Successful treatment due to vacuum seal technique of a severe *Scedosporium apiospermum* skin infection in a renal transplant recipient

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**Introduction**

In transplantation medicine the occurrence of an invasive fungal infection is considered a major complication. Because of the immunosuppressed state, it is often difficult to cure the affected patients. Sometimes a fungal infection even progresses to a state where the transplant or the patient’s life may be threatened. Candida and aspergillus species are commonly encountered fungi in such settings. In contrast, we were confronted with an infection by the rare fungus *Scedosporium apiospermum*. It had caused a severe skin infection in a recipient of a kidney transplant. This fungal skin infection proved resistant to anti-fungal drug treatment and standard surgical debridement over many weeks. In fact the skin infection continued to spread to more proximal areas of the patient’s leg. However, change of the surgical treatment of the wound to the vacuum seal technique was followed by a rapid cure of the skin infection. The vacuum seal technique is a surgical procedure providing particularly intense cleansing of wounds from debris and other products of tissue decay.

We would like to convey our unusual experience to other physicians potentially encountering similar infectious problems.

**Description of the clinical course**

A 58-year-old kidney transplant recipient was admitted to the hospital because of an abnormality of the skin. He gave a 7-day history of a painful swollen induration on his right forefoot. This lesion showed a slightly blue discolouration and measured 2 × 2 cm. There were three raised yellowish blisters on the lesion. The patient had not noticed any shaking chills and he had not had a fever. He associated the skin change with an insect sting 3 weeks previously.

**Past medical history**

The diagnosis of the patient’s underlying kidney disease was ‘chronic glomerulonephritis’. He did not have diabetes mellitus. The patient had received his second renal transplant 1 year before the present admission. He was treated with triple therapy consisting of cyclosporine A, methylprednisolone and mycophenolate mofetil. He had not received ATG/ALG or monoclonal antibodies. The graft had functioned satisfactorily. The serum creatinine concentration was 119 μmol/l (normal range 65–115 μmol/l). Laboratory findings had not shown any neutropenia, lymphopenia or hypogammaglobulinaemia.

**Clinical course**

Shortly after admission, the lesion was incised and drained. The discharge consisted of a yellow exudate. Cultures grown on CandiSelect agar® (Pasteur Freiburg) yielded white hyphomycetes after 48 h. The colour assumed a greyish-brown shade after 6 days. Wet mounts using 20% KOH with 0.4% Blankophor® and visualized under UV-light showed numerous dense septate hyphae. The fungus was identified as *S.apiospermum* (Figure 1).

Based on the fungal diagnosis and susceptibility testing, we started antimycotic therapy (Table 1). During the following 10 weeks it was deemed necessary to change the anti-fungal treatment several times due to changes in the fungal susceptibility to antimycotics. In addition, we determined minimal inhibitory concentrations frequently (Table 1).
Despite treatment consisting of susceptibility tested antifungal agents and frequent surgical debridement of all old and new skin infiltrates, the infection continued to spread to more proximal areas of the leg. After \( \approx 9 \) weeks, the inside of the entire right leg was covered by multiple incised and debrided skin infiltrates. The older incisions failed to show any detectable healing, and the margins of the incisions did not show any granulation. Repeated cultures had been obtained weekly, and almost all of them continued to show \textit{S. apiospermum}.

In the 10th week of hospital treatment, the surgical approach was changed. From now on, the technique of vacuum sealing was used [1]. The latter consists of the fitting of a sterile polyvinyl foam inlay into each lesion after its careful debridement. Suction tubes are then inserted into each inlay of foam. Finally, the site is covered by a foil of polyurethane and sealed by it. Suction of \(-20 \) to \(-125 \) kPa is applied continuously to the foam inlay via the suction tubes (Figure 2).

Over the next 10 days, the appearance of the wound surfaces changed remarkably. For the first time there was evidence of granulation tissue. Additional cultures taken at that time failed to show any growth of \textit{S. apiospermum}. Four weeks thereafter, it was possible to cover the skin defects surgically using Meshgraft transplants (Figure 3). At the time of discharge, the patient’s creatinine concentration was 190 \( \mu \text{mol/l} \).

The patient has continued to do well over the next 2 years. His most recent transplant function was satisfactory.

**Comments**

Opportunistic infections by the fungus \textit{S. apiospermum} have been described in the literature before. In these reports, the fungus usually caused dermatitis, arthritis, endocarditis, osteomyelitis, meningitis, keratitis or pneumonia [2–4]. Most of the infections were considered life-threatening and many of the affected patients died as a result.

However, a severe \textit{S. apiospermum} skin infection unresponsive to standard surgical incision and drainage that was readily treatable by the intensified suctioning of the vacuum seal technique has not been described previously.

The vacuum seal technique provides close contact between the surfaces of a foam inlay and that of the debrided tissue defect. The porosity of the foam results in capillary effects exerted on the surfaces of the wound. The external suctioning of the sealed off chamber will contribute further to the drainage of the wound. As a result, the cleansing of the tissue defect will be more efficient than that provided by standard,
Table 1. Overview of therapy in the present patient following identification of the fungus *S. apiospermum*

<table>
<thead>
<tr>
<th>Time</th>
<th>Antimycotic agents</th>
<th>Literature reference</th>
<th>Immunosuppressants</th>
<th>Other measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weeks 1 and 2</td>
<td>Fluconazole (400 mg/day p.o.) followed by itraconazole</td>
<td>Kusuhara <em>et al.</em> 1997 [8]</td>
<td>Cyclosporin A</td>
<td>Repeated surgical debridement</td>
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<td></td>
<td>(200 mg/day p.o.; MIC = 0.062 μg/ml)</td>
<td>Lopez <em>et al.</em> 1994 [9]</td>
<td>Methylprednisolone</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Mycophenolate Mofetil</td>
<td></td>
</tr>
<tr>
<td>Weeks 3, 4 and 5</td>
<td>Itraconazole (200 mg b.i.d. i.v. MIC = 0.062 μg/ml)</td>
<td>Cunningham <em>et al.</em> 1996 [10]</td>
<td>Unchanged</td>
<td>Repeated surgical debridement</td>
</tr>
<tr>
<td></td>
<td>plus amphotericin B (100 mg/day i.v.)</td>
<td></td>
<td>GCSF</td>
<td></td>
</tr>
<tr>
<td>Weeks 6, 7 and 8</td>
<td>Itraconazole (200 mg b.i.d. i.v.)</td>
<td>Ben Hamida <em>et al.</em> 1993 [11]</td>
<td>Unchanged</td>
<td>Repeated surgical debridement</td>
</tr>
<tr>
<td>Week 9</td>
<td>Miconazole (400 mg t.i.d. i.v.; MIC = 0.06 μg/ml)</td>
<td></td>
<td>Dicontinuation of mycophenolate mofetil</td>
<td>Surgical debridement</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>reduction of cyclosporin A and methylprednisolone</td>
<td></td>
</tr>
<tr>
<td>Week 10</td>
<td>Miconazole (400 mg t.i.d. i.v.; MIC = 0.06 μg/ml)</td>
<td></td>
<td>Unchanged from previous reduction</td>
<td>Vacuum seal technique plus suction</td>
</tr>
</tbody>
</table>

*Granulocyte colony stimulating factor.

Fig. 2. Schematic drawing to illustrate the principles of vacuum seal technique.

Fig. 3. The patient's leg after surgical coverage of the wound using Meshgraft. The photo demonstrates the extent of the patient's initial skin infection as far as involved mycetoma and lower leg. The lesions on the face and toes of the upper thigh are not shown.
passive, surgical drainage. This may have been important in the present case. It is well known that tissue debris and products of microbial metabolism and decay may serve to devitalize tissues. In this way the formation of granulation tissue, necessary for healing of a wound is prevented or inhibited.

We speculate that such a sequence of events may have been in operation when we used standard surgical incision and drainage—but that was interrupted by the vacuum seal technique.

Previous studies of wound healing in experimental animals showed an effect of the vacuum seal technique to increase the generation of granulation tissue. In a pig model of chronic skin ulceration, Morykwas et al. [5,6] applied the vacuum seal technique and reported the following effects: accelerated removal of bacteria from the wound, improvement of blood supply to the wound margins and enhancement of the formation of granulation tissue. In a comparable fashion, Ford et al. [7] studied patients with chronic ulcers of the skin that were treated by the vacuum seal technique. These authors demonstrated stimulation of granulation tissue, reduction of microbial contamination and increased vessel density in the wound bed in their patients in response to the vacuum seal treatment.

The present case was complicated by the subnormal response to antifungal agents—even though their effectiveness had been demonstrated in vitro. This is best explained by the concomitant immunosuppression. We maintained the immunosuppressants unaltered over the first 8 weeks of the skin infection. It is possible that an earlier reduction would have been helpful.

Taken together, our case suggests that local wound care including the use of the vacuum seal and suction technique can be helpful to treat chronic suppurating skin infections of immunosuppressed patients when these infections are resistant to standard surgical incision and drainage.

Conflict of interest statement. None declared.

References

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