

## Original Research Article

# A HOSPITAL BASED PROSPECTIVE STUDY TO BENEFICIAL EFFECTS OF EARLY ESCHAROTOMY AND REGULAR DRESSING AND THEIR ROLE IN PREVENTION OF SEPSIS AT TERTIARY CARE CENTER

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Received : 17/10/2024  
Received in revised form : 06/11/2024  
Accepted : 25/11/2024

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DOI: 10.70034/ijmedph.2024.4.215

Source of Support: Nil,  
Conflict of Interest: None declared

**Int J Med Pub Health**  
2024; 14 (4); 1170-1173

**ABSTRACT**

**Background:** Burns mainly affect the skin but can also affect deeper tissues such as bones or muscles. Depending on the stage of the burn, the patient's condition and the cause of the burn, we need to choose the most appropriate treatment. Personalization and multidisciplinary collaboration are key to the successful management of burn patients. This study is being done with the intention to obtain the best possible outcome regarding the mortality and morbidity in burns sepsis.

**Materials & Methods:** A hospital based prospective study done on 30 patients admitted for burns in SMS Medical College and attached group of hospitals, Jaipur, Rajasthan, India during one-year period. The patients ranged from more than 30% to less than 70% burns of total body surface area measured with "Rule of nine". Escharotomy and regular dressings were done in patients willing for the same and in those patients who were willing for blood transfusion.

**Results:** In our study group, maximum number of cases of burns 10 (33.33%) were seen in the age group 20-30 years. 86.66% of the cases were in the age group 20-50 years. Female to male ratio was 1.14:1. Our study population, 20 (66.66%) cases of burns were caused due to accidental injuries followed by suicidal attempts 6 cases (20%). Out of 30 cases, 18 (60%) cases developed signs of sepsis, 12 (40%) cases didn't show any signs of sepsis. Out of 30 cases, 20 (60%) cases were subjected to escharotomy. 18 (90%) recovered and 2 (10%) expired. Out of the 10 patients who didn't undergo escharotomy, 6 (60%) patients recovered, 4 (40%) patients expired. The difference was statistically significant in the recovery group ( $p < 0.05^*$ ).

**Conclusion:** We concluded that escharotomy with regular cleaning of the wound reduces the colony counts, removes septic focus and is found to have a beneficial effect in the overall outcome. However, the most important predictor in burns mortality is the percentage of the total body surface area involved wherein 100% mortality was observed in patients with 70% burns.

**Keywords:** Sepsis, Escharotomy, Burns, Wound, Mortality.

**INTRODUCTION**

Burns is a major cause of mortality and morbidity worldwide.<sup>[1]</sup> Sepsis is a major cause of death and remains the subject of much research and debate

within the critical care community. Burns accounts for 2, 00,000 deaths every year in India.<sup>[2]</sup>

Burns are among the most serious and painful of injuries, often affecting children, people with disabilities and the elderly, whose numbers are

increasing in ageing societies.<sup>[3,4]</sup> Burns are the fourth most common type of injury after road traffic accidents, falls and physical violence.<sup>[5]</sup> With climate change and rising temperatures, sunburns, which are associated with a variety of skin cancers including melanoma, are also increasing.<sup>[6]</sup>

Despite the advances in burn prevention, treatment and rehabilitation, sepsis remains the most common cause of death. The unique physical, metabolic, physiological changes seen after major thermal injuries means that the management of sepsis in burns poses a particular challenge and differs in many respects to the management of sepsis in the general critical care population. Patients with sepsis who respond to early goal directed resuscitation therapy in the emergency department and show no end organ hypo perfusion may be admitted to general burns ward whereas patients who do not respond to initial early treatment require an admission in the intensive care unit.<sup>[7]</sup>

The loss of the natural cutaneous barrier to infection, coagulated proteins and other microbial nutrients in the burn wound, combined with a vascularity of the wound leads to microbial colonisation. In some patients, colonization is followed by invasion by microorganisms, giving rise to burn wound infection.<sup>[8,9]</sup>

The most important threat to survival in successfully resuscitated patients is infection; with burn wound sepsis and pneumonia being the leading causes of death. Since the local mechanical defences of the skin and respiratory tract are the systems injured most frequently in burn victims, it is not surprising that the burn wound and the lungs are the most common foci of fatal infection. The burn wound was the most common site of infection which caused devastating morbidity and when invasive, universal mortality. This has changed after the introduction of effective topical anti-microbial agents in the mid-1960s.<sup>[10,11]</sup> Prevention of sepsis is one of the main goals for anybody involved in the care of patient with severe burns. Early burn excision with grafting, wound care and dressings, prophylactic antibiotics, management of catheter related infections, selective decontamination of the digestive tract are several techniques, in addition to standard infection control measures, which are thought to reduce the risk of infection and sepsis.

Burns sepsis is a complex condition and successful management requires specific prevention strategies, reliable diagnostics tests and early targeted and effective treatment underpinned by sound clinical research. This study is being done with the intention to obtain the best possible outcome regarding the mortality and morbidity in burns sepsis.

## **MATERIALS AND METHODS**

A hospital based prospective study done on 30 patients admitted for burns in SMS Medical College

and attached group of hospitals, Jaipur, Rajasthan, India during one-year period.

### **Inclusion Criteria**

- a. All patients with deep partial thickness and full thickness burn admitted to SMS Hospital.
- b. All patients with 30-70% of burns of total body surface area.
- c. All patients in the age group of 10-50 years.
- d. All patients with flame burns, acid, alkali and other chemical burns.

### **Exclusion Criteria**

- a. All patients with superficial partial thickness burn.
- b. All electrical burns.
- c. All patients in immunocompromised state.

### **Methods**

The patients ranged from more than 30% to less than 70% burns of total body surface area measured with "Rule of nine".

After the patient's admission in the burns ward, immediate calculation of burnt surface area was done, and accordingly fluid requirement was calculated. In our hospital Parkland's formula is commonly used which allows use of crystalloid fluid 4ml. percent/ kg body weight of the patient. The type of fluid administered is Ringer Lactate. A maximum of 20 units (each unit containing 500 ml) of fluids were allowed to administer in 24 hours to prevent the fluid overload complications.<sup>12</sup> To measure the fluid input and urinary output, Foleys indwelling catheter was routinely used taking proper aseptic precautions.

In the major burns patients where subcutaneous veins were not accessible for fluid administration than venesections preferably in the lower limb for great saphenous vein was done, for the easy administration of large amount of fluids.

Along with the above measures, Ryle's nasogastric tube was used in cases of paralytic ileus and oral administration of fluid was restricted till peristaltic sounds were heard. Tetanus prophylaxis was given.

To study the flora of the burn wounds and invasion of organisms into the blood stream causing bacteraemia the culture from burn wounds and blood culture were used as tools in this study.

Culture and sensitivity of the wound and blood culture were sent on the first day of noticing the signs of sepsis. The patient was started on antibiotics based on the sensitivity reports and the response to treatment was monitored on a daily basis with respect to general condition of the patient and required investigations were repeated especially complete haemogram, serum electrolytes, and renal function tests.

Escharotomy and regular dressings were done in patients willing for the same and in those patients who were willing for blood transfusion.

## RESULTS

In our study group, maximum number of cases of burns 10 (33.33%) were seen in the age group 20-30 years. 86.66% of the cases were in the age group 20-50 years. Female to male ratio was 1.14:1. Our study population, 20 (66.66%) cases of burns were caused due to accidental injuries followed by suicidal attempts 6 cases (20%). Out of 30 cases, 18 (60%) cases developed signs of sepsis, 12 (40%) cases didn't show any signs of sepsis. [Table 1]

In the current study, out of the 18 patients who had developed sepsis, 10 (55.55%) patients underwent Escharotomy. Out of the 12 patients who didn't develop sepsis, 10 (83.33%) patients underwent Escharotomy. [Table 2]

In the present study of 30 cases, 20 (60%) cases were subjected to escharotomy. 18 (90%) recovered and 2 (10%) expired. Out of the 10 patients who didn't undergo escharotomy, 6 (60%) patients recovered, 4 (40%) patients expired. The difference was statistically significant in the recovery group ( $p < 0.05^*$ ). [Table 3]

**Table 1: Demographic and clinical profile of patients**

Age (in years)	No. of Patients (N=30)	Percentage (%)
<b>Age (years)</b>		
11-20	4	13.33%
20-30	10	33.33%
30-40	8	26.66%
40-50	8	26.66%
<b>Sex</b>		
Male	14	46.66%
Female	16	53.33%
<b>Cause of burns</b>		
Accidental	20	66.66%
Homicidal	4	13.33%
Suicidal	6	20%
<b>Depth of involvement</b>		
Deep partial	20	66.66%
Full thickness	10	33.33%
<b>Signs of sepsis</b>		
Observed	18	60%
Not observed	12	40%

**Table 2: Escharotomy in Patients with Sepsis**

Escharotomy	With Sepsis (N=18)	With Out Sepsis (N=12)
	No. of patients (%)	No. of patients (%)
Yes	10 (55.55%)	10 (83.33%)
No	8 (44.44%)	2 (16.66%)

**Table 3: Escharotomy (Recovery)**

Prognosis	Escharotomy		Total	p value
	Yes	No		
Recovered	18	6	24	$<0.05^*$
	90%	6%	80%	
Expired	2	4	6	
	10%	40%	20%	
Total	20	10	30	
	60.0%	40.0%	100.0%	

## DISCUSSION

Infection has always been the predominant determinant factor in post burn wound healing. Incidence of complications and outcome of burn patients totally depends on the incidence of infective complications in burn patients which in turn is directly proportional to the total body surface area involved.

In our study group, maximum number of cases of burns 10 (33.33%) were seen in the age group 20-30 years. 86.66% of the cases were in the age group 20-50 years. Female to male ratio was 1.14:1. Anil Batra reported from a rural district in Maharashtra that 70% of cases of burns were in the second to fourth decade.<sup>[13]</sup> High incidence of burns in females

was mainly due to occupational hazards of working in the kitchen.<sup>[13]</sup> Ratna sen reports 50% males and 50 % females incidence in Calcutta.<sup>[14]</sup>

Our study population 20 (66.66%) cases of burns were caused due to accidental injuries followed by suicidal attempts 6 cases (20%). Whether they are really accidental or suicidal or homicidal is highly questionable as the history given by the patients or their relatives is not reliable. R.L. Bang from Kuwait reports that 80% of the burns were due to domestic accidents. He also reports that flame is the cause in 45.5% and scald in 42.7%.<sup>[15]</sup>

Out of 30 cases, 18 (60%) cases developed signs of sepsis, 12 (40%) cases didn't show any signs of sepsis in our study. The incidence of burn wound sepsis and subsequent mortality is proportional to

the extent of burns. In patients with extensive burns wound closure is difficult to achieve and hence they develop a variety of bacterial and non-bacterial infections. In our study, 100% mortality was seen in patients with a burn of 70% of TBSA. This correlates with a study by Bariar et al who reported a 100% mortality in patients with 60% or above burns.<sup>[16]</sup>

The burn wound is constantly colonized by various microorganisms from the time of injury till healing is complete. Septicaemia in severe burns is usually thought to be heralded by marked hyperpyrexia, tachycardia, paralytic ileus, severe disorientation leukocytosis and deterioration of granulation tissue followed by hypotension, oliguria and death.

The most common organisms colonizing the burn wound are *Staphylococcus Aureus*, *Pseudomonas Aeruginosa*, *Klebsiella*, *Proteus*, *Citrobacter* and *Streptococcus* species. Because of the aerobic environment of burn wounds *Clostridium* is not seen. In the last couple of decades because of better local and systemic chemotherapy, fungal infections have assumed importance. The burn wound is best examined at the time of daily cleaning when all dressing and topical agents have been removed from the wound. In our series, to study the flora of infective organisms in burn wounds, the wound culture has been studied with the help of a sterile swab sent to the microbiology department for further studies and also the blood cultures to know the bacteraemia or septicaemia in the patients and also to know the sensitive antimicrobial drugs to combat that particular infection.

In a study done by R.K. Meswani at Burn Unit of Medical College, Rohtak, shows an overall mortality of 38% and 100% mortality in patients with 70% or more TBSA involved.<sup>[17]</sup> In a study done by W.A. Altemeier and B.G. McMillan at Cincinnati General Hospital, out of 10 expired patients, 7 showed gram negative bacteraemia and in the remaining three-gram positive cocci were recovered.<sup>[18]</sup>

## CONCLUSION

We concluded that escharotomy with regular cleaning of the wound reduces the colony count,

removes septic focus and is found to have a beneficial effect in the overall outcome. However, the most important predictor in burns mortality is the percentage of the total body surface area involved wherein 100% mortality was observed in patients with 70% burns.

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