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Klinik Çalışma

Tandir burns in and around Diyarbakır, Turkey

Diyarbakır ve çevresinde tandır yanıkları, Türkiye

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BACKGROUND

Tandir is the name given to a special oven used for baking bread in the eastern and southeastern part of Anatolia. Tandir burn is a unique trauma in that it involves primarily women and young children falling into the in-ground ovens and suffering deep extensive burns. In this study, we aimed to evaluate the tandir burns occurring in the Diyarbakır region.

METHODS

The records of 21 patients with tandir burn who were treated in our Burn Center between May 2003 and February 2006 were reviewed. Patients with tandir burns accounted for 2.14% of all burned patients. The mean age was 10.7 years (1–47 years). Of the patients, 71.43% were female, and 61.90% were under six years old. The mean total body surface area (TBSA) burned was 22.33% (8-75), and 71.43% of the patients had third-degree burns.

RESULTS

Three patients required amputation of an extremity. Eight patients had fasciotomies, 16 eschar excision, and 5 partial thickness skin grafts. The mean hospitalization period was 16.90 days (5-34 days). Five patients (23.81%) died.

CONCLUSION

Tandir burn is a severe burn with a higher morbidity and mortality.

Key Words: Children; complications; Diyarbakir; mortality; tandir burns.

AMAÇ

Tandır, Doğu ve Güneydoğu Anadolu Bölgesi'nde, içinde ekmek pişirmek için kullanılan bir fırının adıdır. Tandır yanığı, öncelikle kadın ve küçük çocukların içine düşüp acı veren geniş ve derin yanıkların oluştuğu özel bir yanık çeşididir. Bu çalışmadaki amaç, Diyarbakır çevresinde meydana gelen tandır yanıklarını değerlendirmektir.

GEREÇ VE YÖNTEM

Mayıs 2003 ve Şubat 2006 tarihleri arasında yanık ünitesinde tedavi edilen, tandır yanığı olan 21 hastanın kayıtları incelendi. Tandır yanıklı hastalar tüm yanıkların %2,14'ünü oluşturuyordu. Yaş ortalaması 10,7 yıl idi (dağılım, 1-47 yıl). Hastaların %71,43'ü kadın idi ve %61,90'ı altı yaşın altında idi. Ortalama yanık yüzey alanı (TBSA) %22,33 idi (dağılım, 8-75); hastaların %71,43'ünde üçüncü derece yanıklar vardı.

BULGULAR

Üç hastaya ekstremite amputasyonu yapıldı. Hastaların 8'ine fasiyotomi, 16'sına eskar eksizyonu yapıldı; beş hastaya da parsiyel kalınlıkta deri grefti konuldu. Ortalama yatış süresi 16,90 gün idi (dağılım, 5-34 gün). Hastaların beşi (%23,81) hayatını kaybetti.

SONUÇ

Tandır yanığı yüksek morbidite ve mortalitesi olan ciddi bir yanık çeşididir.

Anahtar Sözcükler: Çocuklar; komplikasyonlar; Diyarbakır; mortalite; tandır yanığı.

Acute burns remain a significant source of morbidity and mortality worldwide.[1-5] Scalding is the most common mechanism of burn.[6-9] Two hundred and fifty thousand people sustain burns each year in the United Kingdom.[10] One thousand people each year require formal fluid resuscitation[10] and there are 300 deaths from burns annually in the UK alone.[11] One hundred and seventy-five thousand people attend Emergency Departments in the UK each year with burns, and 13,000 of these people are admitted for further management of their injury.[10] There is little published work available on patients presenting to Emergency Departments with burns. This study aimed to determine the number of patients attending an Emergency Department with tandir burns and to establish the epidemiology, etiology and outcome of these cases.

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In our country, especially in the eastern and southeastern regions, a special kind of oven, named tandir, is used for baking bread (Figs. 1, 2). The tandir oven is buried underground and is basically a large hole full of embers and surrounded with sheet iron.[12] Primarily women and young children fall into these ovens and can sometimes remain there for a long period, resulting in a severe type of burn with extensive depth and a high total body surface area (TBSA) % injured.

In this article, we reviewed the records of 21 patients with tandir burns treated in our Burn Center from 2003 to 2005.

MATERIALS AND METHODS

The Department of Emergency Medicine, Gaziantep University Faculty of Medicine, Hospital serves a local population of 2,500,000 people and treats approximately 65,000 patients each year. The Burn Center of our hospital was established in 2002, and has a 10-bed capacity. Local surgery intervention and every degree of resuscitation can be performed in this center. In this article, the records of the patients with tandir burn were reviewed with respect to age, gender, etiology and severity of the burn, type of treatment, hospitalization period, burn region, time of event, complications, morbidity, and mortality. A total of 981 burn patients (624 scald, 192 flame and 165 electric burns) were treated in this center from May 2003 to February 2006. Of those 981 patients, 21 (2.14%) patients had tandir burns.

Fig. 1. Photograph of a tandir oven used for baking bread. The bread dough is pasted to the lateral walls (shown by arrow) and baked with the heat of the fire at the base of the tandir. The tandir can also be used like an oven to cook meals. The fire at the base of the tandir is generally ignited with firewood and used when it becomes an ember.

Table 1. The distribution of patients according to gender, age and mortality

	n (%)	Exitus n (%)	p
Gender			
Females	15 (71.43)	2 (9.53)	0.075
Males	6 (28.57)	3 (14.29)	0.075
Total	21 (100.00)	5 (23.81)	
Age			
0-2	6 (28.57)	1 (4.76)	0.627
2-4	3 (14.29)	1 (4.76)	0.676
4-6	4 (19.05)	1 (4.76)	0.950
6-10	2 (9.53)	2 (9.53)	0.008
10-20	2 (9.53)	0	
20-40	3 (14.93)	0	
>40	1 (4.76)	0	
Total	21	5	

RESULTS

The mean age was 10.7 years (1-47 years). Of the patients, 71.43% were female. The majority of the study population included children under 10 years old. The distribution of the patients according to gender and age is presented in Table 1.

The treatment protocol was established in a standardized manner including resuscitative regimens, antibiotherapy, wound care, and surgical operations. Fluid resuscitation in all patients was according to the Parkland formula. Nutritional support was provided based on the caloric and protein needs of the patients, parenterally and orally (preferred), if possible. Antibiotic use in our center was standardized based on the general microbiological flora of the infections. Since most of the patients had deep burns, we used antibiotics in all tandir victims. Surgical operations include debridements of the devitalized tissues and also skin grafting when needed. We did not perform early tangential excision or early grafting in this group of patients.

Ventilatory support was used according to the general respiratory condition of the patient (breath rate and pO_2 levels) on admittance. In concordance with

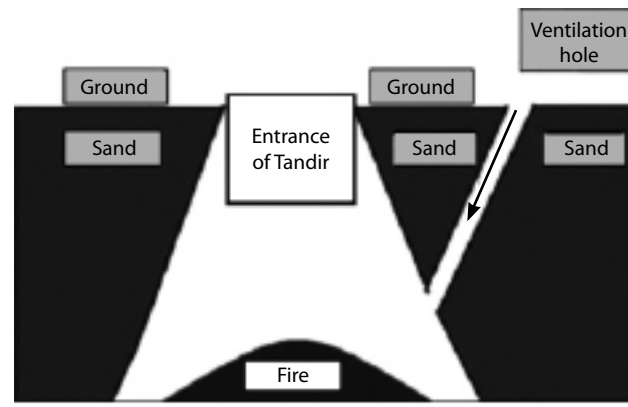

Fig. 2. Schematic view of the tandir oven.

Table 2. The etiological factors of the burn of patients treated in our Burn Center

Burn types	n (%)	Exitus n (%)	Total
Scalding burns			
Spilling of hot water	491 (96.10)	20 (3.90)	511
Hot milk	63 (86.30)	10 (13.70)	73
Falling into hot meal	22 (91.67)	2 (8.33)	24
Spilling of hot oil	16 (10.00)	0	16
Flame burns			
Direct contact with flame	98 (94.23)	6 (5.77)	104
Falling into tandir	16 (76.19)	5 (23.81)	21
Diesel oil-gasoline burn	31 (100.00)	0	31
Gas tube explosion	25 (89.30)	3 (10.70)	28
House fire	1 (33.33)	2 (66.67)	3
Suicide burns	3 (60.00)	2 (40.00)	5
Electrical burns	150 (90.90)	15 (9.10)	165
Total	916	65	981

the literature, scalding was the most common mechanism of thermal injury. The etiological factors of the burn injuries treated in our Burn Center are outlined in Table 2.

Of the 21 patients, 80.95% admitted to our emergency department within 10 hours of the event; the remainder admitted within 36 hours. The mortality rate was higher (29.41%) among those admitted within 10 hours; however, it was not statistically significant (p=0.214). The mean hospitalization period was 16.90 days (5-34 days). Three patients were hospitalized for 5 days, 11 patients for 15 days and 7 patients for longer than 15 days. All of the deaths occurred (n=5) after 10 days of hospitalization. Upon arrival, no treatment was performed in 6 patients, 2 of whom died. Seven tandir burns were accidental, while 14 were the result of negligence. Burn regions were divided into five areas as: neck, trunk, upper extremities, lower extremities and genital). Neck burn was seen in 4, trunk in 15, upper extremities in 10, lower extremities in 14, and genital burn in 1 patient(s). Although 6 (28.57%) patients had only second-degree burn, 15 (71.43%) had both second- and third-degree burn. The mean TBSA burned was 22.33%; however, the first assessment and documentation of the size and depth of burns can not be correct every time. For example, a second-degree burn can convert to third- degree if not treated correctly. Six patients were discharged from the hospital by relatives before completion of their treatment; four of them were later re-admitted to the emergency department.

Three patients underwent amputation of an extremity. Eight patients had fasciotomies (3 upper extremities, 5 lower extremities), 7 escharotomy, 16 eschar excision, and 5 partial thickness skin grafts. Five patients (23.81%) died of burn complications, namely, multiorgan injury due to sepsis (3 patients) and acute distress syndrome (2 patients). The most serious complications were respiratory problems such as pneumonia and upper respiratory tract infection, and urinary infection, etc.

In the cultures, *Pseudomonas* microorganisms were seen in two patients, and *Enterobacter aerogenes* in one patient. All of the patients with tandir burn received multiple antibiotic therapy combined with topical application of silver sulfadiazine. In addition, all were given proton pump inhibitors for stress ulcer prophylaxis. A few of the patients required total parenteral nutrition and blood transfusion.

DISCUSSION

Burn is one of the most severe injuries. The treatment is rather difficult and is frequently prolonged.[5,13-15] The most common agents are scalding liquids (65%) followed by flames (15-23%).[6-8] In Al et al.'s study,[9] the scalding and flame burns rate were reported as 76.2% and 23.6%, respectively. Additionally, many unusual causes of burns are encountered in the literature. Stone and Dunn[16] reported a case of a chemical burn following cutaneous exposure to vinyl pyridine. Nettelblad et al.[17] reported three patients with psoriasis treated with psoralen combined with long-wave ultraviolet radiation who represented a novel cause of severe skin loss, defined as "psoralen burn". Kerosene stove fires constitute one of the commonest causes of burn injuries in Egypt, especially in underprivileged areas.[18] Gosh et al.[19] reported burn cases caused by chip-pan fires, and Harper and Dickson[20] discussed the burns caused by central heating radiators. Tandir burns, which occur when people fall into a special in-ground oven used for baking bread in the eastern and southeastern regions of Anatolia, are not an uncommon type of burn in and around Diyarbakır. The extent and depth of burn are important predictors of patient survival.[5,14] In our Burn Center, the mean TBSA% was 22.33 (8-75) and the burn was third-degree in 71.43% of the patients. These rates were reported as 21.09 (6-58) and 88% in Akçay et al.'s study.[5] They treated 60 cases of tandir burns over a seven-year period. These factors have shown that the patients with tandir burn have a severe type of burn injury.

Our analysis revealed that children under six years formed the patient group most affected from tandir burn and over half of the study population included children between 0 and 5 years. The patients generally fall into the tandir on their hands or feet. Thus, these extremities were burned very deeply and sometimes necessitate amputation. Three of 21 patients with tandir burn treated in our Burn Center underwent amputation of an extremity. Bekerecioglu et al.[12] treated 68 major burn cases in a three-year period, 32 (47%) of them due to a tandir. In their series, most of the burn victims were children and in most of the cases burn

injuries included the head and both hands. These findings were similar to those of Akçay et al.'s study.[5]

The mortality rates vary widely between burn centers, ranging from 6.2%[9] to 83%.[21] While Komolafe et al.[6] reported a mortality rate of 12% in 1825 patients, Anlatıcı et al.[22] reported this ratio as 33.5% in 1083 cases. Our mortality rate was 23.81% in the patients with tandir burn, and we think that this number is rather high. In our study, the most serious complications were respiratory problems such as pneumonia, acute respiratory distress, upper respiratory tract infection, and urinary infection, etc. Multi-organ injury due to sepsis and acute respiratory distress were the commonest causes of death. The mortality rate was 25% in Akçay et al.'s[5] tandir burn study; in their study, the rate of complications was similar to ours. Chen et al.[23] reported 351 patients burned in gunpowder explosions from 1 January 1987 to 31 December 1999. The patients constituted 4.4% of the 7932 patients admitted over the same period. Forty-four patients died, with a mortality rate of 13%. The commonest causes of death were sepsis followed by multiple organ dysfunction syndrome (MODS), hypovolemic shock and pulmonary infection. Similarly, Sharma et al.[24] reported septicemia as the commonest cause of death.

We think there are two main causes of tandir burns in our region, especially in children. The first is that mothers try to look after their children in the tandir room while baking bread. The second is that occasionally, especially in the winter, children use the tandirs to warm themselves after the bread has finished baking. In both situations, children can fall into tandirs either accidentally or through negligence, while playing in the vicinity of the ovens.

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