Effect of medical honey on wounds colonised or infected with MRSA

Full healing was achieved in seven consecutive patients whose wounds were either infected or colonised with methicillin-resistant Staphylococcus aureus. Antiseptics and antibiotics had previously failed to eradicate the clinical signs of infection.

In whom MRSA colonisation/infection had been detected in a wound swab in the previous five years
In whom MRSA had been treated with antibacterial medical honey by a wound-care specialist (GB).
Patient 4 has been included in a previous report about the use of Medihoney products in severely immunocompromised children.
Patient informed consent to use their data for scientific and educational purposes was obtained at the start of treatment. Ethical approval was not required over the wound. In our experience this dressing keeps antibacterial honey in permanent contact with the wound surface. Fistulas were filled with medical honey, and a calcium alginate dressing was only applied if the outer diameter of the fistula was larger than 1cm.

In most cases the honey was applied onto a calcium alginate dressing (Sorbalgon, Paul Hartmann AG, Heidenheim), which was then placed directly over the wound. In our experience this dressing promotes moist wound healing. Additional benefits include swift deodorisation of malodorous wounds and reduced pain at dressing changes.

In this retrospective case series we report on seven consecutive cases with wounds chronically infected or colonised with MRSA that were treated with Medihoney wound-care products (Medihoney AG, Heidenheim), which was then placed directly over the wound. In our experience this dressing keeps antibacterial honey in permanent contact with the wound surface. Fistulas were filled with medical honey, and a calcium alginate dressing was only applied if the outer diameter of the fistula was larger than 1cm.

In this retrospective case series we report on seven consecutive patients with wounds colonically infected or colonised with MRSA that were treated with Medihoney wound-care products (Medihoney AG, Heidenheim), which was then placed directly over the wound. In our experience this dressing keeps antibacterial honey in permanent contact with the wound surface. Fistulas were filled with medical honey, and a calcium alginate dressing was only applied if the outer diameter of the fistula was larger than 1cm.

Wounds with apparent clinical signs of infection were pre-treated with an antiseptic (Ocitodinehydrochloride, Octeni Sept, Schülke & Mayr, Norderstedt) on the first day of treatment only. In some cases the attending physician also prescribed systemic antibiotics to patients with local or systemic signs of wound infection.

Wound swabs were investigated, following standard microbiological procedures, at the Institute of Medical Microbiology, Immunology and Parasitology, University of Bonn.

Given the retrospective nature of this case series, the frequency of the microbiological investigations was not considered in the evaluation (okay?).

Method

Patients

Data were collected using a case report form from the files of patients:

- Certified for wound care
- Biocompatible, standardised and sterile
- Suitable for prolonged application
- Applicable for all of the stages of wound healing
- Suitable for both acute and chronic wounds.

They must also support moist wound healing. Medical grade honeys have been found to satisfy these requirements, and the scope of their usage in wound care is increasing. If certified as a medical device, honey is safe to use and, as well as keeping the wound free from bacterial colonisation, may promote healing. Additional benefits include swift deodorisation of malodorous wounds and reduced pain at dressing changes.

In this retrospective case series we report on seven consecutive patients with wounds chronically infected or colonised with methicillin-resistant Staphylococcus aureus (MRSA) that were treated with Medihoney wound-care products (Medihoney AG, Heidenheim), which was then placed directly over the wound. In our experience this dressing keeps antibacterial honey in permanent contact with the wound surface. Fistulas were filled with medical honey, and a calcium alginate dressing was only applied if the outer diameter of the fistula was larger than 1cm.

Wounds with apparent clinical signs of infection were pre-treated with an antiseptic (Ocitodinehydrochloride, Octeni Sept, Schülke & Mayr, Norderstedt) on the first day of treatment only. In some cases the attending physician also prescribed systemic antibiotics to patients with local or systemic signs of wound infection.

Wound swabs were investigated, following standard microbiological procedures, at the Institute of Medical Microbiology, Immunology and Parasitology, University of Bonn.

Given the retrospective nature of this case series, the frequency of the microbiological investigations was not considered in the evaluation (okay?).

References


G. Blaser, MD, Wound Care Specialist, Study Nurse, Woundpecker Database; K. Santos, Wound Care Specialist, Study Nurse, Woundpecker Database; H. Veit, MD, Director of Department of Paediatric Haematology and Oncology; U. Bode, MD, Director of Department of Internal Medicine; A. Simon, MD, Consultant Paediatric Haematology, Oncology and Infectious Diseases; Woundpecker Wound Care Team, Children's Hospital Medical Centre, University of Bonn, Germany; S. Miedziowska, University of Bonn, Germany.

Email asimon@ukb.uni-bonn.de
general, wound swabs were taken from inpatients at least once weekly; there were no recommendations for microbiological investigations in outpatients at the time of treatment.

**Results**

The clinical manifestations of the seven patients are summarised in Table 1. In addition to the MRSA infection or colonisation of their wounds, all had significant comorbidities that affect wound healing. Six had surgical wounds.

Despite the use of topical antiseptics in some patients, and systemic administration of vancomycin in three, MRSA wound infections had persisted for up to five years (Table 1).

Clinical outcomes achieved with the medical honey are summarised in Table 2. Patient acceptance of wound treatment with honey was good. Its positive effect on wound cleansing and healing encouraged patient concordance. Patient 1 was unable to comply with basic principles of wound hygiene due to excessive alcohol abuse.

MRSA was eradicated in all wounds without the further use of topical antiseptics or systemic antibiotics. In five patients the exact time required to eradicate the bacteria could not be determined because wound swabs were not taken on a regular basis. However, swabs were taken on the days indicated in Table 2 and no MRSA was detected. Patient 4 had been treated unsuccessfully with topical

<table>
<thead>
<tr>
<th>Table 1. Patient characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Patient no.</strong></td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>7</td>
</tr>
</tbody>
</table>
Table 2. Clinical course of the patients treated with the medical honey

<table>
<thead>
<tr>
<th>Patient no.</th>
<th>Treatment duration</th>
<th>Time until MRSA eradication</th>
<th>Concordance with treatment</th>
<th>Clinical outcome</th>
<th>Further comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>150 days</td>
<td>No intermittent tests; wound swab negative on day 99 of treatment</td>
<td>Outpatient treatment. Treatment well accepted with no pain after administration. Poor concordance due to alcohol abuse</td>
<td>Full wound healing, with no further local or systemic complications</td>
<td>Effective MRSA eradication. No additional topical or systemic antimicrobial treatment administered</td>
</tr>
<tr>
<td>2</td>
<td>42 days</td>
<td>No intermittent tests; wound swab negative on day 42 of treatment</td>
<td>Outpatient treatment. Treatment well accepted with no pain after administration. Wound difficult to dress due to extremely vulnerable skin margins</td>
<td>Full wound healing, with no further local or systemic complications</td>
<td>Effective MRSA eradication. Additional decontamination measures. No additional topical or systemic antimicrobial treatment administered</td>
</tr>
<tr>
<td>3</td>
<td>16 days</td>
<td>6 days</td>
<td>Inpatient treatment. Patient isolated due to MRSA. Treatment well accepted with no pain after administration</td>
<td>Full wound healing, with no further local or systemic complications</td>
<td>Effective MRSA eradication. Additional decontamination measures. No additional topical or systemic antimicrobial treatment administered</td>
</tr>
<tr>
<td>4</td>
<td>10 days</td>
<td>2 days</td>
<td>Inpatient treatment. Patient isolated due to MRSA. Treatment well accepted with no pain after administration</td>
<td>Full wound healing, with no further local or systemic complications</td>
<td>Effective MRSA eradication. Chemotherapy was initiated after wound healing. No additional topical or systemic antimicrobial treatment administered</td>
</tr>
<tr>
<td>5</td>
<td>690 days</td>
<td>No intermittent tests; wound swab negative on day 100 of treatment</td>
<td>Outpatient treatment. Fistula filled with the medical honey Treatment well accepted without pain after administration.</td>
<td>Full wound healing, with no further local or systemic complications</td>
<td>Effective MRSA eradication. No additional topical or systemic antimicrobial treatment administered</td>
</tr>
<tr>
<td>6</td>
<td>211 days</td>
<td>No intermittent tests; wound swab negative on day 96 of treatment</td>
<td>Outpatient treatment. Treatment well accepted without pain after administration.</td>
<td>Full wound healing, with no further local or systemic complications</td>
<td>Effective MRSA eradication. No additional topical or systemic antimicrobial treatment administered</td>
</tr>
<tr>
<td>7</td>
<td>54 days</td>
<td>No intermittent tests; wound swab negative on day 30 of treatment</td>
<td>In- and outpatient treatment, started in the intensive care unit. Patient received up to 40mg morphine for 30 minutes before the dressing change but still complained of severe pain</td>
<td>The wound was debried and cleansed with the medical honey. After 54 days granulation tissue was seen on the wound bed</td>
<td>Effective MRSA eradication. Treatment discontinued due to severe pain shortly after administration.</td>
</tr>
</tbody>
</table>

**Notes:**
- Patient 1: Patient isolated due to MRSA. Treatment well accepted but still complained of alcohol abuse.
- Patient 2: Treatment well accepted with no pain after administration. Wound difficult to dress due to extremely vulnerable skin margins.
- Patient 3: Inpatient treatment. Patient isolated due to MRSA. Treatment well accepted with no pain after administration.
- Patient 4: Inpatient treatment. Patient isolated due to MRSA. Treatment well accepted with no pain after administration. Wound difficult to dress due to extremely vulnerable skin margins.
- Patient 5: Outpatient treatment. Fistula filled with the medical honey Treatment well accepted without pain after administration.
- Patient 6: Outpatient treatment. Treatment well accepted without pain after administration.
- Patient 7: In- and outpatient treatment, started in the intensive care unit. Patient received up to 40mg morphine for 30 minutes before the dressing change but still complained of severe pain.

7 Molan, P.C. The evidence supporting the use of honey as a wound dressing. Int J Low Extrem Wounds, 2006; 5: 1, 40-54.
We thank Dr. Ralph Ichenhausen, Biomedical Consulting, Ichenhausen, Germany, for his support and for his critical reading of the manuscript.

Discussion

Although detailed data are not available on the detection of MRSA in wound-care settings in Germany, reports from other countries describe MRSA as a causative pathogen with an increased prevalence in skin and soft-tissue infections, adult and paediatric emergency patients, surgical wound infections and patients with chronic wounds. Antibiotic-resistant bacterial strains often thrive in wounds, with profound detrimental effects on healing. Medical honey exhibits its primary antibacterial effects by inducing autolytic debridement, supported by the action of its high osmolarity and low pH. When diluted, some honeys have additional antibacterial properties due to the action of the enzyme glucose oxidase and still unidentified active components that have exhibited a significant antibacterial effect in vitro when hydrogen peroxide production was chemically blocked. The antibacterial effects of honey are not comparable to those of antiseptics, which achieve a 5-log reduction of bacterial counts within two minutes. Nevertheless, our data support the finding of other groups that medical honey efficiently controls colonisation and local infection.

Unfortunately, in contrast to current practice, wound swabs were not taken on a weekly basis. Thus, we can only speculate about the duration of infection in most of the wounds. This needs to be addressed in a prospective study.

Importantly, the use of medical honey has not been observed to foster bacterial resistance or to have any toxic effects after prolonged application. This is of particular relevance to paediatric patients, who may be more susceptible to systemic toxicity after resorption of compounds used in wound care.

A practical challenge was application of the product to vertical wounds (such as leg ulcers or abdominal wounds) in ambulatory patients. Sustained contact was achieved by soaking the honey into a calcium alginate dressing, which was kept in place under a sterile gauze layer covered with a vapour-permeable transparent film.

Medihoney dressings still have to be changed daily as no other standard of treatment has been published. This may increase demand for staff resources and result in relatively high costs. Some wounds may have little or no exudate, in which case dressing changes on alternate days or even longer would be feasible, although prospective studies on this issue are lacking.

The lack of randomised controlled trials on the use of Medihoney in wound care is a major obstacle for practitioners, and necessitates consideration of more evidence-based treatments. With only a few exceptions, Medihoney still remains a compassionate treatment approach for patients in whom other treatments have failed. As minimal safety requirement, its use on complex wounds in patients with severe pre-existing comorbidities should be supervised by a physician or a wound-care specialist.

Concordance can be a serious problem in patients with complex wounds, in particular in the home-care setting (see patient 1, in whom non-concordance was associated with alcohol abuse).

Wound care in outpatients is still not standardised in Germany and even state-of-the-art wound-care interventions are not always paid for by insurance companies.

Pain occasionally occurs after administration of medical honey for reasons that are not yet fully understood. This may because the high sugar concentration draws fluids from the wound tissues and due to the low pH (approximately 4). The Medihoney wound gel preparation (Medihoney Wound Gel), which contains a wax ester and ethoxylated oil derived from organic plant sources, has solved the pain problem in some patients (unpublished observations). Application of local anaesthetics such as lidocaine-prilocaine (EMLA, AstraZeneca) cream may be helpful but the side-effect of prolonged local vasoconstriction may outweigh the benefit in wounds where perfusion is impaired.

Conclusion

These results should encourage others to use CE-certified antibacterial honey dressings in wounds infected or colonised with MRSA. Nonetheless, prospective randomised studies are urgently needed to confirm the real benefit of this unconventional treatment approach. We recently developed a database (Woundpecker, Children's Hospital, University of Bonn, Germany) for the standardised collection of datasets on the clinical use of Medihoney products in wound care, with a view to fostering the collection of clinical evidence and to perform prospective comparative studies in the near future.