Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/burns

A comparison between occlusive and exposure dressing in the management of burn wound

M.M. Soltan Dallal [a,b], R. Safdari [c], H. Emadi Koochak [d,e], S. Sharifi-Yazdi [f], M.R. Akhoondinasab [g], M.R. Pourmand [b], A. Hadayatpour [h], M.K. Sharifi-Yazdi [d,i,*]

[a] Food Microbiology Research Center, Tehran University of Medical Sciences, Tehran, Iran
[b] Division of Microbiology, Department of Pathobiology, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran
[c] Health Information Management Department, School of Allied Medicine, Tehran University of Medical Sciences, Tehran, Iran
[d] Zoonosis Research Centre, Tehran University of Medical Sciences, Tehran, Iran
[e] Infectious Diseases Department, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran
[f] School of Medicine, Tehran University of Medical Sciences, Tehran, Iran
[g] Burn Research Center, Iran University of Medical Sciences, Tehran, Iran
[h] Department of Anatomical Department, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran
[i] Department of Medical Laboratory Sciences, School of Para Medicine, Tehran University of Medical Sciences, Tehran, Iran

ARTICLE INFO

Article history:
Accepted 4 May 2015

Keywords:
Occlusive dressing
Exposure dressing
Burn wound infection
Bacterial prevalence

ABSTRACT

Background and aim: Two types of dressing, occlusive and exposure dressing, are commonly used in burn units. A dressing is said to be occlusive if a moist wound surface is maintained when the dressing is in place. This study was designed to compare the effectiveness of occlusive and exposure dressing in controlling burn infections.

Patients and methods: Two hundred patients with second-degree burns admitted to Motta-hari Hospital, Tehran, Iran, over a period of 12 months from May 2012 to May 2013 were studied. They were divided into two groups of 100 each, to receive either occlusive or exposure dressing. During the first week of treatment, wound specimens were obtained by sterile swab and cultured in selective media. Demographics (age and gender), burn areas, cause of burn, length of hospital stay (LOS), type of infections and time to total healing were compared between the two groups.

Results: Occlusive dressing was more susceptible to microbial contamination and infections than exposure dressing. The mean duration of treatment based on epithelialization and healing in occlusive dressing was longer than for exposure dressing. The most common isolate was *Pseudomonas* spp., followed by *Enterobacter*, *Escherichia coli*, *Staphylococcus aureus*, *Acinetobacter*, and *Klebsiella* spp.

Conclusions: Exposure dressing was more suitable than occlusive dressing for treating partial-thickness at our center. *Pseudomonas aeruginosa* was the most common organism encountered in burn infection.

* *Corresponding author at*: Zoonosis Research Centre, Tehran University of Medical Sciences, Tehran, Iran. Tel.: +98 9123874873.
E-mail address: mksharifi@tums.ac.ir (M.K. Sharifi-Yazdi).

http://dx.doi.org/10.1016/j.burns.2015.05.001
0305-4179/

1. Introduction

The International Society for Burn Injuries defines a burn as an injury to the skin or other organic tissue caused by thermal trauma [1]. Skin injuries due to ultraviolet radiation, radioactivity, electricity, or chemicals, as well as respiratory damage resulting from smoke inhalation, are also considered burns [2,3]. When the skin as a physical barrier is damaged, pathogens have a direct route to infiltrate the body, possibly resulting in infection [4,5]. In addition to the nature and extent of injury influencing infections, the type and quantity of microorganisms that colonize the burn wound appear to influence the future risk of invasive wound infection. The pathogens that infect the wound are primarily gram-positive bacteria such as methicillin-resistant *Staphylococcus aureus* (MRSA) and gram-negative bacteria such as *Acinetobacter baumannii–calcoaceticus* complex, *Pseudomonas aeruginosa*, and *Klebsiella* species [6–10]. A burn is denoted as first degree when it affects the epidermis, superficial second degree when the damage penetrates into the papillary dermis, and deep second degree when the damage extends beyond the reticular dermis. However, burns destroying all layers of the skin down to the subcutaneous fat are designated as third-degree burns [11]. In first- and second-degree burns, healing is by primary intention and is almost scarless. However, in deep second-degree and third-degree burns, the healing process usually leads to contracture and formation of hypertrophic scars, with patients often requiring reconstructive surgery [12,13]. Before selecting a dressing for a particular wound, a practitioner must assess the needs of the wound carefully to understand which dressing would provide maximal benefit. It must be noted that occlusive dressings might potentiate wound infection [7]. However, although heavy colonization by skin and wound flora is often seen under certain types of occlusion, clinical infection is not a frequent occurrence. Infections are considered to be one of the most important and potentially serious complications in people with burns [14]. The National Burn Repository of the United States reported 19,655 cases of complications in people with burns over a 10-year period; of these, 31% were pulmonary complications, 17% were related to wound infection and cellulitis, and 15% were due to septicemia and other infectious complications [15]. Certain aspects of wound healing may, in fact, be promoted by bacterial colonization, although clinical infection can lead to wound breakdown and systemic infection [16]. Occlusive dressings may help prevent infection by presenting a barrier to potential pathogens, and hydrocolloid occlusive dressings have been shown to prevent the dissemination of MRSA [17,18]. This study was designed to compare the effectiveness of occlusive and exposure dressing in controlling burn infections.

2. Patients and methods

Two hundred subjects with second-degree burns over 2–5% of the total body surface area (TBSA) were examined after being admitted to the Mottahari hospital burn unit over a period of 12 months from May 2012 to May 2013.

The inclusion criteria applied was outpatients who sustained second-degree burns not exceeding 2–5% of TBSA and who received systemic cephalexin (first-generation cephalosporin). The burn sites included the wrist, forearm, palm, backs of the hands, ankles, buttock, and back of the leg. These patients were randomized into two equal groups to receive either occlusive or exposure dressing for treatment. A structured questionnaire was prepared to record the history (age, gender, occupation, cause, location, and percentage and degree of burn), examination details, and investigation reports. In open dressing, the wound was cleared of dead tissue and debris gently, cleaned with warm water and baby shampoo, then washed with sterile normal saline, and dried with a sterile gauze. Next, the wound was covered with an approximately 16-mm-thick layer of silver sulfadiazine cream. The above procedure was repeated the following day in the hospital emergency room. During the first week of treatment, swabs were collected from the burn wounds after cleaning the site with sterile normal saline. To obtain a culture of the burn surface, topical agents (if any) were first removed with gauze soaked in sterile saline. An area measuring 4 cm^2 was swabbed using two sterile swab sticks. For dry wounds, the swab was moistened with sterile saline before swabbing. These specimens were immediately transported to the laboratory for further processing. The burns were treated up to the level of the epithelium, and wound healing and the results of microbial culture for each patient were recorded. The occlusion dressing was performed using the same technique as that for exposure dressing, except that the wound was wrapped with a sterile bandage at the end. The following definition was taken as a sign of infection:

- Change in color of the area with burns or the surrounding skin
- Purplish discoloration, particularly if swelling is also present
- Change in thickness of the burn (the burn suddenly extends deep into the skin)
- Greenish discharge or pus
- Fever

For data analysis, an independent *t*-test was used in SPSS package version 11.5.