



SURVIVAL OF SPLIT SKIN GRAFT IN DIABETIC ULCER VERSUS NON- DIABETIC ULCER

General Surgery

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ABSTRACT

Introduction: Chronic ulceration of the lower leg and foot is a frequent condition and wide in distribution they may be associated with a number of Medical, Surgical & Dermatological condition the patient suffering is very immense, commonly seen in most of the surgical wards and OPD
Material & Method: Present prospective cohort study was conducted among the patients with foot ulcers presenting to department of General Surgery, AVMCH and were posted for elective surgeries during a period of 2 years. The patients posted for split skin graft were admitted a day prior to surgery. A detailed history including the identification detail of the patient, presenting complaints, were obtained. General Examination and detailed clinical examination was done. The outcome among the patients were analysed as graft uptake and any complications noted between the groups. **Result:** In present study, total of 170 patients fulfilling inclusion criteria were included with mean age of 51.4 ± 13.2 yr of age. On assessment of the 1st acceptance of graft, it was significantly higher in group B (78.8%) compared to the group A (60.3%). ($p < 0.05$) On assessment of different post operative day the percentage of acceptance was significantly higher in group B compared to the group A patients. ($p < 0.05$) On assessment of complications, there is no significant complication documented in group B compared to the group A patient. **Conclusion:** The study documented the improvement in the graft acceptance in both the group, of which the non-diabetic group had significantly early healing compared to the diabetic foot ulcer.

KEYWORDS

Split skin graft, ulcers, diabetic, non-diabetic, healing

I. INTRODUCTION

Ulceration can be defined as wounds with "full thickness depth" and a "slow healing tendency" in general the slow healing tendency is not simply explained by depth and size. But caused by an underlying pathologic fact that needs to be removed to induce healing.^{1,2} About 15% of diabetic patients will develop chronic ulcer, and about 25% of those will have to undergo foot amputation.^{3,4}

There are several studies discussing about the effectiveness of the split skin graft in ulcers. Chronic ulceration of the lower leg and foot is frequent condition and wide in distribution they may be associated with a number of Medical, Surgical & Dermatological condition the patient suffering is very immense, commonly seen in most of the surgical wards and OPD.⁵⁻⁷

Despite its common indications, there have been few large studies assessing the use of split thickness skin graft as a modality for treatment of diabetic foot and leg wounds.^{8,9} Many techniques exist to heal chronic wounds, most of which focus on secondary intention.¹⁰ Split-thickness skin graft (STSG) placement has rarely been discussed as a primary means of healing wounds, particularly those on the diabetic foot.⁹ Present research aimed to study the effectiveness of split skin graft in the treatment of diabetic and non-diabetic foot ulcers

II. MATERIAL & METHOD:

Present prospective cohort study was conducted among the patients with foot ulcers presenting to department of General Surgery, AVMCH who were posted for elective surgeries during a period of 2 years were included. The patients posted for split skin graft was admitted a day prior to surgery. Patients with age group >35 yrs of age & <65 yrs of age, patients suffering from T2DM presenting with diabetic foot ulcer and those with ulcers other than diabetic foot ulcer were included. Patients with co-morbidities like renal/ hepatic/ cardiac/ dysfunctions, those with infected ulcers, Immunocompromised patients, Recurrent cases, and those not willing to consent were excluded. Sample size was calculated was 170 (85 in each group) using $\alpha = 0.05$ Power = 85%.

III. Statistical analysis

All the data were collected in proforma and entered in excel sheet. The collected data demographic data was summarized as frequency,

percentage, mean and standard deviation. The summarised data were represented using tables, figures, bar diagram and pie charts. The mean difference between the continuous data was analysed using t-test, for follow-up data paired t-test and for categorical data Chi-square test was used to determine the significance between the parameters observed in this study. $AP < 0.05$ was accepted as significant. Statistical analysis was performed using SPSS version 22.0 (IBM SPSS, US) software operating on windows 10.

IV. RESULTS:

Patients were included in the study after taking informed consent and grouped into two groups based on etiology of the foot ulcer, as; Group A: Patients presenting with diabetic foot ulcer ($n=85$) and Group B: Patients presenting with non-diabetic foot ulcer ($n=85$). In present study, total of 170 patients fulfilling inclusion criteria are included with mean age of 51.4 ± 13.2 yr of age. Among 170 patients, 54.1% were male and 45.9% were female patient, with marginal male preponderance. On assessment of the 1st acceptance of graft, it was significantly higher in group B (78.8%) compared to the group A (60.3%). ($p < 0.05$) On assessment of different post operative day the percentage of acceptance was significantly higher in group B compared to the group A patients. ($p < 0.05$) There is no significant complication documented in group B compared to the group A patients, were 25.9% documented with presence of complication in them. ($p < 0.05$)

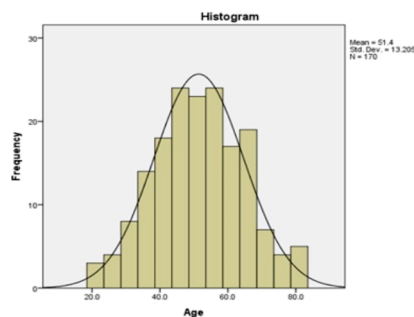


Figure 1: Mean age of the patients

Fig 1 shows in present study, total of 170 patients fulfilling inclusion criteria are included with mean age of 51.4±13.2yr of age.

Table 1: Comparison of characteristics between the groups.

	Group A			Group B		(p-value)
	Count	N %	Count	N %		
Gender	Female	38	44.7%	40	47.1%	0.09 (0.758)
	Male	47	55.3%	45	52.9%	
Time of 1st acceptance of		60.3	18.4	78.8	9.9	0.01*
Graft acceptance	POD5	66.5	20.4	85.3	10.3	0.01*
	POD7	74.3	19.9	88.9	9.3	0.01*
	POD9	82.3	18.1	92.0	9.4	0.01*
	POD11	89.9	13.4	94.5	8.0	0.01*
Complications	Absent	63	74.1%	81	95.3%	14.712

Table 1 shows that between the gender, there is significant difference in distribution between the groups. On assessment of the 1st acceptance of graft, it was significantly higher in group B (78.8%) compared to the group A (60.3%).(p<0.05). On assessment of different post operative day the percentage of acceptance was significantly higher in group B compared to the group A patients.(p<0.05). On assessment of complications, there is no significant complication documented in group B compared to the group A patients, were 25.9% documented with presence of complication in them.(p<0.05).

V. DISCUSSION AND CONCLUSION

Chronic ulceration of the lower leg and foot is a common and widely distributed disorder that can be linked to a variety of medical, surgical, and dermatological conditions.^{11,12} It is frequently observed in surgical wards and OPDs and causes the patient great discomfort. Despite its common indications, there have been few large studies assessing the use of split thickness skin graft as a modality for treatment of diabetic foot and leg wounds. Many techniques exist to heal chronic wounds, most of which focus on secondary intention. Split- thickness skin graft (STSG) placement has rarely been discussed as a primary means of healing wounds, particularly those on the diabetic foot.⁷ The response to the injury in healthy individual is inbuilt and is sequentially arranged process that result in the healing of wound with complete re-epithelialization, drainage of resolution and attainment of function to the affected tissue.

A total of 170 patients fulfilling inclusion criteria are included with mean age of 51.4±13.2yr of age. 41.2% were in age of 41-55yrs, followed with 25.3% in 56-65yrs and 21.2% in 21- 40yrs of age. Among 170 patients, 54.1% were male and 45.9% were female patient, with marginal male preponderance. There is a significantly higher in group B (78.8%) compared to the group A (60.3%).(p<0.05) On assessment of different post operative day the percentage of acceptance was significantly higher in group B compared to the group A patients.(p<0.05) On assessment of complications, there is no significant complication documented in group B compared to the group A patients, were 25.9% documented with presence of complication in them.(p<0.05) In concordance the study by Dhanaram B et al., Split skin grafts treated about 88% of patients (graft take higher than 90%), with a 5% recurrence rate. The others had less than 90% of the graft taken, but the ulcer had healed. Donor site infection occurred in 5% of cases, and all were handled conservatively. The primary purpose of diabetic foot treatment programmes is to prevent morbidity, promote early wound healing, and encourage early ambulation. This process of split skin grafting aids in this. However, the optimal approach is to prevent the formation of such diabetic ulcers by patient education and improved glycemic management. Diabetic clinic follow-up should include vascular and neuropathic foot examination as well as foot care instruction.¹³

Sanniec K et al. reported that 16 skin grafts failed and that 27 healed with more than 90% graft take. There was no statistically significant difference in HbA1c levels between the groups that healed a skin graft and the groups that did not heal a skin graft. According to preliminary evidence, an increased HbA1c level does not exclude the use of a skin graft. In diabetic individuals, the benefits of early wound closure outweigh the hazards of skin graft application.¹⁴

According to the findings of the research by Yammine K et al., STSG is the best treatment for treating noninfected recurring or resistant leg and dorsal foot ulcers. The authors further believe that STSG should be utilised more often in the treatment of similar wounds. The findings

should pique the interest of future researchers.¹⁵ Maduba CC et al., The negative pressure dressing had a higher mean skin graft take of 99.2±0.95% than the standard dressing, which had a mean take of 89.7±6.44%, which was statistically significant with a P value of <0.001. The complication rate was 12.9% in the negative pressure dressing group and 96.8% in the conventional wound dressing group, indicating that traditional wound dressing had about 7.5 times greater problem. With a P value of <0.001, this is statistically significant. When compared to typical wound dressing methods, negative pressure dressing for split-thickness skin transplant dramatically improves split-thickness skin graft take with a lower complication rate.^{16.}

In multiple other trials, split-thickness skin grafts were used as an adjuvant to a treatment that was only marginally beneficial or to cover the donor site of another plastic surgery technique. Split-thickness skin grafts, when used as the primary closure on ideal diabetic foot ulcerations, are 78% efficient in healing 90% of the lesion by eight weeks.⁵

In the present study, on assessment of the 1st acceptance of graft, it was significantly higher in non-diabetic patients than in diabetic patients and on assessment of different post-operative day the percentage of acceptance was significantly higher in non-diabetic patients than in diabetic patients. There is no significant complication between both the groups.

VI. REFERENCES

- Nelzen O, Bergqvist D, Lindhagen A. Venous and non-venous leg ulcers: clinical history and appearance in a population study. *Br J Surg*. 1994;81(2):182-7.
- Jiménez F, Garde C, Poblet E, Jimeno B, Ortiz J, Martínez ML, et al. A pilot clinical study of hair grafting in chronic leg ulcers. *Wound Repair Regen*. 2012;20(6):806-14.
- Apelqvist J, Ragnarson-Tennvall G, Larsson J, Persson U. Diabetic foot ulcers in a multidisciplinary setting: An economic analysis of primary healing and healing with amputation. *J Intern Med*. 1994;235(5):463-71.
- Willrich A, Pinzur M, McNeil M, Juknelis D, Lavery L. Health related quality of life, cognitive function, and depression in diabetic patients with foot ulcer or amputation. A preliminary study. *Foot Ankle Int*. 2005;26(2):128-34.
- McCartan B, Dinh T. The Use of Split-Thickness Skin Grafts on Diabetic Foot Ulcerations: A Literature Review. *Plast Surg Int*. 2012;2012:1-6.
- Valencia IC, Falabella A, Kirsner RS, Eaglstein WH. Chronic venous insufficiency and venous leg ulceration. *J Am Acad Dermatol*. 2001;44(3):401-24.
- Pekarek B, Buck S, Osher L. A comprehensive review on Marjolin's ulcers: diagnosis and treatment. *J Am Col Certif Wound Spec*. 2011;3(3):60-4.
- Ramanujam CL, Stapleton JJ, Kilpadi KL, Rodriguez RH, Jeffries LC, Zgonis T. Split-thickness skin grafts for closure of diabetic foot and ankle wounds: a retrospective review of 83 patients. *Foot Ankle Spec*. 2010;3(5):231-40.
- Anderson JJ, Wallin KJ, Spencer L. Split thickness skin grafts for the treatment of non-healing foot and leg ulcers in patients with diabetes: a retrospective review. *Diabet Foot Ankle*. 2012;3(1):10204.
- Leaper D, Assadian O, Edmiston CE. Approach to chronic wound infections. *Br J Dermatol*. 2015;173(2):351-8.
- Spentouris G, Labropoulos N. The evaluation of lower-extremity ulcers. In: *Seminars in interventional radiology*. New York: © Thieme Medical Publishers; 2009. p. 286-95.
- Srinivas J, Pillai M, Vinod V, Dinesh RK. Skin and soft tissue infections due to *Shewanella algae*—an emerging pathogen. *J Clin Diagnostic Res JCDR*. 2015;9(2):DC16.
- Dhanaram B, Arunachalam J, Muthukumaraswamy B. Split skin graft for diabetic ulcers: an analysis. *Int Surg J*. 2016;3(4):2160-2.
- Sanniec K, Nguyen T, van Asten S, La Fontaine J, Lavery LA. Split-thickness skin grafts to the foot and ankle of diabetic patients. *J Am Podiatr Med Assoc*. 2017;107(5):365-8.
- Yammine K, Assi C. A Meta-Analysis of the Outcomes of Split-Thickness Skin Graft on Diabetic Leg and Foot Ulcers. *Int J Low Extrem Wounds*. 2019;18(1):23-30.
- Maduba CC, Nnadozie UU, Modekwe VI, Onah II. Split skin graft take in leg ulcers: conventional dressing versus locally adapted negative pressure dressing. *J Surg Res*. 2020;251:296-302.