 27:1689-91, 1989.
15. Holzschu DL, Chandler FW, Ajello L, et al:Evaluation of industrial yeasts for pathogenicity. Sabouraudia 17:71-8, 1979.
16. Anaissie E, Kantarjian H, Ro J, et at:The emerging role of fusarium infections in patients with cancer. Medicine 67:77-83, 1988.