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Acta Haematologica Polonica

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DOI: 10.5603/AHP.a2023.0032

Article type: Clinical vignette

Submitted: 2023-03-26

Accepted: 2023-04-18

Published online: 2023-06-15

Infection with *Fusarium solani* presenting as septic shock in child after hematopoietic cell transplantation

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Patients after allogeneic hematopoietic cell transplantation (allo-HCT) belong to a high risk group of invasive fungal disease (IFD). The distribution of pathogens in an allo-HCT setting includes aspergillosis in 55–60%, candidiasis in 25–30%, mycormycosis in 7–8%, and rare species (e.g. fusariosis, scedosporiosis, geotrichosis) in 2–3% [1]. With the widespread introduction of antifungal prophylaxis based on azoles, this epidemiology is tending to change, with the rise of rarer and more sporadic species. No major differences in etiology between children and adults have been reported [2–5], although the incidence of IFD after allo-HCT has also been reported to be significantly higher in children than in adults [5].

Regardless of the age, the following groups of patients are considered as high-risk groups for IFD: acute myeloblastic leukemia (AML), recurrent acute leukemia, allogeneic hematopoietic cell transplantation, and high risk acute lymphoblastic leukemia (ALL) [3, 4, 6, 7].

Clinical symptoms of IFD in immunocompromised patients are dependent on the localization of infection, which in most cases involve the lungs, abdomen, paranasal sinuses, skin or brain. In the majority of cases, general symptoms occur including fever, followed by other systemic symptoms, and laboratory markers of severe infection (e.g. C-reactive protein, procalcitonin). Sometimes symptoms of septic shock can occur.

The objective of this report was to present the case of a pediatric allo-HCT recipient with infection with *Fusarium solani* presenting as septic shock.

A 15-year-old girl treated for refractory relapsing B-precursor ALL (STIL/TAL1-positive) underwent allo-HCT from her sister fully human leukocyte antigen (HLA)-matched, after fludarabine–treosulfan–thiotepa–anti-thymocyte globulin (ATG) conditioning. Due to the persistent growth of minimal residual disease (MRD) after day +60 post-transplant, the patient received two cycles of blinatumomab. However, two months later she had another bone marrow relapse. She underwent a second allo-HCT, this time from an unrelated human leukocyte antigen (HLA)-matched donor, with treosulfan-melfalan-ATG conditioning. For graft-versus-host disease (GvHD) prophylaxis, she received mycofenolate mofetil and methotrexate. Initial anti-infective prophylaxis included intravenous antibiotics, micafungin, and acyclovir. On day +11, she experienced catheter-related septic shock, and skin rash. She was treated with antibiotics and dopamine. Microbiological analysis showed the presence of *Fusarium solani* in the blood, while no bacteria was detected from blood or central venous catheter. The patient was treated with liposomal amphotericin B and voriconazole followed by voriconazole monotherapy for another three months (Figure 1), with no symptoms of fungal infection. Six months later, the patient was diagnosed with a fifth leukemic relapse, with central nervous system (CNS) and bone marrow involvement. After analysis of the previous course of disease, with numerous relapses and the use of all available therapeutic options, the decision was made to switch to palliative treatment.

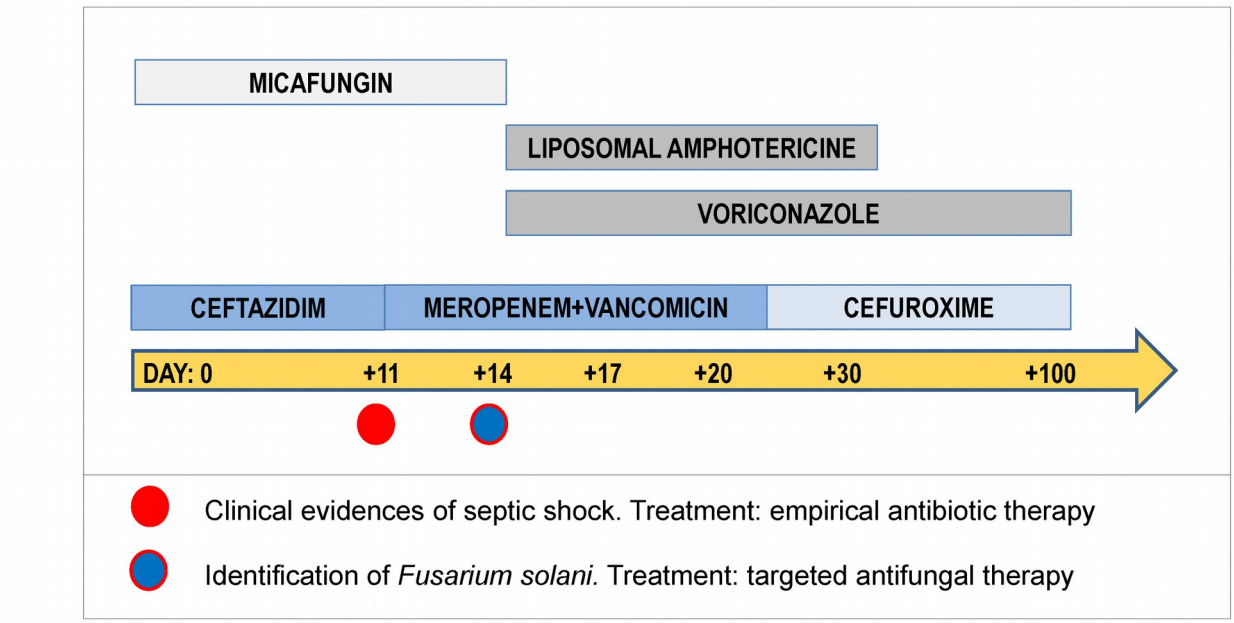

Figure 1. Antifungal and antibacterial prophylaxis and treatment

Septic shock is a very rare presentation of IFD. Literature data describing etiology, age and outcome is limited. Except for Candida species infections, the available pediatric data includes 23 patients, most of them with an underlying non-hematological disease (reviewed in [8]). Only 6/23 are reported to have survived this infection. High mortality after IFD-related septic shock has been reported also in adults (reviewed in [8]). In this context, we have shown the positive effect of therapy of breakthrough invasive fungal infection with *Fusarium solani* presenting as septic shock in a pediatric patient with acute leukemia after allo-HCT. This positive effect was achieved with swift microbiological diagnostics, the quick administration of targeted antifungals, and its continuation for an additional three months.

In conclusion, we here report an unusual presentation of invasive fungal disease with septic shock in an immunocompromised child after hematopoietic cell transplantation. With rapid diagnosis and treatment, the outcome of therapy of IFD-related septic shock was successful.

Authors' contributions

KC — design of study. RD, MRP, KC — provision of clinical data. All authors — analysis of clinical data. PZW — microbiological analysis. TS, JS — literature search, analysis of data, writing manuscript. All authors — critical revision and final approval.

Conflict of interest

The authors declare no conflict of interest.

Financial support

None.

Ethics

The work described in this article has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for experiments involving humans; EU Directive 2010/63/EU for animal experiments and uniform requirements for manuscripts submitted to biomedical journals.

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