ORIGINAL ARTICLE

TENZEL ROTATIONAL FLAP IN UPPER AND LOWER LID RECONSTRUCTION IN TERTIARY CARE HOSPITAL OF KARACHI PAKISTAN: A PROSPECTIVE INTERVENTIONAL STUDY

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Background: Reconstruction of the lids is a significant challenge for ocular plastic surgeons as it requires the greatest functional and cosmetic outcomes. This study aimed to share the experience of Tenzel rotational flap in upper and lower lid reconstruction of anterior lamella at a tertiary eye care hospital of Karachi, Pakistan. **Methods:** 10 patients with upper and lower eyelid defects over a period of 6 months were a part of this prospective interventional clinical study. The examination on the subject was performed at tertiary care hospital of Karachi, Pakistan after ethical approval. Pre and post operation evaluation LPS (Levator palpebrae superioris) action MRD-1 (Margin Reflex Distance-1) values central vertical Palpebral Fissure Height (PFH) were recorded. Data was entered and analyzed on SPSS version 23.0. **Results:** For the upper eyelid the preoperative measurements of MRD-1, LPS action, central palpebral aperture were -1.6±1.63 mm, 4.33±1.21 mm and 4.33±1.33 respectively. The postoperative measurements of these parameters were 3.83±0.25 mm, 13.16±1.17 mm and 10.83±0.68 mm respectively. For the lower eyelid the Mean±SD of MRD-1, LPS action, central palpebral aperture preoperatively was 3.62±0.25 mm, 12.75±0.50 mm and 10.75±0.95 mm respectively. Postoperative values of MRD-1, LPS action, central palpebral aperture before operation were 3.83±0.25 mm, 12.75±0.50 mm and 10.75±0.95 mm respectively. The mean incision length in the upper and lower eyelid was 8.50±0.83 and 9.50±0.91 respectively. **Conclusion:** Tenzel rotational flap not only helps to heal the upper and lower eyelids but also there is no further requirement of additional surgery for posterior lamella. The study concluded that this technique provides both cosmetically and functionally aesthetics outcomes.

Keywords: Tenzel Rotational Flap; Reconstruction; Upper and lower Eyelid; Anterior lamella; Cosmetic Outcomes

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INTRODUCTION

Due to the complexity of the eyelid anatomy, functional limitations, and cosmetic concerns, reconstructing eyelid deformities brought on by any of the reasons including trauma, tumors, congenital conditions and burn continues to be a difficult task in plastic and reconstructive surgery.[1] The eyelid defect that cannot be closed directly but needs a local flap for closure. Flaps are essentially pieces of tissue that are shifted from one location to another while maintaining the blood supply. However, to determine the first step whether the abnormality affects the anterior, posterior, or both lamellae.[2]

The principal objectives of eyelid reconstruction are to preserve ocular surface homeostasis and prevent vision loss, restore eyelid structures and functions, and provide an attractive appearance with minimal surgical morbidity. Depending mostly on the flexibility of the skin, defects that make up less than 25% of the lid can be closed. However, free tissue grafts or flaps are typically required for reconstruction when abnormalities cover more than 20% to 30% of the eyelid.[3,4]

The Tenzel flap can be utilized to fix abnormalities involving 1/2–2/3 of the lower or upper eyelid in a single step procedure but also has a good color match and minimal donor site morbidity.[2,5] The Tenzel flap can provide a continuous full-thickness eyelid section along with a lash line and is straightforward and effective, although it is still susceptible to cicatricial ectropion.[6] The present study was aimed to share the experience of upper and lower lid reconstruction surgery using Tenzel flap

technique at Tertiary Care Hospital of Karachi, Pakistan.

MATERIAL AND METHODS

The present prospective interventional study was carried out during of six months' timeline was January 2023 to June 2023 after Ethical approval from Ethics Committee of Layton Rahmatullah Benevolent Trust (LRBT), a tertiary eye care hospital in Karachi, Pakistan. The study included 10 patients that had eyelid defect due to any reason like trauma, burn, congenital conditions etc. These patients will be included after their written consent.

The patient was given general anaesthesia for this surgery. A semicircular flap was constructed by a full-thickness skin incision began at the lateral canthus. For the upper eyelid this flap arched the convexity downward and vice versa for lower eyelid. Tenzel's lower eyelid flap is incised from the lateral canthus, with arcs running temporally upward in a semicircular manner and then downward to the tragus height. It never transcends the line that connects the brow to the upper edge of the tragus. In order to form a skin and muscle flap, the lateral canthal ligament was severed near to the lateral orbital rim. The skin, muscle, and underlying bone were used to prepare the flap at the temporal artery's base so that it could migrate. After the flap was dissected, lateral canthotomy and cantholysis were carried out simultaneously to let the flap move and allow medial rotation. Muscle and soft tissue were used to close major defect in the two layers, followed by skin. To prevent the skin muscle flap from returning to its original location, it was secured with 4–0 mm prolene sutures at the lateral orbital border above the zygomatic bone. The new lateral canthus was produced by joining deep fibres of the orbicularis oculi to periosteum at the lateral orbital border. Because it had the highest suture line tension, the initial suture was formed at the tarsal plate. Skin sutures were then used to reinforce the cut edge of the eyelid. Following that, the incision was closed with interrupted 5–0 mm polyglactin, which postponed the use of absorbable sutures. Similar repairs were made to the underlying skin defect using 5–0 mm black silk. It should be observed that the posterior lamella was not attempted to be sutured or approximated in any way. The smooth conjunctiva covering and posterior lamella were found to form naturally without the need for either creation or reconstruction.

Levator palpebrae superioris (LPS) action, Margin Reflex Distance-1 (MRD-1), eyelid closure, central vertical palpebral fissure height, upper eyelid created defect was assessed in this study pre and post operation. The created defect in study was calculated and expressed in percentage. Patients were asked for follow up checkup after 6 months. The analysis of statistics was performed with the help of Statistical Package for Social Sciences (SPSS) version 23.0.

RESULTS

The dominancy of male was found in the eyelid defects in the study. Out of 10 patients, 8 were males and 2 were females (Figure 1) and the distribution of the age shows that majority of the participants were in the age range between 40–60 years (n=6). The upper eyelid defect was found in 60% of patients (n=6) and lower eyelid defect was found in 40% of patients (n= 4).

The clinical features of eyelids defects pre and post operation is shown in Table 1 and it is depicted in Figure 4 that shows pre and post features of the procedure. It is seen that for the upper eyelid the preoperative measurements of MRD-1, LPS action, central palpebral aperture were -1.6±1.63 mm, 4.33±1.21 mm and 4.33±1.33 respectively. The postoperative measurements of these parameters in the upper eyelid was observed as Mean±SD of MRD-1, LPS action, central palpebral aperture was 3.83±0.25 mm, 13.16±1.17 mm and 10.83±0.68 mm respectively.

Similarly, for the lower eyelid the Mean±SD of MRD-1, LPS action, central palpebral aperture before operation was 3.62±0.25 mm, 12.75±0.50 mm and 10.75±0.95 mm respectively. Postoperatively Mean±SD of MRD-1, LPS action, central palpebral aperture before operation was observed as 3.83±0.25 mm, 12.75±0.50 mm and 10.75±0.95 mm respectively. The mean of incision length in upper and lower eyelid was 8.50±0.83 mm and 9.50±0.91 respectively.

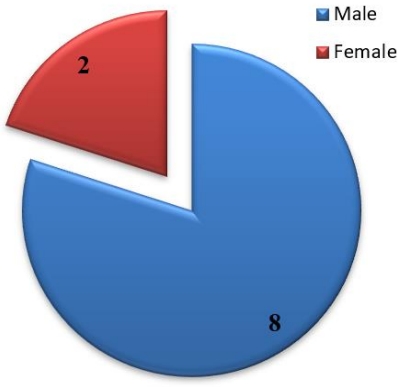

Figure-1: Distribution of gender among study participants

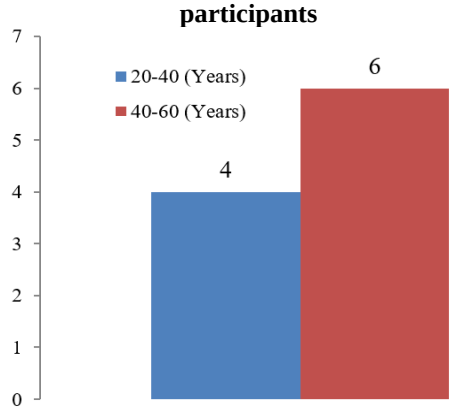

Figure-2: Distribution of age among study participants

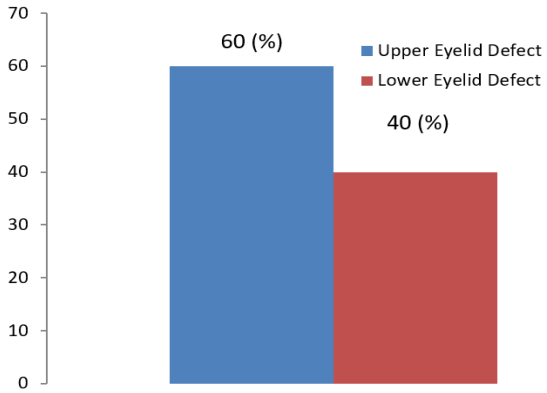

Figure 3: Occurrence of lower and upper eyelid defect

Table-1: Clinical features pre and post operation

MRD-1 Pre op. (mm)	MRD-1 Post op. after 6 months (mm)	LPS Action Pre op. (mm)	LPS Action Post op. after 6 months (mm)	Central Vertical fissure height Pre op. (mm)	Central Vertical fissure height after 6 months post op. (mm)	Length of incision (mm)
Upper lid tumours in Tenzel rotational flap						
+1	3.5	6	14	6	10.5	8.5
-2	4	3	12	4	11	9
-2	4	4	13	4	10	9.5
-1	3.5	5	12	5	10.5	8.5
-2	4	3	13	4	11	8.5
-4	4	5	15	3	12	7
Lower lid tumors in Tenzel rotational flap						
3.5	4	14	14	12	12	10.5
3.5	4	12	12	8	10	10
3.5	4	13	13	7	11	9
4	4.5	12	12	8	10	8.5

MRD-1: Margin Reflex Distance-1. LPS: Levator palpebrae superioris. Op.: Operation

Figure 4: Features of the procedure and recovery of the patient. A and B: After Tenzel rotational flap surgery. C and D: At 3 and 6 months follow up

DISCUSSION

In the present study we shared the experience of Tenzel rotational flap technique for the reconstruction of upper and lower eyelid defects in tertiary care hospital of Karachi, Pakistan. The study was conducted in period of six months from January 2023 till June 2023 and 10 surgical procedures were reported in this duration. In our study most of the patients were male in the age range of 40–60 years. This was also reported previously that the ratio of male patients was higher than females in eyelid defects.[7] In the current study upper lid defects was found in 60% of cases while lower lid was involved in 40% of cases. The involvement of upper lid was reported in another study by Mandal *et al*. (2021) in which it was shown that the ration of upper: low lid defect was 2.33:1.[2] The experience of Tenzel rotational flap technique for reconstruction of upper and lower eyelid highlights the excellent functional and cosmetic result of this technique. An article on the semicircular flap technique for reconstructing eyelids was published in 1978 by Tenzel RR. In that article a rotational flap surgery was discussed. With the follow-up duration of 6 months to 6 years, the surgery has been used to reconstruct 36 lower eyelids and 5 upper eyelids in 41 patients, with satisfying short and long-term cosmetic

and functional outcomes.[8] In our study, similar functional and aesthetic results were seen over a follow-up period of 6 months.

Due to the intricate architecture of the eyelids, reconstructing eyelid abnormalities is challenging for oculoplastic surgeons who strive for both a cosmetic and functional result. Conjunctivitis, keratitis, entropion, ectropion, and an unpleasant appearance are just a few of the major issues that improper reconstruction can result in. Compared to the lower eyelid, the upper eyelid defect has a higher rate of complications.[9] Flaps have the advantage of having their own blood supply, which speeds up healing. After transfer, the skin flaps contract less than skin grafts. The same colour, texture, and surface feature are supplied by them. Adnexal structures have a higher probability of surviving, which helps them blend in even more with the surrounding skin. At a remote location, flaps prevent extra surgery.[10,11] The minor elasticity of the skin makes them easily mobilizable. Flaps can vary in depth, but skin grafts must be at least a certain thickness to survive. Finally, the muscle and connective tissue beneath the flaps provide them with nutrition. No particular blood channel is required for nutrition. The ability to retain muscular function gives myocutaneous flaps an extra muscular and vascular component.[12,13] The musculocutaneous flap used in Tenzel's semicircular rotational flap emerged from the cheek and revolved around the lateral canthus with an arch superiorly. It is applied to lower eyelid abnormalities that range from 40–60%.[14]

The clinical features of upper and lower lid pre and post operation shows that for the upper eyelid the preoperative measurements of MRD-1, LPS action, central palpebral aperture were -1.6±1.63 mm, 4.33±1.21 mm and 4.33±1.33 respectively. The postoperative measurements of these parameters in the upper eyelid was observed as Mean±SD of MRD-1, LPS action, central palpebral aperture was 3.83±0.25 mm, 13.16±1.17 mm and 10.83±0.68 mm respectively. Similarly, for the lower eyelid the Mean±SD of MRD-1, LPS action, central palpebral aperture before operation was 3.62±0.25 mm, 12.75±0.50 mm and 10.75±0.95 mm respectively. Postoperatively Mean±SD of MRD-1, LPS action, central palpebral aperture before operation was observed as 3.83±0.25 mm, 12.75±0.50 mm and 10.75±0.95 mm respectively. The mean of incision length in upper and lower eyelid was 8.50±0.83 mm and 9.50±0.91 respectively.

According to the results of our investigation, Tenzel's rotational flap surgery can successfully rebuild eyelid abnormalities that vary from 40–66.70% in both eyelids. Additionally, it is a one-stage process. For the both upper and lower lids reconstruction, there is no need to provide posterior lamella support. Traditionally, the reconstruction was done by another mucosal membrane, hard palate or nasal mucosa but this may cause abnormalities in cornea.[15] As per the experience of the present study the single stage local flaps employed in Tenzel's reconstructive surgery is a gold standard choice for eyelids defect because they are highly reliable and produced good outcomes as mentioned in a previous study.[16] The essential features of the present interventional investigation were appropriate mobilization of the skin and muscle flap to avoid tension on the suture line of the newly healed flap. Furthermore, no posterior lamella reconstruction was performed in any of the case of the study.

CONCLUSION

The study concluded that Tenzel rotational flap technique provides aesthetically functional and cosmetic outcomes and the there is no need of additional surgery for posterior lamella as it heals automatically.

Conflict of Interest: There is no conflict of interest
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AUTHORS' CONTRIBUTION

FA: Concept, write-up, proofreading. FA, ZK, MTHK: Data collection, data analysis, data interpretation.

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