

Case Series

An experience in the integrated management of paediatric burns in a tertiary care centre: a case series

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ABSTRACT

Paediatric burns are the leading cause of unintentional injuries in children. The leading cause of burns in the majority is scalds (70–85%) followed by flame burns, electrical, and chemical burns. Globally, burn injuries pose a substantial public health challenge, with a high risk of mortality and morbidity, accounting for over 310,000 annual deaths. Six patients of paediatric burn injuries admitted in our tertiary care centre were discussed as case series. All the children were managed by an integrated team of paediatrician, plastic and reconstructive surgeon, anaesthetist and physio therapist. All the children were in the age group between 2 years and 10 years. Five patients had scalds and one had electrical burns. Out of 5 scald burns three children had hot cauldron burns and two children had accidental spill burns. The hospital stay was between 12 days and 36 days. There was no mortality in this case series. Most of the paediatric burns are accidental and hence preventable. Most often it is the parent's carelessness or oversight which leads to accidental burns in children. We must ensure that not only the children survive the initial injury, but also the morbidity and complications are minimized.

Keywords: Burns, Paediatric, Integrated management, Outcome

INTRODUCTION

Paediatric burn injuries can have far-reaching physical, psychological and social consequences for both children and their families.¹ Children may experience difficulties in their daily activities and social interactions, leading to a negative impact on their overall well-being. Furthermore, families are often burdened by the emotional and financial stress associated with burn injuries.² Caregivers play a critical role in supporting the child through the recovery process and providing the necessary physical and emotional care.³

CASE SERIES

This is a case series of paediatric burns patients admitted in a tertiary care centre between June 2025 and May 2026.

Admission criteria for children with burns in PICU included: children with >10% total burns surface area (TBSA), all electric burns, features of shock, and burns requiring airway support.

All the six children admitted with burns were evaluated for area and depth of burns after eliciting thorough history. Initial airway, fluid management, pain control and wound care were taken care by a multidisciplinary team of paediatrician, plastic surgeon, anaesthetist and a physiotherapist.

Biochemical, microbiological investigations were done periodically. Wound dressing was done in a sterile environment under anaesthesia by the plastic surgeon. Both caretakers and physiotherapist ensured adequate splinting and prevention of post burn contractures.

Case 1

Eight-year-old male child admitted with hot cauldron burns involving part of face, neck, front of chest, abdomen and both upper limbs (Figure 1). He was managed by an integrated team of paediatrician, plastic and reconstructive surgeon, anaesthetist and physio therapist. Laboratory parameters including blood counts, liver, and renal function tests, blood gas analysis were done at admission and repeated at once in three days. Blood and tissue cultures revealed mixed infections and appropriate antibiotics were given. He stayed in the hospital for 18 days. Early escharotomy under anaesthesia saved him from sepsis. He is being followed up regularly.



Figure 1: Eight-year-old male child with cauldron burns.

Case 2

Three-years-old child admitted with scald due to accidental spill burn. The baby had second degree burns involving chin, neck, front of chest and both arms (Figure 2). Initial management was taken care by paediatrician and plastic surgeon. Burns resuscitation was done using Parkland formula (3 ml/kg/TBSA) for urine output optimization above 0.5 ml/kg/hour. Biochemical investigations revealed initial elevation of renal parameters and managed efficiently. Wound culture showed *Pseudomonas aeruginosa* growth and appropriate antibiotic was given. Management of the wound with Collagen was done under anaesthesia. The child had a turbulent post burn period and discharged in good condition after 20 days.



Figure 2: Three-year-old child with scalds due to accidental spill burn treated with Collagen.

Case 3

Ten-year-old male child admitted with 30 percent scalds involving face, neck, chest wall and both upper limbs (Figure 3). Initial management by paediatrician and plastic surgeon saved the patient from sepsis. Under anaesthesia collagen application was done and the wound healed without any skin graft.



Figure 3: Ten-year-old male child admitted with 30 percent scalds.

Case 4

Three-year-old child admitted with scalds in the back of chest and abdomen on the left side (Figure 4). All the biochemical and microbiological parameters were normal. The fluid and antibiotic management had been taken care by the paediatrician. Thorough wound wash was given under sedation and the escharotomy was carried out by the plastic surgeon. The child had stayed in the hospital for 12 days and discharged in good condition.



Figure 4: Three-year-old child admitted with scalds in the back of chest and abdomen.

Case 5

Two-years-old female child admitted with scalds due to accidental spill burns. She had superficial burns of face and chest (Figure 5). After initial fluid and antibiotic management child's wound healed spontaneously without any scar.

Case 6

Six-year-old male child had electrical burns following contact with a water heater coil placed in an iron tub. Initially he was treated at a local hospital and referred to

our centre after 3 days with gangrene involving right-hand, right-side chest wall, right lumbar region and right upper thigh (Figure 6). The right hand was amputated. After escharotomy the raw area was covered with split thickness skin graft. The child stayed in the hospital for 36 days.



Figure 5: Two-years-old female child admitted with scalds.



Figure 6: Six-year-old male child admitted with electrical burns.

DISCUSSION

Burn injuries are a major cause of morbidity and mortality in children. In India, the figure constitutes about one-fourth of the total burn accidents.¹ Paediatric burns management must be a major challenge for the treating unit. One has to keep in mind that “children are not merely small adults”; there are certain features in this age group that warrant special attention.² In children younger than three years, scalds are responsible for most of the burns.³ Scald burns usually occur when a child accidentally pulls the container with hot liquid onto himself. It may also result from bathtub submersion injuries usually by an unattended child. In older children, flame burns are more common. Firecracker injuries and household fires are the common aetiologic factors for these burns, which are often of full thickness. Children have nearly three times the body surface area (BSA) to body mass ratio of adults. Fluid losses are proportionately higher in children than in adults. Consequently, children have relatively greater fluid resuscitation requirements and more evaporative water loss than adults. The large BSA to body mass ratio of the child also predisposes the child to hypothermia, which must be aggressively avoided.⁴

Children younger than two years have thinner layers of skin and insulating subcutaneous tissue than older children and adults. As a result, they lose more heat and water than adults do, and they lose these more rapidly than adults. In very young children, temperature regulation is partially based on non-shivering thermogenesis, which further increases metabolic rate, oxygen consumption, and lactate production. In addition, because of disproportionately thin skin, a burn that may initially appear to be of partial thickness in a child may instead be of full thickness in depth. Thus, the child's thin skin may make initial burn depth assessment difficult.⁵

Endotracheal intubation is indicated in children with respiratory distress or airway compromise caused by airway oedema.⁶ The depth of burn is classified as superficial partial thickness, deep partial thickness and full thickness. The burn size is calculated by Lund and Browder chart by mapping the injured areas of the body on charts detailing age-appropriate measurements.

The children have a limited physiologic reserve. Thus, fluid resuscitation in a child needs to be more precise than that for an adult with similar burn. Children also require more fluid for burn shock resuscitation than adults with similar thermal injury.^{7,8}

Total requirement for first 24 hours: $2000 \text{ ml/m}^2 \text{ BSA} + 5000 \text{ ml/m}^2 \text{ body surface area burned (BSAB)}$. Half of the total fluid allowance is administered during first eight hours, the other half during the next 16 hours. The fluid generally used is Ringer lactate.^{8,9}

Infants are at risk of developing hypoglycaemia because of limited glycogen stores; therefore, glucose levels should be monitored, and Ringer lactate solution with 5% dextrose should be used for maintenance fluids. Adequacy of fluid resuscitation can be assessed by monitoring sensorium, peripheral circulation and arterial blood gas analysis. Urine output is one of the most sensitive indicators and it should be maintained at 1 ml/kg/hour .

A nasogastric tube should be placed in all children with burns more than 20% TBSA or in intubated children with burn injury. Abdominal distension caused by swallowed air from crying and intubation are extremely common in children, and the nasogastric tube commonly will decompress distension because of air in the stomach.¹⁰

Intravenous paracetamol is a good adjunct along with opioids in the acute pain management of the paediatric burn injuries,

Burn wound is sterile, so if dressed with proper aseptic precautions no antibiotic cover is required early unless wounds are grossly contaminated. Burn wounds in children can be best treated by closed dressings except burns over the face which can be left open and perineum which is only covered with topical antimicrobial agent over which a diaper may be applied. Ambient room

temperature must be kept between 28°C and 30°C. The blisters in a second-degree superficial burn should as a rule be kept intact as it is supposed to aid in early epithelialization. However, if they are too big or covering the eyes or orifices, they can be de-roofed. Devitalized skin and ruptured blisters should be debrided. Topical antibiotic therapy should be used to delay bacterial colonization. Silver sulphadiazine cream is a commonly used broad-spectrum topical antimicrobial cream. It is applied as a thin layer with gauze dressings twice a day. Ear burns should be treated with mafenide cream because of its excellent cartilage penetration properties. Full thickness circumferential burns require escharotomy to improve circulation to distal extremities. Early eschar removal is effective in decreasing morbidity and improving the mortality rate. Burn wound excision and grafting is generally undertaken around 5–7 days post-burn and 5–15% BSA is excised at a time.

CONCLUSION

In children burn injury continues to be a major epidemiologic problem. Close attention must be paid to initial evaluation and management, resuscitation, and pain control. We can continue to offer these patients an excellent chance for recovery through the use of multidisciplinary teams, burn centres, and advancement of knowledge through sustained research efforts.

Recommendations

Burns in children are common; the anaesthetist plays a key role in their management, including resuscitation, perioperative care and pain control.

A multidisciplinary team is required in every recovery stage because the treatment and care of a child with a burn injury includes the child's physical and psychological state as well as complex family and social issues.

Most of the paediatric burns are accidental and hence preventable. Most often it is the parent's carelessness or oversight which leads to accidental burns in children.

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