Secondary intention wound healing using hypochlorous acid dressings: case report

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Wound healing by secondary intention is often difficult and costly to treat, with most patients being managed by private nurse practitioners (PNPs) or primary care wound clinics. Daily or less frequent dressings are the most common treatment method used where primary closure was not possible or following wound dehiscence after surgery. In such instances, wounds remain open for an extended time, thus making them prone to infection, biofilm formation and inflammation, which delays healing. Herein, we present case studies exploring the use of a pharmaceutical-grade hypochlorous acid (HOCl) solution to facilitate wound healing through secondary intention with limited scar formation.

Keywords: biofilm, healing through secondary intention, hypochlorous acid, Trifectiv® Plus Wound & Burn Care, infection, inflammation, delayed healing.

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Introduction

Wound healing by secondary intention is often difficult and costly to treat, with most patients being managed by private nurse practitioners (PNPs) or primary care wound clinics.[1] Daily or less frequent dressings are the most common treatment method used where primary closure was not possible or following wound dehiscence after surgery.[2] In such instances, wounds remain open for an extended time, thus making them prone to infection, biofilm formation and inflammation, which delays healing.

Most wounds heal by primary intention where the edges of the wound are closed together, using sutures.[1] When an open wound heals from the base of the wound upwards, through the formation of new tissue, it is called "healing by secondary intention".[2,3] Wounds heal by secondary intention due to a variety of reasons. Large open traumatic wounds with tissue loss and surgical wounds resulting from drainage of infected abscesses are two examples of wounds that are better suited for healing through secondary intention.[2,4] Herein, we present case studies exploring the use of a pharmaceutical grade hypochlorous acid (HOCl) solution to facilitate wound healing through secondary intention with limited scar formation.

Clinical cases

Patient 1

An 86-year-old hypertensive female who was also suffering from dementia, a patient in frail care of a retirement facility, sustained loss of skin on her right knee from a fall. She was initially treated in the frail care facility by the nursing staff with daily dressings of povidone-iodine and gauze, retained with a crepe bandage. Treatment was continued in frail care. The first photo, on day 5, (Figure 1), demonstrated a large area of skin loss (11 x 12 cm) and the onset of inflammation, with no signs of healing. After that, HOCl 380 mg/L (available as Trifectiv® Plus Wound & Burn Care, Manufactured by Thoclor Labs, Stellenbosch) was applied to moist foam dressings (Allevyn®, Smith and Nephew) retained with a crepe bandage.

Wound progress

Daily dressings of HOCl-saturated foam retained with crepe bandage started on day 5 after injury. From day 14, a single layer of paraffin gauze was applied between the HOCl-saturated foam and the wound, to prevent the dressings from sticking to the wound base. The signs of inflammation diminished daily.

By day 25, healing through secondary intention is evident and the size of the wound had diminished to 8 x 4 cm.

Complete recovery of the wound was evident with very little scarring, after 39 days.

Patient 2

A 55-year-old male presented with an abscess on his left elbow.

Staphylococcus aureus was cultured from the puss on drainage of the abscess, and an area of non-viable tissue was excised, leaving an elliptical open wound of 5 x 4 cm. After surgery, the wound was irrigated with Trifectiv Plus® and packed daily with Trifectiv® wetted gauze dressings, retained with a crepe bandage. The dressings were changed daily, whilst the gauze was still moist.

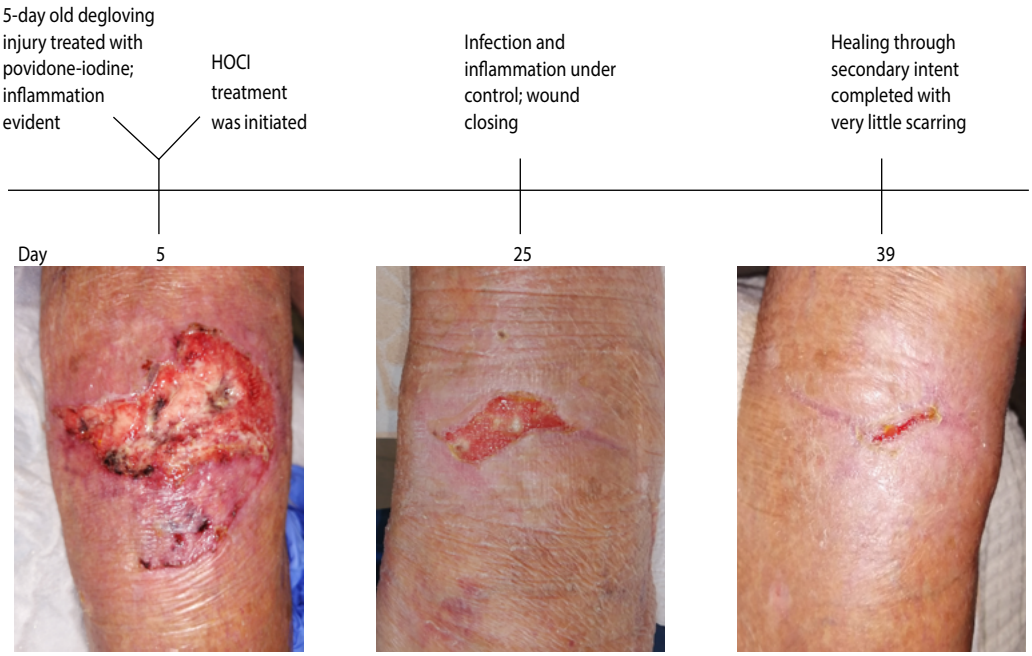

Figure 1: 86 year-old female who sustained a large area of skin loss on the right knee from a fall

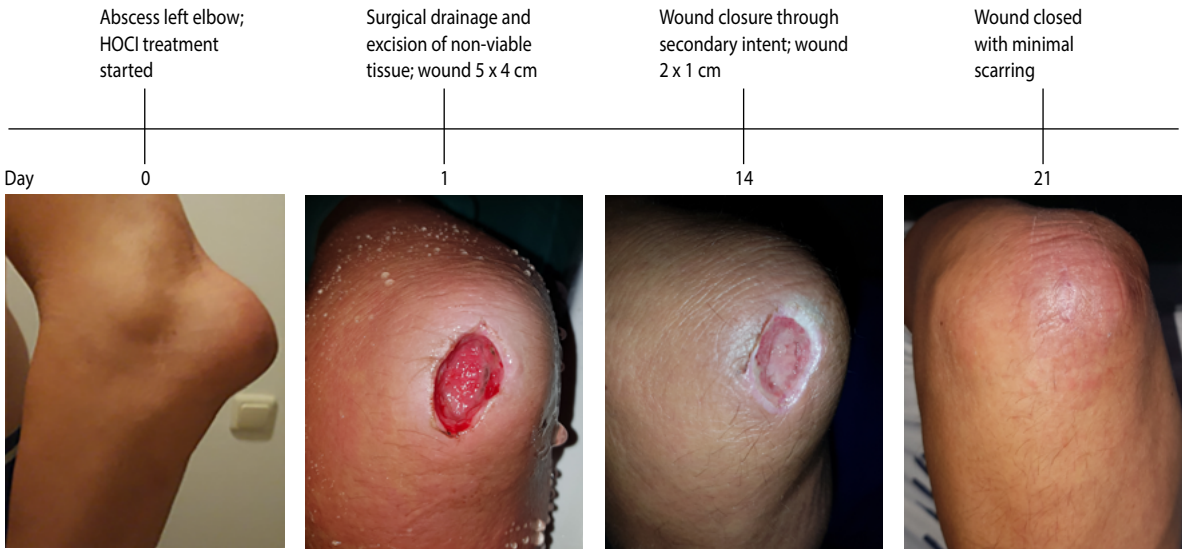

Figure 2: 55-year-old healthy male with a 5 x 4 cm excision wound on the olecranon aspect of his left elbow, after an abscess was drained at his local hospital

Wound progress

Starting from day 1, daily wound irrigation with Trifectiv® HOCl wet to moist gauze dressings packed into the wound.

By day 14, healing through secondary intent is evident as reduction in wound size to 2 x 1 cm (Figure 2). No signs of inflammation were present. Also by day 14, dressing routine was changed to a single layer of paraffin gauze placed between the HOCl-saturated gauze and the wound.

The wound was healed with little evidence of scarring on day 21.

Discussion

Open wounds are challenging to manage as they are often large, deep, prone to infection and produce copious amounts of exudate.[4] Usually, these wounds are managed with frequent dressing changes and sometimes painful packing of the wound. Different dressing options include simple dressings such as nonadherent gauze dressings and more modern options such as foam, hydrocolloid, alginate, or negative pressure dressings.[5] The rationale for choosing between these options and appending evidence of which is superior for applications is currently largely lacking. A Cochrane review found that gauze dressings might cause more pain than foam dressings.[6] A further review highlighted the lack of evidence concerning the relative effectiveness of any antiseptic, antibiotic, or antibacterial preparation for use on open surgical wounds.[7]

Open non-healing wounds are frequently infected with bacteria and biofilm or contain necrotic or other non-viable material, which leads to inflammation and proteolytic enzyme imbalances that favour tissue degradation over repair. Successful repair entails debridement of

the wound, control of infection and modulation of the inflammatory response.[8,9]

HOCl is active against pathogens, including multidrug-resistant bacteria, fungi and biofilms, together with demonstrating a strong anti-inflammatory effect.[10-12] It has also been proven to be non-cytotoxic.[13] HOCl increases oxygenation of the wound site to improve healing.[14] Considering these effects, HOCl provides an optimal wound healing environment which, when combined with foam dressings, may be a non-expensive and effective way of facilitating the healing of wounds through secondary intention and reducing scarring. HOCl also reduces odour and pain in the wound.[15] No resistance against the use of HOCl has been reported.[15] This makes topical HOCl a particularly attractive option for treating wounds that must heal through secondary intention.

HOCl demonstrates significant promise in the management of open wounds and is crucial to treat infection, including biofilm, to minimise inflammation and control scar formation.[14,16]

It also plays a significant role in controlling pruritis in the wound.[17] The management of scars is intimately connected to all stages of wound healing. Recent research suggests both hypertrophic scars and keloids are influenced by chronic inflammation of the reticular dermis.[18] Healing through secondary intent may be improved when wound inflammation and oedema is reduced, promoting uneventful healing of the wound. The reduction in inflammation from as early as possible can be expected to result in optimal scarring.[19]

Conclusion

HOCl can be a cost-effective, indispensable treatment method as an antiseptic and anti-inflammatory wound healing agent. As a scar management agent, it could play a role in preventing or minimizing aberrant scar formation. It could become a valuable adjunct for supporting wound healing and scar management.

Conflict of interest

HR is a Director of Trifectiv (Pty) Ltd. BK is a scientific advisor to Trifectiv (Pty) Ltd.

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None.

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