



CASE REPORT

Reconstruction of a Traumatic Large Upper Eyelid Avulsion with Tarsconjunctival Graft and Rotational Flap: A Surgeon's Preference

Authors:

Muhammad Fariz*^{ORCID}
Sutjipto^{ORCID}

Affiliations:

Department of Ophthalmology,
Faculty of Medicine, Universitas
Airlangga—RSUD Dr. Soetomo
Surabaya, Indonesia.

Corresponding author:

Muhammad Fariz
muhammad.fariz-2018@
fk.unair.ac.id

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**Abstract**

Introduction: Large, full-thickness upper eyelid defects management presents a thorough and challenging approach due to the multilaminar character of the eyelid and its dynamic function. The Cutler-B Beard flap method has been the mainstay management, but posterior lamellar graft usage with recent modifications may reduce complications.

Case Presentation: A 43-year-old man presented to the emergency ward after a traffic accident left him with a full-thickness laceration on his left upper eyelid and an approximately 60% avulsion on the one-third medial of the eyelid. Traumatic ptosis was also found. After considering the large size of the affected area and the probability of faster wound healing, a free graft from the tarsus and conjunctival eyelid of his fellow eye was harvested to replace the posterior lamellar of the affected eye and closed the defect with a rotational skin flap from the remaining of the left upper eyelid. **Conclusions:** This technique could be one of the alternatives to the more common cutler-beard flap with mild complications. However, temporary visual obstruction cannot be avoided due to the traumatic ptosis complication of this patient.

Keywords: tarsconjunctival graft; rotational flap; traumatic eyelid avulsion

Introduction

Eyelid injuries, which can occur from acute or blunt ocular trauma, are most commonly caused by traffic accidents, injuries related to sports, traffic accidents, animal bites such as dogs, and violence-related injuries.^[1] To carefully manage significant, full-thickness defects of the upper eyelid requires a thorough and challenging approach due to the multilaminar nature of the eyelid and its dynamic function, which requires a mucosal inner surface and a stable margin to maintain adequate mobility and avoid abrasion of the to protect the ocular surface.^[2]

We present a case of traumatic large upper eyelid avulsion due to a traffic accident, reconstructed using the tarsconjunctival graft technique from the fellow eye and rotational flap with attention to the surgical procedure, its result, and subsequent complications and management.

Case Presentation

A 43-year-old man presented to the emergency room with pain and bleeding from his left eyelid after a traffic accident eight hours prior. We found a full-thickness laceration involving the lid margin on his left upper eyelid and an approximately 20 x 4 mm avulsion. Visual acuity was 6/7.5 in his left eye. Examination of his right eye was within normal limits. Bleeding was also found on his left forehead, left cheek, and from his lips and mouth (Figure 1).

We assessed this patient with left eye full-thickness upper eyelid laceration involving lid margin and left eye upper eyelid avulsion. After a few considerations, including the number of the step of the procedure, faster wound healing, and avoiding a considerable amount of complications, a free graft from the contralateral tarsus and conjunctival eyelid was planned. Moreover, to cover the graft, we would use the remaining of the left upper eyelid to make a rotational skin flap.



Figure 1. A large full-thickness upper eyelid laceration involving the lid margin and a large eyelid avulsion resulted from a traffic accident.



Figure 2. Harvesting of tarsoconjunctival graft from the contralateral upper eyelid. (A) Incision of the tarsoconjunctival tissue; (B) Excision of the graft; (C) the graft, after excised, cleaned, and disinfected with alcohol.

After five days of care, the surgery was performed electively to wait for the inflammation to decrease. First, we cleaned and evened up the wound edges. We identified the edge of the remaining tarsal plate and conjunctiva on the wound's medial and lateral parts. We measured the length of the wound to be 20 mm in size. Then we proceeded to harvest the tarsoconjunctival graft from the fellow eye. We performed eversion of the upper eyelid of the fellow eye with a nylon 4-0 and eyelid spatula. We measured approximately 4 mm from the lid margin to indicate the border of the tarsoconjunctival graft, and then we marked 20 mm in length based on the size of the avulsion. We did the incision as deep as the tarsal plate using mesh and scissors for undermining. We extracted approximately 20 x 4 mm tarsal plate and conjunctiva from the fellow eye. The wound area of the donor's eyelid was cleaned with povidone-iodine and rinsed with normal saline. The suture was not performed on this area, as the wound healing process will promote epithelialization. We then administered antibiotic eye ointment to the donor area (Figure 2).

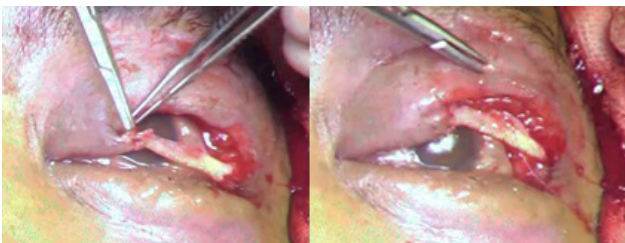


Figure 3. The process of suturing the harvested graft to the wound.

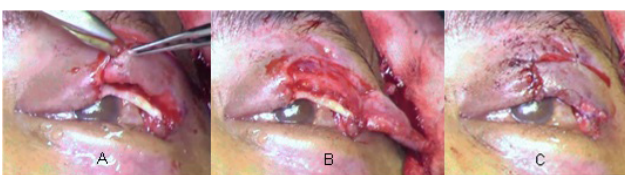


Figure 4. Making a rotational flap from the remaining upper eyelid. (A)-(B) Undermining the skin of the upper eyelid; (C) Rotational flap was sutured to the graft, and the defect.

After disinfection and a few excision, we sutured the graft onto the wounds; along the edges of the tarsal plate, remaining Müller muscle, conjunctiva, and lid margin with a 6-0 vicryl needle to reconstruct the posterior lamella (Figure 3).

For the anterior lamellar replacement flap, a rotational advancement flap was made by excising the skin along the upper lid; then, we sutured the flap onto the tarsal and conjunctival with a 6-0 vicryl needle and onto the skin with a nylon 6-0 needle. To ensure the patency of the graft, we also performed a blepharorrhaphy on his left eye and a pressure bandage to be maintained for one-day post-surgery (Figure 4).

We opened the bandage the next day after observation and found an inflammation sign but no blood leakage or any signs of infection. We planned to maintain the blepharorrhaphy for one week after the patient's discharge. After the surgery, a systemic antibiotic for three days was given to the patient, analgesic, antibiotic eye ointment for the suture wounds, and antibiotic eye drops.

Follow-up examinations were done one week, two weeks, and one month after the surgery. Blepharorrhaphy was released on the first week, and eyelid swelling and corneal abrasion due to an internal suture on the upper eyelid were found. We gave the patient an antibiotic eye ointment for the corneal abrasion, which had to be used frequently, at least after removing the sutures. For the following week's observation, improved wound healing on the suture sites was met, and the corneal abrasion gradually decreased. We released the sutures on the eyelids, but the sutures on the lid margin were planned to be released for the subsequent follow-up (Figure 5).

One month after the surgery, improved wound healing was met, and the corneal abrasion was healed, mainly because the internal sutures had been removed. No necrosis tissue was found on the graft and the flap, and minimal scarring made for an adequate cosmetic result, but traumatic ptosis remained in this patient. As for the donor site, the epithelialization had already occurred, and no complaint was found from the patient (Figure 6).

We measured the ptosis on this patient, and the result of the interpalpebral fissure on the right eye was 10 mm and 4 mm on his left eye. The margin reflex distance was 4 mm and -2 on the right and left eye, respectively. Margin limbal distance revealed 9 mm on the right eye and 4 mm on the left eye. We found 15 mm on the right eye and 6 mm on the left eye for the levator function. The corneal abrasion decreased, but we found a punctate fluorescein test on the left eye.

From the three-month follow-up, we found the wound healing process of the upper eyelid was already met, but traumatic ptosis, while decreased, remained. We planned to observe the patient for another three months for the following management of ptosis.



Figure 5. Clinical presentation on the first-week follow-up after surgery found eyelid swelling and corneal abrasion.



Figure 6. One month after surgery, the clinical presentation revealed improved wound healing and decreased corneal abrasion; however, traumatic ptosis remained.

Discussion and conclusions

When addressing a case of eyelid laceration, surgeons should be adept in eyelid anatomy. For eyelid lacerations, surgeons depend on the injury's depth, width, and location and whether the margin of the eyelid and canalicular are involved.^[3] The goal of managing significant full-thickness eyelid defects is to replace the anterior and posterior lamella with equal tissue substitution to restore its function and for cosmetic purposes.^[4] To maintain adequate mobility and to avoid abrasion of the ocular surface, it will require a mucosal inner surface and a stable margin.^[2]

In this case, we found a patient with a large, full-thickness eyelid margin involved, upper eyelid laceration, and avulsion. Upper eyelid reconstruction is arguably more complex than lower eyelid defects, which have less dynamic movement and cover less of the globe.^[5] A few surgical techniques are described in the literature for sizeable upper eyelid defects. The most common is the Cutler–Beard procedure^[6], a two-step procedure where a full-thickness bridge flap raised from the lower eyelid is advanced to the upper eyelid defect, which will be divided after a few weeks.^[7]

The Cutler-Beard procedure has become the mainstay of large upper eyelid reconstruction. However, many have pointed to the lack of rigid support in the upper eyelid posterior lamella as one of its disadvantages, which causes entropion and ocular surface abrasions that can lead to eye irritation.^[2] It may also be complicated with malposition, retraction, and deformity of the eyelid. Over the years, changes have been made to this technique to improve the results further. The use of a posterior lamellar graft and recent modifications may reduce complications.^{[7],[8]}

Recently, the tarsoconjunctival graft in eyelid reconstruction has become popular because it provides

both structural support and mucosal lining, and most of the time, it only requires one-step surgery.^{[4],[9]} Alternatives such as hard palate, auricular cartilage, and nasal septum might also provide rigidity but lack essential conjunctiva surface for contact with the cornea.^[2] Moreover, autologous tissues are more resistant to resorption; thus, the tarsoconjunctival grafts might be the most suitable for reconstructing the posterior lamella because of its posterior conjunctival surface, its simple technique, and low donor site morbidity.^[2] Transconjunctival harvest is arguably less technically complex than the harvest of oral or nasal grafts and is well tolerated by patients.^[4]

For this patient, we used a tarsoconjunctival graft taken from the contralateral upper eyelid to replace the posterior lamellar. Although the free graft donor site could be either ipsilateral or contralateral upper eyelid tarsus, some studies prefer to utilize the contralateral eyelid for preserving the ipsilateral eyelid needed.^[9] We made sure that the size of the graft can be removed without risk of damaging the donor area and enough to reconstruct upper eyelid defects where the defects we found do not cross the lateral or medial canthus.^[2]

Tarsoconjunctival grafts are not without their limitations. Although, studies found complications are generally mild and may include eyelid notching or retraction of the donor's eyelid, distortion of the eyelid contour, corneal epithelial disorder, entropion, formation of granulomas or symblepharon, and distortion of the eyelid contour.^{[4],[10]} Our patient had eyelid swelling and corneal abrasion after a few weeks of follow-up, but it was quickly resolved after the internal sutures were removed and the administration of antibiotic ointment.

We performed a rotational advancement flap, commonly used in the periocular area^[11], where the directly adjacent skin is undermined and rotated on itself to fill the close. This technique is helpful for those defects

located between the eyelid crease and the lid margin, and it minimizes the risk of necrosis due to good vascular supply in highly vascularized areas.^[12]

After a few follow-ups on our patient, we found minimal graft and flap complications. The tarsoconjunctival graft might cause the corneal abrasion, but it was resolved quickly with antibiotic eye ointment. No necrosis tissue was found in this patient. The flap provides good elasticity and adequate aesthetic results to replace the anterior lamella, though scarring was still found on the eyelid.

However, we still found ptosis in this patient, causing a temporary visual obstruction. This condition might be caused in massive part due to direct injury to the levator muscle and Müller's muscle (myogenic) or a lesion to the cranial nerves (neurogenic), or a combination of the two (mixed).^[13] Although examination revealed good visual acuity from the affected eye, studies say half of the myogenic cases may remain unsatisfactorily resolved. Wait and monitor for up to six months for this type of ptosis to see whether there is any improvement and to allow scar tissue to stabilize.^[14] A few surgical options to manage the ptosis on this patient include preparation for mullerectomy, frontalis sling, and external levator advancement.^{[13],[15]}

In the case of large, full-thickness upper eyelid avulsion, a graft taken from the contralateral tarsus and conjunctiva provides structural support and mucosal lining as replacements for posterior lamellar defects. At the same time, the rotational advancement flap offers adequate blood supply and good cosmetic results to replace the anterior lamella. This technique can be one of the alternatives to the more common Cutler-Beard flap. Choosing this technique is a large area of the avulsion, faster wound healing, and only requires a one-step reconstruction surgery.

However, due to the traumatic ptosis complication of this patient, temporary visual obstruction cannot be avoided due to the traumatic ptosis complication of this patient, which may be caused by injury to the muscle or the nerves. The following management will be decided after careful observation and the stabilization of the scar tissue.

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