Surgical Correction of Ectropion: Comparison Between Full Thickness Skin Grafts and Local Flaps

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ABSTRACT

Objective: To compare the effectiveness of two reconstruction techniques, i.e., full-thickness skin graft and local flap, for patients undergoing reconstructive surgery for ectropion repair.

Study Design: Prospective comparative study.

Place and Duration of Study: Department of Plastic & Reconstructive Surgery, Dr Ruth K.M. Pfau Civil Hospital Karachi, from Feb to Aug 2020.

Methodology: The study was conducted after acquiring approval from the Institutional Review Board of Dow University of Health Sciences. Patients advised repairing ectropion were admitted to the ward prior to a day or night of the procedure. The consultant surgeon decided on the operative management, either using a full-thickness skin graft or a local flap, depending on the type of ectropion.

Results: 60 patients were recruited for the study, with 30 patients in each group. At follow-up of two weeks, one month, and three months' skin colour match and pliability were significantly better in patients who received local flap than those treated with a full-thickness skin graft. Out of 30, 2 (6.7%) patients developed ectropion recurrence when they received full-thickness skin graft coverage, whereas ectropion recurrence was not observed in patients managed with local flap.

Conclusion: Local flap appears to be more effective than full-thickness skin graft in achieving excellent aesthetic effects in patients who underwent correction of ectropion.

Keywords: Ectropion, Full-thickness skin graft, Local flap, Reconstruction technique.

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INTRODUCTION

There is dominant importance of the eyelid as there are several eyelid functions, such as protecting the eye from a foreign body, dust, trauma, draining tears, maintaining moisture, etc. The complexity of eyelid structure poses a challenge for its reconstruction. Many conditions require eyelid reconstruction, such as trauma, congenital anomalies, or the excision of malignant lesions involving eyelids. Uncorrected wounds may develop many conditions that include ectropion as well. Commonly ectropion occurs as a result of malpositioning of eyelid.[1] It appears to result from outward rotation of the eyelid margin that affects the lower eyelid.[2] This condition causes conjunctival inflammation, corneal exposure and ocular irritation. Usually, patients presenting with ectropion complain about dryness in the eyes, keratopathy, epiphora, pain and lagophthalmos.[3] Ectropion may be bilateral or unilateral, and commonly lower eyelids are involved.[4]

Based on the pathophysiology, ectropion is categorized as congenital, paralytic, cicatricial, involutional or mechanical.[3,5] There may be different and frequently combined causes of ectropion 6. Usually, trauma failed blepharo-plasty, infections or other factors cause ectropion or lower eyelid retraction, and approximately ectropion appears in 2.5-7% of cases following the surgical removal of eyelid lesion. Ectropion compromises the aesthetic appearance and can also lead to hypophasis.[7,8]

For the treatment of ectropion, surgical management is required as the first-line treatment for its correction, irrespective of the cause of ectropion.[6] There are several surgical approaches for managing defects of the lower eyelid. The reconstruction approach differs according to the defect thickness, location and size.[9] Preoperatively considering the specific kind of ectropion, the applicable surgical approach should be chosen and used; however, no such surgical algorithm has been established.[3] However, repairing ectropion is still surgically challenging as every surgical procedure has its pros and cons.[6]

One of the most challenging areas in reconstructive plastic surgery is the reconstruction of eyelids. None of the other human body parts involves this interaction of aesthetics, function and anatomy. The main aim of reconstruction surgery is to restore function and aesthetics. Since no such reconstructive

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algorithm has been established, the current study aims to compare the effectiveness of two reconstruction techniques, i.e., full-thickness skin graft and local flap, for patients undergoing reconstructive surgery for ectropion repair.

METHODOLOGY

This prospective comparative study was conducted at the Department of Plastic and Reconstructive Surgery, Dr Ruth K.M. Pfau Civil Hospital Karachi, from February to August 2020. The study was conducted after acquiring approval from the Institutional Review Board (IRB-411/DUHS/approval/2020/04) of Dow University of Health Sciences.

Inclusion Criteria: Patients of both gender and age more than 18 years presenting with ectropion with anterior lamellar defect were included in the study.

Exclusion Criteria: Patients with full-thickness eyelid defects, requiring both anterior and posterior lamellar reconstruction and rendering graft only coverage impossible, were excluded from this study. In addition, patients having globe injury, recurrent ectropion and/or extensive facial burns or facial tumours rendering local flaps unavailable for eyelid reconstruction were also excluded from this study.

Proportions of patients with recurrent ectropion treated with full-thickness skin graft=24%.[10] Proportions of patients with recurrent ectropion treated with local flap=0%.[11] Therefore, at a 95% confidence interval and power of 80%, a sample of 28 patients was calculated. However, for better results, we recruited 30 patients in each group. Patients were enrolled in the study after taking informed consent. Non-probability consecutive sampling technique was used to enrol study participants.

Patients advised repairing ectropion were admitted to the ward prior to a day or night of the procedure. The assigned doctor on duty physically assessed the patient's condition and did baseline investigations to assess the patient's medical fitness for the surgery. Preoperatively the desired position of an eye was marked. Based on the surgeon's choice, the patient received either a full-thickness skin graft or a local flap depending on the type of ectropion. All the cases were performed under general anaesthesia using Adrenaline and Lidocaine. At the time of discharge, patients were advised for regular follow up in the outpatient department. Skin colour match and pliability were assessed by a consultant surgeon post-operatively on follow-up of two weeks, one month and three months. The skin colour and pliability of the grafted site were matched to the normal skin colour subjectively and rated as excellent, good, fair and poor.

Statistical Package for Social Sciences (SPSS) version 21.0 was used for the data analysis. Demographic and clinical variables were summarized in mean ± standard deviation and frequencies with percentages for quantitative and qualitative variables, respectively. Independent t-test for quantitative variables and chi-square test for categorical variables was applied to observe the significant differences in study variables between the two groups of the patients. The two-tailed p-value ≤ 0.05 was considered statistically significant.

RESULTS

A total of 60 participants were enrolled in this study. The mean age of patients who underwent full-thickness skin graft and the local flap was 37.1 ± 11.20 years and 41.67 ± 8.77 years, respectively. There were 19 (51.4%) females and 11 (47.8%) males in the group who received full-thickness skin grafts. While in the group treated with local flap, 18 (60%) were male and 12 (40%) were females. More than half of the patients had ectropion due to trauma n=36 (60%). Moreover Post-burn (n=12, 20%), eye surgery (n=4, 6.7%), basal cell carcinoma (n=8, 13.3%) were also causes of ectropion in our study. The two groups were homogenous based on age (p=0.084), gender (p=0.791) and causes of ectropion (p=0.193) (Table-I). Recurrence of Ectropion was observed in 2 (6.7%) patients who were managed with a full-thickness skin graft, whereas none of the patients had ectropion recurrence who received local flap.

Table-I: Comparison of participants; characteristics between two groups.

Study Variables	Full Thickness Skin Graft n (%)	Local Flap n (%)	p-value
Age (in years)	37.1 ± 11.21	41.67 ± 8.77	0.084
Gender			
Male	19 (63.3)	18 (60.0)	0.791
Female	11 (36.7)	12 (40.0)	
Causes of Ectropion			
Basal Cell Excision	3 (10.0)	5 (16.7)	0.193
Eye Surgery	0 (0)	4 (13.3)	
Post Burn	7 (23.3)	5 (16.7)	
Trauma	20 (66.7)	16 (53.3)	

At two weeks follow-up, Skin colour match was excellent in 4 (13.3%) patients treated with local flap, while none of the patients had excellent skin colour match in the group treated with a full-thickness skin graft. Skin colour match was significantly better in the

group received reconstruction technique of local flap (p<0.001). In the first month of follow up, the proportion of patients with excellent skin colour match in the local flap group (n=17, 56.7%) was significantly higher than those who were treated with a full-thickness skin graft (n=7, 23.3%) which indicated that at one month follow up skin colour match was significantly better in patients receiving local flap than full-thickness skin graft (p=0.011). At the third month follow up, entire patients treated with local flap had excellent skin colour match, while in the group treated with full-thickness graft, few patients had fair (n=2, 6.7%) and poor (n=1, 3.3%) skin colour match. Skin colour match at third-month follow-up was also significantly better in patients who were treated with local flap (p<0.001) (Table-II).

Table-II: Comparison of skin color match among patients grafted full thickness skin graft and local flap.

Follow-up Period	Groups	Skin Color Match		
		Full Thickness Skin Graft n (%)	Local Flap n (%)	*p*-value
Two Weeks	Excellent	0 (0)	4 (13.3)	**<0.001
	Good	18 (60)	26 (86.7)	
	Fair	11 (36.7)	0 (0)	
	Poor	1 (3.3)	0 (0)	
One Month	Excellent	7 (23.3)	17 (56.7)	*0.011
	Good	19 (63.3)	13 (43.3)	
	Fair	3 (10)	0 (0)	
	Poor	1 (3.3)	0 (0)	
Three Months	Excellent	14 (46.7)	30 (100)	**<0.001
	Good	13 (43.3)	0 (0)	
	Fair	2 (6.7)	0 (0)	
	Poor	1 (3.3)	0 (0)	

*ǂFisher-exact testis reported, *Significant at p<0.05, **Significant at p<0.01*

On follow-up of two weeks, 25 (83.3%) patients achieved good pliability in the local flap group. In contrast, in the group treated with a full-thickness skin graft, only 6 (20%) patients achieved good pliability, which indicates that pliability was better in the local flap group (p<0.001). At follow-up of one month, pliability was significantly better in the local flap group (p<0.001). 22 (73.3%) patients achieved good pliability in the local flap group, whereas half of the patients in the full-thickness group were observed to have good pliability. On follow-up of the third month, pliability was better in the local flap group (p<0.001). 4 (13.3%) patients had good pliability, and 26 (86.7%) achieved excellent pliability in the local flap group. In contrast, more than a quarter of patients had fair pliability in the full-thickness group, and few had poor pliability (n=2, 6.7%) (Table-III).

Table-III: Comparison of skin pliability among patients grafted full thickness skin graft and local flap.

Follow-up Period	Groups	Skin Pliability		
		Full Thickness Skin Graft n (%)	Local Flap n (%)	*p*-value
Two Weeks	Excellent	-	2 (6.7)	**<0.001
	Good	6 (20)	25 (83.3)	
	Fair	17 (56.7)	3 (10)	
	Poor	7 (23.3)	-	
One Month	Excellent	1 (3.3)	8 (26.7)	**<0.001
	Good	15 (50)	22 (73.3)	
	Fair	12 (40)	-	
	Poor	2 (6.7)	-	
Three Months	Excellent	3 (10)	26 (86.7)	**<0.001
	Good	16 (53.3)	4 (13.3)	
	Fair	9 (30)	-	
	Poor	2 (6.7)	-	

*ǂFisher-exact testis reported, **Significant at p<0.01*

DISCUSSION

After cancerous skin excision from eyelids, the reconstruction process is a challenge. The difficult part in the construction of the periocular area after the excision process is to give a proper and stable margin in the eyelid area, evenness, clean surfaces internally, proper shutting off eyelids to avoid non-closure sequel events, restoring tension in eyelids usually as well as giving enough dimensions horizontally and vertically for proper functioning. No such unique algorithm has yet been developed that indicates the dominance of one procedure over another.[12,13] There are several choices for surgical treatment; a thorough understanding of lamellar components in anatomy is necessary to select the most suitable surgical procedure. The involvement of eyelids in sight and social activities is crucial; restoring each role and beauty is difficult. Usually, full-thickness skin grafts with regional inversion flaps have been used to elongate the anterior layer.[2] The present research established the efficacy of full-thickness graft versus local flap for ectropion correction.

Reconstruction strategies often rely on the thickness, location and orientation of the defect, the determinant of the preference of reconstruction technique in the form of ectropion. Grafts could be seen as an essential concept of plastic surgery in which there is sufficient vascular bed to increase their survival. It is possible to achieve an aesthetically successful outcome by avoiding the formation of a defect; there is also a benefit since it can quickly predict the recurrence of tumours. On the other side, it is impossible to harmonize colour and form, and there is a downside

during recovery because it leaves marks in the plate-like pattern.[14]

On either side, the key benefit of a flap is that it may have an aesthetic appearance while using the donor site with a common hue, shape and thickness as well as a flap has a better rate of survival than a skin graft.[15] A flap, however, requires extra incision and tissue movement, so if the skin incision line is not very well concealed underneath the skin tension line, an improper mark could remain.[16]

The present study evaluated the effectiveness of local flap versus full-thickness skin graft in terms of skin colour match, skin pliability and ectropion recurrence. The matching skin colour and skin pliability were evaluated at two weeks, one month and three months. The current study results suggest that the reconstruction outcomes, including skin colour match and pliability, were better in a local flap than full-thickness skin graft throughout the study. Ebrahim *et al,* performed a study to compare the effects of the local flap and full-thickness skin graft in repairing cheek defects. It was indicated in study findings that in the initial post-operative span of 2 weeks, tissue cohesion and skin colour fit were slightly improved for local flaps. The average length of stay for infected patients with a local flap was less than for those who had full-thickness skin graft,[17] Lee *et al,* conducted a study to compare local flap and skin graft in facial skin cancer patients requiring reconstruction after surgical resection. Lee and co-authors reported that patient satisfaction was higher with aesthetics and functional effects of the local flap than skin graft.[16]

Recurrence of ectropion was observed in our sample in a population treated by full-thickness skin graft, although no problem was identified in individuals controlled with local flap. Rathore *et al,* reviewed to determine the effects of full-thickness skin grafting in cohort patients needing eyelid reconstruction. Nevertheless, he observed few surgical complications, including contracture of the lower eyelid graft (1%) and partial failure (1%).[18] In addition, the effectiveness of local V-to-H rotational myocutaneous flap in reconstructing cicatric lower lid ectropion was studied. None of the patients needed surgery and revision. No complications and ectropion recurrence were observed.[2]

LIMITATIONS OF STUDY

The current study has some limitations as the sample size was smaller, so it could be possible that none of the patients showed complications in the local group due to the smaller sample. Secondly, the study did not compare the patients' satisfaction with two procedures and pain associated with two procedures. Therefore, the current study suggested a prospective study with a large sample size to compare the pain status and patients' satisfaction with the two reconstruction techniques.

CONCLUSION

Local flap appears to be more effective than full-thickness skin graft in achieving excellent aesthetic effects in patients undergoing correction of ectropion.

Conflict of Interest: None.

Authors' Contribution

SK**:** Concieved idea, Manuscript writing, Accountable for the accuracy and integrity of the study, FAAK: Proof reading, statistical analysis, HA: Literature searching, contribution in manuscript writing, SK: Data collection and analysis, WS: Data collection and critical review, RMK: References writing and critical review.

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