Wounds and MRSA

Approaches to therapy and an outlook on improving the clinical data situation, with a special focus on the polihexanide-containing Suprasorb® X+PHMB HydroBalanced dressing

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Current situation
The clinical incidence of methicillin-resistant Staphylococcus aureus strains has been on the rise for several years. This microorganism is particularly common in chronic wounds. According to the Robert Koch Institute (RKI), the estimated incidence rate in the inpatient setting is approx. 20% by now. The bacteria typically colonize the skin and mucous membranes, most commonly affecting the nose.

Patients with chronic wounds are carriers of a specific biotope which provides ideal conditions for colonization and persistence of these microorganisms.

Sanitizing the wound biotope is one of the major challenges in MRSA decontamination. It is estimated that the incidence of staphylococci with antibiotic resistance has increased about tenfold over the past decade. There are no absolutely definite figures available, as infections of this type are not notifiable. The actual incidence of the microorganisms varies among individual regions in Germany, and the situation at one particular facility may be entirely different from that of another.

The data currently available for the U.S., Japan, Great Britain, and the Mediterranean region presents a more serious picture: in these regions, no less than 50% of all Staphylococcus aureus type microorganisms are actually MRSA. In the Scandinavian countries and the Netherlands, by contrast, these strains are all but non-existent.

Risk factors
The following risk factors have been identified for colonisation with MRSA:

Patient-specific factors:
- advanced age
- low mobility
- open wounds, such as pressure ulcers or leg ulcers
- Diabetes mellitus and other chronic conditions
- eczema, exudative dermatitis
- functional disorders, multimorbidity

Non-patient-related factors:
- prolonged antibiotic therapy
- hospitalization within the previous 6 months
- invasive surgery, exogenous implants
- high level of nursing care classification
- close contact between patients and staff
- urinary catheters

Moreover, the results of a study conducted by the State Office for Public Health Services of the German state North Rhine-Westphalia in 2002 revealed the following risk factors with regard to an even higher probability of MRSA colonisation in the nose and throat in nursing home residents:
- male sex
- peripheral malperfusion
- presence of other underlying conditions, e.g. pancreatitis, foot necrosis, previous tuberculosis (TBC)

Currently the problem is increasingly shifting from hospitals towards inpatient health care facilities and nursing homes.

Basic problems of MRSA eradication
In daily clinical practice, the eradication of MRSA presents a constant challenge, and its practical implementation is difficult even when a high-quality management system is in place which meets the requirements of authoritative hygiene recommendations. A major problem in this context is the sanitisation of specific biotopes. The most prominent of these known from literature are the nose and throat, as well as wounds and other areas of non-intact skin (incision sites for catheters and probes, ostomies etc.).

Selection of substances for MRSA eradication
Furthermore, it must be noted that a wide variety of different data are available regarding the efficacy of different substances for topical application within the scope of MRSA eradication.

One such substance, which lends itself to the use in wounds due to its safety and broad spectrum of efficacy, as well as excellent tolerability in vivo and in vitro, and the lack of resistances, is the cationic polymer polyhexamethylene biguanide (polihexanide, PHMB).

Further considerations: importance of the carrier substance
Another important consideration in this context is the influence which the formulation and/or the carrier substance of polihexanide may have on the properties of this antimicrobial substance.
Initial empirical data from practical application of the polihexanide-containing Suprasorb® X+PHMB HydroBalanced wound dressing for decontamination of chronic wounds colonised with MRSA

Within the scope of the first systematic clinical case study, the polihexanide-containing Suprasorb® X+PHMB HydroBalanced wound dressing was used to treat a group of 3 wounds with long-term intractable MRSA colonisation in which sanitisation had not been achieved despite several lege artis attempts at decontamination.

In a new attempt at decontamination, the dressings were applied at 1-day or 2-day intervals over a total period of 14 days. This was followed by an assessment of the microbiological situation in accordance with the RKI’s recommendations.

Result

These initial case studies were successful at achieving a complete absence of MRSA in patients with MRSA-positive pressure ulcers by use of a polihexanide-containing moist cellulose dressing. Once these results are corroborated by the current study mentioned below, a new evident method will be available for achieving the difficult task of sanitising the wound biotope.

This would be an advance in the management of MRSA-positive wound patients, and it might also help to improve the overall quality of patient care and safety of use.

Table 1 shows the development of the microbiological situation over time.

Ongoing study on polihexanide used for “eradication” of MRSA in wounds

Problem at hand

In November 2007 a randomised, prospective, controlled multicentre comparison trial was initiated to investigate the properties and effects of a polihexanide-containing moist cellulose dressing versus a polihexanide-containing wound cleansing and decontamination solution with regard to achieving a complete absence of MRSA in patients with MRSA-positive pressure ulcers, based on the results of a microbiological test for MRSA in the wound.

Procedure

This comparison trial involves 2 groups of 15 patients each who have been tested positive for MRSA in the wound biotope; one group was treated with the polihexanide-containing Suprasorb® X+PHMB moist cellulose dressing, the other with cotton dressings impregnated with a polihexanide-containing wound cleansing and decontamination solution. The total treatment period for both groups was 14 days.

At each dressing change, the treatment results are assessed by use of a questionnaire, and photos are taken for documentation.

For surveillance of the antimicrobial effectiveness of treatment, swabs are taken on 3 consecutive days after the end of the observation period (semi-quantitative swabs in accordance with the RKI recommendations).

Conclusions and outlook on future developments

These initial empirical data from practical application in MRSA patients present a clear picture of the effectiveness of decontamination measures taken at the wound level by use of a polihexanide-containing cellulose wound dressing.

The results of this ongoing study will facilitate a conclusive interpretation of this initial evidence.

<table>
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<th>Wound</th>
<th>Semi-quantitative assessment at baseline</th>
<th>Sanitisation</th>
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<th>Semi-quantitative assessment at 2nd check-up</th>
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Tab. 1: Development of microbiological situation over time
Case

The development of one of the wounds colonised with MRSA that were treated with Suprasorb® X+PHMB is illustrated below.

The patient is a 47-year-old man who is completely immobilised and under permanent care due to a apallic syndrome. In this patient, a complete absence of MRSA could not be achieved by repeated full-body decontamination. In particular, the wounds caused by pressure had not become entirely free of MRSA despite several lege artis eradication cycles; thus other biotopes were also affected again by endogenous recontamination.

During this phase of recontamination, the polyhexanide-containing HydroBalanced wound dressing was used for a total period of 5 days, along with typical full-body decontamination. The dressing was changed at daily intervals. After completion of therapy, Suprasorb® X without PHMB was left on the wound for another 3 days. After that, semi-quantitative swabs were taken for surveillance on 3 consecutive days in accordance with RKI recommendations.

The development of the microbiological situation over time is shown in Table 1 (wound 3).

The treatment was successful in eliminating MRSA from all biotopes. The patient remained free of microorganisms from that time onward.

Within the scope of wound healing, initiation of reparative processes was observed once the problem of MRSA colonisation had been resolved.

The illustrations (Fig 1-3) below show the development over time.

References

7. www.rki.de