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Case Report

Large full thickness medial canthal reconstruction: a report of two cases and review of literature

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Abstract The reconstruction of the upper eyelid with medial canthal involvement post extensive removal of malignant tumour remains a challenge. Proper eyelid reconstruction is necessary to re-establish anatomic integrity, restoration of its functions and to maintain the best cosmetic appearance. These case reports illustrate an alternative reconstructive technique for large upper eyelid full thickness defect with medial canthal involvement. Two cases of upper eyelid tumours involving medial canthal region underwent staged reconstruction by glabellar flap advancement and reconstruction of the posterior lamellar with autologous graft using buccal mucosa and ear cartilage. The posterior lamellar graft and flap survived without any complication except for mild eyelid margin notching in one of the two cases. The staged reconstruction with glabellar flap advancement provides adequate defect coverage, excellent blood supply, maintains eyebrow contour and function of the eyelid. The flap also perfectly matches the surrounding tissue with minimal donor site morbidity.

Keywords: Full thickness eyelid defects, medial canthal defect, upper eyelid reconstruction.

Introduction

The eyelid defect reconstruction ranges from a simple repair to the integration of multiple procedures to restore the functional anatomy of the periorbital region (Sassoon and Codner, 1999). Both partial and full thickness defect can be closed by either direct closure or using flap or graft. However, in full thickness defect, where direct closure is impossible, the combination of flap and graft is then needed. The choice of surgical techniques depends on the size of the defect, position and status of the surrounding tissue (Collin and Welham, 1989). There are limited options for reconstruction of large upper eyelid defect with medial canthal involvement.

Eyebrows, eyelids and medial canthal play a significant role in facial expression (Bowman *et al.*, 2003). Thus, they are considered as an important aesthetic unit of the face and poses major challenging reconstruction dilemmas. The surgical reconstruction needs to provide excellent cosmetic outcome, to restore the anatomy, preserves the function and provides protection to the ocular structures.

There are many factors which need to be considered in planning for reconstruction of large upper eyelid defect. The availability of similar thin eyelid skin from adjacent area and the presence of the concavity of the defect are among the main challenge in medial canthal defect repair (Behroozan and Goldberg, 2005).

Skin flap is often superior to graft when function and cosmesis are being considered (Bowman *et al.*, 2003). The availability of adequate blood supply is critical to prolong the survival of the flap. Skin flap has the advantages as it bring its own blood supply, and less likely to fail but technically more difficult to perform. Excessive tension to the free margins is also important to avoid malposition of the eyelid that can leads to ectropion and eyelid notching. Therefore, in order to minimize the free margins displacement, "secondary movement" which occurs opposite to the primary movement of the flap needs to be anticipated (Bowman *et al.*, 2003).

Reconstruction of large medial canthal defect using glabellar flaps are the most widely used technique (Sciscio and Joshi, 2001). It is technically easy. Glabellar flap is excellent for large and deep defect as the skin around this area is thick with good blood supply. We report two cases of large upper eyelid malignancies involving medial part of the eye, which were successfully reconstructed using the glabellar advancement flap and posterior lamellar reconstruction with autologous graft using buccal mucosa and ear cartilage.

Materials and methods

Case Reports

Case 1:

A 78-year-old South-east Asian Malay lady with euthyroid multinodular goitre presented with painless progressive right upper eyelid medial canthal swelling for five months duration. On examination, the best corrected visual acuity in both eyes was 6/18. There was yellowish upper eyelid fungating mass measuring 2cm × 2cm causing secondary ectropion. The lesion extended to the eyelid margin and medial canthal area (Figure 1a). There was immature cataract in both eyes. There was no involvement of other parts of the eye and the left eye was sound. Systemic examination revealed multinodular goiter and fine needle aspiration cytology revealed colloid goitre. There was no organomegaly and lymph nodes were not palpable. Computed tomography (CT) scan of the orbit showed right upper eyelid soft tissue mass without extraocular extension. Excision biopsy was performed prior to surgical excision which revealed sebaceous cell carcinoma (Figure 2a).

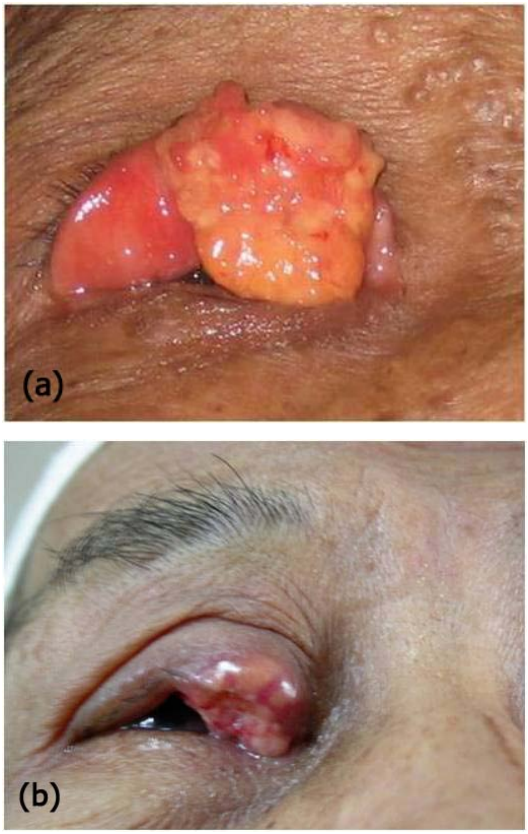

Figure 1 Fungating mass at right upper eyelid on presentation, a) Case 1 and b) Case 2.

Case 2:

A 73-year-old South-east Asian Malay gentleman presented with painless and progressive right upper eyelid swelling of two months duration. It started as a 'stye like lesion' and later the growth progressed towards the medial side. He was diagnosed as tonsillar non-Hodgkin lymphoma on remission after radiotherapy. He also had ischaemic heart disease and hypertension diagnosed many years ago. On examination, the best corrected visual acuity was 6/24 and 6/36 over the right and left eye respectively. The right eye examination revealed a multilobulated

mass, firm in consistency, measured 2cm X 1cm at the medial aspect of the upper eyelid. The eyelid margin and medial canthal were also involved (Figure 1b). There was bilateral immature cataract. Multiple dry drusens were seen disseminated on the retina but not involving the macula. There was no lymphadenopathy. The intraoperative biopsy revealed malignant sweat gland tumour, suggestive of malignant eccrine spiradenoma (Figure 2b). CT scan of the orbit revealed right upper eyelid soft tissue mass without extraocular extension.

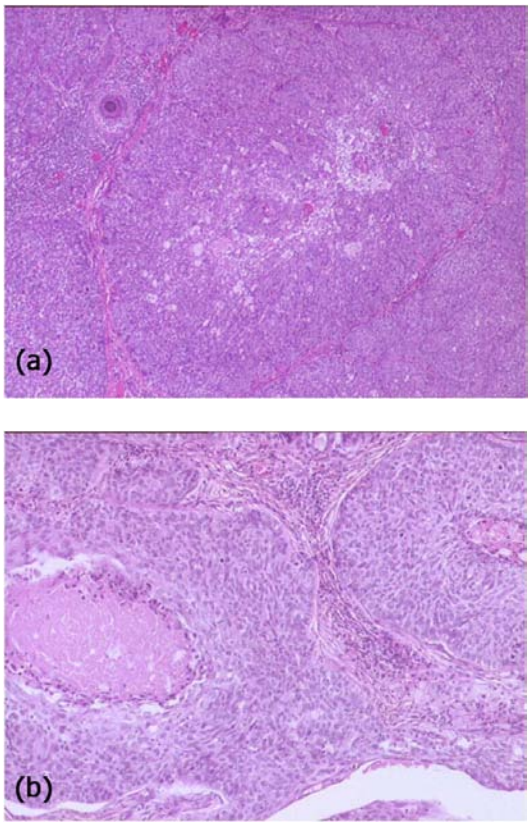

Figure 2 Histopathological examination of the right upper eyelid mass. a) Sebaceous cell carcinoma: Nests of tumour cells showed sebaceous differentiation towards the center (x5, H&E stain). b) Malignant eccrine spiradenoma: Section shows tumour tissue composed of lobules of pleomorphic hyperchromatic cells separated by fibrous tissue infiltrated by lymphocytes. Necrotic material is seen in the center (x10, H&E stain).

Surgical techniques:

Total removal of the large upper eyelid lesion and reconstruction was performed on similar setting under general anaesthesia. The cornea was protected by using conformer lubricated with chloramphenicol ointment. The eyelid skin was infiltrated with local anaesthesia (bupivacaine 0.5% and epinephrine 1:200 000) to minimize bleeding. Full thickness excision of the upper eyelid mass was performed under frozen section guidance. After the removal of the lesion, the upper eyelid defect was approximately more than two third of the whole upper eyelid length (3cm X 2cm) with involvement of the medial canthus. Grafting process was initiated once the excision was free of tumour. Posterior lamella of the eyelid was formed by buccal mucosa of the cheek and cartilage of the ear. The buccal mucosa measuring 3cm X 2cm was harvested from left cheek and secured to the conjunctival remnant using ethilon 9/0 (Figure 3a). Two third partial thickness of the ear cartilage harvested from the retroauricular area of the right ear was then sutured to the remnants of the tarsal plate using ethilon 6/0 (Figure 3b). The retroauricular skin was then closed with silk 5/0. The first stage of the reconstruction involved the formation of anterior lamella by the glabellar flap. An inverted V shaped incision was made at the glabellar region measuring 3.5 cm vertically with one limb extending down the defect. The flap was undermined with extreme care to avoid damaging the blood supply, leaving it attached by broad base pedicle across the bridge of the nose. The brow defect was closed with ethilon 6/0 to make stem of an inverted Y. This advances the flap and it is rotated on the pedicle across the bridge of the nose to form the external surface of the graft. The glabellar flap was then sutured with ethilon 6/0 (Figure 3c). The wound was covered with chloramphenicol ointment and was put on pressure bandage for 48 hours. The skin sutures were then removed at one week post operative day. The second stage of reconstruction involved the removal of the flap, which was conducted under local anaesthesia about 3 weeks following the first stage. During this procedure, the pedicle was then re-divided and granulation tissue was

removed. The skin was then sutured with dafilon 6/0. The removal of the skin sutures was done at one week post operation.

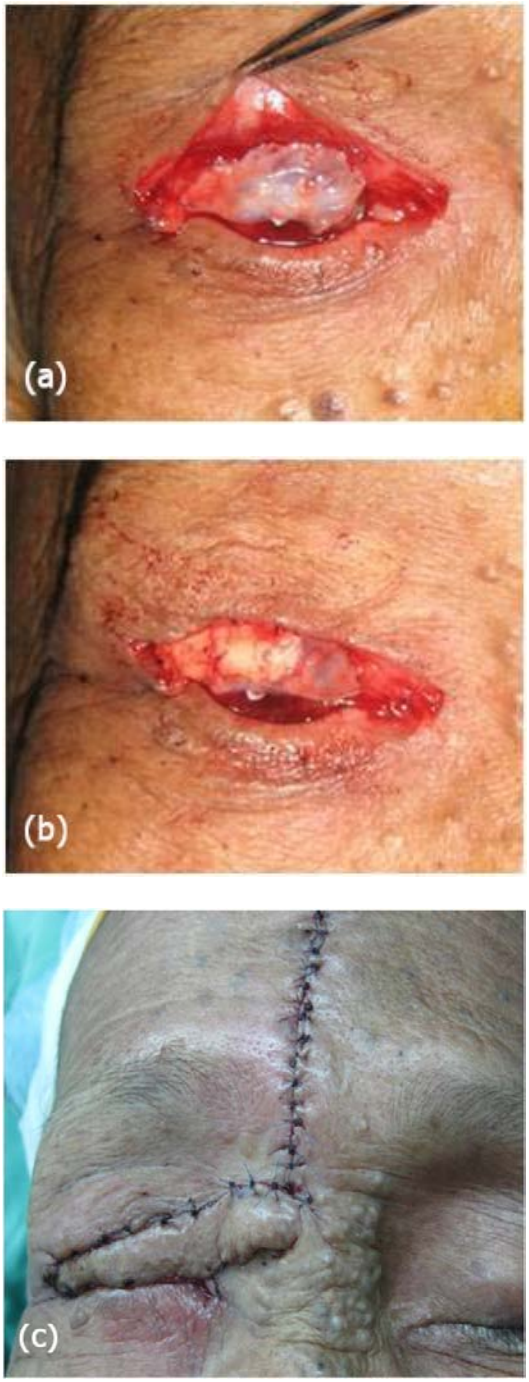

Figure 3 Eyelid reconstruction. a) Posterior lamella: Buccal mucosa sutured to the remnant of conjunctiva. b) Posterior lamella: Ear cartilage sutured to the remnant of tarsal plate. c) Anterior lamella: Glabellar flap rotated to cover the posterior lamella.

Results

There was no total or partial flap necrosis noted. The donor site healed well without any complication. The eyebrow spacing and symmetry was maintained. None of them required revision of surgery. Case 2 developed mild eyelid margin notching. There was mild corneal exposure, which responded well to frequent lubricants. The final postoperative eyelid outcome was satisfactory functionally and cosmetically (Figure 4). There was no evidence of recurrence over the period of 2 years (Case 1) and 5 years (Case 2) of follow up.

Figure 4 Post surgery (Case 1) at 24 months follow up.

Discussion

Eyelid defect following surgical removal can be allowed to heal either by secondary intention in a technique called Laissez Faire or repaired conventionally with a reconstruction surgery (Bowman *et al.*, 2003). Dacosta *et al.* (2009) reported good functional and cosmetic outcome in 8 of the 10 patients in various location of periorbital defect including medial canthus. It is still applicable even in relatively large defect. However, the major concerns are bleeding, risk of infection, contracture and longer time required for wound care (Dacosta *et al.*, 2009).

Regional, myocutaneous or free flaps are among the best options for large defects (Price *et al.*, 2004). The traditional method of Cutler-Beard flap (bridge flap), involves the full thickness flap from lower eyelid to cover the upper eyelid defect. However, this method needs to be done in 2 stages, with the eye remains closed for at least two weeks before division of the flap can be done (Sassoon and Codner, 1999). It is rather unsuitable and unpleasant to the patient.

Upper eyelid rotation flap was also advocated by Behroozan and Goldberg (2005) to repair the medial canthal defect. The flap was taken from the lower margin of the eyebrow on the adjacent upper eyelid with flap to defect size ratio of 3:1 to 4:1 to maintain adequate blood supply. This rotational flap provides well-matched skin texture and thickness but unsuitable for large or deep defect. Transnasal advancement flap has been reported to provide excellent cosmetic outcome especially for small to medium medial canthal defect with hidden surgical scar in the natural lines of the nasal bridge (Sciscio and Joshi, 2001).

The technique described in this two cases is widely used with several modification reported. Turgut *et al.* (2009) has reported the modification of glabellar flap using “flap in flap” technique to cover medial canthal defect. Two flaps were created within an inverted V-shaped advancement flap to overcome the common problem in preserving the concavity of the canthus without causing distortion to the surrounding tissues. It also maintains normal eyebrow contour and symmetry. A single staged procedure to repair the medial canthal defect was also reported. The glabellar flap was divided into two parts and rotated to cover the medial canthus and both the upper and lower eyelid defects. Any residual defects in the eyelid were closed by orbicularis oculi myocutaneous advancement flap (Chao *et al.*, 2010). Berry and Fernandes (2008) described triple flap medial canthal reconstruction for extensive medial facial defect following oncological resection. They used combinations of flap including glabellar flap and the result was satisfactory functionally and cosmetically.

Bertelmann *et al*. (2006) used a skin tunnel prepared diagonally at the root of the nose and the pedicle of the glabellar flap was guided through the tunnel. Therefore, a bulge at the root of the nose at the region of maximal torsion was avoided. Almost similar approach was applied by Motomura *et al.* (2006) using the skin tunnel. The median forehead flap was transferred as an island through the subcutaneous tunnel in the glabella region to the lateral nasal defect to avoid secondary disfigurement. The acute angle of the medial canthus was then preserved by using 0.3mm titanium wire inserted to the tips of the tarsal plate of the upper and lower eyelid and fixed to the perforated nasal bone on the affected site. Both techniques can be used for medium to large medial canthal defects.

Glabellar flap is an excellent option as it provides rich vascular supply from major vasculature primarily supratrochlear vessels, which minimize failure related to inadequate blood supply (Price *et al.*, 2004). The redundancy around this area gives it an advantage to be used for large and deep defect (Bowman *et al.*, 2003). In addition, glabellar flap allows combination with other local and regional flaps. The pliability and the ease for trimming to a desired thickness make an additional value to this technique. The skin around the forehead matches the pigmentation and texture of the recipient site (Price *et al.*, 2004). Moreover, there is no risk of rejection.

Vertical scar is the major drawback in this technique. However, this is not a major problem in our cases, as the patients were elderly. The laxity of the skin allows better healing without unsightly vertical scar. Karşidağ *et al.* (2008) has addressed this issue in their ‘frontal hairline island flap’ technique.

They used an elliptical incision at the frontal hairline to hide the scar at the frontal hairline border.

Mild eyelid notching encountered in Case 2 was perhaps due to contracture of the overlying glabellar flap. This common complication can be easily avoided by harvesting adequate flap size to allow approximation without excessive tension to the underlying posterior lamella graft.

However, this technique requires multiple procedures. In fact, it was conducted under general anaesthesia. Thus, it may pose potential risk to elderly with multiple chronic systemic diseases such as in Case 2. Careful selection of patient allows maximum advantage of this technique.

Conclusion

Glabellar flap provides an excellent alternative technique for full thickness eyelid defect with medial canthal involvement. Staged reconstruction with glabellar flap advancement provides adequate defect coverage, excellent blood supply, maintains eyebrow contour and functionality of the eyelid. The flap also matches perfectly with the surrounding tissue with minimal donor site morbidity.

Acknowledgment

***Declaration of interest*:** The authors report no conflict of interest.

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