CASE REPORT

FATAL DOMESTIC ACCIDENT FROM A 1.5 VOLT DRY-CELL BATTERY EXPLOSION AS SEEN IN LAGOS STATE UNIVERSITY TEACHING HOSPITAL, IKEJA, LAGOS, NIGERIA

Fadeyibi I.O.,[1] Izegbu M.C.,[2] Benebo A.S.[2]

Departments of Surgery, Burns and Plastic Unit[1] and Morbid Anatomy,[2] Lagos State University Teaching Hospital, Lagos

SUMMARY. *Objective*: To illustrate the danger of wrong disposal of used dry-cell batteries in Lagos, Nigeria. *Method*: Information was extracted from the case notes of a patient who died following the explosion of a 1.5 volt dry-cell battery. No post-mortem was performed because the death certificate was inadvertently issued and the body was buried hurriedly according to Islamic rites. *Results:* A 53% burn involving the face, upper arm, trunk, and thigh was found on examination, in addition to inhalation injuries. *Conclusion:* Dry-cell batteries are highly explosive when heated. There is a need to educate the populace about their explosive nature and to keep batteries away from children.

Introduction

Dry-cell batteries, usually 1.5 volts, are commonly found in our homes throughout the year as they are used in torches, radios, cameras, and MP3 players. These appliances use from one to eight batteries. While some are manufactured in Nigeria, many are imported from Asian countries. Some of these carry caution signs, such as 'Do not incinerate, short-circuit, or disassemble', while others do not.

Explosions are common during festive periods as a result of fireworks. The major causes of burns in recent times in Lagos[1] and other parts of Nigeria have been contaminated kerosene and petroleum burst-pipe explosions. However, there are also explosions from dry-cell batteries - these are rare but when they occur they are devastating, causing severe burns that may eventually lead to death.

We present a rare cause of death following an explosion of a 1.5 volt dry-cell battery and we alert the populace to the danger of improper disposal of these battery cells at home.

Case report

The deceased was a 10-yr-old primary schoolgirl who was seen at the Lagos State Emergency Medical Service Unit of Lagos State University Teaching Hospital (LASUTH), Ikeja, on 26 July 2006 at 8.30 p.m. with burn injuries sustained the previous day while she was trying to pour water onto a lighted charcoal pot containing used batteries.

The batteries exploded and set her clothes ablaze. The incident occurred in an open space but the duration of exposure is unknown. There was no associated loss of consciousness or convulsions. She sustained 53% burn injuries to the face, upper arms, trunk, and thighs. There was clinical evidence of inhalation injury. She was taken to General Hospital, Lagos, where gentian violet dressing was applied and was later referred to LASUTH for expert management.

At presentation, she was in obvious pain, distressed, conscious, with facial and bilateral peri-orbital oedema and dehydration; she was in obvious respiratory distress, not pale, anicteric, and cold to touch and had blisters all over her body but no pedal oedema. She was admitted into the burns units, rehydrated, given analgesics and antibiotics, had her wounds dressed, and was transfused with one pint of blood (0.56 l) because of low PCV (22%). The electrolytes remained fairly stable. The wound was noticed to be septic on day 5 after admission to LASUTH despite the antibiotic cover and the wound biopsy taken for culture and sensitivity studies.

However, she stopped breathing on 2 August 2006 at 9.25 p.m. and was certified dead.

Post-mortem examination was not done as the body was hurriedly taken away for burial, after the attending physicians issued a death certificate.

Discussion

Batteries are easily recognized and frequently used items in households as a result of the high demand in this era of electronics and computerization, and there is the likelihood of indiscriminate disposal, including incineration. This can cause surface burns if there are explosions. A recent study of survival of victims after major burns in Ibadan showed that the major causes of burns included flame and dry heat (67.1%), friction (15.9%), scalds (12.2%), chemicals (3.7%), and electricity (1.2%).[2] Explosions of batteries are a rare cause of burns but it is important that the public should be aware of the danger and keep batteries away from children.

It is however noted that whereas batteries manufactured in some parts of Asia carry caution signs to the effect that batteries are explosive, batteries produced in Nigeria and some imported brands do not carry such caution signs. It is important that the Standard Organization of Nigeria and other bodies in other countries concerned with quality control should do something about this.

Our patient had 53% surface burns and inhalation injuries, which may have contributed to her death. Most reviews indicate that inhalation injury, age, and burn size are important determinants of mortality.[3-8] This case may support the report of Thompson et al.,[3] who indicated that inhalation was the most important determinant of mortality in an analysis of 1018 consecutive cases, and a report from Ibadan that total body surface area burned was the most important single determinant of mortality.[2]

Anaemia and septic shock were present in our case, considering the fact that the patient presented more than 72 h after the incident. This could have been prevented if the patient had been referred immediately to the LASUTH burns and plastic unit, where specialists are on hand to deal with such cases. Improved management has increased the survival of patients with burn injury over the last 50 years.[3,10,11] This trend has resulted from a better understanding and treatment of shock,[4] aggressive wound management and use of topical antibiotics, advances in intensive care and metabolic support,[11,12] and improved respiratory care.

A post-mortem examination was not carried out owing to the fact that a death certificate was mistakenly issued and the body was removed for burial. Doctors should realize that burns are medico-legal cases and that a post-mortem examination must be requested at all times.

This report reinforces the need for proper education of the populace regarding the inherent dangers of the use of dry-cell batteries. Manufacturers and the Standard Organization must ensure that batteries on the Nigerian market carry caution signs.

RÉSUMÉ. *But:* Illustrer le danger de l'élimination erronée des batteries à piles sèches à Lagos, Nigeria. *Méthode*: Les informations ont été prises du dossier d'une patiente décédée à cause de l'explosion d'une batterie à piles sèches de 1,5 volt. Aucune autopsie n'a été effectuée parce que l'acte de décès a été délivré par mégarde et le corps enterré en toute hâte selon le rite islamique. *Résultats*: Il s'agissait de brûlures qui intéressaient 53% de la surface corporelle (visage, bras supérieur, tronc, cuisse), associées à des lésions par inhalation. *Conclusion*: Les batteries à piles sèches deviennent extrêmement explosives si elles sont exposées à une source de chaleur. Il faut éduquer le grand public sur leur capacité explosive nature et tenir les batteries hors de la portée des enfants.

BIBLIOGRAPHY

1. Oduwole E.O., Odusanya O.O, Sanni A.O., Fadeyibi I.O.: Contaminated kerosene burns disasters in Lagos, Nigeria. Annals of Burns and Fire Disasters, 16: 208-12, 2003.
2. Adigun I.O., Oluwatosin O.M., Adeyemo A.A., Oumese P.E.: A study of survival after major burns in Ibadan. Nig. Med. J., 45: vol. 4, 2004.
3. Thompson P.B., Herndon D.N., Traber D.I., Arston S.: Effect on mortality of inhalation injury. J. Trauma, 26: 163-4, 1986.
4. Merrel S.W., Saffle J.R., Sullivan J.J., Larsen C.M., Warden G.D.: Increased survival after major thermal injury. Amer. J. Surg., 154: 623-7, 1987.
5. Barret J.P., Gomez P., Solano I., Gonzalez-Dorrego M., Crisol F.J.: Epidemiology and mortality of adult burns in Catalonia. Burns, 25: 325-9, 1999.
6. Whitelock-Jones L., Bass D.H., Millar A.J., Rode H.: Inhalation burns in children. Paediatric Surg. International, 15: 50-5, 1999.
7. Ryan C M., Schoenfeld D.A., Thorpe W.P., Sheridan R.L., Cassem E.M., Tompkins R.G.: Objective estimates of the probability of death from burns injuries. New England J. Med., 338: 362-6, 1998.
8. Wolf S.E., Rose J.K., Desai M.H., Mileski J.P., Barrow R.E., Herndon D.N.: Mortality determinants in massive paediatric burns. An analysis of 103 children with 80% or greater TBSA burns (70% or greater full thickness). Ann. Surg., 225: 554-65, 1997.
9. Pruitt B.A., Tumbucsh W.T., Mason A.D., Pearson E.: Mortality in 1100 consecutive burns treated at a burns unit. Ann. Surg., 159: 396-401, 1964.
10. Feller I., Tholen D., Cornell R.G.: Improvement in burn care, 1965 to 1979. JAMA, 244: 2074-90, 1980.
11. Ireton-James C.S., Baxter C.R.: Nutrition for adult burns patients: A review. Nutrition in Clinical Practice, 6: 3-7, 1991.
12. Waymack P.J., Herndon D.N.: Nutrition support of the burned patient. World J. Surg., 16: 80-6, 1992.

This paper was received on 25 September 2006.

Address correspondence to: Dr I.O. Fadeyibi, Burns and Plastic Surgery Unit, Department of Surgery, Lagos State University Teaching Hospital, Ikeja, Lagos State, Nigeria.