

Sternal Wound Infection by *Trichosporon inkin* following Cardiac Surgery

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Wound infection following cardiac surgery is well described but is rarely due to fungal infection. We describe a case of sternal wound infection caused by *Trichosporon inkin* with a fatal outcome, in an immunocompetent patient following aortic root surgery.

CASE REPORT

A 71-year-old female with known severe aortic stenosis and a dilated aortic root was admitted for elective aortic root replacement surgery. She had a medical history of severe emphysema, leading to breathlessness at rest, and spirometry revealed a forced expiratory volume in 1 s of just 500 ml. The operation involved implantation of a porcine aortic root and a Dacron graft but was complicated by bleeding from the left coronary artery origin, necessitating saphenous vein grafting onto the left coronary. The surgery lasted for 8 h, and teicoplanin and gentamicin were administered as antibiotic prophylaxis prior to surgery, in accordance with local protocols.

Postoperatively the patient was transferred to the intensive care unit, where she remained intubated and ventilated. A tracheostomy was performed on day 3, because a prolonged period of ventilation was anticipated. Further complications included acute renal failure, requiring continuous venous-venous hemofiltration. The patient also developed an intrinsic nodal cardiac rhythm and was paced via epicardial wires, inserted in theater and removed on day 7. On day 8 of her intensive care stay, she developed a ventilator-associated pneumonia, which was treated with cefuroxime and gentamicin, with some clinical response.

A subsequent septic decline (accompanied by negative blood cultures) was treated with an empirical course of vancomycin and ceftazidime, but with no substantial change in the patient's condition and a continued inotrope requirement. On day 24 of admission, *Candida albicans* was isolated from a central venous catheter tip, urine, and respiratory secretions, and treatment with intravenous fluconazole (400 mg daily) was commenced. It was noted, on examination, that the patient had developed a left pleural rub, and a small left-sided pleural effusion was seen on a chest radiograph. Bloody material began to ooze from the lower portion of the sternal wound and previous epicardial pacing wire sites. The gram stain of this fluid revealed numerous pus cells with yeasts and fungal hyphae (Fig. 1). The wound dehiscd, and one liter of pus drained spontaneously from the wound. There was associated sternal instability elicited upon examination. The patient was not considered a candidate for further surgical intervention, and her condition continued to

deteriorate. She died 2 days later, 26 days postoperatively. No autopsy was performed.

Subsequent to her death, blood cultures became positive after 2 days of incubation (Fig. 2) using the BacT/ALERT system (bioMérieux Inc., Durham, N.C.). The yeast isolated from both blood and sternal fluid was identified by the Mycology Reference Laboratory (HPA, Bristol, United Kingdom) as *Trichosporon inkin* by using AUXACOLOR (Bio-Rad, Marnes la Coquette, France), giving profile 7376225, and API 20C AUX (bioMérieux SA, Marcy-L'Etoile, France), with profile 6545775, giving a very good identification (99.7%). The culture also showed a true mycelium and disarticulating hyphae producing cylindrical arthrospores, which are characteristic of *T. inkin*. Identification was confirmed by sequencing of the D1–D2 region of the large ribosomal subunit, producing 100% identity with *T. inkin* (6). Susceptibility testing was performed using the CLSI (formerly NCCLS) M27-A2 method (15), and the following MICs were obtained: for amphotericin B, 1.0 mg/liter; for caspofungin, 16.0 mg/liter; for fluconazole, 0.25 mg/liter; for itraconazole, 0.06 mg/liter; and for voriconazole, <0.03 mg/liter.

Trichosporon species were reclassified in 1992, and the previous *Trichosporon beigeli* (*cutaneum*) group was subdivided into six new species thought to be human pathogens which exhibit epidemiological and pathogenic differences: *T. asahii*, *T. asteroides*, *T. cutaneum*, *T. inkin*, *T. mucoides*, and *T. ovoides* (5). In addition there have been case reports of invasive infection due to *T. loubieri* (4, 16) and *T. pullulans* (4), which were not previously linked to human disease. *T. inkin* is most commonly associated with the superficial condition known as white piedra, causing a disease of hair follicles; this species is particularly associated with pubic hair (5, 20). It has been reported mainly in temperate and semitropical climates and is more frequent in women than in men (20, 22). Invasive infections are rare (1, 14, 20), and the majority occur in the context of immunosuppression, notably hematological malignancies (3, 4, 12) or chronic granulomatous disease (18, 24). Other examples of invasive disease include peritonitis in patients undergoing continuous ambulatory peritoneal dialysis (9), endocarditis (2, 7, 11, 19), central venous catheter infections (12), and invasive lung disease (14, 24). As far as we are aware, only one case of invasive *Trichosporon* infection following cardiac surgery has been reported previously (13). This report described infection following insertion of an artificial heart prior to orthotopic

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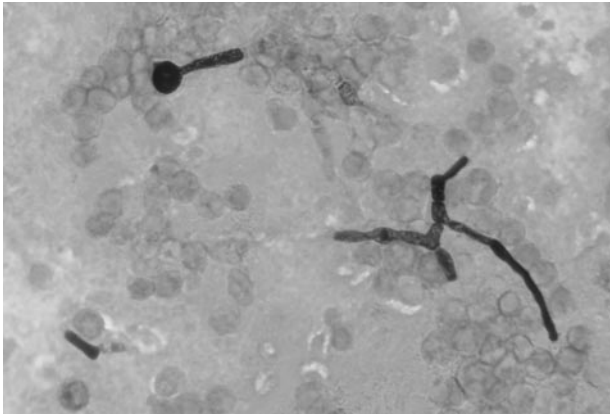


FIG. 1. Gram stain of pus draining from sternum, showing branching hyphae of *Trichosporon* (magnification, $\times 1,000$).

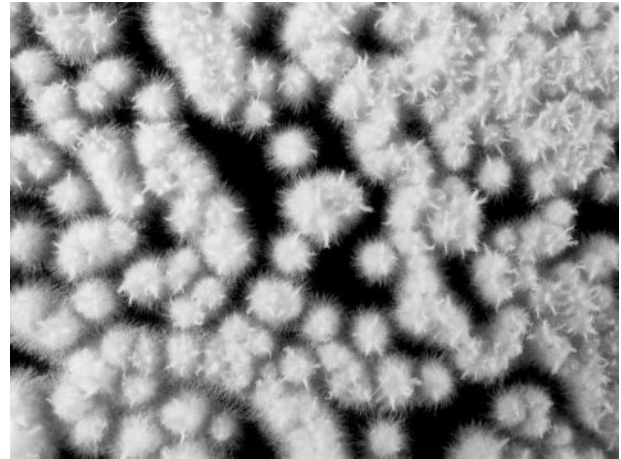


FIG. 2. Appearance of *T. inkin* on Sabouraud's agar after 2 days of culture from the patient's blood, demonstrating characteristic aerial mycelium.

heart transplant. The cases of endocarditis caused by *Trichosporon* species following their reclassification have all been identified as *T. inkin* infections. However, it is impossible to say whether the cases of endocarditis classified as due to *T. beigelii* (or *T. cutaneum*) were actually due to *T. inkin* or to one of the other members of the *Trichosporon* group.

Postoperative mediastinitis following cardiac surgery has an estimated incidence of 1 to 4%, and the majority of these infections are due to *Staphylococcus* species or the *Enterobacteriaceae* (10, 23, 25). Fungal mediastinitis is very rare, is usually caused by *C. albicans* or *Aspergillus* species, and carries a particularly high mortality rate (8, 23). As our patient had no underlying immunodeficiency or apparent skin disease, it is not clear exactly why the infection occurred. We postulate that the organism was introduced into the surgical site at the time of surgery and suspect that emergency saphenous vein harvest (involving a groin incision) may have put the patient at particular risk. In addition, she had several well-recognized risk factors for surgical site infection, such as a long and technically difficult operation with marked bleeding, severe lung disease, and prolonged ventilation (25). The extent of infection in our case was unclear. The copious purulent discharge from the patient's sternal wound, the associated fungemia, and the rapid and fatal outcome strongly suggested mediastinitis. In the absence of computed tomography or autopsy, evidence of mediastinitis could not, however, be definitively confirmed.

Our patient died despite treatment with high-dose intravenous fluconazole (to which the isolate was susceptible in vitro, with a MIC of 0.25 mg/liter). Postoperative mediastinitis is usually best managed with a combined medical and surgical approach (10), and our patient's fatal outcome may have been due partly to the fact that she was unfit for further operative intervention. Due to the rarity of the condition, the optimal antimicrobial treatment for invasive trichosporonosis is currently unclear. Recent studies propose that amphotericin B or azole preparations are likely to be effective (4, 17, 21) but that the infection carries a high mortality, approximately 70% (4, 7, 11, 13), even with prompt diagnosis and removal of an infective focus (24). *Trichosporon* species are generally resistant to caspofungin in vitro, as are the other basidiomycetous yeasts,

such as *Cryptococcus* species (17). Consequently, this agent is not recommended for treatment.

In conclusion, we have described a patient who died from a rare infection in an unusual site. With the increase in invasive procedures and immunosuppression accompanying modern medical practice, clinicians and microbiologists need to be alert to the possibility of unusual fungal infections such as *T. inkin*. Optimal antimicrobial regimens are ill defined, but agents such as voriconazole and amphotericin B preparations are most likely to be effective until full in vitro susceptibility testing has been performed.

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