

## Effect of Delay in Transportation on Burn Outcomes

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### Abstract

**Aim:** To describe & review the effect of delay in transportation on the outcome of major thermal burns.

**Methods:** Retrospective data analysis of major burn victims that presented to a tertiary burn center over a 3-month period from September to November 2018. The factors measured are the delay in transportation, fluid resuscitation lag and the outcome.

**Results:** On descriptive analysis of the data, all patients who were adequately resuscitated in the primary health center survived with no complications.

**Conclusion:** Burn related mortality in India has been among the highest in the world and the delay in transport of the burn victim is one of the important contributing factors. The classical studies of Dr. Archibald McIndoe have shown us that specialized burn centers are the only way forward, India lacks behind in that aspect with an acute shortage of burn centers all over the country.

The study discusses the problems faced in management of major thermal burns and ways to overcome it.

**Keywords:** *Major Burns; Transportation Delay; Burn Outcome*

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### Introduction

Trauma care system is established and organized in today's world with set guidelines and protocols for management. For burn related trauma the system is of paramount importance and prompt admission to a specialized burns unit even after bypassing the set protocols to save time lag may show improved outcomes as it has shown with other traumatic injuries [1-5].

In a developing country like India, the state health system and primary health care centers lack basic training and facilities to manage major burn injuries leading to improper resuscitation and increased lag time.

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A landmark in burn management was the work of Dr. Archibald McIndoe when he made a specialized center for burn management and named it the guinea pig club [2]. His studies showed that only dedicated burn centers could give superior results. Specialized burn care is a neglected field in India with only one burn center in the Union Territory of Pondicherry and only two in a large state like Odisha [6].

This study is an attempt to highlight the problem with respect to the delay in time and resuscitation lag by scrutinizing the statistics of the patients referred to our center in the past 3 months from September to November 2018. It must be noted that pre hospital mortalities in major burns are not very uncommon and have not be included in our study.

### Materials and Methods

Study was done in JIPMER Tertiary Burn Centre in Puducherry, India with the over 3 months September 2018 to November 2018. The LA50 of the burn's unit was calculated to be 56.4%

For every patient being admitted, the delay in admission (Calculated from time of burns to time of admission) and the Fluid deficit (Calculated using the Parkland Formula for per hour basis after time of Injury) was calculated.

Major burn Injuries were included (Burn percentage between 20% to 60%). Minor burns (< 20% TBSA) and Burn >60% TBSA were excluded.

Only burns in patients with age more than 12 were included.

### Results

Mean age of the patients was 36. 30 years (15 minimum to 75 years maximum). Among the mortalities, the mean age was 42.5 years.

In our study, the patients who died had a mean time delay of 9.25 hours (minimum 3 and maximum 20). All patients (Six in total) who were adequately resuscitated in the primary health center survived with no complications.

S. No	Age/ Sex	%age burns	Delay	Fluid Deficit	Hospital stay	Outcome	Cause of Death (If applicable)
1	27/M	35%	3 hours	1000 ml	8 days	Died	Septic shock with MODS
2	56/F	20%	7 hours	Nil	63 days	Healed	-
3	38/F	35%	4 hours	2000 ml	8 days	Died	Septic shock with MODS
4	31/M	45%	18 hours	2100 ml	72 days	Healed	-
5.	15/M	55%	36 hours	5000 ml	31 days	Healed	-
6.	18/F	30%	10 Days	Nil	34 days	Healed	-
7	30/M	60%	20 hours	9000 ml	5 days	Died	Septic shock with ARDS
8	75/F	45%	10 hours	4000 ml	1 day	Died	Acute hypovolemic shock
9	39/M	20%	48 hours	Nil	20 days	Healed	-
10.	34/M	40%	2 hours	600ml	19 days	Healed	-

## Discussion

It's a well-known fact that delayed arrival to a level 1 trauma center is an independent predictor of poor outcome [3]. This holds true for all burn patients as well as shown by the studies in the United States [7].

The burn related mortality in our country is the maximum in the world by far [1]. This is due to lack of healthcare infrastructure, lack of public awareness and prevailing social evils.

In order to improve burn care after reviewing literature, we advise the following strategies:

1. The number of specialized Burn centers and burn surgeons is extremely low in our country where the population is more than 1.3 billion. Specialized burn centers should be set up in every district of the country with a strict maintenance of the required guidelines of burn surgeons and trained nurses [8].
2. Fluid resuscitation and airway management is the cornerstone of early management in major burns. Due emphasis should be laid on fluid rate calculation; proper training and orientation of the EMT staff for pre hospital care to optimize the patient. In our study, the patients who received proper fluid resuscitation fared better.
3. Burn care requires access to novel skin substitute, biological dressings and maintenance of strict asepsis. The healthcare expenditure of our country is one of the least in the world. Funding to every burn centre should be enough to maintain a supply of the biological dressings.
4. Training of the EMT (Emergency Medical Technicians): Emergency medical technicians must be trained about burns fluid resuscitation, the importance of delay in transportation in burns and the need to shift the patient directly to the specialized burn center [9].
5. Orientation programs can be conducted in training EMT's, peripheral referral/primary and secondary health centers in fluid resuscitation and regarding the importance of early transportation to tertiary burn centers by the tertiary burn centers.
6. Provision of facilities of air ambulance: Air ambulances have become the standard of trauma management in the west since the past 20 years. In a country like ours, where the access to healthcare is so poor, air ambulance offers a way to save millions of lives. The running expenses of the air ambulance can be met by novel insurance strategies that have been implemented in the country.
7. Cost effectiveness in relation to the use of air ambulances is a debatable issue. Patients with less than 30% TBSA thermal burns without evidence of inhalation injury with less than 200-mile distance from the burn centre may be safely transported by road ambulance and air ambulance may be considered for the rest [10].
8. Reliable telemedicine services to be established between the peripheral referral centers and level 1 trauma centers to enable rapid action, proper transmission of protocols for management to the referring doctor/nurse.

A systematic review of the use of telemedicine services in burn outcomes has shown great efficacy in all aspects of triage, management and outpatient management [11].

Our study needs validation with more cases and statistics to assert the fact that delay in transportation leads to poorer outcomes but the aim of the article is to put forward the problem and to bring to everyone's notice the measures required to correct it.

Confounding variables like age, sex, co-morbidities have not been evaluated and excluded and a follow up study taking into account these factors is needed.

### **Conclusion**

And so, in conclusion, one of the Factors in controlling the outcomes of a burn's patient is delay in portage of the patient from primary and peripheral referral centers to tertiary burn centers. Simple administrative measures, as written above, can aid in saving thousands of lives. Orientations programs can be implemented in training of the doctors and staff in peripheral centers. Proper guidance can be given by the tertiary centers to the peripheral/primary health centers with the aid of telemedicine services. The study, though a small one, points out an important ingredient in burn management which plays a major role in the end result and prognosis of the patient.

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