Biobrane Dressing for Second Degree Burns in Children

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ABSTRACT

Objectives: Biobrane is a flexible biosynthetic wound dressing that is known for its success in the definitive management of partial thickness burns in many centers. The aim of the study was to conduct our experience with Biobrane dressing for second degree burns in children and to compare it with traditional dressings. Methods: A prospective study included children with second degree burns in whom Biobrane was used for dressing. Those were compared to children having the same burn degree where traditional dressing with silver sulfadiazine or nitrofurazone were used. Data analyzed using SPSS version 17. Results: Sixty-eight patients with age ranged from 2 to 12 years were included. Patients in the Biobrane group had statistically significant less dressing changes, less admission days and less time for re-epithelialization. 15.6% of patients in control group developed burn wound infection compared to 2.8% in the treatment group (P value = 0.062). Conclusion: When used in children with second degree burns, Biobrane could result in less healing times, less frequent dressing changes and decreased hospital stay compared to traditional dressings. Further research to clarify other outcomes is needed.

Keywords: Biobrane, Second degree burn, Re-epithelization

1. INTRODUCTION

Burn injuries are considered a devastating condition among other injuries, having a great impact on the patient’s physical, physiological and psychological aspects. Burns are still one of the top causes of death and disability in the world [1]. Local burn wound management is one of the most important aspects of burns therapy after the shock phase. Several methods of burn wound management are available today [2]. The most important principles are to keep the wound clean and moist during healing. The frequency of dressing changes can vary from daily to weekly and is determined by the product used and the amount of wound exudate. While health practitioners may favour a less expensive dressing, they should be aware that less frequent dressing changes and a lower chance of infection may make some relatively expensive dressings more cost-effective. As burns are very painful, fewer dressing changes, and therefore less associated procedural pain and distress, are highly desirable and may expedite healing [3].
Biobrane is a flexible biosynthetic wound dressing constructed of silicone bonded to woven nylon containing peptides derived from type I porcine collagen. The use of Biobrane has been shown to significantly reduce hospital stay, wound healing time, and pain in comparison to other dressings [4]. It is known for its success in the definitive management of partial thickness burns in many centers, is relatively inexpensive, easy to store, apply and fix, and reliable when used according to guidelines [5].

The aim of this study was to conduct our experience with using Biobrane as a dressing for second degree burns in children at our hospital. Also we presented a comparison of Biobrane with traditional dressing at the same institution.

2. METHODS

A prospective study in which children aged less than 12 years, with second degree burn presented to our hospital between September 2015 and September 2016, were included. Children with third degree burns, delayed presentation >24 hours or burns across joints were excluded from the study. This group was compared to other children with second degree burns seen by other surgical teams in the same period.

In the first (Biobrane) group, the wound is washed with normal saline and then a Biobrane sheet of suitable size applied directly to the wound with edge slightly beyond wound margin. No fixation techniques were used. Gauze is then spread over the sheet and conforming bandage is wrapped over the gauze. The patient was then seen after 48 hours and only the gauze and the bandage removed, wound checked for infection and abnormal discharge, and a new gauze and bandage applied. Again, the patient is seen one week and two weeks later. The Biobrane started to slough off and removed when epithelialization is complete. In the second (traditional dressing) group, antimicrobials like silver sulfadiazine and nitrofurazone with gauze were used as burn dressing. The dressing was changed daily or every other day until epithelialization was completed.

Information collected include: age, sex, burn total body surface area, number of dressing changes, time to full epithelialization, whether patients used alternative homemade therapies, admission days and development of wound infection. Data analyzed using SPSS version 17. Descriptive statistics and student t tests were used for means and frequency calculations. Chi square and logistic regression was used for binary variables while linear regression was used for other variables. P value less than 0.05 was considered statistically significant.

3. RESULTS

Sixty-eight patients were included, 36 in the Biobrane group and 32 in the control group. Patients characteristics are shown in table (1). There were no statistically significant difference between the two groups in terms of age, gender or burn total body surface area.

<table>
<thead>
<tr>
<th>Table (1): patient's characteristics</th>
<th>Biobrane group</th>
<th>Control group</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>25</td>
<td>18</td>
<td>0.26</td>
</tr>
<tr>
<td>Female</td>
<td>11</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Age(years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>6.3</td>
<td>5.7</td>
<td>0.56</td>
</tr>
<tr>
<td>Range</td>
<td>2-12</td>
<td>2-11</td>
<td></td>
</tr>
<tr>
<td>Burn surface area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>15</td>
<td>13.5</td>
<td>0.35</td>
</tr>
<tr>
<td>Range</td>
<td>9-22</td>
<td>9-21</td>
<td></td>
</tr>
<tr>
<td>Number of dressing changes</td>
<td></td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Mean</td>
<td>3.5</td>
<td>6.75</td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>2-5</td>
<td>4-9</td>
<td></td>
</tr>
<tr>
<td>Time to reepithelialization mean(days)</td>
<td>15</td>
<td>18</td>
<td>0.006</td>
</tr>
<tr>
<td>Use of homemade alternatives (n/%)</td>
<td>0/0%</td>
<td>5/31%</td>
<td>0.045</td>
</tr>
<tr>
<td>Admission days</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>1.07</td>
<td>2.7</td>
<td>0.003</td>
</tr>
<tr>
<td>Range</td>
<td>0-2</td>
<td>0-5</td>
<td></td>
</tr>
<tr>
<td>Infection rate(number)</td>
<td>2.8%(1)</td>
<td>15.6%(5)</td>
<td>0.062</td>
</tr>
</tbody>
</table>

Patients in whom Biobrane dressing was used had statistically significant less dressing changes, less admission days and less time for re-epithelialization compared to patients received traditional dressing. None of patients in Biobrane® group had used homemade alternatives compared to 5 patients in the control group. Compared to 5 patients (15.6%) in control group, one patient in Biobrane® group developed burn wound infection. Of note, a strong positive correlation was found between use of alternative therapies and risk of burn wound infection (correlation coefficient=0.745, P value <0.001).

4. DISCUSSION

Burns are serious health problems and are the most frequent injury among pediatric patients [6]. The majority of burn injuries sustained by children occur at home as the result of an accident, thus most of these injuries are preventable. All cases require some degree of medical attention and many patients suffer morbidity or even die [7]. Burns that are classified partial thickness or second degree can be superficial when reaching the epidermis and superficial dermis, showing hypersensitivity and pain, or deep when it extends to the deepest layer of the dermis and may have reduced sensitivity with red and/or white coloration of the tissue [8].

One of the most important aspects in burn wound care is proper dressing. Proper dressings should cover wound surfaces, resist bacterial invasion, prevent infections and most importantly, participate in the process of wound healing, without toxicity or adverse reactions [9]. The limitations of conventional dressings (Paraffin gauze, silver sulfadiazine...etc), improvements in technology and advances in our understanding of wound healing have led to an enormous expansion in the range of dressing options that can be used. The range of dressings now available can be sub-categorized into different types based upon the materials used in their manufacture. These sub-categories can include: films, foams, composites, sprays and gels. Also available as an alternative to traditional gauze dressings are the biological skin replacements and the bioengineered skin substitutes, including autologous cultured and non-cultured products, and the newer biosynthetic skin dressings such as Biobrane [10].

Dr. Woodroof revolutionized burn care in 1979 when he created Biobrane, the first biosynthetic wound dressing cleared by the FDA. It is a bilaminar material composed of an outer silicone film with partially embedded nylon. Porcine type one collagen is incorporated into both components. The collagen peptides bind to the wound surface fibrin and so act as a dermal analogue. Re-epithelialization is thus facilitated which results in spontaneous detachment of the Biobrane once complete [11,12].

The use of Biobrane has many benefits over traditional dressings. It is a lightweight material and is packaged and stored as dry sheets or gloves and has a long shelf-life [13]. In our study, patients in whom Biobrane was used needed less frequent dressing changes, less admission time and re-epithelialized faster. This was consistent with other studies [4,12,14,15,16,17,18,19,20,21,22]. Also, others have shown that Biobrane decreased extracellular water loss from burns and donor sites, can act as a base for growing cultured keratinocytes, and may serve as a triage and transport option for severe burns in the military and mass casualty settings [16, 23, 24]. Although not included as outcome variable in our study, pain was noted to be much less with Biobrane than traditional dressing. This holds true when considering the significantly lower frequency of dressing changes. Also, removing Biobrane after re-epithelialization was almost painless. In a study comparing Biobrane with silver sulfadiazine in 56 burns [25], using a pain scale of 1 to 5, the Biobrane group averaged lower pain scores compared to silver sulfadiazine group (1.6 ± 0.8 vs 3.6 ± 1.3, P < 0.001) and used less pain medication. Another study comparing the same products in 20 patients with second degree burns showed that pain scores were reduced by 54% in the group treated with Biobrane [19].

The incidence of burn wound infection with Biobrane was reported to be from 0.7 to 10% [12,13,18,26]. In our study, only one patient in the Biobrane group developed burn wound infection while 5 out of 32 patients in traditional dressing group got infection, however, this did not reach statistical significance. Of note, there was a strong positive correlation between infection and use of homemade remedies, using these remedies was only seen in patients using traditional dressing. This may be explained by the adherence of Biobrane® to the wound and the decrease need for painful dressing changes.

This study was not without drawbacks. First, it had a small sample size. Second, pain as outcome variable was not included and third there was not an analysis for the cost effectiveness of the intervention in both groups.

5. CONCLUSION

The use of relatively newer agents for burn management such as Biobrane could result in better outcomes in terms of healing times, need for frequent dressing changes and duration of hospital stay compared to traditional dressings in children sustained second degree burns. In addition, use of Biobrane may have beneficial effect in when considering pain magnitude, need for analgesics and infection rate, however, more studies with larger sample sizes are needed in these areas. Further research is also needed to clarify the cost effectiveness of such treatments.

REFERENCES