Punctal preserving excision of basal cell carcinoma with the reconstruction of the lower eyelid using Nasojugal flap

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***Abstract*—BACKGROUND-Basal cell carcinomas (BCCs) are locally invasive periocular skin cancers affecting the lower eyelids more than the upper eyelids. The purpose of this study was to describe techniques used for lower eyelid reconstruction after clear margin excision of BCC.**

METHODS-Twelve patients with BCC who underwent lower eyelid reconstruction were enrolled. The tumor was surgically excised with 4 mm clear margins by one surgeon. Defects were repaired by using a Nasojugal flap. Follow-up was done at 1 week, 2 weeks, 4 weeks, 3 months, 6 months, 12 months, and 18 months after surgery.

RESULTS-Twelve patients aged 44 to 73 years were followed up for 18 months. After follow-up, the condition of the Nasojugal flap was good in functional and aesthetic aspects in all cases. One patient reported surgical site inflammation in the initial post-operative period which later on resolved while one patient complained of medial ectropion. No total or partial necrosis, hematoma, or infection was observed in the flaps, and no additional surgery was needed.

CONCLUSION-The Nasojugal flap is considered the procedure of choice for the reconstruction of nasal lower eyelid full-thickness defects to preserve function and good aesthetic outcomes.

***Index Terms*—Basal cell carcinoma, Lower eyelid reconstruction, Nasojugal flap,**

I. INTRODUCTION

The eyelid reconstruction is a complex and challenging area in ophthalmic plastic surgery especially in the cases of eyelid mass and facial trauma. This is because, the eyelid deals with one of the most sophisticated interactions in context with anatomy, physiology, and aesthetics.[1] The main aim of eyelid reconstruction is to restore the anatomical, functional, and aesthetic outcomes that permit normal vision. Furthermore, it can also maintain the normal tear film and protect the globe. The other objective is to maintain facial symmetry by dealing with adequate socio-anatomical relationships in the periocular region. [2] The basic principle of eyelid surgery is to divide it into anterior lamella and posterior lamella. Skin and orbicularis are included in the anterior lamella, while the posterior lamella is composed of a tarsoconjunctival complex including eyelid retractors. For partial thickness defects graft or flap can be utilized but for full-thickness eyelid defects usually bilamellar reconstruction is required.[3] The incidence of cutaneous malignancies progressively increases as the age advances. The facial skin is the most common area of skin cancer.[4] Basal cell carcinoma makes up a huge proportion and accounts for about 90% of all eyelid tumors.[5] The lower eyelid and mainly inner canthus are the most frequently involved facial sites. [6] The eyelid trauma and tumor are the most common causes of acquired eyelid coloboma that require surgical reconstruction. Eyelid reconstruction is done using several techniques, which depend on site, size, nature, amount of tissue loss, involvement of lamella, and age of the patient. A lateral canthotomy with or without cantholysis is appropriate for defects involving less than 1/3rd of the eyelid length. In cases where the defect is between 1/3rd to 2/3rd of the eyelid length, the Tenzel flap or lateral advancement flap can be utilized. For total or near-total defects of the lower eyelid, the Mustarde cheek rotation flap, lid switch surgery, or the nasojugal flap of Tessier, combined with a nasal mucoperichondrial graft or postauricular cartilaginous graft, is a highly effective approach.[7] Ectropion is commonly observed as an involutional change associated with horizontal laxity of the affected

eyelid. This condition can be classified into five types: congenital, mechanical, senile, paralytic, and cicatricial. [8] The risk of developing ectropion is influenced by the size and depth of the defect, the type of reconstructive procedure performed, preexisting laxity, and the position of the maxilla in relation to the orbit. [9] To address this challenge, we have developed a novel technique that utilizes the nasojugal flap for lower eyelid reconstruction to preserve the punctum, aimed at preventing and reducing the incidence of ectropion.

II. MATERIALS AND METHODS

This prospective, single-centric study occurred at the tertiary care center. Twelve patients were enrolled in this study. After a thorough history, clinical examination, and essential investigation, all patients underwent eyelid mass excision and reconstruction at tertiary care center. The lower eyelid surgery was made in all cases after clinically diagnosing basal cell carcinoma. The wide resection with a 4mm clear margin and intra-op frozen section biopsy was done to confirm the tumor-free margin of the neoplastic lesion in all dimensions. The eyelid tissue was removed with full thickness in size ranging from 10 to 24 mm. After part preparation the eyelid lesion was marked with a 4 mm clear margin under a microscope and the local anesthesia (1% lidocaine with epinephrine 1 in 100000) was infiltrated on the marked site. A full-thickness resection with sufficient margin was done by using intra-op frozen section biopsy. Haemostasis was achieved by using bipolar cautery. A nasojugal flap, based on the medial aspect of the lower eyelid and extended to the nasojugal fold was designed. The nasojugal flap reconstruction was made as a single-stage procedure in which the medial aspect of flap is kept as wide as possible in a ratio of 4:1 for the base to length of the flap. The dissection of flap is done at the subcutaneous plane and mobilized along the lid defect. The lower eyelid defect was filled by using a nasojugal flap. Wound closure was achieved by using an interrupted 6-0 vicryl suture on the subcutaneous plane and an interrupted 6-0 nylon suture for the skin layer. The donor site was also closed similarly. All post-op patients underwent follow-up at 1 week, 2 weeks, 4 weeks, 3 months, 6 months, 12 months, and 18 months after surgery. The data was collected in the form of patient demographic profile, associated systemic illness, size of the lesion, post-op complications if any, and overall patient satisfaction using the Likert satisfaction scale.

III. RESULTS

The 12 patients were 8 male and 4 female, aged between 44 and 73 years, enrolled in the study. Table 1 elaborates on the details of the patients, including age, gender, socio-economic status, systemic illness, site of lesion, defect size, and postoperative complications.

Patient	Age	Sex	Socio-economic status scale	Defect size (mm)	Systemic illness	Post op complication	Follow-up time (Month)	Patient Satisfaction (Likert scale)
1	53	Male	Upper lower	18x12	Diabetes	None	12	Highly satisfied
2	68	Male	lower	20x14	Diabetes	Inflammation at 2week	14	Somewhat satisfied
3	44	Female	Upper lower	16x10		None	14	Highly satisfied
4	55	Male	lower	22x13	Diabetes	None	18	Highly satisfied
5	73	Female	Lower middle	18x15		None	18	Highly satisfied

6	58	Male	lower	15x9	Diabetes	None	12	Highly satisfied
7	63	Male	Upper lower	19x13		None	14	Highly satisfied
8	48	Male	Upper middle	22x14	Diabetes	None	12	Highly satisfied
9	62	Female	lower	24x10	Diabetes	Medial Ectropion	16	Somewhat satisfied
10	46	Male	Upper lower	14x10	Diabetes Hypertension	None	18	Highly satisfied
11	50	Female	Lower middle	17x12		None	12	Highly satisfied
12	57	Male	lower	18x11	Diabetes	None	12	Highly satisfied

Table 1: shows patients age, gender, socioeconomic status, size of lesion, systemic illness, post operative complications, followup and overall patient satisfaction.

The lower eyelid mass varies in size from 14 to 24 in length and 9 to 14 in height among selected patients. The socioeconomic status of patients was calculated by using a modified Kuppuswamy scale which is based on patients' education, occupation, and per capita income. Most of the enrolled patients belong to upper lower and lower classes, two patients belong to the lower middle class and one patient is in the upper middle class. Out of 12 patients, eight were known cases of diabetes for a period of 4 to 18 year and their blood sugar was adequately controlled and one patient was diagnosed case of hypertension along with diabetes. All patients underwent clear margin mass excision of the lower eyelid and the first post-operative follow-up was done on 3rd day, subsequent follow-ups were done on 1 week, 2 weeks, 4 weeks, at 3 months, 6 months, and at the end of one year after surgery. At the first postoperative follow-up, the wound site was healthy and sutures were intact in all cases except one having a mild inflammation over the wound site, and medial ectropion was noted in one patient at the end of 2 weeks. Overall post-operative patient satisfaction was assessed by using the Likert scale in which satisfaction level varies from score 1 to score 5, score 1 stand for unsatisfied, and score 5 denotes patient is highly satisfied. In the present study, 10 patients were highly satisfied while 2 patients were somewhat satisfied because of post-operative complications.

Figure 1: Right lower eyelid mass near the medial canthus

Figure 2: Post-op image on day one shows mils edema of the lower eyelid

Figure 3: condition of the lower eyelid on post-op follow-up at 2 weeks minimal scar and well apposed with globe

IV. DISCUSSION

Basal cell carcinoma (BCC), also called rodent ulcer, is a common form of skin cancer. It is one of the most common varieties of human malignancy.[10] The lifetime risk of developing BCC is about 12% and in the periocular area, BCC involvement is about 12%-16%. [11,12] The symptoms and signs of BCC are usually rare because it is a slow-growing locally invading tumor.[13] Basal cell carcinoma is frequently seen among Caucasians but it is rare among dark-skinned populations. Unlike melanoma and other skin malignancies, it rarely metastasizes to distant tissues. Basal cell carcinoma is a steady grooving tumor, that involves local tissues, usually non metastasizing and if not treated adequately it can destroy large areas of skin, thus the need for ophthalmic plastic surgery.[14] The older age groups are primarily affected. The important risk factors are chronic exposure to sunlight and fair skin. BCC accounts for about 90% of malignancies of the head and neck and among them, 10% of these involve the eyelid. It is one of the most common eyelid tumors, accounting for 90% of all cases, and the most common site is the lower eyelid followed by medial canthus, upper lid, and lateral canthus. The medial canthal tumors are more prone to orbital and sinus invasion so it is difficult to manage and have high chances of recurrence. The aggressiveness of tumor is very high and reoccurs following incomplete excision of eyelid mass.[10] The important general principle for the reconstruction of eyelid is to analyze the most appropriate method for the restoration of normal anatomical, functional, and aesthetic outcomes in each scenario. Adequate preoperative workup and a distinctive surgical plan are needed in each case along with the following factors that need to be considered. Size of the defects, location of the lesion, involvement of canthus, eyelid laxity, condition of the contralateral eyelid, and mobility and involvement of surrounding tissues. The prime goals of eyelid reconstruction are to ensure adequate eye closure, Preservation of tear film, maintain an unobstructed field of vision, and make an aesthetically appealing eye.[15] The nasojugal flap was used in our study to fill the defect on the nasal side of the lower eyelid and is also useful in preventing postoperative ectropion. Ectropion is a well-known post-operative cause of patient dissatisfaction and discomfort especially in lower eyelid reconstruction.[16] In the present study, one case was documented for right lower lid medial ectropion, later, that needed surgery for correction. The available literature shows that the risk of recurrence of basal cell carcinoma of face is strongly related to the partial excision of mass, infiltrative, micronodular, and recurrence following a history of surgical excision.[17] The recommended guidelines of the United Kingdom National Multidisciplinary Approach suggested that the non-infiltrative form of BCCs of 2cm size should be excised with a 4-5mm margin. For smaller and superficial lesions 2-3mm margins may be taken in cases of limited reconstructive lesion.[18] In the present study, different sizes of lesions were taken and in all cases 4 mm clear margin lesion was excised and confirmed by using an intra-operative frozen section biopsy. The reconstruction was done by using a nasojugal flap to protect and preserve the structure and function of the lower eyelid. In another study like our study, in which tarsus and conjunctiva were fully preserved and no evidence of ectropion was found. Several methods were applied for the reconstruction of the upper and lower eyelid including using direct closure method, tenzel advancement flap, and cheek advancement flap with nasal mucoperichondrial graft. The graft rejection and lagophthalmos were the common complications, and ptosis, and epiphora were also a major issue. The ectropion was reported in one patient.[19] The major cause of epiphora in post-operative cases is due to improper reconstruction of the lacrimal drainage tract, ectropion, and lower laxity. Our nasojugal flap was shown to be a highly effective method, especially for the reconstruction of the medial

half of lower eyelid. This method prevents ectropion and provides better contour of the lower eyelid because of lighter nature and reliable blood supply of the Nasojugal flap.[20] There is a possibility of recurrence of BCC at the same site even after treatment.[21] The only peculiar nature of BCC is to recur at new places in the previously affected patients. About 50% of previously diagnosed BCC patients have a chance to develop new skin lesions within 5 years.[22] In the present study, recurrence was not reported even follow-up of 18 months. We did not notice any necrosis or ischemic problems in our patients. The scar of the Nasojugal flap was also very well hidden in the nasolabial fold.

V. CONCLUSION:

Basal cell carcinoma of the lower eyelid leads to the invasion and damage of surrounding tissues, significantly affecting both functional and cosmetic abilities. The surgical excision of the tumor and subsequent reconstruction of the lower eyelid can be complex and largely depend on the skill of the ophthalmic plastic surgeon. An oculoplastic surgeon's role is to restore facial symmetry and functionality to the affected eyelid after the radical removal of the tumor. Moreover, aesthetic considerations are vital to enhance the patient's quality of life. Among the various surgical options available for addressing a mass in the lower eyelid, the Nasojugal flap is regarded as one of the most effective methods for correcting deformities while achieving an aesthetically pleasing outcome. Compared to other techniques, the incidence of postoperative complications such as surgical site infection, edema, graft necrosis, flap retraction, delayed healing, ectropion, epiphora, and lagophthalmos is minimal with the Nasojugal flap. Successful reconstruction of the eyelid hinges on accurately assessing the defect and determining whether to employ a graft, direct closure, a distant flap, or a lid-sharing procedure. A single-stage lid reconstruction is generally preferred, as it yields better anatomical, functional, and aesthetic outcomes without compromise.

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