

Silver based dressing for the management of second degree burns. A case report

Fernando Barbosa Villarreal M.D.
 Carlos Manuel Cortes Aguilar M.D.
 Randall Cruz Soto M.D.
 Miguel Eduardo Marin Canto M.D.
 Ana Priscila Campollo López M.D.
 Mauricio Gutierrez Alvarez M.D.
 Patricia Lizette López Medellín M.D.
 Benny Alonso Osuna Wong M.D.
 Cuahutémoc Márquez Espriella M.D.

Mexico City, Mexico

Case Report

Plastic Surgery



Background

Burns are a major cause of disability worldwide. Proper management of burns significantly improves the functionality and aesthetic outcome of burned areas. Mepilex-Ag® is an intelligent dressing that improves healing in chronic wounds, burns among them. We present the case of a 40-year-old female patient with 2 degree burns superficial and deep burns in 19% of TBSA. Surgical cleaning was performed with placement of Mepilex Ag to place autologous grafts later, she was discharged after 14 days with adequate clinical evolution. The aim of this article is to document our experience with the use of dressings as temporary coverage for the management of burns.

Keywords: Burns, management of burns, silver based dressings.

Burns represent a widely common type of trauma worldwide. According to estimates from the World Health Organization (WHO), there are up to 11 million cases of burns requiring medical attention annually, with an estimated 180,000 related deaths worldwide. It is important to note that approximately 90% of these injuries occur in countries with limited economic resources, where the availability of burn specialists is often limited. Most burns occur in the domestic environment and are largely preventable. Internationally, the epidemiology of burns varies based on socioeconomic status and gender. Women and children are at higher risk of suffering burns at home, while men are more likely to suffer burns in the workplace or during recreational activities. Only around 5% of burns globally result from intentional acts or abuse, while the rest are due to accidental incidents.

Special dressings and burn management

Optimal burn management will reduce hospitalization time, improve the long-term quality and appearance of scars, and decrease the likelihood of wound infection. Partial thickness burns often lose significant amounts of fluid through evaporation, and the degree may increase if they dry out or become infected. Therefore, special dressings should not only absorb the fluid but also maintain a moist environment to promote epithelialization and allow the patient to move without complications.

Silver ions are molecules that affect a wide range of bacteria, fungi, and viruses, making silver-

based products frequently used in burn management. Mepilex-Ag® is an intelligent dressing that consists of a silicone film (Safetac) (Figure 1), an absorbent polyurethane foam with silver sulfate, activated charcoal, and a vapor-permeable, waterproof film that absorbs fluid and maintains a moist environment. Safetac adheres firmly to dry, intact skin but does not stick to the moist edges of the wound, making dressing changes less painful and traumatic for the wound. While Mepilex-Ag® is in place, it releases silver ions that decrease bacterial colonization, providing a protective and long-lasting effect, and it can reduce unpleasant odors by controlling bacterial count. Therefore, Mepilex-Ag® is indicated for any exuding wound, such as diabetic or pressure ulcers, and burns. A meta-analysis by Lo et al. in 2009 revealed that Mepilex-Ag® significantly improved wound healing ($p < 0.001$), reduced odor ($p < 0.001$), reduced pain ($p < 0.001$), and reduced wound exudate ($p < 0.001$).

It contains a silver content of 1.2 milligrams/square centimeter. Its application can last for up to 7 days, considering the condition of the perilesional skin and wound characteristics. There are general considerations for its use, which are mentioned below: it should always be used under the supervision of a qualified professional; it should not be used in patients with a history of silver hypersensitivity; caution should be exercised in the continuity and replacement of the product in neonates and children; it should be removed before undergoing radiation therapy if the treated area contains the product, and reapplication should be done after completing the treatment; it should not be used in conjunction with

From the Plastic and Reconstructive Surgery Department at South Central Hospital Pemex, Mexico City, Mexico. Received on July 20, 2023. Accepted on July 29, 2023. Published on July 30, 2023.



Figure 1. Safetac, an absorbent polyurethane foam with silver sulfate, activated charcoal, and a vapor-permeable, waterproof film.

products containing hypochlorite or hydrogen peroxide; the use of Mepilex Ag® does not substitute systemic treatment or any other optimal treatment in cases of infection. According to a study by Aggarwala et al., Mepilex Ag® seemed to be the most effective in terms of reepithelialization time, with an average of 8.9 ± 2.4 days compared to 9.6 ± 3.3 , 9.6 ± 3.2 , and 10.8 ± 2.4 days for Aquacel Ag, Acticoat, and Biobrane, respectively.

It is estimated that the international market specialized in burn care will exceed \$22 billion by 2024. There are key factors contributing to its growth, including an increase in traffic accidents and chronic diseases such as diabetes, as well as a growing elderly population in all countries [1].

The healing process of burns is one of the most complex biological processes that occur in the human body, making burn management one of the essential practices in medicine [2]. Wound dressings are commonly used to assist in the wound healing process, primarily developed to aid reepithelialization by protecting the wound from further damage and/or infection. Modern wound dressings protect wounds from contamination while regulating exudate to provide a moist environment that promotes healing [3]. Alginate dressings, hydrocolloids, hydrogels, foams, and films can control the hydration level of the wound. However, the selection of the appropriate dressing is of utmost importance in wound treatment. The choice depends on the size and location of the wound, the level of exudate, and the physician's preference [4,5].

In cases where the dressing does not absorb enough, it can lead to maceration, which in turn increases the risk of infection and delays wound healing. On the other hand, a dressing with excessively high absorption capacity can dehydrate and damage

the tissue, resulting in a more extensive injury. Therefore, it is concluded that improper wound management and dressing selection can delay the healing process [6].

Mepilex Ag® is identical to Mepilex®, except for the addition of silver nanoparticles that make the dressing antimicrobial. It is indicated for use in (infected) wounds with mild to moderate exudate and second-degree burns [7]. Burn injuries continue to be a significant cause of mortality and morbidity worldwide, making them among the costliest traumatic wounds due to extensive hospitalization, rehabilitation, and expensive post-event treatment. The mortality rate associated with severe burns remains high. Burn injuries continue to be a significant cause of mortality and morbidity worldwide, making them among the costliest traumatic wounds due to extensive hospitalization, rehabilitation, and expensive post-event treatment. The mortality rate associated with severe burns remains high [8]. Multiple factors guide the evaluation and management of burn injuries, based on type, extent, depth, and specific patient factors such as age (<10 or >50 years), personal pathological history, specialized locations of burn injuries (face, eyes, ears, nose, hands, feet, and perineum), and the presence of associated injuries from smoke inhalation and other traumatic injuries. Burn injuries most commonly affect low- and middle-income individuals and people in low-income countries. The management of burn patients is multidisciplinary. Burn patients are best managed by a burn team in a specialized center, with a key focus on preventing complications and restoring functionality. Most second- and third-degree burn injuries require prolonged hospitalization, and their recovery is slow. It has been reported that aesthetics and self-perception are significantly altered in patients with burn injuries, and a mental health consultation should be conducted before discharge. The timely identification and management of burn injuries are important due to the complications that may arise during intra- and extra hospital care.

Case report

A 40-year-old female patient was referred from her unit due to burns caused by an explosion that had been evolving for 8 hours. Upon admission, the current burn protocol was followed, and the patient, who was currently intubated, underwent initial management and fluid resuscitation. Surgical cleansing, debridement, and application of intelligent dressings (Mepilex Ag®) were performed, revealing second-degree mixed burns covering 19% of the total body surface area (TBSA) on the face, posterior chest, and upper extremities. The patient was transferred to the burn intensive care unit for further care. Subsequently, a repeat surgical cleansing was



Figure 2. Satisfactory evolution with early discharge, functional, and aesthetic outcome.

performed, and definitive coverage was achieved using autologous grafts. The patient was discharged after a 14-day hospital stay, currently showing improvement and being monitored with appropriate clinical progress (Figure 2).

Discussion

The reported statistics on burn injuries from various studies coincide with the profile of our clinical case. In a German hospital, during a 14-year study period, 617 burn patients with TBSA $\geq 10\%$ were admitted to the ICU. Of these patients, 71.5% were male and 28.5% were female, resulting in a male-to-female ratio of 2.5:1. However, our patient contrasts with the expected distribution. On average, the patients were 49 years old, within the fourth decade of life. The most common etiology of burns was flame and contact burns (55.3%), followed by explosion and deflagration (22.7%), scald burns (18.6%), chemical burns (1.8%), and electrical burns (1.8%). Explosion and deflagration burns presented as the second most frequent type.

The most frequently affected burn sites included the arms (70.7%), the face/neck/scalp area (58.3%), the legs (53.6%), the hands (50.7%), and the chest (47.2%). These areas accounted for most burn injuries.

It is worth noting that 42.8% of the patients suffered from full-thickness burns, and the average TBSA was 23.2%, which falls within the average range [9,10]. Synthetic dressings, such as Mepilex Ag® (Mölnlycke, Gothenburg, Sweden), can serve as an alternative to topical creams, ointments, antimicrobials, or biological dressings. They offer the advantage of requiring fewer dressing changes while promoting accelerated wound healing.

Conclusion

Burn injuries typically manifest within a period of 2 to 3 weeks after the trauma, and it is expected that superficial partial-thickness burns will not result in significantly noticeable scars. The established standard treatment involves immediate debridement of non-viable tissue and covering the wound with dressings that promote favorable conditions for reepithelialization. An optimal wound dressing acts as an effective barrier to prevent transdermal fluid loss, reduce the risk of infection, facilitate reepithelialization of the wound surface, be cost-effective, easy to use, and provide pain control.

In some specialized centers for the treatment of partial-thickness burns, the standard approach involves performing debridement under analgesia, followed by wound coverage with a silver-coated foam dressing (such as Mepilex Ag®), and providing outpatient follow-up with dressing changes every 3 to 7 days until the wound fully heals. A dressing like Mepilex Ag® for the treatment of partial-thickness burns can be used in an outpatient setting. Since dressings generally have shorter healing times, creating a microenvironment that reduces wound size and mitigates associated pain can be advantageous, especially in the pediatric population, although this benefit should not be disregarded for adults.

It is crucial to have personalized management that includes comprehensive assessment and targeted treatment by multidisciplinary teams with adequate experience in burn care to ensure favorable outcomes.

Conflicts of interest

The authors declare no conflict of interest.

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Fernando Barbosa Villarreal
Plastic and Reconstructive Surgery Department
South Central Hospital Pemex
Mexico City, Mexico