



Our 18-month experience at a new burn center in Gaziantep, Turkey

Gaziantep'te yeni kurulan bir yanık merkezinde 18 aylık deneyim

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BACKGROUND

This study is a retrospective analysis of 411 cases admitted to Cengiz Gökçek State Hospital Burn Center from 1 May 2007 to 10 October 2008.

METHODS

Through an electronic database of medical records of the burn center, all patients admitted to the center were traced. With respect to the numbers of burns according to sex, 35.7% (147) of the cases were female and 64.3% (264) were male.

RESULTS

For total burn surface area (TBSA) of 20-35%, the hospital stays for electric, flame and scald burns were 28, 18 and 12 days, respectively. For TBSA of 35-50%, electric burns resulted in a mean stay of 44 days, followed by chemical burns (33 days), flame (31 days), and scald (22 days). For TBSA over 50%, electric and scald burns resulted in hospital stays of ≥ 40 days. Case fatality was 5.6% (23 patients). 1.2% of the study group experienced at least one episode of epilepsy during treatment. Six cases had acute renal failure that responded to hemofiltration during treatment. Eight cases, which were flame burns, also had inhalation injury, and four of these cases required mechanical ventilation.

CONCLUSION

Members of the burn care team not only carry a heavy workload in the treatment of burn victims, we believe they also have the responsibility of recording and publishing their own data to increase the overall knowledge related with the subject, which will guide future studies.

Key Words: Burn treatment; epidemiology; hospital stay.

AMAÇ

Bu çalışma 1 Mayıs 2007 ile 10 Ekim 2008 tarihleri arasında Cengiz Gökçek Devlet Hastanesi Yanık merkezine kabul edilen 411 olgunun retrospektif bir analizini içermektedir.

GEREÇ VE YÖNTEM

Merkeze kabul edilen tüm olguların kayıtları elektronik veri tabanından elde edildi. Cinsiyete göre yanık oranları %37,7 (n=147) kadın, %64,3 (n=264) erkek idi.

BULGULAR

Toplam vücut yanık yüzeyi %20-35 arasında olan olguların hastanede yatış süreleri elektrik, alev ve haşlanma yanıkları için sırayla 28, 18 ve 12'şer gün idi. %35-50 toplam vücut yüzey alan yanığı olan olguların ise bu süreler elektrik, kimyasal, alev ve haşlanma yanıkları için sırayla 44, 33, 31 ve 22'şer gün olarak saptandı. Vücut yüzey alanı %50'den fazla olan yanıklarda ise elektrik ve haşlanma yanıkları 40 gün ve daha üzerindeki hastane yatış sürelerine sahipti. Ölüm oranları %5,6 (n=23) idi. Yanık tedavisi sırasında en az bir epilepsi atağı ise %1,2 oranında görüldü. Altı olguda hemofiltrasyona yanıt veren akut böbrek yetersizliği gelişti. Alev yanığı olan 8 olguda inhalasyon hasarı varlığı gözlemlendi ve bunlardan 4 tanesi mekanik ventilasyona gerek duydu.

SONUÇ

Yanık hastalarının tedavisi ile uğraşanların bu yoğun mesailerine ek olarak, kendi verilerini tutmaları ve bunları yayınlamalarının konu ile ilgili ileriki çalışmalara yol göstereceğine inanmaktayız.

Anahtar Sözcükler: Yanık tedavisi; epidemiyoloji; hastane yatış süresi.

In 2005, a large traffic accident occurred on the main road of Gaziantep-Adana. A truck carrying liquid petroleum gas (LPG) caused a large explosion. Its door was unintentionally opened and the gas within

the tank flooded the road over 1 kilometer. As a result, the passengers in the surrounding vehicles suffered serious burns and injuries. More than 20 cars were involved and 20 patients died. The tragedy brought to

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light the need for construction of a new burn center in the region by the government. The Ministry of Health funded this organization in Gaziantep. The Cengiz Gökçek State Hospital Burn Center was completed in March 2006. Since the admittance of the first case to the center, 411 burn cases had been treated as of 10 October 2007. We aimed to analyze these cases and present our experiences.

MATERIALS AND METHODS

This study is a retrospective analysis of 411 cases admitted to Cengiz Gökçek State Hospital Burn Center from 1 May 2007 to 10 October 2008. Through an electronic database of medical records of the burn center, all patients admitted to the center were traced. It is a well-equipped center with an operating theater, a dressing room with Hubbard tank and a 24-hour laboratory. The center has 18 beds with an intensive care facility. The staff included two surgeons, two practitioners with burn course certification, an anesthesiologist, 18 nurses specialized in burn care, and four technicians.

Burns are coded according to the LMR 1980 classification of disease. The following data for each patient were collected: total burn surface area (TBSA), etiology, length of hospital stay, complications during treatment, gender, and age at admission. Gaziantep has a wide seasonal variation in weather conditions, but the seasonal variations were not included for analysis, as the duration of the study was short. Extensively burned patients (burn area exceeding 30% TBSA) had preventive measures and treatments that consisted of prompt rapid fluid resuscitation, use of oxygen free radical scavengers (i.e. mannitol, vitamins C, E) and extensive escharectomy during the shock stage, early tube feeding, and support of organ function.

Causes of burn were divided into five groups: electric, scald, contact, chemical, and flame. Severity of burn was classified in TBSA. TBSA was described in percentage.^[1] The length of hospital stay was classified in days, including the days of admission and of discharge. The hospital stay was divided into four groups as follows: 1-10 days, 11-21 days, 22-41 days, and >42 days. Burns by age were classified to the age limit of 14 years (i.e., under and above 14 years). Statistical analysis was performed with the SPSS 11.0 statistical package for Windows. Values were expressed as percent and mean.

Table 1. Burns by cause and age

| Age | Scald | Chemical | Contact | Flame | Electric |
|------------------------|-------------|-----------|-----------|-------------|-------------|
| <14 years (130, 31.7%) | 71 (17.2%) | 6 (1.4%) | 5 (1.2%) | 23 (5.6%) | 25 (6.1%) |
| >14 years (281, 68.3%) | 76 (18.5%) | 12 (3.8%) | 5 (1.2%) | 83 (20.1%) | 105 (25.5%) |
| Total | 147 (35.7%) | 18 (4.3%) | 10 (2.4%) | 106 (25.7%) | 130 (31.6%) |

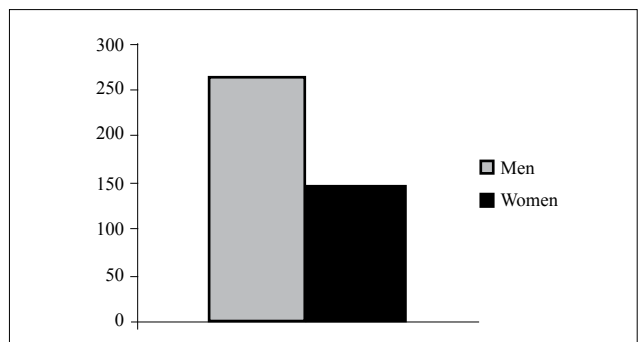


Fig. 1. Sex distribution of the burned patients during the study period.

RESULTS

Burns According to Sex

During the study period, 411 burn episodes occurred. No case required a second admission. Figure 1 shows the numbers of burns with respect to sex; 35.7% (147) of the cases were female and 64.3% (264) were male.

Burns According to Cause and Age

Table 1 presents the burns and age relation; 31.7% of the cases were under the age of 14 years and 68.3% were over the age of 14 years. The leading cause of burn was scald (35.7%), followed by electric (31.6%), flame (25.7%), chemical (4.3%), and contact (2.4%).

Total Burn Surface Area and Hospital Stay

Table 2 shows the TBSA of the patients and respective length of hospital stay. With a TBSA of 10-20%, mean hospital days for electric burns was 16 days, followed by flame (12 days), chemical (10 days), scald (10 days), and contact (6 days) burns. For TBSA of 20-35%, these values for electric, flame and scald burns were 28, 18 and 12 days, respectively. For TBSA of 35-50%, electric burns resulted in a mean hospital stay of 44 days, followed by chemical (33 days), flame (31 days) and scald (22 days) burns. For TBSA over 50%, electric and scald burns resulted in hospital stays of ≥ 40 days.

Surgical Interventions and Complications With or Without Fatality

Escharectomy was required in 11.2% of cases. 65.45% of the cases had one or more skin graft operations. The amputation rate was 7.05%. Table 3 illustrates the numbers of surgical procedures and related or unrelated complications and fatalities in the study group. Case fatality was 5.6% (23 patients). 1.2% of

Table 2. TBSA and mean hospital stay (days)*

| TBSA | Scald | Electric | Flame | Chemical | Contact |
|---------|---------------|---------------|------------|----------|---------|
| 10%-20% | 10 | 16 | 12 | 10 | 6 |
| 20%-35% | 12 | 28 | 18 | – | – |
| 35%-50% | 22 | 44 | 31 | 33 | – |
| 50%-70% | – | 43 (4 exitus) | 3 (exitus) | – | – |
| ≥70% | 42 (9 exitus) | – | 7 (exitus) | – | – |

* 74 burned patients who had TBSA of less than 10% with deep burns were treated on an outpatient basis.

the study group experienced at least one episode of epilepsy during treatment.

Causes of Case Fatalities

All 23 fatal cases had at least one or more positive blood and wound culture for a microorganism of *Pseudomonas*, *Klebsiella* or *Staphylococcus aureus* with single isolation or in combination. Six cases had acute renal failure (ARF), which responded to hemofiltration during treatment. No cases with ARF led to chronic renal insufficiency. Eight cases with flame burns also had inhalation injury, and four of these cases needed mechanical ventilation. Multiple organ dysfunction syndrome (MODS) was the main cause of death in all fatal cases. Causes of case fatalities are seen in Table 3.

DISCUSSION

After the acceptance of the first case, the center worked at full capacity. Our patients are generally from Southeastern Anatolia. There are several hospitals that admit burned patients, but referrals to the center are usually due to major burns. Thus, the center has functioned as a new major burn center in the region. During its first year of operation, we noticed that the staff had a continuous heavy workload and this clearly confirmed the necessity of a new burn center to serve the region.

The male predominance of our study conforms to some previous reports^[2-6] and contrasts other studies.^[7,8] It seems that cultural and/or regional specifications have some effects on the sex predominance in burn injuries.^[3-5] Our study showed that the commonest cause of burn injury in this region was scald and electric, followed by flame. These findings are consistent with

previous reports.^[5,6,9] Chemical and contact burns were the least frequent burn causes in the study group. Epidemiologically, electric and scald injuries are primary causes in low-income countries.^[2]

Regarding the relation between TBSA and hospital stay, there was an increase in hospital stay with increased TBSA in the present study. Extensive burns cause a marked increase in inflammation and catecholamines, which leads to an increased metabolic rate. Smaller burns significantly decreased body weight loss and net muscle protein balance when compared with the larger burns. Morbidity and mortality in burned patients are burn-size dependent, starting at a 60% TBSA.^[10] This finding correlates with the study of Sharma et al.^[11] They determined age under five years, flame burns and TBSA over 70% as major risk factors for both morbidity and mortality. Our results clearly show that with TBSA of 35-50%, electric burns caused the longest hospital stay, followed by chemical burns. These etiologic factors are responsible for much deeper burns than other factors.

Our fatality rate was also closely related with high TBSA, and all of the fatal cases were patients with a TBSA of 50% or more. Risk factors for MODS in major burn injury are inhalation injury, catheter infection and sepsis. It was reported that septicemia was the cause of death in 65% of fatal burn cases.^[12] In all fatal cases, there was a septicemia and/or candidemia episode. Amputation rate in our series was mainly dependent on the presence of electrical burn cases. Electrical burns remain a major health problem with significant amputation rates and hospital stay in low-income countries.^[13]

Table 3. Surgical interventions, complications and fatalities

| | |
|-------------------------------|---|
| Inhalation injury | 18 (8 cases needed mechanical ventilation) (4.3%)* |
| Escharectomy | 92 (in 46 patients) (11.2%) |
| Amputation | 29 (in 29 patients) (7.05%) |
| Debridement and skin grafting | 690 grafting (in 269 patients) (65.45%) |
| Epileptic seizure | |
| Episodes | 12 (in 5 cases) (1.2%) |
| Acute renal failure | 8 requiring dialytic support, with a mean 56±3.7 TBSA (1.94%) |
| Exitus** | 23 (5.6%) |

* 8 of them also had ARF; ** All exitus cases were major burns with a TBSA of 50% or more.

Another major complication of major burns is ARF. Leblanc et al.^[13] reported 16 ARF cases requiring dialytic support among 970 burn cases. Their mean burn surface area was 58 ± 5.7 . Although an aggressive initial fluid resuscitation was given, the rate (1.94%) of occurrence of ARF in our series was slightly higher than in Leblanc's series (1.45%). Appearance of ARF in a severely burned patient is a serious complication. It has a negative prognostic value and usually develops in the context of MODS induced by sepsis. Holm and associates^[14] reported an incidence of 14.6% with a corresponding mean TBSA of 48%. This was a very high rate of occurrence of ARF in severe burns. This high rate may be attributed to inhalation injury, because their rate of associated inhalation injury was 79%. It seems that presence of inhalation injury is a risk factor for development of ARF in severe burns. Incidence of inhalation injury varies in the literature, but it is correlated with increasing TBSA and flame burn.^[15] Smith et al. reported a mortality rate of 31% in severely burned cases with inhalation injury, and this rate for burns without inhalation injury was 4.6%. The rate of occurrence of inhalation injury in the present study was 4%, which is lower than in Smith's report. This was partially due to the presence of scald type injuries as the leading cause in our series because inhalation injury is usually caused by flame injury, which was the third leading etiologic cause in our series. Fatality risk was reported to be increased by 400% with inhalation injury.^[16] This conclusion is supported by our findings, as 14 of 23 exitus cases in the study group had inhalation injury. Overall fatality rate among patients with a TBSA of 50% or more was 24.2%. In Lari's report,^[5] this rate was two-fold higher. There has been a rapid improvement in equipment and medical technologies related to burn care. Some new technologies like VersaJet have already been integrated into wound care in the last decade. We routinely use VersaJet for burn wound debridement and have seen its several advantages, which are reduced blood loss, optimal preservation of viable tissues and effective elimination of bacterial colonization. Thus, the reduced rate of death among patients with TBSA of over 50% may be a result of usage of these technologies, when compared to the results published in earlier periods. A decline in overall mortality in severely burned patients with changing trends is consistent with reports of other authors.^[17] Another parameter may be early grafting of severe burn wounds. Sixty-five percent of the cases were skin grafted at the earliest possible time. As a well-known clinical entity, an increased incidence of sepsis is seen in patients with delayed wound excision and grafting.^[18]

In conclusion, we wanted to share our first 18 months experience in order to evaluate any needs to improve the quality of burn care in this new center. Burn care requires a professional team approach and

high caliber equipment. Members of the burn care team not only carry a heavy workload to ensure the survival of burn victims, we believe they also have the responsibility to record and publish their own data so that an overall increase in knowledge related with the subject can guide future studies.

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