Neonatal contact burns from hot plastic water bags; A preventable menace: Case series

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Abstract

Burns in a newborn is uncommon. Flame burns and scald injuries are the commonest type of burns by aetiology. Most cases of reported neonatal burns occur in hospital settings and are preventable by heightened awareness and applying simple measures. We present four neonates who had iatrogenic contact burns injury from plastic bags filled with hot water, used to provide warmth. Three cases occurred during the transition to the referral center. The newborns had varying degrees of minor burns that healed on conservative management with a good outcome. This review highlights the dangers associated with the use of plastic bags filled with hot water as a means of providing warmth to neonates and the importance of educating the populace especially mothers and healthcare workers on the simple alternative ways like kangaroo mother care (KMC) in burn prevention among neonates.

Keywords: *Burns in neonates, Burn prevention, Contact burns, Kangaroo mother care, hot satchet water*

Résumé

Les brûlures chez un nouveau-né sont rares. Les brûlures par la flamme et les échaudures sont les types de brûlures les plus courants par étiologie. La plupart des cas de brûlures néonatales signalés surviennent en milieu hospitalier et peuvent être évités grâce à une sensibilisation accrue et à l'application de mesures simples.

Nous présentons quatre nouveau-nés qui ont subi des brûlures de contact iatrogènes causées par des sacs en plastique remplis d'eau chaude, utilisés pour fournir de la chaleur. Trois cas sont survenus lors de la transition au centre de référence. Les nouveau-nés présentaient divers degrés de brûlures mineures qui ont guéri avec une prise en charge conservatrice avec de bons résultats. Cette revue met en évidence les dangers associés à l'utilisation de sacs en plastique remplis d'eau chaude comme moyen de fournir de la chaleur aux nouveau-nés et l'importance d'éduquer la population, en particulier les mères et les agents de la santé, sur les moyens alternatifs simples comme les soins maternels kangourou (KMC) pour la prévention de brûlure chez les nouveau-nés.

Mots-clés : *Brûlures du nouveau-né, Prévention des brûlures, Brûlures par contact, Soin maternel kangourou, Eau chaude en sachet*

Introduction

Burns is a form of injury to the skin or any other body tissue caused by an exchange of energy from heat, radiation, chemicals, electricity, friction/trauma. It occurs rarely in newborns, usually due to accidental exposure or complications of inappropriate therapeutic measures [1]. Globally, 90% of burns occur in low- and middle-income countries such as Nigeria, contributing to a mortality rate of 4.3 per 100,000 as opposed to 0.4 per 100, 000 in high-income countries [2].

The exact incidence of neonatal burns remains unknown due to its rarity. Isiguzo *et al* in their two year prospective study of burn injuries in a tertiary hospital in southeast Nigeria reported 2% contact burns with no mention of neonatal component. [3] Two African studies reported incidences of 0.34% and 0.5-2.5% of neonatal burn injury admissions respectively [4,5].

We report four newborns who had iatrogenic contact burns from plastic bags filled with hot water (hot satchet water). This review highlights the dangers associated with the use of plastic bags filled with hot water as a means of providing warmth to neonates and the importance of educating health workers on the alternative ways of keeping the neonates warm.

Case summaries

Cases 1 and 2

A set of twin, male babies presented to our facility 12 hours after birth on account of preterm delivery,

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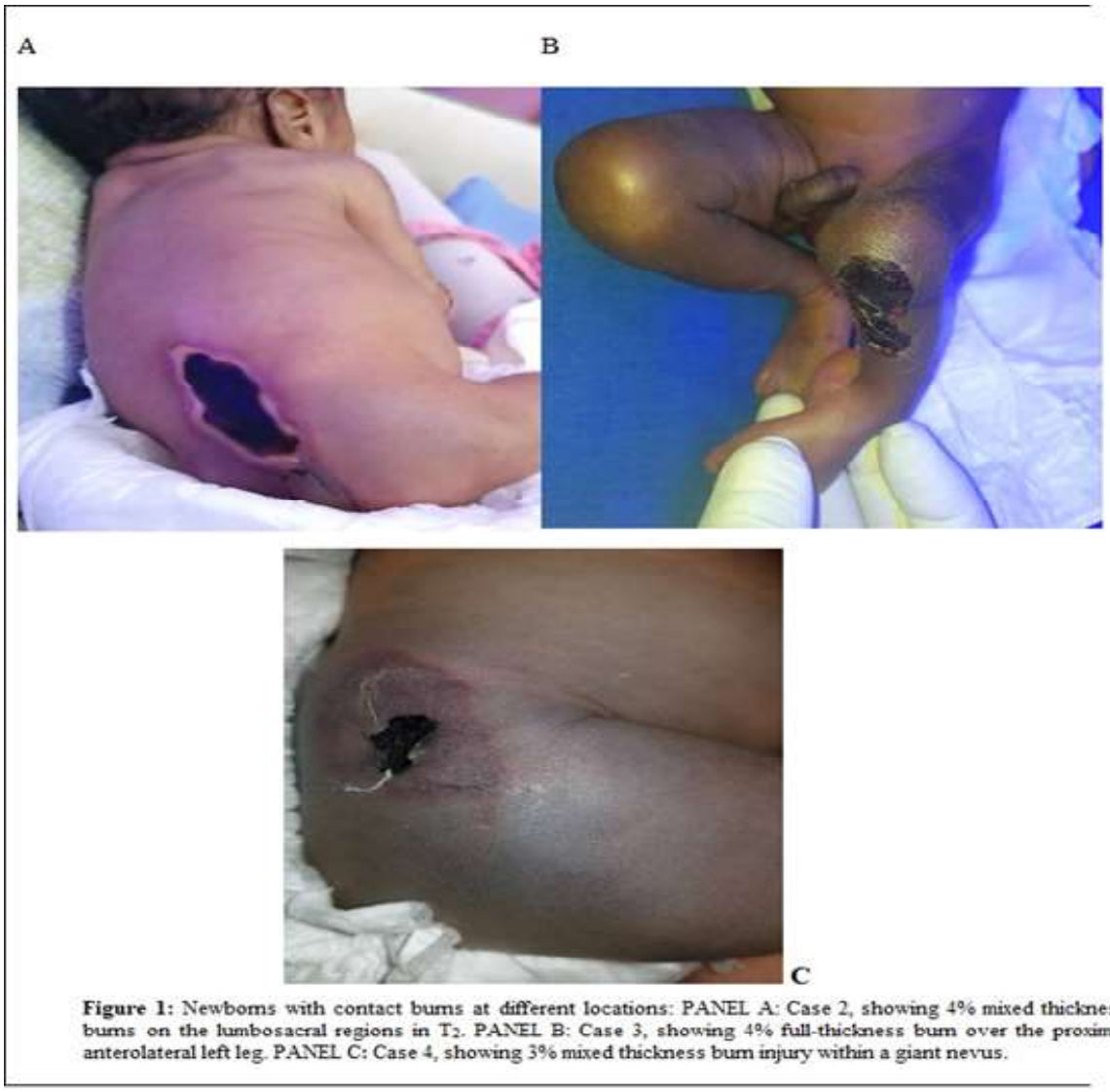

Figure 1: Newborns with contact burns at different locations: PANEL A: Case 2, showing 4% mixed thickness burns on the lumbosacral regions in T_2. PANEL B: Case 3, showing 4% full-thickness burn over the proximal anterolateral left leg. PANEL C: Case 4, showing 3% mixed thickness burn injury within a giant nevus.

and low birth weight. They were delivered through spontaneous vaginal delivery at gestational age (GA) of 35 weeks at the referring health center located in a rural location. Plastic bags filled with hot water (hot water bottles) were used to provide warmth to the babies by the healthcare worker during the transit.

The first twin (T_1) weighed 1.95kg and the second twin (T_2) weighed 1.5kg. They were assessed to be clinically stable late Preterm low birth weight neonates with 3% and 4% predominantly full thickness burns on the left gluteal (T_1) and lumbosacral regions (T_2), respectively (Fig 1A (T_2)).

Other clinical parameters are presented in table 1. They were placed on intravenous fluid for maintenance and parenteral antibiotics and vitamin K.

The burn wounds were managed conservatively by cleaning with normal saline and dressing in sofra tulle gauze and gauze soaked with 5% povidine iodine solution. They were put on alternate day dressing and had bedside escharectomy on the fifth day when the eschars were demarcated. They did well on the above regimen and were discharged on the 13th day of admission when the wounds had healed.

Case 3

A six-day-old preterm male presented with complaints of fever, inability to suckle, yellowness of the eyes, and burn injury to the left leg of 5 days duration to our facility as a referral from a health center owned by a Non-governmental Organization operating in the hinterlands. The single mother was known to have mental health challenge for 5yrs. She defaulted from antenatal-care (ANC) at the facility. She did not take her routine medications. She delivered at home at 32 weeks + 5 days of gestation assisted by her neighbors who cut the umbilical cord with a fresh razor blade before the baby was taken to the referring hospital

Table 1: Characteristics of neonates with contact burns

Variables	Case 1	Case 2	Case 3	Case 4
Age at presentation	12 hours	12 hours	6 days	2 hours
Gender	Male	Male	Male	Female
Place of delivery	Rural healthcare center	Rural healthcare center	Home in a rural setting	Rural healthcare center
Cause of burn	Hot plastic water bag	Hot plastic water bag	Hot sachet water bag	Hot plastic water bag
Mechanism of burns	Direct contact with a plastic bag filled with hot water	Direct contact with a plastic plastic bag filled with hot water	Direct contact with a boiled sachet water	Direct contact with a bag filled with hot water
Body area affected	Buttocks	Lower back	Left leg	Right buttocks
Time of burns injury occurrence	First day of life	First day of life	The second day of life	First day of life
Place of burn injury occurrence	On transit to the hospital	On transit to the hospital	Rural healthcare center	On transit to the hospital
Degree of burns	3% predominantly full thickness	4%predominantly full thickness	4% Full thickness	3% predominantly full thickness
Treatment measures	Escharectomy, and alternate daily wound dressing with normalsaline, sofra tulle gauze & gauze soaked in 5% povidone iodine solution	Escharectomy,and alternate daily wound dressing with normal saline, sofra tulle gauze & gauze soaked in 5% povidone iodine solution	Escharectomy, and alternate daily wound dressing with normal saline, sofra tulle gauze & gauze soaked in 5% povidone iodine solution	Escharectomy, and alternate daily dressing with normal saline, sofra tulle gauze, gauze soaked with Laser honey
Neonatal outcome	Discharged	Discharged	Discharged	Discharged
Length of hospital stay in days	13	13	7	16

where he had initial care. Warmth was provided for the baby with hot sachet water at the health center. The baby was noticed to have burn injury on the second day of life

He weighed 1.2kg with clinical features of neonatal sepsis in a very low birth-weight preterm baby with tibia hemimelia and 4% full-thickness burns over the proximal anterolateral left leg (Fig 1B). The baby was admitted, and intravenous ampicillin and ceftazidime were commenced while the baby was continued on breast milk substitute. The full blood count, blood film, reticulocyte count was done and showed normal blood parameters. Blood culture and plain X-ray of the left lower limb were requested but were not done due to financial constraints. The burn wound was managed successfully as shown in table 1. The baby did well, sepsis was controlled and the burn wound healed over two weeks on the above regimen.

Case 4

A 2hr old term female delivered to a 19-year-old primigravida was referred to our facility from a maternity home located in a rural area of the state on account of inability to cry at birth, difficulty breathing, and seizures noticed few minutes after birth. While on transit to our facility, the baby sustained burn injury to the right buttock following contact with a plastic bag filled with hot water (hot water bottle) used by the healthcare worker to provide warmth for the baby. The mother attended ANC at the referring maternity home and the pregnancy was uneventful. The delivery was through emergency lower segment Caesarian session at 38 weeks GA indicated by a cord tied around the neck and prolonged second stage of labor, and the baby did not cry at birth.

The examination showed an unconscious, dyspnoeic female baby in respiratory distress, not pale, anicteric, not cyanosed, normal anterior fontanel, hypotonia in all limbs. There was a 3% predominantly full thickness burn injury within a giant nevus that extends from the lower trunk to the lateral aspect of the right thigh (Fig 1C).

The diagnosis of Severe perinatal asphyxia, Congenital melanocytic nevi, and 3% predominantly full thickness contact burn was made. The baby was admitted, and seizures were controlled with intravenous phenobarbitone. Intravenous fluids, ceftazidime, and ampicillin were given for fluid maintenance and prevention of neonatal sepsis. The burn wound care was as shown in table 1. The baby was discharged home on the 17th day of life after having shown remarkable clinical improvement with the wound healed completely.

All the mothers were educated on kangaroo mother care and the use of cloth wraps to provide warmth to their babies before discharge.

Discussion

Most cases of burns in neonates occur in the hospital setting with the cause of the burn injury ranging from contact burn from devices employed for keeping babies warm such as hot water bottle [5], radiant heat [6], topical disinfectants such as chlorhexidine-methanol, laryngoscope and others. Ogunlesi *et al* [7] in Nigeria reported a case of iatrogenic thermal injury in a newborn during resuscitation for perinatal asphyxia through the use of thermal stimulation with (plastic/rubber bag filled with hot water) a harmful traditional practice for neonatal resuscitation. Domestic neonatal burns have been documented but rare in literature [8].

Poor socioeconomic factors played significant roles in these cases. Burn injuries in three of the cases presented were discovered on presentation in our facility and were not part of the reasons for their referral. None of the antenatal periods and deliveries was supervised in a tertiary hospital where asphyxia would have been prevented and prematurity managed better. Delivery at home, poor compliance to the medication of the mentally challenged mother may have heightened the effect of poverty and ignorance in her baby's case.

All cases of burns in these newborns were caused by the use of plastic bags filled with hot water to provide warmth to the newborns. The use of rubber/plastic bag filled with hot water has been practiced in some health facilities in resource-poor settings due to the unavailability of standard equipment for warmth provision in needy newborns such as incubators, radiant warmers, heated beds etc. [6,9] In resource-poor settings, skin to skin contact with the mothers exemplified in KMC remains safe in providing extra warmth to the newborn. Where this is not possible, the baby can be covered with layers of clothes, cloth caps, and stockings. This danger of contact burns associated with the use of plastic bags filled with hot water needs awareness creation including training and retraining of women and primary healthcare workers in our environment.

The outcome of burn injury can be devastating as affected persons may experience a long hospitalization period, develop body disfigurement, or disability often leading to stigmatization and rejection. Burns injury may also

Table 1: Characteristics of neonates with contact burns

Topic	Item	Checklist item description	Page Number
Title	1	The words "case report" and the area of focus should appear in the title (e.g. presentation, diagnosis, surgical technique or device or outcome).	Page 1, Lines 1
Key Words	2	3 to 6 key words that identify areas covered in this case report (include "case report" as one of the keywords).	Page 1, line 13
Abstract	3a	Introduction—What is unique or educational about the case? What does it add to the surgical literature? Why is this important?	Page 1-2, lines 15-26
	3b	The patient's main concerns and important clinical findings.	Pages 2-4, lines 29-84
	3c	The main diagnoses, therapeutics interventions, and outcomes.	Pages 2, lines 36-44 Pages 3, lines 54-61 Pages 4, lines 75-82
	3d	Conclusion — what are the "take-away" lessons from this case?	Page 6, lines 117-119
Introduction	4	A summary of why this case is unique or educational with reference to the relevant surgical literature and current standard of care (with references, 1-2 paragraphs). Nature of the institution in which the patient was managed; academic, community or private practice setting?	Page 1, lines 14-26
Patient Information	5a	De-identified demographic and other patient specific information including age, sex, ethnicity, occupation and other useful pertinent information e.g. BMI and hand dominance.	Page 7, table 1
	5b	Presentation including presenting complaint and symptoms of the patient as well as the mode of presentation e.g. brought in by ambulance or walked into Emergency room or referred by family physician.	Page 7, table 1
	5c	Past medical and surgical history and relevant outcomes from interventions	Not applicable
	5d	Drug history, family history including any relevant genetic information, and psychosocial history including smoking status and where relevant accommodation type, walking aids, etc.	Page 3, lines 48-50
Clinical Findings	6	Describe the relevant physical examination and other significant clinical findings (include clinical photographs where relevant and where consent has been given).	Page 2, lines 35-39 Page 3, lines 54-56 Page 4, lines 71-73 Page 9 for figures
Timeline	7	Inclusion of data which allows readers to establish the sequence and order of events in the patient's history and presentation (using a table or figure if this helps). Delay from presentation to intervention should be reported.	Page 7, Table 1
Diagnostic Assessment	8a	Diagnostic methods (physical exam, laboratory testing, radiological imaging, histopathology etc).	Page 2, lines 35- 39 Page 3, lines 54-59 Page 4, lines 71-80*OE*

	8b	Diagnostic challenges (access, financial, cultural).	None
	8c	Diagnostic reasoning including other diagnoses considered	Not applicable
	8d	Prognostic characteristics when applicable (e.g. tumour staging). Include relevant radiological or histopathological images in this section (the latter may sometimes be better placed in section 9).	Not applicable
Therapeutic Intervention	9a	Pre-intervention considerations e.g. Patient optimisation: measures taken prior to surgery or other intervention e.g. treating othermia/hypovolaemia/hypotension in a burns patient, ICU care for sepsis, dealing with anticoagulation/ other medications, etc	None
	9b	Types of intervention(s) deployed and reasoning behind treatment offered (pharmacologic, surgical, physiotherapy, psychological, preventive) and concurrent treatments (antibiotics, analgesia, anti-emetics, nil by mouth, VTE prophylaxis, etc). Medical devices should have manufacturer and model specifically mentioned.	Page 7, Table 1
	9c	Peri-intervention considerations - administration of intervention (what, where, when and how was it done, including for surgery; anaesthesia, patient position, use of tourniquet and other relevant equipment, prep used, sutures, devices, surgical stage (1 or 2 stage, etc). Pharmacological therapies should include formulation, dosage, strength, route, duration, etc).	Page 7, Table 1
	9d	Who performed the procedure - operator experience (position on the learning curve for the technique if established, specialisation and prior relevant training).	
	9e	Any changes in the interventions with rationale. Include intra-operative photographs and/or video or relevant histopathology in this section. Degree of novelty for a surgical technique/device should be mentioned e.g. “first in-human”.	Not applicable
	9f	Post-intervention considerations e.g. post-operative instructions and place of care.	Page7, Table 1
Follow-up and Outcomes	10a	Clinician assessed and patient-reported outcomes (when appropriate) should be stated with inclusion of the time periods at which assessed. Relevant photographs/radiological images should provided e.g. 12 month follow-up.	Page7, Table 1
	10b	Important follow-up measures - diagnostic and other test results. Future surveillance requirements - e.g. imaging surveillance of endovascular aneurysm repair (EVAR) or clinical exam/ultrasound of regional lymph nodes for skin cancer.	None
	10c	Where relevant - intervention adherence and tolerability (how was this assessed).	
	10d	Complications and adverse or unanticipated events. Described in detail and ideally categorised in accordance with the Clavien-Dindo Classification. How they were prevented, diagnosed and managed. Blood loss, operative time, wound complications, re-exploration/revision surgery, 30-day post-op and long-term morbidity/mortality may need to be specified.	None
Discussion	11a	Strengths, weaknesses and limitations in your approach to this case. For new techniques or implants - contraindications and alternatives, potential risks and possible complications if applied to a larger population. If relevant, has the case been reported to the relevant national agency or pharmaceutical company (e.g. an adverse reaction to a device).	Not applicable

	11b	Discussion of the relevant literature, implications for clinical practice guidelines and any relevant hypothesis generation.	Page 4 & 6, lines 86-115
	11c	The rationale for your conclusions.	Page 6, 116-119
	11d	The primary "take-away" lessons from this case report.	Page 2, lines 23-26
Patient Perspective	**12**	When appropriate the patient should share their perspective on the treatments they received.	
Informed Consent	**13**	Did the patient give informed consent for publication? Please provide if requested by the journal/editor. If not given by the patient, explain why e.g. death of patient and consent provided by next of kin or if patient/family untraceable then document efforts to trace them and who within the hospital is acting as a guarantor of the case report.	Yes
Additional Information	**14**	Conflicts of Interest, sources of funding, institutional review board or ethical committee approval where required.	

cause complications such as infections, electrolyte derangement, cardiac insufficiency, muscle weakness, delay in growth, and loss of bone mass contributing to neonatal morbidity and mortality.[10] In this present study, there was no recorded mortality which may be attributed to the extent and intensity of injury as all babies had small total body surface area burn injuries.

Conclusion

There is a need to create awareness about the dangers of the use of plastic bags filled with hot water in preventing hypothermia in newborns. Burn prevention in neonates through several means including the use of kangaroo mother care is advocated.

Acknowledgements

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References

1. Burns-WHO/World Health Organization. [Cited 2021 Jul 1]. Available from: https://www.who.int/news-room/fact-sheets/detail/burns.
2. World Health Organization. World Health Statistics 2012. Geneva, Switzerland: World Health Organization; 2012. [Cited 2021 Jul 1]. Available from: https://www.who.int/gho/publications/world_health_statistics/EN_WHS2012_Full.pdf.
3. Isiguzo CM, Opara C, Nnadozie UU and Opara K. Burn injury in tertiary health facility in South East Nigeria: A 2 year prospective study. Burns Open 4 (2020) 153–157. https://doi.org/10.1016/j.burnso.2020.08.001.
4. Cox SG, Rode H, Darani AN and Fitzpatrick-Swallow VL. Thermal injury within the first 4 months of life. Burns J Int Soc Burn Inj 2011;37:828–834.
5. Ugburo AO, Fadeyibi IO, Mofikoya BO, *et al*. Burns J Int Soc Burn Inj 2013;39:483–492.
6. Asuquo ME, Ekpo R and Ngim O. A prospective study of burns trauma in children in the University of Calabar Teaching Hospital, Calabar, south-south Nigeria. Burns J Int Soc Burn Inj 2009;35:433–436.
7. Ogunlesi TA, Oseni SBA, Okeniyi JAO and Owa JA. Iatrogenic burns injury complicating neonatal resuscitation. West Afr J Med 2006;25:254–255.
8. Al-Ahdab M and Al-Omawi M. Deep partial scald burn in a neonate: a case report of the first documented domestic neonatal burn. J Burn Care Res Off Publ Am Burn Assoc 2011;32:e1-6.
9. Bhatia VY, Mishra S, Menon PA and Nanavati N. Life-threatening deep scald burns in a neonate: A rare case report. Indian J Plast Surg 2013;46:130–133.
10. Alaghehbandan R, MacKay Rossignol A and Rastegar Lari A. Pediatric burn injuries in Tehran, Iran. Burns J Int Soc Burn Inj 2001;27:115–118.

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