Full Length Research Paper

Vinegar Simple Method in Dressing of Pseudomonas Infected Wound

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Abstract

The awareness is increasing of the persistency of non-healing wounds often being caused by bacterial infections. One of the most common pathogens in chronic wounds is Pseudomonas aeruginosa, a very problematic microbe due to its resistant to many antimicrobial agents. P. aeruginosa is an opportunistic pathogen, often acquired in hospital environments. Chronic wounds are those wounds that are persistent and do not respond to any sort of treatment. The concept of using topical antiseptics on open wounds is to prevent and treat infections. In economically deprived areas, the problem gets complicated by inability of patients to afford newer drugs which are usually costly. In this study aiming to evaluate effect of acetic acid (vinegar) which is easily and cheaply available, on pseudomonas infected wound. This study conducted on ten cases with chronic wounds with pseudomonas infection in Sayed Galal hospital and wound dressing was done by vinegar every six hours. Five patients have diabetic foot, two infected mesh, one crush foot and one infected wound post open cholecystectomy. Debridement of wound was done when needed. All cases show improvement within 7 to 14 days by clinical and culture from the wound. The vinegar can be safely, effectively methods in treatment of pseudomonas infected wounds.

Keywords: Pseudomonas, Vinegar, Chronic wound, Acetic acid, Debridement.

INTRODUCTION

The skin is one of the largest organs of the body and functions as a protective barrier from the outside environment with temperature differences, radiation and pathogenic microorganisms. An injury to the skin immediately starts the complex wound healing mechanism, involving blood cells, epithelial and connective tissue cells, extracellular matrix and a variety of cell mediators usually resulting in wound closure within days or weeks (Power et al., 2001).

Ever since the creation, man has been struggling to treat infected wounds and in the process man devised a large number of dressings and drugs (Salati and Rather, 2008).

The awareness is increasing of the persistency of non-healing wounds often being caused by bacterial infections (Bjarnsholt et al., 2008). All wounds are contaminated by several strains of bacteria, derived from endogenous sources such as the gastrointestinal tract, the surrounding skin, the environment or from the healthcare provider (Kirketerp-Møller et al., 2008). A wound is said to be infected when the invading microorganisms cause notably impaired wound healing. When infectious bacteria are invading a host, toxic substances are produced by the microorganisms that cause damage to the host tissues (Gjodsbol et al., 2006).

But even today, there remains a huge chunk of infected patients in whom even modern drugs are of little use, either due to lack of affordability or sensitivity or onset of adverse effects. In such circumstances, surgeons resort to rather unconventional means of wound management (Nagoba et al., 2008).

Pseudomonas aeruginosa is a classic opportunistic pathogen with innate resistance to many antibiotics and disinfectants and because of its ability to survive in hospital environment it creates threat to patient’s care. It is the most difficult nosocomial pathogen to be eliminated from infection site (Nagoba et al., 1997).

The purpose of this study to evaluate effect of
vinegar in treatment of chronic wounds infected with pseudomonas in poor patients who can't afford new expensive drugs.

MATERIALS AND METHODS

The study was done prospectively on 10 cases of proved pseudomonal infection not responding to traditional therapy, were selected. The acetic acid was used in 5% concentration, which is commonly and cheaply available in the market, being primarily used for cooking purposes and surgical debridement was done when in need.

Inclusion criteria: All patients with chronic wounds infected with P. aeruginosa and surgical debridement was done to the patients who have necrotic tissue in the wound.

Exclusion criteria: Wounds due to massive burns, suspected malignancy, immunocomprised individuals and individuals with sepsis.

A specimen of pus was collected before application of acetic acid and after completion of treatment. In these patients, sterile gauze soaked in acetic acid was replaced every six hours till the wounds showed clinical improvement in form of absence of purulent and foul-smelling discharge and regression of inflammatory features. The swab cultures were repeated once the wounds improved and acetic acid was applied till swabs yielded no growth of pseudomonas. None of these patients received any other antibiotic.

RESULTS

The profile and outcome of these patients is given in Table 1.

All isolates were found to be resistant to four or more antibacterial, Figure 1 to 4.

Most of patients show improvement of odor of the wound within four to seven days but as regarding pain five patient show some discomfort after application of vinegar especially after first application then disappear after two to three days , only patient (crushed foot) need small dose of non-steroidal anti-inflammatory drugs for three days.

DISCUSSION

Vinegar is an acidic liquid, which is made both naturally and synthetically, from the oxidation of ethanol, CH3CH2OH, in an alcohol-containing liquid such as wine, fermented fruit juice (e.g. cider) or beer. It has been used since ancient times as an important cooking ingredient.

Wounds are classified as either acute or chronic. Acute wounds heal in a predictable manner and time frame. Chronic wounds are defined as wounds that have failed to proceed through the orderly process that produces satisfactory anatomic and functional integrity or that have proceeded through the repair process without producing an adequate anatomic and functional result (Hopf et al., 2006).

The incidence of wound infection is about 5% to 10% nationwide and has not changed during the last few decades (Arnold and Barbul, 2008).

Pseudomonal infection in hospitalized patients has always been problem to the clinicians. Traditional therapies with antipseudomonal agents have their own limitations because of multiple antibiotic resistance in nosocomial strains of P. aeruginosa. The use of acetic acid has been reported from time to time as a topical agent for the treatment of pseudomonal infections and in most reports has been used for superficial infection (Nagoba et al., 1997).

Dressings can be classified as primary or secondary. A primary dressing is placed directly on the wound and may provide absorption of fluids and prevent desiccation, infection, and adhesion of a secondary dressing. A secondary dressing is one that is placed on the primary dressing for further protection, absorption, compression, and occlusion. Many types of dressings exist and are designed to achieve certain clinically desired endpoints (Martinez-Zapata et al., 2012).

Desired characteristics of wound dressings

- Promote wound healing (maintain moist environment)
- Conformability
- Pain control
- Odor control
- Nonallergenic and nonirritating
- Permeability to gas
- Safety
- Nontraumatic removal
- Cost-effectiveness
- Convenience (Barbul et al., 2010).

Topical use of acetic acid at concentrations 5% eliminated P. aeruginosa from the burns and soft tissue wounds. In this study 5% acetic acid was used that successfully eliminated P. aeruginosa in 12 days from all cases. Acetic acid may act against P. aeruginosa simply by lowering of the pH and thereby making an environment unsuitable for growth and multiplication of P. aeruginosa.

It is possible that the application of acetic acid may confer other benefits on the healing process as well as the removal of bacteria. The effect of acetic acid on re-epithelization has been studied in animal and human models and it has been found to have no negative impact on wound healing, (Kjolseth et al., 1994) although one study found that acetic acid initially delayed re-epithelization, but after the eighth day this effect did not persist and tensile wound strength was not
Table 1. Profile of patients treated with acetic acid

<table>
<thead>
<tr>
<th>No.</th>
<th>Age</th>
<th>Sex</th>
<th>Nature of the wound</th>
<th>Duration of treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>48</td>
<td>M</td>
<td>Diabetic foot</td>
<td>10 days</td>
</tr>
<tr>
<td>2</td>
<td>50</td>
<td>M</td>
<td>Diabetic foot</td>
<td>12 days</td>
</tr>
<tr>
<td>3</td>
<td>45</td>
<td>M</td>
<td>Diabetic foot</td>
<td>14 days</td>
</tr>
<tr>
<td>4</td>
<td>55</td>
<td>F</td>
<td>Diabetic foot</td>
<td>10 days</td>
</tr>
<tr>
<td>5</td>
<td>53</td>
<td>F</td>
<td>Diabetic foot</td>
<td>7 days</td>
</tr>
<tr>
<td>6</td>
<td>55</td>
<td>M</td>
<td>Infected wound</td>
<td>7 days</td>
</tr>
<tr>
<td>7</td>
<td>25</td>
<td>F</td>
<td>Bed sore</td>
<td>10 days</td>
</tr>
<tr>
<td>8</td>
<td>46</td>
<td>M</td>
<td>Crushed foot</td>
<td>10 days</td>
</tr>
<tr>
<td>9</td>
<td>45</td>
<td>F</td>
<td>Infected mesh</td>
<td>7 days</td>
</tr>
<tr>
<td>10</td>
<td>35</td>
<td>M</td>
<td>Infected mesh</td>
<td>7 days</td>
</tr>
</tbody>
</table>

Figure 1. Diabetic foot within application of vinegar

Figure 2. Diabetic foot after application of vinegar

Figure 3. Infected wound post open cholecystectomy
influenced (Drosou et al., 2003).

As far as the mechanism of action of acetic acid is concerned, it is suggested that acidification of a wound also increases the pO2 and reduces the histotoxicity of ammonia which may be present (ammonia being less toxic in an acidic environment). This acidification of a wound is, however, relatively short-lived and it has been found in one study that the wound does not maintain acidity for periods longer than about few hours and therefore soaks would require frequent replacement. (14)

In this study, we changed the acetic acid soaked gauze every six hours though some study have got excellent results with even single daily gauze replacement.

CONCLUSION

The vinegar can be safely, effectively and very economically used in elimination of multiple antibiotic resistant strains of P. aeruginosa from soft tissue infected wounds.

REFERENCES


