THE EFFECTS OF HYCURE POWDER ON THE RATE OF WOUND CLOSURE IN DIABETIC MICE

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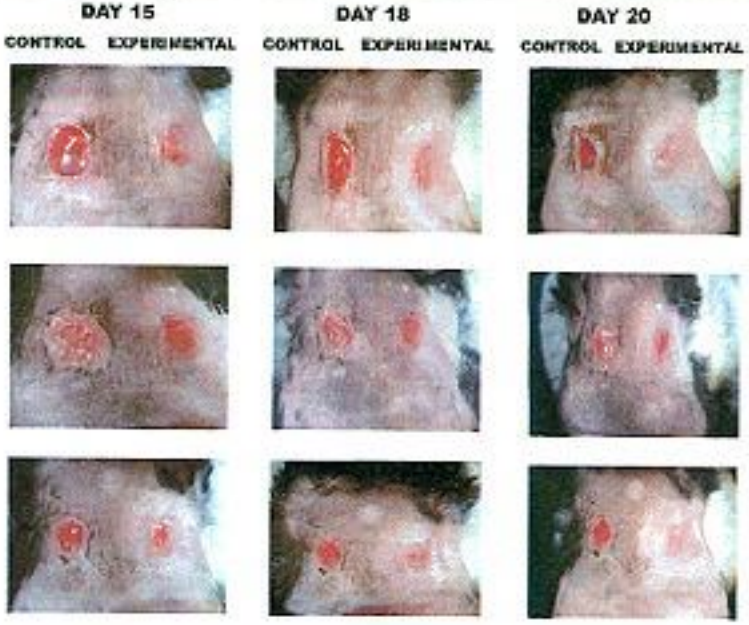
ABSTRACT

A commercially available hydrolyzed collagen powder (hyCure™) proposes to enhance the rate of healing in chronic wounds and dermal ulcers. The objective of this study is to evaluate the effect of topical application of hyCure powder on wound healing in diabetic mice. Twelve homozygous genetically diabetic female mice (BKS.Cg-m+/+Lepr<db>) 8-12 weeks old were used in this study. Two full-thickness surgical wounds (one experimental the other control) were made, one on each side of the dorsal midline of the mice. The dorsal surface was bandaged with a non-adherent pad (Telfa). Bandages were changed daily with the experimental wound receiving topical application of hyCure powder until complete closure of the experimental wound (approximately 30 days). Wound edges were serially traced onto transparency film everyday from Day 0 until wound closure occurred. The areas of the traced wounds were measured using a planimetry software program. Results show a consistent faster rate of closure in the experimental group versus the control as early as 11 days post injury. In addition, the physical appearance of the experimental group of wounds appeared cleaner and healthier during the course of healing.



RESULTS/DISCUSSION

The purpose of this study was to determine whether hyCURE powder, can accelerate the healing of full thickness wounds in diabetic mice. The data demonstrate that daily applications of hyCURE powder followed by bandage changes, enhance the healing rate. Clear differences in the extent of wound healing (expressed as a percentage of wound closure over time) were found between the wounds treated with hyCure powder and the control wounds.

Photographs of representative examples of diabetic animals during different time periods (15, 18 and 20 days) of healing are included for review.

As shown in the following graph, there was reduction in wound size within the experimental group when compared with those in the untreated group as early as 11days post wounding. This accelerated healing process continued throughout the experiment. In addition, the physical appearance of wounds receiving collagen appeared cleaner and healthier during the course of healing.

We concluded from these results that the application of collagen speeds up the process of healing in diabetic mice.

INTRODUCTION

Under normal situations, wound healing is a well coordinated process involving an overlap of inflammation, cell proliferation, matrix deposition, and tissue remodeling.

Complications in wound healing do occur and are typically seen in patients with diabetes. These healing complications slow the rate of healing thereby increasing morbidity and mortality rates, as well as length of stay in the hospital and associated expenses. Therefore, the search to accelerate deficiencies in the rate of healing has obvious importance

It is known that the process of healing can be influenced by a variety of factors such as collagen. There are a number of collagen-based products commercially available with hycure ™ being an example. A controlled study of hycure ™, a natural hydrolyzed collagen powder, does not exist. In addition, some of the methodologies incorporated in this study follow a pattern similar to what might be observed in a clinical situation.

We sought to examine the effects of topical application of Hycure ™ collagen powder on full-thickness wounds in diabetic mice utilizing daily dressing changes.

MATERIALS AND METHODS

Animals. Genetically diabetic (BKS.Cg-m+/+Lepr<db>) mice were obtained from Jackson Laboratories (Bar Harbor, ME). Mice were 8 to 12 weeks old weighing 35-45 grams and were individually housed in a central animal facility. Mice were maintained on a 12-hour light/12-hour dark cycle. Water and standard rodent laboratory food were offered ad libitum.

Wounding. Wounding was performed with the use of aseptic technique. Mice were anesthetized with sodium pentobarbitol. Two full-thickness surgical wounds 1.0 x 1.0 cm were made (one experimental the other control), one on each side of the dorsal midline, on twelve mice. The wound was bandaged with a non-adherent pad (Telfa) and taped to the back with Durapor 3M tape. Bandages were removed daily, wounds were traced and rebandaged and the experimental wound received the topical application of hyCure powder.

hyCure ™ (supplied by the Hymed Group) is a natural hydrolyzed protein (collagen) powder . It is a wound filler and exudate absorber. It interacts with the wound by forming a gel with the exudate, providing a moist healing environment.

Wound Analysis. Wound edges were serially traced onto transparency film on Day 0 and every day for the duration of the survival period or until complete closure occurred. The areas of the traced wounds were measured by planimetry and percentage wound closure was determined. The wound areas were standardized by comparison with the original wound size and expressed as a percentage of the wound closure:

$$\% \text{ Wound Closure} = [(\text{day 0 area} - \text{Day N area})/\text{Day 0 area})] \times 100$$

% WOUND CLOSURE