



All-in-One Lower Eyelid Reconstruction after Skin Malignancies Removal: Combined Modified Tenzel Flap & Palatal Mucosal Graft

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Abstract

Lower eyelid reconstruction for defects greater than 50% is a much discussed topic in literature. The aim of this paper is to present an "all-in-one" surgical technique based on the combination of modified Tenzel flap and palatal mucosal graft to restore the anatomical integrity.

In our paper we present a case report of 64 years old patient admitted in Maxillo-Facial Surgery Unit of Polyclinic Federico II of Naples in January 2020. He was affected by lower eyelid basal cell carcinoma, measuring 1.5 cm in diameter. He was treated removing full-thickness neoplasia, leaving a surgical gap of 2 cm. Reconstruction was performed using modified Tenzel flap to cover the skin gap and a palatal graft for the reconstruction of the tarsal region structural integrity.

This "all-in-one" technique can handle full thickness eyelid defects with the advantage of respecting the dual layer eyelid structure without the need of a secondary surgical step. Moreover, has shown excellent results for both the preservation of eyelid competency and the low complications rate like ectropion and lagophthalmos.

Keywords: Lower eyelid reconstruction; Modified Tenzel flap; Palatal mucosal graft; Lower eyelid carcinoma

Introduction

Several techniques are described in literature for lower eyelid reconstruction after malignant lesions removal [1]. Many authors approve the reconstruction of the lower eyelid bilaminar structure with a combination of grafts and flaps depending on the depth and width of the removal. The defects of the lower eyelid are classified according to increments of 25% of the width [2-4]. An extremely important component is the vertical size of the eyelid, responsible for its structural support. Higher is the defect, more difficult are using local flaps while maintaining a low tension, especially in defects involving the supporting structures, such as tarsus and orbital septum. In addition to the aesthetic result, the functionality is fundamental in terms of maintaining height and eyelid competency, in order to protect the integrity of tear film. The aim of our work is to present a combined reconstructive technique with graft and slide flap that allows the integrity of the supporting structures and the coverage of deficits greater than 50% of the lower eyelid.

Eyelid anatomy

The anatomical and functional knowledge of the eyelid region is essential facing to the challenge of eyelid reconstruction. The lower eyelid consists of two layers, front and back. The posterior is coated with conjunctive, non-keratinized epithelial tissue filled with secretory glands. Underneath the conjunctive, there is the tarsus and the orbital septum composed of dense connective tissue that ensures structural support. The anterior blade consists of keratinized epithelial tissue and the underlying orbicularis oculi muscle. The skin of the eyelid is the thinnest of the body, lacking of subcutaneous fat [5,6]. The orbicularis oculi fits in front of the tarsal plaques and provides eyelid motility.

The corners of the tarsus are connected to the bone scaffolding by the medial and lateral tendons: Medial tendon fits on the tear ridge that surrounds the lacrimal sac while lateral tendon fits inside the orbital counter-section, 2 mm higher than the medial tendon [7,8].

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The tears drainage system originates from the lacrimal punctum in the medial margin of the eyelids following into the tear sac, and then continues into the nose below the lower turbinate [9-11].

Palatal mucosa anatomy

The hard palatal mucosa shares many histological features with the conjunctive mucosa. Both mucous membranes are composed by multi-layered epithelium and in addition the hard palatal mucosa is keratinized.

In 1992 Cohen et al. proposed the reconstruction of the posterior layer of the eyelid with hard palatal mucosa graft, showing excellent results without complications, followed by a metaplasia of the hard palatal mucosa [12-15].

Histopathological studies in 2007 confirmed a transformation of the palatal epithelium into a well-integrated structure with histological characteristics similar to the original tissue [16-21].

Case Presentation

A 64 year old patient was admitted to the Maxillo-Facial Surgery Unit of the Federico II University of Naples in January 2020. He was affected by lower eyelid neoplasia, measuring 1.5 cm in diameter, well delimited, developed during the last 2 years, without comorbidities or accessory symptoms. Histological exam of the preoperative incisional biopsy detected basal cell carcinoma, ulcerate, with keratotic/squamoid differentiation (Figure 1).

He was candidate for elective surgery in order to remove basal cell carcinoma and to reconstruct the region.

Step 1

Antisepsis procedures were performed with iodine-povidone solution and administration of 1 g of intravenous Cefazoline. A corneal protective device was placed to avoid possible accidental injury. Local anesthesia was obtained by infiltration of a 2% carbocaine solution and adrenaline to promote hemostasis and flap hydrodissection.

The tumoral excision was planned with a margin of 5 mm macroscopically healthy tissue, the tissue margins were tensioned by n. 2 nylon sutures in order to reduce the local traumatism. The lesion was removed at full thickness; it was oriented with nylon threads and sent for histopathological examination.

The residual defect measured about 2, 5 cm (>50% of the tarsus and the lower eyelid) (Figure 2).

Step 2

Reconstruction was programmed using a modified Tenzel flap to cover the skin gap and a palatal graft for the tarsal region structural integrity reconstruction.

The graft was harvested in the lateral-posterior half of the hard palate about 10% to 20% larger than the receiving site and degreased manually.

The donor site on the palate was treated with hemostatic gauze compression fixed by vicrylsuture 3.0.

The graft was flexible and was used to reconstruct the posterior lamella placing the mucous side in contact with the eyeball. The graft was stabilized at its extremities by vicrylsuture 6.0, taking care to place the knot externally and ensuring the tension necessary for the eyelid containment. The healthy controlateral eye was used as reference for the evaluation of the scleral exposure (Figure 3).



Figure 1: (a) A 64 years old patient affected by lower eyelid neoplasia. (b-c) Basal cell carcinoma in solid nests, ulcerate, with aspects of annexation and keratotic/squamoid differentiation measuring 1.5 cm in diameter, well delimited.



Figure 2: (a) Surgical resection planning with 0.5 mm safety margin (b) residual defect measured about 2 cm (>50% of the tarsus and the lower eyelid).

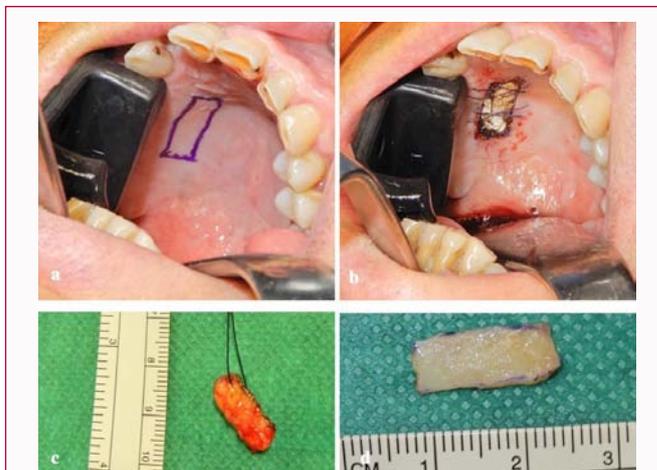


Figure 3: Hard palatal mucosa graft harvesting: (a) Planning; (b) tabotamp compression fixed by suture in vicryl 3.0; (c) hard palatal mucosa graft and (d) graft ready for insertion.

Step 3

A modified Tenzel flap was designed respecting the pre-existing skin wrinkles for a better aesthetic result. The skin incision was extended laterally from the lateral resection margin to the pre-auricular region preserving lateral canthus integrity. The dissection was performed above the orbicularis muscle by setting up a flap of skin and subcutaneous. The flap thus set up, was transposed medially to ensure coverage of the surgical gap without tension. The eyelid margin was fixed with vicryl 6.0, stabilizing the palatal mucosa graft



Figure 4: (a) Modified Tenzel flap mobility; (b) Modified Tenzel flap transposition; (c) comparison of scleral exposure with contralateral eye.



Figure 5: Post operative check 1 month: (a) comparison of scleral exposure with contralateral eye (b) donor site hard palate mucosa (c) lower eyelid competency.

and restoring the double anatomical layer between the anterior and posterior lamella. The remaining skin was closed with nylon 5.0 mattress suture, paying attention to the reconstruction of the lateral canthus by checking the eyelid restraint after removing the corneal protector. Tobramycin was used topically, and a restraint dressing with steri-strip was applied (Figure 4).

Postoperative time

The patient continued intravenous antibiotic therapy with ceftriaxone 2 gr. x1/die for 7 days, and daily local dressing with tobramycin, 2 applications/die. Sutures have been removed 7 days apart. During the postoperative period an oral and dental hygiene was required combined with soft diet. The donor site on the hard palate healed spontaneously within 3 weeks, without any problem.

The patient underwent periodic follow-up at one month, three months, and six months, showing eyelid competency and symmetry. The histopathological exam confirmed the diagnosis of basal cell carcinoma with complete surgical removal, and margins free from disease (Figures 5-7).

Discussion

The lower eyelid defects may follow malignancy surgical excision,

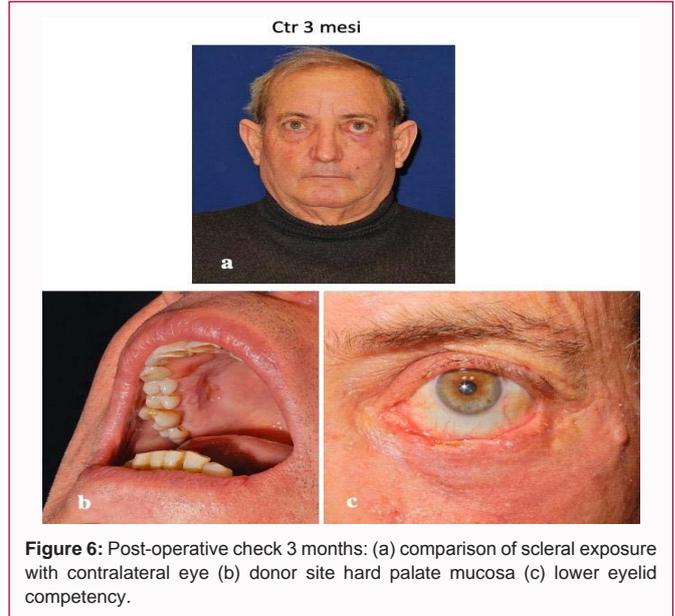


Figure 6: Post-operative check 3 months: (a) comparison of scleral exposure with contralateral eye (b) donor site hard palate mucosa (c) lower eyelid competency.

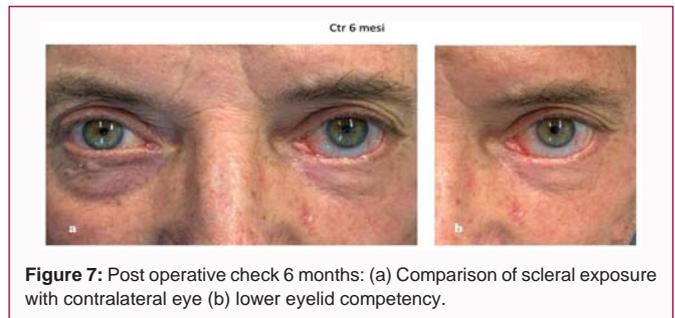


Figure 7: Post operative check 6 months: (a) Comparison of scleral exposure with contralateral eye (b) lower eyelid competency.

as well as they may be caused by burns, trauma or congenital pathologies [19]. Basal cell carcinoma is a locally invasive skin tumor that often can involve lower eyelid [22]. Many reconstruction techniques have been described in the literature: Nasojugal flap, forehead flap, skin flap based on the angular artery, Mustardè flap. All techniques allow good results but often need a second surgical step to remodel flap, or to increase supporting structural tissues [23].

The first Author to describe the use of a palatal mucosal flap for eyelid reconstruction was Seigel in 1985, focusing on its rigidity and stability. In his work, Seigel presented 11 patients successfully treated with an average follow-up of 18 months, all graft appeared to root completely, without desquamation or change in consistency with a complete donor site heals in three weeks [24]. Many Authors have recently added this basic technique to the use of transposition flaps or covering advancement (V-Z plastic, classic Tenzel flap, Mustardè flap).

Wearne et al. [25] described 68 patients undergoing hard palate mucosa grafting for displacement or retraction of the lower eyelid with an average follow-up of 17 months, reporting a low outcome in 15 patients, a “good” result was obtained in 40 eyelids and an “acceptable” outcome in 47. Skippen et al. [26] reported 5 patients treated with a vertical skin and muscle advancement flap with mucosal graft repair. Only one patient developed late post-operative lower eyelid retraction of 2 mm compared to the contralateral eyelid.

In our case, considering the tumor size and the tarsal involvement, we planned a surgical excision >50% of the eyelid, and reconstruction

with a modified Tenzel flap. This flap was first described by Cha et al. [27], reporting seven patients (median age, 70.8 ± 10.7 years; median defect size, 301.8 ± 244.6 mm) who underwent surgery by using the modified Tenzel advancement flap technique, with a median follow-up of 8.4 months. Only one patient complained ectropion and epiphora, and no other late complications were observed during the follow-up.

Compared to the classical technique, "modified Tenzel flap" was limited to subcutaneous layer without extending the dissection to the orbicularis oculi muscle, and it was harvested preserving the lateral can thus without performing a cantholysis [22,28,29]. Unlike Cha's et al. [27] technique, in our case the flap trim remained above the muscular plane even in the zygomatic area, ensuring the flap mobility and preserving blood flow. However, we have assessed that removing the tarsus; the lower eyelid would have lost its cartilaginous scaffold. We opted for a medium rigid grafting to avoid complications such as ectropion, lagophthalmos, tear film alteration, and sclera exposure. We harvested a hard palate mucosa graft due to its resistance and stiffness that mimics the internal tarsal scaffold. The graft is supported by a rich vascularization in the recipient site, from the sides and from the flap tissue anteriorly. The vitality of the graft can theoretically be altered from harvesting time but not in our patient.

From a review of the literature, the main advantage of using this technique is lateral canthus and orbicularis muscle preservation, ensuring the lower eyelid support with palatal mucosal graft.

Conclusion

In conclusion, this "all-in-one" technique can handle full thickness eyelid defects with the advantage of respecting the dual layer eyelid structure without the need of a secondary surgical step. This technique has shown excellent results preserving the eyelid competency avoiding the most frequent complications in lower eyelid surgery: Ectropion and lagophthalmos.

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