Our Clinical Experiences in Lower Eyelid Reconstruction

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Abstract

Objective: Different treatment principles have been applied in the reconstruction of partial or full layer defects of the lower eyelid. The use of the most similar tissue for eyelid reconstruction is important for both functional and esthetic results. This study aims to investigate the reconstruction methods performed in lower eyelid defects and to evaluate their esthetic and functional results.

Patients and Methods: In this study, patients who underwent reconstructive surgery from 2012 to 2016 in our clinic were included. Cases of primary repairs after skin tumors located in the lower eyelids were excluded from the study. The sociodemographic characteristics of patients, the type and location of the tumor, defect size after surgery, anterior and posterior lamellar defects, and reconstruction methods used were retrospectively reviewed. Results: Thirty-seven patients were included in the study. Fifteen were male and 22 were female. There was only anterior lamellar defect in 29 patients and full-thickness lower eyelid defect in 8 patients. Anterior flaps used in lamellar defects were identified as glabellar flap, Limberg flap, advancement, transposition flap, nasolabial flap, forehead flap, and cheek flap. Chondromucosal graft, palatal mucosal graft, and buccal mucosal graft were used for repairing posterior lamellar defects. Conclusion: Separate reconstruction of the posterior and anterior lamellae is important to provide good functional and esthetic results in lower eyelid reconstruction. Depending on the size of the defect, using a single local flap or a combined flap with posterior lamella repair provides highly acceptable results.

Keywords: Lower eyelid, posterior and anterior lamella, reconstruction

INTRODUCTION

Reconstruction of wide defects in the lower eyelid area bears special importance because of the complex anatomic structure of the eyelid. Unsuccessful reconstruction cannot only lead to esthetic flaws but also to conjunctivitis, keratitis, and severe complications that can lead even to blindness. Most of the lower eyelid defects can be repaired with already defined and accepted techniques.[1,2]

Eyelid tumors are frequently encountered, and their modes of treatment vary depending on the size, localization, and histologic pattern of the tumor. Tumors are less common in the upper eyelid, and given the looseness and abundance of its soft tissue, the upper eyelid reduces the need for using flaps, whereas a number of options have been described in the reconstruction of the lower eyelid.[3]

The purpose of this article is to share the reconstruction approaches we use in lower eyelid reconstruction and our clinical experiences.

PATIENTS AND METHODS

Thirty-seven patients who were operated on in our clinic in the years 2012–2016 were included in the study. All patients were operated on for skin tumors localized to the lower eyelid, and reconstruction was performed wherever defects did not allow for primary closure. All patients were informed about the surgical techniques before the operation and their consents were obtained in line with the World Medical Association Declaration of Helsinki, Ethical Principles for Medical Research Involving Human Subjects. Sociodemographic characteristics of patients, the localization and type of tumors, defect size after surgery, anterior and posterior lamellar defects, and reconstruction techniques were retrospectively examined. Patients with only anterior lamellar defects were classified as Group 1, and patients with both anterior and posterior lamellar defects were classified as Group 2. The most similar tissue for eyelid reconstruction was used. The local tissues used in the reconstruction included the glabellar flap, Limberg flap, advancement, transposition flap, nasolabial flap, forehead flap, and cheek flap. Chondromucosal graft, palatal mucosal graft, and buccal mucosal graft were used for repairing posterior lamellar defects. The purpose of separate reconstruction of the posterior and anterior lamellae is important to provide good functional and esthetic results in lower eyelid reconstruction. Depending on the size of the defect, using a single local flap or a combined flap with posterior lamella repair provides highly acceptable results.

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How to cite this article: Altuntas Z, Uyar I, Findik S. Our clinical experiences in lower eyelid reconstruction. Turk J Plast Surg 2018;26:2-5.
defects were classified as Group 2. Patients in Group 1 were divided into three subgroups based on the localization of the defect (medial, lateral, and total), and reconstruction options were reviewed. Patients in Group 2 were reviewed for the options used in posterior lamellar defects.

**Results**

Fifteen of the patients are male and 22 are female. Mean patient age was 53. Thirty patients had basal-cell cancer and 7 had squamous-cell cancer. Twenty-three patients were operated on under general anesthesia and 14 under local anesthesia. Patients were classified as Group 1 and Group 2.

- **Group 1:** It included 29 patients who had anterior lamellar defect only. Patients in Group 1 were divided into three subgroups:
  - **Group 1A:** It included 12 patients with medially localized defect. Reconstruction was performed with glabellar flap in 6 patients, forehead flap in 3 patients, V-Y advancement flap in 2 patients, and nasolabial flap in 1 patient.
  - **Group 1B:** It included 9 patients with laterally localized defect. Reconstruction was performed with Limberg flap in 4 patients, with transposition flap from the lateral cheek in 3 patients, and with cheek flap in 2 patients.
  - **Group 1C:** It included 8 patients with total or nearly total defects. Reconstruction was performed with transposition flap from the lateral cheek in 2 patients, with cheek flap in 4 patients, and with cheek flap and

<table>
<thead>
<tr>
<th>Method</th>
<th>Number of patients</th>
</tr>
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<tbody>
<tr>
<td>Chondromucosal graft</td>
<td>4</td>
</tr>
<tr>
<td>Palatal mucosal graft</td>
<td>2</td>
</tr>
<tr>
<td>Buccal mucosal graft</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
</tr>
</tbody>
</table>

**Table 2: Reconstruction of the posterior lamella**

- **For patients with posterior lamellar defects,** the options used were:
  - Chondromucosal graft
  - Palatal mucosal graft
  - Buccal mucosal graft
  - Total

- **Table 1: Flaps used in the reconstruction of lower eyelid defects**
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Turkish Journal of Plastic Surgery ¦ Volume 26 ¦ Issue 1 ¦ January-March 2018

• Group 2: It included 8 patients with full-thickness lower eyelid defect. Reconstruction of the posterior lamella was performed with chondromucosal graft from the nasal septum in 4 patients, with palatal mucosal graft in 2 patients, and buccal mucosal graft in 2 patients [Table 2].

Postoperative flap loss was not seen in any of the patients.

DISCUSSION

Eyelid defects can be the result of congenital anomalies or develop after traumas or surgical resection in cancer cases.

The lower eyelid has a complex structure from the anterior to the posterior, the skin, the orbicularis oculi muscle, the tarsal plate and the conjunctiva, and the mucosa and sebaceous glands in the subconjunctival region. The former two make up the anterior lamella and the latter two the posterior lamella. It is important to separately repair the anterior lamella and the posterior lamella to achieve functionally and esthetically good results.

As a general principle, reconstruction in eyelid defects is described based on the size of the defect, i.e., as lateral cantholysis or as primary repair without cantholysis in cases with <50% tissue loss and tarsoconjunctival flap and graft in cases which tissue loss is more than 50%. Composite nasal chondromucosal grafts with cheek flaps are described in defects that are more than 75%.[4]

As described in the literature, different strategies are required in wide defects.[5-7] Eyelid advancement flap, cheek rotation flap, forehead flap, nasolabial flap, temporoparietal fascia flap, laterally based tarsoconjunctival transposition flap, superiorly based tarsoconjunctival advancement flap, orbicularis oculi muscle-skin island flap, laterally based skin advancement flap, cheek V-Y advancement flap, Tripier flap, and semicircular flap (Tenzel flap) are other reconstruction techniques. In total losses, the defect can be closed with a tarsoconjunctival flap from the upper eyelid, a mucochondral graft from the nasal septum or a conchal cartilage graft from the ear, and a Mustardé flap containing cutaneous-subcutaneous tissues from the cheek and preauricular region.[8,9]

Mustardé reconstructed total defects of the lower eyelid with a rotation flap prepared from the temporal region and the cheek and covered with a septal chondromucosal graft. Mustardé flap is an easy-to-learn and predictable method in lower eyelid reconstruction. This flap is indicated to include all components required for repairing the lower eyelid. The septal chondromucosal graft constitutes the supporting layer in this technique. Acceptable results are reported in most of the cases in which this technique is used. Secondary corrections are required in very few patients. To achieve good results with the Mustardé technique, the flap should be prepared to form a high arch in the temporal region, a composite septal graft should be performed, and the flap should be fixed to the frontozygomatic area with suspension sutures.[10]

A frequently used flap, the Tripier flap, was first described by Landolf as a pedicled flap from the upper eyelid. The major advantage of this flap is excellent color and structure compatibility, and donor-site morbidity is minimal in viable patients. Its major disadvantage is that it may not be sufficient to give adequate vertical length, and this may lead to retractions in the upper eyelid if the donor site is not sufficient.[11,12]

Another flap that can be used in the reconstruction of the lower eyelid is Tenzel’s semicircular flap. The semicircular flap, which is a myocutaneous flap planned from the lateral orbit, can provide near-perfect results. This flap can cover small, mid-sized and some large defects. Some of its major advantages are lack of orbicularis muscle involvement, minimal donor site morbidity, ease of preparation, and being a single session procedure. This flap is reported to be suitable in elderly patients with defects involving two-thirds of the lower eyelid.[13]
There are different techniques described in the literature for the posterior lamellar reconstruction of the lower eyelid. Tarsocconjunctival graft is a perfect choice of technique in posterior lamellar reconstruction since this type of graft sufficiently provides the properties of the eyelid.\(^1\)\(^4\) Hard palate mucoperiosteal grafts are frequently used in posterior lamellar defects, given their capability to provide structural support. Despite the reliable results, donor-site problems can arise in this technique. Moreover, studies report that its multilayered epithelium with keratinized flat cells can cause corneal irritation. Another posterior lamellar graft option is a combination of nasal chondromucosal graft and ear cartilage graft. Ear cartilage can easily take the shape of the tarsal plate. A buccal mucosal graft provides good coverage in reconstruction; however, the loose structure of its connective tissue still necessitates the support of a combined cartilage graft. Another technique that should be mentioned in the reconstruction of the posterior lamella is tarsomarginal grafts. This is a composite graft including the tarsal plate, the conjunctiva, and the eyelash margin. Components of the anterior lamella are excised before this wedge-shaped graft is applied.

In our cases, we used the Limberg flap, especially in laterally localized lesions. In the reconstruction of the anterior lamella in cases with laterally localized and nonlarge tumors, we applied the Limberg flap after tumor excision and achieved considerably good esthetic results [Figure 1].

Glabellar flaps were our first choice in nonwide defects that were localized to the medial canthal region and did not extend into the orbit. No complications were encountered in the postoperative period even though the reconstruction did not involve any procedures targeting the lacrimal system. Reducing the thickness of the local flap was seen provide esthetically more acceptable results [Figure 2]. We preferred to use forehead flaps in wide medial canthal defects that extended to the nasal dorsum and the orbit [Figure 3]. Chondromucosal graft was used together with a forehead flap in the reconstruction of the lower eyelid. The disadvantage of this technique is that it necessitates a second session for pedicle revision; however, we believe that this is a safe technique that should be born in mind for closing considerably large defects.

Superiorly based long transposition flaps from the lateral cheek or the nasolabial region were observed to be effective and safe techniques with good esthetic results for closing all defects of the lower eyelid in cases with total defects of the lower eyelid that do not extend into the malar region. We believe that it would be more suitable to use a cheek flap in the reconstruction of wider defects that extend into the malar region including the cheek area.

In our cases, we observed that chondromucosal grafts taken from the septum for the reconstruction of the posterior lamella provided good lower eyelid stability in the late postoperative period as well as good esthetic results. Favorable results are reported in the literature with tarsocconjunctival flaps, especially in cases with centrally localized defects; however, the need for two sessions of surgery and the limited width of the flap are its disadvantages. In our cases, chondromucosal grafts were our first choice to ensure patient comfort and provided highly acceptable results in the late period.

**Conclusion**

In the reconstruction of the lower eyelid, it is important to separately repair the anterior lamella and the posterior lamella to achieve functionally and esthetically good results. Highly acceptable results can be achieved with single local flaps or combined flaps, depending on the size of the defect.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patients have given their consent for images and other clinical information to be reported in the journal. The patients understand that names and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

**Financial support and sponsorship**

Nil.

**Conflicts of interest**

There are no conflicts of interest.

**References**