A RARE MODE OF ELECTRIC BURNS - FLYING KITES

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ABSTRACT

BACKGROUND

The purpose of this work is to present accidental electrical burns while flying kites, a rare mode of burns.

MATERIALS AND METHODS

A retrospective study of 32 cases of electrical burns while flying kites, a rare mode of burn injury during 2008 - 2012. The study includes incidence, distribution of age, sex, pattern of burn injury, complications, treatment modalities (reconstruction and rehabilitation), outcome of patients and preventive measures.

RESULTS

14% of electrical burns are during flying kites, age group is from 10 to 25 years, both boys and girls are present. Burn size ranges from 9% - 66% TBSA, 90.7% patients survived, 31.3% needed amputations, 53% developed post burn sequelae, 9.3% was the mortality rate.

CONCLUSION

It is preventable cause of burns. Preventive measures and educational reinforcement should be undertaken to reduce electrical burns due to kite flying.

KEYWORDS

Electrical Burns, Kite Burns, Manja, Lund and Browder's Chart, Parkland Formula, Myo/Haemoglobinuria, Fasciotomy, Amputations, Septicaemia.

HOW TO CITE THIS ARTICLE: Bhushan BR. A rare mode of electric burns - flying kites. J. Evolution Med. Dent. Sci. 2016;5(102): 7474-7477, DOI: 10.14260/jemds/2016/1692

BACKGROUND

Kite flying is a popular sport in children and young adults all over the world. It is a traditional recreation and is celebrated as Basant festival at the start of spring season in the months of January, February and March. Previously, kite string which was made with three to nine layers of variously treated cotton thread was used. But in the recent past, string¹ was made up of metallic, chemical and glass powder coated string (Manja).² Use of that string turned the simple traditional fun of kite flying into deadlier game. Kite flying³ is a high-risk activity. Numerous electrical injuries related to kite flying³ are fatal. Most of injuries are burns. Head injuries, fractures and sometimes penetrating injuries.

Aim

To study "The rare and dangerous mode of electrical burns due to flying kites."

MATERIALS AND METHODS

This is a study of 32 patients with electrical burns due to kite flying that was conducted in Osmania General Hospital, in Department of Plastic Surgery from January 2008 to December 2012.

Financial or Other, Competing Interest: None.

Submission 15-11-2016, Peer Review 29-11-2016,

Acceptance 15-12-2016, Published 22-12-2016.

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DOI: 10.14260/jemds/2016/1692

- Burnt surface area was assessed using Lund and Browder's chart.
- Distribution of Age, Sex, Incidence, Management and outcome of the patient and emphasis on preventive aspects of the burns due to flying kites are evaluated.
- On arrival, the patients were resuscitated and investigated for all other associated injuries.
- Resuscitation began with intravenous fluids according to the Parkland formula,⁴ using isotonic solution.
- In the absence of myo/haemoglobinuria, urine output is maintained at 30 - 50 mL/hr (Adults) and 0.5 - 1 mL/kg/hr (Children).
- If myo/haemoglobinuria, fluid administered at a rate sufficient to grossly clear the urine pigment.
- The urine was examined for myoglobinuria, which was treated upon diagnosis with mannitol and alkalinisation of the urine.
- The patients were monitored closely for vital signs, central venous pressure and urine output.
- Daily blood investigations for Packed Cell Volume (PCV) and electrolyte disturbances were performed.
- Antibiotics were not used unless there was evidence of systemic infection or infection on tissue culture.
- The burn was dressed daily with a topical antibiotic agent: silver sulphadiazine.
- Fasciotomy/escharotomy⁵ was performed in cases with suspected compartment syndrome.
- The early debridement of devitalised tissue done.
- When the limbs were completely severed, amputations were performed as soon as possible to prevent sepsis.
- When the burn area bed was clean with good granulation tissue, Split Thickness Skin Graft (STSG) was used to cover the burn area.
- The patients were followed up until free of complaints.

Cause of Burns and Role of Manja in Burns during Flying Kites

Manja² is not the whole cause of burns during flying kites.

- Besides glass powder and glue, metallic powder like iron/metal dust is also used to coat the manja which conducts heat.
- Trying to retrieve kite when entangled to high tension electric wires by children may cause arc burns.
- Accidental ignition of clothing due to flash of electric current causes burns.
- Sometimes, due to use of metal rods to retrieve kites from electric poles causes contact⁶ burns.

Inclusion Criteria

Electrical burns due to flying kites of all ages and both sex.

Exclusion Criteria

Electrical burns due to other modes and other type of burns.

No. of Kite Burns	32
Type of electrical current	High voltage current
Age distribution	10 - 25 yrs.
Sex distribution	30 male, 2 females
TBSA burned	9% - 66%

Table 1. Demographic Data

Graph 1

Graph 2

TBSA %	No. of Patients
< 30%	18 (56.2%)
30 - 49%	8 (25%)
> 50%	6 (18.8%)

Table 2. Total Burn Surface Area

The total burn surface ranges from 9% - 66%. Body surface areas involved are -

- 30 patients got upper limb burns.
- 32 patients got lower limb burns.
- 26 patients got facial burns.
- 24 patients got anterior chest wall burns.

Graph 3

Graph 4

Area Burnt	No. of Patients Affected (%)
Face	26 (81%)
Upper limbs	30 (94%)
Lower limbs	32 (100%)
Anterior trunk	24 (75%)

Table 3. Site of Burn

RESULTS

- Most of them are affected by high voltage current burns.
- 30 patients are male patients and 2 female patients.
- Age of the patients with electrical burns associated with flying kites ranges between 10 – 25 yrs.
- Mode of burns: Flash type of burns in 24 patients
 - Arc burns in 2 patients
 - Contact burns in 6 patients
- Escharotomy was done in 20 patients.
- Fasciotomy in 6 patients.
- 10 patients got gangrenous limbs and amputations were done.

Amputation	Unilateral	Bilateral
Lower limb	4	0
Upper limb	5	1

- Raw areas were skin grafted.
- Soft tissue defects with exposed vital structures are covered with flaps (groin/abdominal).
- 17 (53%) patients with post burn sequelae like hypertrophic scars, keloids and contractures of joints.
- Contractures of joints released and grafted after six months from period of burns and maintained with splints.
- 3 (9.3%) patients died.
- The main cause of death was upper gastrointestinal bleeding in one patient and septicaemia in two patients.
- 29 (90.7%) patients recovered and discharged, attending outpatient department for rehabilitation.
- Average hospital stay ranged from 10 - 60 days.
- Patients were followed over a period of 6 months to 1 year.

Figure 1 **Figure 2** **Figure 3** **Figure 4** **Figure 5**

DISCUSSION

Electrical burns related to flying kites formed 14% in our hospital. As an electrical burn is mostly due to high tension currents, rate of morbidity and mortality is significantly higher.

A high amperage (the actual amount of current that passes through the tissues) produces severe tissue necrosis. Prolonged contact can cause sufficient injury to require amputation.

All patients in this study are children and young adults. Burns are either flash type or contact burns while trying to retrieve kites from high tension wires.

All burns related to flying kites were admitted. Percentages calculated using Lund and Browder's chart. Initial resuscitation along with monitoring vitals done. EKG/cardiac monitoring⁵ are routinely done.

Following stabilisation of the patient, early coverage of wound with collagen was done in first and second degree burns. Early intervention with escharotomy or fasciotomy decreased rate of amputation.

Aggressive debridement and amputation of necrotic limbs were done. In our series, ten limbs were amputated.

Where there is uncertainty of tissue viability, second look debridement⁷ undertaken before wound coverage with skin grafting or flaps. Contractures were released. Physiotherapy and rehabilitation⁸ were undertaken to improve long-term prognosis.

Reconstruction and Rehabilitation

For defects of hand and forearm groin flaps are used; amputations are done with an objective of stable covered stump, which allows early fitting and adoption of prosthetic device.

Rehabilitation

Should be preventive and therapeutic. It should include Pain management, early wound coverage,⁹ positioning, splintage and exercises (range of motion and ambulation). Massages, moisturising creams and pressure garments given for scar management.

CONCLUSION

- Most of the electrical burns due to flying kites are preventable with proper education and knowledge.
- As all patients are children and young individuals, there is a great challenge in management of both in the acute stage and throughout the rehabilitation period.
- Preventive measures and proper educational reinforcement reduces the kite burns.

Preventive Measures

- Choosing a safe location (such as an open beach or field with a diameter of at least 100 meters).
- Keeping a safe distance from telephone lines, electricity cables, trees, roads, cars, people and animals.
- Participants should wear gloves while flying a kite. The use of glass and glue increases the potential cutting surface of the string, turning a simple game into a deadly activity.
- Recently, regional laws that prohibit the preparation and sale of manja have been approved.
- The implementation of Sao Paulo State law 12,192 has reduced the number of injuries related to kite flying in the metropolitan area.
- Punjab Government has promulgated, Punjab prohibition of kite flying (Amendment) ordinance 2006.
- Under this ordinance, no person would be allowed to manufacture, sell or offer for sale of Manja.
- Violators of the ordinance would be liable to imprisonment for 3 years or to a fine of Rs. 40000/- or both.

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