



A COMPARATIVE STUDY OF MANAGEMENT OF BURN WOUNDS WITH CONVENTIONAL DRESSING VERSUS HEPARIN-BASED METHODS

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ABSTRACT Burn injuries pose a significant challenge all over India with substantial morbidity and mortality rates. Various conventional methods are employed for burn wound management, including silver sulphadiazine, petroleum-based antimicrobial agents, synthetic and biological dressings etc. Heparin, primarily known as an anticoagulant, exhibits anti-inflammatory and pro-angiogenic properties suggesting its potential utility in burn wound treatment. This study aims to assess whether incorporating heparin in burn wound management could improve patient outcome and reduce morbidity and mortality. 84 patients were randomly assigned to two groups equally. One group received conventional dressing (CD) another received topical heparin (TH). On evaluation TH group showed significant shorter hospital stay, reduce pain levels and accelerated wound healing compared to CD group.

KEYWORDS : Burn, Wound, Conventional, Heparin**INTRODUCTION:**

Almost 70 lakh individuals yearly suffer from burns in India and among them there is around 1.4 lakh mortality and 2.4 lakh individual succumb to disabilities.^[1] Different factors of morbidity and mortality are related with such burn wounds, which are managed by adequate fluid resuscitation, antibiotics to counter infections, conventional dressing with silver sulfadiazine, mafenide acetate, petroleum-based antimicrobial agents, synthetic and biological dressing films and dermal graft.^[2,3] Heparin, which is majorly used as an anticoagulant, also possess some anti-inflammatory and neoangiogenic properties that help in reducing bacterial translocation and promote collagen restoration and tissue repair in burn patients.^[4,5] Its topical application results in reducing pain, inhibiting clot formation and inflammation, restoring blood supply and enhancing smoother skin healing, shorter hospital stays and decreased need for debridement and skin grafting.^[6,7]

AIM:

Evaluate whether the addition of heparin, could improve burn treatment and reduce burn morbidity and mortality.

MATERIALS AND METHODS:

84 burn patients were randomly selected for the study who have been admitted to the burn ward of a tertiary medical facility in North Bengal and followed over a period of one and half years. Inclusion Criteria were 1) age group 18 to 45 years 2) who presented within 24 hours of the incident 3) Second and Third degree burns and 4) burn involving 10% to 40% of the body surface area. Patients with a history of known co-morbidities like diabetes, peripheral vascular diseases, haemorrhagic diatheses; pregnant women and hypersensitivity to heparin were excluded from the study. These 84 patients were randomly distributed between two groups with 42 each. The first group, namely conventional treatment group (CD) received a thorough saline wash of the wound followed by periodic dressing with silver sulfadiazine ointment.

The other group, namely topical heparin group (TH) were administered topical heparin 25000 IU every 6 hours by spraying 5ml of Inj. Heparin (5000 IU/ml) diluted in 200 ml of normal saline over the entire burnt area and also by injecting small amounts in blisters. Patients were evaluated on day 4 and tangential excision was done for deep burns if needed. Topical heparin application was continued with close monitoring of aPTT/INR values and also evidence of excessive bleeding of burn wounds is closely monitored. Wounds were evaluated on days 1, 4, 14 and 21 days. All patients received adequate antibiotics and analgesics as and when required to counter primary, secondary infection and pain. Patients was followed up till satisfactory reepithelization and three parameters were evaluated for the comparison, duration of hospital stay, Visual Analogue Scale (VAS Score) for pain relief, Granulation Tissue Score (GTS) to evaluate wound healing.

RESULT AND ANALYSIS:**Table 1: Distribution by AGE and SEX:**

AGE (Years)	SEX	Total participants		Conventional Dressing (CD)	Topical Heparin (TH)	P value
18-30	Male	20	44	9	11	0.6219
	Female	24		14	10	0.1730
31-45	Male	21	40	8	13	0.8436
	Female	19		11	8	0.2017
			84	44	44	

A total of 84 patients were randomly distributed into two groups, 42 patients had undergone Conventional Dressing (CD) and the rest 42 patients had undergone dressing with Topical Heparin (TH). Age and gender distribution in both groups are statistically insignificant.

Table 2: Distribution by Percentage of Body Surface Area (BSA):

Distribution by BSA and Depth of Burn		Conventional Dressing (CD)		Topical Heparin (TH)		Total		P value
		No. (%)		No. (%)	Dose (Lakh IU)	Dose per patient		
Percent age of Burn (BSA)	10-20	8 (19)		9 (21)	25.5	2.8	17(20)	0.5341
	20-30	23 (55)		32 (76)	186	5.8	55(65)	0.8783
	30-40	11 (26)		1 (3)	9.5	9.5	12(15)	0.009
Depth of Burn	Superficial	3 (7)		8 (19)			11(13)	0.9344
	Second							
	Deep Second	39 (93)		34 (81)			73(87)	0.2550

Among all participants, 20% of patients have 10-20% BSA burns, 65% of patients have 20-30% BSA burns and 15% of patients have 30-40% BSA burns. Statistical analysis shows that this distribution is insignificant in the 10-20% and 20-30% BSA categories but significant in the 30-40% BSA category. In terms of depth of burns (superficial and deep second-degree burns), distribution in both groups was statistically insignificant (p-value 0.9344 and 0.2550). But when compared in terms of the percentage of BSA, CD group had more patients having greater than 30% burn over TH Group (11 in the CD group and 1 in the TH group). We have also calculated the total amount of Heparin needed for the TH group according to the BSA.

Table 3: Distribution by Hospital Stay:

Duration of hospital stay	Conventional Dressing (CD)	Topical Heparin (TH)	p value
	No. (%)	No. (%)	
< 2 weeks	3 (7)	25 (60)	0.0060

< 3 weeks	6 (14)	34 (81)	<0.0001
< 4 weeks	10 (24)	40 (95)	<0.0001
< 5 weeks	19 (45)	42 (100)	<0.0001
> 6 weeks	23 (55)	0	Not calculable

Days of hospitalisation show a significant reduction in the TH group when compared with the CD group. 25 (60%) patients were discharged within 2 weeks in the TH group whereas it was only 7% in the CD group. All the patients in the TH group were discharged within 5 weeks but only 19 (45%) patients in the CD group were discharged at the same time ($p<0.0001$). The rest of the 23 (55%) patients took almost 6 weeks before being discharged from the hospital.

Table 4: Compare of VAS Score for pain:

VAS Score MEAN Value	Conventional Dressing (CD)	Topical Heparin (TH)
Day 1	9.6	9.8
Day 4	8.7	8.4
Day 14	7.9	5.7
Day 21	6.4	3.4

Table 5: Granulation Tissue Score:

Granulation Tissue Score	Day 1		Day 14		Day 21	
	Conventional Dressing (CD)	Topical Heparin (TH)	Conventional Dressing (CD)	Topical Heparin (TH)	Conventional Dressing (CD)	Topical Heparin (TH)
1	36	32	0	0	0	0
2	6	10	8	2	6	0
3	0	0	18	16	14	8
4	0	0	16	24	22	34

We have used the Visual Analogue Scale (VAS) for the determination of pain perception in both groups (VAS 1= No Pain, VAS 10= worst possible pain). Average of pain perception in both of our groups on Day 1, 4, 14 and Day 21 have been calculated. Our study shows a considerable reduction in pain perception in the TH Group (9.8 to 3.4) than the CD group (9.6 to 6.4) which in turn resulted in a smaller amount of analgesics for the TH group.

A Granulation Tissue Score (GTS) signifies the percentage of wounds covered by granulation tissue. At the end of the third week, 22 (52%) patients in the CD group and 34 patients (81%) in the TH group had achieved a GTS score of 4 which signifies 75-100% of wound coverage by healthy granulation tissue. It signifies significant improvement ($p<0.0001$) of the wound by dressing with Topical Heparin.

8 patients in the CD group needed skin grafting whereas only 3 (7%) patients in the TH Group needed grafting at a later stage. There were no serious complications including bleeding problems in either of the groups and there was no mortality among our study patients.

DISCUSSION:

In our comparative study we have found some noteworthy observations. Age and gender distribution between the two groups were statistically insignificant, suggesting that the randomization process was effective. Additionally, the distribution of burn depth (superficial vs. deep second-degree burns) did not significantly differ between the two groups. However, the analysis revealed a notable difference in the percentage of body surface area (BSA) affected by burns, with the CD group comprising more patients with burns exceeding 30% BSA compared to the TH group. Despite this discrepancy, the TH group exhibited a lower requirement for skin grafting and significantly shorter hospital stays. Notably, a substantial proportion of patients in the TH group were discharged within two weeks, highlighting the potential for heparin-based dressing to expedite the healing process and improve patient outcomes. In a similar study by Venakatachalapathy T.S., Mohan Kumar S., and Saliba M.J they have also found that the treatment of burn wounds with topical heparin results in improved outcome and lower hospital stay.^[8]

Pain control is an important part of management in burn patients. We have employed Visual Analogue Scale (VAS) to assess pain perception

in both groups. The results demonstrated a considerable reduction in pain perception among patients of TH group, leading to a decreased need for analgesics compared to the CD group. A similar finding was observed by various studies like Vijayakumar C, Prabhu R, Senthil Velan M et al and Masoud M., Wani A. H., & Darzi M. A.^[9,10]

Furthermore, the assessment of granulation tissue formation revealed a significant improvement in wound re-epithelialisation outcomes with topical heparin dressing. A higher proportion of patients in the TH group achieved granulation tissue scores compared to the CD group. This finding suggests that heparin's anti-inflammatory and pro-angiogenic properties contribute to enhanced tissue repair and regeneration in burn wounds.^[11]

Importantly, the study reported no serious complications or mortality associated with either treatment modality, indicating the safety and feasibility of heparin-based dressing in burn wound management. These findings corroborate previous research demonstrating the beneficial effects of heparin in promoting wound healing and reducing morbidity in burn patients.

CONCLUSION:

In our study we have observed improvements in pain relief, wound healing, and hospitalization outcomes with heparin-based therapy over conventional dressings with silver sulfadiazine ointment. Though a larger-scale evaluation is needed to validate these findings and elucidate the underlying mechanisms driving the therapeutic effects of heparin in burn wound management.

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