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A Single Staged Reconstruction of Upper Eyelid and Eyelashes

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Abstract

The upper eyelid is a complex structural part of the face that plays an important role in protecting the cornea from drying and damage to preserve vision. The eyelashes are an essential part of the upper eyelid and help in protecting the eyes from dust, foreign bodies, and sweat. Being a part of the face, which is the most noticeable part of the body, both structures hold an important role in reconstructive procedures. Reconstruction of both structures simultaneously is tricky but helps reduce the number of procedures required in achieving an aesthetically acceptable eye. Our techniques describe the use of the paramedian forehead flap with an anterior hairline to reconstruct the upper eyelid and eyelashes in a single stage in a posttraumatic near-total upper eyelid defect with a favorable outcome. Depending on the parting of the patient's hair, the anterior hairline of one side can be included in the distal edge of the flap while raising, which can be inset so that the direction and orientation of the eyelashes perfectly match. Our technique refurbishes an established technique for eyelid reconstruction to include eyelash reconstruction at the same time, thus saving time and resources without any inconvenience to the patient.

Keywords

- paramedian forehead flap
- eyelid reconstruction
- eyelash reconstruction

Introduction

Upper eyelid reconstruction is required to correct eyelid defects that occur due to surgical resection, trauma, or congenital anomalies such as colobomas.[1] Despite the techniques outlined in the literature, reconstructing eyelid defects still presents a challenge for the surgeon due to the complex anatomy of the eyelid and sparse donor area, which makes surgical planning difficult. Owing to the unique qualities of the eyelashes (e.g., length, pigmentation, direction, and shape), reconstructing the eyelash margin also presents an obstacle for plastic surgeons.[2] Although the paramedian forehead flap was originally designed to repair nasal deformities, it has since been modified to efficiently reconstruct other facial anatomical structures, such as the eyelids and the periorbital region.[3] To date, the use of a paramedian forehead flap has not been documented in the literature for reconstructing the eyelashes. The purpose of this study was to report a case of reconstruction of the eyelash margin along with the right upper eyelid using a paramedian forehead flap.

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Fig. 1 Posttraumatic near-total upper eyelid defect.

Fig. 3 Paramedial forehead flap raised with a 1-mm strip of anterior hairline.

Case Report

A 24-year-old man presented with 75% loss of the right medial upper eyelid after encountering a road traffic accident. He suffered a right upper eyelid defect involving the levator muscle, punctum, and canaliculi. Laterally, one-third of the tarsal plate and eyelashes was intact (►**Fig. 1**). The conjunctiva was reconstructed using a buccal mucosa graft and tarsal plate using ipsilateral conchal cartilage.[4] The remaining levator muscle was sutured with the superior border of conchal cartilage to restore eyelid function (►**Fig. 2**). For reconstructing the upper eyelid skin paddle, the paramedian forehead flap was planned on the contralateral side of the forehead. A 1-mm strip of the frontal hairline was included with the forehead flap to reconstruct the eyelashes on the affected side based on the parting of the patient's hair. The flap was delivered over the defect (►**Fig. 3**). The inner aspect of the flap was sutured with the remaining orbicular muscle. The flap inset was done in a fashion that the hairline at the flap's distal edge matches the remaining eyelashes on the affected side. The secondary defect that formed was primarily closed. After 21 days, the pedicle crossing the nose was divided, and the ends were sutured to the respective areas. The patient was followed up serially on an outpatient basis. The resultant eyelid looked near normal due to the presence of a single row of hair follicles from the scalp simulating native eyelashes (►**Fig. 4**). The patient had satisfactory eye opening with regular trimming of eyelashes simulated by hair from the forehead flap region. The patient underwent a second stage procedure where a frontalis sling procedure using the tensor fascial lata along with debulking of the flap was performed and achieved a satisfactory eyelid opening (►**Fig. 5**). ►**Video 1** shows successful and apt opening and closure of right upper eyelid.

Fig. 2 Tarsal plate reconstructed with ipsilateral conchal cartilage.

Discussion

The upper eyelid covers the major part of the cornea, protecting the eyes from drying and any kind of damage. Hence, its reconstruction is of utmost importance.[5] Reconstructing the eyelid is a complex process that often requires careful consideration of both functional and aesthetic outcomes. Local flaps can be used to reconstruct the eyelid like superficial temporal artery based flaps, flaps from the forehead region, which provide skin and subcutaneous tissue to

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Fig. 4 Postoperative photograph after flap division and inset.

create the missing part of the eyelid.[3,6] Pedicled flaps like the deltopectoral flap have also been described for total upper and lower eyelid defects.[7] The complex reconstructions of the face involving the upper and lower eyelids and eyebrows can be done simultaneously described as the Olympic torch flap, which included modification of the Guyuron postauricular fasciocutaneous flap, after initial grafting and radial forearm flap.[8] When local and regional tissues have been insufficient to provide optimal reconstruction of the eyelid, free flaps like anterolateral thigh flap have been used.[9] Dynamic reconstruction using radial artery forearm flaps with contralateral frontalis to provide eyelid function has also described.[10] Various techniques have been described for eyelash reconstruction as well like composite eyebrow strip grafting. But the consequences of composite grafts include failure and contraction.[11] Usually, to provide acceptable cosmesis, an additional procedure of hair transplantation is required to procure the eyelashes in the designated direction.[12] Temporal hairline use for eyebrow reconstruction has also been described along with free forearm flap microvascular reconstruction for a forehead defect. Eyelash and eyelid reconstruction using a locoregional flap in a single stage without significant donor site morbidity has not been described yet. In our technique, we have avoided an additional procedure by incorporating hairs of the anterior hairline without sacrificing opposite eyelid tissue so that after the inset, they fall in the same line and in a parallel direction to the remaining eyelashes and grow in the same direction as well. Reconstruction of both parts of the posterior lamella using grafts (buccal mucosa for conjunctival layer and conchal cartilage for tarsal plate) has been previously described by other authors.[3] The survival of the graft can be due to angiogenesis caused by contact with living tissue at the surgical margin that has been well documented. A patient with full-thickness loss of the upper eyelid reconstructed with a forehead flap will have better results than the preoperative period. Although perfect reconstruction is impossible, this modification improved the aesthetics of the eyelashes. The patient has been advised to trim the reconstructed eyelashes, which shows better alignment. Since it is not a native eyelash, the patient has to accept the near-normal alignment of the reconstructed eyelashes. We performed a second stage procedure where a frontalis sling procedure using the tensor fascial lata along with debulking of the flap and achieved a satisfactory eyelid opening. Ophthalmologic examination revealed good vision. The cosmesis and functional outcome that we have achieved with this modification enabled us to achieve a clinical outcome. There are, however, few limitations in the procedure we described. The are patient must accept the unrestrained growth of the hair forming the lashes and the differential thickness of the flap as compared with the native eyelid. The patient can only be advised regular trimming of the hair follicles along with flap debulking procedures to overcome this issue.

Conclusion

We highlight simultaneous reconstruction of the eyelid and eyelashes in a posttraumatic upper eyelid defect. A secondary frontalis sling procedure was performed with a favorable outcome.

Video 1 Online content including video sequences viewable at: https://www.thieme-connect.com/products/ejournals/html/10.1055/s-0044-1779656.

Note

The manuscript has been read and approved by all the authors; the requirements for authorship as stated earlier in this document have been met, and each author believes that the manuscript represents honest work, if that information is not provided in another form.

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Fig. 5 (**A**) Eye opening after frontalis sling procedure and debulking of right upper eyelid. (**B**) Acceptable aesthetic appearance after eye closure.

Conflict of Interest
None declared.

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