



Plastic Surgery

A STUDY OF PEDIATRIC ELECTRICAL BURNS IN A TERTIARY BURN CARE CENTRE

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ABSTRACT **Background:** Electrical burns are known cause of morbidity and mortality in a burn unit. Burn in Pediatric age group is more traumatic, as the deformity they cause has lifelong consequences. This article is to analyze the source of electrical burn injuries that were managed in a tertiary burn care Centre and the procedures that were done and the outcome of the treatment for these victims.

Methods: All the pediatric patients who were admitted in the burns unit of Government Kilpauk Medical College Hospital, Chennai, in 2015 were analyzed. The electrical burn victims of pediatric age group were analyzed for the type of electrical burn- high voltage, low voltage contact or flash burn, BSA, age, sex, body areas involved and the outcome.

Results: Total admissions in burns unit from 1.01.2015 to 31.12.2015 were 1806. Out of this, 313 were in the pediatric age group. In the study period the total number of electrical burns was 78. Among these, 19 were in the pediatric age group.

Conclusions: Though electrical burns are of lesser incidence in the pediatric age group, compared to scalds and flame burns, there is a relative rise in the occurrence of electrical injuries in the pediatric age group. Hence it requires creation of awareness and strict implementation of safety norms for prevention.

KEYWORDS : Pediatric Burns, Electrical burns, Burns, electrical burns in children

Introduction

Electricity forms an integral part of civilization. Electrical and electronic gadgets are freely available and are extensively used by all age groups. Electricity is widely used to supply power to all the appliances. India is a rapidly developing country, with many of the rural areas rapidly adapting themselves to the modern gadgets like their urban counterparts. Cities are flooded with migrants from rural areas, who live in the crowded areas of cities. They set up their houses or rent houses, which either encroach on public roads or in unauthorized public areas. Crowded lanes and unauthorized building extensions result in people living in close proximity to electrical power supply lines. Children become victims of electrical burns when they come in contact with the electrical lines. Government Kilpauk medical college hospital has a tertiary burn care centre and hence a large number of pediatric burn patients are managed here. This study analyses the source of electrical burn, BSA affected, age, sex, body areas affected, outcome, and various surgeries that have been performed and its outcome.

Methods

All the pediatric patients who were admitted in the burns unit of Government Kilpauk Medical College Hospital, Chennai, from 1 January 2015 to 31 December 2015 were retrospectively analyzed. The electrical burn victims of pediatric age group were analyzed for the type of electrical burn- high voltage, low voltage contact or flash burn, BSA, age, sex, body areas involved and the outcome. Patients who had surgical procedures were followed up for two years to assess the outcome of the procedures.

Results

Total admissions in burns unit from 1.01.2015 to 31.12.2015 were 1806. Out of this, 313 were in the pediatric age group.

In the study period the total number of electrical burns was 78. Among these, 19 were in the pediatric age group (**Fig 1**). Among the 19 pediatric electrical burn patients, 11 were discharged and 8 died.

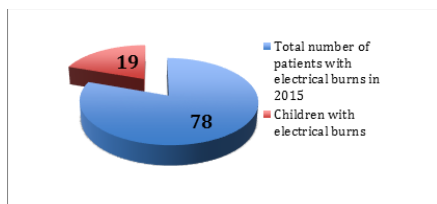


Fig 1: Number of pediatric patients with electrical burns

Among the 331 pediatric admissions, 212 were discharged after successful management of their burns.

Hospital stay varied from 1 day to 56 days. Hospital stay was related to the depth of burns and the voltage of current that caused electrical burns. Most deaths in major electrical burns happened within twenty four hours. Males affected were 16. Female electrical burn victims were 03. Youngest age of electrical burn was 1 year. 3 children were less than 2 years old, 4 were in 6 to 10 years and 12 were in 11 to 18 years group. Distribution of BSA affected was <10% in 4 patients, 11-20% BSA in 2, 21-30% BSA in 5 and >40% BSA in 8. Considering the place of electrical burns occurrence - 5 children were affected in their houses and 14 outside the home. Low voltage current was the cause of burns in the children who suffered electrical burns inside their houses.

The commonest source of electrical burn was due to electrical connection of iron box or pump motor. Children, who sustained electrical burns outside their houses, had come in contact with high tension power supply line in the transformer, overhead electrical cables and in work spot which deals with high voltage machineries. Lorry top, tree branches and farm fences were also areas where these children stood when they came in contact with high tension lines. Most of these patients had involvement of upper limbs, trunk and head. Only few had lower limb involvement. All high voltage burns had involvement of upper limb.

Associated injuries were head injury, crush injuries and lacerations. Surgical intervention was required for head injuries. Suturing of lacerations, craniotomy for intra cerebral bleeding, fasciotomy, amputation of gangrenous limbs, skin grafting and flap cover for the raw areas were the surgical procedures that were carried out. Number of surgeries varied from 2 to 6 in each patient.

Scalds are the commonest cause of pediatric burns. [6]. The incidence of electrical burns in the pediatric age group is mainly due to the household electrical appliances [7] Our centre had 331 pediatric burn admissions in the study period of one year. Out of these admissions 19 were due to electrical injury which is 5.74% of pediatric burns.

The total number of electrical burns admitted in 2015 was 78. Out of

the 78 electrical burns, 19 were in the pediatric age group amounting to 25% of admissions due to electrical burns. The number of children sustaining electrical burn indicates the importance of proper monitoring of the electrical sources, which are a constant threat to the children.

Age distribution: Children between 11 to 18 years of age who sustained electrical burns were 12 (Fig 2). In the 6 to 10 year age group 4 were admitted. The rest of the 3 pediatric burn admissions were in less than 2 years old. This pattern clearly highlights the danger of close proximity of electrical connections to residential areas.

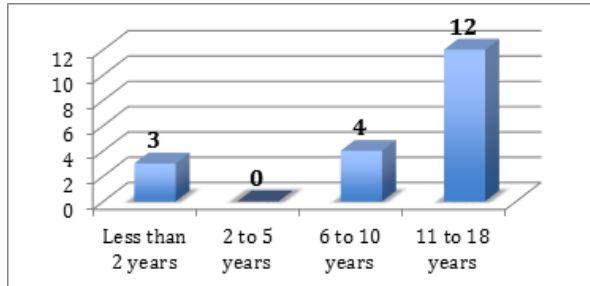


Fig 2: Age distribution of pediatric electrical burns

Sex distribution: Male children were predominantly affected by electrical burns. There were 16 males and only 3 females in the study group. *Arasali Yilmay* has observed that males were more exposed to such accidents because of the increased levels of testosterone in their bodies, which makes them explore more of the dangerous activities.³

BSA: BSA involved in the > 40% group had 8 children affected who were the maximum affected (Fig 3). They all had high voltage electrical burn. < 10% BSA involvement was in 4 children, 11 to 20% BSA burn in 2 to 21 and 30% BSA in 5 children. All burns were deep burns and all survivors needed surgical management to heal the wounds.

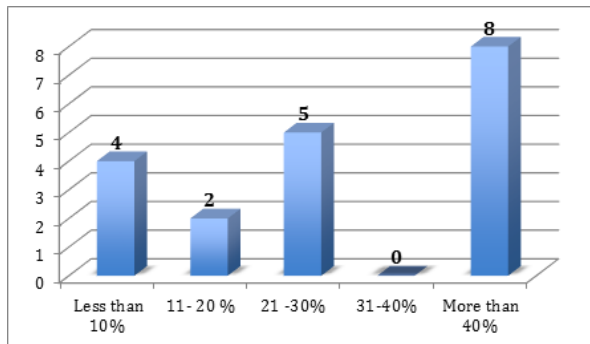


Fig 3: % BSA of the pediatric electrical Burns

Outcome: 25% of electrical burns were in the pediatric age group. Among the 331 admissions 212 were discharged after successful treatment of their burns. Discharge rate was 64.04% in the pediatric age group. Among the 19 electrical burns admitted in the pediatric age group 8 died amounting to 42% mortality, in contrast to the general pediatric mortality due to burns, which was 36%. Mortality was higher when BSA% involvement was more.

Hospital stay: Duration of hospital stay varied from 1 day to 56 days. Hospital stay was related to the depth and BSA involved. Children who sustained higher BSA burns died in a short duration. Children with lesser BSA % deep burn had the longest hospital stay. That was due to the multiple stages of surgery that were required to manage the burn wounds. Most of the children who expired died in less than 24 hours. Mean hospital stay in Welch centre was 17 days⁶.

Voltage: High voltage electrical burns occurred in 14 children in open areas but all were in close proximity to the house or in the adjoining areas. 5 children had low voltage burns and it occurred in the house. Surgical procedures:

Surgical procedures (Fig 4,5) done were fasciotomy - to improve the blood supply of the limbs, SSG and flaps - to cover the raw areas. SSG

was done after debridement of the eschar. 6 patients had SSG. 5 Children had reconstruction of hand with abdominal flaps, transposition flaps and para umbilical perforator flaps. They had 6 procedures before discharge.



Fig 4: Reconstruction of electrical burns in the hand of a child using abdominal flaps



Fig 5: Reconstruction of hand and scalp defects following electrical burns in a boy aged 12 years

Conclusion

Being devastating, leading to loss of life and limbs, electrical burns are to be prevented by proper planning of safe electrical connections. Children need proper advice and have to be taught about the dangers of electrical injuries in the early school days. Parents need to carefully monitor toddlers and avoid placement of electrical connections for motors in lower levels. Mortality is high in major burns and in high voltage burns, which are preventable. Multiple surgical procedures and flaps give a good skin cover and better outcome in electrical burn survivors.

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