

Comparative Study of Open versus Closed Technique of Split Skin Grafting

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Abstract:

Background: A skin graft is a thin layer of skin from a donor site that is received. It comprises the epidermis and part of the dermis (split skin graft thickness) or, depending on the thickness, the epidermis and dermis (full thickness skin graft). For covering skin and soft tissue defects, split thickness skin graft is also used.

Objectives:

Primary objectives

1. To compare the product of split grafting of the skin by open and closed technique.
2. To find out the complications and causes of rejection of split skin graft in relation to both open and closed technique.

Secondary objectives

1. To compare outcome of meshed and non-meshed graft.
2. To study bacterial flora of recipient bed.

Methodology: It is a prospective comparative study done in patients having wound that has to be managed with split skin grafting. It will be conducted at Dept. of General Surgery, J.N.M.C and AVBRH, Sawangi (Meghe), Wardha. The study will be conducted on patients having wound that has to be managed with split skin grafting. Informed consent will be obtained from all the patients and institutional ethical committee approval, DMIMS (DU) will be taken.

Results: From this study we expect that there should be at least 85% acceptance of graft by receptor area and we compare outcomes from both open and closed technique of split skin grafting.

Conclusion: Conclusion will be based on findings of study.

Keywords: split skin grafting, open and closed dressing

INTRODUCTION

Care of wounds caused by varied etiology and pathogenesis Consumes significant financial as well often resources of the healthcare system. This demands special attention to further optimize the current wound coverage strategies.^(1,2)

A skin graft is a thin layer of skin from a donor site that is received. It comprises the epidermis and part of the dermis (split skin graft thickness) or, depending on the thickness, the epidermis and dermis (full thickness skin graft)⁽³⁾

For covering skin and soft tissue defects, split thickness skin graft is also used.⁽⁴⁾

Postoperative treatment of graft site is of utmost importance after conducting split skin grafting. Over the years, the increase in final results after split skin grafting done by open technique was thought provoking to determine the importance of post-operative dressing. Different kinds of nonadhesive dressing materials have been described in the literature that enhance wound healing at the donor site and decrease postoperative pain.^(5,6)

However, there is no fixed described protocol regarding time of 1st dressing and frequency of grafting site dressing after split skin grafting.

The etiopathogenesis and the location of the graft site also play an important role in the final outcome after split skin grafting.⁽⁷⁾

Primary objectives

- To compare product of split grafting of the skin by open and closed technique.
- To find out the complications and causes of rejection of split skin graft in relation to both open and closed technique.

Secondary objectives

1. To compare outcome of meshed and non-meshed graft.
2. To study bacterial flora of recipient bed.

It will be a prospective comparative study to be carried out on parallel groups with 20 patients in each study group.

METHODOLOGY

It is a prospective comparative study, done on the patients with wound to be managed with split skin grafting. It will be conducted at Dept. of General Surgery, J.N.M.C and AVBRH, Sawangi (Meghe), Wardha of DMIMS (DU).

The study will be conducted on patients with wound to be managed with split skin grafting. Informed consent will be obtained from all the patients and institutional ethical committee approval, DMIMS (DU) will be taken.

Study design: Prospective comparative study.

Study Setting: A.V.B.R.H. Sawangi (Meghe) Wardha.

Groups:

Group A: Open technique of split skin grafting

Group B: Closed technique of split skin grafting

Group A: 20

Group B: 20

Study Population:

GROUP A: OPEN TECHNIQUE

After split skin grafting, recipient site will be kept open without any suture in mosquito net and recipient site will be kept immobilized for certain time duration (average 3 days) depending on the status of graft.

The graft will be inspected regularly for any collection underneath and its adherence on graft bed.

The graft will be dapped minimum twice a day. Collected serous fluid or hematoma if any will be drained by dapping. If there is graft rejection within this period then the rejected Graft will be replaced by spared graft.

- Surrounding skin will be kept sterile by regular cleaning.
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- Depending on the status of graft, graft will be closed after at least 72hrs of split skin grafting.
- Graft will be inspected alternate day till the graft is fully accepted.
- After the take of graft, recipient site will be managed by daily splintage and compression garments.

Group b: closed technique

After split skin grafting, the recipient site will be closed by placing sutures over the graft and margins of the recipient bed. A thin layer of Vaseline gauze will be kept over the graft. A bolster tie over pressure dressing will be done over the recipient site.

The dressing will be opened on post-operative 6th day to inspect the graft. The sutures will be removed. If there is graft rejection if any then the rejected part of graft will be replaced by spared graft.

Alternate day dressing of recipient site will be done till the graft is fully accepted. After the take of graft, recipient site will be managed by daily massage, splint age and compression garments.

Inclusion criteria:

IPD patients having wound that has to be managed with split skin grafting

Exclusion criteria:

IPD patients having wound that has to be managed with primary closure, full thickness skin grafting or flap cover.

For inclusion in the study, all patients admitted with wound due to some cause will be assessed on the basis of the abovementioned inclusion and exclusion requirements.

Informed written consent will be confirmed

Initial Evaluation:

Detailed demographic profile and complete history will be documented, including current disease history, wound period, history of precipitating events like trauma, history of infection, site and size and surrounding skin, any history of smoking, hypertension, advanced age, obesity, hypothyroidism, diabetes mellitus, peripheral arterial and venous diseases, anticoagulant and coagulation disorders; previous history of treatment, previous surgical (grafting) interventions and other relevant detail will be recorded. All the baseline investigations like CBC, KFT, LFT, PT INR with APTT, RBS will be done.

Clinical Examination:

Inspection:

Baseline blood pressure in both arms will be determined. Total systematic clinical examination, skin condition in the affected limb, trophic changes, wound description with respect to the basic description.

Prospective comparative study:

In the prospective analysis, we look for results such as the percentage of graft taking.

This applies to other factors, such as suspected risk or safety factors, during the research period. The study typically includes taking a cohort of participants and watching them for a long period of time. In this research, the effects of graft are compared taking by open technique with closed technique

Group A: open technique of split skin grafting

Group B: Closed technique of split skin grafting

Study Protocol:

Group A:

After split skin grafting, we will keep open the receptor area either with or without meshing the graft. Generally we keep it open up to 3 days and assess after 3 days then we will close the receptor area alternate day.

Group B:

After split skin grafting with meshing or without meshing, we will keep the receptor area closed for 3 days and then we open the dressing on 4 day and assess and then we do dressing alternate days.

After the surgical intervention as per traditional treatment procedures, the graft will be treated with local dressing materials. The choice of the dressing material will be done by the treating surgeon. All types of dressing materials are allowed including newer and/or recent dressing materials. Where indicated, systemic antibiotics and other drugs are permitted in the study protocol.

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Outcome assessments:

Once the intervention has been applied, the groups will be followed up and outcomes will be compared to evaluate the effect of open dressing with closed dressing technique. Assessment of outcomes will be done at baseline, and at day 3, 5, 12 and 30 days.

Immediate Outcome: we will observe for any seroma

Secondary Outcomes:

1. Graft rejection
2. Graft unacceptance
3. Pus formation
4. Pain

Analysis Plan:

Analysis will be done with the object of treating values. Both respondents with details available at baseline and follow-up visits will be included. The impact of missing values will be explored in sensitivity analysis. The data will be entered into the Excel spread sheets and statistical analyses will be conducted using SPSS software.

Descriptive analyses of age, sex, and treatment compliance will be performed. The histogram will be plotted to observe the distribution of all the variables and continuous variables which are normally distributed will be described using mean and standard error. The effect size will be expressed in terms of relative risk and risk difference along with their 95% confidence interval.

EXPECTED OUTCOMES/RESULTS

From this study we expect that there should be at least 85% acceptance of graft by receptor area and we compare outcomes from both open and closed technique of split skin grafting.

DISCUSSION

A skin graft has been part of the armamentarium of a surgeon for a long time. The use of pinch graft was outlined in 1869.⁽⁸⁾ and Thiersch then demonstrated in 1872 and 1886, respectively, the application of the split thickness graft.⁽⁹⁾ and represented the full thickness graft in 1875 and 1893, respectively.⁽¹⁰⁾ There is a section of the dermis and the full epidermis in a partial-thickness graft or broken skin graft. The healing process of skin grafts has been identified by Rudolph and Klein.⁽¹¹⁾

Other factors believed to influence split skin graft survival are the vascularity of the graft site and the preservation of close adherence between the graft and the wound bed to promote the distribution of oxygen and nutrients from the injured to the grafted skin.

Moreover, graft shearing against the underlying wound bed must be avoided; shear forces interrupt the formation of new vessels and increase the risk of graft failure.

Management of post graft should include measures to ensure strict adherence to. As a consequence of these variables, the graft to the underlying wound bed.⁽¹²⁾

Split skin thickness grafts can be used as adjuvant therapy for wounds partially closed in response to other therapies or to promote the healing of donor sites created by other primary wounds.

and closure plastic surgery procedures.

Split thickness skin grafts are the ideal option. If there are vast areas to be covered and wound burn care with a success rate of nearly 100 percent.⁽¹³⁾

These grafts are also used to cover age in patients with xeroderma pigmentosum for soft tissue injuries, treatment of nontraumatic defects such as vitiligo, and face resurfacing.⁽¹⁴⁾

A variety of factors affecting healing have been reported in studies, including patient age, patient nutritional status such as hypoproteinemia, wound size, anatomical location, and bed variables such as bacterial vascularity and bioburden. Collection below the graft, graft site mobility, and graft site management, despite their widespread use, split skin graft sometimes fail.⁽¹⁵⁾

Increased weight-to-

hip ratio, obesity, and metabolic syndrome have been closely associated with graft failure in recent research.

A hip to weight ratio greater than 1, Partial or absolute failure of graft has been correlated with.⁽¹⁶⁾

Research indicates a link between infection and graft failure, and recent data suggests that there is a decreased risk of graft failure for patients receiving prophylactic antibiotics.⁽¹⁷⁾

Healing is also adversely affected by the colonization of the wound bed without infection; a study at the Copenhagen wound healing centre showed a substantial difference in healing rates for split skin grafts applied to venous leg ulcers colonized with *Pseudomonas*. Despite intensive treatment of colonized ulcers, *monas aeruginosa* versus broken skin grafts applied to noncolonized ulcers. In this study, smoking was also associated with failure to heal.⁽¹⁸⁾

It was estimated that the perfect pressure for a skin graft dressing by Ferris Smith (1926) was 12 mmHg/cm², as the venules were completely and at this pressure the arterioles were partially compressed. This increased the filtration of the lymph into the space between the graft and the graft bed, and this lymph nourished the skin graft.⁽¹⁹⁾

In order to stabilize the graft and avoid shearing, care must be taken; Typically this is achieved by adding bolster or compression dressings or by using negative pressure vacuum treatment to ensure the adherence of the graft to restrict the range of motion to the wound.⁽²⁰⁾

The techniques for applying and securing successful tie over dressing range from simple tie over sutures to the use of elastic band and rubber band skin staples (Shively et al., 1981) and the formation referred to in the journal Burd (1984) that used a metal disk over which a neoprene sealing ring slips the connections.^(21,22,23)

The object of the pressure dressing, since the graft does not have an avascular pedicle, is to improve the contact of the graft with the wound bed and to allow adequate angiogenesis.

After three to five days with the grafted skin, vascular interaction starts to occur.

The pressure dressing works to minimize the risk of a transition that would ensure this interaction. It also makes a reduced incidence of bruising and seroma, incidents that normally lead to loss of vitality and failure of the graft. Using conventional pressure dressing or vacuum treatment with negative pressure, pressure vacuum treatment. It is possible to do

dressing.⁽²⁴⁾ Too little pressure can result in insufficient contact and allow liquid collections to form. The capillaries may be squeezed by too much pressure and lead to graft necrosis. Proper considerations for skin graft should include graft taking, skin graft contracture, donor site morbidity, cosmetic fit, and durability.⁽²⁵⁾

With products such as surgical gauze, moistened cotton and sponge, pressure can be achieved. Sewing a wad of gauze over the graft consists of the normal procedure. A nonadherent gauze is commonly applied, along with antibiotic ointment or Vaseline, between the graft and the curative.⁽²⁶⁾ A tieover bolster of petroleum injected at smaller recipient sites. Often gauze, cotton balls, and nonsolvable sutures are put in. A negative pressure wound vacuum is another viable option for places that are difficult to reinforce. For high volume recipient sites, petroleum-infused gauze and bulky gauze/kerlix are placed over the grafts. Significant aspects, such as the availability of ventilation, liquid absorption, pressure application and the barrier to infection, should be presented in the ideal dressing. An ideal method of graft fixation should be simple, fast, repeatable, capable of being performed in the outpatient clinic, preventing hematoma or seroma formation, soaking the exudates well and allowing the graft bed to be easily inspected.⁽²⁷⁾ Complications of skin grafting can be short term and long term.⁽²⁸⁾

SHORT TERM:

Any fluid buildup between the split thickness skin graft and wound bed, including seroma, hematoma, and infection, will jeopardize skin graft taking. Shear or traction damage often disrupts the healing of the skin graft. The graft may have incomplete or full non-take (less than 100 percent).

LONG TERM:

Wound contracture and cosmetic problems are common, including variations in pigmentation and texture between the skin-graft and the donor site.

SKIN GRAFT TAKE:

Even when accounting for a number of receiver wound beds, split thickness skin graft taking is reported reliably at about 70 to 90 percent. The success rate of split skin grafting may be adversely affected^(29,30,31) TBSA burned over 35%, aged over 55 years, patient dietary deficiency, local site infection, and the involvement of comorbidities such as diabetes mellitus. Few of the related studies were reported⁽³²⁻³⁴⁾.

The drawbacks of split skin graft frequently indicate weak similarity to the surrounding skin of the recipient site (color match and texture if meshed), high sensitivity to trauma, low sensation of the recipient site, need for anesthesia/surgery (compared to secondary intention healing), and prolonged need for wound care for donor and recipient sites compared to other reconstructive meetings).

CONCLUSION

Gap in Knowledge:

There are no studies available comparing open with closed technique of split skin grafting and also no studies available comparing meshed and non-meshed grafting.

This is the gap in which we want to see what its effect on ultimate uptake of graft keeping in

mind that what is the bacterial flora and does it have any effect on graft.

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