Glabellar superciliary bilobed flap for reconstruction of large medial canthus region defect

Ayman M. Abdelmofeed MD

Department of General Surgery, Plastic Surgery Unit, Benha Faculty of Medicine, Benha University, Egypt

Corresponding author, Ayman M. Abdelmofeed

Assistant professor of plastic surgery at Benha Faculty of Medicine, Benha university, Egypt

Email: aymanabdelmofeed@yahoo.com

ayman.hassan@fmed.bu.edu.eg

ORCID ID: https://orcid.org/0000-0002-9963-2539

Mobile: 01006795649

Address: Farid Nada Street, Benha city, qaliobia, Egypt

Keywords. Medial canthus, Glabellar flap, superciliary flap

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Abstract

Aim. To describe a series of patients who have undergone a medial canthal reconstruction with a glabellar superciliary bilobed flap.

Methods. A series of 30 patients with medial canthal defects after excision of medial canthal tumour who underwent reconstruction using a glabellar-superciliary bilobed flap of adjoining skin and subcutaneous tissue. 18 cases were performed under local anaesthesia. The remaining 12 cases were combined with major lid reconstruction and performed under general anaesthesia. Complete closure of the defect, aesthetic outcome, complications, and re-operations were all used as outcome measures.

Results. Primary closure of the donor site was achieved in all cases without wound dehiscence. In all cases the cosmetic appearance was highly satisfactory to the surgeons and patients. There were no intraoperative complications.

Conclusions. The glabellar superciliary bilobed flap is an effective, quick, simple and single stage technique for medial canthal region reconstruction. It provides excellent cosmesis and is associated with minimal complications. It can be modified according to the nature of the periorbital skin, location, size, and depth of the defect.

Keywords. Medial canthus, Glabellar flap, superciliary flap

Level of evidence: Level IV, therapeutic study

Introduction

Due to increased ultraviolet light exposure, the medial canthal region is often a suitable place for the formation of malignant skin tumours, the most prevalent of which is basal
cell carcinoma (80%), followed by squamous cell carcinoma. The resultant defect, depending on its size, location, depth, and patient desire, can be closed using a variety of procedures. Laissez-faire (secondary intention), full thickness skin grafting, and varied local flaps are some of these options. Limberg was the first to describe the rhomboid flap in 1946. It has been used to treat periocular skin defects. (1)

Given its esthetical importance and close interaction with the eye and lacrimal apparatus, the medial eyelid/canthal area is an essential anatomical region. The main goal of any eyelid/canthal defect reconstruction is to achieve a good aesthetic and functional outcome while maintaining the integrity of the lacrimal apparatus and corneal protection. (2, 3, 4) The removal of the medial canthal tumour leaves an aesthetically unattractive scar. As a result, it's critical that a careful surgery is planned for adequate tumour excision as well as to minimize the functional and cosmetic consequences of surgery in order to restore the colour, continuity, consistency, and depth of the dermal tissue, this is best accomplished with the assistance of a flap that is contiguous to the defect, such as a glabellar flap transposition, which matches the tissue features and retains a good vascular supply, which is critical for the flap's sustainability. (5)

The glabellar flap and its variations have been frequently utilized to treat nose deformities and medial canthal regions. It provides a considerable amount of donor tissue for massive, complex medial eyelid/canthal abnormalities. The supra trochlear artery serves as the basis for this axially designed flap. The biggest downside is the flap's thickness, which may necessitate debulking and thinning, putting the flap's vascularity at risk and leading to flap failure. (6)
In 85 to 90 percent of cases, the supratrochlear artery branches from the ophthalmic artery, but in 10 to 15% of cases, the supratrochlear and supraorbital arteries arise as a single branch from the ophthalmic artery and then separate into supratrochlear and supraorbital arteries. (7)

Supratrochlear artery anastomoses with the branches of the supraorbital and superficial temporal artery, both ipsilateral and contralateral, to form a rich vascular network. (7, 8)

The aim of the study is to evaluate the versatility of glabellar superciliary bilobed flap for reconstruction of large medial canthus region defect and what is the benefit of adding the superciliary part to the glabellar flap in this issue.

**Patients and methods**

This study included 30 consecutive patients who underwent medial canthal region reconstruction with a glabellar superciliary bilobed flap at plastic unit in the general surgery department of Benha University Hospital from January 2019 to January 2022 after obtaining approval from the local ethical committee, as laid down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards, and after fully informed written consents from patients as regard photographing and contribution in the study, ages of patients ranging from 55 to 65 years with mean age 59.3, 25 males and 5 females. Each patient’s data was collected and documented including demographic information **Table (1)**, co-morbidities, size of the lesion, duration of the lesion, location of the lesion, size of the resulting defect, eyelid opening, presence of eyelid deformity and aesthetic symmetry. Patients who underwent previous treatments such as radiation, cryotherapy or surgery also cases in which the lacrimal punctum was
involved or metastasis found were excluded from the study. All patients had undergone surgical excision of medial canthal region tumour from which 22 cases with basal cell carcinoma and 8 cases with squamous cell carcinoma, all patients had biopsy-proven pathology prior to surgery, guided by intraoperative pathological analysis to secure the safety clear margin of excision and reconstruction of the medial canthal region defect with glabellar superciliary bilobed flap. 18 cases were performed under local anaesthesia and 12 cases were performed under general anaesthesia because of extensive defects involving the lower lid as well as the medial canthus. Patients were treated on a day case basis except where general anaesthesia needed, Patients were followed for a period of up to six months post-operative, the outcome of surgery evaluated for versatility, accessibility, complete reconstruction of the defect, cosmetic result, complications, re-operations, any recurrence, epiphora, and wound related problems were noted.

**SURGICAL TECHNIQUE**

Under complete aseptic measures, surgical site was marked by a sterile marker as in diagram **Fig (1)**, and with the aid of handheld doppler to localize supratrochlear artery, subcutaneous injection of bupivacaine 0.5% with 1:200 000 adrenaline and suspected tumour along with wide clear margin (3-4 mm from the tumor edge) was excised and sent for histopathological analysis to validate the presence of margin clarity. The size, location, depth of the tissue deficiency and integrity of the lacrimal duct arrangement was assessed.

The bilobed flap is marked on the skin, The flap boundaries are cut with a scalpel, Flaps were dissected, and mobilized with scissors beneath the flap in the subcutaneous level in the superciliary flap which is the primary flap to be thin enough to resemble the skin of
the defect area but the glabeller flap which is the secondary flap was dissected in subperiosteal level to ensure that the stem of the supratrochlear vessels were included in the flap.

The angle between the 2 lobes varies from $30^\circ$ to $90^\circ$. The primary lobe (superciliary) diameter should be similar to the vertical length of the defect. The secondary lobe (glabellar) is half the size of the primary. The axis of rotation is closer to the first than the second lobe, thus introducing an element of advancement to the rotation. The skin and subcutaneous tissue on the dorsum of the nose are undermined widely.

The flap is rotated and positioned in the defect. Three deep polyglycolic-acid sutures are placed on the undersurface of the flaps anchoring it to periosteum to reform the concave contour of the medial canthus and to position the flap with minimal tension, a subcutaneous drain was applied and the skin margins are sutured with interrupted 6/0 polypropylene. The glabellar flap repositioned in the defect of the superciliary flap and its donor site closed primary. When the medial palpebral ligament has been excised, periosteal flaps can be used to reattach the cut ends of the tarsal plates. A periosteal flap will pull the lids medially and helps reduce the size of the defect.

Local antibiotic ointment applied to the area then it was padded with ocular dressing to attain sufficient compression to prevent formation of hematomas and help to establish the shape of medial canthal region. Patients were called for follow-up for the removal of sutures following healing of the sutured skin margins. Topical antibiotic ointment and systemic antibiotic were prescribed twice daily for 7 days with digital pressing of the flap until removal of the sutures for a duration of minimum two months.
The results of the procedure was evaluated for complete reconstruction of the defect, cosmetic result, complications, re-operations, any recurrence, epiphora, and wound related problems were noted. Also patient satisfaction was evaluated using Likert scale regarding shape, irregularities and scars.

Statistical analysis: Data were analyzed by Statistical Package of Social Science (SPSS), software version 22.0 (SPSS Inc., 2013). Continuous data were expressed as Mean ± SD, while the nominal data were presented by the frequency and percentage.

Results
There were 30 patients. Mean age of the patients was 59.3 ± 2.76 years. 25 (83.3%) patients were males and 5 (16.7%) were females, 18 cases were performed under local anaesthesia and 12 cases were performed under general anaesthesia because of extensive defects involving the lower lid as well as the medial canthus. 22 cases with basal cell carcinoma and 8 cases with squamous cell carcinoma, all patients had biopsy-proven
pathology prior to surgery. Treated by excision of the tumour by safety clear margin guided by intraoperative pathology and reconstructed with bilobed glabellar superciliary flap in combination with upper eyelid and cheek advancement in some cases, the mean follow-up period was 6 months. **Fig (2, 3, 4, 5)**

The mean size of the tumor was $12 \times 8$ mm; mean size of the defect was $20 \times 18$ mm.

**Table (1)**

Primary closure of the donor site was achieved in all cases without wound dehiscence. In all cases the cosmetic appearance was highly satisfactory to the surgeons and patients. There were no intraoperative complications. Webbing of the medial upper lid area was present in two patients who had a large defect of the medial part of the upper lid. The webbing was reduced with vigorous massage and was not cosmetically problematic in either patient. There were no re-operations within the follow up period.

All patients of this study were satisfied with the cosmetic outcome with complete lid closure and formation of an acceptable medial canthal contour as expressed from likert scale of patient satisfaction.

During the course of follow-up, 2 patients (6.6%) developed misdirection of lashes medially, which was treated by electrolysis. one patient (3.3%) developed epiphora as a consequence of tumor excision which compromised the lacrimal drainage system, the patient complained of watering and further treatment with dacryocystorhinostomy was planned 6 months later. 2 patients developed lower margin of superciliary flap infections controlled with antibiotics, on case developed dog ear deformity at the angle of glabellar flap repaired 6 months later.
Table (1) size of the tumour and the resulting defect

<table>
<thead>
<tr>
<th>case</th>
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<th>Size of Defect (mm)</th>
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<td>electrolysis</td>
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<td>Cataract</td>
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<td>18 × 18</td>
<td>misdirection of lashes</td>
<td>electrolysis</td>
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DCR (dacryocystorhinostomy)
**Fig (2)** preoperative view of ulcerating basal cell carcinoma of the medial canthal region of the left eye and adjacent parts of the lower eyelid and nasal side.

**Fig (3)** marking of the glabellar-superciliary biloced flaps based on the right supratrochlear vessels.

**Fig (4)** after tumour excision and intraoperative dissection of the two flaps just before inseting.

**Fig (5)** late view of the flap with complete covering of the area.
DISCUSSION

Approximately 40% of all soft tissue tumours in the orbital region are malignant tumours around the inner canthus, chronic UV exposure, sluggish tumour growth, resemblance to benign lesions, as well as unawareness, failure to seek medical counsel in a timely manner, are all factors that contribute to a delay in presentation and diagnosis. (9)

Sokol et al reported a greater preponderance of medial canthal tumour in the male gender, which was also found in present study. (10)

A full-thickness skin graft may be visually unattractive because insufficient volume filling of the defect; the danger of colour mismatch; graft shrinkage with distortion by webbing or banding; necrosis from compromised local blood supply; and hyperpigmentation or hypopigmentation over time, flaps are popular. (11,12)

In contrast to our flap, which is an axial flap with constant blood supply, the rhomboid flap is a flap of skin and subcutaneous tissue that is rotated around a pivot point into a neighbouring defect. (13)

The glabellar flap, according to Timm A et al, might be used to repair deformities measuring up to 30 x 25 mm. (14)

The bilobed flap was initially made up of two identically sized lobes inclined at 90° and 180° to the defect location. (15)

Later, McGregor and Soutar (16) distinguished two types of bilobed flaps: type 1 with a centre of rotation in the second lobe, which is primarily a rotational flap, and type 2 with a centre of rotation between the two lobes, which is both a rotational and advancement
flap. The bilobed flap used in this series was type 2, with a large first lobe and a smaller second lobe, composed of skin and subcutaneous tissue rotated (and partially advanced) into the neighbouring defect. By ensuring that the breadth of the initial lobe is the same, the amount of tissue removed, and by defining the rotational angle of the first lobe with the second 90° to 100° from the defect, this bilobed flap has its own blood supply; therefore, there is rapid healing and a low risk of necrosis and infection.

Three zones were created in the medial canthal region (zone 1 being just above the medial canthal tendon; zone 2, centered on it; and zone 3, just below it) If the defect was mostly in zone 1 after resection, the surgeon might use a combination of upper eyelid advancement flaps, an inverted V-Y flap for the glabellar region, and a transnasal bilobed flap for the more inferior half. If the defect is mostly in zone 3, a bilobed flap can be paired with cheek advancement or a lower eyelid advancement flap, as in one of our cases. (17)

In this study we performed the glabellar superciliary bilobed flap for reconstruction of large medial canthus region defect after tumour excision from this region, done after wide clear margin tumor excision by easy rotation manner without any tension which may comprise the vascular pedicle if the glabellar flap rotated only so the advantages of combining the superciliary part ensure easy rotation, good blood supply by the connection of supratrochlear vessel on both sides by medial communicating vessel, the superciliary part can be harvested in thin fashion to resemble the original tissue of the medial canthus area without need for second debulking stage as the original glabellar flap, also no lymphedema.
which can occur after forehead flap separation, as our bilobed flap has adequate skin bridge with intact lymphatics, short operation time, less invasive with less obvious scarring as compared to a free skin graft. The cosmetic outcome is excellent since the donor sites is concealed in a stress-free dermal tension line and becomes inconspicuous with time.

At the end of six months follow-up period in this study, all the patients were satisfied with the cosmetic result having no inconvenience with the eyelid motility and complete lid closure. Misdirection of lashes medially was experienced by one patient who was treated by electrolysis. Rafael et al noted ectropion in his study. (18)

**CONCLUSION**

The glabellar superciliary bilobed flap is a versatile, simple and reliable that should be considered when a defect in the medial eyelid/canthal area is found. Its ease to harvest and minimal donor site morbidity without second stage or lymphedema and with satisfactory aesthetic and functional results. Limitation of the study was small number of patients and only six months follow-up.

**Conflict of Interest**

No conflicts of interest

**Ethics statement/confirmation of patient permission**

All procedures performed in studies were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Informed consent was obtained
from all individual participants included in the study. The participant has consented to the submission of the data to the journal.

References


