

Application of Honey and Transparent Dressing to Split Thickness Skin Graft Donor Site and Its Effect on Epithelialization Rate

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Background: Split thickness skin graft (STSG) is one of the modalities used to close a defect. The donor site can be healed secondarily with tulle grass and moist gauze after 14 days and with transparent dressing will take about 10-13 days. Recently the wound healing by using honey application has been used. Whether or not using honey application with transparent dressing will hasten the epithelialization rate of the STSG donor site is now in question.

Method: This research is an open, non-randomized clinical trial with a parallel design and intervention using honey application with transparent dressing. A total of 19 patients (7 female and 8 male) were included in this study. The reapplication of honey was done every two days. The patients was followed up every day, with clinical photograph taken and complaints such as pain, odor and infection noted.

Results: The mean epithelialization rate of the donor site treated with honey and transparent dressing was 9,74 ($\pm 0,24$) days compared to 10,79 ($\pm 1,23$) days in the transparent-dressing-only group ($p=0,00$).

Conclusion: The application of honey with transparent dressing to cover for STSG donor site led to a faster epithelialization rate, less odor and less pain. Commercial honey was used, and readily available.

Keywords: split thickness skin graft donor site, epithelialization, transparent dressing, honey

Latar Belakang: Split thickness skin graft (STSG) adalah salah satu modalitas utama dalam penutupan suatu defek. Penyembuhan daerah donor yang dirawat dengan tulle yang ditutup kassa lembab tercapai dalam 14 hari, dan 10-13 hari bila dengan balut transparan. Akhir-akhir ini penggunaan madu dalam perawatan luka mendapatkan perhatian khusus meskipun hal ini bukanlah sesuatu yang baru. Dipikirkan aplikasi madu pada jenis luka akut seperti luka donor STSG, diperkirakan penggunaan madu yang ditutup dengan balut transparan bisa mempercepat proses epitelisasi pada daerah donor.

Metode: Penelitian ini adalah uji klinis non-acak, terbuka (open, non-randomized clinical trial) dengan disain paralel dan intervensi berupa pemakaian madu yang ditutup balut transparan. Sebanyak 19 pasien (7 pasien perempuan dan 12 laki-laki). Reaplikasi madu dilakukan setiap 2 hari sekali. Pasien di follow up setiap hari, dilakukan pengambilan gambar, dan keluhan seperti nyeri, bau, dan infeksi dicatat.

Hasil: Rerata waktu epitelisasi pada luka donor yang dirawat dengan madu dan transparent dressing adalah 9,74 ($\pm 0,24$) hari, dibanding 10,79 ($\pm 1,23$) hari pada luka donor yang dirawat dengan balut transparan biasa adalah ($p=0,00$).

Kesimpulan: Penggunaan madu yang ditutup transparent dressing sebagai metode perawatan luka donor STSG terbukti memberikan rerata epitelisasi lebih cepat, tidak bau, dan tidak nyeri. Madu yang digunakan merupakan madu komersial yang mudah didapat dan terjangkau.

Wound is a condition where there is a discontinuity of tissue that can be caused by many things. For a superficial wound such as in STSG donor site the epithelialization depends on the self healing process. Many problems due to the complexity of the wound itself will need proper treatment so the healing process begin.^{1,2} There are many ways to treat a donor site wound, but researches have shown moist environment will

be better in promoting the healing process compared to a dry environment. The media used can be a paraffin-tulle, tulle that contain antibiotics, and transparent dressing.³

A study by Potter (1998) also showed that epidermal migration on superficial wound will be faster in moist condition compared to dry conditions thus further develop the modern wound dressing method.⁴ Another study done by observing the donor graft site with

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lipidocolloid tulle proven to be less pain, and non sticky compared to paraffin-tulle thus the newly formed epitel is not disrupted (Eko Harihadi, 2009).⁵

Honey has long been used as one of the treatment for wounds. Peter Molan, a researcher from Waikato University, New Zealand, honey will clear the wound from infection and promote the healthy granulation tissue.⁶ Most studies used commercial honey for wound treatment compared to medical honey. Even though both have differences relating to the bacterial spores but the application itself has a relatively same effect.⁷ Pure honey has an antibacterial effect to several pathogenic microorganism such as *Salmonella spp*, *Shigella spp*, *Escheria coli*, *Vibrio cholera*, *Helicobacter pylori* and other gram positive and negative bacterias. Honey has even been studied to have a potential to inhibit the growth of *Pseudomonas aeruginosa*, *Methicillin Resistant Staphylococcus aureus* and *Vancomysin resistant enterococci*.^{8,9} Honey can promote epithelialization, affordable and easy to get.¹⁰⁻¹² So the author decided to study the effect of honey in promoting wound healing in STSG donor site.

METHODS

This study was designed according to, and approved by the local medical ethics committee. An open, non-randomized clinical trial with a parallel design with intervention of honey application with transparent dressing was done. The study was done by taking samples from Cipto Mangunkusumo Hospital-Jakarta, Gatot Soebroto Hospital-Jakarta, Persahabatan Hospital-Jakarta, Sardjito Hospital-Yogyakarta, Kariadi Hospital-Semarang.

From March to April 2010, every patient that was done a STSG in the previously mentioned hospital was taken into the study. The inclusion criteria was a male or female patient from the age of 15 to 60 years old and willing to be included in this study. The patient was excluded from this study if the patient had a liver or renal disorder, receiving steroid or chemotherapy, diabetic patients with uncontrollable blood glucose, shock, septic or

unwilling to be included in this study. Each patient will have two intervention, half of the donor site wound will be treated with honey and transparent dressing (the subject of this study), while the other half will be treated with transparent dressing only as a control.

We collected the samples age and gender, after that the epithelialization rate and depth of the donor site wound. For taking the graft we used a Humby graft knife with dermatome scale 0.6. After that we used a transparent dressing and local honey (Nusantara) which has been registered at POM with affordable price and easy to get. On top of the transparent dressing we used elastic bandage.

From the samples we divided the donor site wound into two parts, one was treated with honey and transparent dressing and the other with transparent dressing only as a control group. The honey was reapplied every two days, and the epithelialization rate was observed everyday by clinical examination after the wound is cleaned. When there was doff coloring, no blood, and pale color then its considered full epithelialized. The observation was done by two observer that has not been told which part has been given honey treatment (single blind).

The data was analyzed with SPSS program version 17.0. The analysis included a univariate analysis on each variable study to see the distribution and percentage. The bivariate analysis was done to see the connection between the epithelialization rate and the treatment used. A Wilcoxon test was used to compare the epithelialization rate between each group.

RESULTS

The samples were taken from April to May 2010 from a few hospitals in jakarta such as Cipto Mangunkusumo Hospital, Persahabatan Hospital, Gatot Soebroto Hospital and also involving other hospitals outside of jakarta such as Kariadi Hospital and Yogyakarta Hospital. We included 19 patients in this study (Table 1). Seven of them were female and 12 were male. Each patient received the same treatment which is the donor site for



STSG was divided in two section given two kinds of treatment. One section was treated with honey application with transparent dressing, and was done reapplication of honey together with dressing changes every two days. The second section was only treated with transparent dressing as a control group. Photograph was taken for both section everyday with the same camera to skin distance using the same camera with no flash.

The evaluation for epithelialization rate was done everyday by observing the wound surface after it has been cleaned and if there was part that was already doff (no light reflection), the color became whitish then it is considered epithelialized. The evaluation through photography was done by two observer who were blinded from which part had been the treatment or control group (single blind).

From the 19 samples, we found that the fastest full epithelialization on the Group 1 with honey application and transparent dressing was

Table 1. Characteristic of the samples study

Variable	n (%)
Male	12 (63,2)
Female	7 (23,8)
Age	41,42 (13,06)*

on day 8 and the longest was day 11. There were some samples were the epithelialization was not as clearly differentiated as the others (4 samples). After we did a statistical analysis we found the mean epithelialization rate for the Group 1 treated with with honey and transparent dressing was 9,74 (0,24) days. While for the Group 2 (control group) it was 10,79 (1,23) days. The difference between the epithelialization rate between two groups were statistically significant ($p=0,00$) as we can see in Table 1.

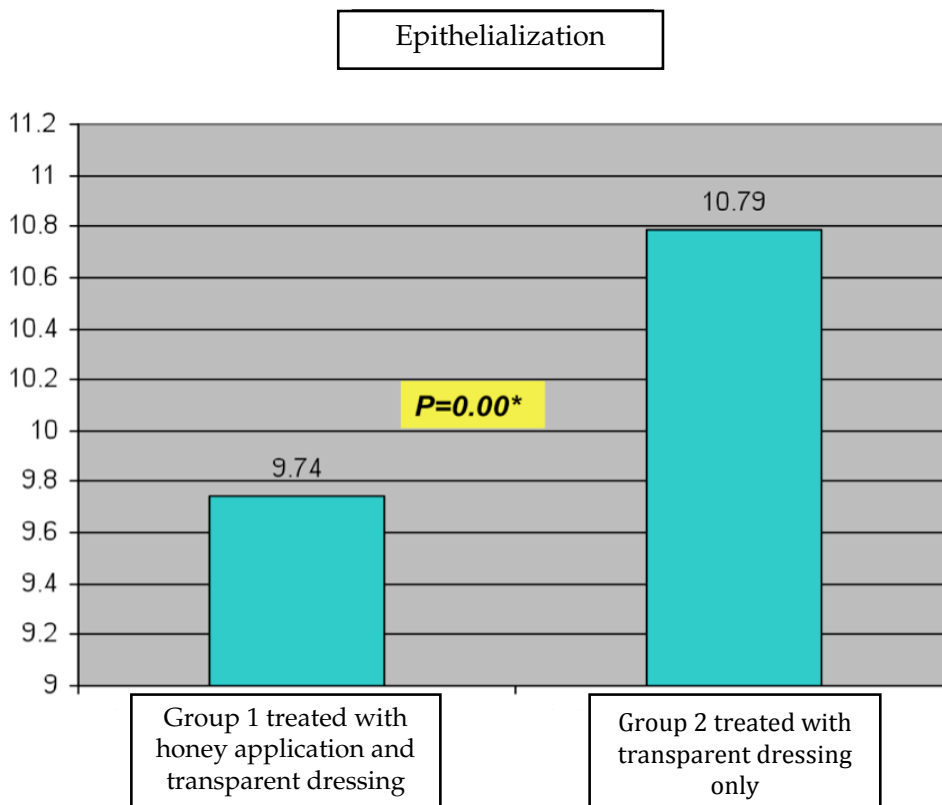


Figure 1. Mean epithelialization rate comparing group 1 and group 2

DISCUSSION

The STSG was taken by the same person and with the same level of thickness for both treatment. After the STSG was taken, the donor site was closed temporarily with adrenaline moist gauze until the fixation of the graft to the recipient site was done. This was done to get a clear operating field and will make the observation easier. During the first group treatment using honey and transparent dressing, we needed to change the dressing every 2 days. This was done to clear the visual field from any blood clots and to do honey reapplication. Actually it was found that the honey itself did not dry off but will de-concentrate due to exudation from the wound itself. The exudate will promote oxidation process and create a hydrogen peroxide that will stimulate angiogenesis and fibroblast growth. The low pH of honey and moist characteristic will also hasten the tissue regeneration for wound healing. But because of the mixing with exudate, the concentration of honey become less and thus needing the reapplication every two days. On day 2 post operatively, the patient did not complained great pain during dressing change. For day 4 and so on none of the patient complained any pain. It was observed that there was a thin layer on the donor site that was thought to have made the dressing changes less painful. Compared to the control donor site, until day 7 post operatively the patients still complained of pain. The transparent dressing changes did not disrupt the newly formed epithel.

Epithelialization process was observed through actual visual observation and photo documentation. To reduce bias, the observation was done by two observer (single blind) who are both capable to differentiate which part has full epithelialization. There was no difference in the observation result from both observer.

The difference between epithelialization rate of the donor site treated with honey and transparent dressing compared to the ones treated with transparent dressing only was statistically significant. The mean epithelialization rate of the wound using honey and transparent dressing was 9,74 days while

in the control group it was 10,79 days. This result shows difference for the time needed in wound healing process.

There was no wound infection or allergic reaction in all samples. Two of the samples had been through another STSG donor site treatment previously with a conventional tulle grass and moist gauze. According to this two patients the new treatment was more convenient due to lack of odor.

This method of treatment with honey and transparent dressing was thought to have a good effect due to several factors. The first one is that a moist condition was preserved. Because the honey has a high osmolarity combined with the transparent dressing thus creating a moist environment. The second one is because honey has been proven to induce angiogenesis, fibroblast growth, granulation formation and re epithelialization. The third factor is there were no infection on the wound which obviously promote wound healing process. The low infection rate is thought to be caused by the low pH of honey, hydrogen peroxide formation, high osmolarity and contains inhibin thus creating an antibacterial effect. the fourth factor is less odor, this is because honey can lessen the production of free fatty acid, ammonia, sulfur, and amino created by bacteria from dead tissue. The last point is that this treatment create less pain because of the formation of a thin layer on the surface of donor site.

CONCLUSION

The mean time of epithelialization rate for the STSG donor site treated with honey and transparent dressing was 9.74 days.

The epithelialization rate is considered faster in this method compared to the ones treated with transparent dressing only or with conventional method by using tulle grass and moist gauze. The reapplication of honey had to be done every 2 days. So we concluded that this method is safe and applicable for the patient because the honey used in this study is a commercial honey that can be easily found and affordable for many patients. We still need another study using other kind of honey to further conclude this study on honey and

wound healing. Comparing the bactericidal effect of commercial honey and the medical honey also need further study.

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