

# Presentation and Management Outcome of Burn Ectropion with Full Thickness Skin Grafts

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## Introduction

Eyelid ectropion refers to the abnormal eversion of the eyelid margin that results in variable exposure of the cornea, conjunctiva and eye-globe. The eyelid loses its contact with the eye globe. Ectropion can emanate from a number of pathological conditions. These include burn injuries to the eyelids; age-related involution of the eyelids; scarring secondary to a variety of skin disorders; sequel of local tumors and traumatic insults. The condition can have serious ramifications in the form of corneal ulceration, globe perforation, and blindness.<sup>1-3</sup>

Burn insults constitute a relatively common cause of eyelid ectropion among our patients. This occurs especially if the burns are deep and affect the skin and soft tissues around the eye globe. The burn injuries affecting the eyelids may cause varying degree of damage to the constituent structures such as the skin, muscles, and connective tissues.

Resultantly there are sequel such as tissue inflammation and swelling, scarring and contracture formation that exert a pull on the eyelids away from the globe. The resultant condition is commonly known as ectropion. Characteristically there is vertical shortening of the anterior lamella (which is formed by the skin and orbicularis oculi muscle). Additionally, the components of the posterior lamella (which includes the conjunctiva and tarsus) may also be involved.<sup>2-5</sup>

The surgical treatment of ectropion aims to restore the normal anatomic relationship of the eyelids with the globe. This is achieved by ensuring adequate release of the vertical cicatricial contracture and resurfacing the resultant defect with a full-thickness skin graft (FTSG).<sup>4-7</sup>

This study was undertaken to document the epidemiologic profile of patients presenting with burn

## ABSTRACT

**Objectives:** To document the epidemiologic profile of patients with burn ectropion and determine the outcome of treatment with full thickness skin grafts (FTSGs) in terms of graft take, restoration of adequate eye closure, any postoperative complications and recurrence at one year.

**Methodology:** This descriptive case series study was carried out at the National Institute of Rehabilitation Medicine, Islamabad over a period of seven years (Nov 2015 - Nov 2022). All patients who presented with ectropion secondary to burn injuries of at least three months duration were included. The exclusion criteria were those patients who had cicatricial ectropion secondary to non-burn skin conditions. For instance, cases of chronic inflammatory skin conditions, excision of tumors, traumas other than burns, and involuntal ectropion.

**Results:** There were a total of 40 patients. Out of these, 29(72.2%) were males and 11(27.5%) females. Their age ranged between 7-54 years with a mean age of 24.32±4.77N years. Majority (n=31;77.5%) of the surgeries were undertaken under local anesthesia. Excellent take of FTSGs was observed among 38(95%) patients. There was no case of recurrence among the patients. There was no mortality in our series.

**Conclusion:** Burn ectropion were found among facial burn injury victims who had received conservative treatment with dressings for more than three weeks duration. Flame burns and acid burns were the most common underlying types of these insults. Complete surgical release and resurfacing with Full thickness skin grafts were successfully employed among all the patients. There was no case of recurrence of ectropion at one year follow up.

**Key words:** Burn injuries; Facial burns; Burn ectropion; Postburn ectropion; Cicatricial ectropion; Release of ectropion; Full thickness skin graft.

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ectropion and determine the outcome of their treatment with full thickness skin grafts (FTSGs) in terms of graft take, restoration of adequate eye closure, any postoperative complications and recurrence at one year.

## Methodology

This descriptive case series study was carried out at the Department of Plastic surgery, National Institute of Rehabilitation Medicine (NIRM), Islamabad over a period of seven years (Nov 2015 - Nov 2022). Written informed consent was taken from the patients for inclusion in the study. The study followed the principles of the Helsinki's declaration of 1975, as revised in 2008. Anonymity of the included patients was ensured. Non-probability consecutive sampling was done. All patients who presented with ectropion secondary to burn injuries of at least three months duration were included. The exclusion criteria were those patients who had cicatricial ectropion secondary to non-burn skin conditions. For instance, chronic inflammatory skin conditions, excision of tumors, traumas other than burns, and involitional ectropion. Also excluded were those patients who needed some form of flaps or some other adjunct reconstructive procedures in addition to FTSGs.

The patients underwent initial evaluation with complete history and physical examination. Baseline investigations were performed to assess the general health and fitness for local or general anesthesia. The demographic profile of the patients, data regarding whether upper or lower eyelids were affected, type of initial burn insults, donor sites for harvest of FTSGs, take of the skin grafts and recurrence of ectropion at one year were all recorded.

The patients underwent the surgeries under local or general anesthesia. Each surgery was aimed to achieve adequate release of the ectropion; reconstruct the resultant defects with full thickness skin grafts and to restore the normal mobility of the affected eyelids.

Meticulous surgical technique was employed that entailed release of the ectropion and resurfacing with FTSGs. The sub-ciliary incision for release was placed approximately 2-3 mm from the lid margin. It was extended through the entire length of the affected eyelid. Laterally the incision was extended for 1 cm beyond the lateral aspect of the canthus. Before making the incisions, markings were done and the area was infiltrated with local anesthetic. Xylocaine

1% mixed with adrenaline 1:200 000 was used. With the help of number 15 surgical blade and fine scissors, the ectropion was completely released while preserving the delicate ocular structures. The release was considered adequate when the eyelid could easily reach to its normal position while covering the globe. Meticulous hemostasis was secured using a bipolar cautery. Templates of the recreated defects were taken to help with the harvesting of donor FTSGs from the retro-auricular or medial arm areas. The harvested pieces of FTSGs were oversized 5mm on all sides. The donor sites were locally anesthetized with Xylocaine mixed with adrenaline.

The FTSGs were cleansed. All redundant fat tissues were removed. The FTSGs were smoothly sutured onto the defect with Prolene 4/0 sutures and tie over dressings were applied. The graft donor sites were closed with Prolene 3/0 sutures and covered with standard dressings. The tie-over dressings over the eyelids were maintained for one week. After removal of the dressing, gentle washing with clean water was recommended along with topical application of antibiotic eye ointment. At the first dressing removal, the take of graft was recorded. Additionally, any infection, hematoma formation or graft loss were all observed. Once the grafted eyelids healed, rehabilitation measures were instituted. The rehabilitation measures included the use of massages and physiotherapy to restore mobility of the eyelids. The primary outcome measure was the adequacy of ectropion release and take of the full thickness skin grafts whereas the secondary outcome measure was the recurrence of ectropion at one-year follow-up.

The take of skin graft was accepted as Good if  $\geq 95\%$  of it survived. It was considered Fair if  $80\% - 95\%$  of it survived. It was considered Poor if  $< 80\%$  of it survived. The functional outcome of ectropion release was graded by comparing the postoperative eye closure with the preoperative closure status. The functional outcome was declared as Excellent if complete closure was achieved. It was labelled as satisfactory if modest closure was achieved. It was considered as Poor if no functional improvement was observed.

The frequencies of various parameters will be presented in tables. Comparative analysis for potential associations between variables such as age, gender, and type of burn insult with outcomes will be conducted using chi-square tests for categorical variables, and the significance level will be set at  $p <$

0.05. Figures 1 through 5 show some illustrative cases of the ectropion included in the study.



Figure 1. This clinical photograph represents a boy aged 9-years who had sustained flame burns to his face seven months ago. He was managed with conservative measures at his local hospital. He presented with ectropion involving both lower eyelids.



Figure 2: This clinical photograph shows a boy aged 10-years who had sustained flame burns to his face 2-years ago. He was managed with conservative measures in another hospital. He presented with ectropion involving the right lower eyelids. One can appreciate post burn stigmata on the rest of the facial components.



Figure 3: This clinical photograph represents a boy aged 7-years who had sustained flame burns to his face one year ago. He was managed with conservative measures elsewhere. He presented with ectropion involving both lower eyelids. Rest of the face shows post burn stigmata.



Figure 4: This clinical photograph represents a girl aged 14-years who had sustained flame burns to her left face two years ago. She was managed initially in another healthcare facility. She presented with ectropion involving her left lower eyelid.



Figure 5: (A-G). These clinical photographs represent a male aged 24-years who had sustained flame burns to his face three years ago. He was managed initially in a remote city. He presented with ectropion involving both his upper eyelids. These photographs show the preoperative, intraoperative and postoperative photos of the patient.

## Results

A total of 40 patients were included, with a male-to-female ratio of 2.6:1 and a mean age of  $24.32 \pm 4.77$  years. Ectropion affected the left eyelids in 42.5% of patients, right eyelids in 27.5%, and was bilateral in 30%. The majority (77.5%) of surgeries were performed under local anesthesia, and the

retro-auricular area was the most common donor site for full-thickness skin grafts (77.5%).

Flame burns were the predominant cause of injury (85%), followed by chemical burns (10%) and scald burns (5%). Excellent graft take was observed in 95% of patients, while 5% had satisfactory graft take. No recurrences or mortalities were reported (Table I).

**Table I: Demographic and Clinical Characteristics of Patients with Burn Ectropion and Surgical Outcomes.**

Variable	N	%
Gender		
Male	29	72.2
Female	11	27.5
Type of Ectropion		
Left Eyelid	17	42.5
Right Eyelid	11	27.5
Bilateral	12	30
Donor Site for FTSG		
Retro-auricular	31	77.5
Medial Arm	9	22.5
Type of Burn Insult		
Flame Burn	34	85
Chemical Burn	4	10
Scald Burn	2	5
Anesthesia Type		
Local Anesthesia	31	77.5
General Anesthesia	9	22.5
Graft Take		
Excellent	38	95
Satisfactory	2	5
Recurrence		
No Recurrence	40	100

## Discussion

Burn insults are a common form of trauma in the low resourced nations like ours (Pakistan). Adults and children are all affected by such unfortunate incidents. The low-income countries often suffer from lack of robust facilities and specialists who can effectively manage these patients. Due to the lack of robust initial management, a great proportion of patients with facial burns end up with a number of complications. Among these include ectropion, vision loss, deformities of the nose, ears, lips secondary to significant facial scarring. Contrary to the current scenario of the low resourced nations, it has long been realized in the developed countries that robust acute surgical management of deep burns of the eyelids with full thickness skin grafts (FTSGs) helps to avert the possibility of ectropion development and related sequelae.<sup>8-12</sup>

The optimal timing for the excision and resurfacing of eyelid burns has been debated for long. Some authorities recommend it to be performed within 2-3 weeks after sustaining the initial burn injury. The dead tissue is usually clearly demarcated at this time and evolution of ectropion is eminent at this point. Most authorities agree to the strategy of early excision and grafting to prevent corneal exposure, ectropion and other associated complications. The strategy of delayed skin grafting may be associated with issues such as increased risk

of hypertrophic scarring, asymmetry of the eyelids, and other eyelid deformities.<sup>13-17</sup>

In our study, eyelid ectropion were more frequent among males than female patients. Contrary to our finding, Tahir C et al<sup>18</sup> reported a male to female ratio of 1:1.3.

In our study, the mean age of the patients was 24.32 years. Tahir C et al<sup>18</sup> in their series reported a mean age of 23.3 years.

In our study, we observed favorable outcomes of managing the ectropion with FTSG. The benefits of using full-thickness skin grafts for eyelid reconstruction have long been recognized. Prudent use of the FTSGs especially in large facial burns is imperative. The critical locales of eyelids are resurfaced with FTSGs whereas other areas of the face are covered with split thickness skin grafts (STSGs). Adequate release of the ectropion and slight overcorrection while applying the FTSGs helps to optimize the outcome and prevent recurrence of ectropion. We didn't come across any major skin graft losses or other complications. The published literature has quoted several possible complications. For instance, surgical site infection, formation of hematoma, pigmentation of the graft and partial graft loss.<sup>18-21</sup>

In our series we didn't employ any Frost suture in any patient, however some authorities have been using it as a routine adjunct to the application of skin grafts on the eyelids. They usually maintain the Frost tarsorrhaphy for 5 days after applying the skin graft. They report that this technique helps to prevent eyelid movements. Additionally; they report that these sutures keep the recreated defect and the applied skin graft stretched, hence ensuring better graft take.<sup>22</sup>

In our series, we didn't use any skin substitute such as Integra. The Integra has been reported to a great addition to the surgeon's armamentarium in managing large areas of deep burns on the face including the eyelids. It helps to address the issue of donor site deficiency. In cases of large size facial burns where larger skin grafts are required, the surgeon is posed with challenge to resurface the harvest sites with split thickness skin grafts (STSGs).

The availability of Integra relieves the surgeon from this added challenge. Integra also provides superior match of color and texture. The prohibitive

cost of Integra limits its use in low resourced settings like ours. <sup>23-25</sup>

## Conclusion

Burn ectropion were found among facial burn injury victims who had received conservative treatment with dressings for more than three weeks

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duration. Flame burns and acid burns were the most common underlying types of these insults. Complete surgical release and resurfacing with Full thickness skin grafts were successfully employed among all the patients. There was no case of recurrence of ectropion at one year follow up.