BURNS XXX (2016) XXX–XXX

Available online at www.sciencedirect.com

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journal homepage: www.elsevier.com/locate/burns

Biobrane versus topical agents in the treatment of adult scald burns

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ARTICLE INFO

Article history:
Received 1 April 2016
Received in revised form
20 July 2016
Accepted 22 July 2016
Available online xxx

Keywords:
Biobrane
Scald lesion
Scald treatment
Adult scald
Burn wound infection

ABSTRACT

Background: Limited data is available for treatment of scald lesions in adults. The use of the biosynthetic matrix Biobrane® has been suggested as treatment option with more benefits over topical dressings. Application of Biobrane® in scalds in our center led to a perceived increase of infection, secondary deepening, surgery and length of stay. We therefore assessed the effect of different treatment options in adult scalds in our center.

Methods: We performed a retrospective cohort study of adult patients that have been admitted with scalds in our center between 2011 and 2014. We assessed two groups, group 1 with Biobrane® as initial treatment and group 2 with topical treatment using polyhexanid hydrogel and fatty gauze. Primary outcome variables were rate of secondary deepening, surgery, infection (defined as positive microbiological swabs and antibiotic treatment) and length of stay. Total body surface area (TBSA) as well as diabetes mellitus (DM), hypertension, smoking and alcohol consumption as potential confounders were included.

Results: A total of 52 patients were included in this study. 36 patients received treatment with Biobrane® and 16 with ointment and fatty gauze. No significant differences were found for age and TBSA whereas gender ratio was different (25/11 male/female in group 1 vs 4/12 in group 2, $p = 0.003$). Rate of secondary deepening, surgery, infection as well as days of hospital stay (DOHS) were comparable. Logistic and multilinear regression showed TBSA to be a predictive factor for infection ($p = 0.041$), and TBSA and age for length of stay (age $p = 0.036$; TBSA $p = 0.042$) in group 1.

Conclusion: The use of Biobrane® in adult scald lesions is safe and non-inferior to topical treatment options. In elder patients and larger TBSA Biobrane® may increase the risk of infection or a prolonged stay in hospital.

Level of evidence: Level 3 – retrospective cohort study.

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http://dx.doi.org/10.1016/j.burns.2016.07.022
0305-4179/

1. Introduction

Scald burns are frequent lesions among burn patients. The most common mechanisms of injury are spill or immersion scalds with hot water. Water has one of the highest heat transferring capacities and accounts for severe injuries [1]. Treatment algorithms for first and third degree scalds are well defined with topical treatment for the first and surgery for the latter. Second degree lesions (partial thickness) make these decisions more challenging, as they can vary from superficial second degree burns, that heal by conservative measurements, up to deep second degree lesions, which benefit from surgical treatment. Most of the national burn societies provide guidelines and suggestions with regard to general treatment of scalds depending on burn depths, without specific recommendations for one particular conservative treatment including the use of alloplastic materials, which is most likely due to missing data in this field [2]. Even though conservative treatment is recommended for superficial second degree scalds, these lesions can show ''secondary deepening'' or ''spontaneous conversion'' to full thickness second or third degree burns, which benefit from subsequent surgical treatment [3–5]. Potential risk factors for this phenomenon are unquantifiable lasting effects of hot liquid even after initial treatment, incomplete initial assessment, insufficient cooling, desiccation and infection [1,6]. Numerous treatment options have been established for treatment of partial thickness scalds. The application of biosynthetic matrices like Biobrane® for burns has been described with reduced length of healing, ease of use and improved patient comfort like pain reduction over standard topical treatment [7,8]. Most studies with Biobrane® are based on trials and experiences in child scalds though, as this patient group is more prone to this injury [9,10].

Albeit the advantages, the use of Biobrane® in adult patients with scald lesions in our center led to a subjective increase of secondary deepening, surgery, infection and length of stay. In order to overcome the ambiguity of scald treatment results we performed a retrospective analysis of our patient cohort. Here we assess the effectiveness of Biobrane® in comparison to topical treatment in adult scald lesions.

2. Materials and methods

In order to determine, whether the use of Biobrane® in scald lesions is inferior to topical treatment, we defined the null hypothesis as follows:

There is no difference between Biobrane® and topical treatment with regard to four primary outcome parameters: rate of secondary deepening, infection (as defined by presence of positive microbiological swabs and antibiotic treatment), number of surgical interventions as well as the days of hospital stay (DOHS).

2.1. Study design

We applied a retrospective single center data analysis using the hospital information system. All patients admitted and treated due to scald burns were included. Patients who succumbed to death during the stay were excluded, as were patients where time of injury to admission was greater 24 h or sufficient documentation was lacking. Data was assessed comparing two groups, patients with Biobrane® treatment (group 1) and patients with topical treatment (group 2). Apart from demographic characteristics (age, gender) the total body surface area (TBSA) and number of surgical interventions, rate of secondary deepening and infection (as defined by presence of positive microbiological swabs and antibiotic treatment) as well as DOHS as the primary outcome parameters were included. To evaluate potential effects of comorbidities, patient history of diabetes mellitus (DM), hypertension, smoking and alcohol abuse were recorded.

2.2. Patient treatment

On admission patients were seen in the hydrotherapy unit of the burn center by the attending and resident on duty. Depending on the general status of patient and surface of the affected skin, the patient underwent general anesthesia or analgo-sedation. After bathing and superficial debridement of the burn wounds, the burn depth was clinically assessed and in dubious cases confirmed via needle scoring. Dependent on the attending's preferences treatment was initiated either with application of Biobrane® biosynthetic dressing (fixed with staples or stripes) or topical treatment with Lavanid® ointment (polyhexanid hydrogel) and fatty gauze dressings. A sketch figure of each patient was designed, indicating all affected areas of the scald lesion and their assessed burn depth at time of admission. This figure was later used to compare the progress of wound healing at bed-side.

Patients treated with Biobrane® received daily changes of the superficial dressings in a standardized sterile manner. Staples were removed upon adhesion of the Biobrane®. It was cut back as soon as the underlying skin regenerated and the Biobrane® adhesion subsided. In areas with fluid collection the membrane was excised and topical ointment applied. Clinical signs (fever, chills, pus, large fluid collections under the membrane) and/or microbiological signs of infection led to complete removal of Biobrane® membrane. Targeted antibiotic treatment was initiated in case of both clinical and microbiological signs of infection. Areas of delayed healing or suspected areas of secondary deepening of the burn lesion also resulted in removal of the Biobrane® followed by subsequent surgical treatment. Secondary deepening was suspected when areas that have been defined as superficial second degree scald at admission did not show healing tendencies as the surrounding wound, reduced recapillarization showed and or scoring of the scald showed no bleeding in the course of hospitalization. Areas of full thickness or deep partial thickness burns received surgical necrosectomy with split-skin grafting.

Patients with local ointment therapy received daily dressing changes with antiseptic treatment of the affected skin using Octenisept®, followed by re-application of Lavanid® gel and fatty gauze dressings. Signs of infection and secondary deepening were treated as in the Biobrane group.

Please cite this article in press as: Krezdorn N, et al. Biobrane versus topical agents in the treatment of adult scald burns. Burns (2016), http://dx.doi.org/10.1016/j.burns.2016.07.022