EARLY OUTCOME AND ASSOCIATED FACTORS OF SPLIT THICKNESS SKIN GRAFTING AT MUHIMBILI NATIONAL HOSPITAL DAR ES SALAAM, TANZANIA.

Shedrack Frank Lusasi, MD

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Department of Surgery



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By

Shedrack Frank Lusasi, MD

A Dissertation Submitted in (Partial) fulfilment of the Requirement for the Degree of Masters of Medicine in Surgery at

Muhimbili University of Health and Allied Science

October, 2024

CERTIFICATION

The undersigned certify that they have read and hereby recommend for acceptance by Muhimbili University of Health and Allied Science dissertation entitled "**Early Outcome and associated factors of split thickness skin grafting at Muhimbili National Hospital, Dar es Salaam, Tanzania**" in partial fulfilment of the requirements for the degree of Master of Medicine in General Surgery of Muhimbili University of Health and Allied Science.

_____

Dr. Moses Byomuganyizi

(Supervisor)

Date: _____

_____

Dr. Edwin Mrema

(Supervisor)

Date: _____

DECLARATION AND COPYRIGHT

I**, Shedrack Frank Lusasi**, declare that this **dissertation** is my own original work and that it has not been presented and will not be presented to any other University for a similar or any other degree award.

Signature…… Date……...

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DEDICATION

I dedicate this dissertation to my late father Mr. Frank Charles Lusasi, though you are not with us in physical sense but your love wisdom unwavering support continue to guide me.This dissertation is a testament to the value you instilled in me and the lesson you taught me.Your memory will forever be source of inspiration and strength as I navigate through life challenges.

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ABSTRACT

Introduction

Split-thickness skin grafting is the most basic technique for transferring tissue which consists of epidermis plus a variable thickness of dermis from the donor site to the recipient site for the purpose of covering the wound to allow fast healing. Factors contributing to STSG outcome include age, sex, comorbidities, smoking, medications, wound size, wound site, first day of wound dressing post-surgery, hematoma, seroma and wound infection. There is paucity of information regarding outcome and factors contributing to STSG outcome in our settings.

Aim of this study; Assessment of early outcome and associated factors of split thickness skin grafting at Muhimbili National hospital.

Methodology; Prospective cohort study design conducted at MNH involving patients admitted in burn and plastic surgery unit. Data were collected using Swahili version questionnaires and analysis was done using SPSS Version 23. Cumulative incidence was calculated and risk ratio was used to measure association of the graft and variables. Multivariable logistic regression was used to control potential confounders. Any variable showed association with P value < 0.05 was considered as independent predictors.

Results: The study involved 100 study participants. The median age of the participant was 25yrs with interquartile range (IQR) of 34yrs. 58% of the participants were male. 12% of the study participants had comorbidities.5% were on chronic drugs use, 1% of the participant had infected graft and 1% had hematoma on lower limbs. Cumulative incidence of STSG failure was 12%. Factors associated with skin graft outcome were age, peripheral vascular disease and source of wound. Burn source of wound was found to be independent predictor for skin graft failure.

Conclusion: Incidence of skin graft failure was 12% among patients who underwent STSG at Muhimbili National Hospital. Burn wound was independent predictor for STSG failure.

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LIST OF ABBREVIATIONS

BMI……..Body Mass index

DM……Diabetes mellitus

DVT……..Deep venous thrombosis

HIV……Human Immunodeficiency Virus

IHD…… Ischemic heart disease

IQR……..Interquartile range

ISD……..Inter-item standard deviation

MUHAS……Muhimbili University of Health and Allied Science

MNH ……Muhimbili National Hospital

MOH……..Ministry of Health

NPWT……Negative pressure wound therapy

NSAIDS……Non-steroidal ant inflammatory drugs

PAD……..Peripheral arterial disease

PVD…….Peripheral vascular disease

SPSS……..Statistical Package for Social Science

STSG……..…Split Thickness Skin Grafting

WHO……..World Health Organization

WHR……..Waist- height ratio

DEFINITION OF TERMS

Split thickness skin graft is defined as a graft that contains the epidermis and a portion of the dermis.

Graft take is defined as one that has more than 80 % graft take in the 14 days of follow up.

Graft Failure is defined as graft that had greater than 20% failure at any assessment point, which then required ongoing wound management

Peripheral vascular disease is described as slow and progressive disorder caused by narrowing, blockage or spasm in the blood vessels (arteries or vein). All patient with ankle brachial index less than 0.9 and confirmed with Doppler ultrasound or Computed tomography scan angiography.

Hematoma is defined as clotted blood that form under a grafted skin.

Seroma described as accumulation of clear fluid under the skin, typically near site of surgical incision.

Body Mass Index (BMI), defined as, underweight<18.5kg/m2, normal 18.5-24.9kg/m2 overweight 25-29.9kg/m2 and obesity ≥30kg/m2.

Pediatric BMI is evaluated using age- and sex-specific percentile charts, typically provided by WHO and is defined as underweight $<5^{th}$ percentile, health weight $5^{th} \leq x < 85^{th}$ percentile, overweight 85th≤x<95th percentile and obesity ≥ 95^{th} percentile.

Renal failure was defined as presence of serum creatinine above 120 micromole per liter.

Early ambulation is the ambulation within one day of split thickness skin grafting.

Early outcome of STSG was defined as graft take or graft failure after being implanted to recipient site from donor site which was assessed within a duration of 14days.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of the study

Ancient India developed skin grafting techniques to cover up nasal defects thousands of years ago.(1). Split thickness skin grafting is the simplest method of tissue transfer from the donor site to the recipient site which consist of epidermis plus a variable thickness of dermis (2).STSG are used to cover wounds due to burns , after local excision of cancer, contractures, excision of infected skin ,traumatic wound and chronic ulcers.

After implanting, the skin graft take several steps of healing. The steps of graft healing include the following; imbibition which take about 4days, inosculation which takes about 48 hour post grafting and revascularizations. All these steps of graft healing complete in 5 to 7 days(1).

The incidence of the outcome of skin grafting is a subject in question in this study, different studies were done in different countries to assess outcome and associated factors of split thickness skin grafting. Current in our country we don't have a study which have assessed the outcome of the split thickness skin grafting and common factors which contributes to split thickness skin graft outcome.

The outcome of split thickness skin grafting include graft take and skin graft failure. The skin graft failure increase the cost of care ,prolonged hospital care, increased pressure on hospital resource utilization, increase cost to patients and psychological stress to the patients(3). In Denmark prevalence of patient with non-healing wound approximately 1% of the population .and care of those patient cost about 2% to 3% of the total budget of the health care system(4).

Incidence of split thickness skin graft failure seem to be high. Turisin et al found that incidence of split thickness skin graft failure was 31.8%.(5). Also Nsaful et al found the incidence of split thickness skin graft failure was high with incidence of 20.8%(6).Moreover Shah et al found the incidence of skin graft failure was 35.4%(7).

The high incidence of skin graft failure may be due to complications of skin grafting and factors which contribute to the graft failure. Complications of the skin grafting include the short term or early complications and long-term complications. The short-term complications include seroma, hematoma, infections and shearing or traction of the graft. These short-term complications contribute to the failure of the skin graft.

A part from complications above there are other factors which can contribute to skin graft outcome. Those factors include the following; Patient demographics, co morbidities, wound parameters, wound bed preparation, as well as the surgical dressing used after STSG placement may affect the final take of the graft(3).

Patient demographics such as age have been reported to influence outcome of skin grafting.as the age increase the healing of wound delay, this can lead to poor outcome of skin grafting. Wounds heal better and faster in the younger age group. Reductions in angiogenesis, epithelialization, collagen synthesis, and growth factors are all reasons why healing takes longer in older people(8). On the other hand, the final scar will look great on elderly people(8).

Comorbidities play crucial role in affecting the outcome of skin grafting. Comorbidities include peripheral vascular diseases, diabetes mellitus, renal failures, HIV are said to affect healing of the skin grafting.

Poor nutrition status also affects the outcome of skin graft take. Nutritional deficiencies, particularly those in protein, vitamins, and minerals, can have a negative effect on graft survival and wound healing. Lack of vitamin A affects the inflammatory phase, collagen synthesis, monocyte activation, and growth factor actions. Factors VII, IX, and X, as

well as prothrombin (II), are all affected by vitamin K deficiency(8). Antioxidant vitamin E helps stabilize membrane a cell. Lack of vitamin C worsens angiogenesis, fibroblast proliferation, and collagen synthesis; it also makes capillaries more fragile and susceptible to infection. Magnesium is a co-factor for the synthesis of proteins and collagen, and zinc is a necessary co-factor for RNA and DNA polymerase(8). Less than 2 g/dl of serum albumin prolongs the inflammatory phase, reduces fibroplasia, neovascularization, and cell synthesis, and impairs wound remodeling, all of which contribute to slower wound healing(8).

Wound parameters include site of the wound, size of the wound and wound recipient site status, source of wound are important determinant of the outcome of the skin grafting.

Wound bed preparation play important role in determining graft outcome. Poor preparation of graft bed will led skin graft failure and good preparation will lead to skin graft take. The quality of the tissue, the presence of infections, the vascularity of the wound bed, and any prior scarring can all affect how well a graft takes.

Post-operative care of the patient include wound dressing, ambulation also influence the outcome of skin grafting. For the graft to survive, it is crucial to provide adequate wound care, which includes the right dressings, immobilization, and infection prevention. For the best results, postoperative instructions must be followed.

Hematoma formation, which prevents the skin graft from adhering and vascularizing effectively, has been identified as the most frequent reason for skin graft failure (7). The outcome of the graft can also be significantly impacted by other post-operative complications, such as seroma formation and infection (3).

Other factors which may affect outcome of STSG include smoking and long term use of medications such as ant-inflammatory drugs, corticosteroids, anticoagulants such as warfarin, heparin.

There is paucity on information regarding outcome of split thickness skin graft outcome and associated factors in our settings. Understanding these variables aids surgeons in patient selection, preoperative planning, and postoperative care, ultimately improving clinical outcomes.

1.2 Statement of the problem

Split thickness skin grafting has been one of the commonest surgical procedures in plastic surgery unit. There two main outcomes of skin grafting are the graft take and skin graft failure. Studies have been done in some countries to assess outcome skin graft which are skin graft take and graft failure, most of them have demonstrated skin graft failure rates are still high, and several contributing factors are associated with skin graft failure (7).In our setting in plastic surgery unit we observe some patient post skin grafting have graft failure. To our knowledge no literature have been reported on outcome and associated factors of split thickness skin grafting in East Africa and Tanzania. There is paucity of the information regarding outcome and associated factors of split thickness skin graft in our settings.

1.3 Conceptual framework

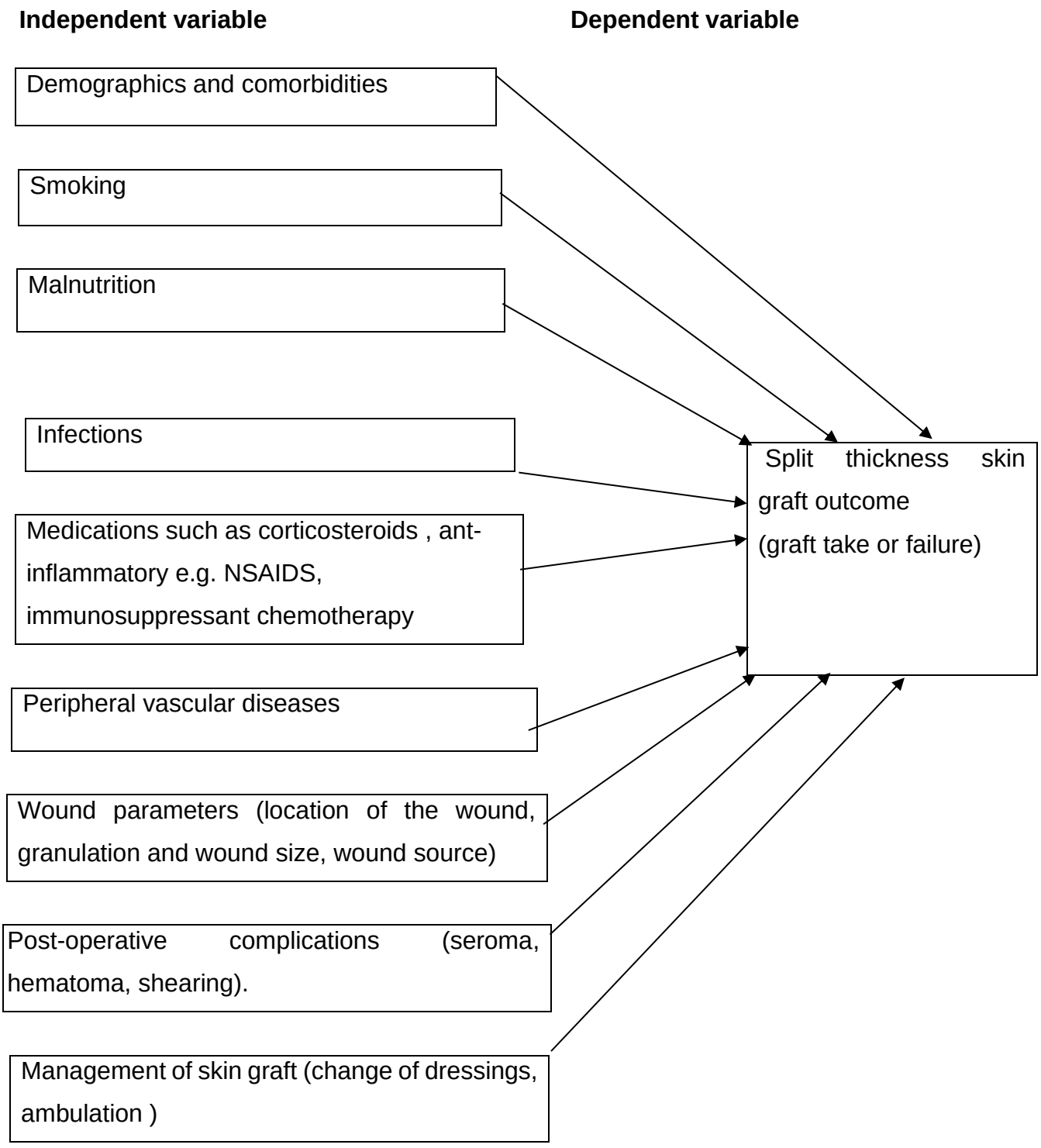


Figure **1** Conceptual framework

Figure1: Above is the conceptual frame work showing different patient demographic characteristics and factors which can contribute to outcome of split thickness skin grafting among patient who underwent skin graft at Muhimbili National Hospital.

1.4 Rationale of the study

This research highlight outcomes and associated factors of STSG at Muhimbili National Hospital. Understanding of the outcome and factors will help to take measure to minimize post-operative skin graft failure which may lead to long hospital stay of the patients, over utilization of hospital resources, increase cost of care to patient and his or her family and psychological stress to the patient(9–11). This research will open door for further research on skin grafts in the field of plastic and reconstructive surgery in our settings.

1.5 Research questions

1.5.1Primary questions

What are the early outcome and associated factors of split thickness skin grafting at Muhimbili National Hospital?

1.5.2 Secondary questions

i. What are the socio demographic and clinical characteristics of the patients undergoing STSG?

ii. What are the early outcome of STSG at Muhimbili National Hospital?

iii. What is the association of factors and early outcome of STSG?

1.6 Objectives of the Study

1.6.1 Broad Objectives

To assess early outcome and associated factors of split thickness skin grafting at Muhimbili National Hospital from January 2023 to June 2023.

1.6.2 Specific Objectives

i. To determine social demographic and clinical characteristics of patient undergoing split thickness skin graft.
ii. To determine early outcome of split thickness skin grafting among patient attended at MNH
iii. To determine association of factors and early outcome of split thickness skin grafting

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Socio demographic and clinical characteristics

The median age of the study participants was varying in different studies .The study done by Nsaful et al showed median age was 30yrs (6).Another study done by Reddy S et al which showed median age of the participants was 79yrs (13).

Several studies showed showed male were more predominant compared to female. This was demonstrated by study done by Dias RH et al which male participants were predominant 61%(25).another study by Turisin et al showed similar findings male sex predominance 62.3%(5).

In clinical characteristics of the patients a study done by Shah et al showed peripheral vascular diseases was 39%, diabetes mellitus 14.5%, heart diseases 17.74 % (7).

Also Shah et al which showed 13% of participants were smoker and 28.5% were on chronic drugs use anticoagulants and immunosuppressive drugs(7) .A study by Turissin et al showed post-operative complication such as hematoma occurred by 1.3% and surgical site infection 2.2% among study participants (5).

2.2 Outcome of split thickness skin grafting

Despite numerous advancements in technology, chronic wounds and other wounds management remain to be challenge due to different factors that affect the outcome. In a study done by Reddy S et al reported that among patient who underwent skin graft of lower limbs one third of the skin grafting failed (13). In a study done by Blume PA et al which was comparing the Negative pressure wound dressing and Conventional dressing shows that failure of skin graft was 3·5% for NPWD and 16% for conventional dressing (14).Also in another study done by Senchenkov, A et al on Outcomes of skin graft reconstructions with the use of Vacuum Assisted Closure (VAC®) dressing for irradiated extremity sarcoma defects shows that complete healing of the wound without

reoperation was achieved in 88% of cases. Complete (>95%) skin graft take was observed in 71% of cases, partial (80%–94%) take in 18%, and complete loss of the graft in 12% (15)**.**Study done by Nsaful Ko shows that skin graft failure rate was 20.8% mostly due to presence of bacteria on the wound bed(6) . Stankiewicz M found incidence of skin graft failure was 53.4%(3).

Hematoma formation, which prevents the skin graft from adhering and vascularizing effectively, has been identified as the most frequent reason for skin graft failure (7). The outcome of the graft can also be significantly impacted by other post-operative complications, such as seroma formation and infection (3).

2.3. Association of factors and outcome of STSG

There are several factors which can contribute to the outcome of split thickness skin graft. Those factors include patient demographic factors, co-morbidities, wound parameters, post-operative complications and management(3). Literatures for potential risk factors for split thickness skin graft outcome will be discussed below.

2.3.1 Patient demographic factors and co-morbidities.

Different literature have been reported the association of skin graft and cormobidities.Study by Rawat et al and Stankiewicz M found statistical association of graft acceptance and increasing age(3,16).However study by Paradela et al found no association between increasing age and poor surgical outcome(18).Also Turissin et al and Reddy S found no statistical association between age and outcome of STSG(5,13).

In a study done by Reddy S et al shows Lower limb skin grafts have high failure rates where by Increased BMI and PVD appear to be significant risk factors associated with graft failure(13).However Turissin et al found no significant statistical association between site of wound and STSG outcome (5). Turissin et al found heart failure is an independent predictor of skin graft failure (5).

However study done by Anderson JJ et al shows that comorbidities does not have effect on the healing of split thickness skin grafting(17).Paradela et al., reported no statistical relationship between medical comorbidities with poor surgical outcomes(18).More over Rawat et al found no statistical association between graft up take and comorbidities such as controlled diabetes mellitus and hypertension(16).

2.3.2 Malnutrition

Malnutrition is defined as “a state of nutrition in which a deficiency, or excess, of energy, protein and micronutrients causes measurable adverse effects on tissue/body form (body shape, size and composition) and function, and clinical outcome”(19).Good wound healing outcome is strongly associated with good nutritional status((20)).In a study done by Pennington and Morrison (2007) comparing BMI and WHR as predictors of skin graft failure shows that WHR was a good predictor of skin graft failure(21)However a study by Shah et al and Redd S et al revealed that BMI was a significant factor contributing to skin graft failure(7,13).

Other parameter such as albumin and hemoglobin level were historically known as biochemical markers for malnutrition. Theoretically were believed low albumin and hemoglobin level can lead to poor healing of the wounds. In study conducted by Moghazy A.M et al shows that there is no significant correlation between graft healing and level of serum albumin(22). Also study done by Soedjana H et al reported that graft healing has no significant correlation with serum albumin level(23). However in a study done by Cheng et al revealed that for DFU patient undergoing surgery, preoperative albumin level may be used in predicting postoperative healing(24). More over a study conducted by Dias RH et al shows that hypoalbuminemia was a significant factors affecting graft uptake with graft failure rate of 18.86% among diabetic patient who underwent split thickness skin grafting (25).

Agarwal P et al stated that anemia and hypoalbuminemia does not necessarily affect the healing of the wound(26).For skin graft take, mild to moderate anemia does not cause deleterious effect on wound healing provided there is maintained perfusion provided by adequate circulatory volume(26).

2.3.3. Medications

Medication is one of the risk factors that may affect the outcome of skin grafting. Medications include Corticosteroids and glucosteroids, Immunosuppressant, Anti-inflammatories Anticoagulant and chemotherapy. Medication such as steroid, chemotherapy, immunosuppressant and anti-inflammatory drugs tend to affect inflammatory phase of wound healing hence can impair the uptake of skin graft. Antiplatelet or anticoagulant theoretically are said to increase risk of bleeding on surgical site for patient who are using these medications hence increase chance of graft failure. In a study done by Reddy S et al shows that immunosuppressant drugs plays a crucial role in lower limb skin graft failure(13).However a study by Walters ET et al reveal that use of anticoagulants or antiplatelet therapy in perioperative period were not associated with skin graft failure(27) .

2.3.4. Surgical site Infection

Surgical site infection is defined as presence of microorganism in the tissue organ or space exposed during surgical procedure and this occurs with 30days post-operative if no implant was used(28). Most of the wounds especially chronic one are infected. Infection range from small quantity of microorganisms to large quantity which are pathogenic. Gjodsbol K et al., reported most of chronic wounds contain multiple bacteria and these may delay wound healing (29).Also Gjodsbol K et al .,reported 80% of culture results post skin grafting shows presence of Pseudomonas aeruginosa(29). Nsaful et al., stated that most of the cultured bacterial growth were Pseudomonas aeruginosa and other Pseudomonas spp and rate of graft failure due to infection was 24.6%(6). Presence of pseudomonas in chronic wound predict poor outcome of STSG as stated by Hogsberg et al(4) Turissin et al., reported not presence of any bacteria in

the in culture growth swab from the grafted skin affect the outcome of STSG but the type of bacteria species(5).More over Turissin et al and Gilliland et al., reported that Pseudomonas and Staphylococcus presence found to have bad outcome of STSG(5,30).

2.3.5 Peripheral vascular disease

These are occlusive or inflammatory disease that develop within the peripheral arteries ,veins or lymphatic(31).Intermittent claudication is the most common presenting symptom. Ankle brachial index (ABI) is current used to predict presence of peripheral vascular disease .Patient with ankle brachial index of less than 1 is suggestive of presence of peripheral vascular disease(31). Confirmation of diagnosis can be done by using vascular imaging such as Doppler ultra sound, MRI Angiography, Computed Tomographic angiography(31). Peripheral vascular diseases such as peripheral arterial disease or venous stasis have been associated with skin graft failure. Study done by Henderson and colleagues (2009) reported that none of the six patients diagnosed with PAD had graft failure, although this was not statistically significant (p=0.589) when compared with those that did not have PAD and graft failure. Another prospective observational by Paradela and colleagues (2010) did not find a statistically significant relationship between surgical site failure and PAD(18).Turissin et al found no statistical significant association between peripheral arterial diseases or venous stasis and split thickness skin graft outcome(5).

2.3. 6. Smoking

Chronic tobacco use results in the release of nicotine, carbon monoxide, and hydrogen cyanide, which together result in tissue anoxia, cellular hypoxia, inhibition of epithelial cell proliferation, vasoconstriction, a reduction in the capacity of blood cells to carry oxygen, and poisoning of the enzyme systems necessary for wound healing (31, 32). A meta-analysis by Mills and colleagues revealed that smoking is still a factor in unsuccessful surgical procedures. A recommendation of quitting smoking four weeks prior to surgery has been shown to reduce graft failure, infection, and primary closure

dehiscence (33). However, Rawat et al and Reddy S et al found no connection between smoking cigarettes and graft failure.(13,16).Also Shah et al found no significant association between smoking and skin graft failure (7).

2.3. 7. Wound parameters

Study done by N.J.Hendeson et al 2009 showed that there is higher failure rates of skin graft and complications rates on the lower limbs compared to the other areas of the body(13).Also in a study by Paradela et al shows high rate of surgical site complication on lower limbs.(18)However Rawat et al and Turissin et al stated that no association between the site of ulcer and the percentage of the graft acceptance(5,16).Also Rawat et al found that no association between source or etiology of wound and success of split thickness skin grafting(16).

2.3.8 Post-operative complications.

Post skin grafting complications which have been seen to impair graft take include seroma formation, hematoma, infections and shearing movement of the graft. A study done by McGrath et al reported that the most common cause of skin graft failure was hematoma under the graft, where the blood clot was a barrier to contact of the graft and bed for revascularization(28). Shearing or movement of the graft on the bed will preclude revascularization and caused graft loss. Another study by Jon D Turissini et al, 2019 has shown that among complications of skin graft only infection had statistical significance compared to other complications such as hematoma and seroma (5).

2.3.9 Ambulation

Ambulation is said to determine outcome of skin grafting. There is controversy in the literature with regard to early ambulation versus bed rest after lower limb skin grafting. Early ambulation post skin grafting is ambulation within one day of surgery(32).Some studies report early ambulation has good outcome while other studies report bed rest is good for good outcome of skin grafting. Study done by B. Luczak, J. Ha, and R. Gurfinkel showed no difference in outcomes or complications was seen between patients placed on bed rest and those who were immediately mobilized. Also study by

Sumeet Reddy 2016 reveal no statistical significance of outcome of skin graft take for placing patient on bed rest post-operative(13). Bed rest is still widely used throughout the world despite an increasing body of evidence showing no significant benefit in outcomes. However a study done by Gawaziuk et al state that early ambulation had graft take rate 98.9% for patients who started ambulation within one day post skin graft(32).

2.3.10 First day of change of dressing post-operative

The first day to change dressing post skin graft has greater impact on the outcome of skin graft. Study done by Gurushantap Y et al has shown that the first postoperative dressing done on Day 3 following skin grafting, significantly increased the final uptake of the graft, reduced seroma, infection and rejection rate(33).Also study done by Younes et al revealed successfully graft take when the first dressing change was done on the third day post-operative(34).

More over Taulo et al conducted a study which demonstrated that the changing of dressing first time on the fifth day following split thickness skin grafting was associated with poor skin graft uptake. (35)

CHAPTER THREE

3.0 METHODOLOGY

3.1 Study Design

Prospective cohort study among patients who underwent STSG grafting at Muhimbili National Hospital from October 2023 to February 2024.

3.2 Study area

The study was conducted at Muhimbili National Hospital in Dar es Salaam Region. The Hospital receives patients from all the regions of Tanzania with an estimated catchment population of 63 million people. It is a National referral, research Centre, and teaching hospital with a bed capacity of 1500 serving1000 to 1200 outpatients per week. MNH being a National hospital receives patients from all regions of Tanzania and neighboring countries. Muhimbili National Hospital (MNH), is the Centre in our country which offers comprehensive treatment such as diagnosis, surgery, pathological services and chemotherapy treatment before and after surgery and radiological services. MNH has many department including department of surgery.

Plastic, Reconstructive surgery and burn unit is one of the unit in the department of surgery at Muhimbili National hospital. The unit provide inpatient and outpatient services. The unit have a bed capacity of 60 in adult wards and 30 in Pediatrics burn ward. Unit perform approximately 144 surgeries per year.

3.3 Study population

The study population included patients who underwent split thickness skin grafting at Muhimbili National hospital.

3.4 Eligibility criteria

3.4.1 Inclusion criteria.

All patients with well granulated wound.

Age 12 months and above

Hemoglobin level must be 10g/dl or above

3.4.2 Exclusion criteria

All patients who were not willing participate in the study.

Patient with infected wound, poorly vascularized with necrotic tissue.

3.5. Study Variables

There were two types of variables in this study; independent and dependent variables.

3.5.1: Independent Study Variables

This study comprise of socio demographic and clinical characteristics of the study participants. Demographics features includes age in years (1-24, 25-44, 45-64,>64), Gender (male, female),Marital status(Single, Married/Cohabiting, Divorced widow) education level (no formal education, primary education, secondary education, University education) smoking (no, yes),Clinical factors included presence of comorbidities (yes, no) Body Mass Index (underweight, normal, overweight, obese), post-operative complications: hematoma (yes , no), seroma (yes ,no), infections (yes, no), history of long term use of medications (no, yes), peripheral vascular diseases (no, yes), wound parameters such as location of the wound (head and face upper limbs trunk lower limbs), size of the wound (<50cm^2, 50-100cm^2, >100cm^2) source of wound (trauma, cancer ,chronic ulcer/wound) and granulation status of the recipient site (well granulated, poorly granulated).

3.5.2: Dependent Study Variables/ Outcome variable

Skin graft outcome (graft take/graft failure)

Split thickness skin grafting was declared successful if 80% or more of the grafted skin has adhered to the grafted wound site and clinically wound had lighter skin compared to the surroundings due to vascularization. The duration for declaring successfully of the graft take or failure was 14 days.

3.6 Sample size estimation

$N=Z^2 P (100 - P) /D^2$

Where: N= Number of sample size,

Z= Standard normal deviation 1.96 which correspond to 95%,

P= 7% percentage of skin graft loss or failure (Yeong E et al)

D= Standard error which is 5%.

$N=1.96^2 \times 7 (100-7)/5^2 = 100$ patients

Estimated number of sample size was 100 patients

3.7 Sampling technique

The study enrolled all patient who needed split thickness skin grafting due to different reasons**.** These patient were identified by principle investigator and research assistants. Subjects were enrolled from the male ward, female ward and pediatric burn and plastic and reconstructive surgery unit at Muhimbili National Hospital.

3.8 Procedure of Split thickness skin grafting;

Split thickness skin grafting was performed by standard operating techniques. All operations were performed under general anesthesia or spinal anesthesia with prophylactic antibiotics intravenously.

Split thickness skin graft was harvested using a Humby's knife or electrical dermatome depending on surgeon preference. To ensure similarity of the thickness of skin graft in

all cases, during the use of Humby's skin graft knife the wheel was locked between calibration 1 and 2 and the distance between the roller and the blade was 0.025 to 0.004 depending on surgeon preference. When dermatome was required to be used it was set at calibration 0.1inches.The graft was meshed prior to application and the skin graft was secured to the wound bed with sutures. Graft was dressed using conventional dressing. Post-operative all patients were kept on intravenous broad spectrum antibiotics and analgesia. Then graft take was estimated by observation during change of dressing from day 3 was recorded as percentage. Post-operative ambulation decision was depending on surgeon preference. Any discharges from the wound postoperative, swab was taken for culture and sensitivity. Follow up of the patient was done for 14days.Post-operative care was done by surgeons and ward nurses.

3.9 Measurements

Weight was measured during the interview using a well-calibrated weighing scale and recorded in kilograms; height was also measured during the interview and recorded in meters.

The body mass index was calculated by dividing the body mass in kg by the square of the body height expressed in kg per square meter.

Percentage of the graft take was calculated by taking area of the graft take divide by the approximated total area of grafted wound times 100 percentage.

The skin graft was declared successfully by observing if grafted skin attached completely and epithelization was apparent by inspection at the edges.

3.10 Tools and Methods for Data Collection

To gather the data from each patient, an interviewer administered a pre-tested and pre-coded structured Swahili translated version questionnaire. The principal researcher or a research assistant directly collected patient profile and procedure information through an interview and observation.

3.11 Data Analysis

Data analysis was conducted using SPSS version 23.Descriptive statistics was used to describe baseline characteristics of the study participants .This include :frequencies for categorical variables and mean (ISD) or median (IQR) for numerical variables depends on the distribution of these numerical variables.

Cumulative incidence (risk) of graft failure was calculated and risk ratio (relative risk) was used as a measure of association between graft failure and independent variables

Multivariate Robust Poisson regression model was used to control potential confounders. Any variable shows association with p value <0.05, at multivariable was considered as independent predictor (factor) of graft failure.

3.12 Data Quality Assurance.

Standard assessment instrument was selected for collecting the data. The standard checklist questionnaire was prepared and pre-tested on 5% of patient in plastic surgery ward (which are not included in the study) to test its validity and reliability before finalization. Following pre-test result necessary modification can be made. Before start of the data collection, data collectors were given intensive training on correct and accurate data collection and Principle investigator was cross checking the completeness of the data correction every day. Several quality safeguards was incorporated into the data entry program Microsoft excel. All questionnaires were reviewed again to ensure accuracy of data entry once data were transferred into the SPSS database.

3.13 Validity and Reliability of Tool.

3.13.1 Validity

It refers to the range that measures what the gauge is designed to measure. To ensure the validity and reliability of the data collected during the study, structured questionnaires were employed to ensure convergence of facts during the data collection process. Respondents of the questionnaire were explained the purpose of the study.

3.13.2 Reliability

It refers to the consistency, stability and reproducibility of results. This refers to the degree to which the instrument can be measured in the same way every time when used on the same subject under the same conditions. An instrument is reliable as long as its measurements reflect its true score. Reliability was ensured by questionnaire pre-testing prior to the actual study. This helps to identify gaps in our survey, take your time to complete the survey, and ensure your instructions are clear.

3.14 Ethical consideration and consent

Ethical review and approval was obtained from Muhimbili University of Health and Allied Science IRB with reference letter DA282/298/01.C/1927 and approval number MUHAS- REC-10-2023-1927. The Muhimbili National Hospital Management Team provided permission to perform the study with letter Ref No; MNH/CRTCU/Perm/2023/553. All study participants were asked for their written consent before having their medical history and details about their current treatment collected for research purposes.

The questionnaires was kept in a safe and secure location to maintain the confidentiality of any data collected from the respondent. Instead of using names, serial numbers was used to ensure the subjects' anonymity and confidentiality. Participants had the option to leave the research at any time, and it was made sure that doing so won't affect their ability to get therapy.

CHAPTER FOUR

4.0 RESULTS

4.1: Social demographic and clinical characteristics of the study participants.

Table 1; A total of 100 patients were involved in this study. Among the participants 58% were male and 42% were female patients. The median age of the participant was 25yrs with interquartile range (IQR) of 34yrs .56% of the study participants were single, 43% were married and 1% was divorced.

Majority of the study participant had secondary education 39%, 29% had primary education, 28% had no formal education and 4% had university education.

Among study participants 12% had comorbidities. Patient with comorbidities include 4% had peripheral vascular disease, 2% HIV, 2% renal failure and 2% Diabetes Mellitus patients, 1% heart failure and 1% hypertension.1% of the study participant was a smoker, 5% were on chronic drug use, 1% of the participant had infections and 1% had hematoma.

Nutritional status, 54% of the study participants had normal weight followed by 35% who were overweight, 5% were obese, 6% were underweight. Table 1 below showed above findings.

Table 1: Social demographic and clinical characteristics of the study participants (N=100)

Variables	Frequency	Percentage
Age	Median (IQR)=25(34)	
Sex		
Male	58	58.0
Female	42	42.0
Marital status		
Single	56	56.0
Married	43	43.0
Divorced	1	1.0
Education		
No formal education	28	28.0
Primary Education	29	29.0
Secondary	39	39.0
University	4	4.0
Smoking	1	1.0
Comorbidities		
Hypertension	1	1.0
Diabetes mellitus	2	2.0
PVD	4	4.0
Heart failure	1	1.0
HIV	2	2.0
Renal failure	2	2.0
Chronic drug use	5	5.0
Infection	1	1.0
Hematoma	1	1.0
Nutrition Status		
Underweight	6	6.0
Normal	54	54.0
Overweight	35	35.0
Obesity	5	5.0

4.2: Association of factors and early outcome of split thickness skin grafting.

Table 2 revealed Cumulative incidence of skin graft take (success) was 88% compared to skin graft failure of 12% among 100 patients who underwent split thickness skin grafting at Muhimbili National Hospital.

In the current study, age was observed to be significantly associated with split thickness skin graft outcome (P value =0.03). Increase in age is associated with increase chance of skin graft failure and decrease in age is associated with skin graft uptake

In this study peripheral vascular diseases was observed to be statistically significantly associated with split thickness skin graft outcome (P- value =0.01).

Also source of wound was observed to be statistically significantly associated with split thickness skin graft early outcome (P- value = 0.001).

No significant association was seen in variables sex, hypertension, Diabetes mellitus, heart failure, creatinine levels, albumin levels, smoking, location of wound, size of wound ,day of first dressing and time of ambulation as shown in table 2.

Table 2: Factors associated with split thickness skin graft early outcome

Variables	(%)	Early STSG outcome		*p*-value
		Graft takes n (%)	Graft Failure n (%)	
		88	12	
Age				0.03
1-24	49	48 (98.0)	1 (2.0)	
25-44	27	21(77.8)	6(22.2)	
45-64	18	15(83.3)	3(16.7)	
>65	6	4(66.7)	2(33.3)	
Sex				0.76
Male	58	51(87.9)	7(12.1)	
Female	42	38(90.5)	4(9.5)	
Comorbidities				
Hypertension	1	0	1 (100.0)	0.11
Diabetes mellitus	2	2 (100.0)	0	0.78
PVD				0.01
Yes	4	2 (50.0)	2 (50.0)	
No	96	87 (90.6)	9 (9.4)	
Heart failure	1	1 (100.0)	0	0.8
Smoking	1	1 (100.0)	0	0.8
Creatinine				0.06
<60	58	55 (94.8)	3 (5.2)	
60-119	39	32 (82.1)	7 (17.9)	
>120	2	1 (50.0)	1 (50.0)	
Nutrition Status				0.68
Underweight	6	6 (100.0)	0	
Normal	54	49 (90.7)	5 (9.3)	
Overweight	35	30 (85.7)	5 (14.3)	
Obesity	5	4 (80.0)	1 (20.0)	
Albumin				0.75
<35	59.0	53 (88.9)	6 (10.2)	
35-50	41.0	36 (87.8)	5 (12.2)	
Wound location				0.78
Head and /neck	13.0	12(92.3)	1(7.7)	
Upper limbs	10.0	10(100.0)	0	
Trunk	22.0	20(90.9)	2(9.1)	
Lower Limbs	55.0	47(85.5)	8(14.5)	
Chronic drug use				
Yes	5	5 (100.0)	0	0.55
Wound Size (cm2)				0.52
Small (<50)	29.0	27(93.1)	2(6.9)	
Medium (50-100)	34.0	31(91.2)	3(8.8)	
Large (>100)	37.0	31(83.8)	6(16.2)	
Source of Wound				<0.001
Burn	66.0	65(98.5)	1(1.5)	
Cancer	8.0	5(62.5)	3(37.5)	
Chronic Wound	26.0	19(73.1)	7(26.9)	
First day of dressing				0.38
First 3 days	4.0	3 (75.0)	1 (25.0)	
5th day	96.0	86 (89.6)	10 (10.4)	
Ambulation				0.16
Early ambulation	31.0	30 (96.8)	1 (3.2)	
Late Ambulation	69.0	59 (85.5)	10 (14.5)	

4.3: Predictors of split thickness skin graft failure.

From table 3 below participants with young age (1-24yrs) shows significant association with split thickness skin graft failure compared to elderly group (>65yrs) (COR=0.04,P=0.02).This suggesting younger age has lower likelihood of failure compared to elderly group .however after adjusting for other factors ,the association was found to be not significant.(P=0.90).Also participants with peripheral vascular diseases had significantly higher likelihood of developing skin graft failure compared to the one with no peripheral vascular diseases (COR=9.5, P=0.03). After adjustment of other factors, the association was found to be statistically not significant (P=0.30).

In contrast among source of wound, burn wounds shows significantly lower likelihood of developing skin graft failure compare to chronic wound and cancer has 50% chance of developing skin graft failure compared to chronic wounds (COR=0.04, P=0.04) .Burn wounds showed statistical significant association with skin graft failure (P- value =0.04).After adjustment of other factors, the association was found to be significant (AOR=0.02, P=0.01).Burn wound was found to have 98% chance less likely to cause STSG failure. Therefore burn source of wound was found to be independent predictor of STSG failure.

Table 3.Multivariety logistic regression of predictors of split thickness skin graft failure.

Variables	COR (95%CI)	*p*-Value	AOR* (95%CI)	*p*-Value
Age				
1-24	0.04(0.01-0.5)	0.02	0.8 (0.01-78)	0.90
25-44	0.5 (0.06-3.3)	0.45	-	
45-64	0.4 (0.04-3.3)	0.40	-	
>65	1		1	
PVD				
Yes	9.5 (1.2-76.2)	0.03	6.5 (0.19-225)	0.30
No	1		1	
Source of Wound				
Burn	0.04 (0.01-0.3)	0.04	0.02(0.001-0.35)	0.01
Cancer	1.5 (0.3-8.2)	0.61	0.5 (0.05-5.9)	0.62
Chronic Wound	1		1	

CHAPTER FIVE

5.0 DISCUSSION

5.1: Social demographic and clinical characteristics of the study participants.

The median age of the participant was 25yrs with interquartile range (IQR) of 34yrs.This almost similar to the study done by Nsaful et al in which median age was 30yrs (6). The current study was not similar to study by Reddy S et al which showed median age of the participants was 79yrs (13). The difference could be due to the fact that the current study involves all age groups (children and adults) but the latter study involves only adult group.

Among the 100 patient 58% were male and 42% were female patients. The current study is similar to the study done by Dias RH et al which male participants were predominant 61% (25). Another study by Turisin et al showed similar findings male sex predominance 62.3%(5).Male predominance could be due to the fact that male were involved in works that predispose them to trauma.

12% of the study participants had comorbidities. Among patient with comorbidities 4% had peripheral vascular disease, 2% HIV, 2% renal failure and 2% Diabetes Mellitus patients, 1% heart failure and 1% hypertension. This was contrary to previous study by Shah et al which showed peripheral vascular diseases was 39%, diabetes 14.5%, heart diseases 17.74 % (7).

1% of the study participant were smokers, 5% were on chronic drug use. The current study is not similar to the study done by Shah et al which showed 13% of participants were smoker and 28.5% were on chronic drugs use anticoagulants and immunosuppressive drugs (7). the difference could be due to the latter study was dealing with only adult population.

In the current study post STSG complications found were hematoma was 1% and surgical site infection 1% of the graft among study participants. This was almost similar

to the study by Turissin et al which found hematoma 1.3% and infection 2.2% among study participants (5).

5.2 Outcome of split thickness skin grafting

In the current study incidence of split thickness skin graft failure was found to be 12%. This is similar to study done by Senchenkov, A et al which found skin graft failure was 12% (15). Another study done by Blume PA et al show incidence of skin graft failure was 16% and also Nsaful et al shows incidence of skin graft failure was 20.8%. Similar findings were seen in the study done by Rawat et al (16). But these results were contradicting with findings of the study done by Reddy S et al which shows incidence of skin graft failure is one third of the patients who underwent skin grafting (13). Also findings of the current study were contradicting with findings of the study done by Stankiewicz M which revealed incidence of skin graft failure was 53.4% (3). The findings of the incidence of STSG failure was low in the current study compared to most of the previous studied this could be due to improvement of preoperative preparation intra operative techniques such as meshing of graft and improved post-operative care.

5.3 Association of factors and early outcome of split thickness skin grafting

5.3.1 Patient demographic clinical and post-operative care

5.3.1.1 Age of the study participants

In this study we found that age was significantly associated with outcome of split thickness skin grafting. This is consistent with the Study done by Rawat et al and Stankiewicz M found statistical association of graft acceptance and increasing age(3,16).However Study by Paradela et al report no statistical relationship between increasing age with poor surgical outcomes(15).

5.3.1.2 Peripheral vascular diseases

In this study peripheral vascular disease was found to be statistically significant associated with the outcome of split thickness skin grafting. In peripheral vascular diseases blood supply to the tissue will be compromised hence even healing of the graft may be impaired. The study findings were consistent with the study done by Reddy S et al which showed lower limb skin grafts have high failure rates where by Peripheral vascular diseases appear to be significant risk factors associated with graft failure(11).however study by Paradela et al report no statistical relationship between medical comorbidities with poor surgical outcomes(15).Also study done by Anderson JJ et al shows that comorbidities did not have effect on the healing of split thickness skin grafting(17). Rawat et al found no statistical association between graft up take and comorbidities such as controlled diabetes mellitus and hypertension(16).

5.3.2 Malnutrition

In determining association of malnutrition and outcome of skin grafting two important parameters investigated, albumin level and body mass index. In the current study was found that as the BMI of the patient increase the chance of graft failure also increase, although no statistically significant relationship was found between BMI and skin graft failure. Also study by Stankiewicz M et shows no association between malnutrition and surgical site failure(3). However a study by Shah et al and Redd S et al revealed that BMI was a significant factor contributing to skin graft failure(7,13).

In this study was found that albumin level was not statistically significant associated with split thickness skin graft outcome. This is consistent with the finding of the study conducted by Moghazy A.M et al and Soedjana H et al showed that there is no significant correlation between graft healing and level of serum albumin(22,23).also study done by Agarwal P et al found that hypoalbuminemia was not significant associated with graft failure(26). However,Cheng et al and Dias RH et al revealed that for DFU patient undergoing surgery, preoperative albumin level may be used in predicting postoperative healing(24,25).

5.3.3 Smoking

In the current study was found no statistical significant association between cigarette smoking and outcome of skin grafting. This could be due to small number of patients found to use cigarette among the study participants. Longer duration of when they stop smoking cigarrete to the time they underwent surgery also have impact on the outcome. Similar findings was found in a study done by Rawat et al and Reddy S et al which showed no significant statistical association between smoking and skin graft outcome (16, 13). Also study done by Stankiewicz M and Shah et al found no association between smoking and skin graft failure(3,7).

5.3.4 Wound parameters;

Wound parameters that have been discussed in the current study include site of wound, source of wound and size of wound. Source of wound was found to be significant associated with outcome of skin grafting. The source or etiology include trauma such as burn, degloving wound, cancer and chronic wounds such as diabetic foot ulcer. Trauma wound was found to be independent protective factor for skin graft failure. This is not similar the study done by Rawat et al which found that the etiology of raw area was not significantly associated with the outcome of skin grafting (16). Other sources of wounds were not found to be significant may be due to low number of participants with those etiology of wounds.

Other parameters such as site of wound, size of wounds was not statistical significant. This finding is similar to the study done by Rawat et al (16). The study done by N.J.Hendeson et al and Paradela et al showed that site of wound lower limbs have higher skin graft failure rate compared to other sites (18).

5.3.5 Ambulation

In the current study we found no statistical significant association between early or late ambulation and outcome of skin grafting. This similar to Study done by B. Luczak, J. Ha, and R. Gurfinkel which showed no statistical difference in outcomes or complications was seen between patients kept on bed rest and those who were

immediately mobilized. Also study by Reddy S reveal no statistical significance of outcome of skin graft take for keeping patients on bed rest post-operative (13). However a study done by Gawaziuk et al state that early ambulation had graft take rate 98.9% for patients who started ambulation within one day post skin graft(32).Early wound inspection has advantage of identifying complications such as seroma hematoma ,surgical site infection early and this help to intervene those complications and reduce chance of graft failure.

5.3.6 First day of change of dressing post-operation

In this study we found no significant statistical difference in outcome of skin graft between first wound dressing on first three days and day five. This is contrary to the study done by Gurushantap Y et al and Younes et al which showed significant increase success of skin when dressing was done on the third day post operation (34). Furthermore Taulo et al conducted a study which demonstrated that the changing of dressing first time on the fifth day following split thickness skin grafting was associated with poor skin graft uptake (35).

CHAPTER SIX

6.0 STUDY LIMITATIONS, CONCLUSION AND RECOMMENDATIONS.

6.1 Study limitations

It is a single Centre study with smaller population and short duration of follow-up. It involves all age groups and multiple factors were investigated.

6.2 Conclusion

Split thickness graft failure was 12% among patients who underwent split thickness skin grafting at Muhimbili National Hospital. This study has shown that age, source of wound and peripheral vascular diseases were significantly associated with early skin graft outcome for patient who underwent split thickness skin grafting. Among source of wounds, burn wounds were found to be predictive factor of split thickness skin graft failure.

6.3 Recommendations.

1. To do STSG more on burn wounds but when grafting on wounds of other etiology, patient should be counselled on increased chance of failure and use of specific appropriate treatment for non-burn wounds.

2. To conduct multicenter study with longer duration of follow-up on the outcome of skin graft

3. Future study should focus on specific age group e.g. Adults only and specific factor which can affect outcome of skin graft.

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APPENDICES

Appendix I: English Version Questionnaire

Date of interview…….

Date of admission …….

Hospital registration No…….

Mobile phone number.....

Contact address ……

Research Title: Outcome and associated factors of split thickness skin graft at Muhimbili National hospital Dar es Salaam Tanzania.

Instruction to interviewers:

i. Principal researcher or research assistants will interview the patient or care taker.
ii. Patient or care taker are not supposed to be given this questionnaire to fill it since it is an interview.
iii. This data collection tool has four parts;
iv. Please circle or fill where appropriate.

Part one: Socio-demographic characteristics.

1. Age of the patient ……
2. Sex of the patient
    i. Male
    ii. Female

3. Marital status of the patient
    i. Single
    ii. Married
    iii. Cohabiting
    iv. Divorced
    v. widow
4. Educational level of the patient?
    i. No formal education
    ii. Primary education
    iii. Secondary education
    iv. University education

Part two: Comorbidities.

5. Is the patient Hypertensive?
    i. Yes
    ii. No
6. Patient HIV status:
    i. Positive
    ii. Negative
7. Is the patient known to have Diabetes Mellitus?
    i. Yes
    ii. No
8. If yes in QN 7 above, what is the glycemic control?
    i. < 7%
    ii. 7%- 8%
    iii. >8%
9. Does the patient have peripheral vascular disease confirmed with Doppler USS?
    i. Yes
    ii. No

10. Is the patient know to have heart failure or ischemic heart disease confirmed with ECG, ECHO?
    i. Yes
    ii. No
11. What was the level of serum creatinine in micromole per liter before surgery?
    i. <60
    ii. 60-119
    iii. ≥120
12. Anthropometric measurement of the patient
    i. Body weight in kg …….
    ii. Height of the patient in meter ……
13. Body mass index (kg/m2) …….
14. What was albumin level before surgery? .....
15. Does the patient use any medications for chronic illness?
    i. Immunosuppressant
    ii. Ant- inflammatory
    iii. Ant-coagulants
    iv. Use of both above mentioned drugs
    v. Not using any drugs
16. Is the patient smoking?
    i. Yes
    ii. No

Part 3: Wound parameters

17. What is the location of the wound or ulcer?
    i. head or face
    ii. upper limbs
    iii. Trunks
    iv. lower limbs

18. Dimensions of the wound
    i. Length of the wound ……...
    ii. Width of the wound ……
19. Dimension of the graft take
    i. Length of the skin graft take…….
    ii. Width of the skin graft take……...
20. Size of the wound ……
    i. <50cm2
    ii. 50-100cm2
    iii. >100cm2
21. What was the status of the Recipient site?
    i. Well granulated
    ii. Not well granulated
22. What was the etiology of the wound?
    i. Traumatic injury
    ii. Cancer
    iii. Ulcer

Part 4; Post-operative management and complications

23. Post-operative ambulation status
    i. Early ambulation
    ii. Bed rest
24. First day of change of dressing post-operative
    i. 3day post op
    ii. 5th day post op
    iii. More than 5days
25. Shearing movement of the Split thickness graft
    i. Yes
    ii. No

26. Was there seroma found after Split thickness skin grafting?
    i. Yes
    ii. No
27. Was there hematoma formed after split thickness skin grafting surgery?
    i. Yes
    ii. No
28. Are there signs of infections (pus discharge, fever) on the graft?
    i. Yes
    ii. No
29. If yes in question 23, what are the results of Swab for culture and sensitivity?
    i. Pseudomonas aurogenosa
    ii. Staphylococcus aureus
    iii. E coli
    iv. Klebsiella pneumonia
    v. Others

Appendix II: Dodoso la Kiswahili

Tarehe ya mahojiano…….

Tarehe ya kulazwa …….

Namba ya usajiri…….

Namba ya simu.....

Anuani ya makazi…….

Kichwa cha tafiti: Matokeo Na vichochezi vya matokeo ya upandikizaji wa ngozi Kwa wagonjwa katika idara ya plastic hospitali ya Taifa Muhimbili, Tanzania.

Maelekezo Kwa wachukua maelezo:

i. Mhoji ni lazima awe mtafiti mkuu, watafiti wasaidizi kama madaktari wauguzi.
ii. Kwa mahojiano dodoso haitakiwi ijazwe an mgonjwa au ndugu wa mgonjwa
iii. Dodoso lina sehemu nne;
iv. Zungushia majibu Kwa maswali ya kuchagua Na kujaza nafasi zilizo wazi.

Sehemu ya kwanza: Socio-demographic characteristics.

1. Umri wa mgonjwa ……..
2. Jinsia ya mgonjwa
   i. kiume
   ii. kike

3. Hali ya ndoa
    i. Hajaolewa
    ii. Ameolewa/ameoa
    iii. Wanaishi pamoja bila ndoa
    iv. Ameachana
    v. Amefiwa
4. Kiwango cha elimu?
    i. Hajasoma
    ii. Elimu ya msingi
    iii. Elimu ya sekondari
    iv. Elimu ya juu

Sehemu ya pili: Magonjwa mengineyo.

5. Ni mgonjwa wa shinikizo kubwa la damu?
    i. Ndio
    ii. Hapana
6. Hali ya maambukizi ya ugonjwa wa virusi vya ukimwi:
    i. Chanya
    ii. Hasi
7. Mgonjwa ana ugonjwa wa kisukari?
    i. Ndio
    ii. Hapana
8. Kama ni ndio kwenye swali la 7 juu hapo, kiwango cha control ya sukari Hb A1C ni ngapi?
    i. < 7%
    ii. 7%- 8%
    iii. >8%

9. Mgonjwa ana matatizo ya mishipa ya damu?
    i. Ndio
    ii. Hapana
10. Mgonjwa ana matatizo ya moyo kushindwa kufanya kazi vizuri iliyothibishwa kwa EKG na ECHO
    i. Ndio
    ii. Hapana
11. Kiwango cha creatinine kwenye damu kabla ya upasuaji?
    i. <60
    ii. 60-119
    iii. >120
12. Vipimo vya arthropometric vya mgonjwa
    i. Uzito wa mgonjwa kg ……
    ii. Urefu wa mgonjwa meta……
13. Uwiano wa uzito na urefu wa mgonjwa katika kg/m2 ……
14. Kiwango cha albumin kabla ya upasuaji kilikuwa ngapi? .....
15. Je mgonjwa anatumia dawa za muda mrefu?
    i. Immunosuppressant
    ii. Ant- inflammatory
    iii. Ant-coagulants
    iv. Anatumia dawa zote hapo juu
    v. Hatumii dawa zozote

16. Je mgonjwa anavuta sigara?
    iii. Ndio
    iv. Hapana

Sehemu ya tatu: Vipimo vya kidonda

17. Kidonda kipo sehemu gani ya mwili?
    i. Kichwa au uso
    ii. Mikononi
    iii. kiwiliwili
    iv. miguuni
18. Vipimo vya kidonda
    i. Urefu wa kidonda……
    ii. Upana wa kidonda……..
19. Vipimo vya ngozi iliyoshika
    i. Urefu wa ngozi iliyoshika ……
    ii. Upana wa ngozi iliyo shika……...
20. Ukubwa wa kidonda
    i. <50cm 2
    ii. 50-100cm2
    iii. >100cm2
21. Hali ya kidonda cha kuwekewa ngozi bandia
    i. kipo granulated vizuri
    ii. Hakuna granulation
22. Kidonda kilisababishwa na nini?
    i.kuumia
    ii.saratani
    iii.kidonda sugu

S**ehemu ya nne; Matibabu baada ya upasuaji na madhara yatakayojitokeza.**

23. Hali ya kutembea kwa mgonjwa baada ya upasuaji
    i. Ameanza kutembea mapema
    ii. Kupumzika kwa kitanda
24. Siku ya kwanza ya kufungua kidonda baada ya upasuaji
    i. Siku ya tatu
    ii. siku ya tano
    iii. Zaidi ya siku tano.
25. Je kuna seroma imejitengeneza baada ya upasuaji wa kupandikiza ngozi?
    i. Ndiyo
    ii. Hapana
26. Je ngozi iliyopandikizwa imesogea kutoka eneo ilipopandikizwa
    i. Ndiyo
    ii. Hapana
27. Je kuna damu iliyoganda (hematoma) baada ya kupandikiza ngozi?
    i. Ndiyo
    ii. Hapana
28. Je Kuna dalili ya Maambukizi kwenye ngozi iliyopandikizwa?
    i. Ndiyo
    ii. Hapana
29. Kama ndiyo swali 25, je majibu ya kuotesha wadudu yalikuwaje?
    i. Pseudomonas aurogenosa
    ii. Staphylococcus aureus
    iii. E coli
    iv. Klebsiella pneumoniae
    v. wengineo

Appendix III: Informed Consent Form

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

INFORMED CONSENT FORM

TITLE: EARLY OUTCOME AND ASSOCIATED FACTORS OF SPLIT THICKNESS SKIN GRAFTING AT MUHIMBILI NATIONAL HOSPITAL DAR ES SALAAM TANZANIA.

Part 1: Information Sheet

Introduction: I Dr Shedrack Lusasi a post graduate student at Muhimbili University of Health and Allied Sciences (MUHAS). I invite you to take part in the research with above mentioned title. Informed consent form you are reading provides information on the study. Read thoroughly the information given in this consent form. If you are ready to take part in this study, sign in the allocated area in the consent form certificate .If you encounter words or information you don't understand Please don't hesitate to ask for clarification.

Purpose of the Research; Aims is to assess early outcome and associated factors of split thickness skin grafting at MNH. Understanding the outcome and factors contributing to skin graft outcome will help in management of chronic wounds and improve outcome of skin grafting. This will help to reduce hospital resources utilization; patient congestion and prolonged hospital stay.

Study Procedure: Your/patients' demographic data (excluding your Name) and Contact Details and clinical information on arrival at the surgical outpatient department, surgical wards, intra-operative and postoperative information/data will be used for data analysis.

Voluntary Participation: Your participation in this study is voluntary and you have a right to refuse to consent or withdraw from the study at any time without compromising care.

Benefits: There are no direct benefits to you, but your participation is likely to help find out more about how to improve care for patients undergoing split thickness skin grafting.

Alternatives: No alternative way of participating in the study if you disagree to take part in the study.

Risks and Discomfort: No risk for participating in this research study.

Compensation for Time: No rewards or payment will be given for participating in this research.

Confidentiality: Numbers will be used instead of names in the data collection tools.

Review and Approval: The research study was reviewed and approved by MUHAS Institutional Review Board.

Results Dissemination: Dissemination of the results of the research will be done to MUHAS library and will be published in the scientific journal after being approved.

PART 2: CERTIFICATE OF CONSENT I confirm that I have gone through the consent form thoroughly and understand the information provided in the form for me to participate in this study. Also I understand that I am allowed to withdraw from the study any time when I want to do so.

Signature: …….. Date: ……

Contacts information:

If you have any queries or questions, contact me through telephone number 0715114252 or through an email address;lusasi89@gmail.com .you may also contact my supervisor Dr Moses Byomuganyizi through contact 0783195915.

If you have any question concern your right as participant you may contact the director of research and publication MUHAS, Professor Bruno Sunguya, P.O.BOX 65001, Telephone 2152489 Dar es salaam.

Appendix IV: Fomu ya Ridhaa

CHUO KIKUU CHA AFYA NA SAYANSI SHIRIKISHI MUHIMBILI

FOMU YA MAELEZO NA UKUBALI WA KUSHIRIKI KATIKA TAFITI JUU YA MATOKEO YA MAPEMA AND VICHOCHEZI YA KUSABABISHA NGOZI MBADALA KUSHINDWA KUSHIKA KWENYE KIDONDA, HOSPITALI YA TAIFA MUHIMBILI DAR ES SALAAM TANZANIA

SEHEMU YA KWANZA: TAARIFA

Utangulizi; Mimi ni dkt Shedrack Lusasi mwanafuzi wa Shahada ya Uzamili katika Chuo Kikuu cha Afya na Sayansi Shirikishi Muhimbili. Ninakualika kushiriki katika tafiti tajwa hapo juu. Tafadhali soma maelezo yafuatayo na endapo utaridhia kushiriki katika tafiti hii, weka sahihi yako katika eneo tengwa mwisho wa maelezo haya. Usisite kuuliza maswali endapo utahitaji ufafanuzi Zaidi.

Dhumuni La Tafiti: Tafiti hii inalenga kujua matokeo ya kubandika ngozi mbadala na vichochezi vinavyosababisha ngozi mbadala kushindwa shika kwenye kidonda katika hospitali ya taifa Muhimbili.

Taratibu za Utafiti: Taarifa za kidemografia za pamoja na taarifa za matibabu na uchunguzi aliopatiwa mgonjwa zitachukuliwa kutoka kwa mgonjwa baada ya operesheni na kishakufanyiwa uchambuzi.

Ushiriki wa Hiyari: Ushiriki katika tafiti hii ni hiyari na unaruhusiwa kukataa kushiriki au kujitoa katika utafiti huu muda wowote bila kuathiri huduma za kitabibu zitakazoku wa zikitolewa.

Faida ya Kushiriki: Tafiti hii itasaidia katika kuboresha utoaji huduma kwa wagonjwa wenye vidonda sugu wanaohitaji kuwekewa ngozi mbadala kwenye vidonda.

Mbadala: Usiporidhia kushiriki katika tafiti hii hakuta kuwa na tafiti mbadala.

Madhara: Hakuna madhara yanayotarajiwa tokea. Tafiti hii haita husisha gharama zozote za ziada.

Malipo; Hakuna malipo ya aina yotote ambayo mshiriki atapokea wala kuchangia. Usiri; Majina, anwani, picha na taarifa zozote za utambuzi wa mgonjwa hazita chukuliwa.

Kibali Cha Utafiti: Kibali cha kufanya tafiti hii kimetolewa na bodi ya Maadili ya tafiti, chuo kikuu cha Afya na Sayansi Shirikishi Muhimbili.

Uchapishwaji wa Taarifa; Matokeo ya tafiti hii yatachapishwa katika maktaba ya Chuo na Majarida ya kimataifa ya Sayansi ya Afya. Taarifa binafi za mgonjwa hazita oneka na katika machapisho hayo.

Sehemu ya Pili:

Ukubali wa Kushiriki; Nina thibitisha kuwa nimesoma na kuelewa maelezo juu ya tafiti hii na nimekubali kushiriki kwa hiari yangu mwenyewe.

Sahihi (Mgonjwa/Mbadala): …… Tarehe: ……

Mawasiliano:

Kama una wasiwasi au maswali unaweza wasiliana nami kupitia namba 0715114252 au kupitia barua pepe: lusasi89@gmail.com.Pia waweza wasiliana na msimamizi wangu wa utafiti huu Dk Moses Byomuganyizi kupitia namba 0783195915.

Kama utakua na maswali kuhusiano na haki zako kama mshiriki kwenye tafiti waweza wasiliana na mkurugenzi wa tafiti na uchapishaji MUHAS profesa Bruno Sunguya S.L.P 65001, namba ya simu 2152489 Dar es salaam.

Appendix V: Ethical clearance –MUHAS

UNITED REPUBLIC OF TANZANIA

MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

OFFICE OF THE DIRECTOR – RESEARCH, PUBLICATIONS AND INNOVATION

Ref. No.DA.282/298/01.C/1927 Date: 03/10/2023

MUHAS-REC-10-2023-1927
DR SHEDRACK F LUSASI
SCHOOL OF MEDICINE
MUHAS

RE: APPROVAL FOR ETHICAL CLEARANCE FOR A STUDY TITLED: EARLY OUTCOME AND ASSOCIATED FACTORS OF SPLIT THICKNESS SKIN GRAFTING AT MUHIMBILI NATIONAL HOSPITAL DAR ES SALAAM TANZANIA

Reference is made to the above heading.

I am pleased to inform you that the Chairperson has on behalf of the University Senate, approved ethical clearance of the above-mentioned study, on recommendations of the Senate Research and Publications Committee meeting accordance with MUHAS research policy and Tanzania regulations governing human and animal subjects research.

APPROVAL DATE: 03/10/2023
EXPIRATION DATE OF APPROVAL: 03/10/2024

STUDY DESCRIPTION:
Purpose:

The purpose of this prospective observational cohort study is to determine outcome and associated factors of the split thickness skin grafting at Muhimbili National Hospital.

The approved protocol and procedures for this study is attached and stamped with this letter, and can be found in the link provided:
https://irb.muhas.ac.tz/storage/Certificates/Certificate%20-%2014801.pdf and in the MUHAS archives

The PI is required to:

1. Submit bi-annual progress reports and final report upon completion of the study.
2. Report to the IRB any unanticipated problem involving risks to subjects or others including adverse events where applicable.
3. Apply for renewal of approval of ethical clearance one (1) month prior its expiration if the study is not completed at the end of this ethical approval. You may not continue with any research activity beyond the expiration date without the approval of the IRB. Failure to receive approval for continuation before the expiration date will result in automatic termination of the approval for this study on the expiration date.
4. Obtain IRB amendment (s) approval for any changes to any aspect of this study before they can be implemented.
5. Data security is ultimately the responsibility of the investigator.
6. Apply for and obtain data transfer agreement (DTA) from NIMR if data will be transferred to a foreign country.
7. Apply for and obtain material transfer agreement (MTA) from NIMR, if research materials (samples) will be shipped to a foreign country.
8. Any researcher, who contravenes or fail to comply with these conditions, shall be guilty of an offence and shall be liable on conviction to a fine as per NIMR Act No. 23 of 1979, PART III section 10 (2)
9. The PI is required to ensure that the findings of the study are disseminated to relevant stake holders.
10. PI is required to be versed with necessary laws and regulatory policies that govern research in Tanzania. Some guidance is available on our website https://drh.muhas.ac.tz/.

Dr. Nahya Salim Masoud,

Chairperson, MUHAS Research and Ethics Committee



Appendix VI: Introduction Letter

UNITED REPUBLIC OF TANZANIA
MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY
MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES
OFFICE OF THE DIRECTOR – POSTGRADUATE STUDIES

In reply quote;
Ref. No. HD/MUH/T.254/2021

26th October, 2023

The Executive Director,
Muhimbili National Hospital,
P.O. Box 65000,
DAR ES SALAAM

Re: INTRODUCTION LETTER

We would like to inform you that the bearer of this letter is Shedrack F. Lusasi with Reg. No. HD/MUH/T.254/2021 is a student at Muhimbili University of Health and Allied Sciences (MUHAS) "pursuing MMed. General Surgery.

As part of his studies, he will be doing an elective research titled: "**EARLY OUTCOME AND ASSOCIATED FACTORS OF SPLIT THICKNESS SKIN GRAFTING AT MUHIMBILI NATIONAL HOSPITAL DAR ES SALAAM.**" he is being supervised by Dr. Moses Byomuganyizi from MUHAS and Dr. Edwin Mrema from MNH.

The research has been approved by the Chairman of University Senate.

Kindly provide him the necessary assistance to facilitate the conduct of his research.

We thank you for your cooperation.

Ms. Victoria Mwanilwa
For: DIRECTOR, POSTGRADUATE STUDIES

c.c Shedrack F. Lusasi

9 United Nations Road; Upanga West; P.O. Box 65001, Dar Es Salaam: Tel. G/Line: +255-22-2150302/6; Ext. 1015; Direct Line:+255-22-2151378;Telefax:+255-22-2150465;E-mail:dpgs@muhas.ac.tz;Web:https://www.muhas.ac.tz

Appendix VII: Permission Letter

MUHIMBILI NATIONAL HOSPITAL

In reply please quote;

Ref. No.: MNH/CRTCU/Perm/2023/553 Date: 07th November, 2023

Head of Department
Surgery
Muhimbili National Hospital

RE: PERMISSION TO COLLECT DATA AT MNH

Name of Student	**Shedreck F. Lusasi**
Title	**"Early Outcome and Associated Factors of Split Thickness Skin Grafting at MNH Dar es Salaam".**
Institution	Muhimbili University of Health and Allied Sciences
Supervisor	Dr. Moses Byomuganyizi (MUHAS)
Co – Supervisor	Dr. Edwin Mrema (MNH)
Period	07th November, 2023 to 28th March, 2024

Approval has been granted to the above principal investigators to collect data at MNH. Dissemination of study findings at MNH shall be overseen by **Dr. Edwin Mrema** (MNH) supervisor.

Kindly ensure the named principal investigator abide to the ethical principles and other conditions of the research approval.

Sincerely,

Dr. Deus Buma
For: Head of Clinical Research, Training and Consultancy Unit

HEAD, TEACHING, RESEARCH & CONSULTANCY UNIT
P. O. Box 65000
DAR-ES-SALAAM
MUHIMBILI NATIONAL HOSPITAL

c.c DSS
c.c Dr. Edwin Mrema
c.c **Shedreck F. Lusasi**