Infection of burn wound by Aspergillus fumigatus with gross appearance of fungal colonies

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ABSTRACT
The morbidity of invasive aspergillosis in burn patients is low but the diagnosis is difficult and the mortality rate is high. A severe burned patient at the Vietnam National Institute of Burn was suspected of fungal wound infection (FWI) with fungal growth on the wound. The diagnosis of FWI caused by Aspergillus fumigatus was made by isolation and histological examination. This may be the first reported case of FWI caused by Aspergillus fumigatus in Vietnam.

1. Introduction

Due to thermal damage to the skin barrier, burn patients are at high risk of getting wound infections which comprise the three-quarters of deaths among them [1]. The most common responsible agent of wound infection is bacteria followed by fungi, virus [2]. Fungal wound infection (FWI) is uncommon but has a high rate of mortality, especially aspergillosis (may be as high as 87.1%) [3]. Diagnosis of FWI is difficult due to atypical clinical symptoms and the need for biopsy to take viable tissue [4] so the prevalence of FWI may be underestimated, yet may be as high as 13% [3]. For most patients with FWI the responsible fungi cannot be seen by the naked eye but in some cases, the fungal burden is so significant that they can be seen macroscopically [5], however, the precise identification of responsible agents is difficult with conventional methods [6]. Vietnam is a developing country and people are at higher risk of burn injuries compared to those living in developed countries [7]. There are thousands of burn injuries annually and most severe burn patients who live in northern Vietnam are transferred to Vietnam National Institute of Burn (NIB). Nevertheless, there have been no reports of FWI in Vietnam, especially those caused by Aspergillus. This may reflect the lack of awareness or reluctance to look for FWI. Here we report a case of FWI in a severe burn patient at NIB caused by Aspergillus fumigatus which spread on the surface and infiltrated the wound.

2. Case

A 61-year-old male admitted to Vietnam NIB with burns estimated to 50% of total body surface area (41% full thickness) including face, trunk, limbs and inhalation injury (day 0). After recovering from shock during the first two days he sustained an infection from the day +3 with fever (temperature higher than 39 °C) and wet necrosis of the lesions even though he was under treatment of broad-spectrum antibiotics (Ciprofloxacin, Meropenem, Piperacillin, Tazobactam). On the day +4 some samples (oropharyngeal secretion, feces, urine, wound swabs and blood) were taken to screen for fungi. Candida tropicalis was isolated from the gastrointestinal tract, urine and wound swabs and the patient received intravenous fluconazole from day + 8 with loading dose of 800 mg for the first day and 400 mg per day for the following day. On the day + 8 many blue patches appeared on the surface of burn lesions (Fig. 1) so a skin biopsy was taken for fungal culture and histopathological examination. Some hyphae and conidia of Aspergillus were discovered on the slide stained with Periodic acid Schiff (Fig. 2) and a strain of Aspergillus was isolated from the biopsy specimen. The isolated strain was subjected to molecular analysis by sequencing internal transcribed spacer (ITS) region and then identified as Aspergillus fumigatus (the sequence generated from ITS was submitted to GenBank under the code MH932411). With the aggressive progression of the infection, the patient was unable to recover and died on the day + 10 before appropriate treatment was initiated due to the incubation time.
assay may not be associated with FWI or FWC [13]. It was notable that the patient had fungal colonies on the surface of lesions and conidia of Aspergillus was found on histologic examination, a very rare phenomenon. In 2014 Resch, T. R et al. reported a case of fungal burn infection with fungal colonies easily seen at the bedside [5].

The source of infection maybe conidia of Aspergillus from the surrounding air that fell and invaded the wound [14], which differed from an infection caused by Candida where the responsible agents were mainly endogenous in origin and need time to translocation from colonized sites (gastrointestinal or respiratory tracts) to the wound [15]. There have been some reports showing the genotypic matches between Aspergillus strains isolated from patients and from the environment [16] and measures to protect the wound from Aspergillus colonization were considered the only reliable method to prevent invasive aspergillosis for burn patients [17].

For identification of responsible agents, even in most recent reports of FWI the speciation of Aspergillus, has been performed using phenotypic examination [11,18]. Identification of Aspergillus based on phenotypic characteristics is simple and low cost but may lead to confusion due to the variability in the phenotypic characteristics of fungi. At present, the best approach to species differentiation is a polyphasic approach incorporating the phenotypic characters and molecular data [6]. The identification of the isolated strain in the present study was done by both phenotypic and molecular tool with analyzing the ITS gene, one of the most useful genes for species identification of fungi [19].

The treatment of FWI caused by Aspergillus or primary cutaneous aspergillosis is difficult and may require the combination of general (voriconazole) and local antifungal (amphotericin B) drugs [18]. Though the patient was treated with fluconazole, a drug used for preemptive therapy when C. tropicalis was isolated; a FWI still occurred and progressed severely. Triazoles are considered the drug of choice for most patients with invasive aspergillosis however fluconazole has no effect on Aspergillus [9].

In conclusion, we report a case of fungal wound infection caused by Aspergillus fumigatus in a severe burn patient with gross appearance of fungal colonies on the surface of lesions. The responsible agent was confirmed with histologic examination and identified by the molecular tool. This may be the first reported case of fungal wound infection caused by Aspergillus fumigatus in Vietnam. With the higher risk of burn injuries and the lack of supporting tests for definite diagnosis, there would be more undiagnosed patients with FWI in Vietnam. This case report emphasizes the need for performing surveillance tests and effective measures to prevent invasive aspergillosis for burn patients.

Conflict of interest

This work was partially supported by the Vietnam Ministry of National Defence, (grant no. 2017.75.054, to TAL).

Ethical form

Written informed consent was obtained from the legal guardian(s) for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

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