Management of Burns

Essay
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In General Surgery

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ITEM	*ABBREVIATION*
ABA	American Burn Association
ABG	Arterial blood gases
ACS	Acute coronary syndrome
ALT	Aminotransferase
AMPLE	Allergies, Medications, Past medical history, Last meal, Events
ARDS	Acute respiratory distress syndrome
ARF	Acute renal failure
ASPEN	American Society for Parenteral and Enteral Nutrition
AST	Aspartate aminotransferase
BSHS	Burn Specific Health Scale
BWD+PHMB	Polyhexanide containing bio-cellulose dressing
COX	Cyclooxygenase
DSW	Donor site wound
ECG	Electrocardiogram
ED	Emergency department
EMLA	Eutectic Mixture of Local Anesthetics
Et-CO2	End-tidal carbon dioxide
FTSG	Full thickness skin grafts
GFR	Glomerular filtration rate
GSH	Glutathione
ICU	Intensive care unite
IL-1b	Interleukin-1b

LR	Lactated Ringer's solution
MODS	Multiple organ dysfunction syndrome
NAC	N-acetylcysteine
NOS	Nitric oxide synthase
ORS	Oral Rehydration Solution
PEFR	Peak expiratory flow rates
PGI2	Prostaglandin I2
PT	Prothrombin time
PTSD	Post-traumatic stress disorder
SCCM	Society of Critical Care Medicine
SIRS	Systemic inflammatory response syndrome
SMD	Standardized mean difference
SSD	Silver sulfadiazine
STSG	Split thickness skin grafts
TBSA	Total body surface area
TENS	Transcutaneous electrical nerve stimulation
TGF-b	Transforming growth factor beta
Th	T-helper cells
TNF-a	Tumour necrosis factor alpha
VBG	Venous blood gases
WHO	World Health Organization

Introduction

Burns are a global public health problem, accounting for an estimated 195,000 deaths annually. The majority of these occur in low- and middle-income countries and almost half occur in the WHO South-East Asia Region. In many high-income countries, burn death rates have been decreasing, and the rate of child deaths from burns is currently over seven times higher in low- and middle-income countries than in high-income countries. In 2004, nearly 11 million people worldwide were burned severely enough to require medical attention. In Egypt, 17% of children with burns have a temporary disability and 18% have a permanent disability ***(Forjuoh SN,2006).***

Most burns affect only the skin (epidermal tissue). Rarely, deeper tissues, such as muscle, bone, and blood vessels can also be injured. Burns may be treated with first aid, in an out-of-hospital setting, or may require more specialized treatment such as those available at specialized burn centers**.** Burns are caused by a wide variety of substances and external sources such as exposure to chemicals, friction, electricity, radiation, and heat ***(David Herndon, 2010).***

Managing burn injuries properly is important because they are common, painful and can result in disfiguring and disabling scars, amputation of affected parts or death in severe cases. The treatment of burns may include the removal of dead tissue (debridement), applying dressings to the wound, fluid resuscitation, administering antibiotics, and skin grafting. While large burns can be fatal, modern treatments developed in the last 60 years have significantly improved the prognosis of such burns, especially in children and young adults ***(Steven E. Greer, 2004)***.

Deep or widespread burns can lead to many complications; Smoke inhalation damages the lungs and can cause respiratory failure. Burn can leave skin vulnerable to bacterial infection and increase risk of sepsis, can damage blood vessels and cause fluid loss. This may result in low blood volume (hypovolemia), loss of body heat which increases risk of hypothermia, cause scars and keloids, and may limit movement of the

joints. Complications such as shock, infection, multiple organ dysfunction syndrome, electrolyte imbalance and respiratory distress may occur ***(Purdue GF , 2011)***.

Aim of the work

To evaluate different ways of burn management

Burn injuries are among the most devastating of all injuries and a major global public health crisis. Burns are the fourth most common type of trauma worldwide, following traffic accidents, falls, and interpersonal violence. Approximately 90 percent of burns occur in low to middle income countries, regions that generally lack the necessary infrastructure to reduce the incidence and severity of burns ***(Forjuoh SN,et al,2006)***.

Epidemiology

Unintentional and intentional burn injuries vary across age groups, gender, income and global region.

Burns in Egypt are a significant problem, especially in families of low socioeconomic status. A retrospective hospital - based analytical study conducted on burn patients admitted to the burn unit at Cairo University Hospital in the period between1 January 2007 to 31 December 2011, evaluated 564 patients from 1-60 years old with different burn injuries. During the study period, 230 female and 334 male patients were hospitalized (ratio F: M 0.6:1). Of the included sample 52.1% lived in urban areas while the rest (47.9%) in rural areas with no significant difference between both. Scald burns were the leading cause of burn injuries, accounting for 61.9% of all injuries, followed by flame burn at 28.4%, electric burn at 6,7%,contact burns at 2.3% and burns due to chemicals at 0.7%. Regarding the relation between age and types of burn injuries; Flame type was significantly higher in older age groups, while Scald burn was more common in younger age group (less than 5 years) ***(Farouk SH, et al, 2013)***.

Site and setting

Most burn injuries occur in a domestic setting, with cooking as the most common activity. Pediatric burns occur more commonly in the home (84 percent) and while children are unsupervised (80 percent). Adults are equally likely to sustain a burn in the home, outdoors or at work. Burns to adult females occur mostly at home, while burns to adult males occur mostly in outdoor or work locations. The elderly are most likely to sustain a burn in the bathroom, followed by the kitchen ***(Peck MD,et al,2008)***.

Incidence

The worldwide incidence of fire-related injuries in 2004 was estimated to be 1.1 per 100,000 population, with the highest rate in Southeast Asia and the lowest in the Americas. The incidence of burns in low and moderate income countries is 1.3 per 100,000 population compared with an incidence of 0.14 per 100,000 population in high income countries. The incidence of burn injuries severe enough to require medical care is nearly 20 times higher in the Western Pacific (including China) than in the Americas. Infants in Africa have an incidence of fire-related burns that is three times the world average for this age group (***Pressman MA,et al,2013).***

A population-based survey of over 170,000 households representing nearly 350,000 children and 470,000 adults during 2003 in Bangladesh showed that the overall incidence of non-fatal burn injuries was 166 per 100,000. Approximately 173,000 Bangladeshi children suffered moderate to severe burns each year, which is an annual rate of 288 burns per 100,000 children. 90 percent of the burns occurred at home ***(Tung KY, et al, 2005)***.

	Africa	**The americas**	**Eastern Mediterranean region**	**Europe**	**South-East Asia region**	**Western Pacific region**	**World**
Population (000)	689,632	874,380	519,688	883,311	1,671,904	1,738,457	6,436,826
Burns (000)	982	163	970	523	4069	388	7105
Incidence rate (000)	1.33	0.19	1.87	0.59	0.243	0.22	1.10

Table 1: Estimated annual incidence (000) of fire-related burn injuries* in 2004

(Tung KY, et al, 2005)

	Africa	The americas	Eastern Mediterranean region	Europe	South-East Asia region	Western Pacific region	World
Population (000)	737,536	874,380	519,688	883,311	1,671,904	1,738,457	6,436,826
Burns (000)	17,733	7,850	14,919	15,668	44,344	388	116,284
Incidence rate (000)	2.40	0.90	2.87	1.77	2.65	0.22	1.81

Table 2: Estimated prevalence of fire-related burn injuries* in 2004

(Tung KY, et al, 2005)

An estimate of the frequency with which children are hospitalized throughout the world for treatment of burns is a rate of 8 per 100,000. In a rural community survey in Ethiopia, burns were the second most common injury to children under 15 years of age. Burns were therefore the leading cause of admission for injury to pediatric hospitals, and ranked third as a source of outpatient visits ***(Demamu S, 2001)***.

It was estimated that approximately 11 million people sought medical care for burns in 2004. This number exceeds the combined incidence of tuberculosis and HIV infections, and is just slightly less than the incidence of all malignant neoplasms ***(Laloë V, 2004)***.

Prevalence

Burn injuries rank in the top 15 leading causes of the burden of disease globally. Burns are more common in lower middle income and low income countries. The three regions with the highest prevalence rates are the Western Pacific Region, Eastern Mediterranean Region and Southeast Asia Region. Region for region, lower middle income have a greater burden of fire-related burns than high income countries. The prevalence of burns is higher for women (0.09 per 100,000) than men (0.06 per 100,000) ***(Murray CJL, et al, 2006)***.

Intentional versus accidental

The majority of burn injuries worldwide are unintentional. Less than 5 percent are deliberate self-burnings or the result of abuse, with regional exceptions. The highest absolute number of deliberate self-burnings cases and their highest ratio to overall burn hospital admissions occur in India, and the highest incidence of deliberate self-burnings cases occurs in Sri Lanka ***(Gupta RK, et al, 2002)***.

In the US and Europe, deliberate self-burnings account for less than 1 percent of suicide attempts. In higher income countries, 37 percent of DSB was associated with mental illness and/or substance abuse. In lower income countries, the data are difficult to discern ***(Modjarrad K, et al, 2007)***.

A review of 55 studies of deliberate self-burnings found that the most common motivations for self-harm were psychiatric illnesses (Western and Middle East regions); personal (India, Sri Lanka, Papua-New Guinea and Zimbabwe); and political (India and South Korea). Assault, usually by a spouse, is most often caused by throwing caustic chemicals or flammable liquids at the victim's face or genitalia, or ignition of clothing ***(Poeschla B, et al, 2011)***.

A retrospective review of 7139 burn patients between 1979 and 1998 in a US burn center found that 184 (2.6 percent) were self-inflicted. Self-immolation with an accelerant (53.3 percent) and ignition of clothing without an accelerant (20.1 percent) were the most common methods used ***(Thombs BD, et al, 2007)***.

Etiology

In locations with seasonal variations of temperature, burns occur more frequently in the colder winter months. Burns also occur more commonly when meals are prepared, particularly in lower income countries where there is exposure to open flames and non-electric appliances used for cooking, heating, and lighting ***(Mabrouk A, et al, 2000)***.

Flames and scalds

Flame injuries and scalds are the most common causes of burns in children and adults worldwide. Based on information collected from US burn centers between 1995 and 2005, 46 percent of burns resulted from flame/fire and 32 percent from scalds from hot liquids ***(Barss P, et al, 2006)***.

A retrospective review of 127,016 hospitalized burn patients between 1999 and 2008 from 79 US hospitals found that the most frequent known causes of burns were: fire/flame (42 percent); scald (30 percent); contact with hot object (9 percent); electrical (4 percent), chemical (3 percent) and other (12 percent) (***Shields BJ, et al, 2008)***.

In many households in lower middle income countries (LMIC), especially in rural areas lacking electrification, open flames are common, including floors of huts with open hearths used for cooking and warmth, candles, and small kerosene and naphtha stoves and lanterns (***El-Badawy A, et al, 2001)***.

The fire risk from these sources is increased by lack of enclosure for open fires, floor-level location of fires and stoves, instability of appliances, nearby storage of volatile and flammable fuels, flammable clothing and housing materials, and lack of exits. Serious injuries from kerosene stoves have been documented in Egypt ***(Nasser S, et al, 2003)***.

Scald burns occur from hot tap water baths, hot foods and liquids, and heated cooking oils. Flame/fire-related injuries overall are the most frequent reason for admissions to US burn centers. Seventy percent of fire/flame burns and 81 percent of scald burns are sustained at home.

> Adults: Burns secondary to flames and fire are the most common cause of burns in adults. Flames account for 35 to 42 percent of hospital admissions related to burns, while scalds account for 15 to 18 percent ***(Peck MD, 2012)***.
>
> Children: There are regional differences for the most frequent cause of burns in children. In the US, the number of scalds far exceeds the number of flame burns in children age 0 to 4.9 years.