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Original Research Paper

Plastic Surgery

AN EPIDEMILOGICAL STUDY ON MANAGEMENT OF LARGE BODY SURFACE AREA BURNS AND REVIEW OF LITERATURE

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ABSTRACT **Introduction-** The total burn surface area (TBSA) can be used to calculate and measure the related morbidity and mortality of burns. Large total body surface area burns can have a substantial impact on morbidity and mortality, but with early management and intervention by a skilled surgical team, outcomes can be favorable. **Material And Methods-** A review of 43 patients admitted to this hospital in the previous 2 years with burns greater than 80% was done. Questionnaire included age, gender, type of burn injury and depth of burn, mode of burn injury, total burn surface area(TBSA), presence of inhalational injury, duration between burn injury and admission to the hospital, burn related surgery, tracheostomy status, duration of survival and cause of death. **Results-** Average age was 28.674± 9.37 years (range 9-58 years). Female: male ratio was 1.047:1. The mean % TBSA was 91.54+/- 5.46%. Flame burn was the most common cause of burns (86.04%). Surgery done in maximum patients was escharotomy (46.5%), followed by fasciotomy and debridement. 11 patients (25.4%) had tracheostomies. Sepsis was the most common cause of death (74%). **Conclusion-** Comfort care may be the best choice when clinical predictors based on prior experience and the literature indicate no likelihood of success for the treatment or a limited possibility of success, but with the certainty of the greatest amount of patient pain, disfigurement, and future handicap.

KEYWORDS : Burn, TBSA, morbidity

INTRODUCTION

The total burn surface area (TBSA) can be used to calculate and measure the related morbidity and mortality of burns, which is considered as an independent factor.[1,2] The morbidity and mortality rate increase with increasing surface area.[3] According to Jeschke et al., TBSA greater than 40% is linked to a high risk of morbidity and mortality.[4] The modified Baux Score can be used to predict the chance of mortality due to burns, taking into account the age, surface area burned and presence of inhalational injury. Large total body surface area burns can have a substantial impact on morbidity and mortality, but with early management and intervention by a skilled surgical team, outcomes can be favorable. [5] In this paper we have discussed the management of extensive burns and review the experience at our centre.

MATERIAL AND METHODS

This research was done at the Burns Intensive Care Unit of the Plastic Surgery Department of our institute. A review of 43 patients admitted to this hospital in the previous 2 years (January 2021 to May 2023) with burns greater than 80% was done. Information was collected using a pre-prepared questionnaire and collected in Microsoft Excel.

Questionnaire included age, gender, type of burn injury and depth of burn, mode of burn injury, total burn surface area(TBSA), presence of inhalational injury, duration between burn injury and admission to the hospital, burn related surgery, tracheostomy status, duration of survival and cause of death.

Statistical Analysis included mean with standard deviation, range, percentages of the values.

RESULTS

Demographics

43 patients with burn sizes more than 80% TBSA were admitted in the department. Average age was 28.674± 9.37 years (range 9-58 years). Female: male ratio was 1.047:1. The mean % TBSA was 91.54+/- 5.46%.

Cause Of Burn

Flame burn was the most common cause of burns in our group (86.04%)

TABLE 1: Causes of Burn Injury		
Type of burn injury	Mode of burn injury	No. of patients(%)
Thermal	Flame burn	37(86.04%)
	Kerosene oil burn	3 (6.9%)
	Sanitizer burn	1(2.32%)
	Scald burn	0
Electrical	High voltage	1(2.32%)
Chemical		1(2.32%)

Surgical Intervention

Surgery done in maximum patients was escharotomy, which was done in 20 patients (46.5%), followed by fasciotomy and debridement. Most of the patients underwent surgery on the same day or day one of admission. No cover in the form of skin grafts could be given due to lack of donor site in these patients and unavailability of skin bank in our center. Surgical intervention done is shown in [Table 2].

Table 2: Surgical Intervention	
Procedure	Number of patients
Escharotomy	20
Fasciotomy	8
Debridement	8
Amputation	0
Grafting	0

Inhalational Injury

Inhalational injury was identified by clinical signs such as early hypoxia (PaO2< 60 mm Hg on room air), tachypnea (respiratory rate > 30 per min) and hypercapnia(PaCO2> 45 mmHg) [6]. Inhalational injury was a part of the burn in 37 patients (86.04%).11 patients (25.4%) had tracheostomies while all patients were kept on ventilatory support.

Mortality, Survival Time And Causes Of Death

One patient left against medical advice. Other 42 patients expired. Overall mortality rate was 97.67%. Mean survival time was 3.90+/- 1.09 days. 23.2% patients survived for less than 2 days, while only 2 patients survived for more than 9 days. [Table 3 depicts the duration of survival of patients.]

TABLE 3: Duration of Survival	
Duration	Number of patients
Less than 2 days	10 (23.2%)
2-5 days	24 (55.8%)
6-9 days	6 (13.9%)
More than 9 days	2 (4.65%)

Sepsis was the most common cause of death accounting for 74% of deaths, followed by ARDS (in 12% patients) and then AKI (in 9%).

There was an average delay of 2.053±2.19 days between the burn and arrival at our centre, ranging from a minimum of 3 hours to a maximum of 9 days.

DISCUSSION

Extensive body burns treatment remains a big challenge. With awareness in initial resuscitation, most patients survive the first week. Sepsis is caused by the lack of barrier function, which, when combined with the weight of dead tissue, overwhelms the body and results in the patient succumbing by the second week. [7] Although regularly seen in all burns centres, few literature exists to guide the provider in this scenario.

Initial Resuscitation

Resuscitation of total body burns provides its own unique challenge. Routine formulae for resuscitation would overestimate the amount of fluid delivered and hence these are capped at 50% TBSA. No separate guidelines exist for massive burns. [8] The fluid of choice is crystalloids but recent evidence suggests that there is a role of giving early colloids in large burns. This reduces the amount of fluid that needs to be given, reducing edema and helping in maintaining the zone of stasis. [9]

Surgical Care

The management of wounds, from which infections always originate, is most important. Early excision with grafting is another key step in survival, involving removal of necrotic burned tissue and preservation of as much underlying viable tissue as possible. This treatment not only decreases release of inflammatory mediators but also reduces bacterial colonisation of wounds, alleviating the systemic inflammatory response syndrome (SIRS) and reducing the occurrence of sepsis and MODS. The problem of how limited donor-site skin can be used to cover large surface wounds in cases with burn size over 80% TBSA and FT burn over 50% is a big challenge. [6]

Skin substitutes are available in the market but can be prohibitively expensive. [10] Biological dressings are available like collagen and amniotic membrane [11]. It is the need of the hour to actively establish as many skin banks as possible and spread awareness among the common public regarding their possibilities. Skin allotransplantation has also been performed usually in children from mothers, which help to tide over the initial burn. However, it has not been reported in whole body burns. [12] Tissue engineering is another exciting branch which may make the need for allotransplantation redundant inhale distant future. [13]

Analgesia

Placement of continuous catheters for opioids for long term pain control. Multimodal analgesia strategy includes NSAIDs, acetaminophen, non-opioid analgesics, like alpha-2 agonists, and gabapentinoids are important for managing acute pain. [14] No specific recommendation for extensive burns. They should receive high-dose analgesia intravenously. Mechanical Ventilation can be aided by paralyzing the patient with muscle relaxants. This can be a major component of comfort care [15,16].

Antibiotics

Extensive burns patients are at a risk of developing infections. To decrease its risk, prophylactic antibiotics can be prescribed, controversy exists. Proper wound care, hygiene, and infection control measures are considered essential. Systemic antibiotics is indicated for patients with proven burn wound infection or sepsis. [7]

In Cochrane database Systematic Review 2013, effects of other forms of antibiotic prophylaxis on burn wound infection are unclear. There is no evidence that prophylactic antibiotics improve outcomes for burn with inhalational injury. [17]

Tracheostomy

Tracheostomy is another decision that needs to be made in these patients. The airway is frequently affected in these patients. Securing an airway is important to make the patient comfortable. A compromised airway makes the patient restless and troubled. Although tracheostomy is a surgical procedure, it can be performed relatively quickly and even at bedside if required. Inability to speak is a major drawback of tracheostomy and must be explained to the attendants. This becomes especially important in medico legal cases, where declarations may get hampered. [18]

Nutritional Support

A nasoenteric tube placed upon admission to start early enteral nutrition, within first 48 hours. [19] Nutrition to be delivered enterally, to avoid need for parenteral nutrition; which is correlated with increased mortality in burn patients. [20]

Survival

Survival in extensive/whole body burn is difficult to achieve but not impossible. There are centers that have a LD50 of > 90%, especially in pediatric patients. These serve as guiding lights which others centers can look to emulate. Other reports also exist of extensive burns survival. [21]

One of the largest series of extensive burns published was that of 54 patients by Guo et al [6]. Their patients were divided into two groups, 24 people were admitted over 1987–1996 and 30 during 1997– 2006. The reason for this division was upgrade in their facilities around 1996 after which they had access to ventilators and adopted practices of early excision. They found improvement in their outcomes in the second period and demonstrated that survival of patients is indeed possible consistently in such a population. Evidences of survival around the world have been enlisted in Table 4.

TABLE 4: List of survived patients around the world

Alalwan et al[5]	95% TBSA	24-year-old man	Gas flame burn	Fluids, oxygen, escharotomies, tracheostomy
Hahn et al.[23]	80% TBSA	40-year-old plumber	Burnt by hot water and hot steam	50% ability to work, he survived and went back to work in 92 weeks.
Robenpour et al[9]	95% TBSA	21-year-old male	Gas explosion	Recovered in 18 months
Burke et al[21]	>98% TBSA	6 pediatric patients	Thermal burn	Three out of 6 survived

CONCLUSION

The two most significant risk variables affecting a burn victim's survival and clinical outcome are well-known to be burn size and depth. Because donor sites are insufficient for the necessary grafting procedures, burns with a size greater than 80% of the total body surface area provide daunting surgical obstacles. Comfort care may be the best choice when clinical predictors based on prior experience and the literature indicate no likelihood of success for the treatment or a limited possibility of success, but with the certainty of the greatest amount of patient pain, disfigurement, and future handicap. [6]

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