Brief report

Severe cutaneous aspergillosis in a premature neonate linked to nonsterile disposable glove contamination?

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Infection with Aspergillus spp can cause primary cutaneous aspergillosis in neonates of extremely low birth weight (ELBW) because of these neonates’ decreased qualitative immune defenses and defects in the skin barrier. The presence of building work near hospital wards receiving immunocompromised patients is one of the main risk factors for developing invasive aspergillosis (IA). We report the investigation of a fatal case of primary cutaneous aspergillosis complicated with IA in an ELBW neonate.

CASE REPORT

Six days after delivery at 24 weeks’ gestation, an ELBW neonate (birth weight, 600 g) developed necrotic skin lesions. These lesions invaded the back, perineum, and axillae and were complicated by the occurrence of pneumonia. A fumigatus was isolated in skin lesions and bronchoalveolar lavage fluid. Despite the initiation of intravenous antifungal therapy, the neonate died due to multiorgan failure. Necropsy confirmed a diagnosis of primary cutaneous aspergillosis complicated with IA.1

Setting

The neonatal intensive care unit (NICU) of the University Hospital of Saint-Etienne contains 3 main areas occupied by 4 incubators, for a total of 12 beds (Fig 1). The ventilation system includes high-efficiency particulate air filters. Moreover, the unit is equipped with an anteroom to maintain the air pressure at a higher level than the hallway outside the unit. All windows are sealed against air leaks. As a rule, health care workers use an alcoholic handrub for hand hygiene, and the introduction of cardboard boxes in the unit is strictly forbidden. Moreover, environmental surveillance is performed monthly, including analysis of at least 12 mycologic samples obtained by swabbing 10-cm² surface areas in the patients’ close environment, on air vents, and on metallic surfaces known to retain contamination by spores. Water samples from the unit are checked for the presence of pathogens every 3 months. Because of outside renovation work, precautions aimed at preventing dust infiltration into the unit had been reinforced before the start of this study.

Mycologic analysis

Samples were cultured on Sabouraud dextrose agar plates containing chloramphenicol (Sabouraud chloramphenicol, SAB CHL2-F; bioMérieux, Craponne, France). The plates were incubated at 37°C for 1 day to promote the growth of A fumigatus, and then incubated at 25°C for another 4 days. Colonies were identified at the genus level for filamentous fungi and at the species level for Aspergillus spp.

Investigation

After the occurrence of the present case, an investigation was conducted that included a review of medical and microbiological
files and an exhaustive check of the NICU ventilation system and of the plastic barriers protecting the NICU from the area of renovation work. Additional environmental samples were obtained in various locations, including the labor and delivery area, incubator used for transfer of the neonate, incubator and areas near the infant, surfaces in the unit where care was provided, nonsterile care devices (eg, diapers, disposable strips, creams, compresses), and disposable towels used for hand drying. Because we had already reported bacterial and fungal contamination of disposable nonsterile gloves stored in unopened boxes, we also targeted these, obtaining samples from the surfaces of new boxes stored in the clean supply room of the NICU and from gloves located at the top and in the middle of these boxes. All of the mycologic cultures were performed in a class II microbiological safety cabinet to exclude airborne contamination.

RESULTS

No dysfunction of the NICU ventilation system was detected. More than 140 environmental samples were tested. No *A fumigatus* contamination was documented, with the exception of the area where the neonate was located (Fig 1); after cleaning of this area, no additional strains of *Aspergillus* spp were recovered. Although high sterile hyphae contamination was observed outside the NICU, particularly in the peripheral hallway surrounding the unit, only a few surface samples from inside the NICU were found to be positive (with low cell counts).

Colonies of *A fumigatus* also were recovered from the top glove of an unopened box of nonpowdered latex nonsterile disposable gloves. Out of 3 other tested boxes of gloves from 3 separate batches, 2 yielded gloves contaminated by *A versicolor* or *A niger* (Table 1). Sampling of the surfaces of the clean supply room and of unopened glove boxes revealed no *A fumigatus* contamination.

In accordance with NICU practice, it was decided to use only sterile gloves when delivering care to neonates weighing <1,000 g or born at <28 weeks’ gestation until 15 days of life, at which point the skin provides a sufficient barrier. During the 24 months following implementation of this measure, no *A fumigatus* contamination of NICU surfaces was observed, and no other cases of aspergillosis were recorded.

DISCUSSION AND CONCLUSION

Despite the global increase of fungal infections, primary cutaneous aspergillosis is a rare event in the NICU. Most of the reported cases occurred in ELBW neonates and were hospital-acquired. Renovation work is a common source of environmental...
contamination by *Aspergillus* spp., but preventive measures using plastic barriers and reinforced surveillance can decrease this risk.

In the present study, we did not isolate *Aspergillus* spp in the NICU environment, with the exception of the neonate’s *mediasim* surroundings. Because our samples were obtained within a few hours after the neonate’s death and because of negative results in samples obtained from the same locations 12 days earlier, we deemed the contamination of surfaces near the neonate to be secondary to the neonate’s extensive cutaneous aspergillosis. Thus, we hypothesized that the neonate’s skin could have been contaminated by nonsterile devices or material used while providing care. A disposable nonsterile glove from an unopened stored box was found to be contaminated with *A. fumigatus*. Such a glove, used notably for diaper changes, could have contaminated the neonate’s skin. Because the skin barrier is very thin in EBLW neonates, skin contamination can lead to severe aspergillosis. Singer et al. reported 4 cases of IA in premature neonates linked to the contamination of latex finger stalls. In a previous study, we investigated the microbiological contamination of disposable nonsterile gloves that had been stored in their native packages. A wide variety of spore-forming and non–spore-forming bacteria was recovered, including *Bacillus cereus* and *Clostridium perfringens*; *A versicolor* was recovered in 1 sample. We had concluded this previous study by recommending the use of sterile disposable gloves for care procedures involving mucosa in highly immunocompromised patients. The present case of fatal primary cutaneous aspergillosis in an ELBW neonate raises the question of whether the exclusive use of sterile gloves should be extended to this category of fragile patients, even when providing noninvasive care measures.

### Acknowledgment

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### References


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**Table 1**

<table>
<thead>
<tr>
<th>Position of the glove in the box</th>
<th>Box 1 (batch 1)</th>
<th>Box 2 (batch 1)</th>
<th>Box 3 (batch 2)</th>
<th>Box 4 (batch 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top</td>
<td><em>A. fumigatus</em> (3)</td>
<td>0</td>
<td>0</td>
<td><em>A. versicolor</em> (1)</td>
</tr>
<tr>
<td>Mid</td>
<td>0</td>
<td>0</td>
<td><em>A. niger</em> (2)</td>
<td><em>A. niger</em> (1)</td>
</tr>
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<td></td>
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</tbody>
</table>

0 means that the search for fungi was negative.