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REVIEW

Acetic acid treatment of pseudomonal wound infections — A review

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Summary
Purpose: Pseudomonas aeruginosa is a significant cause of burn wound infections and, skin and soft tissue infections. The antiseptic management is an integral part of the management of wound infections and is essential to control wound infection. Although commonly used, concerns have been raised.
Results: Available experimental data suggest that many commonly used antiseptic agents may be toxic to the cells involved in wound healing process and may affect the process of normal tissue repair. In view of this, the present review summarized the various organic acids commonly used as a substitute for antiseptics to control pseudomonal wound infections with special reference to acetic acid and their role in the process of wound healing.
Conclusion: Acetic acid is to be kept in mind as one of the alternatives when infection is caused by multiple antibiotic resistant strains of *P. aeruginosa*. At a time when bacterial resistance to antibiotics is a matter of increasing concern, the value of topical agents such as acetic acid should not be forgotten.

Contents

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Introduction

Pseudomonas aeruginosa is a classic opportunistic pathogen with innate resistance to many antibiotics and disinfectants [1]. It is resistant to some common antiseptics and disinfectants such as quaternary ammonium compounds (e.g., cetrimide and benzalkonium chloride), chloroxylenol and hexachlorophane [2,3]. Its isolation has been reported from povidone-iodine, chlorhexidine, dettol and savlon solutions used in hospitals [4—8]. In recent years, *P. aeruginosa* has acquired significance as an important cause of nosocomial infections because of its ability to survive in the hospital environment and because of its ability to develop resistance to antimicrobial agents. It is ubiquitous in the hospital environment and is the most frequently isolated nonfermentative bacillus from various clinical specimens. It can infect almost any external site or organ in the body. It is a significant cause of burn wound infections, and skin and soft tissue infections. Approximately, one third of burn wounds are caused by *P. aeruginosa*. It is an important cause of nosocomial infections and is associated with high morbidity, increased stay in the hospital and increase the cost of treatment because of its resistance to a variety of antipseudomonal agents commonly available. In recent years, an increased frequency of strains resistant to several antimicrobial agents have been reported [9—11]. In spite of continuing introduction of potent antipseudomonal agents, it is the most difficult nosocomial pathogen to be eliminated from infection site. Growing resistance to antimicrobial agents seriously hampers the therapy of pseudomonal infections. The incidence of such multiple drug resistant isolates remains very high in burn units. *P. aeruginosa* is the most commonly encountered and most difficult to eradicate, needs special attention, if uncontrolled, becomes life threatening. There is a substantial evidence that excessive use of antibiotics promotes the selection, propagation and maintenance of antibiotic resistant microbes, especially in the hospital environment. In the recent times, the advent of new antimicrobial agents has helped to decrease the seriousness of many types of infections but in case of nosocomial infections caused by *P. aeruginosa*, the results have been less satisfactory and still the nosocomial infections caused by *P. aeruginosa* present a serious problem. The burn wound infections and, skin and soft infections caused by *P. aeruginosa* are very difficult to treat, in spite of availability of newer antibiotics with broad spectrum of activity. Thus, *P. aeruginosa* continues to create a threat to patient care [1—3,7,8,11].

Local wound care agents (antiseptics)

The optimal topical treatment is a balance between microbicidal activity and tolerability. Generally, highly reactive antiseptics are estimated as too toxic (though there are reports on the usability of agents like hypochlorous acid). Modern antiseptics are less reactive and need a little longer killing times against pathogens but are still efficient.

To the clinician it is obvious that reducing the number of bacteria in wounds is ultimately aimed at accelerating wound healing. The antiseptic management has a dichotomous history anchored in tradition and science. It is an integral part of the management of acute as well as chronic wounds [12,13]. The ideal topical therapy is aimed at reduction of bacterial contamination and removal of soluble debris without adversely affecting cellular activities vital to wound healing process. Although several studies support the value of topical antimicrobial agents, many commonly used antiseptic agents are not approved for use in wound infections. The safety and efficacy of many antiseptics as topical agents for local wound care is a questionable issue. A number of experimental studies both in vitro and in animal wounds suggest that many antiseptic agents including iodine, chlorhexidine, hydrogen peroxide, alcohol, silver sulfadiazine, mefenide acetate, sodium nitrate, sodium hypochlorite, etc. may be toxic to the cells involved in wound healing process. Available experimental data suggest that the antiseptics such as hydrogen peroxide and iodine are not only toxic to fibroblasts but also potentially retard the contribution of fibroblasts