Successful Treatment of Recalcitrant Chronic Diabetic Foot Wounds with Transdermal Continuous Oxygen Therapy: Reviving the Dead(wound)

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Background
It is estimated that 15% of all diabetics will experience diabetic foot ulcers in their lifetime. These ulcers often cause considerable pain and reduction in quality of life, are difficult to treat and some will not be healed even using many of today’s advanced, adjunct therapies that represent best practice. In our practice, dedicated to the treatment of diabetic foot ulcers, we often come across cases that have previously undergone many of these advanced wound treatments, without much success.

Recently we have been utilizing a new treatment to combat recalcitrant chronic diabetic foot wounds: Transdermal Continuous Oxygen Therapy (TCOT). The role of oxygen in wound healing is well documented in the literature. It plays a critical role in energy metabolism, neovascularization, fibroblast proliferation, polymorphonuclear cell function and collagen deposition. In addition, leukocytes kill bacteria most effectively when supplied with abundant oxygen. The rate of bacterial killing may be directly dependent on oxygen tension. Further studies suggest that Transdermal Continuous Oxygen Therapy may also improve other components of ischemic healing, including granulation tissue formation and reepithelialisation.

Transdermal Continuous Oxygen Therapy (as administered by EPIFLO®) is a unique way of administering oxygen to a wound. Unlike topical oxygen which is administered intermittently (2-3 hours per day, 4-5 times per week) within a small chamber and Hyperbaric Oxygen Therapy (HBOT) that provide oxygen in large stationary chambers at 2-3 times atmospheric pressure, Transdermal Continuous Oxygen Therapy utilizes a small oxygen concentrator allowing the patient to be ambulatory during treatment and receive continuous oxygen delivery while they are away from the clinic.

The following three cases illustrate the utilization and effectiveness of TCOT.

Case 1
84-year-old diabetic who presented with a neuropathic ulcer her right ankle with exposed bone at the surface. The wound progressed to a maximum size of 9.4 cm and failed to contract despite advanced treatment modalities to the point of necrosis and desiccation. EpiFlo was started after 6 months and within 2 weeks granulation tissue appeared and over the course of the next 4 months the wound fully healed without further sequelae.

Case 2
78-year-old diabetic with 8 month history of neuroischemic wound at a right great toe amputation site. Revascularization was not possible. Wound size had increased dramatically, despite stabilization attempts with Proviodine. EpiFlo was applied to the wound and over the course of the next 7 weeks granulation appeared. The wound contracted by 70% and subsequently healed over the next 18 weeks.

Case 3
78-year-old diabetic with past history of gross ischemia bilaterally with a previous above left AKA who presented with an 8-month history of gross ischemia in the right foot with second, third and fourth digit amputation site ischemic wound, showing desiccated, necrotic tissue in the base. Revascularization was not possible. The patient refused lower limb amputation. EpiFlo was started and within 3 weeks the wound had been rehydrated and began to contract, with the lateral aspect, near the fifth digit healing and obvious areas of granulation appearing in the base of the remaining wound. Unfortunately, the gentleman passed away in his sleep 2 weeks later.

Conclusions
The 4 cases in this small study indicate that Transdermal Continuous Oxygen Therapy (administered as EPIFLO®) shows great potential for wound healing in diabetic, ischemic, recalcitrant wounds that previously failed to progress despite aggressive use of advanced treatment modalities. A large multi-centre, double blinded, Randomized Controlled Trial (RCT) is underway to investigate the effect of EPIFLO® on diabetic foot ulcers vs. a control group receiving standard wound care. Further studies that would identify indications where EPIFLO® could be utilized as an adjunct or even primary therapy may be desirable and may allow clinicians to work towards healing wounds that were once believed to be untreatable or maintenance wounds. The portable nature of EPIFLO® makes it a preferable treatment modality for both clinician and patient alike.

References