

Comparison of Normal Saline and Honey Dressing in Wound Preparation for Skin Grafting

Bashir M.M.,¹ Afzal S.²

Address for Correspondence: Muhammad Mustehsan Bashir, Assistant Professor of Plastic Surgery, KEMU, Mayo Hospital, Lahore

Objective: To compare the continuously wet normal saline and honey gauze dressings in terms of cost of treatment, days required for wound preparation for skin grafting and graft take.

Study Design: Quasi experimental.

Place and Duration of Study: Plastic and Burn surgery unit, Mayo hospital, KEMU, Lahore from April to September 2009.

Methodology: Sixty wounds with small patches of slough and pale granulation tissue requiring preparation for skin grafting were included and divided into two groups by simple random sampling. Wounds requiring mechanical debridement or grossly infected wounds, diabetics and patients with age > 60 years, Hb <10 g/dl and serum albumin level ≤ 3 g/dl were excluded. Time for wound preparation in days and cost of treatment in Pakistani rupees was noted. Split thickness skin grafts meshed to 1-1.5 were applied. Largest area of graft loss in both wounds was measured in two largest dimensions and noted in cm². This was the end point of the study.

Results: Average time for preparation in saline group was 10 days where as the average time in honey group was 27 days (p value = 0.02). Average area of graft loss in saline group and honey group was 2 cm² and 3 cm² respectively (p value = 0.67). In saline group average cost of treatment was 800 rupees as compared to 2400 rupees in honey group.

Conclusion: Normal saline dressing is a hyperosmolar physiological dressing and prepares the wound faster than honey dressing at a low cost with quite satisfactory graft take.

Key words: Normal saline, Honey, Dressing.

Introduction:

Wounds and their management are fundamental to the practice of plastic surgery. Skin grafting is still the most viable option for the wounds that cannot be closed primarily. Many skin graft failures can be attributed to inadequate recipient site preparation. For the successful take of the graft, bed should have healthy granulation tissue free of slough and infection. If these conditions have not been met, it may be prudent to delay skin grafting until the wound is better prepared.¹ A pseudo eschar or slough is essentially a provisional matrix formed from exudated serum components at the wound air interface. Slough plays a role in prolonging the inflammatory stage of wound healing thus delaying formation of healthy granulation tissue.² An effective way to deal with the slough is through autolytic debridement with the proper use of moist interactive dressing.³ Thus nature of the dressing for a wound while in preparation for grafting is very important. Dressing should be inert, physiological and cheap- providing moist relatively low oxygen tension milieu. A moist wound environment physiologically favors cell migration and matrix formation while accelerating healing of wound.⁴ Search for an effective, cheap and easily available dressing continues.⁵

To keep the pathogens count low various dressings ranging from naturally available products like honey, banana leaves, papaya, amniotic membranes to bactericidal chemotherapeutic applications like silver sulphadiazine, chlorhexi-

dine etc are used with variable results. Use of bactericidal chemotherapeutic agents like silver sulphadiazine on wounds in preparation for grafting is to be condemned.⁶⁻⁸ Advent of newer dressings like hydrocolloids, hydrogels and alginates has given new dimensions to wound management. These modern dressings are costly, not easily available locally and have yet to prove their superiority over traditional gauze dressings.⁴

High osmolarity has been considered a valuable tool in desloughing the wounds and lowering the pathogen count. Both these factors encourage healing and promote the formation of healthy red granulation tissue.⁹ Normal saline dressing functions in part as an osmotic dressing.¹⁰ Application of simple normal saline soaked gauze dressing is cost effective, easily available and has no known cytotoxic side effects. Continuously moist saline gauze dressings are as effective for autolytic debridement as other types of moist dressings in terms of healing rate and have the additional benefits of easy application and regular wound examination.⁹ With evaporation of water the dressing becomes hypertonic. The hyperosmolarity of the normal saline dressing provides an osmotic gradient for absorption of wound fluid and desloughing, contributing to its effectiveness as moist wound dressing promoting granulation and epithelialization.¹⁰

Honey has been an integral part of medicinal culture in different parts of the world. It is one of the earliest known

dressings for the wound acting as osmotic dressing with the added benefit of its antibacterial properties. It has been observed that inflammation, swelling and pain are decreased with the use of honey and healing is enhanced.¹¹⁻¹³

In clinical practice both normal saline and honey gauze dressings are used in preparing the wounds with patches of slough and pale granulation tissue. No study in Pakistan has compared the two agents. Thus the objective of this study was to compare the normal saline and honey dressing in terms of cost of treatment, days required for wound preparation for skin grafting and graft take.

Material and Methods

It was an experimental study conducted at Plastic and Burn surgery unit, Mayo hospital, Lahore from April to September 2009. Sixty wounds with small patches of slough and/ or pale granulation tissue not ready for grafting and not requiring surgical debridement were included in the study and divided in two groups by simple random sampling using random table. Grossly infected wounds, and patients with Diabetes, age < 60 years, Hb < 10g/dl and serum albumin ≤ 3 g/dl were excluded from the study.

Informed consent explaining the use of two dressings was taken from all the inclusive patients. Area of the wounds to be dressed was measured in two largest dimensions and noted in cm^2 . Sterile gauzes soaked in commercially available tube packed honey and normal saline available as intravenous drips were applied over the wounds. Both wet dressings were covered with sterile cotton and crepe bandage.^{12,14} Both dressings were changed daily for wound examination and decision regarding grafting was made on clinical grounds by looking for red/pink granulation tissue and noting down epithelialization of margins.¹⁵ Wound swabs for culture and sensitivity were sent before grafting. Wounds with positive culture of group A streptococcus pyogenes were also excluded from study.¹⁶ Single dose of first generation cephalosporin was given at the time of induction. Split

thickness skin grafts taken with dermatome at 12/1000 inch thickness and meshed to 1-1.5 were applied on the wounds and appropriately immobilized.² Dressing was opened on 5th post operative day. Largest area of graft loss in both wounds was measured in two largest dimensions and noted in cm^2 . This was the end point of the study. SPSS version 13 was used to analyze the data. Quantitative data was analyzed using mean, standard deviation, frequency and percentages. Qualitative data like comparison of proportions in two groups was made using chi-square test and p-value less than 0.05 was considered significant. Tables were used to present the data.

Results

Of the sixty patients studied, 39 were males and 21 were females. Age range was 14 years to 52 years with an average of 33 years. Etiology of wounds is shown in table 1. Wound dimensions in saline group varied from 20 cm^2 to 42 cm^2 with an average size of 30 cm^2 where as dimension in honey group varied from 15 cm^2 to 45 cm^2 with an average size of 28 cm^2 . Time from start of dressing to decision for grafting in days and average area of graft loss in cm^2 in two groups is shown in table 2. In saline group average cost of treatment was 800 rupees as compared to 2400 rupees in honey group.

Discussion

Successful preparation of a wound before skin grafting is very important. The dressing used for preparing a wound for grafting should not do any harm to cells involved in healing. The dressing should be "sterile" and should provide moist environment to the wound.¹⁷

There is dearth of good evidence about topical wound agents from systematic reviews of randomized trials. An exception is the subject of dressings and topical agents for chronic wounds, which has been the subject of systematic evidence collecting¹⁸. Perhaps because of a perceived confusion about what is best in a different area, complimentary and alternative therapies are increasingly seen as better than conventional. The lack of evidence about either enhances this.¹¹

Honey has anti inflammatory action, increases the local blood flow, draws the lymph out of wound and lifts dirt/ dead tissue out of wound bed.¹² High osmolarity of honey is considered the key for all the beneficial effects of honey. However there is a biological plausibility, because inhibition of bacterial growth has been shown using impregnated honey discs or incorporating honey in agar plates. How much of this inhibition is due to inherent antimicrobial properties or its hyperosmolar nature is unknown.¹⁹⁻²¹ There is corroborative

Table1: *The etiology of wounds in two groups.*

| Etiology | Normal saline group (n30) | Honey group (n30) | p-value |
|-------------------------|---------------------------|-------------------|---------|
| Burn wound | 17 | 16 | 0.88 |
| Degloving injury wounds | 8 | 10 | 0.68 |
| Post infective wounds | 5 | 4 | 0.75 |

Table 2: *Comparison of Normal Saline and Honey dressings on wounds.*

| Variables | Normal saline Group (n=30) | Honey group (n=30) | p-value |
|---|----------------------------|--------------------|---------|
| Duration of wound prepration (average days) | 10 | 27 | 0.02 |
| Graft loss (average area in cm^2) | 2 | 3 | 0.67 |

evidence that high osmolarity achieved with simple sugar pastes is a valuable tool in the treatment of infections because it prevents the growth of bacteria and encourages healing.⁶ Thus part or all of antimicrobial action of honey is due to hyperosmolarity.¹¹

High osmolarity can be safely achieved topically by use of simple sugar paste, honey and normal saline dressing. In normal saline dressing as the fluid evaporates from the saline soaked gauzes placed over the wound, the dressing becomes hyperosmolar and draws fluid from the wound by osmosis. This movement of wound fluid into the gauze contributes to its effectiveness as a hyperosmolar dressing. Thus normal saline dressing can have anti inflammatory action, increases the local blood flow by decreasing edema by drawing wound fluid out and desloughs the wound.¹⁰ Unlike the antiseptics and antibiotics there is no impairment of healing process with these physiological dressings.

In the current study comparison has been made between the two physiological dressings with similar mechanism of action. It has been found that wound is prepared much earlier with the use of normal saline (average 10 days) in contrast to honey (average 27 days). This difference is statistically significant (p value 0.02). It is difficult to explain this in the presence of traditional beliefs regarding honey. The problem is solved when one looks at the variables associated with the commercially available honey. With honey one needs to be aware that it is a natural product and that those characteristics associated with wound healing may be affected by species of bee, geographical location and botanical origin, as well as processing and storage conditions.¹¹ Most importantly purity and sterility required for a product to be used for medicinal purpose cannot be guaranteed with an item marketed as a food product. Thus honey used in this study and in most of published studies probably acted more like a sugar paste with purity not guaranteed and bacterial contamination of this impure honey can be a possibility. On the other hand normal saline available as intravenous drips is sterile, free of pyrogens and has standard concentration.²² These limitations of impure honey may explain the delay in wound preparation with use of honey.

Regarding cost of treatment normal saline dressing is very cheap as compared to non sterile commercially available honey. Expenditure of gamma radiation for sterilization of pure honey would add to the total cost of treatment.¹² New, large, randomized studies, with blinded assessment of useful clinical outcomes and compared with standard wound treatments need to be done with sterile and pure honey to show any superiority over simple normal saline dressing and justify the cost of treatment. While these trials would be relevant to industrialized countries to compare honey with conventional treatments, it would be important to conduct them in less developed world where cost and availability are the key issues.¹¹

The graft take in the two groups was quite satisfactory and area of graft loss in two groups was comparable with p value of 0.67. This again testifies the belief that com-

mercially available nonsterile honey dressing is no better than the simple normal saline dressing in wound preparation for skin grafting.

Conclusion

Normal saline dressing is a hyperosmolar physiological dressing and prepares the wound faster than honey dressing at a low cost with quite satisfactory graft take.

References

1. Christian EP, Jeffrey JP, Peter R. Skin Grafts. In: Stephen JM. Plastic Surgery General Principles. 2nd ed. Philadelphia: Saunders Elsevier; 2006; 299.
2. Robert DG, Thomas AM. Wound care. In: Charles HT, Robert WB, Sherrell JA, Scott PB, Geoffrey CG, Scott LS. Grab and Smith's Plastic Surgery. 6th ed. Philadelphia: Lippincot William and Wilkins; 2007; 27.
3. Bohdan P, Tobias H, Elof E. Wound management. In: Bahman G, Elof E, John AP. Plastic Surgery. 1st ed. Philadelphia: Saunders Elsevier; 2009; 29.
4. Bohdan P, Tobias H, Elof E. Wound management. In: Bahman G, Elof E, John AP. Plastic Surgery. 1st ed. Philadelphia: Saunders Elsevier; 2009; 31.
5. Myers BA. Wound Management principles and practice. New Jersey(NJ) : Pearson Education Inc; 2004: 80-81.
6. Archer HG, Barnett S, Irving S, Middleton KR, Seal DV. A controlled model of moist wound healing: Comparison between semipermeable film, antiseptics and sugar paste. J Exp Patho 1990; 71: 155-170.
7. Gajiwala k, Gajiwala AL. Evaluation of Lypholized, gamma irradiated amnion as a biological dressing. Cell Tissue bank 2004; 5: 73-80.
8. Gore MA, Akolekar D. Evaluation of Banana leaf dressing for partial thickness burn wounds. Burns 2003; 29: 487-92.
9. Ayodeji AS, Innocent OI, Olatunde OO. A comparison of the effect of chlorhexidine, Tap water and Normal saline on wound healing. Int J Morphol 2006; 24: 673-676.
10. Lim JK, Saliba L, Smith MJ, McTavish J, Raine C, Curtain P. Normal Saline wound dressing— is it really normal? Br J Plast Surg 2000; 53: 42-45.
11. Owen AM, Lesley AS, Fiona C, Kate S, Henery JM, Andrew RM. Systematic review of the use of honey as a wound dressing. BMC Complimentary and Alternative Medicine 2001; 1: 2.
12. Nagra ZM, Fayyaz GQ, Asim M. Honey dressings: Experience at department of plastic surgery and burns allied hospital, Faisalabad. Prof Med J 2002; 9: 246-51.
13. Abdulrazzak M, Tahir SM, Imdad AK, Ghulam Ali M. Therapeutic effects of honey versus silver sulphadiazine in the management of burn injuries. J Liaquat Uni Med Health Sci 2005; 4: 100-4.

14. Ovington LG, Hanging wet to dry dressing out to dry, *Advances in skin and wound care. The journal for Prevention and Healing* 2002; 15: 79-84.
15. Alex S, Ian LV, Ernest KM. Grafts. In: Bahman G, Eloff E, John AP. *Plastic Surgery*. 1st ed. Philadelphia: Saunders Elsevier; 2009: 97.
16. Timothy G. Plastic and reconstructive surgery. In: Norman SW, Christopher JKB, Ronan POC. *Bailey and Love's Short Practice of Surgery*. 25th ed. Arnold: London; 2008: 401.
17. Svensio T, Pomahac F, Yao J. Accelerated healing of full thickness skin wounds in a wet environment. *Plast Recons Surg* 2000; 106: 602-614.
18. Bardely M, Cullum N, Nelson EA. Systematic reviews of wound care management: Dressings and topical agents used in the healing of chronic wounds. *Health Technol Assess* 1999; 3: 1-35.
19. Copper RA, Molan P, Harding KG. Antibacterial activity of honey against strains of *Staphylococcus aureus* from infected wounds. *J Ray Soc Med* 1999; 92: 283-85.
20. Cooper RA, Molan PC. The use of honey as an antiseptic in managing *Pseudomonas* infection. *J wound Care* 1999; 8: 161-4.
21. Karayil S, Deshpande SD, Koppikar GV. Effect of honey on multi-drug resistant organisms and its synergistic action with three common antibiotics. *J Postgrad Med* 1998; 44: 93-6.
22. Sibbald R, Williamson GD, Orsted H, Campbell LK, Keast D, Krasner D et al. Preparing the wound bed—debridement, bacterial balance and moisture balance. *Ostomy/ wound management* 2000; 46: 14-35.
23. Whaley S. Tap water or normal saline for cleansing traumatic wounds? *British J Community Nursing* 2004; 9: 471-8.