

# Modified Fricke Flap for Lower Lid Reconstruction

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**Abstract:** Eyelids are the protective mechanism of the eyes. The upper and lower eyelids have been formed for their specific functions by the nature. Reconstruction techniques have evolved over time and excellent results can now be achieved with a combination of ingenious flaps. The modified Fricke's cheek flap is a variation of classical Fricke flap, as it is designed over the cheek rather than the eyebrow. This prospective article will discuss the advantage of modified Fricke flap. **Objective:** to illustrate a simple and effective technique, for coverage of lower lid. **Material and Method:** A total 16 cases of lower lid defect were reconstructed using modified Fricke flap between September 2019 to December 2021. **Results:** All patients recovered completely without any flap loss, however in knrrrsome patients secondary flap thinning was required. **Conclusion:** Modified Fricke's flap is an easy-to-perform flap, smooth learning curve and often only possible option with acceptable aesthetic results. This procedure can be easily performed on an OPD and daycare basis and in elderly patients who already have skin laxity donor site can be closed easily. The use of this technique is associated with a low complication rate and morbidity.

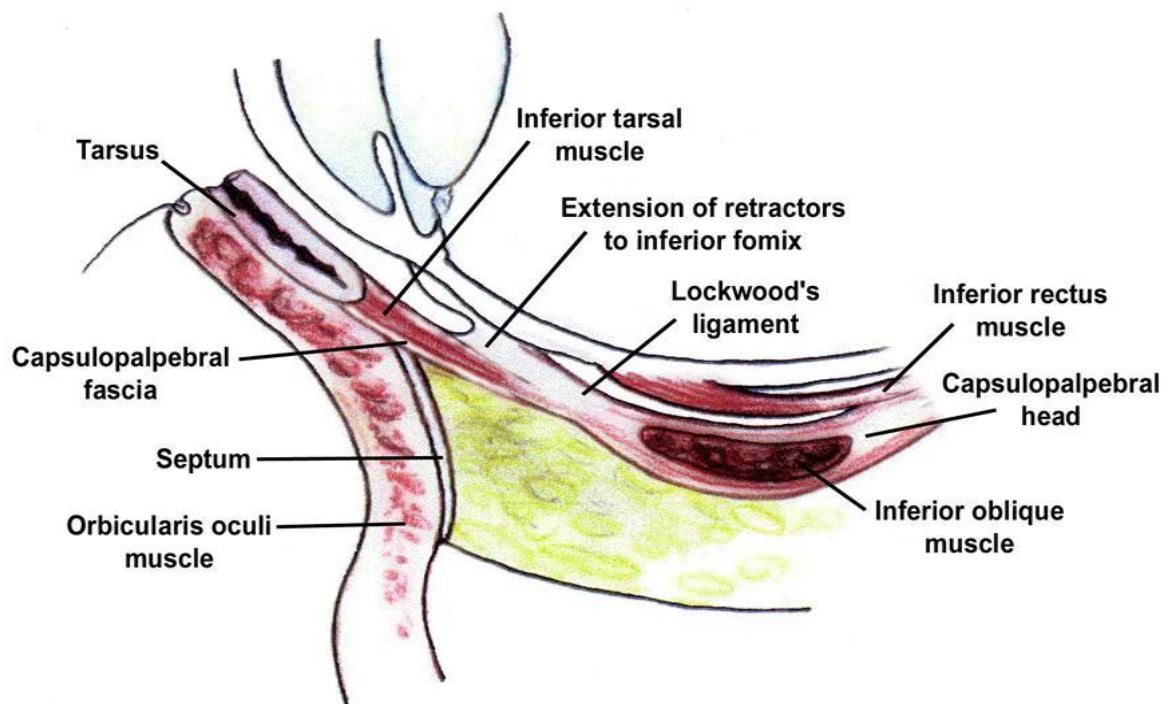
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## 1. Introduction

The eyelids play an important role in protecting the globe. They form a barrier for the eyes against trauma, excessive light, and help in maintaining the tear-corneal film and also aid in pumping the tears toward the nasolacrimal duct system. Another important aspect is the beauty and expression of the face that is provided by the muscles in the lid. To undertake the reconstruction of the eyelids, it is very important to have knowledge of the basic anatomical features of the eyelid, so as to restore it as close as possible

to the presurgical parameters and allow adequate functioning.<sup>1</sup> Eyelids have a complex anatomy. The eyelids are conveniently divided into two anatomical lamellae, the anterior (skin and orbicularis muscle) and the posterior lamellae (tarsal plate and the conjunctiva).<sup>2</sup> (Figure 1)

The lower lid is shorter in height, less mobile, and contributes minimally for palpebral closure. It helps in pushing the tears toward the punctum to help in lacrimal drainage. It has the thinnest skin in the body, which becomes thicker as it approaches the eyebrow and cheek.<sup>3</sup>



## Surgical anatomy of lower eyelid

Reconstruction of Eyelid- many authors have described the unique features of the eyelid anatomy, as well as their approaches, to periorbital reconstruction. Some developed their own techniques and approaches to defects, whereas others only added small details to and slightly modified the

traditional techniques already described for the reconstruction of the complex anatomy of the eyelids.<sup>4</sup> The eyelid defects are encountered in congenital anomalies, trauma, and post excision for neoplasm (benign and

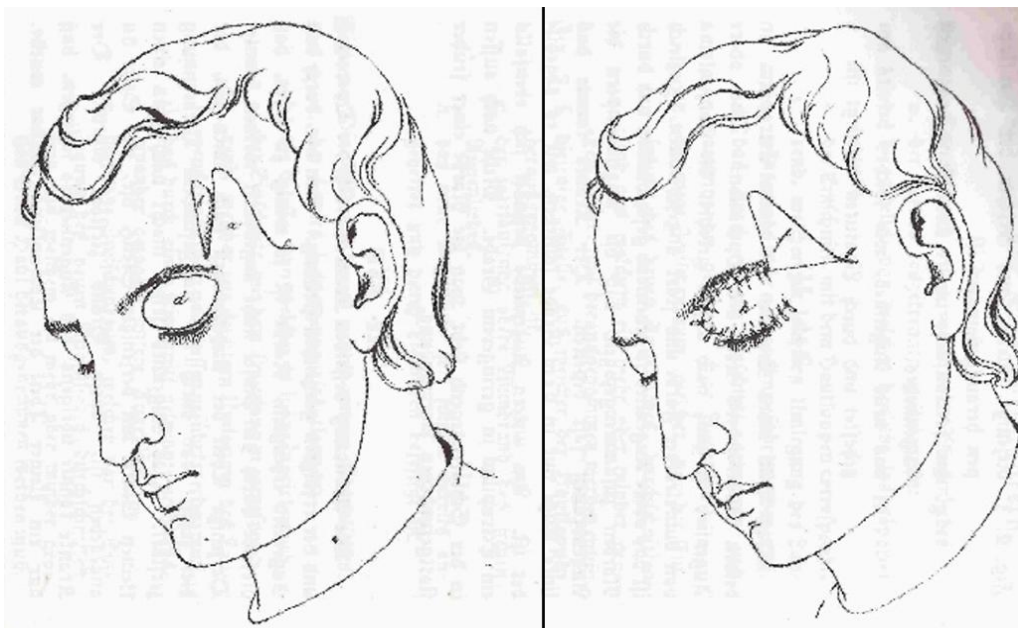
malignant), post burn v and their reconstruction is frequently required.

The main principle of eyelid reconstruction consists of three elements: An outer layer of skin; an inner layer of mucosa; and a semi rigid skeleton interposed between them.<sup>5</sup> One layer should carry its own blood supply and the other can be a free graft. The basic aim of reconstruction is to restore the anatomy and function of eyelids. Optimum results have to be achieved in terms of position, movements, and smooth internal lining capable of producing mucus for lubrication. Color match is important for cosmetic appearance of anterior lamella.

There are different techniques for total or partial lower eyelid reconstruction, such as the method described by Mustarde,

the Hughes transposition flap with its modifications, the eyelid cutaneous rim graft, the hard palate graft covered by an orbicularis oculismyocutaneous advancement flap the Tripiet flap<sup>6-9</sup> and the use of an expanded forehead Fricke flap.<sup>10</sup> All of these techniques are useful when reconstruction of the lower eyelid is required; however, these procedure are not always practically possible.

The preparation of the transposition flaps for the closure of the lower eyelid defects began approximately two centuries prior. Johan Karl Fricke, in 1829, extensively described the treatment of palpebral deformities by using flaps of the periorbital regions. He described the use of a monopedicled flap based on the temporal region in his publications (Figure 2), which became popularly known as the Fricke flap.<sup>11</sup>



**Figure 2:** Fricke flap, published in 1829.

This type of flap can be used in the reconstruction of major defects in the upper or lower eyelid. A lateral base skin flap uses the skin above the eyebrow and is transposed to cover the anterior lamella defect. This flap is raised subcutaneously to avoid deepening in the region, which could cause injury to the temporal branch of the facial nerve.

### Modified Fricke Flap

The modified Fricke's cheek flap is a variation of this classical flap, as it is designed on the cheek rather than over the eyebrow. Use of the cheek donor area has the advantage of providing a greater amount of tissue without causing eyebrow elevation, in contrast to the effects of using the frontal area.

## 2. Material and Method

All the patients provided written informed consent for the use and publication of data for research purposes. Sixteen patients with lower eyelid defect underwent reconstruction using modified Fricke flap, consisting 10 males and 6 females with a mean age of 49 years (range, 17–79 years) between september 2019 to december 2021 (► Table 1). The etiological cause of the lid defect was trauma in 8 patients

and basal cell carcinoma in 4 patients, post burn in 2 cases fibroma in 1 case and melanoma in 1 case.

**Table1**

Study population	16
Male	10(62.5%)
Female	06(37.5%)
Avg. age[ yrs]	49
Etiology	
Trauma	08(50.0%)
BCC	04(25.0%)
Burn	2(12.5%)
Fibroma	01(6.25%)
Melanoma	01(6.25%)

### Surgical technique

The procedure is performed under local anaesthesia or general anaesthesia. The defect is created with care taken to preserve the bulbar conjunctiva and the lower fornix. (Figure 3)



**Figure 3:** A 70 yr old female presented with lower lid basal cell carcinoma (BCC)

The planning in reverse is done with flap dimensions slightly longer and wider than the defect considering skin elastic recoiling. The length-to-width ratio can be kept 3:1 to 4:1 as face has rich vascular supply. [Figure 4]



**Figure 4:** After wide local excision of BCC anterior lamellar defect is created

The flap is then elevated as per the planning and skin surrounding the donor area is undermined to obtain tension free closure of donor site. [Figure 5]



**Figure 5:** Flap is elevated and placed over defect

The first suture is placed between the medial canthus and distal most part of flap in case of complete defect of lid followed by upper and lower margin of defect. Donor site over cheek is easily sutured primarily without any tension as undermining has already been done. [Figure 6]. The repair is done in two layers, the subcutaneous layer is sutured with 4/0 vicryl and the skin margins opposed by simple suture using 5/0 or 6/0 nylon.



**Figure 6:** Flap inseting done and closure of donor site done with continuous suturing.

### 3. Results

All flaps were raised uneventfully without any complications. Specifically, there was no complete or partial flap failure, no loss of skin and no postoperative infections. One patient experienced some postoperative wound inflammation that settled within 2 weeks with conservative management.

All donor sites healed well and no patients experienced problems with hypertrophic scars. Our results showed that donor site morbidity is minimal with this flap. [Figure 7]



**Figure 7:** Healed donor site after suture removal

### 4. Discussion

The most common eyelid skin cancer is basal cell carcinoma (BCC), which occurs more commonly on the lower eyelid. Because of resection, lower eyelid reconstruction is a common problem faced in plastic surgery. Other types of cancers and trauma may also lead to lower eyelid defects. [Figure 8]



**Figure 8:** Post traumatic lower eyelid defect





**Figure 9:** After flap inset and donor site closure.

The modified Fricke's cheek flap is different from the classical Fricke flap, as it is raised over cheek rather than over the forehead. The advantages of modified flap is that the cheek provides greater amount of tissue adjacent to the defect which leads to tension free closure at donor site, color match is absolute and it also prevents scarring leading to ectropion.



**Figure 10:** A 40yr old patient operated for lower lid trauma with conventional Fricke flap leading to raised eyebrow and aesthetically unpleasing appearance

Modified Fricke flap is for anterior lamella reconstruction, if the lid defect is full thickness then the posterior lamella can be reconstructed from buccal mucosa, septal mucosa or periosteum flap.<sup>12</sup> Flap thinning can be done in secondary procedure for better cosmetic results. While Fricke flap causes elevation of upper eyelid modified Fricke flap has no such effects leading to aesthetically pleasing results. Post operatively donor site is not visible in frontal profile and falls along natural crease (crows feet) while in Fricke flap suture line is quite evident. [Figure 11]



**Figure 11:** A 60yr male patient presented with fibroma involving lateral canthus and lower lid for which modified Fricke flap was done. In post op picture donor site is not visible in frontal view.

## 5. Conclusion

Multiple options are available for reconstruction of the lower eyelid and one has to choose the procedure which best suits the lid defect. Consideration has to be given to the involved area, tissue loss and skill of the surgeon. The aesthetic appearance and function is of profound importance. The modified Fricke's flap based on the cheek is easy to perform with a smooth learning curve. This flap is able to provide a functional lower eyelid to a person in whom it was lost due to any ailment or trauma. (figure 12) Moreover, it's a simple technique and does not require any special setup with a very low complication rate.



**Figure 12:** A 80 yr old female presented with lower lid trauma, posterior lamella was intact, for anterior lamella after proper planning modified Fricke flap was done with good aesthetic and functional outcome.

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