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Original Article

AESTHETIC AND FUNCTIONAL OUTCOMES OF EYELID RECONSTRUCTION

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Abstract

Purpose: *Eyelid reconstruction is a challenging procedure; The analysis of the lid defect and a correct preoperative plan is mandatory. The aim of our study was to determine and assess the aesthetic and functional outcomes of various techniques used in eyelid reconstruction after periocular tumors excision.* ***Methods:*** *Twenty-five eyes were included in the study and were subjected to various techniques of eyelid reconstruction following periocular tumors excision. Palpebral fissure measurements, lid movements, tear break up time test, degree of post operative scar and patient satisfaction all were used to assess anatomical and functional success.* ***Results:*** *Our study revealed high anatomical and functional success.* ***Conclusion:*** *Keeping in mind the anatomy and morphology of eyelid and periorbital region, precise preoperative planning, and meticulous surgical techniques help to optimize the Aesthetic and functional results.*

Keywords: *Eyelid reconstruction, lid tumors, Aesthetic.*

1. Introduction

Eyelids reconstruction can range from direct eyelid repair to more complex procedures. The thinking of the reconstruction should always serve the function and aesthetics with the goals directed mainly to maintain protection of the eyeball, smooth internal lining for proper lubrication and to avoid corneal irritation beside insuring a good skeletal support to provide lid shape and rigidity [1]. To achieve all previous goals, the art of aesthetic eyelid reconstruction should always be in mind with thorough understanding of the anatomy and morphology of the eyelid and periorbital area, precise preoperative planning, and meticulous surgical techniques to optimize the aesthetic and functional result [2]. One of the leading causes of eyelid defects is surgical removal of skin tumors which can affect the eyelids and periocular region [3,4]. Our aim of the work was to determine aesthetic and functional outcomes of different techniques used in eyelid reconstruction for periocular defects. And to determine the complications of eyelid reconstruction and how to prevent them.

2. Patients and Methods

Twenty-five eyes of twenty-five patients were included in this prospective study, patients with periocular lesions and candidate for surgical management were

included in the study. All participants signed a written informed consent that clarified the planned procedure, prognosis, possible complications, the aim of the study and their acceptance to participate in it. Additionally, approval of ethical committee of Sohag Faculty of Medicine was fulfilled. The study complied with the tenets of the Declaration of Helsinki. Preoperative evaluation included: History taking, visual acquity and slit lamp examination. Detailed eyelid and lacrimal examination including lid position, lid movements, Presence or absence of lid laxity, the state of surrounding skin to the eyelid, the state of the tarsus and the state of the other eyelid. Measurement of vertical and horizontal palpebral fissure was done, tear break up time test, size of the lesion, state of surrounding skin, Imaging and biopsy if needed. All patients were examined on the third day of surgery. Then follow up visits were scheduled at the end of the 1st week, the 1st month, the 3rd month and the 6th month. At each visit, measurement of horizontal and vertical palpebral fissure height as previously described, assessment of eye lid movement, the graft or flap state, tear break up time test, assessment of postoperative complications including flap or graft necrosis, lid malpositions and tumor recurrence, symmetry between both eyes, assessment of the post operative scar and patient degree of satisfaction.

Table 1: Techniques of reconstruction

	Frequency	Percent %
Direct closure	4	16.0
Complex techniques of reconstruction	19	76.0
laissez fair	2	8.0
Total	25	100.0

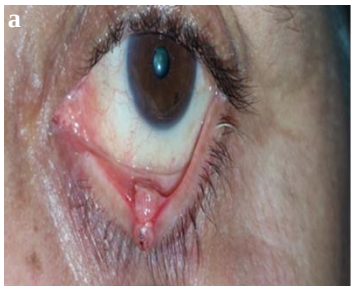
Table 2: Methods of anterior lamella reconstruction

	Frequency	Percent	Valid Percent %
Advancement flap	11	42.3 %	52.4
Rorational flap	5	19.2 %	23.8 %
Tenzel flap*	2	7.7 %	9.5 %
Cutler beard flap	2	7.7 %	9.5 %
Bilobed flap	1	3.8 %	4.8 %
Total	21	80.8 %	100.0 %

***** *Tenzel flap was used in two cases with advancement flaps*

Table 3: Methods of posterior lamella reconstruction

	Frequency	Percent	Valid Percent
Tarsal graft	7	26.9 %	43.75 %
Tarsal flap	1	3.8 %	6.25 %
Hughs flap	5	19.2 %	31.25 %
Cutler beard	2	7.6 %	12.50 %
Nasal muco perichondrial graft	1	3.8 %	6.25 %
Total	16	61.3 %	100.0 %



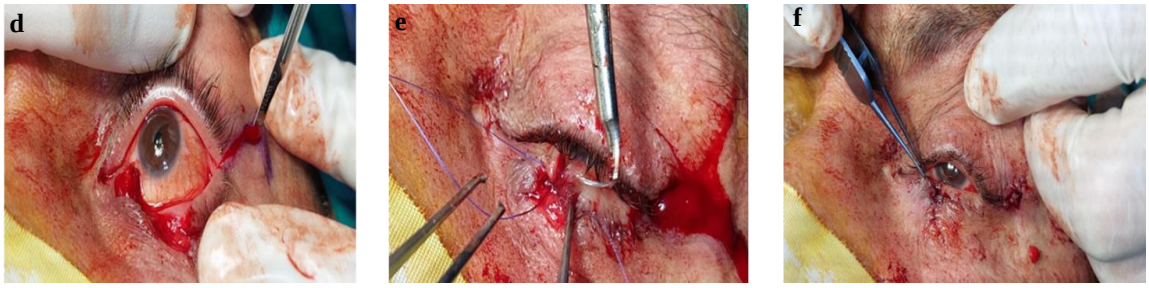


Figure 1: showing direct closure of eyelid defect; **a.** lower lid mass, **b. c**rushing the sides of the lesion before exicision, **c.** defect about one third of lid length after excision of the lesion, **d.** lateral canthotomy, **e. r**epair of lid defect with direct closure, **f. l**id after reconstruction by direct closure.

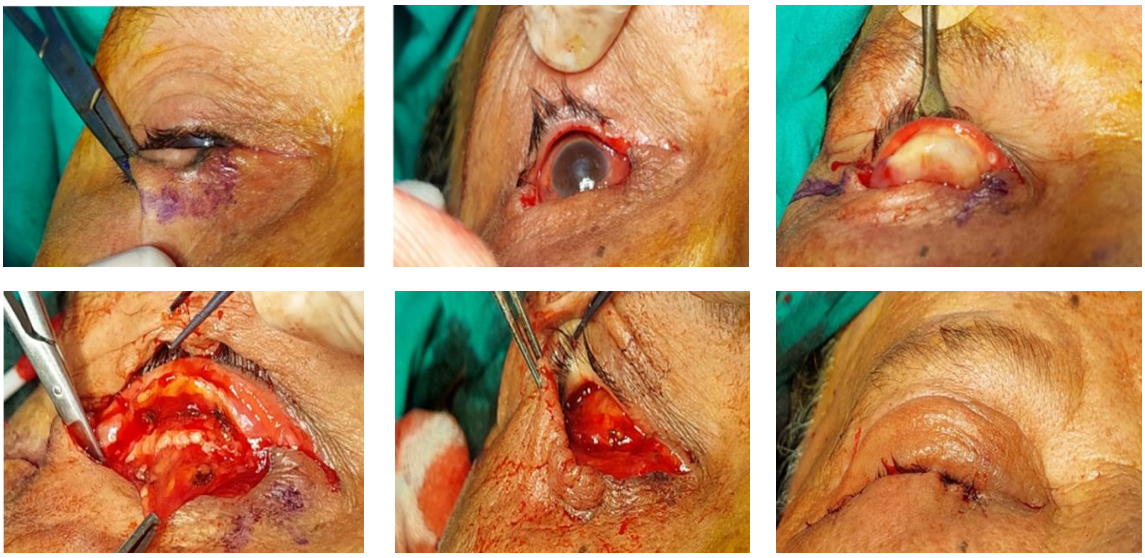


Figure 2: showing reconstruction of large lower lid defect by Hughes flap and advancement myocutanous flap

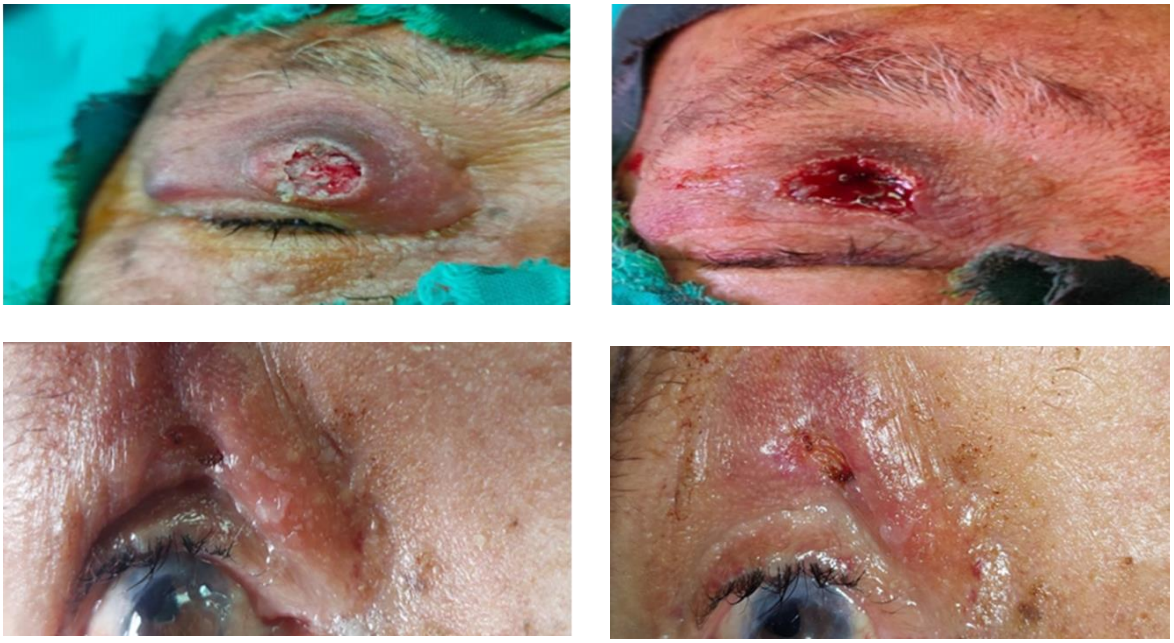


Figure 3: showing laissez fair technique

3. Results

The change in palpebral fissure: The mean pre operative vertical fissure height was 8.1 mm. and changed to 9.5 mm in post operative follow up with no significant change. The mean pre operative transverse fissure width was 27.5 mm. and changed to 28.5 mm in post operative follow up with no significant change between pre or post operative measurements or even between post operative measurements and the other eye. Tear break up time test: Tear break up time revealed significant change in the early post operative period with p value 0.01 at the first week, but at 6 months follow up revealed no significant change with p value 0.15. Eyelid movements: Eyelid opening and closure was documented to be normal in 23 patients with good eyelid motility and adequate eye closure. 4 eyes were associated with inadequate opening in the early post operative period due to associated edema that improved to normal during follow up period. One case with advanced basal cell carcinoma that was subjected to reconstruction by forehead and cheek flaps was associated with lagophthalmos and incomplete eye lid closure.

Table 4: shows assessment of the scar at 6 months during the follow up period

Post operative scar	Frequency	Percent
Not seen	3	12 %
Minimal	10	40 %
Visible	9	36 %
Hypertrophic	3	12 %
Total	25	100 %

Table 5: showing level of satisfaction of patients after 6 months of follow up

Degree of satisfaction	Frequency	Percent
Not satisfied	0	0 %
Moderate satisfaction	7	28 %
Satisfied	9	36 %
Highly satisfied	9	36 %
Total	25	100 %

Figure 4: showing 36 years old male with left eye mass below the eye brow, excision with direct closure was done, biopsy revealed shwanoma, 6 months post operative photo showing no visible scar.

Figure 5: showing 69 years old male with left upper eyelid squamous cell carcinoma, reconstruction was done by transposition flap and tarsal graft, 6 months Post operative photo showing no visible scars.

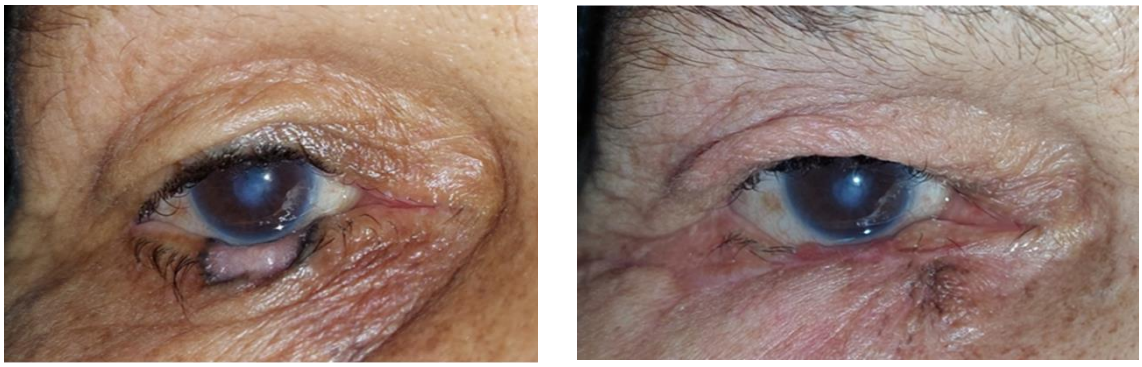


Figure 6: showing 70 years old female patient with lower lid basal cell carcinoma, Reconstruction was done by hugs graft and advancement flap, 3 months post operative photo showing minimal visible scar with minimal change on palpebral fissure

4. Complications

Hypertrophic scar was documented in 2 cases, mild upper lid entropion was found in one case who was subjected to reconstruction by rotational skin flap and tarsal graft. Lower lid ectropion was found in one case who was subjected to reconstruction by cutler beard flap, Ectropion was surgically repaired after three months by lateral tarsal strip procedure. Mild Ptosis was found in two cases, Lagophthalmos: was documented in one case.

Figure 7: showing 58 years old male with hypertrophic scar, ptosis and lower lid ectropion after cutler beard flap, Surgical correction of ectropion was done.

5. Discussion

Eyelid malignancies represent one of the leading causes of periocular defects that require reconstruction in the periocular region. The goals of eyelid reconstruction after tumor excision include corneal protection, restoration of lid lamellae integrity, normal lid movement and achievement of proper and good aesthetic result [5]. Basal cell carcinoma was the commonest lesion in our study, It was found in 56 % of cases, followed by squamous cell carcinoma which was found in 16% cases, followed by sebaceous cell carcinoma which was diagnosed in 12 % of cases. Defect analysis was the first step that we considered in planning for eyelid reconstruction. The patient requirements were also taken into account during the formulation and planning of surgical modality. In our study, the resultant lid defect varied between whole length defect in 5 cases and near total lid defect (more the 75 % of the lid) in 5 cases, 50 % lid defect in 6 cases, about one third lid defect in 3 cases, 6 lesions were away from the lid margin, the size of the defect was affected by the size of the lesion and the safety margin around which varied between 3-5 mm. in our study. Direct closure of the resultant defect can be used in small skin and muscle defects away from the lid margin, or in defects including the lid margin . In a prospective study by Vladimir T. Thaller et al, primary direct lid closure was achieved in 74% of his study. Their study concluded that direct closure of eyelid

defects, irrespective of per-operative palpebral aperature distortion, gives very good late post-operative outcomes [6]. Direct closure of the defect was used in four cases in our study with minimal change in horizontal and vertical palpebral aperature measurements, with no visible scar after 6 months in one case and minimal visible scar in three cases. It was limited to this number of cases in our study due to large resultant defect after lesion excision with only 16% of cases with defect less than third lid length, so other reconstruction techniques were used to restore lid anatomy and function and for better aesthetic outcome. The basic principle that we considered in reconstruction was to respect the anatomy with an anterior and posterior eyelid lamella. Our selection of the technique depended on the vertical and horizontal size of the defect, site of the defect, involvement of the lid margin, age of the patient, available nearby tissue (e.g., skin and muscle), the patient's preference and especially the surgeon's experience. Advancement flap was the most commonly used technique in our study to reconstruct the anterior lamella. We preferred advancement flaps as the peri-orbital area is an area where advancement flaps will survive well due to the rich blood supply in the head and neck. The lid margin was stable initially and remains so till the end of the study. In a study by paolo Fogagnolo et al. twenty one advancement flaps were used for reconstruction and remained viable, whereas only one flap developed partial distal necrosis, they conclouded that local flaps are the gold standard for eyelid reconstruction as they are highly reliable and guarantee best results [7]. The Hughes flap is a procedure for lower eyelid reconstruction, especially for central lower eyelid defects with medial and lateral residual tarsus. In our study 5 cases were subjected to posterior lamella reconstruction by Hughes flap, anterior lamella in these cases were reconstructed by advancement flaps except on case at which rotational flap was used. In atudy by McKelvie J et al that evaluated hughes flap in eyelid reconstructions, postoperative cosmetic appearance was satisfactory in 91% of patients. Mean follow-up in their study was seven months and mean duration to flap division was 37 days [8], That was similar to our study at which follow up was 6 months and flap division was after 4-6 weeks. The tarsoconjunctival or tarsal grafts taken from contralateral eyelid are one of standard tissue for posterior lamellar reconstruction and can be used to repair defects of up to 75% of the eyelid length. They are often used in with other tissue flaps to provide better blood supply for the grafts in full thickness defects [9]. Tarsoconjunctival graft was used in 7 cases in our study to reconstruct posterior lamella, lid defects ranged between 8-20 mm. in length and 8 mm. in height, various methods were used to reconstruct the anterior lamella including advancement, rotational and cutler beard flaps. We reported no cases in our study with graft necrosis or donor eyelid related complications. Various other methods were described in studies to reconstruct the posterior lamella including Hard Palatal Mucoperiosteal (HPM) Graft, Auricular Cartilage Graft and Nasal Chondromucosal Graft. Theses grafts provide good structural support to the eyelids, making them a good choice for reconstruction of posterior lamellar defects. Disadvantages include corneal irritation and donor site possible poor secondary healing, which may result in donor site discomfort and possible hemorrhage [10]. In our study one case with large lower lid defect was reconstructed by chondromucosal graft from the nasal septum and anterior lamella was reconstructed by rotational and advancement flaps. In lower eyelid full thickness defects encroaching the medial canthus in which the lower punctum, along with a part of the canaliculi, has been rescted. Spinelli

et al. concluded that Silicone intubation during primary repair shows a high success rate with maintaining a patent, functional drainage pathway in the absence of lacrimal system tumor [11]. In our study, lacrimal intubation was done in two cases, silicon tube was passed through the cut end of the lower canaliculus, as well as through the upper canaliculus; guided through the nasolacrimal duct into the nose, both cases reported no epiphora during the follow up period with good anatomical and functional success. In general, to achieve optimum results, maintain of meticulous hemostasis, especially when dealing with the orbicularis and orbital fat is important. The use fine oculoplastic instruments with gentle handling of tissues are also necessary. Always be sure of the integrity of the lacrimal pathway in medial canthal defects. Set the lateral canthal region under proper tension and in the proper position.

6. Conclusion

Proper planning for upper and lower eyelid reconstruction starts with fundamental knowledge of the eyelid and periocular region anatomy. Analysis of the anterior lamella, posterior lamella, and the canthal regions helps create an organized operative plan. Lastly, accommodation with the principles, guidelines and recent techniques for eyelid reconstruction will provide best options for the final aesthetic and functional outcomes.

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