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Medico-Legal Study of Fatal Flame Burn Victims in Sulaimani Province

Saad K Kareem *FIBMS (Forensic medicine)*

Dept. of Pathology and Forensic Medicine, College of Medicine, Al-Nahrain University

Abstract

Background Fatal flame burn injuries remain one of the most common causes of fatalities referred to Al-Sulaimania Medico-Legal Institute in spite of many recent advances in care and management. They occupied number one of all cases which were managed medico-legally.

Objective To study, evaluate and determine the causes of death in victims of flame burn injuries.

Method The study was conducted on 221 cadavers of flame burn injuries referred to the medico-legal institute in Sulaimania province during the period between 8th of May 2008 and 7th of May 2009. Complete classical autopsy was performed on each case as well as proper laboratory investigation (CO and renal function tests).

Results Fatal flame burn injuries constituted (28%) of the total number of medico-legal mortalities during the period of the study. The highest percentage of flame burn deaths occurred during the 1st and 2nd day of burn which was related to the state of shock and primary toxemia in (46.08%) of the cases. Late deaths were due to septicemia, cumulative effects of the early cause and miscellaneous causes.

Conclusion Flame burn injuries were the most common police cases managed medico legally. The vast majority of victims died within the first ten days. Staphylococcus aureus was the most common organism isolated from wounds and blood of victims.

Key words Autopsy, flame burn, Al-Sulaimania.

Introduction

Flame burn remains one of the most dangerous and devastating injury in spite of many recent advances in care and management [(1)]. In physical terms, it involves the transfer of an excessive amount of heat energy to the body by many physical modes [(2)]. Recently wound sepsis is considered a major factor of burn death[(3, 4)]. The second common cause of immediate death was inhalation of toxic fumes and gases [(5)]. Shock is the most post-burn concern either neurogenic or of progressive hypovolemic type [(4)]. Blunt trauma may associate burning resulting in death [(6)]. Curling type of duodenal ulcer may perforate with high mortality rate [(7)]. Moors et al revealed male to female ratio of (2:1) [(8)], while Chen-Fm in his study, showed ratio of (5:1) [(9)]. Al-Qaissi stated that more than (50%) of burn deaths were due to state of shock and primary toxemia [(10)]. Feket in his study found different states of renal impairment in postmortem vitrous humor urea and creatinine [(11)].

Methods

Autopsy of 221 cadavers of flame burn victims including those who died as inpatients were examined in Al-Sulaimani Medico-Legal Institute from 8th of May 2008 to the 7th of May 2009.

Complete medical information was obtained from medical files for those who were admitted to hospital prior to death including their lab investigations.

Complete external examination of each cadaver was done in order to re-assess the extent, percentages and degree of burn, with microscopical examination of the wound and any associating injuries.

Complete autopsy examination was done for each case with gross examination of all organs. Investigation were done including heart blood samples for carbon monoxide (CO) level determination using visible spectrophotometer and vitreous humour samples withdrawn from the outer canthus of the eye using disposable syringes G21 to determine the level of urea and Creatinine. Statistical analysis of the results was done using the SPSS version 11.

Results

During one year of work, a total of 221 flame burn cases referred to Sulaimani Medico-legal institute were included in this study. They represented (28%) of the total cases referred for autopsy which was 791 during the period 8th of May 2008 till 7th of May 2009.

Age and sex distribution were shown in the table 1. Age group 21-30 years showed the highest number of victims among male while female highest age group death was 11-20 years.

Table 1. Age and Sex Distributions among flame burn victims.

Age/ Sex	0-10 years	11-20 years	21-30 years	31-40 years	41-50 years	51-60 years	61-70 years	71-80 years	Total
Male	4	5	9	3	4	2	3	0	30
Female	10	87	62	15	7	5	2	3	191
Total	14	92	71	18	11	7	5	3	221
%	6.3	41.6	32.1	8.1	5	3.1	2.3	1.4	100

Table 2 shows the highest survival number was within the first ten days and the number then decreased with increasing survival period.

Table 2. Duration of Survival following flame burns

Survival days	Number	(%)
0-10	192	86.87
11-20	13	5.88
21-30	7	3.16
31-40	4	1.8
41-50	5	2.26
Total	221	100

Most common bacterial organisms found in burn wounds and blood cultures among those admitted to hospital prior to death were Staphylococcus aureus representing 70.4%, pseudomonas aeruginosa representing 48.1% and Klebsiella representing 37% of all patient cases as it is shown in table 3.

Table 3. Bacteriologic wound isolates from 108 admitted burn victims and Microbiologic blood isolates from 60 admitted burn victims

Micro-organism	Wound isolates	No.%	blood isolates	No.%
S. Aureus	+	76(70.4%)	+	40(66.7%)
P. Aeruginosa	+	52(48.1%)	+	28(46.7%)
Klebsiella	+	40(37%)	+	12(20%)
Proteus	+	32(29.6%)	+	5(8.3%)
E. Coli	+	8(7.4%)	+	32(53.3%)
S. Albus	+	5(4.6%)	-	
Enterobacter	+	4(3.7%)	-	
Strepto.	+	3(2.8%)	-	
C.albicans	-	-	+	4(6.7%)

Urea was less than 30 mg/100 cc in 85 cases (38.5%), while it was 100mg /100cc and more in 14 cases. Creatinine level was higher than normal limits in nearly more than 50% of cases as shown in table (4).

Table 4. Post-mortem values of vitreous humor Creatinine and urea in 221 flame burn victims

Creatinine	No. (%)	Urea	No. (%)
		<30	85 (38.5)
<1	109 (49.3)	40	46 (20.8)
2	70 (31.8)	50	27 (12.2)
3	26 (11.8)	60	24 (10.8)
4	13 (5.9)	70	13 (5.9)
5	2 (0.9)	80	6 (2.7)
>6	1 (0.4)	90	6 (2.7)
		>100	14 (6.4)
Total	221 (100)	Total	221 (100)

Carbon monoxide reached the lethal level in 3 cases as shown in table (5) which is 50%-60% saturation in healthy subjects.

Table 5. Postmortem blood carboxyhemoglobin saturation

CO Hb Saturation	No. (%)
0- 9%	89 (40.27)
10- 40%	128 (57.91)
41- 60%	4 (1.82)
Total %	221 (100)

Discussion

In this prospective study, the number of flame burn victims was 221 cases and this does not reflect the real size of thermal deaths at particular time in the area in which they became the unique source of cases including Sulaimani, because of excluded cases like scalding, and electrical burns. The number of victims in this study represented 28% of all cases managed medico-legally during the duration of study. Highest incidence rates of burns were found in this study among teenager and young aged groups.

The explanation for higher incidence among these age group is related to the most active stage of life .The highest age group of flame burn victims in our study was 21- 30 year which is less than the age group in other study done by Chen Yu Lin [10]. Female: male ratio in our study was 6.4:1 which is an inverse result to other study done by Moors, et al and Chen-FM [8,9]. This inversion in our result is du to the source of our cases being domestic and not industrial where females in our society almost always deal with all domestic activities. The death peak during the first and second day of burn were related to the state of shock and primary toxemia in 90\221 cases (46.8%) and this is explained to a fact that all of them presented with extensive burns (more than 80% of body surface area) with systemic complications.

Many studies showed collateral finding for the predominance of staphylococcus aureus and pseudomonas aeruginosa in wound and eschar cultures [8]. Blood cultures showed predominance of pseudomonas aeruginosa and E.coli. The existence of E.coli is a strong indication of translocation of the sepsis from the gut or urinary system, but the result was with lower incidence in a study held by Artz [12]. This is related to lack of proper burn victim's isolation during the course of treatment in the admitted hospital which is very essential to prevent cross infection from other burned patients, suboptimal treatment, and presense of resistant types of microorganisms.

Post mortem vitreous humor urea and Creatinine values usually reflect the state of re-hydration and renal impairment which might be related to inappropriate management and follow up, and this is similar to the result of a study held by Feket [11]. Carbon monoxide poisoning proved in three cases to be a main cause of death at scene.

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Correspondence to Dr. Saad K. Kareem
E-mail: drsaad_kareem @yahoo.com
Cell phone: + 964 7705831334
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