Lower Eyelid Reconstruction Using a Myotarsocutaneous Flap while Considering the Superior and Inferior Palpebral Sulci

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Summary: Various reconstructive procedures have been reported for full-thickness defects of the lower eyelid after tumor excision or trauma. In eyelid reconstruction, not only functionality but also cosmetic results are important; furthermore, making scars inconspicuous is challenging. The purpose of this study is to make the scars less noticeable in lower eyelid reconstruction. We reconstructed the anterior lamella using a myotarsocutaneous flap and the posterior lamella of the donor site using a palatal mucosal graft in a 61-year-old man with basal cell carcinoma of the lower eyelid. In designing the myotarsocutaneous flap, we matched the upper edge of the flap with the superior palpebral sulcus, and the lower edge with the inferior palpebral sulcus. The flap length was the same as the width of the defect. The lateral side of the postoperative scar was hidden by the excess skin of the upper eyelid, while the caudal side of the scar and the trapdoor deformity was covered with a tear trough. After movement, the flap was not located outside the lateral canthus, and good cosmetic results were obtained. This report describes our surgical procedure. (Plast Reconstr Surg Glob Open 2022;10:e4147; doi: 10.1097/GOX.0000000000004147; Published online 17 March 2022.)

CASE REPORT

Flap Design
The patient was a 61-year-old man with basal cell carcinoma of the lower eyelid, which was histologically diagnosed by skin biopsy. The lateral diameter of the tumor was 6 mm, and a horizontal 5 mm margin was secured, resulting in a full-thickness defect in the lower eyelid with a width of 16 mm (Fig. 1).

We made an incision line along the line of the lower edge of the eyelid from the lateral canthus to the extension line of the superior palpebral sulcus (Fig. 1, line a). From the point where the incision line intersects the extension line of the superior palpebral sulcus, the incision was made downward on the extension line of the superior palpebral sulcus (Fig. 1, line b). The length from the lateral canthus to the tip of the flap was the same as the width of the defect (Fig. 1; line c = lines a+b).

The lower edge of the flap was designed to match the inferior palpebral sulcus. If the lower end of the defect was higher than the inferior palpebral sulcus, additional excisions were performed to fit the sulcus. Outside the lateral canthus, the lower edge of the flap was also designed to protrude upward so that the shape matched the upper edge of the flap.

Surgical Procedure
A full thickness flap was elevated, including the tarsus and mucosa, with the orbicularis oculi muscles serving as subcutaneous pedicles (Fig. 2). The lower leg of the lateral canthal tendon was separated.

After flap elevation, the palatal mucosal graft of the hard palate was transplanted to the posterior lamella of flap donor site. The mucosa was continuously sutured with the conjunctival stump at the donor site with 7-0...
polyglactin, and the lateral canthal tendon was fixed using 5-0 polydioxanone with two stitches.

Next, the myotarsocutaneous flap was transplanted to the defect, and the conjunctiva was continuously sutured with 7-0 polyglactin. The inner canthal ligament, tarsal plate, and hard palate mucosa were sutured with two 5-0 polydioxanone stitches each. The flap was sutured to the skin using 6-0 nylon threads, and to the mucosal graft at the lower eyelid margin using continuous 7-0 polyglactin threads.

The donor site was closed in the same way as a V-Y advancement flap. The caudal orbicularis oculi muscle was lifted and fixed to the periosteum of the lateral orbit using a 5-0 polydioxanone thread (Fig. 3).

At 22 months postoperative, good aesthetic results, as well as normal function of the reconstructed eyelid, were achieved without tumor recurrence. The surgical scars were also easily confused with the superior and inferior palpebral sulcus (Fig. 4).

**DISCUSSION**

For full-thickness defects of the lower eyelid, direct suturing with lateral canthotomy or cantholysis is possible up to approximately half of the width. In half or more cases, it has been reported that the nasal septal cartilage mucosa, palatal mucosa, and auricular cartilage are used for reconstruction of the posterior lamella, and a method of reconstructing the anterior lamella using a cheek rotation flap is widely known. A cheek rotation flap has the disadvantage of a long vertical scar on the inside of the defect derived from excision of the dog ear, and a semicircular scar with a long upward protrusion on the temporal region. There is also a report of a V-Y subcutaneously pedicled flap that moves in the vertical direction as another method of reconstructing the anterior lamella. This technique leaves no scars on the temporal region but produces longitudinal scars on the medial and lateral sides of the defect. Miyamoto et al reported anterior lamella reconstruction with rotation flap based on the orbicularis oculi muscles. This is similar to ours as the flap has the orbicularis oculi muscle as subcutaneous pedicles, but leaves a long semicircular scar from the external canthus to the temporal region. In contrast, our myotarsocutaneous flap leaves no long scars on the defect or the temporal region.

A similar procedure is a horizontal V-Y advancement lower eyelid flap, but the difference is whether or not the
tarsus is included in the flap. The greatest advantage of our technique is that the edge of the eyelid, including the eyelashes, can be placed in the center of the lower eyelid, which is cosmetically important. There is a report where a myotarsocutaneous flap similar to ours was used for upper eyelid reconstruction.

The myotarsocutaneous flap is an island flap; therefore, the trapdoor deformity becomes a problem. However, we have devised a flap design to solve this problem. By matching the lower edge of the flap with the inferior palpebral sulcus, even if the flap bulges, it looks like a tear trough and is less noticeable. Additionally, by a W plasty, the scar can be hidden by the skin of the upper eyelid while maintaining the effect of lifting the lower eyelid. By setting the length of the flap from the external canthus as the width of the defect, the lateral end of the flap after movement does not go outside the lateral canthus. We believe that this contributes to the natural skin morphology around the external canthus.

The disadvantage of our method is that it is not very effective in managing defects from the center to the lateral side. Other limitations include difficulty to adapt to young people who have inconspicuous inferior palpebral sulcus. Therefore, our method is particularly useful in managing medial defects of older patients.

CONCLUSIONS

We reconstructed the anterior lamella with a myotarsocutaneous flap and the posterior lamella with the palatal mucosal graft for more than half of the medial full-thickness defects in the lower eyelid. Our myotarsocutaneous flap was designed considering the superior and inferior palpebral sulcus, which yielded excellent cosmetic results.