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Brief communication

Fusarium spp infections in a pediatric burn unit: nine years of experience



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ABSTRACT

Introduction: *Fusarium* spp are ubiquitous fungi recognized as opportunistic agents of human infections, and can produce severe infections in burn patients. The literature on *Fusarium* spp infections in pediatric burn patients is scarce.

Objectives: To describe the clinical and epidemiological features as well as outcome of *Fusarium* spp infections in pediatric burn patients.

Patients and methods: Retrospective, descriptive study of *Fusarium* spp infections in a specialized intensive care burn unit.

Results: In 15 patients *Fusarium* spp infections were diagnosed. Median age was 48 months. Direct fire injury was observed in ten patients. The median affected burn surface area was 45%. Twelve patients had a full thickness burn. Fourteen patients had a Garces Index ≥ 3 . Fungal infection developed at a median of 11 days after burn injury. Fungi were isolated from burn wound in 14 patients and from the bone in one patient.

Amphotericin B was the drug of choice for treatment followed by voriconazole. Median time of treatment completion was 23 days. One patient (7%) died of fungal infection-related causes.

Conclusion: In our series *Fusarium* spp was an uncommon pathogen in severely burnt patients. The burn wound was the most common site of infection and mortality was low.

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Introduction

Infection is the most common and severe cause of morbidity and mortality in burn patients.¹ The longer survival of this population has increased the frequency of fungal infections.

The most commonly isolated species is *Candida* spp and in recent times there has been an increase in filamentous fungi such as *Aspergillus* spp, *Mucor* spp, and *Fusarium* spp.² *Fusarium* spp – a filamentous fungus – is ubiquitous in the environment and can be found in water and in the soil.³ It mainly produces infections in individuals with immune disorders caused by

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tumors, use of cytostatics, steroids, presence of diabetes mellitus, and HIV infection among others. Burn patients are the most commonly affected immunocompetent hosts.^{1,4}

Commonly isolated *Fusarium* spp are *F. solani*, *F. oxysporum*, *F. proliferatum*, *F. verticillioides*, etc.⁵

The literature on *Fusarium* spp infections in pediatric patients with burns is limited. Most publications are case reports of disseminated *Fusarium* spp infections in cancer patients or fungal keratitis infections.^{6–8}

The aim of this study was to describe the epidemiological, clinical, and microbiological features as well as outcome of infections due to *Fusarium* spp in pediatric burn patients.

Patients and methods

This was a retrospective, descriptive and observational study of *Fusarium* spp infections in a specialized burn intensive care unit between January 2006 and March 2015.

Inclusion criteria

All burn patients with clinical and microbiological evidence of fungal infection by *Fusarium* spp documented from representative samples, such as deep burn tissue, and/or blood, and/or other sterile sites with positive cultures were included.

Definition

Clinical evidence was defined by local signs of infection such as drainage of pus, redness or swelling at the margin of the burn, scar separation, localized necrosis, vesicular lesions, and/or poor adherence of the graft.

Microbiological evidence was defined by the isolation of *Fusarium* spp in deep tissue samples or sterile materials (blood, purulent materials, and/or urine).

Infection types

Infections were defined according to the American Burn Association⁹:

The Garces' Index – an index of prediction of severity and mortality calculated as follows: 40 – patient age × 1 percent-age burn (if type A), ×2 (if type AB), ×3 (if type B).

- 0–60 points: Grade 1 (slight risk);
- 61–90 points: Grade 2 (moderate risk);
- 91–120 points: Grade 3 (severe risk);
- >121 points: Grade 4 (critical risk).

Depth of burn

- Type A: superficial burn with erythema and hyperalgesia;
- Type AB: pink-white intermediate-color scar, and hypoalgesia;
- Type B or “full thickness”: deep, white or black scar and analgesia.

Microbiology

In addition to regular bacteriological study, all materials were processed for mycological study.

Table 1 – Patients characteristics.

Variable	N (IQR)	Percentage (IQR)
Patients	15	100
Age	48 m (12–108)	
Male sex	11	73
Burn surface		45 (30–60)
Garces index >3	9	60
Full thickness	12	80
Inhalatory injury	11	73
Mechanical respiratory assistance	13	87
Central venous catheter	15	100
Vesical catheter	15	100
Time between injury and infection	11 (4–24)	
Concomitant infection with bacteria	13	87
Time of treatment	23 (17–42)	
Mortality	1	7
Days of hospitalization	55 (22–60)	

Results

A total of 15 patients were infected by *Fusarium* spp during the study period. The mechanism of burn was direct fire in 10 patients (66%), hot liquids in four (27%), and electricity in one case (7%); 87% (n = 13) were male. Median age was 48 months (IQR 12–108 months). The median body surface area burned was 45% (IQR 30–60%). Eighty percent of patients (n = 12) had deep burns (type B); 60% (n = 9) had a Garces' index of 3, 33% (n = 5) an index of 4, and the remaining 7% (n = 1) an index of 2.

The median time from burn injury to onset of fungal infection was 11 days (IQR 4–24 days). All patients had central lines with a median dwell time of 20 days (IQR 12–30). Of all patients, 87% (n = 13) required mechanical ventilation with a median of 16 days (IQR 10–30). The most common site of microbiological isolation was the burn wound in 15 patients (100%) and bone in one patient (7%). In one patient (7%) *Fusarium* spp was isolated from blood cultures. In 87% of cases (n = 13) concomitant bacterial infections were found. Empirical antifungal treatment was started with amphotericin B deoxycholate in 14 patients (93%) and voriconazole in one patient (7%). All patients were switched to treatment with voriconazole after microbiological isolation of *Fusarium* spp. Median antifungal treatment was 23 days (IQR 17–42 days). No adverse events related to the use of antifungal agents were reported. The combination of medical treatment using amphotericin B, voriconazole, and surgical removal of infectious foci was effective in all cases. The median length of hospital stay was 55 days (IQR 22–60 days). Only one patient (7%) died, 14 days after admission due to septic shock related to *Fusarium* spp infection (Tables 1 and 2).

Discussion

Infections remain the leading cause of mortality in burn patients.¹ The use of topical and systemic antimicrobials along with infection-control measures has reduced the incidence of bacterial infections¹; however, fungal infections have

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