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PRAXIS *Spezial*

– Disturbances of Wound Healing –

**Removal of wound bacteria
from infected and colonized
wounds with
Cutisorb[®] Sorbact[®]**

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Every wound, even an aseptic surgical wound, is contaminated with microorganisms. However, this does not necessarily mean that the wound is infected. Only when bacteria penetrate deeper into the wound, multiply, damage the tissue with their toxins or induce symptoms of inflammation can we speak of an infection. Widely used methods of infection control include systemic antibiotic therapy and local antiseptics with a variety of agents capable of acting on the cell structure of pathogenic organisms, but also the body's own cells.

Cutisorb® Sorbact® wound dressings work without a chemically active agent and therefore have no undesirable side effects. They eliminate wound bacteria solely by hydrophobic interaction.

Wound infections – a cause for concern with serious consequences

Wound infections are often a serious complication. They can cause repeated operations for the patient, prolong scheduled hospitalization and lead to considerable extra costs.

The sooner an infection is diagnosed, the better the prospects for its timely and rapid control. Classical signs of infection include redness, swelling, hyperthermia, pain and functional impairment. The general symptoms such as fever, chills and elevated inflammatory parameters, like leukocytosis and CRP as well as swelling of the regional lymph nodes, are also definite signs of an infectious process.

Recognizing incipient wound infections is difficult, however, since the conclusive symptoms are often absent.



Fig. A: Posttraumatic wound infection

Table 1: Types of infection

In wound infections, several types of bacteria usually are simultaneously active. The appearance of the infection shows whether it is primarily a

- pyogenic wound infection caused by pus-forming organisms
- wound infection induced by putrefactive bacteria or
- anaerobic wound infection caused by anaerobes

Table 2: Precipitating factors of wound infection

The mere presence of bacteria does not automatically mean that a wound infection will develop. Several additional factors also have to be present. The following aspects are also important:

- the number of microorganisms present,
- the type of bacteria,
- the toxicity level (virulence) of the microbes,
- the type of wound (e.g. gaping or smooth), necrotic (covered with dead tissue) or fresh,
- whether foreign bodies are present in the wound,
- how well the patient's immune defence is functioning.

Thus, microbiological studies have shown that 10^5 pyogenic streptococci per cm^3 are sufficient to induce a wound infection.

A correct wound swabbing technique is essential for reliably estimating microbial contamination. Swabs should be taken from deep inside the wound and from the wound margins, which is where the infectious pathogens are concentrated.

Infections themselves are complex processes influenced by many factors (Table 1, Table 2), the etiology and age of the wound being especially important. Postoperative wounds, for example, require a different approach to traumatic or secondary healing wounds. Especially in poorly healing wounds, the blood perfusion conditions are a critical factor. The cells and substances important



Fig. B: Posttraumatic wound infection

for local immune defence and antibody production require oxygen which can only be provided in sufficient amounts in well-perfused tissue. From this it can be concluded that reduced or absent blood perfusion markedly increases the risk of infection.

Deficient blood perfusion can also lead to the formation of necrotic tissue, which itself is an ideal nutrient substrate for bacteria. Furthermore, a close relationship exists between the state of the wound and the patient's immune defences. An already weakened immune status, a generally debilitated condition, malignant tumours, certain metabolic diseases, advanced age and dietary deficiencies may be expected to have adverse effects on the immune response.

Prevention and treatment of infected wounds and wounds at risk of infection

Traumatic wounds are always subject to a greater or lesser extent of contamination with microorganisms. Especially superficial abrasions, lacerations and contusions require not only extensive disinfection and possibly surgical treatment, but also a suitable wound dressing with decontaminating and bacteria eliminating properties. Topical antibiotics should be avoided. Antiseptic solutions may be suitable but have only short-term bactericidal action. Wound covers and dressing materials which release their active ingredient over a prolonged period (at least 24 hours), or wound dressings with a bacteria-binding surface structure are therefore recommended. These materials should not adhere to the wound and should remove atraumatically at every dressing change.

With the declared aim of rapid microbial reduction in already infected wounds, surgical revision, if necessary, should be followed by disinfection either simultaneously with systemic antibiotic therapy or, if the patient's overall clinical condition is suitably good, possibly alone. Wound irrigation can be carried out additionally. The primary dressing should ideally have prolonged antibacterial efficacy and reliably cover the period until the next dressing change. Wound dressings saturated with antiseptic solutions or ointments are in our experience unsuitable, since they very often adhere to the wound bed and wound margins, cause considerable pain and retraumatize the wound when removed.

Postoperative infections, apart from the risks they involve for the patient, also lead to expensive prolongation of hospitalization. 2 to 5 per cent of all extra abdominal and another 20 per cent of all abdominal surgical operations are followed by postoperative disorders of wound healing. The patients concerned require intensive care 60 per cent more frequently, and hospital readmission five times as often, and the mortality in this patient population is approximately doubled. Major emphasis therefore also has to be placed on postoperative wound management.



Fig. C: Postoperative disorder of wound healing after heart bypass operation, surgical revision and rectal muscle flap plasty

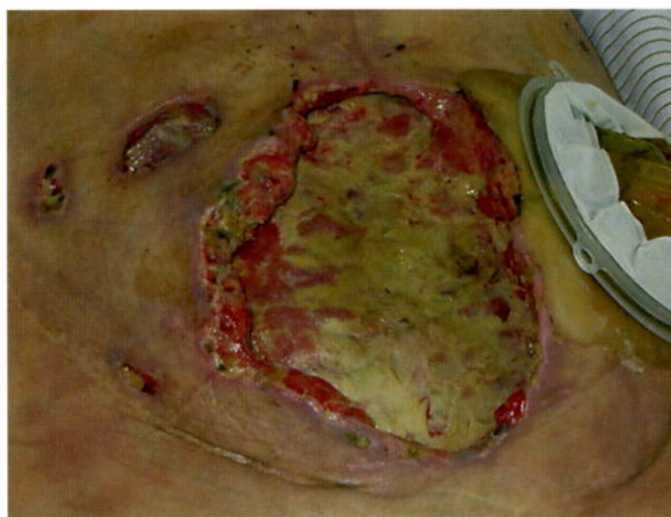


Fig. D: Postoperative disorder of wound healing after rectum resection

Delayed wound healing is often caused by more or less severe microbial colonization. A large number of scientific studies have shown that a high microbial count in a chronic wound is responsible for the very slow healing rate of these wounds. A microbial burden of more than 10^5 bacteria per gram tissue is already thought to impair wound healing. Here too, a surgical procedure and continuous bacteriostatic/antiseptic therapy are necessary until an infection-free and granulating wound develops.

