

Mišično-kožni bipedikularni reženj, prosti tarzalno-veznični presadek in prosti kožni presadek za rekonstrukcijo velikih defektov zgornje veke

Myocutaneous bipediced flap, a free tarsoconjunctival graft, and a free skin graft for reconstruction of subtotal upper lid defects

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IZVLEČEK

Namen: Ocena rezultatov in predstavitev enostopenjskega pristopa k rekonstrukciji velikih defektov zgornje veke po odstranitvi tumorja z uporabo prostega tarzalno-vezničnega presadka, bipedikularnega mišično-kožnega reženja in prostega kožnega presadka.

Metode: V tej retrospektivni seriji primerov so sodelovali štirje bolniki, ki so potrebovali rekonstrukcijo zgornje veke po odstranitvi tumorja. Po operacijah tumorjev pri dveh bolnikih so defekti obsegali 50–75 % veke, pri drugih dveh pa več kot 75 %, vključno z lateralnim kantungom pri enem in medialnim kantungom pri drugem bolniku. Zadnjo lamelo smo rekonstruirali s kontralateralnim prostim tarzalno-vezničnim presadkom zgornje veke, ki smo ga pritrtili na mišico dvigalko zgornje veke na defektu. V enem primeru smo

ABSTRACT

Purpose: To evaluate and present the outcomes of a single-step approach using a free tarsoconjunctival graft, a myocutaneous bipediced flap, and a free skin graft for the reconstruction of subtotal upper eyelid defects following tumor excision.

Methods: This retrospective case series involved four patients who underwent upper eyelid reconstruction after tumor surgery. The defect affected 50%–75% and > 75% of the eyelid in two patients each. Among the latter patients, the lateral and medial canthus were involved in one patient each. The posterior lamella was reconstructed using the contralateral upper eyelid tarsocconjunctival graft, which was attached to the levator muscle at the site of the defect. The levator was weakened and elongated using small myotomies in one patient. The anterior lamella

funkcijo dvigalke veke zmanjšali in podaljšali s pomočjo majhnih miotomij. Sprednjo lamelo smo rekonstruirali z bipedikularnim mišično-kožnim režnjem, kar je pustilo odprto območje pod obrvjo, ki smo ga pokrili s prostim kožnim presadkom.

Rezultati: Celjenje je potekalo uspešno, brez nekroze in z zadovoljivim kozmetičnim rezultatom. Nihče od bolnikov ni razvil klinično pomembnega lagophtalmosa. Delovanje mišice dvigalke zgornje veke je bilo pri vseh bolnikih normalno. Dva bolnika sta potrebovala dodatno operacijo zaradi pseudotrihiazze.

Zaključek: Subtotalne defekte zgornje veke je mogoče učinkovito rekonstruirati s kombinacijo prostega tarzalnovezničnega presadka, bipedikularnega mišično-kožnega režnja in prostega kožnega presadka. S tem pristopom se lahko v večini primerov izognemo dvostopenjskim rekonstruktivnim posegom.

was reconstructed with a myocutaneous bipediced flap based laterally and medially, leaving an exposed area beneath the brow, which was covered with a free skin graft.

Results: The patients had successful non-necrotizing healing and achieved satisfactory cosmetic outcomes. None of the patients developed clinically significant lagophthalmos, which would have required lubrication. Normal levator function was achieved in all patients. Two patients required additional surgery to repair pseudotrichiasis.

Conclusion: Subtotal upper eyelid defects could be effectively reconstructed using a combination of a free tarsoconjunctival graft, a bipediced myocutaneous flap, and a free skin graft. Two-step procedures could be avoided in most cases by using this method.

INTRODUCTION

Reconstruction of the upper eyelid can be achieved using various procedures, including one- and two-step methods with or without allografts or xenografts. The Cutler-Beard and lower lid-to-upper lid switch flap techniques are two-step procedures that use a tissue bridge from the lower lid, which is subsequently repaired (1,2). However, two-step procedures usually have a longer recovery period than one-step procedures. The following one-step procedures have been proposed: skin-cartilage graft; nasal chondromucosal flap; orbicularis muscle advancement flap; orbicularis oculi myocutaneous advancement flap; myocutaneous pedicle flap; Hübner tarsomarginal graft; and frontalis turnover flap (3–9). Marginal defects with residual upper lid tarsus can be reconstructed using posterior and anterior advancement flaps (10). Collin described various combinations of a free mucus membrane graft for the posterior lamella and a local flap (11). Additionally, allografts (Alloderm) and porcine xenografts (Permacol) have been used for upper eyelid reconstruction (12–14). Patrinely et al. (15) described the use of a bipediced myocutaneous flap along with

a free skin graft above and a mucolized tarsal graft for eyelid defects that encompass most of the lid. It has been shown that the same technique could be used to reconstruct larger defects that included one canthus using a periosteal flap (16). In our study we also used a medial canthal suture to reconstruct the medial canthus. Moreover, the levator muscle was carefully attached to the tarsoconjunctival graft. Some authors will argue that this procedure may give rise to upper eyelid entropion; however, we have utilized a technique involving small myotomies to recess the muscle and lengthen the tissue (7,15). Alternatively, expanded polytetrafluoroethylene (ePTFE) implants, which are similar to material used in vascular surgery, can be used to elongate the levator muscle, (17, 18). This biomaterial has also been used for ulcerated corneas in infectious keratitis due to its favorable mechanical properties and biochemical inertness (19). Furthermore, we avoided pseudotrichiasis and secondary corrective procedures by using a technique for lid margin construction with a longitudinal suture from the orbicularis to the tarsus. The purpose of this article was to present our experience and modifications to the method and its outcomes.

PATIENTS AND METHODS

All patients who underwent the surgical method described herein between 2018 and 2022 were included in the study. A retrospective analysis was performed on clinical notes and perio- and post-operative photographs. The study population was comprised of one female and three males with a median age of 82 years (range, 67–92 years). The indications for surgery included one basal cell carcinoma and three squamous cell carcinomas. Two patients underwent surgery under general anesthesia and two patients had local anesthesia. Tumor removal was carried out using rapid paraffin fixation in one patient and frozen sections in three patients to affirm tumor-free resection borders.

We utilized a contralateral tarsal plate to reconstruct the posterior lamella. This procedure involved harvesting the tarsal plate from the upper eyelid on the contralateral side of the affected area using a number 11 blade to make an incision parallel to the lid margin, while leaving the lower 4 mm of the donor tarsal plate intact to provide stability of the remaining lid. Blunt-tipped scissors were used to dissect the tarsus from the underlying Müller's muscle. In some cases, a few mm of supratarsal

conjunctiva was included in the graft depending on the height of the lid defect. The graft was then sutured into the defect using 7-0 Vicryl suture (Fig. 1).

Meibomian glands' orientation was not clinically relevant because during the Hughes' flap procedure, these are always inverted and cause no problems. In one case the tarsoconjunctival graft was not long enough, so a periosteal flap was raised from the lateral orbital rim. In one case in which the complete medial canthus was excised, a 5-0 polyethylene suspension suture was placed to the periosteum of the medial orbital rim (posterior lacrimal crest) and care was taken to cover the posterior aspect of the suture by lifting a flap of the bulbar/fornix conjunctiva and suturing the flap around to the orbicularis of the bipediced flap (Fig. 2).

The levator palpebrae superioris muscle was dissected and attached to the superior margin of the tarsoconjunctival transplant to preserve levator function of the reconstructed eyelid, as shown in Figure 2. If the levator was too short due to extensive tumor excision, we performed small myotomies to perforate the muscle in a mesh-like pattern, thus elongating and weakening the tissue, which prevented lagophthalmos

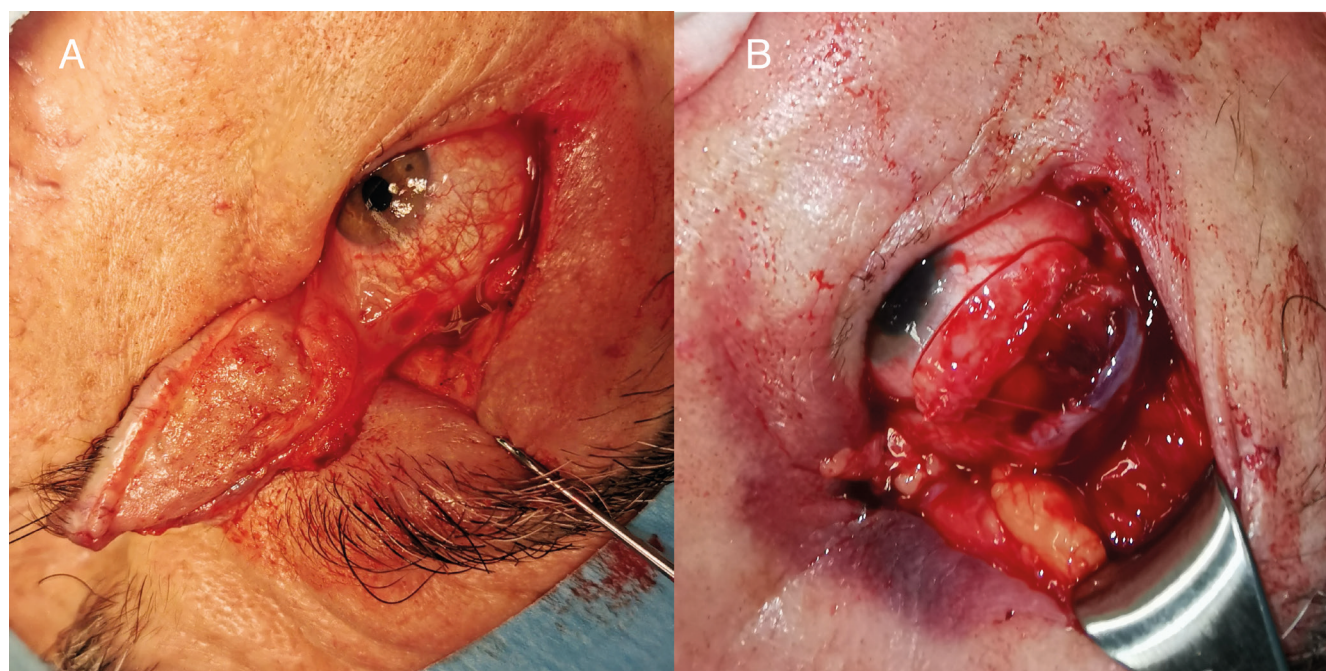


Figure 1. Position of the tarsoconjunctival graft. A) Excision of the tumor, yielding a > 75% defect of the eyelid. In this case, a complete medial canthal excision followed. B) We sutured the tarsoconjunctival flap to the levator medially and laterally with a 7-0 Vicryl suture.



Figure 2. Medial canthal suture. Continuation of the case from Figure 2, in which the complete medial canthus was excised. To provide medial stability of the reconstructed eyelid, we placed a 5-0 polyethylene suture (marked with a yellow arrow) between the tarsconjunctival graft and the periosteum of the medial orbital rim at the level of the crista lacrimalis posterior. A conjunctival flap was sutured posterior to the graft to avoid suture irritation. The tarsconjunctival graft was sutured superior to the levator and lateral to the remnant of the lateral canthal tendon and orbicularis.

and allowed sufficient length for reconstruction. We cut the Lockwood ligament medially and laterally to further mobilize the muscle (Fig. 3).

To reconstruct the anterior lamella, a myocutaneous bipediced flap was raised from the remaining upper eyelid with lateral and medial bases. A 7-0 Vicryl suture was used to perform a “sewing machine” suturing technique to attach the flap muscle just above the lower tarsal border, thus avoiding pseudotrachiasis (Fig. 4). The resulting skin defect under the brow was covered with a free skin graft from the contralateral upper eyelid (Fig. 5).

A tractional suture was placed at the lower reconstructed margin and taped to the lower cheek. Therapeutic

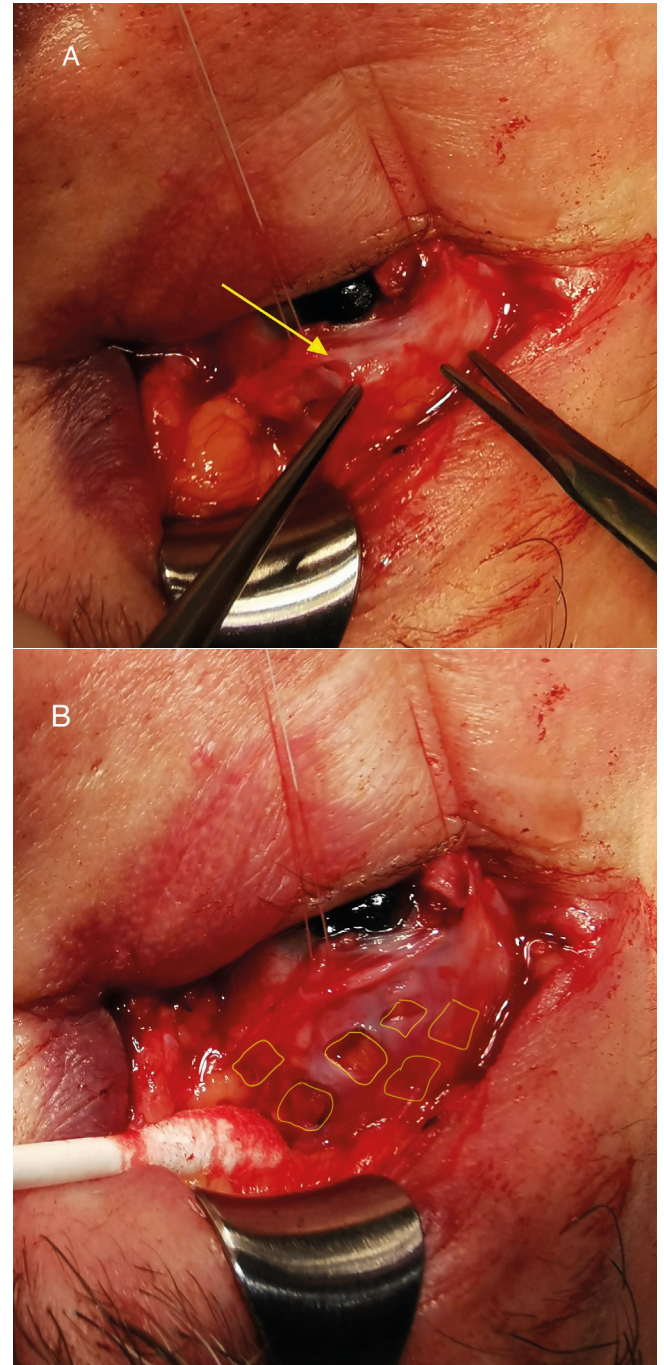


Figure 3. Levator elongation. A) Resected *m. levator palpebrae superioris*, attached to traction sutures. Whitnall's ligament was marked with a yellow arrow. We used blunt-tipped scissors to perform small myotomies in a mesh-like pattern to elongate the muscle, as delineated with a yellow line in B).



Figure 4. Marginal suture. Here we used a yellow arrowed schematic line to highlight the marginal suturing process using a running 7-0 Vicryl suture, with a “sewing machine” technique. We attached the muscle of the bipediced flap to the tarsal surface just above the lower eyelid margin to avoid pseudotrichiasis. Notice how the muscular part of the flap was a bit wider than the overlying skin.

contact lenses were applied to both eyes and an eye pad was placed over the upper eyelid to maintain pressure on the skin graft and lid for the first night. The flap and grafts were inspected on the first postoperative day, and shown to be viable in all patients. Tobramycin drops (Tobrex; Alcon Laboratories, Geneva, Switzerland) and artificial tears were used five times daily during the 1st postoperative week until the therapeutic contact lenses were removed. Dexamethasone/neomycin/polymyxin-B drops (Maxitrol; Alcon Laboratories) were applied five times daily for 1 week. Skin sutures were removed after 7–10 days.

The following outcome parameters were analyzed in the current study: tissue necrosis; infections; eye comfort and need for contact lenses; lid closure; levator function; cosmesis; complications; and donor site morbidity. The study adhered to the Helsinki Declaration. Institutional Ethics Review Board approval was not required.

RESULTS

Figure 6 depicts the eyelid defects and outcomes during patient follow-up and Table 1 lists the patient data.

Patient 1, an 87-year-old male, underwent squamous cell carcinoma excision, which resulted in a > 75%



Figure 5. Free skin graft from the contralateral upper eyelid. To cover the defect under the brow, we used a free skin graft from the other eyelid. We placed a tractional suture at the lower tarsal margin when the surgical procedure was completed. Figure 1-6 is the surgeon’s viewpoint (standing frontally to the patient in the operating room) to create a real-world image of the method.



Figure 6. Defects and outcomes. The image shows three patients not shown in Figure 1-6. The left panels show the initial defects (a preoperative photo of a squamous cell carcinoma in patient 3 is seen). The panels to the right show the results at the follow-up evaluation with open and closed eyes. Notice a 1-mm lagophthalmos in patient 3, which was not significant and required no lubrication.

defect of the upper eyelid, including the lateral canthus. A lateral periosteal flap was utilized. After the reconstruction, the patient was followed for 2 years, 8 months. During that time, no lagophthalmos was present and levator function was normal. Pseudotrachiasis required additional surgery 3 months postoperatively.

Patient 2 was a 77-year-old male in whom pseudotrachiasis also needed to be corrected; it formed 6 months postoperatively and was corrected

with a secondary procedure. A 50%–75% lid defect was reconstructed after a squamous cell carcinoma excision and the patient was followed for 2 years, 2 months. Levator function was normal and lid closure was complete.

Patient 3 was a 92-year-old female who underwent a basal cell carcinoma excision, which resulted in a 50%–70% defect. The levator was lengthened using myotomies, as shown in Figure 3B. We noted a 1-mm lagophthalmos, which was clinically insignificant and

Table 1. Patient data. M – male, F – female, y – year, m – month

Patient	Age in years, Sex	Lid-defect extent	Complications	Levator function, lid closure	Follow-up time
1	87, M	> 75%	pseudotrachiasis	normal, complete	2 y, 8 m
2	77, M	50-75%	pseudotrachiasis	normal, complete	2 y, 2 m
3	92, F	50-75%	none	normal, 1 mm	1 y, 10 m
4	67, M (Fig. 1-5)	> 75%	none	normal, complete	3 m

did not require long-term topical lubrication. Levator muscle function was preserved during the follow-up evaluations performed over 1 year, 10 months.

Patient 4 was a 67-year-old male (Figs. 1–5) who required a subtotal defect reconstruction, including the medial canthus. Medial canthal suture was utilized and the levator was lengthened. No lagophthalmos or levator function impairment was observed.

In our case series, no tissue necrosis or infections was reported.

The patients reported varying degrees of discomfort and pain following surgery. There was no need for additional therapeutic contact lens treatment after week 1 postoperatively and good eye comfort was reported. Pseudotrichiasis was formed due to a lowered skin border in two patients. Superficial corneal erosions in these two patients were temporarily treated using eye lubricants and chloramphenicol ointment. This outcome was mended with a brief revision, excising a strip of overlying marginal skin. Thereafter, the erosions healed and comfort remained good during the remainder of the follow-up time without additional treatment.

Levator function was measured between 6 and 10 mm in all patients during follow-up appointments and remained functional and symmetrical with respect to the contralateral lid throughout the follow-up period. There was no instance of entropion or alteration in the height or shape of the eyelid. The patients were satisfied with the cosmetic outcome of the lid reconstruction. Visual function was not affected by surgery in any of the patients.

DISCUSSION

Various techniques have been suggested for upper lid reconstruction. However, there are some advantages to the current technique that surgeons should consider when dealing with large upper eyelid defects. The method described herein was a one-step procedure and did not require allograft or xenograft material. In short, we reconstructed the posterior lamella using the contralateral tarsal plate. The anterior lamella was reconstructed using a myocutaneous bipediced flap from the remaining upper eyelid with lateral

and medial bases, and a free skin graft from the contralateral eyelid was used to cover the resulting skin defect below the brow.

This approach did not affect the lower lid, and sufficient lid closure could be achieved. The one-step approach was best performed under local anesthesia to check for levator function. The levator muscle attachment provided normal upper lid function, leading to normal visual function and quality of life. Toft et al. (7) suggested suturing the levator to the flap muscle instead of the tarsal plate to avoid lagophthalmos. We used a technique involving mesh-like myotomies in the levator to recess, lengthen, and weaken the muscle, and did not experience any lagophthalmos, despite suturing the levator to the tarsoconjunctival graft. Furthermore, upper lid entropion did not occur in any patient.

Donor site morbidity was not an issue. A tarsal graft could be obtained from the contralateral upper eyelid without significant donor site morbidity, and the defect was covered with conjunctiva usually within 1 week. In some cases, however, an added structure for the lateral or medial canthus may be necessary, such as a periosteal flap at the lateral side or medial canthal suture.

We avoided the risk of apical tissue necrosis, which can be the case in pedicled flaps, by using a bipediced mucocutaneous flap. We recommend fashioning a bipediced flap as wide as possible, leaving the underlying orbicularis somewhat wider in comparison to the skin. We used a bipediced mucocutaneous flap in cases 3 and 4 and have used a “sewing machine” technique for the marginal running suture, which did not result in pseudotrichiasis as in the first two cases.

In summary, a one-step procedure using a free tarsoconjunctival graft combined with a myocutaneous bipediced flap and a free skin graft was a viable option for reconstructing subtotal upper eyelid defects and should be strongly considered before opting for two-step procedures.

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