ORIGINAL ARTICLE

APPLICATION OF CLING FILM OVER BURN WOUNDS (OCCLUSIVE WOUND DRESSING): OUR EXPERIENCE

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Background: This study shares our experience and review the outcome of the use of cling film with silver sulfadiazine cream in terms of healing time, and patient's satisfaction score. **Methods:** It was a descriptive case series conducted at Jinnah Burn and Reconstructive Surgery Center, Lahore, from March 2018 to February 2019. In this study, a thick layer of silver sulfadiazine was applied and then wrapped with cling film on 35 patients sustained mix thickness burns on the trunk and limbs. Dressing was done daily after wound wash with normal saline. Consultant Plastic surgeon assessed the wound healing by observation and serial photographs. Duration of wound healing and complications were noted. **Results:** Complete wound healing was achieved in 25 (71.4%) patients with mean healing time of 13.3 days (range 11–15 days). The wound infection was seen in 5 (14.2%) patients, that were diagnosed by change in colour of wound edges and patients with signs of sepsis (ABA scoring). Sepsis was treated in 5 patients with debridement and culture specific antibiotics. split skin graft done in 8 (22.8%) cases **Conclusion:** Moist wound dressing with Silver Sulfadiazine and cling film is cost effective, easy to apply with good visibility of the wound and has good patient satisfaction, but is labour intensive.

Keywords: Wound healing; Burns; Moist wound healing; Silver Sulfadiazine; Cling film

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INTRODUCTION

Burn remains a global health burden, with over 11 million burn injuries seek medical attention per year, especially in low and middle-income countries.[1] Treatment of deep partial thickness and full thickness burns is early excision with autografting, which is accepted worldwide.[2] The problem remains with mix thickness burns. More recently, new and more effective products of wound care have been introduced for different degree of burns, however the cost of the majority of dressings are beyond the economic means of patients in low- and middle-income countries. Several factors contribute the outcome of burn patients; these include the timely resuscitation, wound care, control of infection, nutritional, physical and occupational therapy, social and emotional support.[3] Each of these factors requires the balancing of skill and resources. Due to limitation of resources burn practitioners are constrained to adopt cheaper alternatives that are equally safe and effective. The selection and use of various biological, synthetic and biosynthetic dressings depend upon the condition of the wound as well as the inherit properties of dressing.[4] The properties of an ideal burn dressing material were summarized as follows by Sood and Granick MS:[5] (a) creates a moist, clean environment, (b) remove excess exudate, (c) creates a barrier for micro-organisms, (d) prevent physical damage to the wound, (e) ease of application, and durability, (f) non-irritant and non-toxic, (g) allows wound humidity, (e) compatibility with the topical antibiotic ointments (f) gaseous exchange and (h) promotes wound healing and does not interfere in any stage of healing. Perhaps, an additional property which is of particular relevance for resource constrained countries is the product must be affordable and readily available. This is a fundamental consideration for economically constrained societies as the patients most commonly involved with the burn injury belong to the lower socio-economic classes.[6] Many of these patients do not have any form of health insurance and would usually have to cover their own health care costs. The use of cling film for burns has been started early in 1987 by Wilson and French.[7] They quoted it in their abstract "plasticised polyvinylchloride film has been used in their burn unit for a long time for dressing before ward round, before surgery and when the patient transferred from the emergency department to burn unit.[8] In 2004, Allison and Porter published the consensus on the pre hospital approach to burn patients, mentioned the use of cling film dressing after burn wound is effectively cooled down.[9] UK ambulance services clinical practice guidelines recommended the pre hospital use of burn injury with cling to burn unit.[10,11] Australia and New Zealand burn association (ANZBA) mentioned the use of cling film as an initial covering after the cooling process of burns is complete.[12] We could not find a single study regarding the use of cling film in management of burn injuries, yet all of them use it in pre hospital settings. We developed an idea of using silver sulfadiazine along with cling film

in our burn patients and obtained a significant result. Our aim of this study is to share our experience and review the outcome of the use of cling film with silver sulfadiazine cream in terms of healing time, and patient's satisfaction score.

MATERIAL AND METHODS

This clinical trial was conducted after Ethical approval was taken from the institutional review board. Patient of either gender between the age of 12 and 50 years with mixed thickness scald or flame burns involving <30% TBSA (determined by Wallace rule of nine), on the front or back of the trunk, upper and lower limbs were included in the study. Total 35 patients were enrolled who fulfilled the inclusion criteria and admitted through the emergency department between March 2018 to February 2019. Patients with deep burns, facial burns, chemical or electric burns and extreme of ages were excluded. After receiving the patient in our resuscitation area of burn centre, we developed a method of "triple wash" for all our burn victims, which constituted of initial wash with pyodine scrub, diluted with warm normal saline and then with aqueous chlorhexidine 0.1% wash, and finally cleaned with 0.9% normal saline. Meanwhile, all the patients receive continued ringer lactate resuscitation and injection morphine 3mg iv was given prior to wash wounds. All initial wound assessment was done clinically by a burn surgeon and pre-treatment photographs were taken for the record and the size of the burn wound was measured. After triple wash, wounds were dried by sterile gauze and patient was shifted to the sterile OT table. Vitals monitoring was done by attaching a monitor, with special care of temperature recording efficiently. With the consent of patient, treatment was started with the application of a thick layer of 1% silver sulfadiazine to the wound in a sterile manner, then cling film was wrapped in layers. Circumferential wrap was avoided around trunk and limbs rather wrapped in layered fashion. Patient was then shifted to ward. We applied wound dressing with silver sulfadiazine and cling film daily after cleaning wound with normal saline. All patients received injection morphine for analgesia prior to change of dressing. Antibiotics, analgesics, nutritional support, psychological and physical therapy were given according to protocol of our burn center. All patients were assessed by burn surgeon for the condition of wounds and photographic record taken daily in the morning round. Healing time in days (starts after application of cling at 1st day), complications in terms of infections, change in colour of wound edges, skin allergy, non-healed areas and the foul smell from the wound were noted. Non healed areas were grafted later on, infectious wound was treated with debridement and grafted and patients who didn't tolerate this dressing were switched to close dressing. The collected data was entered and analysed in computer program SPSS 20. Quantitative variables like age, TBSA %, healing time were calculated in terms of mean±standard deviation and qualitative variables like gender and complication were calculated for frequencies and percentages.

RESULTS

A total of 35 patients (25 males, 10 females) of mixed thickness burns, who met our inclusion criteria were enrolled over the period of eleven months. The mean age of patients was 29.2 years (range: 14–45 years). The aetiology of burn was mainly flame burn (26 patients) and scalding (9 patients). The mean percentage of the total body surface area was 22.9% (range 18–29%). (Table-1). 100% healing was achieved in 25 (71.4%) patients with mean healing time of 13.3 days (range 11–15 days). Wound infection was seen in 5 (14.2%) patients, which was diagnosed by change in colour of wound edges and patient showed signs of sepsis (ABA scoring). Immediate debridement of wounds was carried out under general anaesthesia and autologous grafting were done. Sepsis was managed with culture specific antibiotics. Five patients showed incomplete healing of wounds, which were treated with grafting (n=3) or dressings according to the size of the wound area. None of the patients showed any skin allergy regarding use of cling film.

Figure-1: (a). Scald burn involing back (imediate post burn). (b).after 2 days with pseudoeschar present (c).10th post burn day (d)13 th post burn day (healed wound)

Figure-2: Two different patients (a) showing application of cling around limbs in longitudinal direction (b) demonstration of liquefaction of pseudo eschar after removal of cling film

Table-1: Demographic data

Gender	Age (years)	TBSA %	Healing time (days) 100%	Flame Burn	Scald burn
Male Mean	28.4	22.7	13.3		
N	25	25	17	18	7
SD	7.9	2.7	1.2		
Female Mean	31.2	23.5	13.1	8	2
N	10	10	6	Total: - 26 (74.3%)	9 (25.7%)
SD	6.2	2.9	0.7		
Complications	Wound infection	Non healed (STSG)	Non healed (steroid dressings)	Skin allergy	
n	5	8	2	0	

DISCUSSION

Management of burn injuries in the low to middle socioeconomic countries is formidable challenging due to the limited number of resources and inaccessible skills and technology.[13] The economic realities and cost dynamics of various newer dressing agents are out of reach for many poor patients and burn centres in many poor countries. Burn itself is a disease of low socio-economic class, coupled with poorly equipped health care centre, under funding, limited number of nursing staff and burn surgeons make effective burn care problematic.[14] On the other hand, price of cling film 45cm roll is almost 6$ and the silver sulfadiazine 25 gm is 0.57 $. We found that daily topical silver sulfadiazine with cling film application is affordable, effective and practical, in the resource constrained environment. The adherent property of plastic wrap to the skin prevents the cost of bulky secondary dressing. Although, comparison studies are required to know the cost difference between uses of cling film and close dressings.

Polyvinyl chloride (PVC) is a common component of cling film, the transparent nature and property of semi permeable membrane allows the water vapour and transmission of oxygen to the wound area.[15] Transparency allows the burn surgeon to visualize the condition of the wound and the surrounding skin. Wounds treated with the cling film must not be tightly sealed. This act as occlusive wound dressing and retains the moisture, which in turn promotes wound healing.[16] Liu wei in his paper concluded the effectiveness of moist dressing environment in burns shortens the healing time, promotes epithelial growth as well as decrease the threshold of pain.[17] Silver sulfadiazine has a proven role against gram negative and positive bacteria in treatment of burn wounds, the semi occlusive nature of cling prevents it to get dry and make it available for the wound to enhance its absorption, in fact enhance the potential of antibiotic cream. Burn skin has increase water transportation due to increase vascular permeability and loss of epithelial barrier. Cling film prevents wound dehydration by keeping fluid accumulation underneath it.[18] We felt it a slight troublesome for the patient and caregiver for changing of bedsheet, or placing a Macintosh under the patient bed, as cling has no absorption potential leading the exudate to seep it out, and sometimes it needs secondary dressing to absorb that seep. As far as its sterility is concerned, we suggest to unroll and discard the outer few inches of the film. It is manufactured under high temperature excess of 150^{o} C, its manufacturing and packing is in such a way that there are minimal chances of contamination. We found no organism after taking cultures from multiple rolls, at different segments and on different occasions. Mr Clopton and his associates at

university of Lowa, reported in Elsevier global news 2008, they obtained cultures from freshly opened and already opened rolls from different layers. In 4 out of 5 freshly opened rolls and 14 out of 36 already opened rolls samples didn't grow anything. While 29 of 36 samples from previously opened rolls grew 3 or fewer colonies.[19]

Application of cling film is simple, it can be placed in layered manner rather than circumferentially wrap around the trunk and limbs, to avoid constriction in limbs and trunk. The frequent dressing changes did not significantly increase the caregiver burden due to the simplicity of plastic wrap dressing treatment procedure. We believe that it facilitates early mobilization and improved the effectiveness of physiotherapy, making it more compliant for patients as it lacks the bulk of protective gauze and Gamgee and crepe dressings. It is non adherent to the wound and pliable in nature so that it can conform the contour of body parts very easily. It sticks to the adjacent normal skin that doesn't need tape or crepe bandage to hold it in place. Application of silver sulfadiazine always leads to the formation of yellowish-grey pseudo eschar[20], we found it helping in separation of eschar more efficiently by keeping the wound moist which otherwise needs removal during the daily wound wash to prevent infection.

CONCLUSION

Occlusive wound dressing with 1% silver sulfadiazine and cling film is cost effective, essentially sterile, easy to apply, non-adherent and transparent for inspection.

In lower middle-class countries where biological dressing, skin substitutes or cadaveric skin is not affordable, cling film is a good alternate for mix thickness burns and is cost effective.

Patients' consent: Patients' consents were obtained during the procedures as part of the patient care protocol and to use the data for research purpose.

Conflict of interest statement: None of the authors have any financial and personal relationships with any organisations that could create a conflict of interest with any material presented in the manuscript.

AUTHORS' CONTRIBUTION

ZUA, FAK: Conception and designing, manuscript writing, collection and analysis of data, primary drafting of the paper and final approval. AI: manuscript writing and primary drafting. YM, IS: Acquisition of data, critical review of the paper. AMM, MAA: Collection and analysis of data. MNT: Critical review and final approval of the manuscript.

REFERENCES

1. Mock C, Peck M, Peden M, Krug E. A WHO plan for burn prevention and care. Geneva: World Health Organization; 2008.
2. Jackson DM. The evolution of burn treatment in the last 50 years. Burns 1991;17(4):329–34.
3. Odeyinde SO, Ademola SA, Oluwatosin OM. Predictors of mortality in paediatric burn at Ibadan, Nigeria. Afr J Paediatr Surg 2007;4(1):29–32.
4. Carrougher G. Burn wound assessment and topical treatment. In: Carrougher G, editor. "Burn Care and Therapy", Mosby, Missouri, 1998; p.133–65.
5. Sood A, Granick MS, Tomaselli NL. Wound Dressings and Comparative Effectiveness Data. Adv Wound Care (New Rochelle) 2014;3(8):511–29.
6. Park JO1, Shin SD, Kim J, Song KJ, Peck MD. Association between socioeconomic status and burn injury severity. Burns 2009;35(4):482–90.
7. Wilson G, French G. Plasticized polyvinylchloride as a temporary dressing for burns. BMJ 1987;294(6571):556–7.
8. Bourke PM, Dunn KW. The use of polyvinyl chloride film (cling film) with burn injury in the pre hospital setting - the clear facts. J Paramed Pract 2015;7(1):20–4.
9. Allison K, Porter K. Consensus on the prehospital approach to burns patient management. Emerg Med J 2004;21(1):112–4.
10. Fisher JD, Brown SN, Cooke M, Walker A, Moore F, Chrispin P. Uk ambulance services clinical practice guidelines: 2013. Class Professional Publishing; 2013.
11. Hudspith J, Rayatt S. ABC of burns, First aid and treatment of minor burns. BMJ 2004;328(7454):1487–9.
12. Australian and New Zealand Burn Association. Emergency management of severe burns course manual. Sydney ANZBA; 1996.
13. Atiyeh B, Masellis A, Conte F. Optimizing burn treatment in developing low- and middle-income countries with limited health care resources (Part 3). Ann Burns Fire Disasters 2010;23(1):13–28.
14. Olawoye OA, Osinupebi OO, Ayoade BA. Open burn wound dressing: a practical option in resource constrained settings. Ann Burns Fire Disasters 2013;26(3):154–7.
15. Coultate TP. Food: the chemistry of its components. 6th edition. Cambridge, UK: The Royal Society of Chemistry, 2016; p.599.
16. Takahashi J, Miyagawa M, Yokota O, Aoki H, Aoki T. Plastic Wrap Versus Occlusive Dressings for the Management of Skin Ulcers: Comparison of Two Symmetrical Wounds in Two Individual Patients. Dermatol Case Rep 2017;2(1):1–3.
17. Wei L. The application of moist dressing in treating burn wound. Open Med (Wars) 2015;10(1):452–6.
18. Waffle C, Simon RR, Joslin C. Moisture-vapour-permeable film as an outpatient burn dressing. Burns 1988;14(1):66–70.
19. Wendling P. Think Plastic Wrap as Wound Dressing for Thermal Burns. ACEP (American College of Emergency Physicians) News. [Internet]. Elsevier Global Medical News. August 2008 [cited 2020 Mar]. Available from: http://docshare01.docshare.tips/files/29280/292805406.pdf
20. Adhya A, Bain J, Ray O, Hazra A, Adhikari S, Dutta G, *et al*. Healing of burn wounds by topical treatment: a randomized controlled comparison between silver sulfadiazine and nano-crystalline silver. J Basic Clin Pharm 2014;6(1):29–34.

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