TYPES OF PROCEDURES REQUIRED FOR RECONSTRUCTION AND REPAIR OF EYE LID DEFECTS

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ABSTRACT

Objective: To analyze the causes of lid defects and different types of surgical procedures required for reconstruction / repair of these defects in a referral/teaching Armed Forces hospital.

Study Design: Retrospective noncomparative case series and retrospective, nonrandomized, comparative interventional case series

Place and Duration of Study: Combined Military Hospital Kharian, One year – 2007.

Patients and Methods: Thirty one procedures for lid repair /reconstruction done in 25 lids of 23 eyes (21 patients) were analyzed. Age ranged from six months to seventy five years. Only congenital, traumatic and post surgical (after removal of tumors / scars) lid defects were included. Cases of ectropion, entropion, ptosis, where there were no surgical defects, were excluded. All the patients were photographed pre and post operatively. Follow up ranged from 1 month to 22 months.

Results: Of 25 lids, defects were congenital in 4 (16 %), after removal of scars in 3 (12 %), after removal of tumors in 4 (16 %) and traumatic in 14 (56 %). The 31 procedures included direct closure 38.7%, ateral canthotomy and cantholysis 12.9%, Tenzel semicircular flap 9.7%, canalicular intubation with DCR tube 6.4%, graft from buccal mucosa 6.4%, cartilage from nasal septum to correct posterior lamella defect 6.4%, separation of lid skin from conjunctiva/cornea 6.4%, posterior auricular skin flap to correct anterior lamella defect 9.7% and lids formation by suturing of the lid margin 3.2%.

Conclusion: Trauma is the most common aetiology of lid defects and most of the lid defects can be managed by direct closure. However some require different additional procedures.

Keywords: Eye lid defects, Eyelid repair, Eyelid reconstruction

INTRODUCTION

Lid defects are a significant cause of visual deterioration as well as social embarrassment. These have different aetiologies. Depending on the size, location, and extent of defects, a myriad of surgical approaches may be utilized to repair the eyelids [1]. Traumatic injuries to the lid can be uncomplicated without any injury to eye ball and full recovery [2] but more often eye ball is also involoved. Different surgical procedures are effective to manage the defects. Direct closure of eyelid defects is simplest procedure that produces excellent results but is usually limited to defects measuring less than a quarter of the eyelid length to avoid distorting the palpebral aperture and affecting lid function. Lateral canthotomy and cantholysis, can be done for either the lower or upper lid. It is useful when simple primary closure is inadequate. It can close upto 50% defects of the lid. Tenzel rotation flap is made by a skin and muscle incision at the lateral canthus, which curves temporally in a semicircular fashion. The semicircular skin flap is stretched and occupies the area where lateral tarsal portion is originally present. Thus it forms the anterior lamellae of the lid in that area. It is helpful when the defect is more than 50 % of the lid and can be used for upper and lower lid defects.

Grafts of skin are either partial thickness or full thickness. Upper-lid skin is by far the best as it is very thin, with minimal dermis and no hair. In the elderly large grafts can be taken. The other lid can also be used if more is

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required. Lower-lid skin is similar in quality but resection of significant amounts may lead to ectropion. Supraclavicular area also can provide thin, relatively hairless skin. It should also be thinned a little. The graft is taken as an oval patch parallel to the clavicle. A split-thickness graft can be taken by injecting 100 to 200 mL of saline in the subcutaneous tissue. Retroauricular skin, upper inner arm and thigh can be a relatively thin donor site. The amount of hair is variable.

For reconstructing the posterior lamella of a lid, nasal septal cartilage is commonly used and for conjucnctival replacement mucosa from lips, cheek or hard palate is used.

PATIENTS AND METHOD:

The lid repairs done in eye department, CMH Kharian during 2007 were analyzed in this study. Only congenital, traumatic and post surgical (after removal of tumors or scar tissues) lid defects were included. Cases of ectropion, entropion, ptosis were excluded as there were no surgical defects. The total number of patients was 21. 17 (81%) were males and 4 (19 %) were females. Age ranged from six months to seventy five years. In two patients both eyes were involved. Repair /reconstruction was done in 25 lids of 23 eyes (in two eyes both upper and lower eyelids were involved), which were included in the study. For direct closure of lid laceration, meticulous stitching at the lid margin, followed by stitching of tarsal plate ensured smooth alignment. The overlying skin was then closed with prolene/silk. For lateral canthotomy and cantholysis, with straight scissors, the skin, tendon, and conjunctiva were divided horizontally at the lateral canthal angle. Then scissors were placed on the tendon between the skin and conjunctiva, and the tendon was divided. The lid was thus released. When conjunctiva was divided, it was closed with 8'o silk. The skin was closed laterally at the canthus with prolene/silk suture. Skin, septal cartilage and mucosal grafts were followed by pressure bandage for 5-7 days. Skin sutures were removed after 7-8 days. All the patients were photographed pre and post operatively.

Table-1: Types of eye lid defects

No.	Types of eye lid defects	No. of eyelids
1	Congenital	4 (16 %)
2	After removal of scars	3 (12 %)
3	After removal of tumors	4 (16 %)
4	Traumatic	14 (56 %)
	Total	**25**

Table-2: Procedures performed for reconstruction and repair of lid defects

No.	Procedures performed	No. of eyelids
1	Direct closure	12(38.7%)
2	Lateral canthotomy and cantholysis	4(12.9%)
3	Tenzel semicircular flap	3(9.7%)
4	Canalicular intubation with DCR tube	2(6.5%)
5	Graft from buccal mucosa	2(6.5%)
6	Cartilage from nasal septum to correct posterior lamella defect	2(6.5%)
7	Separation of lid skin from conjunctiva/cornea with bandage contact lens and conformer	2(6.5%)
8	Retroauricular skin graft to correct anterior lamella defect	3(9.7%)
9	Lids formed by suturing of	1(3%)

RESULTS

A total of 31 procedures were carried out for lid repair/ reconstruction. Two eyelids required three and two lids required two

table-1. The procedures adopted are given in table-2. Complications encountered included exposure keratopathy occurring in 2 (9%) eyes patients resulting in loss of vision

due to corneal perforation. The rest of the cases achieved good structural, cosmetic and functional results.

Detail of a few cases is as follows:

Case No.1: Ten years old boy presented with left upper lid cloboma. Skin was adherent to the eyeball. Coloboma was excised and skin was separated from cornea and conjunctiva. Keratinized epithelium was peeled off the cornea. Tenzel semicircular flap was prepared and coloboma defect closed by bringing the two margins together. Buccal mucosa was taken to form post lamella of the remaining defect. Bandage contact lens was inserted. Conformer was placed (Fig.1). The appearance improved but vision did not improve due to the corneal haze.

Case No.2: In Right eye there was lid coloboma, skin was attached to cornea, there

Fig.1: Post op. Upper lid eyelashes occupying middle half of the lid. Bandage contact lens and conformer in place

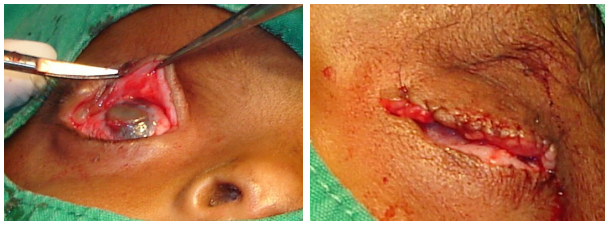

Fig.2:
a. In right eye skin freed from cornea. Keratinized epithelium peeled off cornea.
b. Lids formed by suturing of the lid margin.

was keratinized epithelium over cornea. In left eye there was cryptophthalmos.

In right eye, skin was separated from cornea. Keratinized epithelium was peeled off the cornea. In left eye the skin of the lids was incised. Lid margins were formed by the stitching (Fig.2). Appearance improved but unfortunately because of the conformor patient developed signs of exposure keratopathy and later corneal perforation. Implant and prosthesis may be required at a later stage.

Case No.3: Right eye lower lid defect after tumor resection was repaired by lateral canthotomy and cantholysis (Fig.3) Postoperatively normal lid shape was achieved.

Case No. 4: Fornix formation was done by grafting of buccal mucosa (Fig.4) so that conformer could be placed. Post operatively prosthesis was placed as sufficient fornix was available.

Case No. 5: Lower lid lacerations near medial canthus involving canaliculus required intubation (Fig.5). Cut end of canliculus on the lacrimal sac side was identified by passing pig tail probe from upper canaliculus. Lower ends of DCR tubes were visualized in the inferior meatus with the help of nasal endoscope and pulled out with the artery forceps. Postoperatively patient had normal contour of the lid with no complaint of watering.

DISCUSSION

It was found in the present study that direct closure of the lid defect was possible in many cases i.e. 12 (38.7%) eyelids. Direct closure has been found possible even after full thickness eyelid resection, due to spontaneous eyelid expansion [3]. In three eyelids, retroauricular skin was used to form anterior lamella of eyelid. It was close to lid skin in thinness, color, and texture. The dermis was slightly thicker and required thinning during preparation of the graft. The other alternatives available are skin from inner side of arm and from inner side of thigh. For reconstructing the posterior lamella of a lid defect, tarsus is the best. Nasal septal cartilage was used in

Fig.3 Right: Lid tumor, Middle: Defect after resection Left: After repair by lateral canthotomy and cantholysis.

our set up and it was found to be thick and stiff, fixing in position was thus a little difficult. Sclera either absorbs or is too flexible. Deep temporalis fascia has been used recently successfully for reconstruction of the conjunctiva as the loose areolar layer of the temporalis fascia is very thin and highly vascularized [4]. Buccal mucosa, as a source for conjunctival replacement, was taken from the lower lip. It can be taken from cheek, injury to parotid duct opening should, however, be avoided. It was dissected freehand, and the donor site was closed by plain catgut. Hard palate mucosa provides a mucosal lining and is an effective eyelid spacer [5]. It can replace tarsus as well, as it is thick. However donor site haemorrhage has been reported in 10 % of cases.

Where autologous tissue is unavailable, alloplastic materials e.g. Polytetrafluoroethylene (GORE-TEX and ePTFE) can be used in eyelid reconstruction [6]. PTFE is synthetic, woven, nonabsorbable, pliable, inert material available in sheets and strips. The original 1-mm thick Gore-Tex patch had relative solidity. Any graft not completely covered by conjunctiva or other tissue would extrude. More recently, an expanded PTFE (ePTFE) has been developed in which fibrovascular ingrowth has been demonstrated within 4 to 6 weeks. New substances like, acllular dermal matrix derived from donated human skin tissue (AlloDerm) [7] and acellular porcine dermal graft (Enduragen) [8] have been tried as posterior lamellar replacement when there is an adequate skin and muscle, substitute for ear cartilage and fascia in eyelid surgery. These have been found rigid enough to replace tarsus. AlloDerm has been classified by FDA as banked human tissue. It was readily taken up into the wound defect, with complete coverage of its bulbar surface by conjunctiva and the cornea was not affected by its contact.

Fig.4 Buccal mucosa being taken.

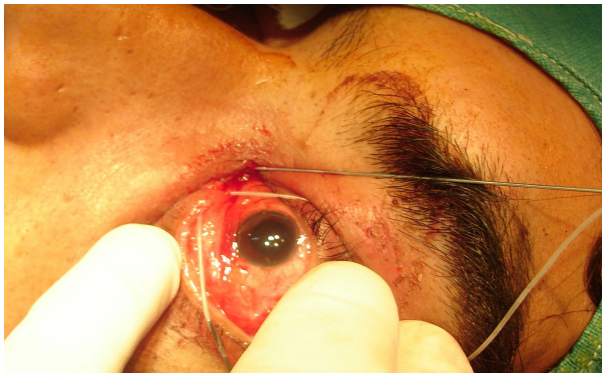

Fig.5. Canalicular intubation after localizing the cut ends with pigtail probe. DCR tube was localized in the inferior meatus with nasal endoscope.

A new flap design, the reading man flap [9] consists mainly of a superiorly based quadrangular flap and an inferiorly based triangular flap. It can be used to reconstruct malar and infraorbital circular defects with good cosmetic results and without creating any tractional forces to the eyelids.

Chemical and thermal burns can cause conjunctivalisation of the corneal surface. In these cases, limbal stem cell transplantation can restore a corneal epithelial cell phenotype, and transplantation of in vitro amplified corneal epithelial stem cells has been developed as an alternative to keratolimbal transfer techniques. Keratoplasty and cataract surgery may then be necessary to clear the visual axis. Finally, keratoprosthesis is an option for the most severely damaged eyes [10].

In this series soft contact lens was used in every case of upper eyelid surgery. A soft (silicone hydrogel) contact lens has been recommended by others also, in upper lid surgery [11]. Exposure keratopathy was main problem which was encountered in two cases indicating the importance of corneal lubrication. Every oculoplastic procedure

should be followed by meticulous corneal protection.

An alternative to surgical repair of lid defects is wound healing by secondary intention (laissez-faire), which can be used for relatively large defects with good results. The medial canthal region and full-thickness lower lid defects were found to be the favored locations for healing by secondary intention [12]. Full-thickness, large eyelid defects are conventionally reconstructed by either a Hughes flap or a Cutler-Beard bridge flap. Switch flap is an alternative method which involves switching a full-thickness flap on a pedicle to fill a defect from lower lid to upper or vice versa and has been found to be effective [13].

An alternative to the modified Hughes flap is orbicularis muscle advancement flap combined with free posterior and anterior lamellar grafts. Orbicularis muscle adjacent to the defect is mobilized, incised vertically, and advanced. The inner surface is covered with a free tarsoconjunctival graft from the (ipsilateral or contralateral) upper lid, and the outer surface is covered with a free skin graft from the (ipsilateral or contralateral) upper eyelid in one stage. It has been used for reconstruction of relatively shallow lower eyelid defects with a horizontal size of up to 70% of the total eyelid width and may be [14].

"Reverse" modified Hughes procedure is analogous to the modified Hughes reconstruction for full-thickness lower eyelid defects and it avoids cicatricial entropion of the upper eyelid, a known complication of the Cutler-Beard procedure [15]. In the first stage, a single tarsoconjunctival flap from the donor lower eyelid reconstitutes the posterior lamella, and a full-thickness skin graft reconstructs the anterior lamella. In the second stage, 5 to 8 weeks later, the skin tarsoconjunctival flap is severed. In the lid-sharing Cutler-Beard procedure, the popular alternative, the full-thickness lower lid is advanced into the upper eyelid defect.

The secondary tarsoconjunctival flap advancement procedure is an effective reconstructive technique for the repair of the full-thickness lower eyelid defect in an eyelid that has already undergone a previous Hughes repair [16].

As photography pre and post operative is a must in oculoplastics, the recommendations for photography should be applied. These have been documented [17] and include using the same camera lens, settings, lighting, film, magnification, and patient position so that reproducibility and comparisons are possible.

CONCLUSION

Trauma is the most common aetiology of lid defects and most of the lid defects can be managed by direct closure. However some require different additional procedures.

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