Silver hydrofiber dressings in the management of patients with toxic epidermal necrolysis: A case series

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Abstract

Background: Toxic epidermal necrolysis (TEN) is a rare autoimmune reaction with severe mucocutaneous involvement. The incidence of the disease is 1 to 3 per million people. Mortality from the condition is high. Contributory to the high mortality is poor wound management resulting in wound infection with subsequent septicaemia.

Patients and methods: This was a prospective study of patients suffering from TEN who were managed by the authors between January 2010 and December 2016 and whose wounds were treated with silver hydrofiber dressings (specifically Aquacel® Ag). The study was approved by the local ethics and research committee. Consent was sought from the patients or their next of kin. All patients with TEN seen by the authors were managed by surgical debridement of the wounds and the wounds dressed with Aquacel® Ag.

Results: A total of 12 patients with TEN of more than 70% body surface area had their wounds managed by serial surgical debridement and dressed with Aquacel® Ag. The male:female ratio was 3:1. The age range of patients was 22 to 43 years with a mean age of 29.5 years. All the wounds healed well in a time-frame of 28 days. No mortalities related to TEN were reported.

Conclusion: The absence of deaths in this series suggests that treatment with Aquacel® Ag silver hydrofiber dressings decreases mortality in patients with TEN. However, these findings need to be further validated by means of randomised controlled studies. Surgical debridement removed necrotic tissue decreasing the chances of wound colonisation. The hydrofiber silver dressing material removed the excess moisture in the wound preventing wound maceration and infection. Due to adequate moisture control the wounds healed rapidly through epithelialisation.

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Introduction

Toxic epidermal necrolysis (TEN) is an autoimmune disorder characterised by erythematous macular rashes that involve the mucosa and the skin. The condition is characterised by extensive detachment of the mucosa and the epidermis resulting in a widespread epithelial defect. TEN is a severe form of the disease with extensive involvement of the skin – at least 30% total body surface area (TBSA). The mucosa is also commonly involved. The less severe form of the disease is Stevens-Johnson syndrome with less than 30% TBSA involvement, with the mucosa rarely being involved.

TEN was first described by Lyell in 1956.[1] It is mainly associated with drug reactions to sulphur-based drugs, allopurinol and antiepileptic drugs.[2] The syndrome is more common in HIV-positive patients, patients with brain tumours and individuals who are genetically slow acetylators.[2] The incidence of the disease is 2.6 to 6 per million people for Stevens-Johnson syndrome and 1 to 3 per million people for TEN.[2,3] Mortality from Stevens-Johnson syndrome and TEN is closely related to the total body surface area affected by the disease. Mortality is in excess of 40% in patients with TBSA of more than 50%. Wound infection with subsequent septicaemia is the main contributor to mortality.[2,3,4]

In the management of TEN, the offending drug must be identified and stopped. Fluids and electrolyte imbalance must be corrected. Patients with respiratory compromise may need intubation with ventilatory support. Nutritional support through nasogastric tube feeding may also be instituted.

There is no consensus on the best way to manage wounds in patients with this syndrome. The management options vary from the open method of dressings to the use of biological dressing materials such as cadaveric skin, amniotic membrane or other dermal skin substitutes such as Biobrane™.[5,6,7,8]

This study is limited specifically to the evaluation of patients with TEN, managed with Aquacel® Ag Hydrofiber® silver dressings.

Patients and method

This was a prospective study of patients with TEN seen by the authors between January 2010 and December 2016. The study was approved by the local ethics and research committee. Consent was obtained from the patients or their next of kin, including for the taking of photographs. The patients were managed through a multidisciplinary approach. Upon admission, a thorough history and physical examination was taken. The TBSA affected with wounds was assessed using the Lund and Browder chart. The offending drug was identified and withdrawn.

Patients were then admitted either to the critical care unit or to a general ward. Treatment was commenced with intravenous fluids and endotracheal intubation, and nasogastric tube feeding was instituted as the case demanded. Investigations done included tissue biopsies, septic screening, urea, electrolytes, creatinine levels, liver function tests, blood gas analyses and fasting blood sugar levels. Patients who were HIV positive were investigated for CD4 counts and viral load levels. Patients in whom microorganisms were isolated (either from the wounds, blood or throat aspirates) or who had features of septicaemia were started on appropriate intravenous antibiotics.

After initial fluid resuscitation, removal of non-viable tissue was performed in the operating room (Figures 1 and 2). The wounds were exposed after three to four days and dressed again with Aquacel® Ag (Figure 3). A secondary dressing in the form of gauze and crepe bandages was applied over the Aquacel® Ag (Figure 4). Once the wounds had healed, the skin was moisturised with the antiseptic lotion, Mebo. Physiotherapy was started on all patients, including mobilisation out of bed as soon as they were stable.

Figure 1. Twenty-nine-year-old patient with 95% toxic epidermal necrolysis skin reaction before surgical debridement

Figure 2. Patient depicted in Figure 1 after surgical debridement of the wounds

Figure 3. Patient depicted in Figure 1 with application of Aquacel® Ag dressings

Figure 4. Patient depicted in Figure 1 with secondary dressings in place (gauze and crepe bandages)

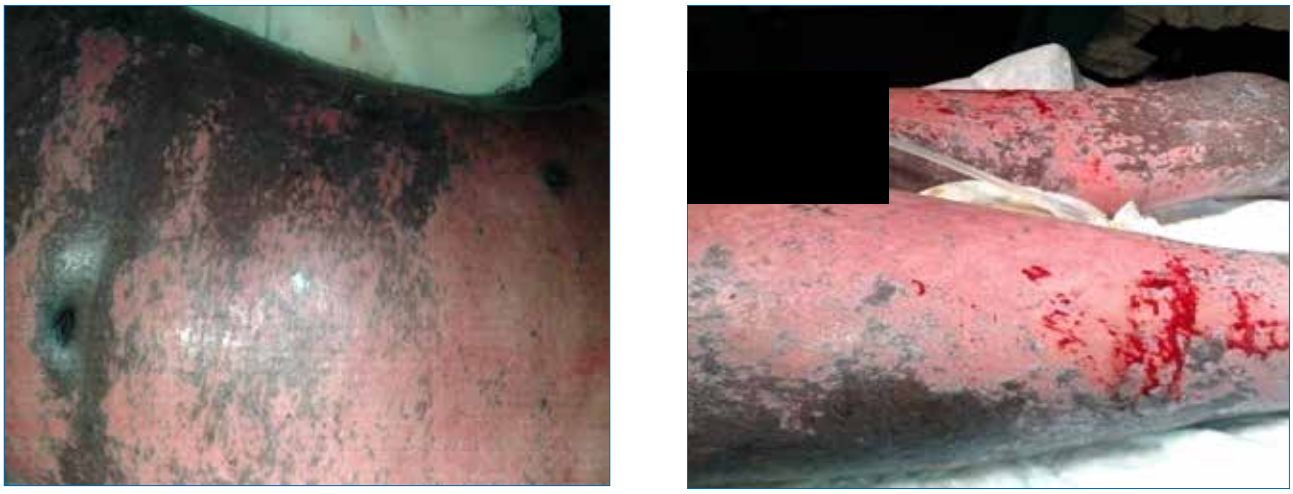

Figure 5. Patient depicted in Figure 1 with the majority of the wounds healed, with the exception of those on the thighs

Figure 6. Patient depicted in Figure 1 with wounds virtually healed after fourth dressing change (14 days after admission)

Figure 7. Patient with TEN and TBSA of about 75%

Figure 8. Patient depicted in Figure 7 with remarkable improvement in the wounds after two dressing changes (10 days after admission)

Figure 9. Patient depicted in Figure 7 with wounds virtually healed after 21 days except for a few hypergranulated areas on the back

Results

A total of 12 patients with TEN were managed by the authors between January 2010 and December 2016. The male:female ratio of the patients was 3:1. The age range of the patients was 22 to 43 years with a mean age of 29.5 years . Seven patients were receiving medication for treatment of malaria, three patients for epilepsy, and two for HIV-related complications. The TBSA of TEN ranged between 75% and 95% with a mean of 88% (Figures 1, 2, 7 and 10). All patients had surgical debridement of their wounds and dressings with Aquacel® Ag. The average number of dressing changes to full recovery was five with a range of four to six. The average hospital stay duration for all the patients was 27.8 days with a range of 24 to 36 days. Eleven patients recovered fully and were discharged. One patient died of HIV-related meningoencephalitis despite his wounds showing remarkable progress.

Discussion

Mortality in patients with TEN and Stevens-Johnson syndrome is closely related to the wound TBSA.[2,3,4,5] The more extensive the area, the higher the mortality. Other than the critical-care management encompassing airway stabilisation, fluid and electrolyte replacement, special attention must be focused on wound management. Wound management with appropriate dressing materials has been shown to reduce mortality in Stevens-Johnson syndrome and TEN.[6,7]

Despite recent advances in the management of most wounds, there is still no consensus on the best way to manage patients with TEN. The management options in the literature vary from open-dressing methods with application of paraffin/topical antibiotic creams, to closed dressings techniques which include nanocrystalline silver, amniotic membranes, collagen dressings, porcine skin substitutes and cadaveric skin.[3,4,5,6,7,8]

TEN wounds are characterised by extensive blistering and loss of the epidermal layer. There is intense inflammation resulting in excessive exudate. Exudate management is thus critical in ensuring rapid wound healing. Failure to manage the exudate would result in tissue maceration and bacterial colonisation. This would in turn lead to the conversion of superficial wounds into deep wounds with subsequent bacteraemia and septicaemia. An appropriate dressing material for these patients should thus be one with antimicrobial properties that can absorb the exudate while preventing bacterial colonisation.

Aquacel® Ag is a cellulose dressing material impregnated with ionic silver. The dressing is ideal for a moderately to highly exudative wound. The dressing, once applied to a wound, absorbs fluid quickly and turns into a gel. The gel produced traps sufficient moisture from the wound to allow for epithelialisation while preventing tissue maceration. This dressing may be left on the wound for up to seven days thus obviating the need for regular dressing changes. The other advantage of this dressing material is the presence of the ionic silver that provides its antimicrobial properties.

The use of Aquacel® Ag in the management of TEN was first reported by Shu Hung Huang, et al.[7] As described in their report, the authors applied Aguacel® Ag in patients with TEN with 85% TBSA, achieving complete healing of wounds within 15 days. In the series under discussion, all twelve patients showed a significant improvement of the wound epithelialisation within ten days (Figures 5, 8). However, complete wound healing was noted only at the end of the third to fourth week (Figures 6, 9, 10). There was no mortality related to TEN. However, there was one death due to Cryptococcus meningoencephalitis related to HIV.

All the patients under discussion had debridement done in theatre prior to dressing changes. There is no consensus on the role of surgical debridement in the management of TEN.[9,10,11,12,13,14,15] However, surgical debridement removes all non-viable and necrotic tissue and thus reduces the toxic bioburden from the wounds. The direct contact of the dressing with a clean wound after the removal of non-viable tissue also allows for the proper action of the dressing.

Figure 10A

Figure 10B

Figure 10A. Female patient with TEN and TBSA of about 90% – the majority of the wounds healed after four dressing changes (Figure 10B), day 23 post admission

In conclusion, the prompt and appropriate management of the skin lesions resulting from TEN may contribute to a decrease in the mortality of this severe cutaneous reaction, and reduction in the length of hospital stay. The dressing to be used should be one that can adequately remove the excessive exudate in the wound while allowing for epithelialisation of the wound, and that can prevent infection. The dressing should be easy to remove during dressing changes so as not to damage the epithelium. Aquacel® Ag, as used in this series, demonstrated rapid wound healing while reducing sepsis and mortality (mortality for TEN has been reported to be in excess of 40% in other series).[2,3,4] It can thus be considered an appropriate dressing material in patients with TEN.

Further work is warranted, however, preferably in the form of randomised controlled studies.

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