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Epidemiology and outcome analysis of hand burns: A 5-year retrospective review of 378 cases in a burn center in Eastern China

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ABSTRACT

Hands are frequent sites of burn but few related studies were reported in China. The aim of this study was to examine the impacts of gender, age, seasons, place, etiology, total body surface area (TBSA), depth, infection and comorbidities on prognosis following injury in a cohort of hand burn inpatients. This is a retrospective study of total 378 inpatients admitted to the burn center of Changhai hospital from January 2009 to December 2013. The present research showed the male inpatients were predominant and most of the inpatients aged from 20 to 49. Flame (37.04%) and electricity (25.40%) were the major causes of hand burns. Hand burns happened more commonly in work place (60.85%). The study preliminarily pointed out that male, flame and depth were the most significant factors impacting surgery. The main factors relevant to amputation were identified including the electrical burns and other etiology of burns. In addition, depth of hand burns was proved to have a higher impact on length of hospital stay (LOS) than other factors. The results of this study not only provide the necessary information of hand burns in Eastern China but also give the suggestions for the prevention of hand burns.

1. Introduction

Burn is a severe type of traumatic injury which can lead to deformity, disability or death, and still remains a significant health problem worldwide. Every year there are approximately 195,000 deaths directly attributed to burns around the world [1]. The majority (over 95%) of which occurs in economically developing countries where prevention programs of burns are primitive [2].

Hands are frequent sites of burns due to its function that allowing us to interact with environments and hand burns occur commonly as part of severe burn injuries as well as isolated injuries, especially in low and middle income countries with dominant handicraft manufacturing industry [3]. In our burn center, Changhai hospital in Shanghai, over 100 hand burn inpatients are treated every year. According to the number of patients in 7–10 burn centers calculated, we estimate that there are at least 1000 hand burn patients every year in Shanghai. The injury and the sequel of hand burns can significantly affect function of hand and daily routine, even quality of life. Most existing reports mainly focused on the treatment of hand burns of hospitalized patients (e.g. operation [4] or management of burn contractures [5]).

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Although several studies have reported the epidemiologic data (including age, region or etiology) of burn injuries in different regions of China such as Shandong, Jinzhou, Beijing, Sichuan and Shanghai in recent years [6–13], there is a lack of epidemiologic data specifically on hand burns that comprises information from inpatients.

Here we conducted a retrospective study and analyzed the clinical data of 378 inpatients with hand burns in the burn center of Changhai hospital from January 2009 to December 2013, with an aim to determine the predictors of hand burns outcomes and provide instructive suggestions for prevention strategies.

2. Methods

The burn center of Changhai hospital, a general hospital with the rank of "Grade 3, Class A" in Shanghai, is a 61-bed first aid center for burns and serves burn patients both from Shanghai and other areas of Eastern China. According to the databank of Burn Surgery in Changhai Hospital, all of our inpatients who had hand burns between January 2009 and December 2013 were identified (total 578 inpatients), of whom 378 inpatients who had complete clinical data were included in the present study. Other 147 inpatients who died of severe burns or came to treat burn scar hyperplasia were not included in our study. Inpatient demographics, accident place, etiology of burn, depth, burn extent, infection and comorbidities were reviewed. The classification of burn depth depended on the standard of ISBI/WHO, which divide it into three degrees: superficial, superficial/deep partial thickness and full thickness [14]. Since patients who suffered with superficial burns would not be admitted to hospital, there is no data of superficial burns. The outcome parameters in the study were surgery, amputation and length of hospital stay (LOS). Surgery does not include amputation in this study. This study was approved by the medical ethical board of the Changhai hospital.

Univariate analysis was carried out to evaluate the odds of outcomes. If two or more patient characteristics were univariately associated with an outcome parameter, these were combined in a multivariable model using multiple regression analysis for continuous outcome parameters and logistic regression analysis for binary outcome variables. Logistic regression analyses were used to examine the impact of risk factors on surgery and amputation. Multivariate regression analyses were used to examine the impact of risk factors on LOS. P values <0.05 were considered statistically significant.

Table 1 – General characteristics of patients.

	Total ($N = 378$)	
	N	%
Gender		
Male	291	76.98
Female	87	23.02
Age		
0–9	46	12.17
10–19	19	5.03
20–29	72	19.05
30–39	79	20.90
40–49	83	21.96
50–59	49	12.96
60–69	15	3.97
70–79	4	1.06
≥80	11	2.91
Place		
Home	110	29.10
Work place	230	60.85
Public place	38	10.05
Season		
Spring (3-5)	112	29.63
Summer (6-8)	107	28.31
Autumn (9-11)	83	21.96
Winter (12-2)	76	20.11
Etiology		
Flame	140	37.04
Chemical	20	5.29
Electrical	96	25.40
Hot oil	70	18.52
others	55	14.55
TBSA (%)		
<1	94	24.87
1–2 (including 1, not 2)	105	27.78
2–3	74	19.58
3–4	17	4.50
4–5 (including 4 and 5)	88	23.28
Depth		
Superficial partial thickness	69	18.25
Deep partial thickness	105	27.78
Full thickness	204	53.97
Single hand	177	46.83
Double hands	201	53.17
Surgery	213	56.35
Amputation	25	6.61
Hands only[a]	109	28.84
Length of stay		
<1 Week	33	30.28
1–2 Weeks	27	24.77
2–3 Weeks	18	16.51
3 Weeks≥	31	28.44

[a] Be burned only on hands without other parts of the body.

3. Results

3.1. General characteristics of patients

The characteristics of the enrolled 378 inpatients are shown in Table 1. The male/female ratio was 3.34/1 (291 males and 87 females). The predominant age-groups of inpatients were 20–49. Work place (60.85%) was the most common place for hand burns. The number of inpatients in spring and summer was a few more than those in autumn and winter. The most frequent causes of hand burns were flame (37.04%) and electricity (25.4%). The majority of inpatients suffered double hands burns and the mean area was 2.03% of the total body surface area. Deep partial thickness and full thickness burns were commonly seen in inpatients. 109 of total 378 inpatients were burned only on hands. The mean LOS was 18.97 days, and the range of LOS varied from 2 days to 90 days.

3.2. Predictors of surgery in all patients

Among all 378 inpatients, 213 inpatients were carried out hand surgery. The characteristics that predicted surgery are