AQUACEL AG® IN PAEDIATRIC BURNS - A PROSPECTIVE AUDIT

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SUMMARY. A variety of dressings are used for the management of paediatric burns. Aquacel Ag® is a silver-impregnated hydrofibre that releases silver within the dressing for up to two weeks. It has been reported in the literature that it is a beneficial dressing for the management of partial-thickness burns. It promotes an appropriate environment for re-epithelialization of the burn wound. The aim of this study was to evaluate the use and outcomes of Aquacel Ag® dressing in paediatric burn patients. This was a prospective audit carried out in the period January-July 2005. The healing time was satisfactory. The dressing normally adheres to the burn wound for up to two weeks and thus requires less frequent changes. In our study, patients required three to four outer dressing changes. However, Aquacel Ag® has not been compared with other dressings. Overall pain requirements were reduced during subsequent dressing changes. It was also easy to apply the dressing in the majority of our patients. Non-adherence was one of the problems encountered but, overall, Aquacel Ag® appeared to be a safe, effective, and comfortable dressing.

Introduction

Burns are a common cause of childhood injury. Most superficial burns will heal with topical antimicrobials and/or dressings within approximately two weeks.[1] However, deeper burns either require early excision and grafting or may be left to heal without surgical intervention but with aggressive use of dressings. The choice of dressing is nevertheless still controversial.

Aquacel®, a moisture-retentive hydrofibre composed of 100% sodium carboxymethylcellulose with a low degree of carboxymethylation, is indicated for the treatment of skin wounds, including partial-thickness burns.[2] The dressing was used initially as a cover dressing over topical antimicrobial creams and ointments, owing to its strong fluid absorption capacity. Later on, it was observed that the dressing allowed adequate drainage of exudate and provided an ideal environment for burn wound healing. It has been shown that this type of dressing is safe, and suitable for partial-thickness burns.[2]

Aquacel Ag® was created by adding 1.2% w/w silver to Aquacel® hydrofibre. It retains the physical properties of Aquacel® hydrofibre with the additional effect of silver, which is slowly released into the wound for up to two weeks, creating an antimicrobial environment.

Aquacel Ag® was tested in a phase II non-comparative trial in superficial, mid-dermal, and mixed partial-thickness burns. The percentage, speed of re-epithelialization, and pain reduction were satisfactory. Overall, the dressing was comfortable, effective, and easy to use.[3]

Methods

This was a prospective audit of Aquacel Ag® use in children who had sustained burn injuries between January and July 2005. The inclusion criteria were:

1. Non-resuscitation burns
2. Patients 16 years old or less
3. Superficial partial-thickness or mid-dermal/mixed depth burn
4. Arrival in burns unit within 48 h of injury

Patient demographics, relevant medical history, and events related to the burn were recorded at the time of admission. Total body surface area (TBSA) was calculated according to the Lund and Browder chart. The anatomical location of the burn, the initial management, and the application of dressings and analgesia (type and dose) required were recorded. The burn areas were cleaned and any blisters were removed. Swabs were taken for microbiological assay and photographs were taken. Aquacel Ag® 15 x 15 or 20 x 30 cm was applied after review of the burn wound by a senior surgeon. The dressing was covered with one or two layers of plain gauze and a crepe bandage. The first outer dressing was changed after 48 h, or earlier if necessary. Thereafter, the outer dressing was changed on days 3, 5, and 7 (± 1 day), leaving the primary dressing undisturbed. The primary dressing was left for 14 (± 3) days, or until the dressing started to come off on its own and there was > 95% re-epithelialization of the wound.

During dressing changes, if any part of the dressing was non-adherent, that portion was trimmed and reapplied. Alternate dressings were applied if there were signs of infection or discharge. Swabs and photographs were taken. We also recorded the subsequent analgesic requirements, ease of application, and any problems encountered with the dressing.

Results

Twenty-two patients fulfilled the inclusion criteria. Of the 22, 13 were male (59%) and 9 (41%) were female; the age of the patients ranged from 6 months to 8 yr (mean, 2.7 yr). The duration of the burns ranged from 2 to 46 h (mean, 13.7 h). Fifteen patients sustained burns secondary to hot water (68%), two were due to flame (9%), and one each (4%) to fat, plastic, radiation, contact, and curry sauce (*Fig. 1*). TBSA ranged from 2 to 10% (mean, 4%).

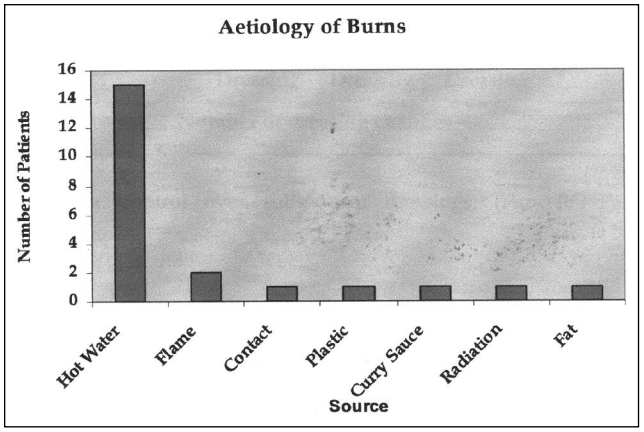

Fig. 1 - Aetiology of burns.

The depth of the burns was superficial in ten patients (45%), mid-dermal in seven (31%), deep dermal in four (18%), and mixed depth in one (4%). The first application of dressing was easy in the majority of patients, i.e. 20 of them (91%). The overall analgesic requirement was reduced from morphine to paracetamol and ibuprofen to none during subsequent dressings (*Fig. 2*). On average, patients required three to four outer dressing changes. We used the dressing on almost every part of the body.

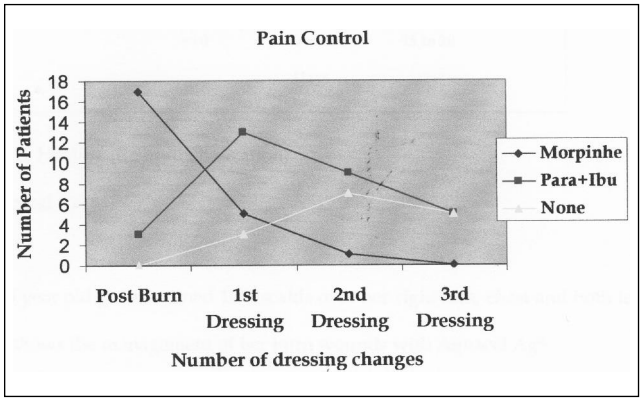

Fig. 2 - Pain control over subsequent dressings (Para + Ibu = paracetamol and ibuprofen).

Sixteen of the 22 patients (73%) had successful healing of the burn wound in 5 to 19 days (mean, 11.6 days) (*Fig. 3*). Six patients had alternate dressings applied owing to problems encountered during or after the dressing. The main problems were either non-adherence or infected wounds. However, on one occasion, Aquacel Ag® was not available. None of the patients required surgery.

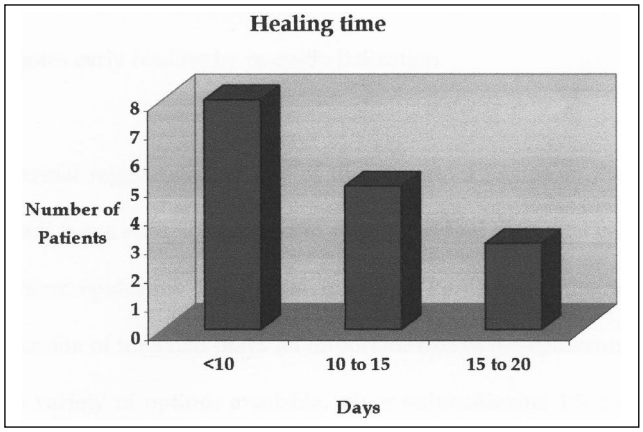

Fig. 3 - Healing (re-epithelialization)

Typical case

A 3-yr-old girl sustained 10% scalds in the right arm, chest, and both legs. *Figs. 4-11* illustrate the management of her burn wounds with Aquacel Ag®.

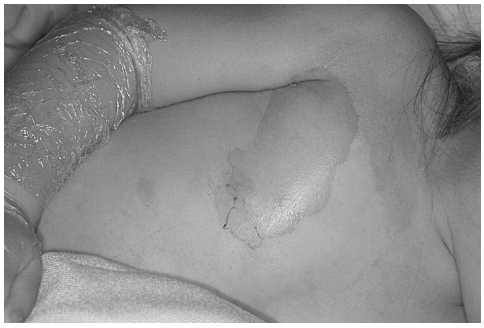

Fig. 4 - Right chest post-burn.

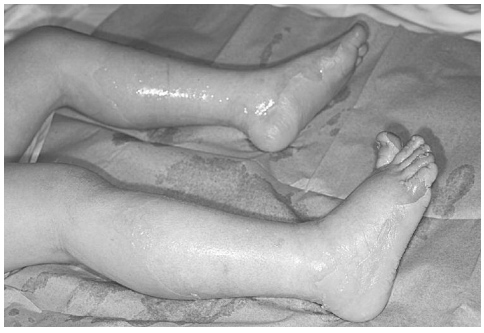

Fig. 5 - Both legs post-burn.

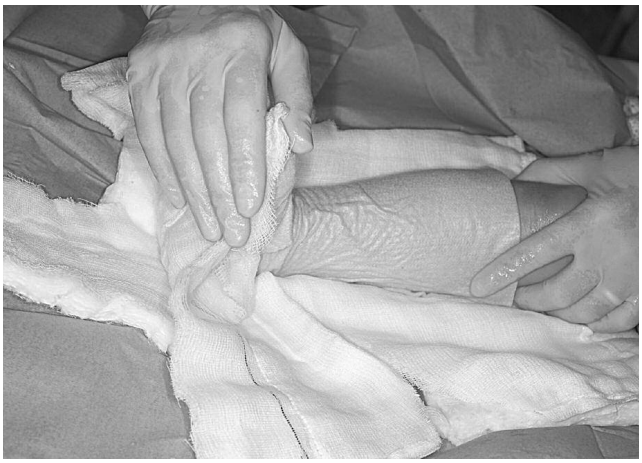

Fig. 6 - Application of Aquacel Ag®.

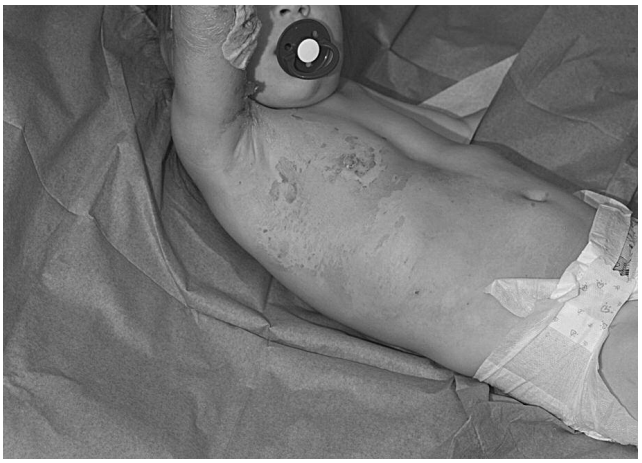

Fig. 9 - Day 7 post-burn. Aquacel Ag® detaches from right chest, with wound healing nicely.

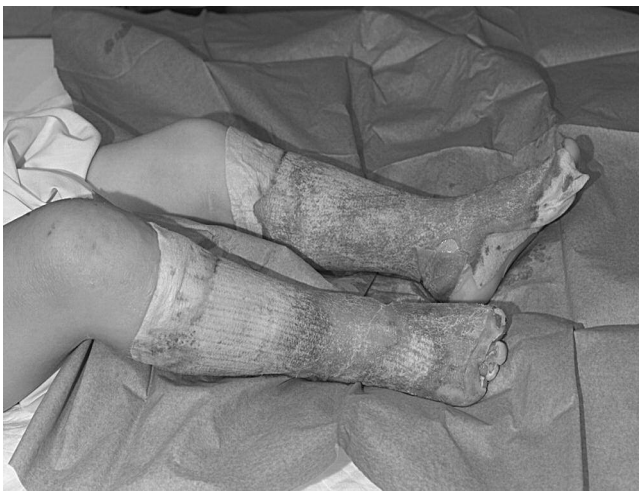

Fig. 7 - Day 3 post-burn. Aquacel Ag® adhering to both legs.

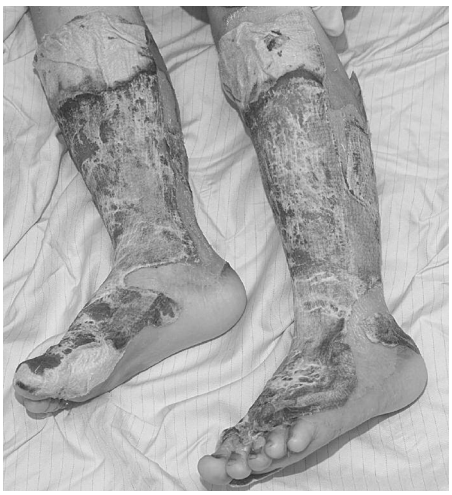

Fig. 10 - Day 10 post-burn. Aquacel Ag® still adhering.

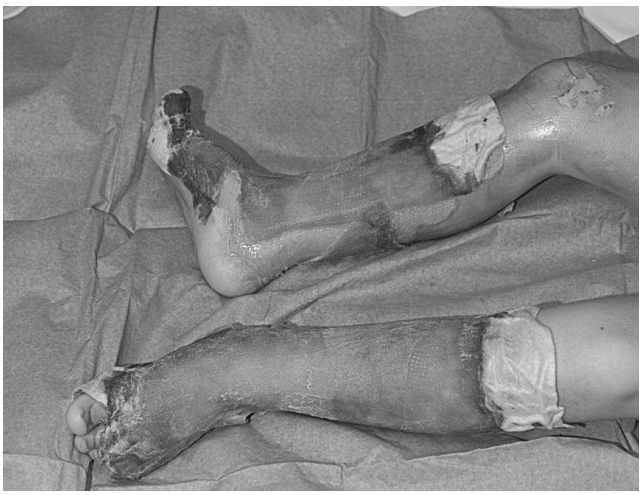

Fig. 8 - Day 7 post-burn. Aquacel Ag® still adhering to both legs.

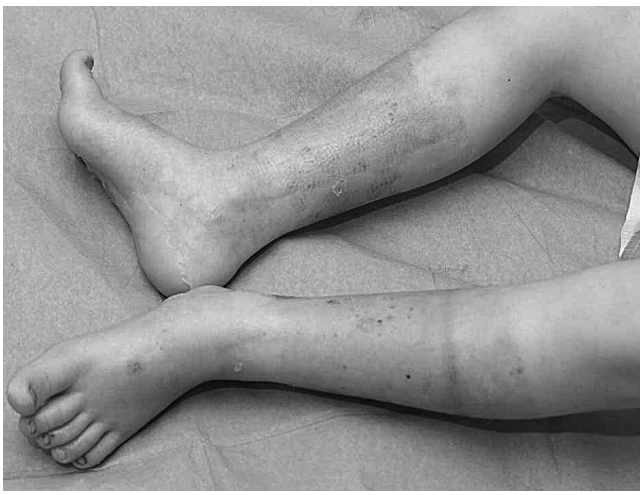

Fig. 11 - Four weeks post-burn. Lesions almost completely healed

Discussion and conclusion

The management of paediatric burns, especially when partial thickness, aims to produce a wound environment that optimizes thermal preservation, prevents infection, and promotes early healing by re-epithelialization.

Epidermal regeneration is an important factor in burn wound healing. It is a complex process in which residual epithelial cells proliferate to form an intact epidermis.[4] Partial-thickness burns are vulnerable to infection, and prevention of infection plays an important role in epidermal regeneration. There are a variety of options available, including silver sulphadiazine 1% cream (SSD), which is still the most commonly used topical antimicrobial agent. However, SSD has some relatively mild disadvantages, e.g. leucopoenia and delayed wound healing.[5] More importantly, it requires daily dressing changes, which can be painful, increase the risk of contamination, and traumatize the epithelializing wound bed.

A moist environment is ideal for epithelialization and wound healing. Moisture retentive dressings perform well in the management of smaller, partial-thickness burns. These dressings not only provide an ideal environment for healing the burn wound but also help to reduce pain and overall costs, with relatively few dressing changes.[3]

Aquacel Ag® can be used on most parts of the body. The dressing normally adheres to the burn wound for up to two weeks or until re-epithelialization commences. It therefore requires fewer dressing changes. However, a formal trial is required to compare Aquacel Ag® with other dressings. One of the problems encountered in some of the patients in our audit was non-adherence

Pain control is an important factor in burn patients, especially in children. The dressing reduced overall pain and subsequent analgesic requirements during dressing changes. We did not compare Aquacel Ag® with other dressings, but our audit showed that the majority of the patients' analgesic requirements were reduced - from narcotics to non-narcotics and to nothing at all. The dressing was flexible, easy to apply, and comfortable.

The cost of Aquacel Ag® and Biobrane is shown in *Table I*. It can be seen that Aquacel Ag® is the more cost-effective dressing, although a formal trial is required make a full comparison of the two dressings.

Table I - Cost comparison of Aquacel Ag® and Biobrane

Type	Size	Cost
Aquacel Ag®	10 x 10 cm	£4.00
	15 x 15 cm	£7.60
	20 x 30 cm	£18.60
Biobrane	10 x 15 in	£110.00
	15 x 20 in	£224.00

In conclusion, Aquacel Ag® proved to be a safe, effective, easy-to-apply, and comfortable dressing. It retained adequate antimicrobial properties and provided an ideal environment for the management of superficial and mid-dermal partial-thickness paediatric burns.

RÉSUMÉ. Pour la gestion des brûlures pédiatriques on emploie divers types de pansement. L'Aquacel Ag® est une hydrofibre imprégnée d'argent qui relâche l'argent dans le pansement pour une période qui dure jusqu'à deux semaines. Selon les données de la littérature, ce pansement exerce un effet bénéfique dans la gestion des brûlures d'épaisseur partielle. Il promeut un environnement approprié pour la réépithélialisation de la brûlure. Les Auteurs de cette étude se sont proposés d'évaluer l'emploi et les résultats du pansement Aquacel Ag® chez les patients brûlés pédiatriques. Cet audit prospectif a été effectué dans la période janvier-juillet 2005. Les temps de guérison étaient satisfaisants. Normalement le pansement adhère à la lésion pour une période qui dure jusqu'à deux semaines et conséquemment nécessite un numéro mineur de changements. Dans cette étude, les patients ont eu besoin de trois ou quatre changements du pansement extérieur. Cependant, l'Aquacel Ag® n'a pas été comparé à d'autres pansements. Les exigences globales pour la douleur étaient réduites pendant les changements de pansement successifs et, en outre, il était facile d'appliquer dans la plupart des patients. Un problème qui s'est manifesté a été la non-adhérence mais, tout compte fait, l'Aquacel Ag® s'est démontré un pansement sûr, efficace et confortable.

BIBLIOGRAPHY

1. Rose J.K., Desai M.H., Mlakar J.M., Herndon D.N.: Allograft is superficial to topical antimicrobial therapy in the treatment of partial-thickness burns in children. J. Burn Care Rehabil., 18: 338-41, 1997.
2. Vloemans A.F.P.M., Soesman A.M., Kreis R.W., Middlekoop E.: A newly developed hydrofibre dressing in the treatment of partial-thickness burns. Burns, 27: 167-73, 2001.
3. Caruso D.M., Foster K.N., Hermans M.H.E., Rick C.: Aquacel Ag® in the management of partial-thickness burns: Results of a clinical trial. J. Burn Care Rehabil., 25: 89-97, 2004.
4. Subrahmanyam M.: A prospective randomized clinical and histological study of superficial burn wound healing with honey and silver sulphadiazine. Burns, 24: 157-61, 1998.
5. Choban P.S., Marshall W.J.: Leukopenia secondary to silver sulphadiazine: Frequency, characteristics, and clinical consequences. The American Surgeon, 53: 515-7, 1987.

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