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Severe thermal burn in Lubumbashi: Descriptive study at the major burn center of the Sendwe Hospital

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Abstract

Introduction: Burns are a common trauma of daily life, however serious burns are rare and can be life-threatening. The consequences of the tragedy represented by burns on a professional, family, social and economic level compromise the reintegration of burns victims who are sometimes severely disabled and who's the future often remains jeopardized.

Patients and Methods: This is a descriptive cross-sectional study with retrospective data collection, on severe thermal burns in the surgical department of Jason Sendwe particularly in the burn center of Lubumbashi over a period of eighteen months, from January 2022 to July 2023. The sampling was exhaustive for convenience, including all cases of severe burn injury that occurred during our study period. The study population include 52 patients hospitalized and treated in above mention hospital for severe thermal burn. Statistical analyzes were performed using Epi info 7.2.2.6 software and Microsoft Excel 2019.

Results: We collected 52 files. Serious burns constituted 9.11% of all surgical cases. 62% of serious burn patients were male with a sex ratio of 1.6.

28.85% of serious burn patients were under 10 years old, and the average age in our sample was 23±16 years old. The upper limb was the region of the body most affected by burns with 92.31% of cases and the majority of patients, 54.77% of them had superficial second-degree burns. This study revealed that 38.46% of patients had a good outcome and the infections were present in 25% of patients.

Conclusion: Serious burns in Lubumbashi represent a real public health problem due to their frequency and mortality. Health education and the establishment of means of prevention would be a great benefit in limiting the major consequences of serious skin burn in Lubumbashi.

Keywords: Burns, severe, Lubumbashi, mortality

Introduction

Skin is the human body's largest organ, covering a surface area of about 2sqm in an average adult. The loss of physical barrier function of the skin open the door to invasion by harmful microorganisms, which can lead to infection, and ultimately even to development of sepsis ^[1].

Burn injury is damage to the skin or other body parts caused by extreme heat, flame, or contact with heated objects or chemicals. The World Health Organization estimated that 322000 peoples die each year from fire related burns with 95% of these occurred in developing countries ^[2]. The mortality rates were much greater at both ends of the age spectrum. Thirty-eight percent of all burn deaths were due to multiples organ failure and only 4.1% were due to burn wound sepsis.

The biggest factor in burn mortality was inhalation injury which increased mortality to 26.3% in the 6.5% of burn patients admitted with inhalation injury ^[3].

Burn injuries are a significant problem with more than 500,000 seeking medical treatment; 40,000 resultant hospitalizations, and 4,000 deaths per year in the United States ^[4].

In Ireland and Australia, only 23% and 39% respectively, had employed the correct first aid burn management in studies conducted on their primary carers ^[5-6].

Burn accidents are therefore a real global scourge which, however, is not among the health priorities of low-income countries. In fact, the number of victims is considerable although statistical studies are insufficient to assess the real number of populations concerned in these countries.

The etiology of burns is directly correlated to the lifestyle of victim exposed in both urban and rural areas.

The consequences of the tragedy represented by burns on a professional, family, social and economic level compromise the reintegration of burns victims who are sometimes severely disabled and who's the future often remains jeopardized [7]. The scarcity of statistical data published in our environment on severe burns was our source of motivation, the objective of which is to highlight the epidemiological, etiological and evolutionary profile of burns in Lubumbashi.

Patients and Methods

This is a descriptive cross-sectional study with retrospective data collection, on severe thermal burns in the surgical department of Jason Sendwe particularly in the burn center of Lubumbashi over a period of eighteen months, from January 2022 to July 2023. The sampling was exhaustive for convenience, including all cases of severe burn injury that occurred during our study period.

Files were then consulted and the data mentioned on a pre-established questionnaire. Our patients are made up of seriously burned patients hospitalized with well-codified severity criteria based mainly on the importance of the burn surface as a function

of age.

Criteria Studies variables were patient's demographic, clinical and paraclinical presentation, depth of the burn, burned surface, management, evolution and outcome.

The study population include 52 patients hospitalized and treated in above mention hospital for severe thermal burn.

The information thus collected was entered in epi-info software 7.2 and Microsoft excel 2013 and analyzed by these informatics programs.

Results

During the study period, 571 patients were managed in surgery service of the Jason Sendwe hospital. Among them, 52 had been selected for our study with severe thermal burn, representing 9.11% of all surgical cases in general surgery.

The average age of patients was 23±16 years (extremes: twelve months or 1 year and 66 years old). In majority of cases, the patients were young,

The male was in majority (62%) with a sex ratio of 1.6; the majority of patients resided in the annex and Kampemba commune (30.77% each other).

Table 1: Patients distributions according to Sociodemographic data

Variable	Effective (N=52)	Percentage (%)	Statistical Parameters
Age (Years)	N (52)	Percent	Means
≤ 10	15	28.85	23
11 - 20	7	13.46	
21 - 30	13	25	Standard deviation
31 - 40	8	15.38	16
41 - 50	6	11.54	
51 - 60	2	3.85	
>60	1	1.92	
Resident commune	Effective N = 52	Percentage (%)	
Kampemba	16	30.77	
Katuba	6	11.54	
annexe	16	30.77	
Kenya	3	5.77	
Kamalodo	10	19.23	
Lubumbashi	1	1.92	
Sexe	Effective N = 52		
Male	32	61.53	Sex ratio
femelle	20	38.47	1.6

Table 2: Distribution of patients according to clinical data

Reason of consultation	Effective (N = 52)	Percentage (%)	Statistical parameters
Acute phase of the burn	51	98	
Aftereffect phase	1	2	
Delay between burn and consultation (in hours)	Effective (N = 52)	Percentage (%)	
Less than 6 hours	45	86.54	
Between 6 and 24	6	11.54	
Beyond 24 hours	1	1.92	
Circumstance of burn	Effective (N = 52)	Percentage (%)	
Public road accident	4	7.69	
Bath	3	5.77	
Domestic accident	16	30.77	
Fire	22	42.31	
Work accident	6	11.54	
Assault	1	1.92	
Burned body segment	Effective	Percentage	
Head and neck	40	76.92	
Trunk	38	73.07	
Upper limb	48	92.31	
Lower limb	43	82.69	
Depth of burn	Effective (N = 52)	Percentage (%)	
Second superficial degree	29	55.77	

Second intermediate degree	7	13.46	
Deep second degree	9	17.31	
Third degree	7	13.46	
Surface area burned (in %)	Effective (N = 52)	Percentage (%)	
<10	7	13.46	Means
11 - 40	22	42.30	39 ± 25%
>40	23	44.23	Extremes of 8 and 98 %

Concerning treatment, all patients were initially treated with an antiseptic bath in lukewarm with stripping of burn lesions upon arrival at the hospital.

The cream named Flammazine was the most commonly used topical antiseptic for dressing burn lesions in 84.64% of patients, there was also a cream named meladerme (7.69%) and tulle gras

(3.85%). Crystalloids were the most used rehydration fluid in the acute phase of burn (87%) while colloids were used as first intention in 13% of patients. Two rehydration formula are used, namely that of Evans for adults and that of Parkland's hospital for children.

Table 3: Distribution patients according evolution data

Evolution	Effective (N = 52)	Percentage
Good evolution	18	34.62
Bad evolution	34	65.38
Length of hospitalization (in days)	Effective (N = 52)	Percentage
<5	12	23.07
6-10	12	23.07
>10	28	53.84
Outcome	Effective	Percentage
Death	22	42.30
Survival	30	57.69

The poor evolution was marked by renal failure (7.69%), infection (25%) and malnutrition (15.38%) without forgetting anemia (26.92%).

Discussion

Burn injuries are under-appreciated trauma that can affect anyone, anytime and anywhere. The injuries can be caused by friction, cold, heat, irradiation, chemical or electric sources, but the majority of burn are heat by heat from liquids, solids or fire^[8]. This corroborates with our data that all cases of serious burns are caused by heat, and the majority are hot liquid and flames.

Burns and their treatment have been regarded as an important medical problem since antiquity^[1].

Although burn injuries are decreasing in high-income countries, the prevalence of burn injuries remains high elsewhere, with approximately 90% of burns occurring in low-and middle - income areas^[9-10].

The WHO estimates that 11 million burn injuries of all type occur annually worldwide, 180,000 of which are fatal^[2]. There is a wide variability in the incidence of burn injury^[9]. For example, the number of burn-related deaths per 100,000population ranges from 14.53 in Ivory Coast to 0.02 in Malta^[11]. In our study, the mortality was too high calculated to 42.30%. This high mortality in our study would be linked in part to the severity of the injuries because our study concerned serious thermal burn but also to the low quality of resuscitation measures of the deficient technical platform in our less-off environments, this was confirmed by a study which revealed that over 95% of fire-related burn death occur in low-and middle income countries^[12]. But burn-related deaths of children are 7 to 11 times higher in low-income than in high-income countries^[2, 13].

All ages were affected by the serious burn; however children under 10 years old made up 28.85% of cases which corroborates with the assertions of several authors on the role of children in serious burn injuries.

All our patient on their arrival benefited of early excision, it was an obligation. The early excision is the gold standard treatment, attenuates the hyper metabolic state and removes the biological

nidus for infection, thereby reducing the risk of burn wound sepsis^[1].

In our series, the poor evolution was marked by renal failure (7.69%), infection (25%) and malnutrition (15.38%) without forgetting anemia (26.92%). Sepsis and multiple organ failure are the main causes of mortality in patients after burn^[14]. Indeed, patients with severe burn injuries are at higher risk of developing infectious complications. Additional sources for infection in these patients can be their own microbiota associated with skin, respiratory tract and intestines. Compromised host defence from the disrupted skin barrier in patients with burn injury leads to increased susceptibility to infection (predominantly bacterial, but also yeast, fungal and viral), increase virulence from specific pathogenic organisms and the subsequent development of organ failure^[15-16].

Aspects of burn care also need further development, including resuscitation²⁴². Adequate resuscitation in patients with burn injury is challenging because questions abound regarding volume, composition, formulae and outcome measurement.

Burn complicates to shock. Burn shock, which combines hypovolemic, distributive and cardiogenic features, occurs in the initial 48 hours secondary to the dysregulated inflammatory response after burn injury, and is characterized by a diffuse capillary leak wherein losses of proteins, electrolytes and plasma further reduce intravascular volume, impair end-organ perfusion and produce cellular dysoxia (aberrant cellular oxygen metabolism). In our case, Crystalloids (Ringer Lactate) were the most used rehydration fluid in the acute phase of burn (87%) while colloids were used as first intention in 13% of patients. The initial fluid of choice is balanced crystalloid, most commonly warmed Ringer Lactate solution^[14], but a recent meta-analysis of burn resuscitation outcomes indicated that albumin-augmented resuscitation with 5% albumin as early as 8 hours after burn injury in those who are projected to receive a massive resuscitation (>1,500 ml per hour for 2 hours)^[14].

The topical antimicrobial slows the septic progress and can take variety of form (creams, ointments, liquids and impregnated dressing). In our series, we most used a cream named Flammazine and a cream named meladerm. The topical

antimicrobial has been the mainstay of non-surgical burn treatment.

Infection, malnutrition and the anemia characterized the medium end long-term evolution of severe burns in our study. The burn wound coverage is essential in the management of severe burn injuries. Unfortunately, almost all of our patients did not benefit from the skin graft, which can partly explain the poor outcome and the long hospital stay of serious burn patients.

Conclusion

Although burn injuries are decreasing in high-income countries, the prevalence of burn injuries remains high elsewhere, with 90% of burns occurring in low- and middle-income areas. Serious burns in Lubumbashi represent a real public health problem due to their frequency and mortality. Our study demonstrates the great difficulty still remaining in the management of serious burn whose the mortality rate remains very high and a serious problem of wound coverage difficult to apply easily because of its requirements in its applicability in this environment where the population is very poor..

Conflict of Interest

The authors declare no conflict of interest.

Author contribution

All authors contributed substantially to the completion of this work.

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