

A medico-legal problem of child maltreatment among pediatric cases admitted to the Burn Unit of Alexandria Main University Hospital

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Abstract Child maltreatment is a significant public health problem. Violence and injuries are serious threats to the health and wellbeing of children, as children are at high risk of disability or even mortality due to these injuries. Childhood victimization has long term negative impacts such as low educational performance, becoming more suicidal prone, fear of other sex and acquiring violent behavior. Child maltreatment by burning is a common means of assault that may be difficult to prove.

The aim of the present work was to highlight the problem of pediatric burn injuries, and to study the recorded cases of these injuries to find out if the recorded data are sufficient for diagnosis of child maltreatment, as well as to investigate a fresh case of child maltreatment and the complex medico-legal problems affecting the management of such cases.

Results: an analysis of records revealed 112 cases of pediatric burn injuries (48.9%) among 229 burned cases admitted to the Burn Unit of Alexandria Main University Hospital during a period of six months from first of January 2013 till the end of June 2013. Scalds were the commonest type especially in children below 5 years (77.3%). Perineal burns were mostly found in females (72.2%). The commonest cause of death was multi-organ failure (63.1%). The records gave no data about the circumstances of burn injuries, thus it was difficult to detect cases of child maltreatment, in spite of finding many clues in the records that may point to this diagnosis. In this work, a case of severe maltreatment was examined, investigated and followed up till discharge. As she was a minor and her caretakers were the main offenders, the question was from whom we would take the consent? This created surgical and medico-legal problems in managing the case.

Keywords Child maltreatment, child abuse, pediatric burn, medico-legal study

Introduction

Burns are an important cause of injury to young children, being the third fatal injury after motor vehicle accidents and drowning. Burn injuries account for the greatest length of stay of all hospital admissions for trauma (Toon et al., 2011).

Child maltreatment by burning is defined as the intentional inflicting of burn injuries on a child aged 0-18 years for various reasons by a perpetrator who is generally a child caretaker or a family member using hot liquids, flame, or heated metals, corrosive poisons and electrical appliances and with a definite proof of the incidence. Burn due to neglect is a condition in which an accident is caused due to objects causing burns being kept in the vicinity of a child's play area by a carer who fully realizes that a child could be injured, for example by running and falling into hot water kept on the floor (Mathangi et al., 2010).

World Health Organization estimated that about 40 million children around the world suffer from child maltreatment (as recently defined by WHO) that require health and social care (WHO 2004, 2006).

Child maltreatment constitutes all forms of physical and /or emotional ill treatment, sexual abuse, neglect or other exploitation, resulting in actual or potential harm to the child's health, survival, development or dignity (Ibrahim et al., 2008).

Cases of maltreatment by burn are often more difficult to prove than non-burn cases because burns are often more easily explained as occurring accidentally (Michael and Diane 2002). If the number of cases of burns due to child maltreatment is underestimated, it can be due to underreporting, a low index of suspicion, or lack of proof. Ojo et al. (2007) reported that although the incidence of child abuse by

burns was 4 to 39%, less than one half of them were recorded.

Because of the seriousness and severity of non-accidental injuries, hence the demand for a thorough investigation of pediatric trauma especially burn cases to prevent recurrence of the offence.

Aim of the work

The aim of this work was to highlight the problem of pediatric burn injuries, and to study the recorded cases of these injuries to find out if the recorded data are satisfactory for diagnosis of child maltreatment, as well as to investigate a fresh case of child maltreatment and the complex medico-legal problems affecting the management of such cases.

Subjects and methods

The current retrospective study was carried out on 112 pediatric patients suffering from burn injuries of different types and severity, admitted to the

Burn Unit of Alexandria Main University Hospital during a period of six months starting from first of January 2013 till the end of June 2013. All data were collected from files and records of this burn unit. These data included age, sex and residence of patients, type, time and site of burn, % total body surface area burned, duration of hospitalization and outcome. A case of special interest was interviewed, examined, assessed by the pediatric trauma score (Table 1) and investigated then followed up till discharge. The study protocol was reviewed and approved by the ethics committee of Alexandria Faculty of Medicine.

Statistical analysis

Statistical analysis was done using IBM SPSS statistics program version 20. Chisquare test was used to study significant association between two qualitative variables. Fisher exact and Monte carlo tests were used if more than 20% of total expected cell counts <5 at 0.05 level of significance (Kirkpatrick et al., 2013).

Table (1): Pediatric Trauma Score (Haller, 1983).

Component	Category		
	+2	+1	-1
Size	>20 Kg	10-20 Kg	<10 Kg
Airway	Normal	Maintainable	Unmaintainable
Systolic blood pressure	> 90 mmHg	50-90 mmHg	<50 mmHg
CNS	Awake	Loss of consciousness.	Deep coma or decerebrate
Open wound	None	Minor	Major or penetrating
Skeletal	None	Closed fracture	Open or multiple fracture

Results

Children constituted 48.9% of the total number of burned patients admitted during the study period. Out of 112 burned pediatric victims, fifty seven were males (50.9%) and fifty five were females (49.1%). The age range of patients was between 4 months and less than 18 years with a mean of 6.3 ± 5.7 years. There was no statistically significant difference between males and females regarding the age. Burns occurred among children younger than 5 years of age constituted 60.7% of all pediatric burn cases (n=68). Children in age groups (from 1-<2 years and from 10-< 18 years) were the highest age groups affected (25%, 25.9% respectively), while the age group from 0 to < 1 year was the least group (12.5%) (Figure 1).

Residence

Of the admitted patients (n=105), 93.8% were from rural and low social status districts in Alexandria.

Type of burn

The burns were scalds in 58.9% (n=66), dry burns in 36.6% (n=41), electrical burns in 2.7% (n=3), and chemical burns in 1.8% (n=2). There was a statistical significant association between the age and the type of burn (p= 0.003), where the majority of scald cases (77.3%) and the two chemical burn cases occurred in children younger than 5 years. Scald burn occurred in age group below 1 year constituted 18.2% of all scald cases. About half of cases (48.8%) of dry burn were in

age group from 10 to less than 18 years (adolescent age) (Table 2).

Diurnal variation and character of burn

The cases burned at night (from 7 p.m. to 7 a.m.) (n=58) outnumbered the cases burned at day time (from 7a.m to 7p.m) (n=54).

Out of 58 night cases, there were 32 patients had scalds (55.2%). All chemical and electric burned cases occurred at night. The majority of cases (89.7%) burned at night (n=52) had %TBSA burned less than 30%. The highest percentage of asking for premature discharge were among the night cases (61.3%) (Tables 3, 4, 5).

Site of burn

Burns in multiple sites could be recorded in a single case, in 80.3% of the studied patients (n=90). The most common burned site was upper limbs 60.7% (n= 68), followed by lower limbs 50.9% (n=57) and then the head and neck region which constituted 46.7% of cases (n=52). Regarding the association between the age and the distribution of burn, it was statistically significant in upper limbs (P= 0.04), gluteal region (p= 0.024), perineum (p=0.049).

The present study revealed that the highest percentage (53.3%) of cases with gluteal burn was in the age group from 10 years to < 18 years, the remaining cases were in the age group from 2 years to

5 years (46.7%). No gluteal burn was encountered in other age groups. (Figure 2)

Moreover, the highest percentage (50%) of cases with perineal burn was in the age group from 10 years to < 18 years followed by the age group from 2 years to 5 years (38.9%). No cases were encountered in age group below two years (Figure 2).

The only statistically significant association between the sex and location of burn was found at perineal region ($P=0.03$), where 72.2% of cases with perineal burn were females.

Duration of hospitalization and outcome

The mean duration of hospitalization was 14.08 ± 13.07 days (ranged from one to 60 days). Regarding the outcome among children, 55.4% of cases ($n=62$) improved, while the caretakers asked for discharge of burned children before complete recovery in 27.7% of cases ($n=31$), and the remaining 17% of cases ($n=19$) died due to multi-organ failure (63.1%) followed by Septicemia and pneumonia (36.9%). Death occurred from 1 to 37 days after admission with a mean of 6.78 ± 3.02 days.

There was a statistical significant association between the age and the outcome ($p=0.002$), where the highest percentage (32.3%) of asking for premature discharge was in the age category from 1- <2 years, followed by age group below 1 year (25.8%), while no one asked for discharge of burned children in age group between 5 years to 10 years. The highest percentage (52.6%) of dead cases was in the age group from 10 years to < 18 years. The least percentage (6.5%) of improved children was in age group below 1 year (Table 6).

There was a statistically significant association between the type of burn and the outcome ($P=0.000$), where all guardians of chemically burned children and more than one third of scald cases (34.8%) were asking for their discharge. Two thirds of electric burn cases died. Moreover, out of 19 dead children 14 had dry burn (73.6%) and 3 children had scald burn, the remaining two patients died of electric burn (Table 7).

The majority of burned cases (85.7%) had percentage total body surface area (%TBSA) burned less than 30%. There was a statistically significant association between %TBSA burned and the outcome ($p=0.000$), where all cases with %TBSA burned more than 60% and the majority of cases (77.8%) with %TBSA burned between 30-60% died. On the other hand, 5.2% of cases ($n=5$) with %TBSA burned below 30% died (Table 8).

There was also a statistically significant association between the site of burn and outcome ($P<0.05$), in head and neck, abdomen, gluteal, perineal regions. The highest percentage of dead cases were among those with burned perineum (55.5%) and gluteal burn (53.3%), followed by abdominal burn (39.5%) and then the burn at head and neck region (26.9%) (Figure 3).

No data were available about the circumstances of burn injuries, degree and specific pattern of burns.

Case report of special interest

A 3 years old malnourished girl from Ghorbal; Muharam Beck area was brought to Alexandria Main University Hospital by her mother and step-father and with alleged history of an accident. She had a spontaneous continuous crying, the patient was admitted and a full clinical examination was done for her. The patient was conscious but not cooperative as she was in an undue fear. She was pale and her Glasgow coma scale (GCS) score was 15. Pupils were regular, reactive and responding to light (RRR). Vital signs on admission were as follow: temperature 38.5° , pulse rate 130 beats per minute, blood pressure 80/60, respiratory rate 28 cycles per minute. Her weight was 14 kg.

Examination of head and neck region revealed multiple old and recent contusions in face; the largest one was about 3x1 cm in the left cheek, in addition to recent bite abrasion with contused wound in left ear pinna which was about 5x 2 cm (Figure 4). Chest examination revealed bilateral equal air entry. Multiple scars of old burns with a typical appearance of healed cigarette burns were found at the anterior chest wall on both sides. They tend to be pink in the centre with a narrow red rim (Figure 5A).

Abdomen was slightly distended and very tender with guarding due to presence of multiple septic wounds and third degree fresh cigarette burns which were red, circular, excavated, with ragged rim. In addition, multiple old cigarette burns and linear scars were detected at right side of abdomen (Figures 5B, 6A). Auscultation of Abdomen revealed normal bowel sounds.

Multiple contusions were detected in the back, the largest one was about 7x3 cm. Old adult human bite mark was also noticed on the back with a size about 5x4 cm (Figure 6B).

Multiple old contusions presented in both legs, constituted about 15% of whole leg, the largest one was about 5x3 cm. Multiple fourth-degree contact dry burns were in back of both thighs and gluteal region, the largest burn was about 10x5 cm with no affection of rectum (Figure 7). Per rectal examination (P.R.) was free with normal stool. Orthopedic examination revealed closed olecranon dislocation with olecranon fractures in both elbows in addition to edema of the elbow at the fracture site yielding under pressure. Neurological examination showed good motor and sensory power (spontaneous movement of fingers).

Thorough laboratory investigations were done: Hemoglobin level (Hb): 5.8 g/dl (N. 11.5-16 g/dl), hematocrit value (Ht): 21.3% (N. 35-45), wbc: 17.2×10^3 (N. 4-11 $\times 10^3$), blood urea: 13 mg/dl (N. 15-45), serum creatinine: 0.1 mg/dl (N. 0.6-1), blood urea nitrogen (BUN): 6 mg/dl (N. 7-18), random blood sugar (RBS): 226mg/dl. Also, the patient was subjected to a detailed radiological screening to assess the extent of injuries. Radiography of the chest was normal. Abdominal Ultrasound was done at time of admission and a minimal free intra-peritoneal fluid collection was noted in between bowel loops. Then serial ultrasound

revealed that no interval changes. Radiography of the upper limbs revealed closed olecranon dislocation with olecranon fractures in both elbows (Figures 8).

The case was diagnosed as child maltreatment as the explanations given by the caretakers did not correlate with the type or the extent of the injuries present on the child. In addition, there was a discrepancy between the history and the physical findings as injuries appeared older than the alleged history, together with presence of different types of injuries e.g. fractures and burns of different kinds. Presence of multiple lesions of different ages (recent and old) from a single cause (multiple separate

cigarette burns) also confirmed the diagnosis. The police was notified and caretakers were imprisoned for accusation of child abuse or maltreatment.

The patient was kept under close observation. Blood transfusion was done. Broad spectrum antibiotic and antipyretic were given to her together with supportive management. Open reduction by K-wire was performed under general anesthesia and closed by sutures (Figure 9). Grafts were done on burns of thighs and gluteal region by plastic surgeons. The patient was taken into custody of Resala welfare institute after 14 days of an eventful stay in the hospital.

Table (2): Distribution of pediatric burned patients according to age groups and type of burn.

Age group (year)		Type			
		Chemical	Dry	Electric	Scald
0-<1	No.	0	2	0	12
	%	0.0%	4.9%	0.0%	18.2%
1-<2	No.	1	7	1	19
	%	0.50%	17.1%	33.3%	28.8%
2-<5	No.	1	5	0	20
	%	0.50%	12.2%	0.0%	30.3%
5-<10	No.	0	7	0	8
	%	0.0%	17.1%	0.0%	12.1%
10-<18	No.	0	20	2	7
	%	0.0%	48.8%	66.7%	10.6%
Total	No.	2	41	3	66
	%	100%	100%	100%	100%

Monte Carlo test= 4.2; P=0.003*.

Table (3): Distribution of pediatric burned patients according to time of burn occurrence and type of burn.

Type of burn	Day time (n=54)		Night (n=58)		P value
	No.	%	No.	%	
Chemical	0	0.0%	2	3.4%	0.459
Dry	20	37%	21	36.2%	
Electric	0	0.0%	3	5.2%	
Scald	34	63%	32	55.2%	
Total	54	100%	58	100%	

Table (4): Distribution of pediatric burned patients according to time of burn occurrence and %TBSA burned.

%TBSA burned	Day time (n=54)		Night (n=58)		P value
	No.	%	No.	%	
< 30%	44	81.4%	52	89.7%	0.19
30-60%	5	9.3%	4	6.9%	
> 60%	5	9.3%	2	3.4%	
Total	54	100%	58	100%	

Table (5): Distribution of pediatric burned patients according to time of burn occurrence and outcome.

Outcome	Day time (n=54)		Night (n=58)		Total		P value
	No.	%	No.	No.	No.	%	
Ask for discharge	12	38.7%	19	61.3%	31	100%	0.406
Death	10	52.6%	9	47.4%	19	100%	
Improved	32	51.6%	30	48.4%	62	100%	

Table (6): Distribution of pediatric burned patients according to age groups and outcome.

Age group		Outcome		
		Ask for discharge	Death	Improved
0-<1	No.	8	2	4
	%	25.8%	10.5%	6.5%
1-<2	No.	10	2	16
	%	32.3%	10.5%	25.8%
2-<5	No.	7	4	15
	%	22.6%	21.1%	24.2%
5-<10	No.	0	1	14
	%	0.0%	5.3%	22.6%
10-<18	No.	6	10	13
	%	19.4%	52.6%	21%
Total	No.	31	19	62
	%	100%	100%	100%

Monte Carlo test= 5.45; P=0.002*

Table (7): Distribution of pediatric burned patients according to type of burn and outcome.

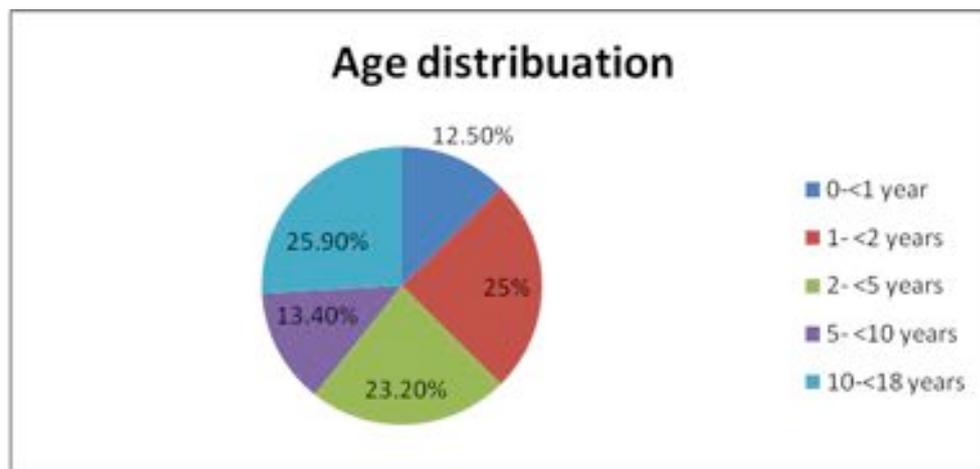
Type		Outcome			Total
		Ask for discharge	Death	Improved	
Chemical	No.	2	0	0	2
	%	100%	0.0%	0.0%	100%
Dry	No.	6	14	21	41
	%	14.6%	34.1%	51.3%	100%
Electric	No.	0	2	1	3
	%	0.0%	66.7%	33.3%	100%
Scald	No.	23	3	40	66
	%	34.8%	4.5%	60.7%	100%

Monte Carlo test= 6.235; P=0.000*

Table (8): Distribution of pediatric burned patients according to %TBSA burned and outcome.

%TBSA burned		Outcome			Total
		Ask for discharge	Death	Improved	
<30%	No.	31	5	60	96
	%	32.3%	5.2%	62.5%	100%
30-60%	No.	0	7	2	9
	%	0.0%	77.8%	22.2%	100%
> 60%	No.	0	7	0	7
	%	0.0%	100%	0.0%	100%

Monte Carlo test= 4.28; P=0.000*

**Figure 1: Age distribution of pediatric burns according to child level of development.**

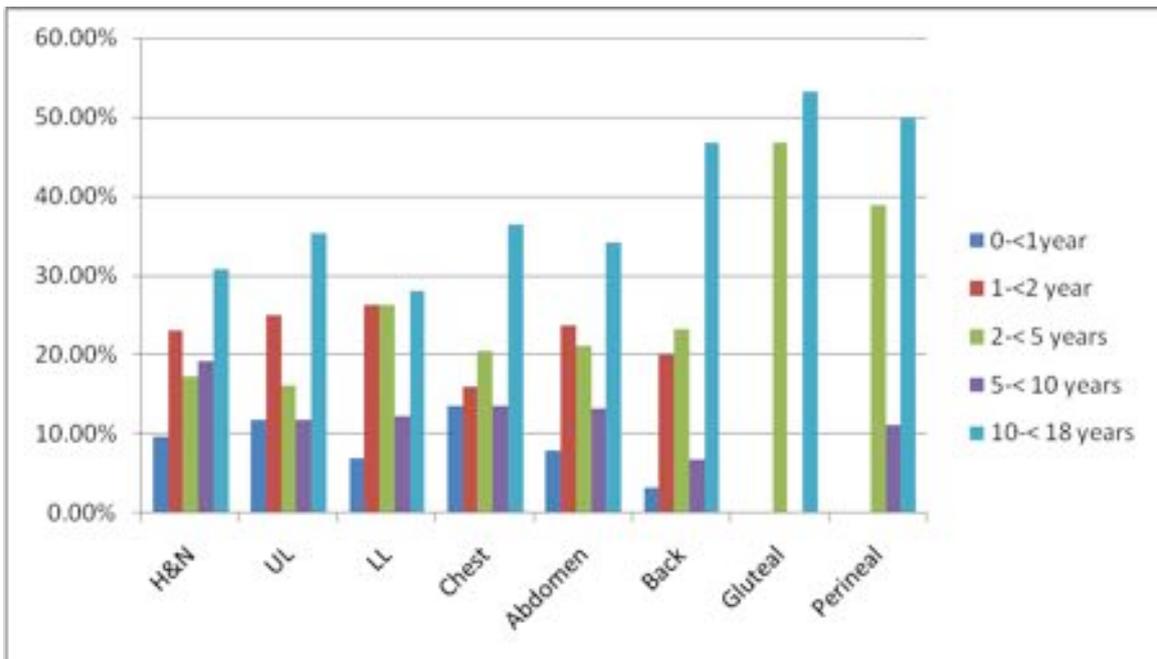


Figure (2): Distribution of pediatric burned patients according to age groups and site of burn.

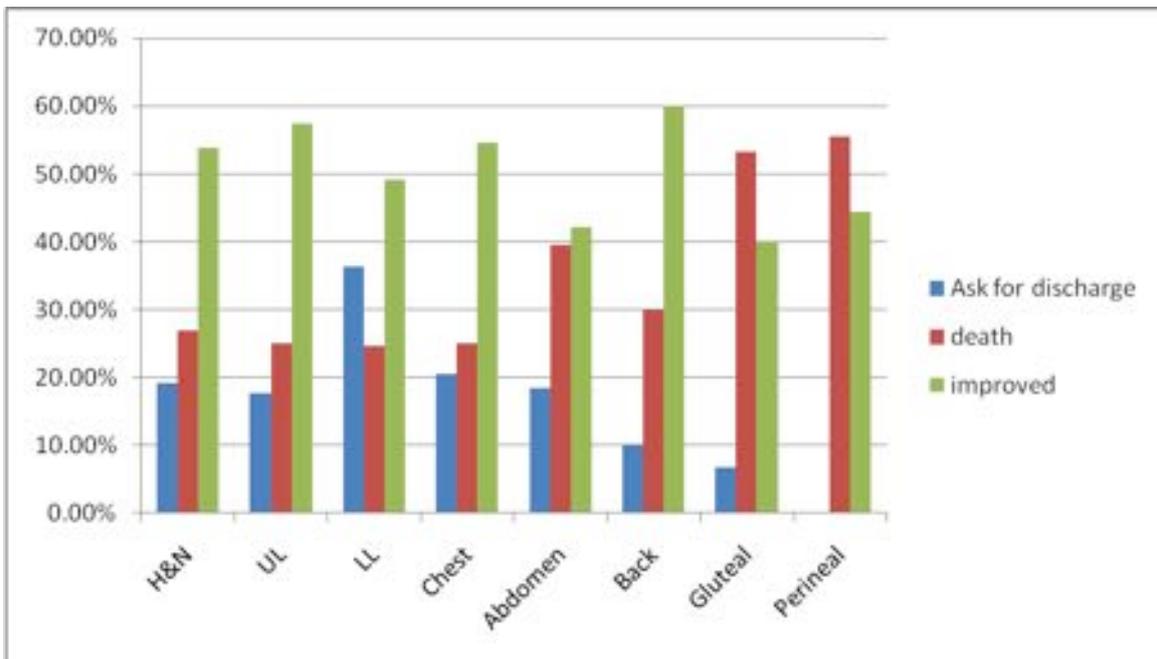


Figure (3): Distribution of pediatric burned patients according to site of burn and outcome.



Figure 4: photo of recent bloody adult human bite at the victim left ear pinna.

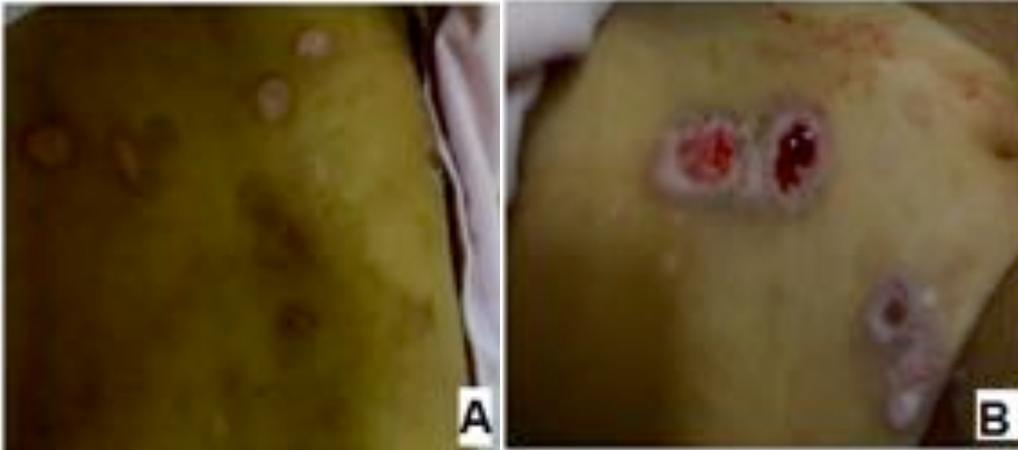


Figure 5: (A) - shows old cigarette burns and old scars at anterior chest wall on both sides. (B) - shows recent cigarette burns with bloody surface present at anterior abdominal wall area.

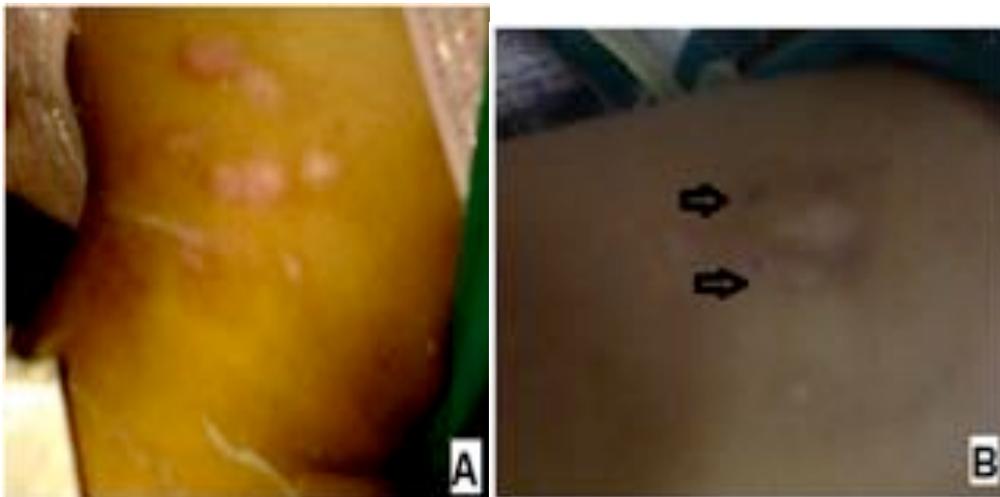


Figure 6: (A) - shows old cigarette burns and linear scars at right abdomen and pelvic regions. (B) - shows old adult human bite at the victim back with imprints of canines.



Figure 7: photo of recent burns (fourth degree) occurred by application of hot iron at gluteal region on both sides.



Figure 8: - Photo of X-ray (lateral view) on right and left elbow regions showing closed olecranon dislocation with olecranon fractures in both elbows and reduction by k- wire.



Figure 9: Photo of the victim while receiving medical treatment.

Discussion

Burn injuries are associated with significant morbidity and mortality, particularly in children under the age of four years (Rayner and Prentice, 2011). Child maltreatment by burning is often unrecognized. Approximately 10% of child maltreatment cases involve burning, and up to 20% of paediatric burn admissions involve abuse or neglect (Ruth, 2003). In an analysis of pediatric burn in India, 10.73% of burn injuries were found to be secondary to maltreatment. Most of the injuries were caused by scalding. On the other hand (37.07%) were due to neglect, while 52.2 % were accidental (Mathangi et al., 2010).

According to the "World report on violence and health" by WHO among children in Egypt, 37% reported being beaten or tied up by their parents, 26% of them were reported as physical injuries such as fractures, loss of consciousness or permanent disability (Youssef et al., 1998). Studies done among students

from Egypt reported that the most prevalent type of maltreatment was physical abuse (Hanaa, 2004).

In the present study, children aged below 5 years were most commonly affected by burn. This was consistent with global studies and could be attributable to children's impulsiveness, lack of awareness, natural curiosity and may be due to deficient caregivers' supervision (Akerlund et al., 2007, Mashreky et al., 2008; Balseven-Odabasi et al., 2009)

The present work showed that most of the admitted patients were from rural and low social status areas. Children may be left unsupervised or in the care of other children. Other factors include using the same area for both cooking and sleeping. Unstable pots and stoves, cooking over low stoves, consuming foods while sitting on the floor; and transporting hot liquids in buckets and pots. Moreover, the use of candles and

small kerosene stoves resulted in burns in many rural areas (Rayner and Prentice, 2011).

In the current work, the majority of scald cases (77.3%) were in children under 5 years of age. Presumably care givers were responsible for scalds in these age groups either due to neglect of supervision and protection or may be intentional burn, especially which 18.2% of scald cases occurred at age group below one year since infants generally did not walk. About half of cases of dry burn was in adolescent age (10-<18 years) as older children were more likely to receive burns from flame injuries (Mukerji and Chamania, 2001). This is supported by an Australian study, which identified that 95% of flammable liquid burns occurred in young adolescent males (Henderson, 2003).

Young and Hyden (2003) recorded that about 5-10% of pediatric patients admitted to a burn center are the result of child maltreatment. The two important questions in evaluating the possibility of maltreatment are:

- Is the pattern of burn consistent with the history or is it a fabricated history?
- Is the burn consistent with child level of development?

It is important to note the developmental capabilities of the child and his measured "**reach**" potential (i.e. length including outstretched arm) in order to properly assess the history in relationship to the injury.

Seifert et al., (2010) stated that up to 22% of child maltreatment cases involve intentional burns or scalds. Unintentional scalds generally occur from hot liquid spills to the upper body with the wound displaying irregular margins and depth. This liquid cools as it runs down the body, causing less deep burns the further it drips. It also causes an "**arrow pattern**" as the liquid comes to a point. Conversely, intentional scalds generally presented as immersion injuries from hot tap water to the extremities, or buttocks and perineum. Intentional scalds appear more symmetrical, with delineated upper margins with the child having old fractures and unrelated injuries (Maguire et al., 2008).

Circumferential immersion burns of hands or feet produce a stocking or glove like bilateral distribution (mirror image burns), which are indicative of maltreatment. Other attributers of abuse burns from submersion are a sharp line of demarcation between the burn and unburned tissue, as well as sparing of flexion creases (Tikkanen, 2010).

The classical **Donut sign** on the buttocks is indicative of maltreatment. But its absence doesn't rule-out abuse. It represents the sitting area of the buttocks being hold against the cooler surface of the bottom of the tub; whereas, areas of the skin that are exposed to the scalding water form a circle around the unburned skin (Young and Hyden, 2003).

If child is submerged in hot water with his clothes on, a **zebra-like pattern** can be seen. This results from burns to areas where the cloth is in contact with the skin, and sparing of areas where the cloth is absent (Tikkanen, 2010).

Chemical burns in the present study may be due to exposure to caustic cleaners. These cases as well as cases of electric burns reflect parental neglect and lack of necessary protection. (Young and Hyden, 2003) stated that neglect is properly the most common reason for unintentional and intentional child poisonings and that the caustic burn mostly occurred as child is left unattended. Child neglect can be noted by reviewing child immunizations to ascertain whether the child is up to date or by noticing evidence of substandard nutrition or growth impairment as well as lack of proper hygiene.

A significant number of cases burned at night even outnumbered the cases burned at day time in the present work. On the contrary, burns peaked during the day in many nations as Taiwan, China and Czech Republic (Lin et al., 2005; Kai Yang et al., 2008; Celko et al., 2009), which is more logic due to increased activities at daytime. This, in addition to increased percentage of guardians asking for premature discharge in night cases (61.3%) raised a question about the circumstances of night burns in the present study.

In the current study, the most common site burned was upper limb, followed by lower limb and then the head and neck region. The highest percentage of cases with upper limb and head burns were under 5 years of age. This could be explained by the natural curiosity of the children exploring their surroundings through pulling, touching and grabbing objects, but also may be caused by intentional maltreatment especially in extremities. Rayner and Prentice (2011) stated that in toddlers, the upper part of the body was the most frequently burned area.

The highest percentages of cases with gluteal and perineal burns were in the age groups (10-<18) and (2-5) years. Furthermore, the only statistical significant association between the sex and location of burn was found at perineal region, where 72.2% of cases with perineal burn were females. Young and Hyden (2003) stated that when immersion burns are present involving the genitalia, the question of sexual abuse must be investigated. Burns due to contact with hot objects like the tips of lighted cigarettes were usually seen in adolescent girls subjected to sexual abuse (Mathangi et al., 2010). The high percentages in age group from 2-5 years in suspected cases of maltreatment could be explained by toilet training period.

The caretakers asked for discharge of burned children before complete recovery in 27.7% of cases. This could be attributed to financial reasons, lack of awareness, neglect or even to avoid attention of the authorities to actual physical or sexual abuse.

In the current study more than half of prematurely discharged cases were below two years of

age. If parents ask for discharge of a burned child before complete cure, the permission from the burn unit should depend on the medical condition, hemodynamic stability of the child and the ability of the parents to follow medical instructions. A follow up by child protective services is mandatory.

There was a statistically significant association between the type of burn and the outcome ($P= 0.000$), where 14 out of 19 dead children had dry burns. This could be explained by higher degree of penetration and spread of flame burn than other types (Rafii et al., 2012).

In the present work, 26.3% of cases with %TBSA burned below 30% died because children have a larger body surface area in relation to body mass than adults. Also, children have thinner skin than adults so that, the same amount of heat will cause a deeper or the same degree of burn in less time in a child (Tikkanen, 2010).

It was found in the present case study that the history given by the caretakers didn't correlate with the type, extent and age of injuries present on the child. Trials to get any history from the child failed as she was in almost panic state with continuous crying. Pressel (2000) stated that history that is inconsistent with the patient's injuries is the hallmark of physical abuse.

The multiplicity of injuries found in this case suggests that they were not accidental, but a planned form of aggression. For example, contusions present in the victim's face, back and both legs were of different ages and in unusual sites. The areas that are bruised commonly during the course of play include the bony edges of the body, such as knees, elbows, forearms, or eyebrows. Whereas, the soft tissue areas, such as face, ears, cheeks, neck, anterior abdomen, buttocks, and thighs, are not normally injured during play. Additionally, patterned bruises e.g. by hand or a belt buckle should be viewed as suspicious for child maltreatment (Pressel, 2000; Shepherd, 2003; Cage and Salus, 2010).

Old human bite present in the studied case appeared as oval or horseshoe-shaped mark in which tooth impressions could be defined. The distance between the canines (the third tooth on each side) was greater than 3 centimeters, so the bite was most likely an adult bite. In addition, a recent bloody adult human bite was present at left ear pinna. Cage and Salus (2010) stated that when an adult bites a child sufficiently hard to leave a mark, it is considered as an assault and a sign of serious danger to a child. An adult bite on a child is the only physical injury where there is the potential to identify exactly who has attacked the child as each individual has a characteristic bite pattern.

Multiple separate burns of different ages and from a single cause (cigarettes) were detected on the chest and abdomen of this case and this confirmed the diagnosis of maltreatment. (Shepherd, 2003) stated that

a single scar left by a cigarette burn is non-specific, but multiple round scars on the body in association with other marks of different chronological ages can be diagnostic.

Multiple fourth degree contact dry burns were found in back of both thighs and gluteal region of the case study. These burns may be produced in these unlikely sites either by putting the child on hot object or application of hot iron at these areas which may be concluded from the elliptical shape of the thigh burn in this case. Inflicted burns often leave characteristic patterns and are usually much deeper and well defined than accidental one (Tikkanen, 2010).

Orthopedic examination of the case revealed closed olecranon dislocation with olecranon fractures in both elbows. These symmetrical multiple fractures may be indicative of physical maltreatment as similarly reported by Cage and Salus, 2010.

In addition to the physical lesions, gross psychiatric damage is commonly present in cases of child maltreatment, which will require careful and prolonged therapy by experts. This was noticed in this case study, where in spite of being fasting for the purpose of grafting operation, she refused food offered by a man, while she accepted feeding by female nurses. Moreover, the patient entered into panic attacks several times per day.

The Pediatric Trauma Score (PTS) was a reliable predictor of severity and outcome in the present case (Haller, 1983). Here, the patient had a score of 8. A follow up study reported a $PTS \leq 8$ as an indicator of increased risk of mortality (Tepas et al., 1988).

The problem faced in this case was from whom we would take the consent before managing the patient? As she was a minor and due to absence of the child's caretakers because of their imprisonment (being accused of child maltreatment) and lack of substituted guardians, all resident physicians were afraid of responsibility of using anesthesia and performing the plastic surgery without consent. This increased the patient suffering and delayed the necessary care to be introduced to her. This weak anemic girl was fasting for more than nineteen hours (from 11 p.m. to 6.30 p.m. on the next day), waiting for operation and no one can help her till the chief resident physician took the responsibility to sign the consent.

Could the refusal of those resident physicians (anesthesiologist and plastic surgeon) be considered as a malpractice or not? The burn was fourth degree dry burn and all physicians confirmed that it would never heal without grafting. Moreover, the victim was still wearing napkins, so this delay in managing this napkin area till the seventh day of admission exposed the burned area to sepsis and aggravated the leucocytosis present.

Furthermore, if there was a complete consent for managing the case, it would be possible to do

gynecological examination for the girl to exclude sexual abuse and presence of genital tract infections.

In fact, even taking the consent from her caretakers if they were present is also questionable. As her caretakers were the main offenders of her maltreatment, they can refuse a proper managing of the case and can refuse gynecological examination for the girl. So, we are in need of a rapid solution for such problem.

In this case, an official approval to examination and photographing of the child injuries was obtained from the Head of the Emergency and Plastic surgery Departments and the chief resident physician of Alexandria Main University Hospital.

Absence of documentation of fresh injuries is one of the major problems faced in abuse cases. During long interval, between the infliction of the injuries and date of examination, the normal healing processes will occur and many acute injuries will disappear completely, while others will remain as vague scars. It requires very careful examination combined with experience to detect and interpret such old lesions (Shepherd, 2003).

This problem was also encountered in this case, where the legal authorities didn't request for a forensic medical examiner to attend the case till the victim left the hospital. This means that the medicolegist will depend on the primary medicolegal report written by a housekeeper in the hospital, which contained misleading data regarding the type and size of lesions. This in turn gave a false anticipation of the instrument used. For example; adult bite in left victim ear pinna was recorded as septic contused wound only and the fourth degree dry burn in the gluteal region was recorded as contused wound.

Conclusively, this study highlights the importance of proper management and recording of cases of pediatric burns or trauma in general especially on suspicion of child maltreatment. As, it is crucial to document burn depth or degree, the time between the incident and admission for treatment, any inconsistencies in history given by parents and the child, and any unexplained history, previous or co-existent injuries as well as specific burn patterns.

Lack of appropriate parental competency, cause of asking for premature discharge, unwillingness to take responsibility for the child's post burn care and evidence of frank neglect should also be recorded by the physician, and entered into the Burns Units' database.

Recommendations

- Physician without the necessary knowledge and skills needs to seek and follow an algorithm or checklist for use in suspected cases of maltreatment. From this comes the topic of "Pediatric Forensic Examination" for undergraduate training.

- Rapid diagnosis should be done by a forensic medical examiner before the insults become ill-defined or disappear.
- Forensic medical department should revise all trauma reports to be sure that they are correct.
- Physicians should notify the law offices of injury to children caused by any non-accidental mechanism including neglect.
- Pattern injury recognition, interpretation of injuries, documentation of the history and the injuries (including photography), reporting requirements, and regulations are all vital components of a forensic evaluation.
- Multiplicity of injuries among children should be considered as non-accidental till proved otherwise.
- Rapid solution of the problem of consent in child maltreatment cases respecting their human rights.
- Law enforcement approach to be thought as a preventive measure of further maltreatment to other sibling or repetition in the same victim.
- Instituting centers for rehabilitation including psychologically maltreated children.
- Economic support of financially distressed families and training programs on sound parenting skills.

Summary of the case study

The case study can be summarized in the following lines:

- I am Eman
- I become a group of wounds either healed or still bloody
- I hate all men, as I hate scars in my body
- I ask: where I live? At my home or in custody!
- I have a painful sad life, really, it became muddy
- I am not just a story or a report or a case study
- I am a message sent to all of you to put an end to this tragedy
- I want to inflict the same wounds on this man. I am ready and I think I am not greedy.

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الملخص العربي

مشكلة طبية شرعية لإساءة معاملة طفلة بين حالات الأطفال الذين أدخلوا وحدة الحروق بالمستشفى الرئيسي الجامعي بالإسكندرية

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تعد إساءة معاملة الأطفال مشكلة صحية عامة ويعتبر العنف و الإصابات تهديدات خطيرة لصحة وسلامة الأطفال حيث أنهم معرضين للعجز أو حتى الموت نتيجة هذه الإصابات. التضحية بالطفولة لها تأثيرات سلبية على المدى الطويل مثل الأداء الدراسي المنخفض، وأن يصبحوا أكثر عرضة للانتحار، الخوف من الجنس الآخر واكتساب سلوك عدواني. إساءة معاملة الأطفال بواسطة الحرق تعد وسيلة شائعة للاعتداء ربما من الصعب إثباتها.

كان الهدف من البحث إلقاء الضوء على مشكلة إصابات الحروق للأطفال، ودراسة حالات الحروق المسجلة لمعرفة هل البيانات المسجلة كافية لتشخيص إساءة معاملة الأطفال أم لا. و أيضا فحص حالة إساءة معاملة طفلة حديثا والمشاكل الطبية الشرعية المعقدة التي تؤثر على إدارة مثل ذلك الحالات.

وقد تمت الدراسة بتحليل ملفات 112 حالة من الأطفال المصابون بحروق من بين 229 حالة إصابة بالحروق أدخلت لوحدة الحروق بالمستشفى الرئيسي الجامعي بالإسكندرية في فترة ستة أشهر من يناير حتى يوليو 2013. أظهرت النتائج أن الحروق السلفية كانت أكثر أنواع الحروق شيوعا في الأطفال تحت 5 سنوات. وأن معظم حالات الحروق بمنطقة العجان كانت في الإناث. كما وجد أن فشل أعضاء متعددة تسبب في وفاة 63.1% من الحالات. وقد تبين أن السجلات لا تعطي أي بيانات عن ملابس الإصابات بالحروق، لذا من الصعب كشف حالات إساءة معاملة الأطفال بالرغم من وجود أدلة كثيرة في الملفات من الممكن أن تشير إلى هذا التشخيص.

تضمنت الدراسة الكشف على حالة من الإيذاء الشديد لطفلة، وفحصها و أيضا متابعتها حتى خروجها من المستشفى. ولأنها قاصر و أولياء أمرها كانوا المذنبين الرئيسيين فالسؤال هنا ممن نأخذ الموافقة قبل إجراء التخدير والجراحة؟ ذلك خلق مشاكل جراحية و طبية شرعية في إدارة هذه الحالة.

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