



## Yanık Merkezindeki Mortalite ve Ölüm Nedenlerinin İncelenmesi: Retrospektif Klinik Çalışma

### Prediction of Mortality and Causes of Death in a Burn Centre: A Retrospective Clinical Study

Yanık Merkezinde Mortalite / Mortality in a Burn Centre

Celalettin Sever, Yalçın Külahaçlı, Haluk Duman  
Department of Plastic and Reconstructive Surgery and Burn Unit,  
Gulhane Military Medical Academy, Haydarpaşa Training Hospital, Istanbul, Turkey.

#### Özet

##### Amaç

Yanık hastalarında mortalite önemli bir parametredir. Literatürde mortalite nedenleri farklı olarak rapor edilmiştir. Bu klinik çalışmanın amacı, yanık merkezindeki mortalite nedenlerini ve risklerini tespit etmek ve tartışmaktır.

##### Gereç ve Yöntemler

Bu çalışmada, Aralık 2001 ve Haziran 2010 arasındaki dönemde yanık merkezine başvuran hastalar retrospektif olarak araştırılmıştır. Bu dönem içindeki, yanık hastalarının, demografik özellikleri, tedavileri ve tedavi sonuçları incelenmiş ve analiz edilmiştir.

##### Bulgular

Bu çalışmada, Aralık 2001 ve Haziran 2010 arasındaki 9 yılda başvuran yanık hastaları retrospektif olarak incelendi. Haşlanma yanıklarının oranı %69.7, alev yanıklarının oranı %24.4 olarak tespit edildi. Başvuran hastaların %4.30'u multiorgan yetmezliği, septisemi ve kardiorespiratuar yetmezlik nedeniyle kaybedildi.

##### Sonuç

Bu çalışmanın sonucunda mortalitenin en sık nedeninin multiorgan yetmezliği olduğu görüldü. Ancak yanık merkezlerindeki mortalitenin en sık nedeninin belirlenmesi için farklı yanık merkezlerinde mortalite oranlarının ve nedenlerinin retrospektif olarak araştırılması gereklidir.

##### Anahtar Kelimeler

Yanık, Mortalite, Morbidite.

#### Abstract

##### Aim

Mortality rates are important outcome parameters after burn. The causes of mortality have been reported differently in the literature. The aim of the study was to identify parameters that are predictive of major morbidity factors and risk of mortality in patients with burn injury.

##### Material and Methods

This study was performed among the patients who admitted to the burn center period between December 2001 and June 2010. Within this period, demographic data, treatment, and outcomes of treatment were reviewed and analyzed.

##### Results

The burn patients were analysed retrospectively during 9-years period between December 2001 and January 2010. Burns caused by scalding were the most frequent (69.7 %) followed by flames (24.4 %). 4.30 % of the patients died because of multisystem organ failure, septicemia and cardiac respiratory failure.

##### Conclusions

The most common cause of mortality was multiorgan failure according to our study. The mortality rates and causes of burn centers should be investigated retrospectively between different burn centres to determine the most common cause of mortality in burn centers.

##### Keywords

Burn, Mortality, Morbidity.

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Corresponding Author: Celalettin Sever, Gulhane Military Medical Academy, Haydarpaşa Training Hospital, Department of Plastic and Reconstructive Surgery, 34668 Kadıköy, İstanbul, Turkey. Fax: + 902163487880 · Phone: + 90 2165422020 · E-mail: drcsever@gmail.com

## Introduction

Burns remain a huge social, public and medical problem, throughout the world, especially in the developing countries [1]. Burns are devastating traumas, as they require long hospitalization. Burns are one of the most important causes of disability and mortality. The predictive power for mortality is known for age, total body surface area (TBSA) involved and presence of inhalation injury [2].

The mortality rate associated with burn centre differ for each country. In developed countries, burn mortality rate is 2.1 per 100,000 person-years [3]. During the past 50 years, mortality rates following burn have dramatically decreased. This remarkable incident may be attributed to the establishment of specialised burn centres, therapeutic developments including advances in critical care and anaesthetic procedures, early surgical excision of burn wounds, and use of topical antimicrobial agents and systemic antibiotics [4]. The physicians and surgeons have tried to decrease the mortality and morbidity of burn injury by only improving the clinical management modality. However, if preventing burn injuries is to be achieved, the epidemiologic characteristics should be evaluated and correlated with the risk factors that are associated with death by burn injury.

We performed a retrospective review in order to describe our population, compare results and analyse causes of death following burn in our tertiary burn care centre catering to a large population from the North-west of Turkey.

## Material and Methods

We reviewed the records of patients admitted to the Burn Unit from 2001 to 2010. The variables of interest were obtained from the clinical histories and the admissions and discharge records from the Burn Unit. Information was collected on age, sex, comorbidities, type of burn (flame, scald, contact, chemical, or electrical), total body surface area affected, length of hospitalization, presence of inhalation injury and causes of mortality.

## Results

The burn patients were analysed retrospectively during 9-years period between December 2001 and June 2010. The average of patient age was 22.4 years. A total of 86% of patients were younger than 30 years of age. The percentage of TBSA burned for burn patients ranged from 15% to 100%. The anatomical

sites most frequently involved were the anterior thorax (85%), upper extremities (80%), face and neck (70%), posterior trunk (40%), genitalia and buttocks (20%), lower extremities (20%). Burns caused by scalding were the most frequent (70.9%) followed by flames (16.7%).

The treatment time of burns ranged from 1 to 228 days with a mean stay of 18.6 days. Forty eight patients (5.58%) had suffered severe inhalation injuries and were intubated; and only eleven of them survived. 37 patient (4.30%) of the patients died because of multisystem organ failure, septicaemia and cardiac respiratory failure. The characteristics of the patients are outlined in table

## Discussion

The mortality is one of the most important outcome parameters following life-threatening trauma and may serve as a measure for quality of care [4]. The goal of our retrospective study was analysis of causes of death following burn injury. According to the literature, multisystem organ failure is the leading cause of death [5]. However, recent studies of the distribution of causes of death are lacking, and therefore we have attempted to categorize causes of death in our burn unit from 2001 to 2010.

Several studies have reported a dramatic decline in mortality due to burns over the last two decades, largely due to a marked improvement in early fluid resuscitation, treatment of pulmonary dysfunction, control of infection, early burn wound excision and coverage and keeping the hypermetabolic response under control [6]. The availability of demographic and injury characteristics together with outcome variables is necessary for treatment. Risk factors such as age, cause of burn, TBSA involved and the presence of inhalation injury should be taken into account. It has been well established in the literature that burns by a direct flame, especially with smoke inhalation, percentage of total burned body surface and percentage of deep body surface burned are significant determinants of the prognosis of burn patients [7, 8]. The discovery that scalding is the main causal agent in minors under 15 years and burns by flames and electricity in the literatures [9, 10]. Scalding predominantly caused combined injuries of second-degree superficial and deep. However, the most frequently observed depth burn associated with flame and electric burns.

Burn injury may cause depression of the immune response and severe catabolism proportional to the extent of injury. The dysfunction of the immune system, a large cutaneous bacterial load, the possibility of gastrointestinal bacterial translocation, prolonged hospitalization and invasive diagnostic and therapeutic procedures, all contribute to sepsis, making the burn wound different from other forms of trauma [11]. Infection in the burn patient is a leading cause of morbidity and mortality and continues to be one of the most challenging concerns for the burn team. According to reports, 75% of all deaths following burns are related to infection [12]. It is therefore necessary to carry out periodic review of patterns of isolation and susceptibility profiles of microorganisms infecting burn wounds in order to modify the preventive and therapeutic strategies for effective management of burn sepsis. This may also help to reduce mortality

Table 1. The characteristics of the patients.

	Survivors	Nonsurvivors
Affected total body surface area	8 %	70 %
Treatment time (days)	22%	11%
Cause of burn		
Scald	70.4 %	0.5%
Flame	13.2%	3.34%
Contact	8%	-
Electrical	3.1%	0.3%
Chemical	0.8%	-
Inhalation injury	1.3%	92%
Cause of death		
Multisystem organ failure		81%
Septicaemia		16%
Cardiac respiratory failure		3%

rate by preventing the colonization of microorganisms responsible for septicemia in different burn centers.

That uncontrolled systemic inflammation, triggered by multiple small infections, leads to multiorgan failure and death is a commonly held belief [5]. That uncontrolled pneumonia is not always present in patients with the acute respiratory distress syndrome and that uncontrolled sepsis is not always present in patients with multiple organ failure is well supported. In our study, multiorgan failure by flame burns caused the greatest number of deaths and were the deadliest among all the causes. This lethality is associated with respiratory lesions that increase the probability of death. In flame burns, total body surface area and inhalation injury are the predictors of death. We found that our patients dying of multiorgan failure, were clinically uninfected at the time of death, with negative blood cultures. Multiorgan failure is felt to be caused by several infection, bacterial translocation from the gut and inadequate oxygen delivery [5]. The

prevention of multiorgan failure is likely to be more effective than its treatment. The prevention requires early wound excision and closure to minimize wound sepsis and inflammation, support of the gut through enteral nutrition, and general haemodynamic support to ensure adequate oxygen delivery to the gut and peripheral tissues.

Increasing burn surface area, the presence of inhalation injury significantly increase the risk of multiorgan failure. The difference in multiorgan failure rates between burn centers may be attributed to differing severe of inhalation injury. For this reason, a uniform definition for the diagnosis inhalation injury will be mandatory for reliable comparison of results in the literature. Incident in mortality rates after burn is most likely to be achieved by development better prevention programmes and treatments for multisystem organ failure.

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