COLLAGEN DRESSING VERSUS HEPARIN DRESSING IN BURN WOUND MANAGEMENT

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HOW TO CITE THIS ARTICLE:
Rakesh Rai, Sunil H Sudarshan, Reshmina Dsouza, Elroy Saldhana, PS Aithala. "Collagen dressing versus heparin dressing in burn wound management". Journal of Evolution of Medical and Dental Sciences 2013; Vol2, Issue 47, November 25; Page: 9124-9130.

BACKGROUND: One of the greatest discoveries of mankind is the double edge sword "fire". This has been both a boon and a bane to mankind, on one side it helps in the survival and on the other it causes suffering to those who succumb to its injuries. Burn injuries are known for their complexity and their treatment requires a complete understanding of patho-physiology and interaction of the major organ systems. In India burn injuries account for most of the hospital admissions. Various treatment options are available for burn wound management. Heparin and collagen are the two dressings have been found to useful in burn wound management, hence we decided to study their comparison in burn wound management. **AIMS:** In view of the above said we considered to study the effectiveness of collagen dressing in treating burns with that of heparin dressing. **METHODS AND MATERIAL:** A prospective study was done at between June 2010 to September 2012 in which 100 patients who presented with second degree burns were chosen by random sampling technique, and were grouped into 2 groups consisting of 50 patients each after excluding patients who did not meet the inclusion criteria and those who met the exclusion criteria. **STATISTICAL ANALYSIS:** Chi square test, Fishers exact test used to assess the statistically significant values. Values of $p<0.05$ or less were considered to be statistically significant. **RESULTS:** In our study it was observed that duration taken for wound healing is lesser in the collagen group than heparin group, 17.36 days in case of collagen dressing and 21.26 days in case of conventional dressings. It was also observed that duration of hospital stay was less that is 10.02 days in those treated with collagen dressing as compared to 15.32 days in heparin group. It was also observed that there was less pain and better patient compliance with collagen dressing. **CONCLUSION:** Collagen sheet is very useful in second-degree burns when compared to heparin. It, is well tolerated, provides multiple benefits and the overall cost-benefit factor is very good when compared to the heparin dressings in burn wound management.

KEYWORDS: heparin, collagen, burn

INTRODUCTION: One of the greatest discoveries of mankind is the double edge sword "fire". This has been both a boon and a bane to mankind, on one side it helps in the survival and on the other it causes suffering to those who succumb to its injuries. Burn injuries are known for their complexity and their treatment requires a complete understanding of patho-physiology and interaction of the major organ systems. In India burn injuries account for most of the hospital admissions. Various treatment options are available for burn wound management. Heparin and collagen are the two dressings which have been compared with conventional dressings and have been found to useful in burn wound management, but no study available has heparin and collagen, hence we decided to study the comparison between the two modalities in burn wound management.

METHODS: A prospective study was done at between June 2010 to September 2012 in which 100 patients who presented with second degree burns were chosen by random sampling technique, and were grouped into 2 groups consisting of 50 patients each after excluding patients who did not meet the inclusion criteria and those who met the exclusion criteria.

Inclusion criteria:

- Patients who present with partial thickness and deep dermal burns.
- Patient presenting within 2 days of burns.
- Patient below 60 years of age.

Exclusion criteria:

- Patient with full thickness burns.
- Patient with allergy to collagen dressing.
- Patient with wound having extensive necrosis.
- Patient with infected burns.

Dressings in the control group: Heparin treatment was started as soon as the patient was received in the Burns Ward after the initial assessment and resuscitation was complete and was continued till seven post burn day and stopped if the patient was taken up for any form of surgical intervention. The affected area was thoroughly cleaned for removal of any external contamination. If the wound was infected, the wound was debrided properly before dressing. The side effects of heparin and/or alteration of the bleeding profile were monitored and if present were a definitive indication for stopping heparin,and the effects reversed with protamine sulphate 1 ml diluted with 9 ml of distilled water over ten minutes.Dressings were changed daily.

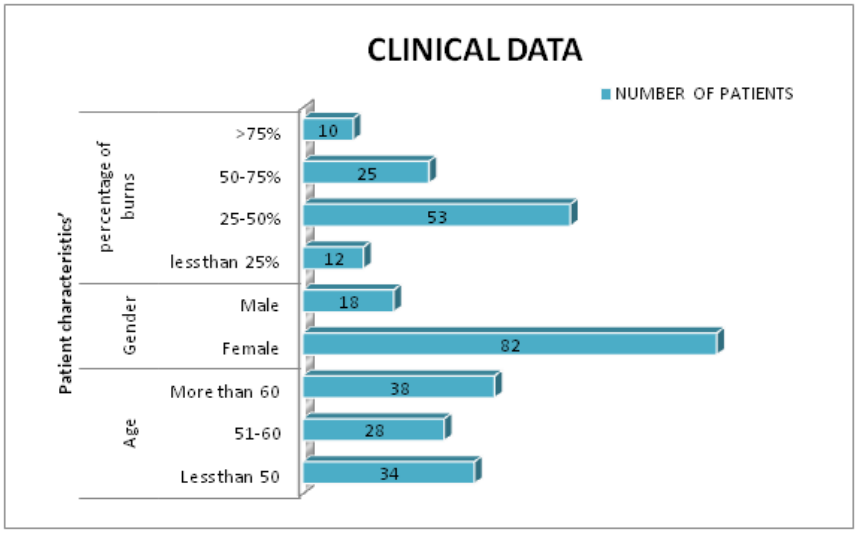
Dressings in the test group: Before applying collagen dressing, the affected area was thoroughly cleaned for removal of any external contamination. If the wound was infected, the wound was debrided properly following that collagen sheets as required for the raw surface area were used of appropriate size are selected. Collagen sheets were rinsed thoroughly in normal saline before application to remove all traces of the preservation fluid. Sheets were applied firmly so as to cover the whole raw area. Care was taken to remove any air bubble between the burn surface and the collagen which was facilitated by using the back of the thumb-forceps.

Data collection: During the period of study, the data collected from the patients' files regarding the following characteristics

- Age of the patient,
- The cause of burns
- Type of burns
- Degree and percentage of burns,
- Treatment given
- The time taken for wound healing
- Duration of hospitalization

Statistic analysis: Statistic analysis was done using the Mann whitney test, chi square test, fishers exact test and Mann whitney test , and the analysis was interpreted by the p value and z value. p value of less than 0.05 was considered as statistically significant.

RESULTS: Subject characteristics are shown in [Fig-1]. There was no statistically significant difference with a X2 value of 6.619 and p value 157, NS in the age distribution among the test and control groups hence the data is comparable between the test and control groups. The age of the participants ranged from 26-80 years with the mean age 38.8 years. Out of total 100 patients 18 were males while 82 of them were females.



In our study it was observed that duration taken for the wound healing is much lesser in the collagen group compared to the heparin dressings, 17.36 days in case of collagen dressing and 21.26 days in case of conventional dressings.

It was also observed that duration of hospital stay was less that is 10.02 days in those treated with collagen dressing as compared to 15.32 days in heparin group.

It was also observed that there was less pain and better patient compliance with collagen dressing.

DISCUSSION: Burn injuries produce coagulative necrosis of the skin and underlying tissues which is very painful and is associated with complex local and systemic pathology and a high mortality.

Superficial burns i.e. First degree burns heal in 5-7 days time without any scarring. While superficial dermal or deep dermal burns i.e. 2nd degree burns take anytime between 2 to 4 weeks to heal and are extremely painful. Second degrees burns if not treated promptly and properly, may get infected & get converted into third degree i.e. Deep burns resulting in scarring & contracture formation.

Inspite of rapid strides made in treatment of burns and better understanding of patho-physiology of burns and advent of good spectrum of antibiotics to prevent infection in burns, the 2nd to 3rd degree burns are still an enigma and challenge to the surgeons. The morbidity & mortality in burns is still high. In burn wound management the efforts to prevent the progression of depth of burns, the relief of pain, the requirement of high quantities of intra-venous fluid for resuscitation & use of multiple antibiotic is still a daunting tasks for the surgeons.

The age of the participants ranged from 26-80 years with the mean age 38.8 years In study of the sex distribution our data was comparable to most of the studies in which females succumbed

more to the burn injuries.43 patients had flame burns and 57 patients had scald burns. In our study 87 patients had accidental burns, 13 were suicidal burns.

Heparin is an antagonist to histamine, bradykinin, and prostaglandin E1 combined with platelets inhibited complement C1 esterase; protective against toxic oxygen metabolites and it also bound to tumor-necrosis-factor [1]. Heparin is a naturally-occurring anticoagulant produced by basophils and mast cells.[2] In 1916, McLean, a second-year medical student at Johns Hopkins University, while working under the guidance of Howell investigating pro-coagulant preparations, isolated a fat-soluble phosphatide anti-coagulant in canine liver tissue[3], Various studies[4,5]

The work of Ramakrishna[6] showed that heparin when used in the management of burns, had anti-inflammatory properties.

The work of Saliba[7]proved that when heparin was added in the management of burns, not only did it reduce pain, but, also limited the inflammation, caused revascularization of ischemic tissue and enhanced tissue granulation.

Heparin therapy consistently relieved pain, reduced inflammation, limited cellular-destruction, was neoangiogenic, regulated tissue restoration, shortened and facilitated healing and resulted in smooth healing. Patients were more alert, physically active, cooperative, able to eat and help in their care. There was a significant reduction in need for escharotomies and fasciotomies and skin grafting[8-12].

Collagen dressing is a type of wound dressing that is made with a form of collagen to aid in body's healing processes[13].

A study done by SINGH O, GUPTA[14] and colleagues has shown that use of collagen dressings hastens the wound healing in burns, reduces scar contracture and reduces need for skin grafting.

In a study by Gupta RL, [15] et al collagen sheet cover was used in 32 cases of fresh burns and 26 cases of post burn contractures. In majority of cases of burns, the collagen sheet remained dry and there was no infection. It safeguards against exogenous infection, prevented exudation from the raw areas and provided rapid epithelialization and healing.

Gerding RL [16]et al concluded that when used on properly selected wounds Biobrane therapy can significantly decrease pain and total healing time. Improved patient compliance may be added benefit.

Demling RH[17], Desanti L,et al. in their study concluded that a bioengineered skin substitute significantly improves the management and healing rate of partial thickness facial burns, compared to the standard open topical ointment technique.

Barret, Jaun P.M.D [18]et, al in their study noted the Length of hospital stay and wound healing time were also significantly shorter in the Biobrane.

A prospective comparative study by Mukund.et.al[14] comprising of 50 patients majority of the patients had less than 10% burns in both the groups in comparison to our study which had 21% TBSA as the mean when the Percentage of burns was analyzed.

Marilyn and his colleagues[19] studied 43 patients aged 1 to 57 years of either sex with deep second- degree burn injury ranging 8% to 40% of the body surface area, randomized to receive the type-1 collagen dressing or 1% silver sulphadiazine. In their study 23 patients were randomly allocated to receive collagen dressings and 22 to silver sulphadiazine.2 patients in silver sulphadiazine group lost follow up, thus a total of 43 patients were evaluated.

A prospective comparative study by Mukund.et.al[14] comprising of 50 patients majority of the patients had less than 10% burns in both the groups in comparison to our study which had 35% as most cases of burns , this change in the percentage is probably because our hospital is a tertiary care and referral centre. There were 4 mortalities, 2 in each group, all 4 had above 95% burns.

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CONCLUSION: Collagen sheet is very useful in second-degree burns when compared to heparin. It, is well tolerated, provides multiple benefits and the overall cost-benefit factor is very good when compared to the heparin dressings in burn wound management.

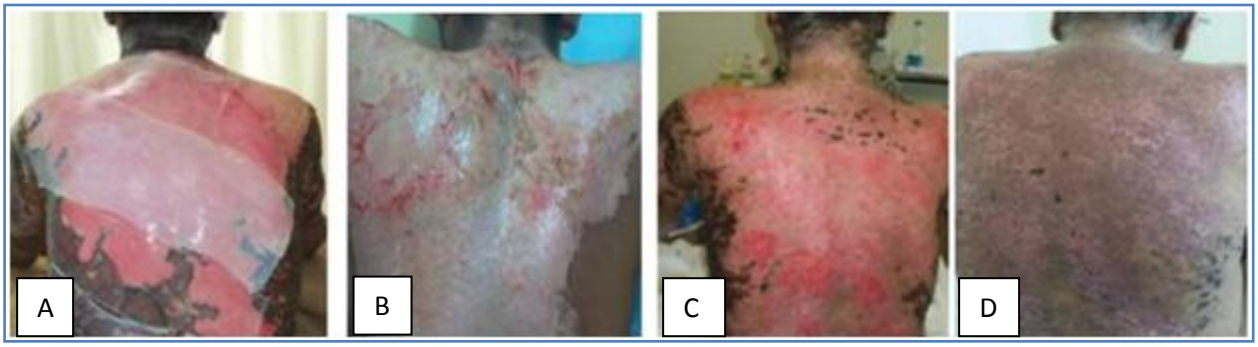
ACKNOWLEDGMENTS:

1. To Dr. Leo Theobald. Menezes Plastic Surgeon for supporting in conducting the study.
2. To the administration of the institution for allowing to conduct the study.
3. To the anaesthesia and general surgical residents for their prompt services whenever required.

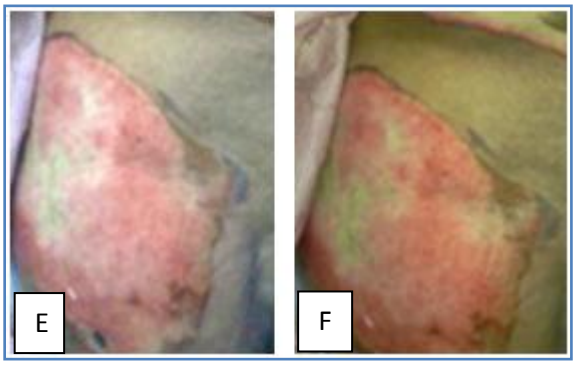
REFERENCES:

1. Guyton, A. C.; Hall, J. E. (2006). Textbook of Medical Physiology. Elsevier Saunders. p. 464.
2. Marcum JA (January 2000). "The origin of the dispute over the discovery of heparin". Journal of the History of Medicine and Allied Sciences 55 (1): 37–66.
3. J. Carr, The anti-inflammatory action of heparin: heparin as an antagonist to histamine, bradykinin, and prostaglandin E1. Thrombosis. Res. 16 (1979), pp. 507–516.
4. Oremus M Hansen Mark D. Richard W. A systematic review of heparin to treat burn injury. Journal of burn care and Research 2007; 26; 6: 794-804.
5. Venkatachalapathy J.S, Mohan Kumar, Saliba Jr. A comparative study of burns related with topical heparin and without heparin, Annals of Burns and Disasters Dec 2007; vol XX; 44: 189-198.
6. Ramakrishnan K, Jayaraman V. Efficacy of low molecular weight heparin in wound healing. Buns Feb 2007, 33:1; 158-159.
7. Saliba Jr. M. Burn treatment with heparin added. Burns Feb 2007, 33: 1 S35.
8. M.J. Saliba, Jr, Heparin in the treatment of burns. J. Am. Med. Assoc. 200 (1967), p. 650.
9. J. Saliba, Jr, Heparin efficacy in burns. II. Human thermal burn treatment with large doses of topical and parenteral heparin. Aerosp. Med. 41 (1970), p. 1302.
10. M.J. Saliba, Jr, W.C. Dempsey and J.L. Kruggel, Large burns in humans, treatment with heparin. J. Am. Med. Assoc. 225 (1973), p. 261.
11. M.J. Saliba, Jr, Heparin, nature's own burn remedy?. Emergency. Med. 106 (1973), p. 111.
12. M.J. Saliba, Jr, W.J. Kuzman and M. Miller, Effect of heparin in anticoagulant doses on the ECG and cardiac enzymes in patients with acute myocardial infarction. Am. J. Cardiol. 37 (1976), pp. 604–607.
13. Bishara S. Atiyeha, Shady N. Hayeka and S. William Gunnb. New technologies for burn wound closure and healing—Review of the literature. Burns 2005; 31(8): 944-956.
14. Singh O, Gupta SS, Soni M, Moses S, Shukla S, Mathur RK. Collagen dressing versus conventional dressings in burn and chronic wounds: A retrospective study. J Cutan Aesthet Surg 2011; 4: 12-16.

15. Gupta R L et al. Role of collagen sheet cover in burns- a clinical study. Indian Journal Of Surgery1978;40(12):646.
16. Gerding RL, Emerman CL and Effron D,et al. Outpatient management of partial thickness burns: biobrane versus 1% silver sulphadiazine. Annals of Emergency Medicine 1990;19:121.
17. Demling RH. Desanti L, Management of partial thickness facial burns (Comparison of topical antibiotics and bioengineered skin substitutes). Journal of Burn Care and Rehabilitation1999;25:256.
18. Juan P Barret, et al. Biobrane versus 1% silver sulphadiazine in second degree pediatric burns. Plastic and Reconstructive Surgery 1999;105(1):62-65.
19. Marily Kwolek, Dhanikachalam, R P Narayan et al. A comparative second-degree burn treatment trial of collagen dressing versus silver sulphadiazine alone at 31st annual meeting of society for biomaterials.



A. DAY ONE APPLICATION OF COLLAGEN
B. RESULT ON DAY 5 FOLLOWING COLLAGEN DRESSING
C. RESULT ON DAY 10 FOLLOWING COLLAGEN DRESSING
D. FINAL HEALED AREA COLLAGEN DRESSING



E. HEPARIN APPICATION DAY 1
F. HEPARIN APPLICATION DAY 10

G. COLLAGEN BRAND USED
H. CLENSING OF COLLAGEN SHEET FROM PRESERVATIVE
I. SPREADING OF COLLAGEN SHEET

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Date of Submission: 05/11/2013.
Date of Peer Review: 06/11/2013.
Date of Acceptance: 14/11/2013.
Date of Publishing: 20/11/2013