OPEN BURN WOUND DRESSING: A PRACTICAL OPTION IN RESOURCE CONSTRAINED SETTINGS

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SUMMARY. Various types of wound care products abound for the treatment of burn injuries. Most of these products are rather expensive and beyond the means of many patients in poorer countries. This poses a challenge to burn care workers in these environments and calls for the adoption of practical solutions with the use of less expensive and readily available alternatives. The aim of this study is to review the outcome of our burn patients managed with topical silver sulphadiazine dressing in terms of time to wound healing and length of hospital stay. Consecutive burn patients admitted over a four year period were included in the study. The patients were resuscitated along standard protocols and their wounds were dressed daily with dermazin. The demographic and clinical characteristics of the patients were retrieved and analyzed using the SPSS version 16. The primary outcome measure for the study was the time to complete re-epithelialization of the wounds and discharge of the patients. 144 patients with a M: F ratio of 2.3: 1 were managed during the period. The age range was 4 months to 81.9 years with a median age of 26 years. The TB-SA range was 1 to 99% with a median of 28.5%. The mean duration from time of injury to wound healing was 21.5 days with a median of 17 days. Open burn wound dressing with silver sulphadiazine offers a satisfactory outcome and should be considered for burn dressing in low resource settings.

Keywords: burn wound dressing, silver sulphadiazine, open wound dressing

Introduction

Various factors contribute to the outcome of patients with burn injury; these include the effectiveness of resuscitation, the care of the burn wound, adequate analgesia, and prevention and control of infections. Others include the nutritional rehabilitation of the patient, physical and occupational therapy, social and emotional support, and patient rehabilitation. Each of these factors requires the balancing of skills and resources. Effective management of burn wounds contributes significantly to the overall outcome of the patient. Wound infection has been found to correlate with outcome in a number of studies. The other morbidities of burn wounds include chronicity, scarring and contractures, dyschromic changes and malignant transformation. Over time, many advances have been recorded in the management of burn wounds. More recently, newer and more effective wound care products have been introduced for the management of different degrees of burn wounds, however the costs of these newer materials are beyond the economic means of the majority of patients in many low-and middle-income countries (LMIC). For this reason burn practitioners are constrained to adopt cheaper alternatives that are equally safe and effective. The patient population demographics and the local environment may all impact on the success or failure of certain dressing products.

Various biologic, biosynthetic and synthetic wound dressings are used in burn care. Selection and use of these products depends on the condition of the wound bed, the inherent properties of the dressing and the goals of therapy. The properties of an ideal burn dressing material were summarized as follows by Pankhurst and Pochkhanawala: (a) protects the wound from physical damage and microorganisms, (b) is comfortable, compliant and durable, (c) is non-toxic, non-adherent, and non-irritant, (d) allows gaseous exchange (e) allows high humidity at the wound, (e) is compatible with topical therapeutic agents, and (f) can allow maximum activity for the wound to heal without retarding or inhibiting any stage of the process. Perhaps, an additional property which is of particular relevance for LMICs is that the ideal burn dressing product or agent must be affordable and readily available. This is a fundamental consideration for economically constrained...
societies as the patients most commonly involved with burn injury belong to the lower socio-economic classes. Many of these patients do not have any form of health insurance and would usually have to cover their own health care costs.

The aim of this study is to review the outcome of all our burn patients managed with open dermazin (1% silver sulphadiazine) [SSD] dressing in terms of time to wound healing and length of hospital stay (LOS).

**Patients and methods**

One hundred and forty four (144) consecutive patients admitted with burn injuries to the Olabisi Onabanjo University Teaching Hospital, Sagamu over a four year period from March 2004 to February 2008 were included in the study. The patients were resuscitated using Parkland formula for fluid replacement and managed according to standard burn care protocol. The adult and paediatric patients were managed on the general surgical ward and the paediatric surgical wards respectively.

The initial wound dressing was done in the accident and emergency department and was continued daily on the wards. The wound dressing consisted of cleaning of the wound with saline soaked gauze and the application of a layer of dermazin (1% SSD) over the whole extent of the wound. A bed cradle with a clean sheet over it was placed over each patient to prevent contact of the anterior surfaces of the wound with the cover sheet. However, for patients with burn wounds on both the anterior and posterior surfaces of the body, one surface invariably had to make contact with the bed sheet. In these instances, the patients were usually positioned to lie more on the side with the lesser surface area of burn.

Routine wound biopsy for microscopy, culture and sensitivity was done for any patient with features of wound infection and therapeutic antibiotic was commenced based on the sensitivity pattern.

All investigations carried out for the patients and consumables used for their care were paid for by the patients or their relations. The demographic and clinical characteristics of the patients were retrieved from prospectively collected data using the International Society for Burn Injuries (ISBI) burn injury proforma. The data was analyzed using the SPSS version 16. The outcome measure for the study was the time taken for the burn wound to heal as reflected by the LOS.

**Results**

One hundred and forty four patients (144) with a M: F ratio of 2.3: 1 were managed during the study period. The age range was 4 months to 81.9 years with a median of 26 years. The extent of the total body surface area (TBSA) burned ranged between 1 and 99% with a median of 28.5%. 29.86% of the patients sustained partial thickness burn wounds while 39.59 % and 30.55% had mixed thickness and full thickness burn injuries respectively.

The range of surgical wound procedures included escharotomy in 28% of the patients, wound debridement in 2% of the patients, and burn reconstruction and tangential excision with skin grafting, both in only 1% of the patients. 54% of the patients had satisfactory wound healing and were discharged. 2% of these patients were managed as outpatients. 5% were referred to other health care facilities because of the severity of their injuries, which required additional care that was not available in the hospital. Another 7% of these patients requested discharge for various reasons, most of which regarded their inability to cover the cost of care. In all, 49 (34%) deaths were recorded.

The mean LOS of the subset of patients that were managed with open burn wound dressing containing SSD from admission until satisfactory wound healing and discharge was 21.5 days with a median of 17 days.

**Discussion**

Numerous factors come into play when selecting suitable dressing for burn wounds. These include the cause, site, depth and extent of the burn, as well as the type of first aid administered, the patient’s ability to manage the dressing, the health professionals’ ability to manage the dressing, and the functional impact of the dressing on the patient's lifestyle. Others include associated pain, urgency of ‘time to healing’ and the cost.

Burn management in many developing LMICs is fraught with challenges. The increasing incidence of burn injuries in many of these countries, coupled with the high illiteracy rate, poor public transportation system, poorly equipped health care facilities, shortage of dedicated burn nurses and burn surgeons along with gross under funding of the health sector make effective burn care problematic. Many populations in LMICs are plagued with the burden of poverty, ignorance and disease. The study setting is a teaching hospital located in a semi urban town with a predominant population of farmers. Most of the patients had no health insurance and had to pay for their own health care needs. This determines to a great extent their health service provision and subscription to health care. These must be constantly borne in mind by the care givers when prescribing medication and adjuncts in order to have a reasonable compliance rate. As expected, our study population comprised predominantly of patients in the low social class and the affordability of burn care has remained a major issue considering the high cost of burn resuscitation and initial care. The onus is therefore on the practitioners to modify the care to suit the patients’ economic means.

We found daily topical SSD application to be affordable, effective, safe and practical under the circumstances with a compliance rate of over 90% and wound infection rate of less than 35%. SSD has been found to have very
good antiseptic properties and it causes no electrolyte derangements. It does not stain the burn wound and is well tolerated by the patients as it does not elicit pain. Another significant advantage of the open SSD dressing is the little requirement for technical skill in its application on the part of nursing staff. The mean LOS in our study was 21.5 days with a median of 17 days. This compares favourably with a mean LOS of 19.5 days for open wound dressing and is shorter than the 24.8 days for closed wound dressing in the study by Gosselin and Kuppers.

Kavanagh and De Jong succinctly summarized some of the challenges of burn wound care in many LMICs with their statement that “Access to costly wound products is not an option in many settings. In these situations, creativity and innovation have led to many excellent alternatives being developed. In some instances sophisticated products are available but lack of clinical experience makes them difficult to use. Wound care needs to be undertaken in the context of the local environment”. Traditional occlusive dressings involve an initial step of wound cleansing or debridement followed by a multi layered dressing comprising usually of a non adhesive tulle layer which may or may not be impregnated with antibiotics, an absorbent layer of gamgee or multiple layers of gauze and a final layer of crepe bandage to secure the dressings in place. The cost of these will be prohibitive to many low income patients, especially for those with more extensive wounds. A multiphase, multicenter study has found that moist exposed burn ointment (MEBO) to be quite effective and cost efficient in the management of burn wounds. Unfortunately, this agent was not readily available and therefore not in use in our center at the time of the study.

Lately, various innovations and improvements have been made with regards to the options and effects of dressing agents. Recently newer preparations and formulations of silver-containing dressing materials such as nanocrystalline silver (NCS) dressing have become widely available for occlusive dressing of burn and other wounds. In most cases, this also requires additional secondary dressing materials depending on the degree of exudates of the wound. Open wound dressings involve an initial wound cleansing with normal saline solution followed by the application of a variety of topical dressing agents such as SSD, which is about the most commonly used agent. Other agents that have been used for open burn wound dressing include moist exposed burn ointment, eusol and phenytoin. The semi-open methods combine both methods to varying degrees, depending on extent, location and severity of burns.

The superiority of the NCS dressings over the older silver formulations such as SSD and silver nitrate is not in doubt. A recent meta analysis of prospective randomized trials that compared NCS dressing versus SSD or silver nitrate found a significant lower incidence of infections compared with the SSD group (9.5% vs. 27.8%, odds ratio: 0.14 [95% CI: 0.06-0.35]; χ² test, P < 0.001), with a 2.9-fold decrease of the risk. It also found that the patients in the NCS group had significantly less pain during dressing changes and a shorter LOS.

The economic realities and cost dynamics make such newer dressing agents out of reach for many patients and institutions in the majority of LMICs. For instance, the cost of NCS dressing for a week for a 70 kg patient with a burn injury of 60% TBSA is approximately $3,750, which translates to approximately $62.5% TBSA compared to $218 (approximately $3.6% TBSA) for twice daily open SSD dressing for the same patient with the same extent of injury over the same time period. The cost almost triples to $586 (approximately $9.8% TBSA) for the same wound size and dressing duration when occlusive SSD is done, the additional cost being the cost of tulle dressing, gauze, gamgee and crepe bandage. The importance of such a comparison is better appreciated when viewed in light of the Gross Domestic Product (GDP) of some of the LMICs relative to those of the developed economies (Fig. 1).

Aside from the affordability of SSD, the open burn wound dressing procedure is faster and a lot easier compared to multilayer occlusive dressing which would usually require longer duration, more personnel and additional nursing expertise, resources that may be in short supply in many health care facilities in developing countries. However, open burn wound dressing with SSD is not without its own challenges. SSD has been reported to delay wound healing and the application of the cream may be messy, especially with wounds on the posterior trunk and posterior aspects of the extremities that make direct contact with the beddings. There may also be the need for more frequent changes of bedding. This problem is reduced with the use of bed cradles. As expected, the rate of wound procedures, such as wound excision and skin grafting in the acute phase of the injury, was low (1%) despite the available expertise, as most patients could not afford surgery. Another reason for the low rate of skin grafting was that some of the patients with deep dermal and full thickness wounds that would
have required skin grafting died because of their more extensive injuries. Some of the patients with deeper wounds had prolonged hospitalization and a few invariably developed contractures necessitating burn reconstruction.

A limitation of the study was that up to 7% of the patients were lost due to request for discharge, mostly because of inability to afford care. This corroborates the financial incapacitation of some of these patients. In addition, the time to healing could not be calculated separately for each group of wound depth.

**Conclusion**

Open dressing with topical silver sulphadiazine is safe and effective with comparable duration of wound reepithelialization and should be considered as an option for burn wound dressing in low- and middle-income countries with health care funding challenges.

RÉSUMÉ. Des produits différenciés de soins pour le traitement des brûlures des plaies abondent. La plupart de ces produits sont assez coûteux et au-delà des moyens de beaucoup de patients dans les pays pauvres. Cela pose un défi pour les agents de santé qui s’occupent des victimes des brûlures dans ces environnements. Pour cette raison il faut adopter des solutions pratiques, moins coûteuses et facilement disponibles. Le but de cette étude est d’examiner les résultats de nos patients brûlés gérés avec des pansements topique à la crème de sulphadiazine d’argent en termes de temps de la cicatrisation et de la durée du séjour à l’hôpital. Patients brûlés consécutifs admis sur une période de quatre ans ont été inclus dans l’étude. Les patients ont été réanimés selon des protocoles standards et les pansements avec dermazin étaient changés quotidiennement. Les caractéristiques démographiques et cliniques des patients ont été récupérées et analysées en utilisant la version 16 de SPSS. Le critère d’évaluation primaire de l’étude était le temps pour la réépithélialisation totale des plaies et le congé des patients. 144 patients avec un sex-ratio de M 2,3: F 1 ont été gérés au cours de la période. La tranche d’âge était de 4 mois à 81,9 ans, avec un âge médian de 26 ans. La gamme de la surface corporelle totale brûlée était de 1 à 99% avec une médiane de 28,5%. La durée moyenne de temps pour la guérison des plaies était de 21,5 jours, avec une médiane de 17 jours. Les pansements avec sulphasphadiazine d’argent sur les plaies de brûlures ouvertes donnent des résultats satisfaisants et devraient être considérés pour traiter des brûlures dans les milieux à faibles ressources.

**Mots-clés:** pansement pour brûlure, sulfadiazine d’argent, pansement pour la plaie ouverte

**BIBLIOGRAPHY**