

Management of Burn Injuries by Daily soaking in Normal Saline prior to Dressing

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Summary

Oyelami OA, Adesunkanmi ARK, Ajibola AJ, Agbakwuru EA. Management of Burn injuries by Daily soaking in Normal Saline prior to Dressing. *Nigerian Journal of Paediatrics* 2001; 28:115. A review of 121 children with burn injuries admitted over a five-year period (January 1992 – December 1996) at the Wesley Guild Hospital, Ilesa was undertaken. The patients were soaked in normal saline for at least one hour daily, prior to dressing with topical application of silver sulphadiazine. Scalds were responsible for 67 per cent of the cases while naked flame, including kerosene explosion and therapeutic burns were responsible for the rest. The burns were categorised as major in 58 per cent of cases. The trunk was affected in 66 per cent of cases, the upper and lower limbs were each affected in 51 per cent, the head and neck in 30 per cent, and the hands and feet in 25 per cent. Wound infection was the commonest complication occurring in 16.5 per cent, while mortality was 6.6 per cent; these were lower than the 24.4 per cent and 7.7 per cent respectively, obtained in previous studies in the Unit when saline solution was not used. Similarly, the rates of contractures and severe anaemia were lower among those whose burns were soaked in saline (5 per cent vs 10.9 per cent, and 2.5 per cent vs 10.3 per cent, respectively). Although the rates were lower in the present study except for septicæmia, the differences did not reach statistical significance except for severe anaemia. However, the study thus indicates that soaking of burn injuries in saline prior to dressing may improve prognosis.

Introduction

BURNS occur universally and their incidence is increasing in developing countries due to sophistication of modern living. According to Hegazy and Ibrahim,¹ burns injuries rank second only to road accidents among all causes of violent deaths. The home is the commonest environment for burn injuries, and children are the most commonly affected. The mental anguish suffered by parents and relations from avoidable accidents such as burns is enormous, while the care of burn patients demands great resources in terms of manpower and materials, which are often lacking in developing countries. Health care personnel and relations also have to cope with the problems of long hospitalization and subsequent complications.^{2,3}

The Wesley Guild Hospital, Ilesa, is one of the units of Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife and caters for the health needs of urban

and rural dwellers from Osun, Ekiti and Ondo states. In 1991, the practice of soaking burn injuries in saline water for about one hour before dressing was adopted in our hospital. The idea was spontaneous and it was thought that the practice could improve prognosis while the parents could be actively involved in the management of their children, before the nursing staff carried out wound dressings. The present study describes our experience with this new modality of treatment of burn injuries.

Patients and Methods

The patients comprised 121 children hospitalized for burns between January 1992 and December 1996. Recorded information included the age and sex of the patients, the surface area involved, anatomical regions, degree of burns and time of presentation. Complications resulting from the burns were also noted. The degree of burns was classified into superficial, deep dermal and deep burns. The severity of the burns was classified as follows: (a) Minor burns – a burn surface area of less than five per cent of deep dermal burns or less than 10 per cent of superficial burns, and (b) Major burns – burn surface area of five per cent or more, of deep dermal or deep burns or 10 per cent and above, of superficial burns. Estimation of total area was by the “rule of 5” in children aged five years and below and the modified Wallace’s “rule of 9” in those older than five years.

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The standard treatment of the burn patients included the administration of intravenous fluids within 24 hours of presentation in all cases of major burns. Antibiotics, which were routinely administered in all cases, comprised either crystalline penicillin or, if presentation is later than 24 hours, ampicillin and cloxacillin (*Amplicox*) with the addition of gentamicin when there was clinical evidence of wound or systemic sepsis. It had been the policy of the unit since 1991 to routinely soak all patients with burn injuries in saline water for about one hour before dressing. If the injury involved the head, the site was intermittently irrigated with the saline water while for other parts of the body, the affected area was soaked in the saline. Thus in this study, all patients were soaked for one hour in "normal saline" solution which was prepared by dissolving 9g of common salt in each litre of clean, warm water. This was followed by wound dressing with topical application of silver sulphadiazine. Closed and open dressings were usually combined. Open dressing was used initially in fresh burns but closed dressing was employed if the wound was suspected to be infected.

Statistical analysis where relevant, was by means of chi-squared test with Yate's correction. A test was considered significant if *p* was less than 0.05.

Results

The 121 children (72 were males and 49 females) were aged one month to 14 years (mean 4.9 ± 3.5 years; Table I). Minor burns occurred in 52 (43 per cent) and major in 69 children (57 per cent). The trunk was the anatomical region most commonly affected (Table II). Scalds were responsible for the burns in 81 cases (67 per cent) and naked flame in 38 cases (31 per cent). There were five cases of therapeutic burns and one was secondary to hot water fomentation of the umbilical cord stump (Table III). Only 52.9 per cent of the cases presented within eight hours of the burns accident, but 75 per cent within the first 24 hours; four patients presented more than seven days after the accident (Table IV).

The patients tolerated, and in many cases appeared to enjoy being soaked in warm saline solution. Unfortunately, serum electrolyte levels were not routinely monitored; however, no features of electrolyte disturbances were

observed in any of the patients.

Wound infection was the commonest complication, occurring in 20 cases (16.5 per cent; Table V), followed by contractures (six cases) and septicaemia (five cases).

Other complications included severe anaemia requiring

Table II

Anatomical Regions involved in 121 Children with Burns

Region	No. Affected	Per Cent of Total
Trunk	66	54.5
Lower limbs	61	50.4
Upper limbs	51	42.1
Head & Neck	30	24.8
Hands only	15	12.4
Feet only	10	8.3
Buttocks	5	4.1
Axilla	4	3.3
Perineum	1	0.8

Table III

Agents responsible for Burns in 121 Children

Agents	No of Children Affected
Hot fluid	81 (66.9)
Naked Flame	38 (31.4)
Kerosene explosion	24 (19.8)
Structural flame	11 (9)
Clothes	2 (1.6)
Petrol	1 (0.8)
Others	2 (1.7)
Hot object	1 (0.8)
Hot ash	1 (0.8)
Total	121 (100)

Percentages of total in parentheses

Table IV

Intervals between Accidental Burns and Presentation in relation to Mortality in 121 Cases

Interval	No of Patients	Per cent of Total	No of Deaths (Percent)
0-8hrs	64	52.9	2 (3.1)
9-23hrs	27	22.3	0 (0)
1-2 days	7	5.8	1 (14.3)
3-7 days	19	15.7	4 (21.0)
8-30 days	4	3.3	1 (25.0)
Total	121	100.0	8 (6.6)

Table I

Age and Sex Distribution in 121 Patients with Burns

Age (yr)	Male	Female	Total
0-4	44	25	69
5-9	20	15	35
10-14	8	9	17
Total	72	49	121

Table V

Complications in 121 Cases of Burns

Complications	No of affected Patients	Per Cent of Total
Wound infection	20	16.5
Contracture	6	5.0
Septicaemia	5	4.1
Severe anaemia	3	2.5
Hypertrophic scar	3	2.5
Acute renal failure	2	1.7
Gangrene of the toes	2	1.7

Table VI

Comparison of Complications and Mortality in Patients soaked in Saline and those not soaked*

Complications	Soaked in saline (Per Cent) (n = 121)	Not soaked in Saline* (Per Cent) (n = 156)	p
Wound infection	20 (16.5)	38 (24.4)	0.29
Contractures	6 (5.0)	17 (10.9)	0.17
Septicaemia	5 (4.1)	6 (3.8)	0.83
Severe anaemia	3 (2.5)	16 (10.3)	0.03
Renal failure	2 (1.7)	1 (0.6)	0.84
Mortality			
Deaths	8 (6.6)	12 (7.7)	0.93

* See Ref. No. 4

blood transfusion (three cases), and acute renal failure (two cases). Death occurred in eight cases, all of whom had major burns. It is also worthy of note that six of the deaths followed kerosene explosion. All the three patients who received blood transfusion for severe anaemia, died and two of them had associated acute renal failure. Furthermore, 50 per cent of those that died developed septicaemia and all of them presented later than the fourth day after the burn injury.

The outcome among the patients in the present study was compared with the outcome recorded in the patients managed earlier in the unit by the same personnel employing similar modes of management except saline soaking (Table VI). Although the rates were lower in the present study except for septicaemia, the difference reached statistical significance only in the case of severe anaemia.

Discussion

Burn injuries continue to represent a serious world-wide problem accounting for considerable morbidity and mortality. This study, when compared to the previous one

in our unit,⁴ shows that the incidence of the problem has not changed for better, and most cases of burns are still secondary to domestic accidents. Over the last 50 years, a lot of progress has been made in the care of burned patients. Improved survival has paralleled the development of new antibiotics as well as major advances in resuscitation, nutritional support, immunity modulating agents, surgical techniques and wound care. The extent of the care is such that in developed countries, the average burn size associated with 50 per cent mortality break point is about 70 per cent of the total body surface area.⁵⁻⁷ Unfortunately, this has not been the case in developing countries with limited facilities and dwindling hospital resources. However, common salt is readily available even in the remotest part of the world, while preparing a crude normal saline is easy and can readily be taught to health care workers and most parents. Hence, the use of normal saline to irrigate burns injuries before dressing should not be a difficult or unattainable procedure in most parts of developing countries. Some studies have documented the efficacy of normal saline irrigation in decreasing wound infection.⁸ It is however, remarkable that such a simple measure has not hitherto, been applied to burns injuries.

The present study shows that burns mortality in our unit was lower during the period when normal saline irrigation was used compared to when it was not. The mortality of 6.6 per cent was also relatively low when compared to mortalities reported from other parts of Nigeria,^{1,3,9} and elsewhere in the developing world. It may even be speculated that the mortality obtained in the present study would have been lower had cases presented earlier, since 50 per cent of the patients that died presented later than the fourth day after their injuries.

The incidence of wound infection, which is the leading problem in the treatment of burn injuries⁹ was less with the use of normal saline in this study than that obtained earlier.⁴ While it was 24.4 per cent during our earlier review,⁴ it was 16.5 per cent in this study. This is similar to the findings of Breuing *et al*⁸ in pigs whose burn injuries were treated with saline irrigation. These workers also reported that saline treated wounds healed without tissue maceration and showed less scar formation than wounds that healed during exposure to air. It was similarly observed in our unit that it was easier to remove eschar tissue from the site of injury when the site had been soaked in saline for quite a while before dressing. The regular removal of such eschar tissue during dressing obviated the need for debridement. The regular removal of eschar tissue and the softening of the fibrous tissue could also have been responsible for fewer cases of contracture in this series compared to our earlier experience⁴ when the victims were not being soaked in normal saline. A contributory factor for the fewer cases of contracture could also be the passive movements of the affected limbs by the parents while the patients were being soaked in normal saline. Furthermore,

the softening of eschar tissue also resulted in less bleeding during dressing, and could have been partly responsible for the fewer cases of severe anaemia in this series when compared to the previous one.⁴

The use of normal saline irrigation ensured that the parents, who were taught how to prepare crude normal saline with common salt and warm water, were actively involved in the management of their children. This involvement of the parents also boosted their morale, increased their sense of self-worth and minimized the harrowing experience of long hospitalization. All these advantages made us feel that it might have been unethical to deny some patients of these benefits; hence the study was not controlled. Despite its shortcomings, the study has shown that even in the presence of limited resources, the rates of complications and mortality in burn injuries can be further reduced by instituting simple measures.

References

1. Hegazy MM, Ibrahim EM. The pattern and outcome of burn injuries at a burn unit in Saudi Arabia. Retrospective analysis of consecutive 501 patients. *Ann Saudi Med* 1991; 11: 255-9.
2. Sowemimo GOA. Burn injuries in Lagos. *Burns* 1982; 9: 280-3.
3. Akitar M, Gang RK. Epidemiology of burns in Benghazi, Libya. *Burns* 1981; 7: 1-6.
4. Adesunkanmi K, Oyelami OA. The pattern and outcome of burn injuries at Wesley Guild Hospital, Ilesa, Nigeria: a review of 156 cases. *J Trop Med Hyg* 1994; 97: 108-12.
5. Parti P, Dorati L. Survival and therapy of burn patients at the threshold of the twenty-first century: a review. *J Chemotherapy* 1995; 7: 475-502.
6. Gioffi WC. Effect of granulocyte-macrophage stimulating factors in burn patients. *Arch Surg* 1991; 126: 74-6.
7. Chisholm CD, Cordell WH, Rogers K, Woods JR. Comparison of a new pressurised saline canister versus syringe irrigation for laceration cleansing in the emergency treatment. *Ann Emergency Med* 1992; 21: 1364-7.
8. Breuing K, Erikson E, Liv P, Miller D. Healing of partial thickness porcine skin wounds in a liquid environment. *J Surg Res* 1992; 52: 50-8.
9. Oluwasanmi JO. Burns in Nigeria. *Br J Plastic Surg* 1969; 22: 216-23.