

## Evaluation of the Role of a Hydropolymer Dressing (Tielle\*) in the Management of Split-Skin Graft Donor Site: Results of a Clinical Study

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### ABSTRACT

**Objective:** A prospective, randomized, clinical study was conducted to evaluate the impact of Tielle\* on wound healing in donor sites of split-thickness skin grafts. Tielle\* represents a hydropolymer, absorbent, synthetic wound dressing.

**Methods:** 20 burn patients who were treated with split-thickness skin grafts and with age ranging between 12-59 years ( $34\pm 6.8$  years) were included in the study. Donor sites of skin grafts were randomly selected. Dressing change was carried on 3-5 days basis until complete re-epithelialization becomes evident. The study focused on healing time, patient pain score, and ease of care.

**Results:** As regards healing time, it ranged between 8-12 days ( $8.8\pm 1.2$  days). Pain scores for patients treated with Tielle\* were significantly low ( $p=0.0002$ ). The material showed excellent plasticity with adequate exudate control and adherence to wound surface. In addition, wound areas treated with Tielle\* required 1-3 dressing changes from primary application to complete re-epithelialization. It also demonstrated excellent ease of care both during application and removal.

**Conclusion:** Tielle\* represents a solid, reliable epidermal skin substitute with impact on wound healing, patient comfort and an excellent applicability. The material effectiveness contributes to the reduction of overall treatment costs.

### INTRODUCTION

Management of donor site of split-thickness skin grafts ranges from simple paraffin gauze to synthetic materials, and has always been a focus of dressing comparison studies and is a source of lively debate [1-5]. In certain patients, healing time of skin donor sites may determine the number of days spent in hospitals. Furthermore, in burn patients, survival can depend even on donor site healing [6]. Thus, it is of major interest that such donor sites heal as quickly as possible and offer the option of re-harvesting if necessary [7].

Many dressings have been introduced to the market with the claim of providing a protective barrier while re-epithelialization of the donor site

takes place. The ideal dressing material should be occlusive in order to provide a moist bacteria-free environment that enhances re-epithelialization, and be absorbent to remove the fluid exudate while maintaining stable wound adherence that minimizes interference with regenerating epithelium [8].

Tielle\* (Johnson and Johnson Medical Ltd, London, UK), a newly developed synthetic material, is an island dressing with a multi-layered structure consisting of a thin sheet of hydrophilic absorbent polyurethane foam applied to the centre of thin polyurethane foam membrane coated with an acrylic adhesive. A piece of non-woven fabric located between the foam island and the adhesive backing acts as a wicking layer and facilitates uniform dispersion of exudate throughout the absorbent layer [9].

It provides an exudate handling system for low to moderately exuding wounds. It also provides a moist environment, thus encouraging auto-debridement that in turn provides wound healing under optimum conditions [10,13,15]. The Tielle\* dressing forms a highly absorbent gel that facilitates its removal, thereby reducing trauma during dressing changes.

After reviewing the literature on the current techniques for dressing skin graft donor sites [10-18], we report our experience with the new dressing material Tielle\*, a hydropolymer, absorbent, synthetic wound dressing, in the management of skin donor sites of burn patients requiring skin grafting.

### MATERIAL AND METHODS

The prospective, randomized, clinical study was performed during a 6-month period of time in the Burn Unit at the Ain Shams University Hospital. The study included 20 adult acutely burned patients [19].

*Eligibility and treatment protocol:*

Skin donor sites measured at least 8 X 4cm or larger, and were located whether on the anterolateral or anteromedial thigh. In all patients skin harvesting was performed with a hand-held skin graft knife using a fresh cutting blade each time. Treatment consistency was achieved by always harvesting in one-pass technique performed by the same surgeon and an assistant who was responsible to flatten convex donor surfaces. The most common cut depth was 0.15-inch. Prior to dressing application, a gauze soaked in 1/20,000 epinephrine-saline solution was temporarily applied to the freshly harvested donor sites for haemostasis for 15 minutes.

Thereafter, the material was inspected and/or changed at 3-5 days intervals until evidence of complete re-epithelialization.

Patients' pain sensation was recorded on a daily basis by using the "Four-point scale" poor to excellent. Swabs for bacterial examination were taken in case of clinical signs of infection. This protocol was performed on a daily routine over a period of 10 days and/or until the dressing fell off.

Photographs were taken before, during and after healing. No topical or prophylactic antibiotics were utilized.

*Data collection:*

Data were collected to evaluate the impact of Tielle\* on the following factors: Time for complete re-epithelialization, pain score and ease of care.

Wounds were considered to be re-epithelialize completely when there was no residual exudate and they were no longer painful when exposed to air [10,13,15].

*Statistical analysis:*

Statistical analysis was carried out by using the MedCal® system for windows, version 1.02 (inde-

pendent sample test). Significance was defined by the *p*-value ≤0.05.

**RESULTS**

A total of 20 patients (8 males, 12 females) with age ranging between 12-59 years with a mean age of 39.6 years were included into this study. All enrolled participants completed the study except 3 cases of infection with pseudomonas aeruginosa who were withdrawn from the study and treated conventionally. The percentage TBSA of patients ranged between 5-15% (9.2±2.1%).

Donor site areas treated with Tielle\* demonstrated re-epithelialization within 8-12 days with a mean of 8.8 days (Fig. 1).

Pain assessment was performed on a daily basis over a period of 10 days using the "Four-point scale" poor to excellent. The mean 10-day pain score was moderate. These scores were statistically significant (*p*=0.0002) (Chart 1).

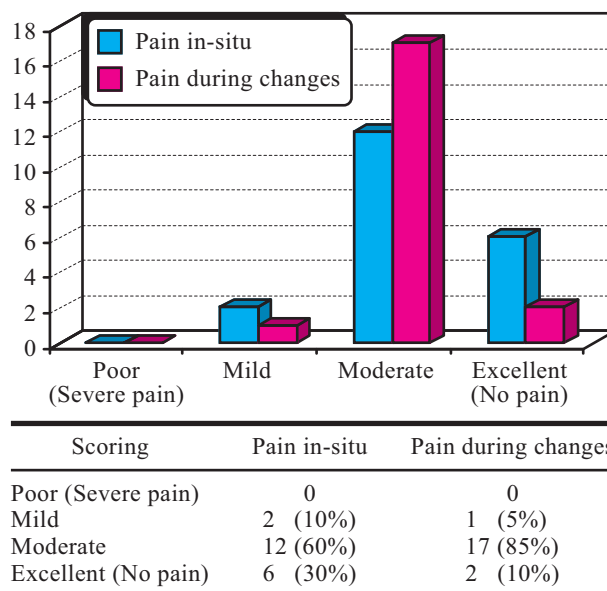


Chart (1): Pain scores in removal in 1<sup>st</sup> dressing and final removal after healing.

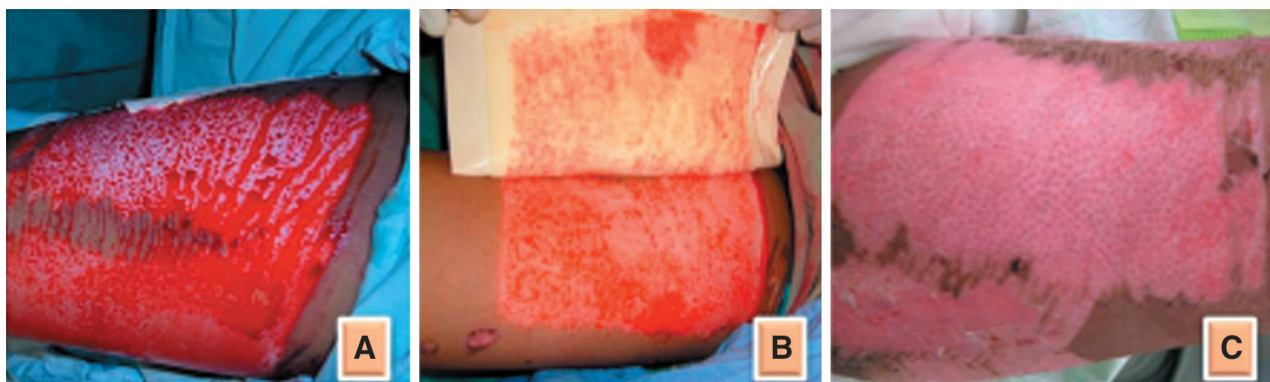


Fig. (1): (A) Harvesting STSG, (B) Application of Tielle\*, (C) 9<sup>th</sup> postoperative day.

Concerning the frequency of dressing changes, all patients enrolled required 1-3 changes from initial application to complete re-epithelialization. Dressing was changed if there is leakage of exudates from edges or the dressing was saturated by exudates as indicated by darkness of the central part of the applied piece. None of the patients required pain medication during dressing changes.

During the treatment period no allergic reactions were recorded to the dressing. Throughout the study, Tielle\* application exhibited excellent membrane elasticity with perfect adherence and adaptation to the wound. The material kept the wound bed covered also during mobilization.

### DISCUSSION

When selecting the ideal wound dressing for skin graft donor sites the goals are promotion of re-epithelialization, minimization of pain, and reduction of patient discomfort. Taking these qualities into account, numerous new wound dressings have been developed and introduced into the medical field [8,20-22].

For years, fine-mesh gauze dressings have been the primary choice of surgeons for coverage of skin donor sites given their ease of application, low risk of infection, and minimal cost [23]. In 1962, Winter [24] showed that the outer eschar layer of the wound allows for quicker healing by maintaining a moist wound environment. Since then, there has been a growing body of evidence suggesting that moist wound environment allow faster epithelialization and healing of partial-thickness wounds [13,15]. This concept seems to be supported by evidence from many skin-graft donor site studies which have shown faster re-epithelialization rates when moist-environment dressings are compared with the traditional dry dressing [10,15]. The main problem with this approach has been a need to change the dressing frequently because of excessive fluid accumulation under the dressing, which eventually leaks from the most dependent portion of the dressing. Solutions to this problem included catheter aspiration of fluid from under the dressing or changing the dressing when the fluid re-accumulates [10,12-14,16].

In this study, we evaluated the efficacy of the newly developed synthetic hydropolymer dressing (Tielle\*) in management of split-skin graft donor site. For this purpose, 20 randomly selected burn patients, admitted for split skin grafting to the Ain Shams University Burn Unit over 6 months, were enrolled.

Tielle\* demonstrated re-epithelialization within 8-12 days with a mean of 8.8 days. The faster re-epithelialization rate that had been seen with the Tielle\* dressing can partially be explained by its physical properties that promote epithelial proliferation and migration to be optimal in a moist environment [2].

On the other hand, analyzing the pain score over a 10-day period revealed a significant lower pain score for Tielle\*. We hypothesize this outcome to be due to the combined occlusive nature and soothing effect of moist environment (pain with dressing in situ), as well as the ease of handling of the material during application and removal (pain during changes).

The tested material also showed to provide adequate handling of wound exudate with minimal if any side leakage, thus preventing cumbersome maceration of the surrounding healthy skin. This finding together with the perfect wound adherence and product plasticity were all assumed to contribute to significantly less frequent dressing changes, and improved overall patient compliance as concerns wearing comfort.

Regarding treatment costs it has been demonstrated that Tielle\* decrease the overall treatment costs. This seems to be related to the less need for dressing changes, and pain medications that both contributed to an increased cost-benefit ratio.

By providing an optimal environment for wound healing and by minimizing patient discomfort and inconvenience, it seems obvious that Tielle\* can be considered a reliable alternative tool in the armamentarium of management of split-skin graft donor sites.

#### *Conclusion:*

The hydropolymer dressing (Tielle\*) proved to have an excellent applicability and positive impact on wound healing process for split-skin donor sites. However, it is likely that future research might enable to compare the material with the other available synthetic dressings and also to determine its impact on long-term cosmetic outcome.

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