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COMPARATIVE STUDY BETWEEN OPEN DRESSING AND CLOSED DRESSING IN BURNS WOUND

General Surgery

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ABSTRACT

Aim:to examine the impact of the open and closed dressing methods on several healing metrics.**Methods:**After removing all dead tissue and blisters, the charred region was covered with antiseptic ointment in the open dressing approach. Two clean, sterile bed sheets, one below and one above the patient, were used to keep patients covered. Every day, fresh sheets were laundered and put on the beds. Patients in the closed dressing group received a thorough washing with sterile saline solution followed by a jet spray of diluted beta-dine solution. Blisters and all dead tissue were removed. Three thicknesses of dressing and antiseptic ointment were used. sterile gauze as the first layer, absorbent cotton pads as the second layer, and gauze as the third layer of pressure bandaging**Results:**Granulation tissue appeared almost identically in both open and closed dressings, however epithelization occurred sooner in open dressing than in closed dressing. The open dressing method was found to be superior to the closed dressing method, notably in patients with less severe burns to the limbs, especially in young patients who could not be easily managed in cradles and patients with superficial to deep burns to the front, back, and chest. The exposure method, which helps to care for the eyes, ear, and nose, was used to treat facial burns.

KEYWORDS

open dressing, closed dressing, burn wound

INTRODUCTION

Burns are severe traumatic wounds caused by heat or chemical agents on the body's outer layer, harming the underlying tissues.The extent of the injury ranges from full coagulation of all skin layers to tiny cellular damage in first-degree burns. A catastrophe is a burn wound. Patients' mental health is impacted, and the financial burden and hardship on families are further causes for worry. A complex biological process called wound healing results in appropriate surfacing with structural continuity and strength that resembles that of normal tissues. A certain thickness of epithelial tissue is still present in superficial burns, and it will allow for complete skin regeneration.

Deep burns cause total skin loss, which heals through secondary wounding and can lead to scarring, which can cause impairments and disfigurement. Any type of dressing, whether natural or artificial, plays a part in minimising discomfort, preventing secondary infections, preventing protein and water loss from the wound, protecting the viable epithelium from deterioration, and serving as a scaffold for epithelial growth. The dressing technique is widely used. Because of its simplicity, ease of evaluation of the burn wound, daily debridement, physical therapy, and willingness to alter the therapy when Escher start to separate, the exposure approach or open type of burn dressing also has favour. Additionally, especially during the hotter months of the year, these do not obstruct heat escape.

As a biological dressing, the Escher that develops over the burnt region keeps the area warm, prevents water from evaporating, and also stops bacterial development from spreading to the systemic circulation. After 4-5 weeks, when sound granulation tissue has grown underneath the Escher, it separates. When there is a shortage of medical personnel and the use of bulky dressings is restricted, the exposure approach is an excellent type of therapy for large casualties.

MATERIALAND METHODS

The current study was conducted on 30 patients who were enrolled in the surgical ward and burn unit at the Kanyakumari Government Medical College's Department of General Surgery between January 2023 and March 2023. Patients with burns who were admitted through the surgical OPD or casualty Department. are included in the study. exploratory inquiries were undertaken following admission. To identify any connected issues, general and systemic exams were conducted.

Patient selection criteria for open dressings included superficial burns to the face, neck, anterior chest, and abdomen, superficial burns to less than 10% of the extremities, superficial burns to less than 20% of the body surface, and superficial burns to the perineum.

After removing all dead tissue and blisters, the charred region was covered with antiseptic ointment in the open dressing approach. Two clean, sterile bed sheets, one below and one above the patient, were used to keep patients covered. Every day, fresh sheets were laundered and put on the beds. The patients were housed in a cradle that was lined with bed linens or mosquito netting. Either steel-made metallic cradles or simple supports made of bamboo sticks were fastened to the bed's borders.

The patients were urged to bathe every day, followed by a wound assessment and appropriate debridement. Deep burns including extremities; superficial to deep burns in both sides of the chest and belly; deep burns involving less than 20% of the body's surface; and patients treated using the open approach who developed oedema, leaking, and pain. Patients in the closed dressing group received a thorough washing with sterile saline solution followed by a jet spray of diluted betadine solution.

Blisters and all dead tissue were removed. Three thicknesses of dressing and antiseptic ointment were used. sterile gauze was used in the first layer, followed by absorbent cotton pads in the second layer, and gauze pressure bandages in the third layer. Every third or fourth day, the dressing was changed, an exam was conducted, and the appropriate debridement was carried out. Every third day, the wound's condition was assessed and compared, and the following observations were made: Pain was present or absent, Escher removal had begun or not, pus discharge was visible or not, granulation tissue had begun to form or not, wound epithelization had begun or not, and any complications were treated as necessary if they were discovered.

When patients had fully recovered from the initial shock, they were released. Patients were discharged with instructions to continue taking oral antibiotics, receive tetanus prophylaxis, and wear a dressing at home while receiving advice to follow up in the surgical OPD if their superficial burns involved less than 10% of their body, involved their extremities, or involved their face without affecting their eyes or ears. Other patients were either directed to other clinics where primary skin grafting or surgical correction of developing abnormalities was

available, discharged upon request, or who had resources for dressing at neighbouring medical centres.

No. of pain persisted	Total Cases	Open dressing		Closed dressing	
0-3	12	4	26.6%	8	53.3%
4-6	11	6	40%	5	33.3%
7-9	5	4	26.6%	1	6.6%
10-12	2	1	6%	1	6.6%
13-15	0	0	0	0	0
Total	30	15	100	15	100

Table 1: Distribution of cases depending on Open and Closed Dressing Method Persistence of Pain after Burns (n=30) Table 1 makes clear that the majority of patients in both groups recorded pain from the first to third days. Some patients were affected by analgesics and sedatives, which made it difficult for them to feel pain. It is evident that while using the exposed form of treatment, discomfort continues for 10 days, as opposed to the group receiving closed dressings, where it only lasts for 8.
(Table)

Table 2: Distribution Of Cases According To Condition Officer Wound On Discharge On Aspect Of Open And Closed Dressing.

Condition of wound	Open dressing		Closed dressing		Total	%
	No of cases	%	No of cases	%		
Healed	6	30%	6	30%	11	55%
Healthy granulation	2	10%	3	15%	9	30%
Epithelizatio	2	10%	1	5%	2	15%
Total	10	50%	10	50%	20	100%

Table 2makes clear that there are more epithelization cases in open dressing (10%) than in closed dressing (5%). In 2 cases with open dressing, or 10% of cases, healthy granulation tissue was discovered; in 3 cases with closed dressing, or 15% of cases.

Complications	Open dressing	Closed dressing	Total	%
	%	%		
Contracture	24%	16%	4	40%
Hypergranulation	16%	14%	3	30%
Infection	6%	4%	1	10%
Bedsore	6%	4%	1	10%
Gangrene	5%	5%	1	10%
Total	57%	43%	10	100%

Table 3: Table 3 makes clear that more cases—57%—of epithelization were identified in open dressings than in closed dressings—43%. In open dressing, there were 24% more contractures than in closed dressing, where it was 16%. In 2 cases, or 20%, hypergranulation tissue was discovered; however, in closed dressings, it was only 10%.

DISCUSSION

The burn is a significant traumatic wound caused by high heat on the body's protective layer. The underlying tissues are damaged, which results in circulation problems and mild to severe constitutional problems. Untreated burn injuries can cause a patient to suffer much, have a long illness that may result in disfigurement and psychological stress, and cost the patient's family money and suffering. Numerous workers around the world are paying attention to local burn wound care. There are a lot of prevailing differences of opinion. The majority of surgeons employ all techniques, and all techniques are legal and practical. The surgeon has the discretion to choose the one that is ideal for a specific patient and at a specific moment. (10), "open or exposure method," "closed dressing method," and "primary excision with skin grafting" are the three ways to treat burns and scalds. In our study, 15 patients received the closed way of dressing, while 15 patients received the exposure method. In order to eliminate prejudice, patients of all ages were equally studied for both dressing techniques. The open or exposure method, made popular by Haldor Sneve of St. Paul in 1905, enables daily debridement, physical therapy, and regular evaluation of wounds as well as the early discovery of infection. The lengthened duration of discomfort is one of this method's drawbacks. The majority of patients using the open dressing method reported discomfort for up to nine days, as shown in the table, whereas patients using the closed dressing method often experience pain alleviation after six days. The wounds start to fill with pus at the end of the first week. According to the results of one study, dryness and coolness are factors that are unfavourable to the growth of pyogenic organisms, and pus formation in the open method is delayed in the majority of patients for up to one week. In contrast, pus formation in the closed method starts as early as the fourth day after admission. By the end of the first week following a burn, the edema in the wounds starts to go down. The table shows that the edema subsided equally in both groups and that the kind of dressing had little impact on its disappearance. The eschar starts to detach at the end of the second week following the burn. In the current series, we have seen that the elimination of eschar starts sooner with the closed dressing method—often between 7-9 days—than it does with the open dressing group, where it typically starts between 10 and 14 days later. This is due to the fact that exudation and moistness in a closed dressing group liquefy and separate the eschar when the dressing is changed. When using the open dressing technique, eschar stays dry and attached to the surface and only starts to separate when pus forms below the surface. In our series, the emergence of granulation tissue occurred slightly earlier in the open dressing group (15.6 days) than in the closed dressing group (16.5 days) as soon as the eschar distinct granulation tissue begins to appear over the surface. This is because the closed dressing group experiences more sloughing and pus development, which prolongs the time it takes for healthy granulation to occur. Similar findings were reported by Artz and Moncrief (1969), who found that whereas deep dermal burns treated with open approach went dry and typically healed without incident, deep dermal burns treated with closed dressing method turned into full thickness burns and were infected. Epithelization is one of the key elements in healing. In our studies, we found that the open dressing strategy results in the appearance of epithelial tissue earlier than the closed dressing group. In the open approach, epithelial tissue typically develops on day 17, whereas in the closed method, it is visible on day 20 or so. According to one study, the most significant benefit of exposure therapy was shorter hospital stays. The average hospital stay in our series was 17 days for open dressing and 21 days for closed dressing, depending on the extent of the burns and the surface area of the wound. When we look at the mortality in cases according to the dressing technique used, we discover that the mortality rate was somewhat greater in the closed dressing technique for up to 40% of the extent of the wound than in the open technique. The closed dressing method considerably increased burn fatality rates above 40%, but this was due to the fact that the majority of patients were exclusively treated using this technique, making comparisons impossible. Finally, we may say that the open technique is a cheap substitute in our situation. In terms of healing and hospitalisation, it produces better results. Despite this, the persistent pain and ugly look issue persists. Closed dressing is equally advised due to its advantages, which include poorly isolated wards, a lack of temperature control, decreased cross-contamination, lower discomfort, and better patient comfort.

Prehospital care of the burn wound is basic and simple, as only protection from the environment with application of a clean dry dressing or sheet to cover the involved part; damp dressings should not be used. Irrigation to cool the wound in the first 3 hours after injury might be considered in controlled conditions, but this should be done actively and not passively with dressings. Further, the patient should be wrapped in a blanket to minimize heat loss and for temperature control during transport. The first step in diminishing pain is to cover the wounds to prevent contact to exposed nerve endings. Intramuscular or subcutaneous narcotic injections for pain should never be used because drug absorption is decreased as a result of the peripheral vasoconstriction, resulting in later and unexpected release with respiratory complications. Small doses of intravenous morphine may be given after complete assessment of the patient and after it is determined to be safe by an experienced practitioner. Although prehospital management is simple, it is often difficult to accomplish appropriately, particularly in at-risk populations. Studies showed that initial burns first-aid treatment was inadequate in many patients.35 These authors also showed that inadequate first-aid care was clearly associated with poorer outcomes. They suggested that defined education programs targeted upon at-risk populations might improve these outcomes.

The timely and effective use of antimicrobials has revolutionized burn care by decreasing invasive wound infections. The untreated burn wound rapidly becomes colonized with bacteria and fungi because of the loss of innate skin barrier mechanisms. As the organisms proliferate to high wound counts (>105 organisms per gram of tissue), they may penetrate into viable tissue. Organisms then invade blood vessels, causing a systemic infection that often leads to the death of the patient. This scenario has become uncommon in most burn units because of the effective use of antibiotics and wound care techniques. The antimicrobials that are used can be divided into those given topically and those given systemically. Available topical antibiotics

can be divided into three classes:

salves, soaks, and antimicrobial dressings. Salves are generally applied directly to the wound with cotton dressings placed over them (Table 20.5), soaks are solutions poured into cotton dressings on the wound, and antimicrobial dressings contain active agents to inhibit microbial growth, generally some form of silver ion or other antibiotic. Each of these classes of antimicrobials has advantages and disadvantages. Salves may be applied daily but may lose their effectiveness between dressing changes. Frequent dressing changes can result in shearing with loss of grafts or underlying healing cells as well as procedural pain. Soaks remain effective because antibiotic solution can be added without removing the dressing; however, the underlying skin can become macerated. Longer-term antimicrobial dressings have the advantage of less frequent painful changes, decreasing both pain and provider effort, but some of these must remain moist and thus must be monitored. Topical antibiotic salves include 11% mafenide acetate (Sulfamylon), 1% silver sulfadiazine (Silvadene), polymyxin B, neomycin, bacitracin, mupirocin, and the antifungal agent nystatin among others. No single agent is completely effective, and each has advantages and disadvantages. Silver sulfadiazine was very commonly used before the development of antimicrobial dressings. It has a broad spectrum of activity because its silver and sulfa 495

TABLE 20.4 Biologic coverings. Xenograft Occlusive closure of the wound, some immunologic benefits Allograft Occlusive closure of the wound, provides normal functions of skin, dermal elements can engraft and worsen scarring moieties are effective against gram-positive, most gram-negative, and some fungal forms. Some Pseudomonas species possess plasmid-mediated resistance. Silver sulfadiazine is relatively painless upon application, has a high patient acceptance, and is easy to use. However, it must be changed daily, which induces significant repeated painful episodes. Occasionally, patients complain of a burning sensation after it is applied, and, in a few patients, a transient leukopenia develops 3 to 5 days following its continued use. This leukopenia is generally harmless and resolves with or without treatment cessation. Of some concern is the recent finding of wound healing inhibition by the agent.51 Mafenide acetate is another topical agent with a broad spectrum of activity owing to its sulfa moiety. It is particularly useful against resistant Pseudomonas and Enterococcus species. It also can penetrate eschar, which silver sulfadiazine cannot. Disadvantages include painful application on skin, such as in second-degree wounds. It also can cause an allergic skin rash, and it has carbonic anhydrase inhibitory characteristics that can result in a metabolic acidosis when applied over large surfaces. For these reasons, mafenide sulfate is typically reserved for small full-thickness injuries. Petroleum-based antimicrobial ointments with polymyxin B,neomycin, and bacitracin are clear on application, painless, and allow for easy wound observation. These agents are commonly used for treatment of facial burns, graft sites, healing donor sites, and small partial-thickness burns. Mupirocin is a petroleumbased ointment that has improved activity against gram-positive bacteria, particularly methicillin-resistant S. aureus and selected gram-negative bacteria. Nystatin, either in a salve or powder form, can be applied to wounds to control fungal growth. Nystatin-containing ointments can be combined with other topical agents to decrease colonization of both bacteria and fungus. The exception is the combination of nystatin and mafenide acetate; each inactivates the other. Available agents for application as a soak include 0.5% silver nitrate solution, 0.05% Dakin (sodium hypochlorite with buffers), 0.25% Domboro (acetic acid with buffers), and mafenide acetate as a 5% solution. Silver nitrate has the advantage of being painless on application and having complete antimicrobial effectiveness. The disadvantages include its staining of surfaces to a dull gray or black when the solution dries. This can become problematic in deciphering wound depth during burn excisions and in keeping the patient and his or her surroundings clean of the black staining. The solution is hypotonic as well, and continuous use can cause electrolyte leaching, with rare methemoglobinemia as another complication. Dakin's solution, which is a dilute solution of sodium hypochlorite with added buffering agents, has effectiveness against most microbes; however, it also has cytotoxic effects on the healing cells of patients' wounds. Low concentrations of sodium hypochlorite have less cytotoxic effects while maintaining most of the antimicrobial effects. Hypochlorite ion is inactivated by contact with protein, so the solution must be continually changed. The same is true for acetic acid solutions, which may be more effective against Pseudomonas. Mafenide acetate soaks have the same characteristics of the mafenide acetate salve, except in liquid form.

Multitudes of topical therapies exist for the treatment of burn wounds, many of which contain antimicrobial properties. A recent Cochrane Database Review nicely summarizes the data surrounding antisepsis for burns; however, much of the data is inconclusive.137 silver sulfadiazine are rare, and at-risk patients can have a small test patch applied to identify a burning sensation or rash. Silver sulfadiazine destroys skin grafts and is contraindicated on burns or donor sites in proximity to newly grafted areas. Also, silver sulfadiazine may retard epithelial migration in healing partialthickness wounds.

Mafenide acetate, either in cream or solution form, is an effective topical antimicrobial. It is effective even in the presence of eschar and can be used in both treating and preventing wound infections; the solution formulation is an excellent antimicrobial for fresh skin grafts. Use of mafenide acetate may be limited by pain with application to partial-thickness burns. As mafenide is a carbonic anhydrase inhibitor, a historically described side effect is metabolic acidosis. However, multiple studies have been performed using mafenide to treat burn wounds without any significant incidence of metabolic acidosis.138,139

Silver nitrate has broad-spectrum antimicrobial activity as a topical solution. The solution used must be dilute (0.5%), and prolonged topical application leads to electrolyte extravasation with resulting hyponatremia. A rare complication is methemoglobinemia.140 257

Although inexpensive, silver nitrate solution causes black stains, and laundry costs may offset any fiscal benefit to the hospital. Although there is no definitive evidence regarding use in the burn population, Dakin's solution (0.5% sodium hypochlorite solution) is an acceptable alternative as an inexpensive topical antimicrobial.

For smaller burns or larger burns that are nearly healed, topical ointments such as bacitracin, neomycin, and polymyxin B can be used. These are also useful for superficial partialthickness facial burns as they can be applied and left open to air without dressing coverage. Meshed skin grafts in which the interstices are nearly closed are another indication for use of these agents, preferably with greasy gauze to help retain the ointment in the affected area. All three have been reported to cause nephrotoxicity and should be used sparingly in large burns. Recent media coverage of methicillin-resistant Staphylococcus aureus (MRSA) has led to widespread use by community practitioners of mupirocin for new burns. Unless the patient has known risk factors for MRSA, mupirocin should only be used in culture-positive burn wound infections to prevent emergence of further resistance.

Silver sulfadiazine is one of the most widely used in clinical practice. Silver sulfadiazine has a wide range of antimicrobial activity, primarily as prophylaxis against burn wound infections rather than treatment of existing infections. It has the added benefits of being inexpensive, being easily applied, and having soothing qualities. It is not significantly absorbed systemically and thus has minimal metabolic derangements. Silver sulfadiazine has a reputation for causing neutropenia, but this association is more likely due to neutrophil margination from the inflammatory response following burn injury. True allergic reactions to the sulfa component of Silver-impregnated dressings are increasingly being used for donor sites, skin grafts, and partial-thickness burns because of their potential to avoid daily dressing changes. These may be more comfortable for the patient, reduce the number of dressing changes, and shorten hospital length of stay, but they limit serial wound examinations. Biologic membranes such as Biobrane (Smith & Nephew Global Products) provide a prolonged barrier under which wounds may heal. Because of the occlusive nature of these dressings, these are typically used only on fresh, superficial, partial-thickness burns that are clearly not contaminated.

CONCLUSION

Patients were revived, and open and closed dressings were used to treat burn wounds. Open dressing requirements included superficial burns to the face, neck, anterior wall of the chest, belly, and less than 10% of the limbs, as well as burns over the perineum. Deep burns involving the extremities, superficial to deep burns in the side chest and belly, deep burns involving less than 20% of the body's surface, and patients treated using the open approach who developed edema, leaking, and discomfort met the requirements for closed dressing. The healing of the wounds was watched, and the patients' subjective alterations in terms of discomfort, the presence of granulation tissue, pus discharge,

or epithelization were noted. Patients omitted from the study were those who were discharged or died within 7 days. Following a review of pertinent literature, observations were methodically collected, critically analysed, and the following results were reached:- After excluding cases, 30 burn patients' wound healing was examined. In 15 patients with burn wounds, closed dressing was used; in 15 patients, open dressing was used. Patients of all ages were enrolled in the study, and their pain reduction, pus discharge, edema subsidence, Escher removal, appearance of granulation tissue, and epithelization were all compared. 40% of patients in the opened dressing group have pain that lasts for 4-6 days.whereas under close dressing, 53.3% of patients report pain lasting 0–3 days. Patients in the group with opened dressings have pain for 10 to 12 days (6%). While 6.6% of patients in the closed dressing group experienced pain that lasted 10 to 12 days. It is evident that the exposed form of treatment causes discomfort to last longer than the group receiving closed dressings, where it only lasts for eight days. When comparing the average number of days, we find that the open method's mean time interval for granulation tissue proliferation was 15.6 days and the closed dressing group's mean time interval was 16.47 days. This indicates that the appearance of granulation tissue occurs much more quickly in patients in the open dressing group. In addition, epithelization began earlier in patients in the open dressing group—on average, on day 17—than in those in the closed dressing group, where it did so on day 21. In contrast to patients who use closed dressing techniques, who have pain alleviation sooner (within 6 days), patients who use open dressing techniques experience agony that can last for up to 9 days.

It has been determined that the open dressing method is preferable to the closed dressing method, particularly for patients with less severe burns to the limbs and for young patients with superficial to deep burns to the front, back, and chest who could not be effectively controlled in cradles. Treatment for facial burns include exposure techniques that protect the eyes, ears, and nose. Early epithelization, reduced pus discharge, and a shorter hospital stay are all benefits of the open approach. The fear of having to change your clothes frequently, especially if you have major burns, is gone because to its ease of maintenance. Mass casualties, where a concern about manpower is warranted, are another situation where the open technique is extremely appropriate. The closed dressing method does reduce pain and suffering for the patient and is also rather comfortable. It also avoids cross contamination, which is necessary for temperature regulation and isolation. It is quite useful for a set up since it reduces heat loss, wound desiccation, and self-debriding effects.

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