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Evaluation of scar quality after treatment of superficial burns of the hands and face with Dressilk or Biobrane—An intra-individual comparison

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ABSTRACT

Introduction: The aesthetic outcome after burn of exposed areas such as the hand and face is of high importance. A number of wound dressings used for the treatment of superficial and partial thickness burns promise rapid wound healing and reduced scarring. Previously, wound healing of hands and faces with superficial burns treated with Dressilk® compared to Biobrane® was evaluated intra-individually with similar results. Nevertheless, up to date objective information regarding the scarring after superficial burns treated with Dressilk® does not exist.

Methods: Therefore, 30 patients with superficial burns of the hand and face that were treated with Dressilk® and Biobrane® simultaneously were included in the study. An objective scar evaluation was performed analyzing melanin and erythema levels, skin elasticity, trans-epidermal water loss and scar perfusion three and six and 12 months after injury. Furthermore, a subjective scar evaluation was performed with the patient and observer scar assessment scale (POSAS) and the Vancouver scar scale (VSS).

Results: Dressilk® and Biobrane® both lead to an aesthetic pleasing outcome after superficial burns of the hands and faces. Regarding the objective scar evaluation only trans-epidermal water loss of burned hands after 6 months showed significant differences between the two dressings. However, these differences were not detected in the 12-month follow up examination. In the subjective scar evaluation no statistical differences could be found between the dressings. All patients stated high satisfaction of scar quality.

Conclusion: Dressilk® is an interesting alternative to Biobrane® for the treatment of superficial burns of aesthetic and functional important areas.

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1. Introduction

As scars especially of exposed areas like the hand and face are visible for everybody aesthetic outcome usually is of high importance to patients. Lawrence et al. showed in a survey with 361 burned patients a correlation between visible scarring and different aspects of the body esteem [1]. Moreover, he proved that visible scarring is associated with greater distress and is correlated with perceived stigmatization.

Furthermore, functionality especially of the hands needs to be preserved after burn. Post burn scar contractures can limit hand function and herewith activities of daily life [2]. Therefore, both scarring and functionality of post burn wounds, need to be evaluated in the long term. Up to date there is a lack of studies focused on the objective evaluation of scarring after burn treatment [3,4]. A number of wound dressings used for the treatment of superficial and partial thickness burns promise a fast wound healing and reduced scarring. There are many different wound care materials for the treatment of burn wounds. Directors of burn centers around the world understandably enough prefer tested "tried and true" material over newer dressings [5]. Nevertheless, there is a high quest finding functional and cost-efficient dressings.

Biobrane® (Smith and Nephew, United Kingdom) is a widely used [3,6–8] temporary wound dressing firstly introduced in 1979 [9,10]. It is a bio-composite dressing made from an ultrathin, semipermeable silicone membrane mechanically bonded to a flexible knitted tri-filament nylon fabric with porcine collagen type I [9]. It is able to temporarily substitute the epidermis and can be used for the treatment of superficial partial thickness to mid-dermal burns after early debridement as well as deep dermal and full thickness burns as long as autograft is unavailable or for graft reduction in areas where burn depth is unclear [9]. The nylon mesh peels of gradually when the new epidermis underneath is built. Biobrane® is often used for the treatment of superficial burns requiring a fast wound healing and reduced scarring [3,6,7]. Williams for instance proofed in a study about physical and quality of life after isolated hand burn of 52 patients that treatment with Biobrane® showed normal or near-normal values after 2 weeks to 1 months concerning pain, return to work/leisure, total active range of motion, grip strength and scar appearance [11]. Biobrane® used to be the standard treatment of superficial burns in our clinic. However delivery problems urged us to look for a functional and cost efficient alternative. In former studies pleasing results were found in the treatment of skin graft donor sites with silk.

Dressilk® (Prevor, France) consists of fibroin silk produced by silkworms. Silk as a relatively new biomaterial for wound dressings shows high potential [12–16]. It is proven to show less inflammation and better regeneration of collagen compared to hydrocolloids [17,18]. Furthermore, it has been tested in an animal model to work together with colistin effectively against wound infection [19]. Moreover, silk is semi transparent, which simplifies observation, is sterilizable and convinces with a reasonable price due to low production costs [18,20]. Costs for Biobrane® were approximately ten times higher than for Dressilk® in our clinic.

Therefore, we had decided to conduct a study comparing natural silk to Biobrane® in the treatment of superficial burns previously. Application did not differ between the two materials. Results regarding inflammation, pain, exudation and time to wound healing were pleasing, leading to a high subjective patient satisfaction [21].

Nevertheless, up to date no data evaluating the scarring after treatment of superficial burns of the hand or face with silk can be found. Therefore, we evaluated the long term scarring of the hand and face after treatment of superficial burns with Biobrane® and Dressilk®.

2. Methods

The present study evaluated the scarring of superficial burn wounds on the hand and face after treatment with Biobrane® and Dressilk®. Previously it had been reviewed and approved by the Ethical Review Committee of the University of Witten Herdecke, Germany (protocol number 35/2015) according to the declaration of Helsinki. Complete informed consent was obtained from all patients. A total number of 30 patients with superficial burns of the hand or face had been treated with Biobrane® and Dressilk® in an intra-individual study design. After inclusion in the study the burned wound had been debrided and cleaned according to our standard of care (SOC). Afterwards, half of the burn wound had been treated with Dressilk® and the other half with Biobrane®.

Then, 6 and 12 months later scar formation was evaluated in regard to (a) melanin and erythema level, (b) skin elasticity, (c) trans-epidermal water loss (TEWL), (d) scar perfusion, (e) patient and observer scar assessment scale (POSAS) and (f) the Vancouver scar scale (VSS). Furthermore, all scars were documented by standardized digital photography imaging.

2.1. Patients

During April 2015 and November 2015, 30 patients with superficial burns had fulfilled the inclusion criteria and were enrolled in the study. According to the treatment protocol they had superficial burns of more than 0.5% of the body surface area, were at least 18 years old and had agreed to be treated with both dressings simultaneously.

2.2. Scar evaluation

Follow-up examinations were performed 6 and 12 months after treatment. All follow-up examinations were performed in the same assessment room in a standardized manner. Patients were first placed physically inactive for at least 20 min. Treatment areas were identified on the basis of digital photo documentation taken post intervention. First scar quality was evaluated following POSAS and VSS individually. Thereafter, in order to minimize the inter-observer error, all measurements were taken by the same experienced user. Probes were held perpendicular to the skin while minimal pressure was applied to avoid skin or scar blanching. All measurements were performed three times.

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