

Original Article

A Comparative Study of Graft-Take Between Tie-Over Dressing and Dressing with Multiple Quilting in Full Thickness Skin Graft

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Abstract

A skin graft is the simplest way of reconstructing an area of skin loss. The graft must acquire blood supply from the wound bed and 'taken' by the recipient site. The aim of the present study was to compare the outcome of graft-take of full thickness skin graft by tie-over dressing versus multiple quilting and simple dressing in face and neck region. This prospective, interventional, comparative study was conducted in the Department of Plastic Surgery, Dhaka Medical College Hospital from January 2009 to December 2010 (2 years). A total number of 60 cases from 56 patients of any age of both sexes requiring full thickness skin graft and fulfilling the pre-set inclusion and exclusion criteria, were selected for the study. Of whom 30 cases were tagged as Group A (Quilting) while the rest 30 as Group B, which was managed with tie-over dressing. Variable outcomes like epidermal loss, partial dermal loss and full thickness loss were observed in both groups. In quilting group excellent result was achieved in 22(73.3%), good 2(6.7%), satisfactory 3(10%) and poor in 3(10%) patient. In tie-over group, it was 19(63.3%), 3(10%), 3(10%) and 5(16.7%) accordingly. So, the good take were 27(90%) in quilting group and 25(83.3%) in tie-over group. Haematoma recorded in 3 (10%) of quilted group and 5 (16.7%) of tie-over group. No infection occurred in any cases of any group. There were no other recorded complications or adverse outcomes directly related to the technique for securing the grafts in either group. The results demonstrate no significant difference in 'graft-take' comparing grafts secured with a tie-over dressing or by quilting.

Introduction

Skin grafting has been used since ancient times, being first described in India in approximately 400 BC for nasal mutilation, skin grafting did not become a subject of interest

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until approximately 200 years ago¹. Its role in wound coverage and reconstruction was further advanced when Pollock² demonstrated the use of skin grafts in the treatment of burns. Survival of a skin graft on its recipient site relies not only on a clean and well vascularized bed but also on adequate immobilization with no infection, haematoma or serous collection beneath the graft.

Full-thickness skin grafts are an excellent reconstructive option. It produce vastly superior cosmetic results compared with split thickness skin grafts especially in the face and exposed area such as neck and dorsum of the hand³. It is a reliable work horse in facial burn reconstruction. Full Thickness Skin Grafts are elastic, contract less, have a 'matte finish' like normal skin, and create a durable, resilient skin surface. Full thickness grafts, however, require a well vascularized bed, primary closure or grafting of the donor site and are best reserved for reconstruction of the head and neck or the hand⁴. It results in soft, pliable, functional skin with minimal contraction.

Many and varied techniques have been developed and used for fixation and care of grafts in the important first few days after grafting. For proper graft take it is essential to ensure complete contact of the graft to the recipient bed, to prevent

shear forces, and to maintain a moist healing environment. To this end, most surgeons will use a tie-over bolster dressing⁵. Full-thickness skin grafts vascularize by anastomosis between vessels of the graft and host at the base of the wound rather than from the wound edges⁶. One of the most important factors to ensure successful vascularization is the maintenance of a firm and constant approximation between the graft and the recipient bed for the first post-operative days and good immobilization of the graft⁷. Mobility or fluid accumulation may predispose patients to infection and contracture, with partial or total loss of the graft. Quilting sutures appear to be especially useful in this type of grafts. It is a simple and easy technique of full-thickness skin graft fixation and with emollient ointment (neobacrin) there's no inflammatory reaction to multiple quilting sutures and no scar results³.

Quilted grafting using full thickness skin grafts has been used in many situations, for nipple reconstruction and in oral cavity^{8,9}. Recently quilted full thickness grafting has been described by Patterson and Wong³ to overcome both seroma and haematoma formation as well as shear forces associated with grafting on hands and the face.

Traditionally skin grafts on the face would necessitate tie-over bolster dressing impregnated with antiseptic agents, and those on the hands would require additional splintage. The dressings were usually removed after 5 days for graft inspection. The main objective of tie-over dressing is that it ensures the adherence of a skin graft to the bed of the wound¹⁰. This dressing ensures fixation as well as haemostasis and prevents the collection of secretions.

Though management of full thickness skin graft (FTSG) is going on for decades in Bangladesh, studies depicting the outcome of graft take by tie-over dressing and multiple quilting with simple dressing are yet to be published.

This study aims to compare the results of a full thickness skin graft-take with the tie-over dressing technique and with multiple quilting and simple dressing and find out any benefit by quilting method.

Methodology:

This study was a prospective, interventional, comparative study, carried out between January 2009 to December 2010 in the Department of Plastic Surgery, Dhaka Medical College Hospital, Dhaka. The study population included the patients admitted for procedures requiring full-thickness skin grafts at the face and neck area in any age of both sexes.

Selection criteria:

Inclusion criteria:

- Patient of any age of both sexes, on whom full thickness skin grafts are suitable, i.e. lesions at face and neck area.

- Defects have to be a minimum of 2 cm to maximum 10 cm in size.
- Patient on whom full-thickness skin graft had been done and who are motivated to participate in the study.

Exclusion criteria:

- Traumatic wound lesion
- Lesion /wound size less than 2 cm or more than 10 cm
- Infected and inflamed lesions
- Non co-operative patient
- Diabetic and anaemic patients

Sample size (n):

A total number of 56 patients with 60 grafts were studied of which 30 cases were in Group A (quilting & simple dressing) and other 30 were in Group B (tie-over dressing). Patients were selected by purposive sampling technique.

Preparation of patient and procedure: All patients were evaluated by taking detailed history of the patient, physical examinations and necessary investigations. The operations were done at elective operating theater. All patients underwent to surgery either general or local anaesthesia.

All grafts were performed following excision of cutaneous lesions. Donor sites and lesions were infiltrated with adrenaline and lignocaine in a ratio of 1:80,000. The lesions were excised and haemostasis achieved. A careful plan of the defect was made. A graft with the exact size of the defect was harvested. The outline of the donor site was incised to the level of the deep dermis and then a full thickness graft gently raised using a scalpel and skin hooks or forceps. The donor site was always the medial upper arm for the grafts. The donor site always closed primarily with either 5/0 prolene (polypropilene) interrupted or 4/0 vicryl subcuticular sutures.

In case of quilting, the graft was quilted onto the defect with fine prolene (5/0). Large, deep bites with 0.5 to 1 cm gap were taken with each suture, and the suture was only loosely tied to approximate the graft to the bed, with care taken not to pucker the graft in any way. Quilting of the graft prevents the graft from shearing and also prevents haematoma or seroma from lifting the graft from the graft bed. Once firm fixation was achieved the graft was dressed with a light smear of tropical antibiotic (neomycin+bacitracin) ointment, sofratullae, dressing gauze cut to the shape of the graft and a light bandage. The dressing was left intact until the first post-operative check at day 3 post surgery. The patient was instructed to applying the topical antibiotic ointment 2-3 times daily from 3rd post-operative day to the entire grafted area. The quilting sutures are usually removed at the end of 1st week.

In tie-over technique, the shaped, full thickness skin graft was secured to the graft bed with a few single interrupted sutures (prolene 4/0, 5/0). A layer of sofratullae and saline-moistened cotton wool was then positioned. The width and length of the dressing corresponded approximately to the graft size. Separate sutures (prolene 3/0 or silk 3/0) with sufficient extra length are used for tightening the dressing. The needle was placed through the graft. The sutures were tightened and secured with knot. The dressing was left in place for 5 days.

The patient was assessed on the 3rd and 5th post operative day in the quilted group and on the 5th POD while dressing removal in the tie-over dressing group. The take of the full thickness skin graft was judged with visual analogue with the help of the observer (a fellow of surgery) on day 7. The colour of the graft compared to surrounding recipient and donor site. Any loss-epidermal, partial dermal or full thickness or any complications were recorded.

All patients received post operative antibiotics (Cephadrine 500mg, qds for 5 days) and analgesics. Appropriate data were collected by preset questionnaire by the investigator using a preformed data sheet. All data were compiled in a master table first. Standard statistical formulae were used and statistical analysis of the results was obtained by using window based computer software devised with Statistical Packager for Social Science (SPSS-13). Numerical data was analyzed by using 't' test and categorical data were expressed as percentage and was compared between groups using 'Chi-square' or 'Fisher's exact' test. A 'p-value' of less than 0.05 was considered as the level of significance.

Results and Observation :

A total number of 60 cases from 56 patients were studied of which 30 cases were in Group A (Quilting & simple dressing) and the other 30 were in Group B (Tie- over dressing)

Table-I
Distribution of age by group

Age (years)	Group A (n=30)	Group B (n=30)	P value*
<15	6 (20.0) [#]	7 (23.3)	
16-30	9 (30.0)	10 (33.3)	
31-45	9 (30.0)	7 (23.3)	
46-80	6 (20.0)	6 (20.0)	
Mean ±SD	32.78±20.19	32.07±18.41	0.886 ^{ns}
Range	3.50-80.00	8.00-80.00	

Figures in parentheses indicate percentage
* 't' test was done to measure the level of significance
ns = Not significant

Table I show age distribution of the study population. In this study the majority of the patients were in the age group of 16-30 years which were 9 (30%) in group A and 10(33.3%) in group B. Mean (±SD) age in group A 32.78±20.19 (range 3.50-80) and in group B 32.07±18.41 (range 8.00-80.00) years showed no significant difference. Out of 30 cases each in group A and group B, respectively, 6 (20%) and 7 (23.3%) belonged to age group <15 years, 9 (30.0%) and 10 (33.3%) belonged to age group 16-30 years, 9 (30.0%) in group A and 7 (23.3%) in group B of age group of 31-45 years, and 6 (20%) each belonged to age group ≥46 years. The age distribution showed statistically no significant variation between Group A and B (p=0.886).

Table II
Distribution of sex by group

Sex	Group A (n=30)	Group B (n=30)	P value*
Male	14 (46.7) [#]	19 (63.3)	0.194 ^{ns}
Female	16 (53.3)	11 (36.7)	

Figures in parentheses indicate percentage
* Chi square test was done to measure the level of significance

Distribution of the patients according to sex in group A, 14(46.7%) and in group B, 19(63.3%) were male, and 16 (53.3%) and 11(36.7%) were female respectively (Table II). In group A majority were females and in group B were males. There was no significant difference in males and females in groups A and B (p=0.194).

Table-III
Distribution of wound size by group

Wound size (cm)	Group A (n=30)	Group B (n=30)	P value*
2-5	22 (73.3)	19 (63.3)	0.405 ^{ns}
>5-10	08 (26.7)	11 (36.7)	

Figures in parentheses indicate percentage, *Chi square test was done to measure the level of significance

Table III shows that wound size was almost equally distributed between the two study groups. In group A and in group B patients, respectively, wound size was 2-5 cm in 22 (73.3%) and 19 (63.3%); >5-10 cm in 08 (26.7%) and 11 (36.7%) each. There was no significant difference between group A and B.

Table-IV
Status of post operative graft colour

Colour (recipient/ donor site)	Group A (n=30)	Group B (n=30)	P value
Similar	23 (76.7)	20 (66.7)	0.390 ^{ns}
Darker	7 (23.3)	10 (33.3)	

Figures in parentheses indicate percentage, Chi square test was done to measure the level of significance.

Status of post operative graft colour in group A and group B, respectively, was similar to recipient/donor site in 23 (76.7%) and 20 (66.7%), and darker in 7 (23.3%) and 10 (33.3%). The result is non significant.

Table-V
Status of epidermal loss of the graft

Epidermal loss	Group A (n=30)	Group B (n=30)	P value
Yes	6 (20.0)	7 (23.3)	0.754 ^{ns}
No	24 (80.0)	23 (76.7)	

Figures in parentheses indicate percentage, Chi square test was done to measure the level of significance

Epidermal loss (%)	(n=6)	(n=7)
<25	3 (50.0)	2 (28.6)
25-49	1 (16.7)	1 (14.3)
50-75	1 (16.7)	3 (42.9)
>75	1 (16.7)	1 (14.3)

Table V shows status of epidermal loss. Epidermal loss was absent in 24 (80.0%) of group A and 23 (76.7%) of group B, and present in 6 (20.0%) and 7 (23.3%). Out of 6 in group A and 7 in group B, epidermal loss was <25% in 3 (50.0%) and 2 (28.6%), 25-49% in 1 (16.7%) and 1 (14.3%), 50-75% in 1 (16.7%) and 3 (42.9%), and >75% in 1 of both group (16.7% and 14.3%), respectively.

Table-VI
Status of partial dermal loss

Partial dermal loss	Group A (n=30)	Group B (n=30)	P value
Yes	3 (10.0)	4 (13.3)	1.000 ^{ns}
No	27 (90.0)	26 (86.7)	

Figures in parentheses indicate percentage, Fisher’s exact test was done to measure the level of significance, ns = Not significant

Partial dermal loss (%)	(n=3)	(n=4)
<25	1 (33.3)	2 (50.0)
25-49	2 (66.7)	2 (50.0)

Table VI shows status of partial dermal loss. Partial dermal loss was present in 3 (10%) and 4 (13.3%) in group A and group B, respectively. Out of 3 in group A and 4 in group B cases, partial dermal loss was <25% in 1 (33.3%) and 2 (50.0%) in quilting and tie-over group. 25-49% losses were seen 2 from each group (66.7% and 50.0%) respectively. >50% partial dermal loss were not seen in any group. The result is non significant.

Table VII
Status of full thickness loss

Full thickness loss	Group A (n=30)	Group B (n=30)	P value
Yes	3 (10.0)	4 (13.3)	1.000 ^{ns}
No	27 (90.0)	26 (86.7)	

Figures in parentheses indicate percentage, Fisher’s exact test was done to measure the level of significance, ns = Not significant

Full thickness loss (%)	(n=3)	(n=4)
<25	1 (33.3)	1 (25.0)
25-49	2 (66.7)	1 (25.0)
50-75	0	1 (25.0)
>75	0	1 (25.0)

Table VII shows status of full thickness loss. Full thickness skin loss was present in 3 cases (10.0%) of group A and 4 (13.3%) in group B. Out of 3 and 4 in group A and group B population, full thickness loss was <25% in 1 case of both group (33.3% and 25.0%). 25-49% loss in 2 cases (66.7%) of quilting group and 1 (25.0%) in tie over group. 50-75% and >75% in none (0%) of quilting group but 1 (25.0%) in tie over group. It’s non significant.

Table VIII
Status of postoperative complications

Postoperative complications	Group A (n=30)	Group B (n=30)	P value
Present	3 (10.0)	5 (16.7)	0.706 ^{ns}
Absent	27 (90.0)	25 (83.3)	

Figures in parentheses indicate percentage, Fisher's exact test was done to measure the level of significance

Postoperative Complications	(n=3)	(n=5)
Haematoma	3 (10.0)	5 (16.7)

Table VIII shows status of postoperative complication. Postoperative complication was present in 3 (10.0%) and 5 (16.7%) patients of group A and group B, respectively. Out of 3 in group A and 5 in group B patients, all (100%) developed haematoma. No other complication was observed. The 'p' value is 0.706 and it is non significant.

Table IX
Comparison of graft-take

Final outcome	Group A (n=30)	Group B (n=30)	P value
Good take	27 (90.0)	25 (83.3)	0.706 ^{ns}
Poor take	3 (10.0)	5 (16.7)	

Figures in parentheses indicate percentage Fisher's exact test was done to measure the level of significance

Excellent	22 (73.3)	19 (63.3)
Good	2 (6.7)	3 (10.0)
Satisfactory	3 (10.0)	3 (10.0)
Poor	3 (10.0)	5 (16.7)

criterion of category:

*Excellent: No graft loss, no complication

*Good - Only <25% epidermal loss & no complication

*Satisfactory - <25% full thickness loss or up to 49% partial dermal loss/up to 75% epidermal loss with or without complication

*Poor - >/ 25% full thickness loss or >50% partial dermal loss/ >75% epidermal loss with or without complication.

Excellent, good and satisfactory category take were considered as good take and poor as poor take.

Table IX shows overall final outcome in the two study group of population. In group A and group B, respectively, good take was achieved in 27 (90.0%) and 25 (83.3%) cases. Outcome are poor in 3 cases (10.0%) of quilting group and 5 (16.7%) in tie over group. It is non significant (p=0.706).

Discussion:

For successful skin grafting, the most important single factor to ensure a good 'take' apart from surgical competence, is the maintenance of a firm and constant approximation between the graft and the recipient bed for the first post operative week⁷. Full thickness skin grafts vascularize by anastomoses between vessels within the graft and those of the underlined host bed, a process well established in successful grafts by the 5th post operative day¹¹. This process occurs from the base of the wound rather than from wound edges and it seems likely that graft revascularization will be facilitated if the graft is initially immobile on its base.

Conventional teaching dictates that the application of even pressure to a skin graft is one of the most important requirements for ensuring successful graft-take¹². It is meant to ensure that the graft is pushed down onto the wound bed so that contact between the graft and the bed is maximized. It is also meant to reduce the formation of fluid collections (either seroma or haematoma) which may interfere with graft take¹². Complete immobilization of the body part through the use of appropriate splints is another essential requirement for successful graft take.

Both the tie-over dressing and the quilting technique might be expected to achieve this, but the potential for shearing movement beneath the tie-over dressing exists in the centre of the graft, particularly if the bolus dressing is small relative to the graft. A tie-over dressing may also conceal either haematoma or seroma in the crucial period when revascularization must occur, and both may lead to partial or total graft loss⁶.

For many years, the goal of achieving even pressure over small skin grafts has been achieved through the use of tie-over dressing. However the ability of a tie-over dressing to achieve this simple aim has been called into question. Recent studies have shown that tie-over dressings do not exert significant pressure over the graft¹³.

In this study a total number of 60 cases from 56 patients were enrolled of which 30 cases were in Group A and the other 30 were in Group B. Patients of Group A was managed by multiple quilting and simple dressing and in Group B patient applied tie-over dressing. 47 of 60 lesions or scar were excised from the face (78.35%) and 13 were excised from the neck area (21.65%). Medial arm was the chosen donor site in all the cases.

The age of the study group was recorded. The majority of the patients were in the age group of 16-30 years. The mean (\pm SD) age in group A 32.78 \pm 20.19 (range 3.5-80) and in group B 32.07 \pm 18.41 (range 8-80) years with a 'p-value' of 0.886. So there was no statistically significant age difference observed between mean ages of Group A and B ($p=0.615$). Considering sex distribution, 46.7% of the male patients were in group A and 63.3% of the male were in group B. Among female patients 53.3% were in group A and 36.7% were in group B. So no significant difference was observed in sex distribution between group A and group B ($p=0.194$).

In this study, status of colour of the graft was recorded. As none were black or white, its compared with the recipient and/or donor site. In group A and group B, respectively, was similar to recipient/donor site in 23 (76.7%) and 20 (66.7%), and darker in 7 (23.3%) and 10 (33.3%). The result is not significant. Colour changes seen more in relatively larger grafts (>5cm) and peripherally in both groups.

Comparison of graft loss among the two groups was recorded. In the study, epidermal loss, partial thickness loss and full thickness loss of the graft was excluded and find out the percentage of the 'graft take'.

Epidermal loss was present in 6 (20.0%) and 7 (23.3%) of group A and B. Out of 6 in group A and 7 in group B, epidermal loss was <25% in 3 (50.0%) and 2 (28.6%), 25-49% in 1 (16.7%) and 1 (14.3%), 50-75% in 1 (16.7%) and 3 (42.9%), and >75% in one in both group; (16.7% and 37.5%), respectively. (Table -V). The result is not significant.

Partial dermal loss was present in 3 (10%) and 4 (13.3%) in group A and group B, respectively. Out of 3 in group A and 4 in group B patients, partial dermal loss was <25% in 1 (33.3%) and 2 (50.0%), 25-49% in 2 cases of both groups (66.7% and 50.0%), >50% partial dermal loss were not found in any cases of any group. This difference failed to reach statistical significance ($p=0.688$).

Full thickness loss was observed in 3 (10.0%) and 4 (13.3%) in group A and group B. Out of these 7 cases, full thickness loss was <25% in 1 of each group (33.3% and 25.0% respectively), 25-49% loss in 2 (66.7%) of quilting group and 1 (25.0%) in tie-over group. >75% loss in only 1 (25.0%) of tie-over group. The loss was seen mostly in the periphery of the graft.

In the study conducted by Patterson and Wong³, seventy-seven of 82 grafts (94%) healed uneventfully, with 100 percent graft survival in quilting technique. They found five grafts (6.1%) had partial loss but any of full thickness loss. In this study partial thickness loss was found in three (10.0%) cases and full thickness loss was also found in same number of cases (10.0%).

Akhavani et al¹⁴ found that graft secured by quilting had 100% graft-take and only one complete and one partial graft failure which occurred in tie-over group amongst the 40 patients. Davenport et al⁶ found near to same result. Thirty-eight of the 40 grafts showed total survival ("take"). Partial graft survival occurred in one quilted graft and total graft failure in one of the tie-over grafts.

In this study post operative haematoma was found in 3 patients (10.0%) in group A and 5 (16.7%) patients of group B and no infection was observed in any patient of any group. No significant difference is seen ($p=0.706$) in this series. Patterson and Wong (2006) found no haematoma and seroma in their study group of 82 quilted grafts. Davenport et al. (1988) studied 40 grafts either by tie-over or quilting technique, in which only two cases had some sort of haematoma from both group each. In quilted group, one patient had graft oedema and patchy haematoma beneath the graft at the 5th day. A degree of marginal loss of graft had occurred. In tie-over group, a haematoma was evident at 5 days at dressing removal, and total graft loss obvious at 10 days.

In this study graft infection was not found in any patient of any group. The overall outcome in the two study group of patients was tabulated. After getting all of the recorded features of graft take it was compiled and categorized in four groups- excellent, good, satisfactory and poor according to percentage of graft take, graft loss and/or complications. If there was no graft loss and no complication it categorized as 'excellent'. If less than 25% epidermal loss only and no other complication it categorized as good. It was in satisfactory group when only <25% full thickness loss or up to 50% partial dermal loss/up to 75% epidermal loss with or without any complication observed. The results are poor when >25% full thickness loss or >50% partial dermal loss/>75% epidermal loss with or without complication occurred.

The overall graft-take in the two study group of population was recorded. Good take occurred 27 (90.0%) in quilting group and 25 (83.3%) in tie over group. The results are poor in 3 (10.0%) and 5 (16.7%) respectively in quilting and tie-over group. No significant difference was found between Group A and Group B ($p=0.706$). Excellent result was achieved in 22 (73.3%) of quilting group and 19 (63.3%) of tie-over group. Graft take was good in 2 (6.7%) and 3 (10%) cases respectively; satisfactory result observed in 3 (10.0%) cases of both group, and results were poor in 3 (10.0%) and 5 (16.7%) cases of quilting and tie over group.

Giovanni et al¹⁵ evaluated the traditional tie-over dressing technique. Out of 60 patients, 48 grafts took well. The evaluation control after 48 to 72 hours showed presence of haematoma in 8 patients, infection in 7, and seromas in 6. This tie-over dressing technique needs surgical sutures to apply a light and uniform pressure over the graft, and its removal is often very difficult because the absorbent capacity of the gauze is limited, and it can easily stick to the graft, causing damage.

In this study we observed that the losses are more in neck site; 3 out of 6 in quilting group and 4 out of 7 in tie over group.

The use of quilting sutures in the management of full thickness skin graft has been growing interest in now- a-days. In the present comparative study though no significant differences in the survival rates for grafts in two groups were found, it feels more comfort to apply quilting than tie-over dressing over curved, concave especially over eyelid area. Finally, both group, multiple quilting and simple dressing, and tie-over dressing, exhibited a high incidence of full graft 'take'.

Conclusion:

Full thickness skin graft is vastly superior to split thickness skin graft and easy to manage both donor and recipient site if meticulous care is taken. Skin malignancy, post burn scar contracture release, congenital naevus managed by excision and full thickness skin coverage is a simple technique. Both the tie-over dressing and quilting can be applied to secure the graft. In the study, it has been found that there is no significant difference of 'graft-take' between tie-over dressing and multiple quilting in full thickness skin graft.

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