

The Effects of A New high Glycerin Content Hydrogel Pre-molded Mask Dressing On Post Laser Resurfacing Wounds

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Abstract

Hydrogels are a three-dimensional network of hydrophilic polymers that are insoluble in water and are nondegradable. They interact with aqueous solutions by swelling to certain equilibriums dictated by their compositions, and thus, retain a significant proportion of water within their structure. This dressing contains a percent of glycerine as a major ingredient which provides bacteriostatic effects. The glycerin also appears to act as an immunomodulator. It appears to relieve the immediate pain of facial resurfacing as well as crust formation and itching. Preliminary studies have shown a significant increase in re-epithelialization of wounds.

The purpose of this study was to compare the efficacy of the new dressing against a placebo (Vaseline cream) after Erbium YAG laser resurfacing. Fifteen patients between the ages of 45-72 years of age with facial wrinkles were enrolled in the study. Patients then underwent full face Erbium YAG procedures. The wounds were then dressed: one side of the face was treated with Vaseline and the other with the new hydrogel dressing.

Introduction

Since control of evaporative water loss following skin injury is of major importance to the overall healing process, hundreds of clinical reports have appeared in various journals over the past thirty years verifying the value of various compositions of hydrogel wound dressings. In 1936 DuPont chemists synthesized poly-2-hydroxyethylmethacrylate, (the precursor to modern day hydrogels), but it was not until the 1950's that Wichterle and his co-workers first recognized the potential medical value of these unique hydrophilic polymers as a general surgical material.

This new dressing material is a hybrid hydrogel containing a blend of glycerin with synthetic hydrophilic polymers into a three-component system in which water enhances the compatibility and function of the dressing. The dressing utilizes various concentration of glycerin (up to 65% in some cases) as water soluble humectant in a mixture of 17.5% water and 17.5% of a polyacrylamide. Its protective properties are similar to other hydrogels, but due to its high percentage of glycerin, it exhibits additional desirable properties, such as bacteriostatic action which is absent in other types of hydrogel dressings.

Due to its high permeability, water content, and acceptable pH, the glycerin dressing can reduce the initial insult of laser resurfacing by protecting exposed neurons from dehydration³. Clinical experiences show that occlusively dressed wounds heal more quickly and with less pain, tenderness, and swelling than undressed wounds⁴. It has been hypothesized that wound dressings, by inducing a mild inflammatory reaction, enhance healing by activating cells, such as macrophages or fibroblasts, to produce growth factors and other mediators of the repair process⁵.

The purpose of our study was to determine the usefulness of this new dressing material in wound healing after laser resurfacing.

Materials and Methods

15 patients enrolled
Female ages 45-72
Skin Type 1 or 2
Photo-damaged skin
Glogau classification I to III
Pretreatment Regiment:
3-4 weeks
0.025% Tretinoin Cream
(Retin A)
4.0% Hydroquinone cream

Laser Treatment
Erbium YAG Combio 294 laser
Wave length 294
Energy -2.0 Joules
Spot size = 5 mm
3 passes: One at 2 joules. 2 at 1.5 J
lower eyelids = 1 joule, 1 pass
Anesthesia:
EMLA topical cream
MAC intravenous sedations

Post Surgical Dressing:
Vaseline Ointment- one half of
face
Cooled hydrogel mask-
other side of the face
Mask changes on 2nd and 3rd
days
Pre-op Medications:
Azithromycin 250mg
Valacyclovir 500mg

Observations:

Re-epithelialization time	Pigmentation
Pain	Erythema
Itching	Edema
Crust formation	Clinical Signs of Infection
pH	Wound Cultures

Results

Re-epithelialization	Prim Score	Itching Score	Crust Report
Pigmentation Grading	Erythema Grading	Edema Grading	

Discussion

Laser resurfacing has become a routine procedure for treatment of wrinkle removal and acne scarring. Skin rejuvenation procedures are expected to increase at a rate of 30% annually (Medical DATA International 1998). However, few studies have examined post surgical care. There is still no consensus as to the type of dressing or topical agents that would be most beneficial to promoting optimal healing. Current treatment options include:

- Open technique – viscous ointments (alone or in combination with wet soaks.)
- Closed technique - occlusive or semi-occlusive dressings.

Studies have shown that occluded wounds produce significantly less inflammation than wounds kept dry, also the rate of epithelialization is stimulated by a moist environment.

This half face comparative study evaluated the usefulness of a new high glycerine content hydrogel dressing(occluded wound) versus Vaseline(placebo: open wound dressing). Preliminary data on a porcine model showed increased re-epithelialization rates and thicker epithelium where the high glycerine hydrogel dressings were applied compared to Vaseline.

The speed of re-epithelialization of the hydrogel dressed wounds warrant some comment. In our preliminary porcine model study, which was conducted at the University of Miami, we also observed increased re-epithelialization rates similar to those observed in this study. In addition, we also observed a phenomenon, which to our knowledge has not been observed before in wound dressing studies. During the first twenty-four hours the glycerin based hydrogel lifted the non-viable tissue from the wound bed allowing the epithelium to migrate under the nonviable tissue creating a debridement effect.

In this study pain, crust formation, and itching ratings were significantly better under the gel than those compared to the Vaseline side. Mild erythema was noted on several patients on the gel side. We believe that the mechanical trauma of movement of the mask in those patients could have produced a mild irritation. It is also possible that the erythema could be a secondary effect from increased

neovascularization produced by the dressing. It is important to note that neither erythema or edema had a negative effect on the re-epithelialization parameters.

No clinical evidence of bacterial infections were found in any of the patients. This is contrary to the concern that increased infection rates occur with occluded wounds.

Conclusion

1. The one distinct advantage of the high content glycerine dressing over an open wound healing system is: an earlier re-epithelialization of the wound.
2. Occluded moist wounds facilitate the migration and proliferation of epithelial cells. At the same time there is an early recruitment of inflammatory cells accelerating the wound healing cascade.
3. Pain reduction and less crust formation were consistent parameters in the hydrogel occluded group.
4. Further studies are needed to evaluate the usefulness of this dressing material in laser resurfaced wounds. The possible debridement effect could have significant implications in achieving optimum cosmetic results.

Poster presentation: National Dermatology Meeting, March, 2000. Sponsored by Dermalabs, Inc.

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