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TO TIE OR NOT TO TIE – OVER FULL THICKNESS SKIN GRAFTS: A PROSPECTIVE COMPARATIVE STUDY

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ABSTRACT

Background: Various techniques are employed for the fixation and management of skin grafts, highlighting the growing demand for a method that reduces the patient's recovery time, reduces the burden of frequent dressings on both medical professionals and patients, and ensures the secure attachment of the skin graft. Moreover, there is a need for a skin graft that is suitable in terms of color, size, and circumference, with no conclusive evidence indicating the superiority of any particular method. **Objective:** This study aims to assess the efficacy of compression dressing in comparison to traditional dressing for full-thickness skin grafts in terms of the duration of complete healing and the occurrence of complications and Methods: Following patient consent, thorough wound debridement was performed, a full-thickness graft was then performed and a dressing was applied. Patients were randomly divided into two groups: the first group received a compression bandage with the skin graft, while the second group did not. Patients were monitored on the fifth day postsurgical to inspect the dressing and confirm graft viability. A subsequent follow-up took place a month later to ensure graft success and assess any complications. Data was collected, entered into SPSS Version 26, and analyzed accordingly. **Results:** The study involved 42 patients from the Reconstructive Surgery Department and Clinic at Tishreen University Hospital, aged between 23-51 years. Sources of skin loss varied among patients, including malignancies (8 patients, 19%), post-surgical complications (21 patients, 50%), and burn injuries (13 patients, 31%). The mean physical loss size among patients was 9.4 ± 2.8 cm2. Graft failure occurred in 8 patients (19%) within 5 days postsurgical, with 2 (9.5%) from the first group and 6 (28.5%) from the second group. One-month later, 3 patients experienced graft failure, with 2 from the second group and 1 from the first group. The areas of graft failure were all on the face in the first group and in diversified locations in the second group. The mean recovery time was 18.4 ± 4.5 days, with the first group recovering in 17.3 ± 5 days and the second group in 20.1 ± 6.7 days. Infections were the most common complication (8 patients, 19%), followed by hematoma (5 patients, 12%), seroma (patients, 25%), graft was observed in 4 patients (9.5%). **Conclusions:** It is necessary to make an approach for each physical loss that requires grafting and use the appropriate bandage according to the preference between the compression bandage and the regular bandage. Both types of dressings showed good effectiveness in preserving the graft , but the location of the physical loss, the size of the physical loss, and the grafting still have the first role in determining the type of dressing.

KEYWORDS: Skin grafts compression dressing, Regular dressing, Full-thickness skin grafts.

INTRODUCTION

Wound healing is a natural physiological reaction to tissue injuries, it involves a complex interaction of many types of cells ،cytokines, inflammatory mediators, and the vascular system. The main goal of vasoconstriction and platelet aggregation is stopping the bleeding.[1]

The inflammatory stage is characterized by hemostasis, chemotaxis, and increased vascular permeability, which limits further damage, closes the wound, removes cellular debris and bacteria, and promotes cellular migration. The duration of this stage usually lasts several days.[2]

The proliferative stage is characterized by the formation of granulation tissue, re- epithelization and the formation of blood vessels. This stage can last several weeks.

The maturation and reconstruction phase is the one in which the wound reaches maximum strength as it matures.[3]

Many surgical options are available to the reconstructive surgeon when he is faced with a difficult wound. However, any decision on the measure should be holistic, take into account factors such as the patient's professional conditions, the possible period of downtime, concomitant pathologies, probability of success, donor morbidity, functional outcomes, risks of surgery and anesthesia. The basic principles of wound management apply to all wounds.[4] The skin grafting technique is commonly used to close wounds caused by physical losses in the skin that cannot be repaired using primary closure, second-intention healing, or topical skin flaps. Although grafting is currently less preferable than flaps closing, it can lead to a very good cosmetic result. Skin grafts are separated from their blood supply completely, unlike flaps, and then transferred to the receiving bed.[5]

Skin grafts can be divided into several types based on the composition of the grafts, and each type of graft has certain risks and indications.[5]

1. Split-thickness skin grafts (STSG): They consist of the epidermis and a superficial part of the dermis.
2. Full-thickness skin grafts (FTSG): They contain both the epidermis and the entire dermis.

Composite grafts: They contain skin and another type of tissue, usually cartilage.

A compression stent is used to apply compression on the graft. When using the stent, a petroleum-nature ointment can be applied directly on the graft to keep the area moist and prevent the graft from sticking to the stent that covers it. The stent itself can be made of moistened cotton, or gauze, wrapped in soft gauze impregnated with lubricating ointment. Long and standing sutures are placed opposite each other in the receiving site and then tied together, stretched over the stent and pressed over the skin graft. Usually these supporting sutures and the stent itself are removed within 5-10 days to" detect" the graft and determine whether it was taken or not.[6]

SIGNIFICANCE AND OBJECTIVES

The need for a technique that reduces the patient's recovery time, reduces the burden of repeated dressing on both the doctor and the patient, and ensures effective fixation of the skin graft. In addition to the need for a suitable skin graft in terms of color, size and circumference, and the multiplicity of dressing methods used to install skin grafts and care for them without studies showing the preference of any of these methods.

Our study aimed to evaluate the effectiveness of compression dressing compared to conventional dressing in full-thickness skin grafts in terms of complete recovery time and the incidence of complications.

MATERIALS AND METHODS

Study design: Prospective Comparative Study

Study sample: The study included 42 patients admitted to the Department of Reconstructive Surgery and referred to the Reconstructive Surgery Clinic at Tishreen University Hospital with a skin defect that was restored by a full-thickness skin graft during the period from 2022 to 2023.

Inclusion criteria

Every patient with a skin defect can be restored with a full-thickness skin graft.

Exclusion criteria

- Multiple trauma and intensive care patients.
- Concomitant chronic diseases that impede the healing of the graft (cardiovascular disease, diabetes, chronic cortisone drug therapy).

MATERIALS AND METHODS

After taking the informed consent of the patients, routine profiles were performed and patients were prepared for the graft procedure, wound measurements and the size of physical loss were taken and recorded, a good debridement of the wound bed was performed and then a full-thickness graft was performed and the bandage was applied. The patients were randomly divided into two groups:

- **The first group:** Patients who had a full-thickness skin graft with applying a compression bandage.
- **The second group:** Patients who had a full-thickness skin graft without applying a compression bandage.

After applying the dressing, the patients were followed up on the fifth day of surgery, exposing the dressing and confirming the vitality of the graft, as well as a month later to confirm the complete success of the graft and check for any complication.

Photographs with standardized measurements and conditions were taken before the surgical intervention, after the end of the surgical procedure and when the bandage was exposed on the fifth day after grafting.

The results were recorded, entered into the statistical program **SPSS Version 26** and analyzed through it.

RESULTS

The study included 42 patients admitted to the Department of Reconstructive Surgery and referred to Reconstructive Surgery Clinic at Tishreen University Hospital with a skin defect that was restored by means of a full-thickness skin graft.

The age of the patients in the sample ranged from 23-51 years with a mean of about 31.5 years ± 6.8, in the first group (33.29 ± 8.7) years, and in the second group (31.38 ± 5.8) years. The number of males in the first group was 12 (57%) males, and 9 (43%) females, and in the second group 13 (62%) males, 8 (38%) females.

The prevalence of smoking was observed in only 5 patients (24%) in the first group, and 7 patients (33%) in

the second group, the **P-value = 0.94**, which means there was no statistically significant difference between the two groups. Only two patients from the first group were alcoholics, and there was no alcoholic patient from the second group, with a **P- value= 0.89**, which means there was no statistically significant difference between the two groups for alcoholism. The cause of injury in patients varied among malignancies (8 patients) (19%), postoperative patients (21 patients) (50%), and burn patients (13 patients)(31%). The distribution of the place of injury in the sample patients was as follows: the number of patients who had a facial and neck injury (21 patients) (50%), in the limbs (7 patients) (17%), and in the trunk (14 patients) (33%). The mean size of physical loss in the sample patients was ± 9.42.8 cm^2, the values ranged from (2-12,4 cm^2).

Graft failure was observed 5 days after surgery in 8 patients (19%), 2 patients (9.5%) from the first group, (6 patients) (28.5%) from the second group, P-value was 0.042, which means there was a statistically significant difference between the two groups in terms of the viability of the graft during the 5-day period of the procedure.

A month later, graft failure was observed in only 3 patients of the sample, two of them from the second group and only one patient from the first group. P-value=0.4 which means there was no statistical significance after a month of follow-up between the two groups.

In the first group, the areas of graft failure were all on the face, two on the nose and a graft on the cheek, while in the second group, the graft failure was on the face in only one patient, 4 patients on the limbs and 3 patients on the trunk. The mean hospitalization period in the sample patients ranged from 6.8 ± 1 days, and the values ranged from (4-9 days), in the first group (6.2 days) and in the second group (7.5 days), with **P= 0.06**, which means there was no statistical significance of the difference between the two groups.

The mean recovery time in patients was 18.4 ± 4.5 days, with values ranging between (14-27 days), in the first group 17.3 ± 5 days, and in the second group the mean complete recovery time was 20.1 ± 6.7 days. We note that the mean recovery time in the first group was lower than in the second group, and **P value=0.021**, which indicates a statistical significance of the difference between the time of complete recovery between the two groups.

The number of dressing times was calculated according to the days the patient needed until the date of the last dressing, the mean was 18.6 ± 2.2 days, and the value of **P = 0.01** indicated a statistically significant difference between the two groups in terms of the number of dressing times, which means greater saving in bandages in the compression dressing group.

Infection was the most common complication that occurred in the sample patients (8 patients) (19%), followed by hematoma formation in only 5 patients (12%), seroma formation was observed in two patients (5%), hemorrhage occurred in 3 patients (7%), and graft shrinkage was observed in 4 patients (9.5%).

DISCUSSION

The age of the patients in the sample ranged from 23-51 years with a mean of about 31.5 years ± 6.8, with no statistically significant difference in the age distribution between the two study groups. The percentage of males in the first group was (57%) of patients, females (43%), and in the second group (62%) males, and (38%) females, the distribution was homogeneous by gender in both study groups.

Graft failure was observed 5 days after surgery in 8 patients (19%), 2 patients(9.5%) of whom were from the first group, and(6 patients) (28.5%) from the second group, but a month later, graft failure was observed in only 3 patients from the sample, two of them from the second group and only one patient from the first group. The superiority of the compression dressing in the viability of the graft can be attributed to the achievement of a good match between the graft and the receiving bed, which ensures adequate perfusion better than ordinary dressing.

The areas of graft failure in the first group were all on the face, two of them on the nose and a graft on the cheek, while in the second group the graft failure on the face was only in one patient, 4 patients on the limbs and 3 patients on the trunk.

The mean hospitalization period in the sample patients ranged from 6.8 ± 1 days, and the values ranged between (4-9 days). Unlike a normal bandage, a compression bandage on thin skin areas such as the face can be counterproductive, as it increases the ischemia of the graft and may therefore help the graft failure.

The mean recovery time for patients was 18.4 ± 4.5 days, with values ranging between (14- 27 days), in the first group 17.3 ± 5 days, and in the second group 20.1 ± 6.7 days, as the compression bandage provides a good match with the receiving bed and relatively reduces the complications that may affect the healing process such as hematoma, hemorrhage and infection, and therefore it contributes to the healing of grafts in less time than a normal bandage.

The mean number of dressing times was 18.6 ± 2.2 days. The value of P=0.01 indicates a statistically significant difference between the two groups in terms of the number of dressing times, which means a greater saving on bandages in the compression bandage group.

Infection was the most common complication that occurred in the sample patients (8 patients) (19%),

followed by hematoma formation in only 5 patients (12%), seroma formation was observed in two patients (5%), hemorrhage occurred in 3 patients (7%), and graft shrinkage was observed in 4 patients (9.5%).

The incidence of bleeding, hematoma, seroma and infection was lower in the compression bandage group, this can be explained by the fact that the compression bandage works to tamp the place of the graft and reduce bleeding, and prevents the formation of voids or areas that allow germs to grow inside, while the graft shrinkage was higher in the compression bandage group, which may be due to the compressive effect applied to the graft, which may affect the normal healing at the edges of the graft.

The sample size was convergent between our study and PULVERMACKER study,[7] and less than in a study conducted by both YUKI[8] and SHIMIZU,[9] and the mean age in our study was lower than in the rest of the studies, as we note the high mean age in the rest of the studies. Postsurgical physical losses were the most common reason for skin grafts in our study while malignancies were the most common cause in YUKIs study,[8] and in PULVERMACKER study[7] all grafts were after mastectomy due to malignancy, while SHIMIZU[9] did not mention in his study the underlying reason for the grafts.

The percentage of graft failure in our study was slightly higher than in the rest of the studies, and this can be explained due to the difference in sample size, as the number of patients was convergent, while the percentage differed as a result of this, the recovery time was lower in our study, firstly because the mean age in the rest of the studies was high, and the reason for the grafts in our study was postoperative , while in the rest of the studies was malignancies, all of which are factors that may delay wound healing in general.

All previous studies have found that there is no statistically significant difference between compression dressing and ordinary dressing, which can be explained due to the small size of grafts compared to our study, as compression dressing plays an important role at a larger wound area, because the compression applied by the bandage on wounds with a smaller size can lead to a partial interruption in blood perfusion, while in large-sized wounds it reduces the distance between the graft and the receiving bed and thus a higher viability of the graft and a shorter healing time.

CONCLUSIONS

It is necessary to make an approach to each physical loss that needs grafting and use the appropriate dressing according to the preference between compression dressing and ordinary dressing. Both types of dressing showed good effectiveness in preserving the graft, but the location of the physical loss, the size of physical loss and grafting still have the first role in determining the type of dressing.

Ethical approval

This research received approval from the scientific research ethics committee at Tishreen University and Tishreen University Hospital.

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