

Case Report

Management of 80% Flame Burns Following a Petrol Explosion in an Infant

Dr. Amila Siriwardana¹

Dr. Yulugxan T¹

¹Burns Unit, Plastic and
Reconstructive surgery
Department, Lady
Ridgeway Hospital for
Children

Abstract

Severe flame burns in infants represent one of the most challenging emergencies in pediatric surgery. The extensive surface area involved, combined with physiological vulnerability, demands rapid, coordinated, and multidisciplinary care. We report the case of a one-year and two-month-old boy who sustained 80% total body surface area (TBSA) burns following a domestic petrol explosion. Through timely fluid resuscitation, meticulous wound care, early surgical intervention, and comprehensive postoperative rehabilitation, the child achieved a favorable recovery. This case illustrates the crucial role of early excision and grafting, supported by intensive multidisciplinary management, in improving survival and functional outcomes in extensive pediatric burns. Keywords: Pediatric burns, Flame injury, Split-thickness skin graft, Burn management, Rehabilitation

Introduction

Burn injuries remain a major global health concern, particularly in the pediatric population where even minor incidents can lead to catastrophic outcomes. Infants are especially vulnerable due to their thin skin, higher body surface area-to-weight ratio, and limited physiological reserves. Large surface area burns, particularly those exceeding 70% TBSA, carry a grave prognosis. However, advancements in critical care, fluid resuscitation, surgical management, and nutritional support have significantly improved survival rates over the last few decades (Herndon et al., 2023).

Here, we present the case of a one-year and two-month-old boy who sustained extensive flame burns involving 80% of his body surface area following a petrol explosion at home. The child's survival and recovery underscore the importance of early resuscitation, timely surgical intervention, and structured rehabilitation in managing large pediatric burns.

Case Presentation

A one-year and two-month-old previously healthy male was brought to the emergency department approximately one hour after sustaining extensive flame burns during a domestic petrol explosion. On arrival, the child was in severe pain and distress, tachycardic with a heart rate of 180 beats per minute, hypotensive (70/40 mmHg), and clinically in burn shock. Roughly 80% of the total body surface area was affected, including the trunk, abdomen, perineum, and both lower limbs. The burns were deep second- and third-degree injuries, with areas of eschar formation, but there was no clinical or radiological evidence of inhalation injury.

The child was immediately transferred to the Burns Intensive Care Unit (ICU) for stabilization. The working diagnosis was 80% TBSA flame burns secondary to petrol explosion.

Initial Management

Resuscitation was initiated promptly according to the Modified Parkland Formula using Ringer's lactate solution, closely monitoring urine output to guide fluid replacement. Supplemental 5% dextrose was infused to prevent hypoglycemia, and strict input-output balance was maintained. Analgesia was provided with intravenous paracetamol and low-dose morphine, while a proton pump inhibitor was administered for gastric protection. Intravenous Cefazidime was started for infection prophylaxis.

Nutritional support was established early through a nasogastric tube, providing a high-protein, calorie-dense formula tailored to the child's metabolic needs. Daily electrolyte and acid-base monitoring guided ongoing care. By the tenth day, hemodynamic stability had been achieved, with progressive improvement in perfusion and urine output. Wound care consisted of daily saline cleansing and topical silver sulfadiazine application.

Despite the extent of burns, renal function remained stable, and metabolic acidosis resolved by day twelve, marking the transition from acute resuscitation to a recovery phase in the ICU.

Surgical Management

By the fourth week post-injury, the child's condition was stable enough to proceed with surgical management. Under general anesthesia, wide burn wound excision was performed over the abdomen and both lower limbs, extending down to healthy tissue planes. Within five days, definitive coverage was achieved with split-thickness skin grafts harvested from unaffected areas, including the upper thighs and back.

The grafts were meshed in a 1:1.5 ratio and applied over the excised surfaces. They were secured with fine staples and dressed with paraffin gauze and absorbent layers. Donor sites were covered with hydrocolloid dressings to promote epithelialization. The postoperative course was uneventful; the grafts remained healthy with approximately 90% take by the seventh postoperative week, and no infection or fluid imbalance was observed.

Postoperative Course

The child's pain was well controlled, and his nutrition was gradually transitioned from enteral to oral feeding. Intensive physiotherapy was introduced in the eighth week, focusing on limb movement and contracture prevention. By day sixty, complete graft healing was achieved, and donor sites had fully re-epithelialized.

Early hypertrophic scars began to develop over the abdomen and limbs. Scar management was initiated using silicone gel Bio-Oil, and Mometasone cream. Pressure garments were introduced for long-term scar modulation, and oral antihistamines were prescribed to control itching. Splints were applied to maintain limb extension, particularly around the knees and ankles, to prevent flexion contractures.

Throughout the recovery phase, physiotherapists worked closely with caregivers to ensure compliance with exercises and positioning, which contributed greatly to the functional outcome.

Outcome and Follow-Up

After seventy-two days of hospitalization, the child was discharged in a stable condition. All grafted areas were healthy, hemoglobin was 11.5 g/dL, and nutritional parameters were satisfactory. The family was educated on scar care, daily application of silicone-based products, and the use of pressure garments. Physiotherapy and stretching exercises were to be continued at home, with follow-up visits scheduled every two weeks.

At the three-month review, the child was thriving. The grafts were stable, scars had softened, and there was no evidence of limb contracture or functional restriction. The multidisciplinary team approach had successfully restored both form and function.

Discussion

Major pediatric burns continue to pose significant treatment challenges. Children with burns covering more than 70% TBSA face high risks of hypovolemic shock, infection, and metabolic derangement. Successful outcomes depend largely on timely fluid resuscitation, early surgical intervention, and meticulous postoperative care (Jeschke et al., 2008).

In the present case, adherence to the Parkland formula ensured adequate fluid replacement and perfusion. Early wound excision and grafting shortened the inflammatory phase and improved recovery time (Atiyeh et al., 2005). Furthermore, scar modulation with silicone gels, pressure therapy, and regular physiotherapy minimized hypertrophic scarring, a common complication in growing children (Brusselaers et al., 2020).

The success of this case underscores the value of a coordinated multidisciplinary approach, involving surgeons, anesthetists, nutritionists, physiotherapists, and nursing staff. Emotional and psychological support to the family was equally vital in facilitating adherence to care and ensuring the child's long-term recovery.

Conclusion

This case demonstrates that even in infants with extensive 80% TBSA burns, survival and meaningful recovery are possible with early intervention and cohesive multidisciplinary management. Prompt resuscitation, early excision and grafting, infection control, and long-term rehabilitation together contribute to improved survival and functional outcomes in severe pediatric burns.

References

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