

Role of topical cholecalciferol (vitamin D3) in the management of electric burns

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Electric burns are known to be difficult in healing as well as wound management. Infection in such chronic wounds can be detrimental and hence needs to be controlled for faster improvement. These chronic wounds also lack various chemokines and growth factors and needs to be supplemented. This article highlights the role of topical cholecalciferol in the management of electric burns.

Keywords: Topical cholecalciferol, Electric burns

Introduction

Wound bed preparation is a novel concept in the realm of wound healing and has proven to be very useful to speed up wound healing. Infection control and supplementation of growth factors form an important part of it. Various modalities are involved for the acceleration of wound healing like autologous platelet rich plasma (APRP), platelet rich fibrin matrix (PRFM), topical insulin, prolotherapy etc. recently we have come across the use of topical cholecalciferol in the management of wound and we share our experience here. This is a single case study.

Materials and methods

This study was conducted in the department of Plastic Surgery at tertiary care center after getting departmental ethical committee approval. Written informed consent was taken from the patient. The details of the patient are as follows: 40 year old female without any known co morbidities with history of accidental electric burns from low voltage source and sustained circumferential 3rd to 4th degree burns over the left little finger with loss of vascularity of the distal area and 2nd degree burns over the medial aspect of the ring finger in the proximal phalanx (figure 1). Patient underwent little finger disarticulation after 1 week when the line of demarcation was developed and also raw area developed after debridement of the burns over the medial aspect of ring finger

(figure 2). Following the procedure, wound dressing was done regularly. She developed a raw area over the medial aspect of her ring finger which did not show any evidence of healing. Wound bed preparation was done for the patient using topical cholecalciferol (figure 3) as her ulcer failed to show any evidence of healing. After debridement of wound, cholecalciferol was applied topically (figure4) over the wound. Over that a non-adherent dressing was kept, and dressings were given. Repeat debridement was done on and cholecalciferol was applied topically every time the dressings were changed. Eight such sessions of cholecalciferol application were done over four weeks.



Figure 1. *Wound at the time of presentation*



Figure 2. *Raw area post disarticulation*



Figure 3. *Cholecalciferol for topical application*



Figure 4. *Topical application of cholecalciferol*

Results

The wound bed showed good granulation tissue (figure 5). Topical cholecalciferol was found to be helpful in wound bed preparation.



Figure 5. *Healed wound bed*

Discussion

Burn injury is a major cause of trauma to the human body, with an extended wound healing period. The mortality rate of burn injury has decreased with new treatment modalities, but prolonged healing periods still affect the morbidity rates. Electric burns causes both mortality and morbidity and can have varying effects on the body. The wounds are difficult to heal and may need added methods to facilitate healing. Many therapeutic methods are available to effect the wound healing such as the topical application of insulin, growth factors, negative pressure assisted wound closure, oxidized regenerated cellulose/collagen.

Vitamin-D or cholecalciferol is known for its role in calcium homeostasis. Apart from this, its role in immunomodulation has also been described. It has been found that Vitamin D is useful in healing of diabetic wounds when administered systemically.⁵ It also reduces inflammation associated with diabetic wounds. Literature also mention the use of cholecalciferol as a drug delivery agent and claim that it can help in the local wound healing. It has been found to improve corneal wound healing.⁶

Vitamin-D act as an antiproliferative, prodifferentiative, antiapoptotic and immunomodulator. Its therapeutic uses (topical and systemic) have been proved beneficial in various skin diseases. The vitamin-D enhance the production of anti-microbial peptides (AMP) like - defensin and cathelicidin. These AMP increase the keratinocyte synthesis and migration, and also increase the productions of the chemokines like IL-8. It also has an immunosuppressive action in the skin. It decreases the antigen presentation by its effect on Langerhans cells and by modulating cytokine production by keratinocyte cells.⁷

In this case, we have used vitamin-D granules in a case of electric burns wound. Various topical antimicrobial delivery systems are available such as gentamicin in collagen dressings, minocycline in chitosan-polyurethane foam, ofloxacin from silicone sheets, dialkylcarbamoylchloride in cotton wool dressing, etc.^{1,2} we have found better wound healing with the use of this regimen.

Conclusion

Cholecalciferol is found useful to facilitate healing in chronic wounds in our study. However the study was done on a single patient and needs large population based control trials to apply in clinical practice.

DECLARATIONS

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Author's contributions

All authors made contributions to the article

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Consent for publication

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