

Management of Severe Burns in Children at the Intensive Care Unit of the Borgou Regional University Teaching Hospital (CHUD-B) in Benin

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Abstract

Background: Severe burns in children are common and their mortality is very high, particularly in developing countries.

Objective: This study aims to investigate the epidemiological, clinical and therapeutic aspects of severe burns admitted to the CHUD-B intensive care unit.

Patients and methods: It was a case-control study with descriptive and analytical purpose carried out in the CHUD-B from January 1st, 2010 to December 31, 2014. The study involved patients under 15 years of age with severe burns admitted to the intensive care unit.

Findings: Among the 65 patients hospitalized for severe burn, 49 were children i.e. 75.3%. The mean age of burned children was 3.5 years (2 months and 12 years as extremes). Children under 5 years of age represented 71.4%. Males were predominant (57.1%). Average waiting time for admission after accident was 2 hours. Burn was accidental and most burns occurred at home (93.9%). The causative agent was thermal (100%); scalding represented 67.3%, and then flames 32.7%. Average body surface area burned (BSAB) was 30% and 2nd degree burns represented 95.9%. At the scene of the accident 46.5% of patients had received care. Treatment consisted of occlusive dressing with Biafine® and vascular filling. The administration of analgesic and antibiotics was systematic. No surgical treatment was provided. The average length of stay in the intensive care unit was 7 days. Complications were noted in 73.5% of the patients. Anemia (75.0%), hypovolemic shock (33.3%) and local infection (22.2%) were the main complications. Mortality rate was 40.8%. This high mortality was correlated to three major complications with P value less than 0.05. These complications were: hypovolemic shock, pneumonia and septicemia.

Conclusion: Severe burn is life-threatening for the child. Primary prevention is the best way to combat against that condition.

Keywords: Severe burns; Child; Intensive care; Primary prevention; Traumatic injury; Electrical burn

Introduction

Severe burns are a traumatic injury of skin with consequences affecting the whole human body. They affect all segments of the population but children are the most vulnerable. Severe burns from fire represented the sixth cause of death among children aged 5 to 14 years [1]. In Sub-Saharan Africa, according to a study conducted by Hyder [2], frequency oscillated between 25 and 68% in children under 5 years of age. It is thus a common and serious condition. In poor countries, population's low purchasing power and inadequate technical equipment of hospitals may contribute to the high mortality of that condition. Therefore, more emphasis is being placed on prevention [1]. This research work aims to investigate epidemiological, clinical and therapeutic aspects of severe burns admitted to the CHUD-B intensive care unit.

Patients and Methods

Our study was conducted in the intensive care unit of the Borgou Regional University Teaching Hospital located in Benin. It was a case-control study with descriptive and analytical purpose conducted over five years from January 1, 2010 to December 31, 2014. It involved children under 15 years of age admitted for burn, and in whom one or many severity criteria were identified.

Severity criteria were [3]:

According to body surface area burned (BSAB)

- In the newborn, regardless the extent of BSAB, burn is serious,
- In the infant, BSAB is higher than 10%,
- In the child, BSAB is higher than 20%

According to depth:

- Any 3rd degree burn with area burned higher than 3%,

According to location:

- Any burn of the face, feet, hands, perineum, and any circular burn of a part of human body

According to the wounding agent:

- Chemical burn (base and acid) and electrical burn,
- Suspected or actual inhalation of smoke

According to field:

- Any pre-existing deficiencies

Exclusion criteria were:

- severely burned patient who refused hospitalization,
- severely burned patient dead on admission.

Study variables were age, sex, means of transport, wounding agent, location of burn, BSAB, local care, vascular filling, antibiotic therapy, escharotomy, graft, length of stay in the intensive care unit, complications and mortality.

Data were processed with Epi info version 3.5.1 and Microsoft Excel software.

Results

Epidemiological aspects

Among the 65 patients hospitalized for severe burn, 49 were children i.e. 75.3%. Mean age of burned children was 3.5 +/- 2 years with extremes of two months and 12 years. Children under 5 years of age represented 71.4% (Table 1).

	Number		Total	Percentage
	Male	Female		
[0-3]	12	11	23	47
[3-6]	11	5	16	32.7
[6-9]	4	4	8	16.3
[9-15]	1	1	2	4
Total	28	21	49	100

Table 1: Distribution of severely burned children according to age group and sex.

Sex ratio was 1.3. Thirty-nine burnt children were brought to hospital by parents by motorbike, six by public transport vehicle, three by firemen and one by ambulance. The average waiting time for admission after accident was two hours +/- 30 mn, and 71.4% were admitted before six hours. Admission was direct in 66.4% of the cases and 30.6% of the children were referred from another health center. All cases of severe burn were accidental, and 94% occurred at home. Mechanism was thermal in all severely burned children (100% of the cases). Scalding represented 67.3% and flames 32.7%. During the quarter ranging from December to February 34.7% of burn victims were recorded.

Clinical aspects

BSAB was on average estimated at 30% ± 19.2%. Table 2 shows the distribution of severely burned children according to BSAB.

	Number	Percentage
[10-19]	17	34.7
[20-39]	19	38.8
[40-59]	7	14.3
60	6	12.2
Total	49	100.0

Table 2: Distribution of severely burned children according to BSAB.

2nd degree burns represented 96% (47/49) of the cases. On the accident site, 32.6% (16/49) of the patients had benefitted from wash down and application of honey or toothpaste. The rest of children (67.4%) had not received any care.

Therapeutic aspects

In the intensive care unit local treatment consisted of cleaning with physiological salt solution, excision of phlyctenules and occlusive dressing with Biafine®. The other types of care were vascular filling, administration of injectable paracetamol and systematic antibiotic therapy. Antibiotic treatment was systematic because of the added risk of nosocomial infections due to the fact that burnt children was hospitalized in the same room with others patients.

Antibiotic treatment was made of ceftriaxone associated to metronidazole. Sero-vaccination treatment against tetanus had been performed in 32 children who had not benefitted from tetanus vaccination coverage.

No surgical treatment (escharotomy, aponeurotomy or skin graft) was performed during stay in the intensive care unit. Average length of stay (ALOS) in the intensive care unit was 7 ± 5 days with extremes of one and 20 days. Complications were observed in 36 patients i.e. 73.4%. The main complications were anemia (31/49: 63.2% of the cases), hypovolemic shock (16/49: 32.6% of the cases), local infection (10/49: 20.4% of the cases), pneumopathy and sepsis: five cases each, kidney failure and undernutrition: two cases each, and one case of itching.

Mortality rate was 40.8% (20/49), including 17 children during the first week. This high mortality was correlated to three major complications with P value less than 0.05. These complications were: hypovolemic shock, pneumonia and septicemia.

Discussion

Children are very vulnerable in case of burn. Surprise effect of accident, lack of reflex and readiness for getting free of thermal, chemical or electrical agent extend contact and worsen the injury. We noted a 75.3% frequency of severe burns among children while adults represented only 24.7%. According to Kouamé et al. [4], Oludiran et al. [5] and Zahid et al. [6] children are generally victims of severe burns. The latter may be due to their excessive restiveness, curiosity, carelessness and sometimes parental neglect. Children are most often victims of burns from hot liquids [6,7].

Actually, all our patients were victims of thermal burn, including 67.3% from hot liquids. This high rate of burn from scalding induce parents to assume responsibility for children follow-up and necessity of taking safety measures in the presence of hot liquids. However, for the burns primary prevention, others measures should be taken. It will be:

- keeping children away from kitchen and cooking food places, as well as others places where there are risks of burns
- limiting the intensity of flames and putting furnace-guard around traditional furnaces
- promoting and encouraging the use of electric household equipment especially cooker, gas furnaces and stoves with less hazardous fuels
- avoiding the home storage and informal sale of hydrocarbon fuels
- formally prohibiting adulterated gasoline's sale and increasing the number of modern stations gasoline distribution.

These preventive measures must be respected and strengthened given the number of death engendered by flame burns. For their transport to hospital, very few patients benefitted from medical transport in developing countries. In Cameroun, Owono et al. [8] reported that no patient had benefitted from medical transport; in our study only one patient is brought to hospital by ambulance. The unavailability of medical transport offer brings parents to use means of personal transport or public transport. Thirty-nine children were brought by motorbike and six by public transport vehicle.

The frequency of burns was higher during the months of December, January and February, corresponding to the harmattan (hot, dry and dusty wind in West Africa) period where the lowest temperatures are recorded in the North-Benin. Iqbal et al. [9] report that winter is a period of risk for burn (63%). The use of hot baths, household pyres to get warm during that period may explain the occurrence of burn. The extent of burned area depends most on occurrence circumstances and mechanism of burn. Burns from flame often cause extended burn. BSAB was between 20% and 39% in 23 patients i.e. 46.6%. This percentage of burned area may be compared to the one of Ibnouzhir et al. [10] which was 28% and considerably lower than 75% found by Fadeyibi et al. [11] in Nigeria in their study on burns and fire disasters from leaking petroleum pipe in Lagos. The extent of body surface area burned was more than 30%, especially when it comes to burns by flames, and hydro electrolytes disturbances associated justified the number of death (17/20) during the first week of hospitalization.

Most of our patients (53.5%) had not received any care at the scene of the accident. By contrast, for Owono et al. [8], some products were often applied on injuries; these are honey, palm oil, egg yolk and toothpaste. Zahid et al. [6] reported 47.3% of tap water cooling; this is a good therapeutic action to limit deepening of injuries. However, in case of much extended burns, water cooling may result in hypothermia. Cold water cooling was used for 32.6% of burned children on the accident site. We put in place systematic antibiotic therapy contrary to recommendations of the French society of burn study and treatment [12] and according to the conclusions of Ugburo et al. [13] in their research work entitled "An evaluation of the role of systemic antibiotic prophylaxis in the control of burn wound infection at the Lagos university teaching hospital".

This therapeutic attitude is justified by the fact that the CHUD-B intensive care unit is a polyvalent unit unable to provide care for patients with major burns characterized by more increased risk for nosocomial infections. Complications are common in patients with severe burns. The occurrence of hypovolemic shock, pneumopathy and

sepsis is a factor of poor prognosis as reported in the literature et al. [4].

We observed the same complications and noticed their poor prognosis impact. The high mortality (40.8%) was correlated to these three major complications with P value less than 0.05.

This mortality was very high compared to 5.5% and 21.3% respectively reported by Mohammad et al. [14] and Agbenorku et al. [15]. In fact, developing countries are confronted with higher mortality rates et al. [16] due to the deficiency of technical equipment and facilities as well as precarious living of the population.

Conclusion

Severe burns are a major public health issue. They are very common in the infant and young child. Mortality is very high during the first week of hospitalization. Efforts should be made to reduce the impact of severe burns through prevention and reduce mortality by creating a care center.

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