

Reconstruction of the traumatic eyelid injuries

A 6-years experience



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AIM: *Our aim is focused on the management of eyelid injuries and on the chose different techniques for the reconstruction. The reconstructions of the upper eyelid and lower eyelid should be based on both functional and cosmetic aspects.*

MATERIAL OF STUDY: *We looked at 47 patients from 2005 to 2011 with eyelid injuries. All patients were subjected to a surgical treatment.*

RESULTS: *After a median follow-up from one to five years, in all cases the skin coverage was reinstated and mobility was restored, thereby adhering to the principles of both morphological and functional reconstruction.*

DISCUSSION: *Eyelids are complex structures and pose a challenge for reconstruction. They play an important role in protecting the globe from trauma, excessive light and in maintaining the integrity of tear films and moving the tears toward the lacrimal drainage system. Concerning reconstruction by means of flap, the main principles dictate that with this procedure the new coverage will appear as much as possible, "like" the original tissue.*

CONCLUSIONS: *There are different techniques available for reconstructions of defects of eyelids. The availability of tissues, technical expertise and the specific needs of the patient have to kept in mind before choosing a particular method. Compared with other frequently used techniques, the nasal chondromucosal flap is a one-stage operation, does not damage the lower lid, and provides a thin, mobile eyelid with an anatomically complete reconstruction.*

KEY WORDS: Anterior lamella, Eyelid reconstructions, Posterior lamella

Introduction

The eyelid structures have the important role to protect the globe from various external injuries, besides help significantly to the sight's appearance. The eyelid traumas could be of various etiology and the reconstructive techniques for the morpho-functional re-establishment could not aside from the complex anatomy of this body region.

The several layers which compose the eyelids can be schematically put together in two lamellae, one front, formed by skin and orbicular muscle and one rear, formed by tarsus and conjunctiva.

Every eyelid reconstruction must provide the re-establishment of the front lamella and of the rear lamella in order to re-establish a normal function. The eyelid functions are distinguished in statics (protection of the globe, sight appearance) and dynamics (redistribution of the tear film, reflex of the wink).

The reparative surgery must consider the different functionality of the upper eyelid then the lower eyelid. The upper eyelid is a dynamic structure. The aim is to build a light structure for the anchorage to the levator palpebrae superioris muscle. The options for the reconstruction are scarce because low is the availability of usable local tissues. On the contrary the lower eyelid is a static structure. So the options for the reconstruction are

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higher because there is a good availability of surrounding tissues.

A pre-operative assessment is fundamental for a patient with eyelid trauma. It makes use of a careful examination (Assessment of: edema, ecchymosis, crepitation, hematoma; eyelid position; eyelid movement; eye position; eye motility; integrity of lachrymal system), of a possible specialistic examination (Rx, CAT, ophthalmologic consultation), of an assessment of the general condition of the patient, of loss of substance and of the tissue layers involved (cutaneous, muscle-cutaneous; conjunctiva, tarsus-conjunctival; total thickness), of a clinical condition of the donor area. In addition, before to choose the possible therapeutic strategy is fundamental a careful preoperative lesional balance; in fact, due to the eyelid retraction when removed from the surrounding structures, the defect can appear at first bigger then the real lesion.

The reconstructive surgical time can be immediate or deferred. In the acute eyelids trauma, when possible, is preferable a quick reconstruction. Even if the immediate fixing is not satisfying but the eye is properly protected, a surgical revision can be deferred for six months to allow the stabilization of the scar healing.

In the periocular and eyelid traumas without loss of substance and immediate fixing (within 8 hours) of the scar is recommended. By the passing of time there will be more trouble due to the local edema. If the circumstances need it, the reparation could be deferred, but no more then 24-28 h. During the reparation, the scar must be profusely irrigated with saline and every foreign body must be removed.

In the periocular and eyelid traumas with loss of substance, the principles of the reconstruction of eyelid defects and of periocular tissues are the same of the after-oncologic reconstruction. A rebuilt eyelid must have a front layer of covering (cutaneous) and one rear (mucous). At least one of the two layers must be properly vascularized, in order to allow to the other, in case of no vascularization and so grafted, the engraftment. In the case of a large damage to the drainage system, it can't be fixed quickly. After inserted a Lester-Jones tube, is allowed the healing of the tissues and the final reparation is postponed to a following date. Lefort II fractures, nose-ethmoid or local penetrating scars can be associated to a destruction of the medial canthal tendon. In this case the front segment can be ignored, while the rear segment should be identified and resutured to the rear lachrymal crest; this reparation is performed after every canalicular reparation and if there isn't a good local stability (mini or micro plates).

The lacerations of the eyelid margins are common; in this case the reparation must be careful, avoiding distortions or retractions. If the margins can't be directly bring near, can be necessary earn tissue mobility in the lateral side region to allow a direct suture. (Lateral cantolisi)

Methods and Materials

From November 2005 to June 2011 we have treated 47 patients with eyelids trauma. These traumas had different etiology: 35 cases of eyelid penetrating trauma and 22 of them with superficial lacerations, 12 with deep lacerations and 1 with corneal abrasion (Figg. 1 and 2); 7 cases of eyelid burn and 5 of them physical burns and 2 chemical burns; 5 cases of bruises and 4 of them eye globe fracture and 1 edema.

In 21 cases there were loss of substance horizontal and vertical of one or both eyelids and we simply moved close the margins.

In 8 cases the loss of substance was larger but only involved the front lamella so we directed our reconstructive choice: in 4 cases of upper eyelid trauma a full-thickness graft from contralateral upper eyelid skin; in 1 case of defect to the lower eyelid the flap of Tripier (from the ipsilateral unhurt eyelid);

In 1 case of defect of upper eyelid the flap of Fricke (from the forehead); 1 case of upper eyelid trauma the flap of Tenzel and in 1 case of lower eyelid trauma the flap of Mustardè (both from cheek).

In 4 cases the loss of substance was full-thickness, involving the upper eyelid, and in all the cases we made an upper cantolisi to earn some millimeters in a horizontal way to allow a direct vertical approach. In one of this case cantolisi wasn't enough to allow the approach of the margins, then we opted for an advance flap.

In 4 cases the eyelid defect involved the lower eyelid from 1/3 to half of the horizontal length and we opted for the tarsus-conjunctival sliding flap of Hughes.

In 1 case of central and large defect of the upper eyelid we opted for the flap of Culter-Beard using a full-thickness segment of the upper eyelid moved under an intact bridge of skin which includes the eyelid margin.

In 8 cases of full-thickness eyelid defects we used the flap of Scuderi which re-establish the tarsus-conjunctival surface exploiting the upper-lateral portion of the triangular cartilage of the nose with its mucosal covering



Fig. 1: A) Complex trauma involving upper and lower eyelid; B) Post-operative result after 8 months.

transposed, lying on the dorsal artery of the nose. A graft of skin is stick as cutaneous coverage. In 6 cases the flap has been taken from the same side, in the last 2 from the other side.

In 1 case of defect to the half lower eyelid we used the flap of Moschella exploiting the skin of the lower eyelid region which is put as drawer on a subcutaneous peduncle, while the inside lamina re-established with a chondro-mucosal graft. The donor area of the flap has been filled by a flap V-Y put medially from the contiguous lateral region always on a subcutaneous peduncle.

Results

The follow -up goes from 1 to 6 years. In every case the eyelid has regained the important protective function of the globe and in most part of the cases we reached a good cosmetic result.

The follow-up included the estimation of the opening of the eyelid, the closing, the function of the levator, the presence of epiphora, the length of eyelid edge, the cosmetic equilibrium and the morbidity of the donor area.

In 5 patients occurred post-operative complications: 2 cases of secondary coloboma, 3 cases of scar retraction. In 8 cases where we used the chondro-mucosal flap of Scuderi, complications didn't occurred and the result was satisfying in all the patients. Moreover, with this kind of flap we noted how both function of levator and eyelid length remained in the normal limits.

Discussion

The aim of an immediate reparation is to re-establish morphology and eyelid function, but above all to assure a proper protection of the eye to prevent a damage. The deferred surgery correct the post-traumatic late



Fig. 2: A) Complex trauma involving internal side, upper and lower eyelid; B) Post-operative immediate result; C) Post-operative result after 2 months.

deformities of the eyelid, as scar ectropion, scar entropion, eyelid retraction, retraction or distortion of the eyelid margins, malposition of the medial and/or lateral side, blepharoptosis, defect of volume of the orbital fat, conjunctival defects, alterations on the lachrymal system. Before re-intervene, a pause of 6 months is better, to allow the stabilization of the wound healing. A careful pre-operative evaluation is important to distinguish the loss of partial or full-thickness substance in order to take a proper reconstructive procedure.

Conclusion

Due to a lack of surrounding tissue and also because both function and shape must be preserved, the upper eyelid reconstruction is more complex than the lower eyelid reconstruction. In the post-traumatic eyelid reconstructions, a good comprehension of the eyelid anatomy is necessary, connected to the competence on the elementary reparation techniques. This surgery represents an interesting problem for the complexity of the regional anatomy, which require to be careful with the details for the performance of delicate surgical techniques. Among the several surgical techniques available the chondromucosal flap, thin and flexible, has proved to be the more reliable in the reconstruction. It allows the reconstruction of both lamellae keeping a light structure. Moreover it has less disadvantages: it allows to avoid the sacrifice of the lower eyelid as it happened with other techniques and the temporary occlusion of the eye.

Riassunto

La ricostruzione delle palpebre superiore e inferiore deve essere basata sia su aspetti funzionali che estetici. Inoltre, la ricostruzione della palpebra superiore è molto più complessa della ricostruzione della palpebra inferiore per via della mancanza dei tessuti circostanti disponibili e anche perchè la funzione e la forma ne deve essere preservata. Abbiamo esaminato 34 pazienti con traumi palpebrali dal 2006 al 2011. Tutti i pazienti sono stati sottoposti ad un trattamento chirurgico. Abbiamo utilizzato diverse tecniche disponibili per la ricostruzione di difetti delle palpebre. Abbiamo valutato di volta in volta la disponibilità di tes-

suti e le esigenze specifiche del paziente prima di scegliere un metodo in particolare. Dopo un follow-up da 1 a 5 anni in tutti i casi la copertura cutanea è stata reintegrata ma la tecnica che si è rivelata più sicura, affidabile e scevra da complicanze è quella basata sul lembo condromucoso di Scuderi. Rispetto ad altre tecniche di uso frequente, il lembo nasale condromucoso, effettuato in un unico tempo, non danneggia la palpebra inferiore e fornisce una copertura sottile della palpebra mobile con una ricostruzione anatomicamente completa.

Le Palpebre sono strutture complesse e rappresentano una sfida per la ricostruzione. Esse svolgono un ruolo importante nel proteggere il mondo da traumi, luce eccessiva e nel mantenere l'integrità del film lacrimale e spostando le lacrime verso il sistema di drenaggio lacrimale. Per quanto riguarda la ricostruzione mediante lembo, dettare i principi fondamentali che con questa procedura la nuova copertura appare il più possibile, "come" il tessuto originale.

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