Negative Pressure Dressing for the Treatment of High-Voltage Electrical Burn Injury

To the Editor:

Topical negative pressure therapy is thought to have an important beneficial effect on promoting wound healing by the removal of interstitial edema, the increase in local blood flow, the stimulation of developing the granulation tissue, and the decrease of bacterial levels in tissues. With the mechanical tension generating from the subatmospheric pressure, tissues may directly stimulate for the cellular proliferation and regeneration, leading to rapid and easy wound healing, corresponding to the conventional dressing.[1–6]

In this study, it was used successfully for the treatment of deep burn wounds caused by high-voltage electrical injuries, which led to ongoing tissue necrosis, elevated compartment pressures, and deep tissue edema. A 30-year-old patient presented to emergency clinic, with high-voltage electrical burn to his both upper extremities and left foot. He had contacted with high-voltage electrical wire carrying more than 10,000 volts and seriously injured his extremities, resulting in contracted upper limbs. Also, his left foot had an extensive burn involving the bones, with nearly complete necrosis of fifth toe. Initially, management of the treatment consisted of fluids using a Parkland formula, and then, the patient underwent immediate fasciotomy with carpal tunnel release for both upper extremities and escharectomy for the left foot. In the following days, serial debridements were performed, leaving the fourth metatarsal bone exposed. On the fifth day after injury, necrosis of the both upper extremities and fifth toe became clearly significant, so upper extremities were amputated at a level of proximal arm. Amputation stumps were closed with posterior arm flaps. Fifth toe of the left foot was also amputated, and a vacuum-assisted dressing was applied to the wound, which involved an exposed bone on its base. Negative pressure was set to 125 mm Hg continuous pressure. On the fourth day after limb amputation, wound dehiscence developed in the right stump because of ongoing tissue necrosis. Therefore, he underwent another operation, which included extensive debridement of the stump necrosis and then closure of the wound with negative pressure dressing. Both wounds covered with vacuum-assisted dressing were followed carefully by daily examination. If necessary, surgical debridement was performed extensively, while dressing was being changed with 3 days intervals. Significant granulation tissue developed rapidly in the amputation wound within 12 days, which was sufficient to allow successful closure of the stump with secondary suturation of posterior arm flap. Negative pressure dressing on the left foot was maintained for 18 days until granulation tissue became apparent and covered the exposed bone sufficiently, then the wound was closed successfully with a split-thickness skin graft.

Apart from scald and flame burns, high-voltage electrical burn is a severely devastating injury, which results in damage not only to the skin but also to other tissues involving muscles, nerve, tendons, and bone. Management of these burn wounds is often different from other burns, because of the nature of the damage, which is deep, extensive, and particularly progressive. Negative pressure dressing seems to be a new and useful option in the management of high-voltage electrical burns. It helps not only to develop granulation tissue rapidly but also to accelerate coverage of an exposed bone with soft tissue.

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