



## EARLY BURN WOUND MANAGEMENT; WOUND MEMBRANES (ACTICOAT™) VERSUS STANDARD SILVER SULFADIAZINE (DERMAZINE™)

Preliminary results

*Yaser H.\* Atheer Alotaibi #Mahmoud Abdelnabi\*\**

General Surgery\*; plastic Surgery Unit \*\*& Emergency# Departments; Faculty of Medicine Zagazig University \*\* (EGYPT)& King Khaled University(KSA)#

**Corresponding author:**  
yaser m hussain

### ABSTRACT

**Background:** Burn wound infection is one of the most frequent and major complications in patients with burn injuries and is the main cause for prolonged in-hospital stay and death in cases of wide-spread infection. The purpose of this study is to investigate the effects of semipermeable membranes( Acticoat™) in deep partial thickness burns in comparison to standard care silver sulfadiazine Dermazine™ .

**Patients and methods:** In a prospective study design included n=30 severely injured patients with superficial to deep partial thickness burns they were randomized into two groups, group A (Acticoat™) (n=15) and group B receiving treatment with standard silver sulfadiazine (Dermazine™) (n = 15) .The outcome measures were pain ,temperature , time of wound healing, and Scar quality.

**Results:** There were significant differences between the two groups. Regard to, time to re-epithelialization and Scar quality in favor of (Acticoat™) treatment group versus (Dermazine™) group (p < 0.005)

**Conclusion:** In this study, we demonstrated that the choice of medication or membrane for a burn wound is a never-ending source of discussion and fortunately, most medications (Dermazine™) and membranes (Acticoat™) perform well if physicians carefully monitor wounds, keep them clean, prevent desiccation, and properly manage secondary infection.

**Key words:** Burn , Partial thickness ,face. Silver sulfadiazine.

### INTRODUCTION

Examination by an experienced burn surgeon remains the most reliable method, despite the many devices developed to measure burn depth or burn blood flow. The changes in wound appearance over the first few days after injury make serial examinations particularly useful tools in surgical planning (1).

A number of membranes have been developed to effect permanent wound coverage, including epidermal, dermal, and composite substitutes. A sheet of autologous epithelial cells can be grown from a full-thickness skin biopsy specimen. These can be useful in patients with massive injury, but they are very fragile, expensive, and provide unreliable definitive cover (2).

Temporary skin substitutes provide protection from mechanical trauma, a vapor barrier, and a physical barrier to bacteria. These membranes contribute to a moist wound environment with a low bacterial density that

is consistent with optimal wound healing. Split thickness human allograft remains the optimal temporary skin cover (3)

Burn wound cellulitis is commonly characterised by erythema of the surrounding unburnt skin (1–2 cm beyond the wound), pain and edema extending beyond the usual rim of inflammation commonly seen in burns in the first 48–72 h. (4) Burn wounds are susceptible to infection due to impairment of the skin barrier and reduction in cell mediated immunity . Infection or sepsis is present in a burn wound when deposition and multiplication of bacteria in the tissue is associated with a host reaction or invasion of nearby healthy tissue and a bacterial count of  $10^5$  of tissue (3,5)

A wide range of topical medications are available, including simple petrolatum, Silver sulfadiazine also various antibiotic-containing ointments and aqueous solutions, and debriding enzymes. All of them can be effective when used properly by experienced

providers in a program of burn care that includes wound evaluation, regular cleansing, and monitoring (5).

The aim of this study is to evaluate the effect both wound membrane versus wound ointment for management of deep partial thickness burn regarding to the aesthetic and wound healing outcome

### Problem

Over the last decade, many authors expressed concern over the increasing incidence of early burn wound cellulitis and the associated increased use of antibiotics, that delay wound healing ..

### PATIENTS AND METHODS

This a prospective controlled trial included n=30 patients of both sexes, with superficial and deep partial thickness burn ,the patient were admitted to our patients clinic in Zagazig University Hospitals and other burn centers , in the period between October 2015 to December 2016.

Patients were divided into two groups each group included n=15 patients ,patients age range between 20-66 years in both sexes Early superficial debridement was performed within the first 48 h after hospital admission when areas of deep partial thickness had been defined.

All patients had twice daily showers or washes of the burn wound with chlorhexidine 4% soap (Tap water ) in exposure technique Then after 48 h the wash followed by early superficial debridement and coverage .In group A ; The water-moistened Acticoat™ dressings were applied directly to the burn wound with the blue side opposing the wound. This application was followed by water-moistened gauze to activate the dressing; it was changed up to 3 days after application, or, when the color of the dressing altered from dark blue/grey to a coppery color.

In group B the Standard treatment'. Dermazine™ cream a topical dressing in a closed method after a hydro-procedure with Hibiscrub and cleansing using disinfection solution, the agent of 2-3 mm layer was applied directly on the wound and covered with dry, sterile and dense bandage-gauze dressing.

The microbiological analysis was performed at the beginning of the treatment and at every dressing change. Early burn wound cellulitis : One or more signs or symptoms of infection including redness or erythema extending more than 2 cm from the wound edges, elevated body temperature of 38.5 8C or above for at least 24 h and/or a positive wound swab culture (105 g of tissue) .

### Study Ethics

The protocol was approved by the local ethics committee in our university and written informed consent was provided by the patients prior the commencement of the study.

### STATISTICAL ANALYSIS

Was performed using Student's t-test with Bonferronis correction for multiple comparisons? Statistical significance was accepted at  $p < 0.005$ .

### RESULTS

Non significant differences between the two groups regarding to sex distribution, age, burn size the average %TBSA burns, the causes and sites of burn also burn wound cellulitis and antibiotic usage were included in ( table 2). Where we found the Dermazine™ group had a higher incidence of burn wound cellulitis (32%) than the Acticoat™ group which was (13 %).

The incidence of burn wound cellulitis decreased with use of Acticoat™. And as a consequence of this there was a decrease in the use of antibiotics from 45.5% in Dermazine™ group (7/15) in Acticoat™ 6.5% (1/15).

In group A treated with the (Acticoat™ ) dressings there were two patients with signs of infection versus n=5 in group B (Dermazine™) also we observed one case with purulent infection that was associated with signs burn wound infection in group A . Post healing wound scar quality was judged not so good when it was more red and appeared heterogeneous

The median time to complete reepithelialization of superficial and deeper burns was  $10 \pm 1.2$  days in group A versus  $18 \pm 1.5$  in the other group respectively. One case with visible signs of hypertrophic scarring or dyspigmentation were found in

(Acticoat™) group A versus four cases in (Dermazine™) group B. (P < 0.005).

Table 1 preoperative patient's characters

Variables	Group B L(n=15 Acticoat™)	Group C (n=15) Dermazine™	P value
Age Minimum to maximum Mean ± SD	23.0-66.0 43.23±9.0	20.0 -62.0 41.32±7.0	0.564
Sex male/female	7/8	6/9	
Causes of burn Flame burn Scalds	6 9 12%	8 7 13%	T=0.648
Average %TBSA			

Average TBSA and types of burn for the Acticoat™ and Dermazine™ groups

%TBSA: % total body surface area of burn.

Table 2 patients characteristics during dressing

Variables	Group B (Acticoat™) n=15	Group C n=15 Dermazine™	P value
Signs/symptoms			0.5
Redness/erythema without positive swab	2(13%)	5(33%)	
Positive swab only without redness or increased temp.	10(66%) 3(19.5%)	7(45.5%) 3(19.5%)	
Positive swab with Elevated body temperature +redness			

Redness means erythema beyond the burn wound more than 2 cm

Incidence of wound cellulitis signs and symptoms in the two groups' preclusive method

Table 3 patient's characteristics in the early burn wound cellulitis and Antibiotic usage

Variables	Group B n=15 Acticoat™	Group C n=15 Dermazine™	P value
Signs/symptoms			<0.005
Occurrence of burn wound cellulitis	n=2(13%)	n=5(32%)	
purulent discharge Antibiotic usage	n=1(6.5%) n=1(6.5%)	n=0(0.0%) n=7(45.5%)	

The incidence of burn wound cellulitis and antibiotic usage ,during the dressing course; there were a significant difference between both groups regarding the cellulitis and usage of antibiotics

Table 4 postoperative burn wound reepithelialization

Variables	Group B n=15 Acticoat™	Group C n=15 Silvazine™	P value
Time of wound reepithelialization (d)	9-14(d) 10±1.2	13-20( d) 18±1.5	0.5
Number of dressings Mean N	3-5 4±1.2	4-8 8±1.7	
Hospital stay	5-10(d) 10±1.3	10-20( d) 14±1.7	
Occurrence of burn wound scar			
No scar formation Hypertrophic scar dyspigmentation	14(93.5%) 1(6.5%) 1(6.5%)	11(73.5%) 4(26.5%) 1(6.5%)	

Postoperative burn wound reepithelialization, early and late after the average time at follow-up was (11±2 months)

## DISCUSSION

Colonization and infection of burn wounds are a dual clinical problem. On one hand, a slowing of the healing process is possible based on a damaged immune system and inadequate perfusion to the wound. On the other hand, the infected wound may be a potential source of spreading of antibiotic-resistant microorganisms.

The choice of the many medications or membranes to place on burn wounds remains unclear, but certain basic principles apply to all situations. Gently clean the wound of debris and exudate on a regular basis. This usually requires daily removal of accumulated exudate and topical medications. Small superficial burns managed in this setting

present a low risk of infection, thus, a clean rather than sterile technique is reasonable (6).

The findings of this study indicated that the incidence of burn wound cellulitis decreased with use of Acticoat™. And as a consequence of this there was a decrease in the use of antibiotics from 45.5% in Dermazine™ group (7/15) in Acticoat™ 6.5% (1/15) similar results were found in a matched paired randomised controlled investigation of 30 burn patients treated with Acticoat™ or 0.5% silver nitrate

dressings and were evaluated for the level of antimicrobial effectiveness that harmony with the results of Tredget et al as the frequency of burn wound sepsis (>105 organism/g tissue) was less in Acticoat™ treated wounds than

those treated with silver nitrate 0.5% dressings (7)

The most important considerations for the choice of a burn wound dressing are the level of its antiseptic effect, the influence of its bioactive abilities on the epithelization and its abilities for management of the wound infection.

Regarding the importance of swap results, we showed that 50%(15/30) had positive swap without signs and symptoms of burn wound cellulitis and 30% (9/30) had positive swap with signs and symptoms of infection and 16% (5/30) negative swap with symptoms and signs of wound infection we passed the regimen of antibiotics like the way of Fraser et al who questioned the usefulness of surface swab cultures especially within the first 24 h of admission and stated from their findings that these results rarely alter or provide direction for therapy(8)

Also our study agree the advice of Hegggers et al; through the using of antibiotics, patients when any of signs or symptoms of inflammations were apparent, like erythema of the surrounding unburnt skin (1–2 cm beyond the wound), pain and oedema extending beyond the usual rim of inflammation commonly seen in burns in the first 48–72 h (9,10)

Regard to the hospital stay and number of dressings we found that patients treated with Acticoat™ spent less days in hospital, less number of dressings

and were discharged earlier than those treated with Dermazine™. This agree with the results of Fong et al. (11)

in terms of cosmetic outcome, hypertrophic scarring In our study the application of Acticoat appears to yield better scar results than the use of Dermazine™ dressings, Scar pigmentation and duration of re-epithelization .where in this study there was only one patient with hypertrophic scars in the group receiving Acticoat™ 14/15(93.5%) versus 11/13(73%) in the Dermazine™ group (p < 0.005) that requiring therapy, our results agree with many authors (12,13).

### CONCLUSION

Burn wound dressing, with either topical medication or wound membranes, should provide benefits ,including prevention of

wound desiccation, control of pain, reduction of wound infection, Acticoat™ is the dressing of choice which reduced the rate of burn wound cellulitis, antibiotic use and scar formation as compared to Dermazine™.

Recommendation

We advised Acticoat™ use in all burn patients especially in areas like face and to provide the best aesthetic scar results .

### REFERENCES

- 1-Coffi G. What's new in burns and metabolism. *J. Am. Coll.Sur.* 2001; **192**: 241–54.
- 2- Barlow Y. T lymphocytes, immunosuppression in the burned patient: a review. *Burns* 1994;20(6):470–87.3
- 3-Sheridan RL, Tompkins RG. What's new in burns and metabolism.*J. Am. Coll. Surg.* 2004; **198**: 243–63.1998;7(6):335–8.
- 4- Demling RH, DeSanti L. Management of partial thickness facial burns (comparison of topical antibiotics and bio-engineered skin substitutes).*Burns* 1999;25(3):256–61.
- 5-Miller P, Matthey F. A cost-benefit analysis of initial burn cultures in the management of acute burns. *J Burn Care Rehabil* 2000;21(4):300–4.
- 6-Precht R, Burrell R. A comparative analysis of the anti-microbial efficacy of a novel silver coated dressing, a silver sulfadiazine and silver nitrate. *J Burn Care Rehabil* 1997;18:1787- Tredget E, Shankovsky R, Groenveld A, Burrell R. A matched-pair,randomised study evaluating the efficacy and safety of Acticoat silver-coated dressing for the treatment of burn wounds. *J Burn Care Rehabil* 1998;19(6):531–7.
- 8-Fraser J, Bodman J, Sturgess R, Faogali J, Kimble R. An in vitro study of the anti-microbial efficacy of a 1% silver sulphadiazine and 0.2% chlorhexidine. *Burns* 2004;30(1):35–41
- [9] Hegggers J, Hawkins H, Edgar P, Villareal C, Herndon D. Treatment of infection in burns. In: Herndon DN., editor. *Total burn care*. 2nd ed.London: Saunders; 2002. p. 136.
- 10- Precht R, Burrell R. A comparative analysis of the anti-microbial efficacy of a novel silver coated dressing, a silver sulfadiazine and silver nitrate. *J Burn Care Rehabil* 1997;18:178
- 11-Fong F , Wood, B. Fowler A .silver coated dressing reduces the incidence of early burn wound cellulitis and associated costs of in patient .*Burns* 31 (2005) 562–567
- 12- Ang ES, Lee ST, Gan CS, et al. The role of alternative therapy in the management of

*Yaser et al..*

partial thickness burns of the face—experience with the use of moist exposed burn ointment (MEBO) compared with silver sulphadiazine. *Ann Acad Med Singapore* 2000;29(1):7–10

**Zagazig University Medical Journals**

13-Quarmby C, Rode H. The cost of cost-savings. *Prim Intention* 2003;11(1):19–22.