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Case Report

Life threatening deep scald burns in a neonate: A rare case report

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ABSTRACT

Domestic burns in neonate are rare in literature. Neonates are high risk for burns because of their thin and fragile skin, fluid overload or dehydration as the fluid balance range is small and immature immune system leading to septicaemia. Neonates are not small adults, owing to their different physiological response makes the management of neonates challenging as the clinical signs are different from the adults and the resuscitation protocols or end points are also different. We present a case of 11 days old neonate, who sustained 51% scald burns when the hot water bag being used by her mother accidentally burst, the youngest reported case of domestic scald burns with such high percentage. The baby was managed by fluid resuscitation, antibiotics, dressings, ventilatory support for septicaemia and subsequently homograft application. The neonate was discharged with completely healed areas after 35 days of burns and is on regular follow up and no complications have been observed.

KEY WORDS

Accidental; neonate; scald burns

INTRODUCTION

The illustration of domestic neonatal accidental scald burns is rare in literature. Neonates form a high-risk age group for consideration of burns due to the rarity of the burns in this age group, thinness of the skin, immature immune system, difficulties in fluid management, the high probability of these patients to land up in septicemia, and the covert signs and symptoms that need strict vigilance, paucity of donor sites for wound coverage, and the long-term complications.

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CASE REPORT

We present a case of domestic neonatal scald burns in an 11-day-old neonate, who sustained major scald burns in her lower limbs, trunk, and both upper extremities when the hot water bag, being used by her mother for shoulder pain accidentally burst while feeding the baby [Table 1]. The child was immediately rushed to a nearby hospital where primary fluid resuscitation was provided by a pediatrician and referred to higher center for definitive management. The child arrived at our institution within 3 h of sustaining burns.

The neonate was alert and excessively crying on arrival.

Vital signs were within normal limit as determined by the neonatologist involved in management. Burn assessment for total body surface area (TBSA) was done using Lund and Browder Chart and was found to be 51%. At preliminary assessment, we found around half, that is, 50% of the involved area to be second degree superficial and rest second degree deep burns. A peripheral venous access was obtained and samples for routine blood investigation and swabs were taken. Fluid calculation was done according to Galveston's formula; dextrose containing solutions were added to the regimen as per the need. The target urine output of 1.5-2 mL/kg/h was strictly monitored and fluid adjustments made accordingly. For prevention of hypothermia, the neonate was dressed with occlusive dressings and covered by a blanket, and hourly monitoring of rectal temperature was done in a pediatric intensive care unit (ICU). Antibiotics and analgesics were started according to the body weight after consultation with the neonatologist. Strict input-output charting was maintained; vital parameters of heart rate, pulse, temperature, and pulse-oximetry were monitored hourly. The urine output too was monitored by weighing the diapers every hour. The serum electrolytes were monitored daily [Figure 1].

On the second day of admission, following resuscitation, the patient was taken onto operative room and under general anesthesia, the burn wound was cleaned with normal saline and polyurethane sheets were applied and dressed with sterile paraffin tulle gras.

The vitals of the patient remained stable for 3 days. During the course of treatment, the mother was constantly encouraged to breastfeed the baby. On the 4th day, the baby refused breastfeed, developed hypothermia, and urine output decreased. With suspicion of septicemia, the patient was immediately assessed by neonatologist and was placed on ventilator support for tachypnea and deterioration of vital parameters. A central venous catheter was placed and antibiotics were changed. Antifungals were added to the treatment, all routine investigations were sent including C-reactive protein, blood culture, and swab for culture and sensitivity from the wound. The patient was fed with expressed milk from the mother through a nasogastric tube. The patient improved after 2 days of intensive management and was weaned from the ventilator on the 7th day of admission.

During this period, there was no soakage or foul smell from the dressed wound site to indicate that the dressings need to be changed immediately. Antibiotics were changed after obtaining reports of culture sensitivity.

Dressings were changed on the 8th day and it was found that majority burns had healed except for about 10% over the abdomen and lower limbs. Polyurathane sheets were reapplied over rest of the areas and dressings were placed. Subsequently, dressings were done on every alternate day continuing the general care and nutrition of the baby [Figures 2 and 3].

The wound showed signs of healing, but around 10% of raw area remained over the lower limbs and anterior abdominal wall after 2 weeks that was considered for definitive coverage by operative procedure. The father was counselled for homograft donation for the child as the mother had herself sustained 10% scald burns over her back, gluteal region, and thighs from the accident, and the donor areas were unavailable for the neonate. On the 22nd day of admission, after normalization of all parameters of the baby and preparation of the wound bed by dressings, homograft was applied for the remaining raw areas. The graft-take was complete and the wounds healed completely. Subsequently, the neonate was discharged with advice for regular follow-up [Figure 4].

DISCUSSION

Thermal injury in infants and neonates is a rare occurrence, often as a result of an accident or iatrogenic injury such as pulse-oximeters, temperature probes, skin cleansing solutions, transilluminators, warming bottles, and other sources meant for resuscitation of the newborns in a neonatal unit. Domestic neonatal burns are documented but rare in literature.[1]

Neonates and, in particular, premature infants are a high-risk population because of their immature homeopathic and immune systems. Although burn injury is very rare in this age group, it is important to know how to deal with it.[2] The depth of burns in neonates is more than what is expected at initial assessment as compared to the adults, and thus the assessment of depth and percentage is challenging. The lack of neonatal fluid resuscitation protocols and difficult to monitor target end points complicated also with difficulties in venous access, dosage and safety of antibiotics and analgesics, monitoring of sepsis and infection (hypothermia, feed avoidance, bradycardia, lethargy, and respiratory distress are often late signs), ancillary care and wound management.[3]

Burn incidence in pediatric age group ranges from 4.2% to 20%.[1] As neonates are nonambulatory, it is essential to rule out battered baby syndrome in every case of neonatal burns and the parents should be thoroughly interviewed regarding this. In our case, since the mother had sustained burns and the history was convincing, we were assured that the scald burns was accidental.

Age has routinely been predicted as a predictor of morbidity and mortality for burns, but there is no documented literature on neonatal burns on the factors for predicting mortality. Barrow compared the mortality of patients younger than 1 year and those aged between 3 and 12 years and found it to be 9.9% and 4.9%, respectively.[2] The mortality of burns depends on various factors like the center of treatment, the consulting physician, patient profiles, and the mechanism of burns, percentage, depth, treatment methods, and time duration of resuscitation following burns.

Neonatal resuscitation following burns is extremely difficult due to under calculation of fluid requirements by the existing formulae. They need additional dextrose-containing solution support due to inadequate glycogen stores that are incapable of maintaining adequate blood sugar levels. Urine output appears to be an accurate method for assessing the adequacy of burns resuscitation. While in adults, the urine output 0.5 mL/kg/h is justified, neonates require a high urine output of 1.5-2 mL/kg/h that correlates with adequate hydration.[3] There are various methods for calculation of urine output, but we opted not to catheterize the patient as it adds to the source of infection. Instead, we relied on accurately measured weight of the diapers in the strict vigilance of trained nurses to obtain the same.

Temperature regulation in neonates is difficult as the burned neonate is prone to develop hypothermia due to large area of burns, large body surface area in relation to body weight, increased metabolic needs, low energy reserves, and immature heat-regulating systems. Hypothermia can be prevented by warming up fluids prior to administration, closed dressings, maintaining an ambient temperature in the neonatal ICU, and providing blankets. However, development of hypothermia should prompt the physician to look for a cause immediately, as sepsis may have its first manifestation as hypothermia.

Control of pain following burns forms a major part in treatment of burns, and the trend has shifted toward generous use of opioids for pain control, in this neonate, we opted for paracetamol suppositories only as we wanted to check on the reflexes of the patient with major burns and assess any deterioration in vital parameters and status, and the opioids would hinder them.

We preferred to follow the national immunization schedule formulated on vaccination of tetanus. Moreover, the mother had been immunized for tetanus during pregnancy and neonatal protection was assured by the maternal antibodies.

Application of polyurethane sheets for burns is a time-honoured technique, which is a synthetic wound covering based on hydrophilized polyurethane and highly permeable to water.[4] It can be applied on the wound, about 4-10 h postburn, when exudation has decreased. The dressing forms a crust with the wound exudates and is removed when the wound has rereepithelialized or at day 14 postburn before split skin grafting of the wound, if the wound had not yet healed.[4] The dressing has neither advantages nor disadvantages compared to conventional exposure treatment with regard to healing time, rate of bacterial contamination, need for split skin grafting, the quality of scars in spontaneously healed areas, or comfort to the patients.[5] We applied omiderm on the patient on 2nd postburn day anticipating the area of superficial burns to heal, simultaneously decreasing the need for frequent anesthesia for dressings. We did not prefer collagen application on this patient; it being an animal derivative and no published reports are there to prove its safety in neonates and allergic reactions.

Homograft applications are indicated in patients with deep burns with paucity of donor areas as in our case. So, after stabilization of all parameters and preparation of the raw area, we applied homograft to the neonate and achieved satisfactory results.

CONCLUSION

Neonatal burns are rare and the management of these burns is extremely difficult as the exact protocols for management of these patients are not clearly depicted in literature. We have successfully treated a major scald burns in this neonate with a note on how to manage such cases. Immediate and adequate resuscitation, close monitoring, and intensive and proactive management of these patients is the cornerstone of treatment.

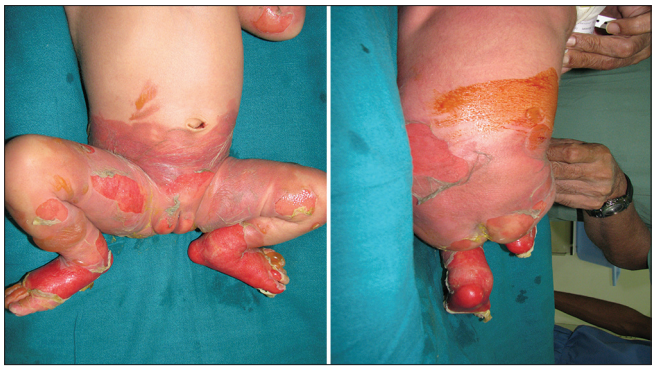

Figure 1: Patient on admission

Figure 2: Patient on 8th day

Figure 3: Patient on 4th postperative day of homograft application

Figure 4: Patient at discharge

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