Continuous Local Oxygen Delivery Promotes Wound Healing - A Case Report

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Introduction

Wound healing is a complex biological process that requires the coordinated delivery of oxygen and angiogenesis to the site of injury. Oxygen is necessary for the survival of normal tissue and the replacement of damaged tissue. Inadequate oxygen delivery to the wound site may impair healing and even lead to tissue necrosis. Oxygen therapy has shown promise in promoting wound healing in chronic wounds.

Materials & Methods

Our approach to oxygen treatment is the extraction of oxygen from the ambient air using an electrochemical reaction scheme. This method allows for the delivery of pure oxygen to the wound site, which may enhance wound healing.

Case Report

An 89-year-old white male in generally poor health presented to his dermatologist with a pressure ulcer on his left medial foot. The ulcer had not healed despite constant care and medical attention for two years and had progressed to osteomyelitis. The patient was in severe pain and unable to ambulate and was scheduled for amputation. Our approach to oxygen generation is the extraction of oxygen from the ambient air using an electrochemical reaction scheme as shown below.

In this scheme, oxygen in ambient air is reduced to water by the application of current from an external power source, e.g., a lithium battery. This process is illustrated in Figure 1.

Discussion & Conclusions

The use of oxygen as a therapeutic modality for chronic wounds is based on the understanding that tissue hypoxia is a significant factor in chronic wound healing. Oxygen therapy can promote angiogenesis and increase the supply of oxygen to the wound, which may enhance wound healing.

Device Application

Oxygen Delivery Bandage

- FDA Approved in the Spring, 2003
- Clinical Applications:
  - Chronic non-healing wounds
  - Burns
  - Infected stumps
  - Frost bite
- Device introduction June 2004

Use of an Oxygen Delivery Device for Venous Stasis Ulcers

Step One: Place the Epiflow™ cannula beneath an occlusive wound dressing near the edge of the wound bed.
Step Two: A protective gauze wrap is carefully wrapped around the leg. Care is taken not to kink the cannula.
Step Three: A Profore® compression dressing is secured to the leg. Again, care is taken not to kink the cannula.

Step Four: The Profore® dressing is a conformable protective bandage. Next, the Epiflow™ device is secured into place with tape.

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