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Case Report

Utility of the Glabellar Flap in the Reconstruction of Medial Canthal Tumors after Mohs Surgery

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Abstract

The goals of periorbital region reconstruction are to obtain both functional and esthetic results. Medial canthus is the second most common periorbital location for basal cell carcinoma. If left untreated, it is locally destructive but rarely metastasizes. Incompletely resected medial canthal tumors recur or penetrate along the lacrimal path and expand to wider lesions. A safety margin is necessary to ensure a complete lesion resection. Since it was introduced in 1941, Mohs surgery has been promoted as an efficient method of dealing with infiltrative periorbital skin tumors. It has been shown to have high rates of complete cancer removal during surgery, minimizing the amount of normal tissue loss and securing better functional and cosmetic outcomes. Due to its concave contour and convergence of skin units with variable thickness, texture and mobility, reconstruction of the medial canthal region (MCR) remains challenging. Reconstructive methods such as free full-thickness skin grafts and glabellar flaps have been used alone or in combination with other techniques. The concavity of the canthus must be achieved, but the maintenance of the normal contour and symmetry of the surrounding tissue is critical. The glabellar flap (GF) is a triangular advancement flap that adequately restores the volume in deeper defects, guaranteeing sufficient vascular support without complex or undesirable scars. We present two cases of basal cell carcinoma affecting the MCR that was successfully reconstructed using a GF alone in one case and together with a cheek advancement flap in the second one. In both cases, tumor excision was performed using Mohs surgery.

Keywords: Basal cell carcinoma, glabellar flap, medial canthus, Mohs surgery

Introduction

Periocular malignancies constitute 5-10% of the total number of cutaneous malignancies.[1] The therapeutic approach to such tumors is predominately surgical and depends on the tumor characteristics, histological subtype, and the patient's facial features.[2] After excision, reconstructive surgery is frequently needed to obtain the best functional and cosmetic results, avoiding undesirable changes in blink dynamics. The reconstruction of the medial canthus can prove challenging due to the anatomic complexity of the region, which involves a concave contour and the convergence of skin units with variable texture, thickness, and mobility. Mohs micrographic surgery (MMS) is a very useful technique since it ensures complete cancer removal and decreases the amount of healthy tissue that is excised.[3] In the medial canthal region (MCR), reconstructive methods are selected depending on the size and location of the defect and morbidity of the donor site. When deeper defects straddle, skin flaps are the best choice. Although

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bilobed flaps,[4,5] rhomboid flaps[6] and advancement flaps[7] are among the most commonly used procedures, the glabellar flap (GF) alone or in combination with other techniques remains useful in selected patients.[8,9]

We present two cases of basal cell carcinoma (BCC) involving a large soft-tissue defect of the MCR, one extending onto the nasal sidewall and the other one extending also onto the cheek. In the first case, a GF was sufficient to cover the defect. In the second case, a combination of GF and cheek lateral rotational flap (CLRF) was used to cover the defect. In both cases, good esthetic and functional results were obtained.

Case Reports

Case 1

A 75-year-old woman presented to our hospital oculoplastic department complaining of a growing mass in the inner corner of her right eye for 5 months. No ocular symptoms were reported. On clinical examination, a pink-colored lesion with pearly edges and telangiectasia was seen in the right MCR extending onto the nasal sidewall. Ulceration, peripheral keratosis and bleeding were also present. Punch biopsy was performed and the pathology report indicated an infiltrating BCC. In both cases, the lesions were excised by the same surgeon in the operating room under local anesthesia and intravenous sedation. The tumor was removed using MMS until completely tumor-free margins were achieved. A GF was designed and elevated to close the defect maintaining the esthetic subunits and concavity of the eyelid canthus and the nasal sidewall. The lacrimal system was inspected by probing and no defects were noted in the canaliculi. After surgery, no distortion of the surrounding tissues was observed, the eyebrow spacing was minimal, and overall good symmetry was obtained (Figure1a, b).

Case 2

A 52-year-old woman was referred from our hospital's dermatology department for evaluation of recurrent BCC near her left eye. She reported two previous local excisions of the lesions without margin checks. The first surgery was performed 3 years prior and the second one 4 months prior, with recurrence of the cutaneous lesion on both occasions. On clinical examination, a discolored plaque-like lesion with telangiectasia, raised pale borders, and a waxy appearance was seen in the left MCR extending onto the nasal sidewall. As in case 1, an MMS was proposed, so an immediate reconstruction with a maximal assurance of tumor ablation could be performed. The resultant soft-tissue defect affected a bigger area below the medial canthal tendon than the one seen in case 1. A GF was elevated, but it was insufficient to complete a tension-free closure of the defect. To avoid unnecessary facial distortion, a CLRF was designed and mobilized to meet the inferior edge of the GF taking advantage of laxity in the cheek. After surgery, the patient was pleased with the esthetic and functional results (Figure 1c, d).

Surgical Technique

In both cases, local examination revealed the tumors involving the MCR (Figure 2a, b). Their limits (inner margin) were first demarcated with a blue marker and the outermost margin was used to define the surgical margin (initially 2 mm) (Figure 2c, d).

Local anesthesia (xylocaine 20 mg/mL with adrenaline 0.0005 mg/mL) was injected, first in the MCR and after the flap was designed, in the glabellar region. Intravenous sedation was administered by the anesthetist.

In the first stage of MMS, a debulking of the central tumor was performed. The first Mohs layer of 2 mm was then taken with the incision beveled at 45°. This was immediately mapped maintaining orientation with anatomical landmarks in the eyelid (Figure 3a, b). Further Mohs stages were performed at the positive areas only and the same process was repeated until tumor-free margins were obtained (Figure 3a, b).

In case 1, using the caudal side as a pedicle, an inverted V-shaped advancement flap was designed over the area of maximal skin laxity in the glabellar region (Figure 4a). A periosteal attachment with a 5/0 polyglactin 910 suture was placed to tack the flap and maintain the normal concavity of the canthus (Figure 4b). The flap was raised in the subcutaneous plane with conservative elevation to preserve the blood supply and then rotated to cover the defect. In the donor area, a blunt dissection in the subgaleal plane at each side of the forehead was made, allowing the wound to be closed primarily. In both cases the defect was smaller than the flap and a small amount of redundant tissue was trimmed from the tip of the flap (Figure 4c). The periosteal attachment suture was passed through the flap and secured with a bolster to achieve direct contact with the wound bed (Figure 4d).

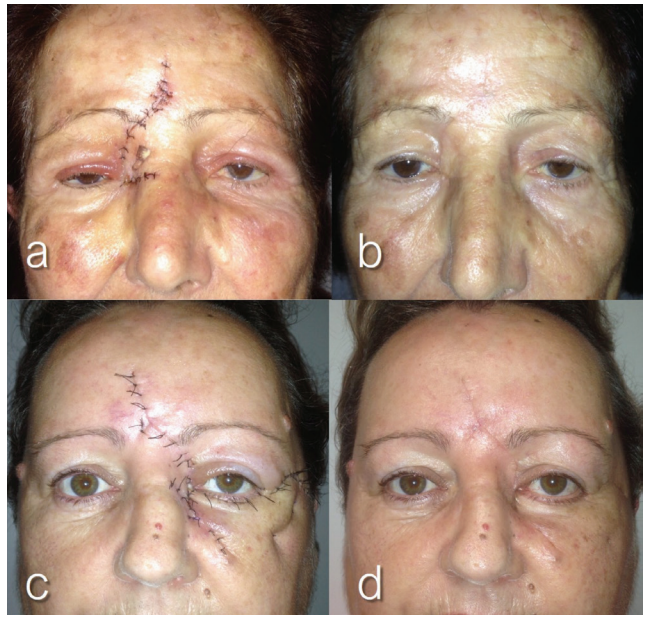

Figure 1. Postoperative aspect at 3 days and 1 month after the surgery in patient 1 (a, b) and patient 2 (c, d)

In case 2, a GF and CLRF were designed (Figure 5a). The GF was performed as described in case 1. A subciliary incision was then extended from the lateral border of the defect to beyond the lateral canthus. Dissection was performed between the orbicularis muscle and orbital septum above the orbital rim, and in the subcutaneous fat plane bellow the orbital rim (Figure 5b). The lower eyelid was stable so no lateral tarsal strip was needed. The CLRF was rotated medially to cover the inferior portion of the defect (Figure 5c). The posterior surface was fixated deep to periosteal attachments to relieve tension from the skin edges with 5/0 polyglactin 910 suture (Figure 5d). In both cases, skin incisions were closed in two planes with a 5/0 polyglactin 910 and 6/0 silk interrupted sutures (Figure 4d, 5d).

Discussion

Tumors of the periorbital region present unique assessment, diagnostic, and therapeutic challenges.[1,3] The most prevalent malignant lesion in the eyelids is BCC (80-92.2%)[10] followed by squamous cell carcinoma, sebaceous gland carcinoma, and cutaneous melanoma.[1] BCC most frequently affects the lower lid and medial canthus or extends to involve both areas. Although usually a slow-growing tumor, some may grow rapidly and invade adjacent tissues including the medial canthal tendon, lacrimal duct, or neurovascular structures. Metastasis of BCC is extremely uncommon, with an estimated rate ranging from 0.003% to 0.55%.[1] In these disorders, the goal of the surgical treatment is to obtain a precise ablation of the entire carcinoma using an accurate histological control.[3]

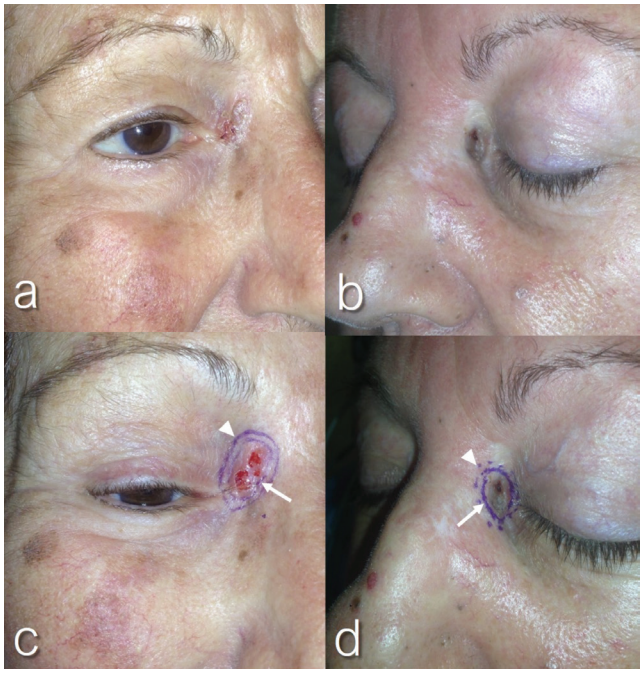

Figure 2. Preoperative aspect of patient 1 (a) and patient 2 (b). Demarcation of the lesion margins (arrow) and the surgical margins (arrowhead) in patient 1 (c) and patient 2 (d)

The MCR is crucial to the appearance and shape of the eye; thus, an accurate reconstruction after skin cancer resection is essential to avoid noticeable asymmetry.[11] The complexity of the region's structural anatomy is due to the confluence of different skin colors, textures, and thicknesses. It has a characteristic depression in the center, a thin subcutaneous tissue, and the least skin excess compared with the surrounding structures. If the tumor resection extends to the nasal sidewall, the upper and lower eyelids, or invades deeper tissues, reconstruction may become more difficult and a combination of different reconstructive techniques may be needed.[12] Inaccurate reconstructive techniques can lead to complications such as epiphora, telecanthus, visibly unnatural appearance, undesirable scarring, and lowered self-esteem.[11]

Conservation of the normal tissue is especially important with eyelid tumor removal because of the limited amount

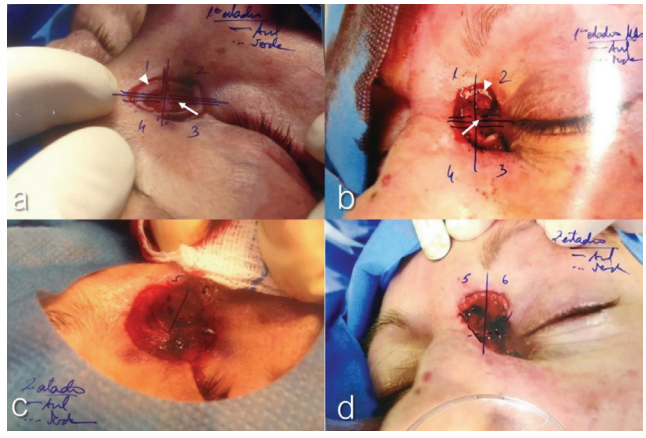

Figure 3. Mohs Micrographic Surgery stages. Debulking (arrow) of the lesion was performed. The first Mohs layer of 2 mm (arrowhead) was taken and immediately mapped in patient 1 (a) and patient 2 (b). Further Mohs stages were performed to the positive areas in patient 1 (c) and patient 2 (d)

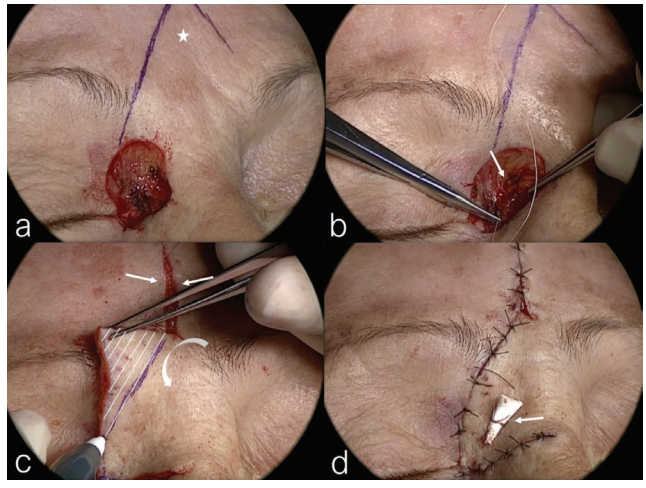

Figure 4. Case 1 surgery. (a) A glabellar flap (star) was designed. (b) Periosteal attachment suture (arrow). (c) Rotation of the glabellar flap to cover the defect (round arrow) and primarily closing of the donor area (arrows). Redundant tissue was trimmed from the tip of the flap (continuous lines). (d) Postoperative aspect at the end of the surgery with the bolster (arrow)

of tissue available to achieve acceptable cosmetic results and preserve normal eyelid function.[13] As described by Huggins et al.[3], MMS is regarded as the gold standard for treatment of BCC with deep tissue invasion in the MCR. It has the benefit of sampling and examining small quadrants of anatomically localized tissue, allowing the surgeon to return to the positive tumor margin and remove tissue only in that small designated area. Thus, MMS ensures a complete cancer removal with the maximum preservation of the normal tissue.[13,14] For primary BCC and squamous cell carcinoma, MMS has an overall 5-year cure rate of 97-99%.[3]

Reconstructive surgical planning in the MCR is tempered by several factors including the depth and size of the defect, the availability and integrity of surrounding tissues, and the surgeon's preferences. If the defect is small and restricted to the anterior lamella, spontaneous granulation and direct closure have been described as good alternatives.[15] A full-thickness skin graft obtained from a donor area with similar characteristics can also be employed for MCR reconstruction; however, graft revascularization is determined by the characteristics of the recipient area, and this can cause graft complications such as necrosis, retraction, or changes in color and texture.[8] For larger anterior defects, or those lacking a vascular bed, various transposition or advancement flaps such as the glabellar, forehead, finger, or orbicularis oculi muscle flaps had been used. A flap has the advantage of having its own intrinsic blood supply, allowing it to be transferred to another area with much less reliance upon the surrounding tissue bed. These aspects make it more predictable in its evolution.[8,9]

The GF described by McCord and Wesley[16] is a flap based on the subdermal plexus and the supratrochlear vessels.[17] It involves an inverted "V" created in the glabellar region and converted into a "Y" to allow the flap to be rotated to provide tissue for the anterior lamella repair. The midpoint of the triangle is midline. It may extend a few centimeters above the superior border of the eyebrow and the midpoint of the triangle may be readjusted more superiorly as needed for flap rotation. It is a relatively quick technique that provides appropriate filling of the resulting defect after MCR lesion removal, including those defects that extend to the bone, as the glabellar skin is thick and provides a good blood supply.[18] The GF offers several advantages, including similarity in color and texture to the recipient site and minimal prevalence of the donor site morbidity. It is obtained from a natural frown line and obviates the need for a second-time surgery or other donor site deformities.[17] One drawback is that it tends to draw the eyebrows together. A bulky nasal bridge and loss of the MCR concavity can also be seen. This can be overcome by avoiding too broad a base to the flap between the eyebrows and performing a meticulous thinning of the flap if needed.[8,19]

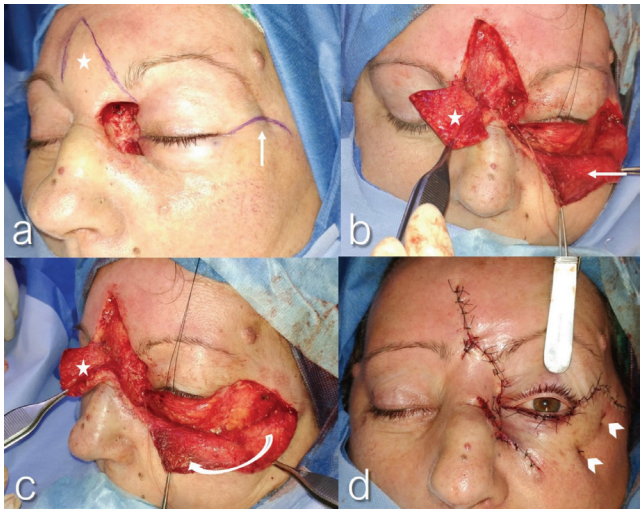

Figure 5. Case 2 surgery. a) A glabellar flap (GF) (star) and cheek lateral rotational flap (CLRF) (arrow) were designed. b) Dissection of the GF (star) and the CLRF (arrow). c) The CLRF was rotated medially (round arrow) to cover the inferior portion of the defect. d) Periosteal attachments were placed (arrowhead) and skin incisions were closed

In the cases presented, a GF was performed because of the defect depth after tumor excision. In these situations, a GF can result in a better cosmetic outcome than that obtained with a free skin graft.[20,21] In some cases, as described in the first patient, a GF alone was enough to successfully reconstruct the MCR as demonstrated by Meadows and Manners[18] or Turgut et al.[17] In cases of larger medial canthal defects involving upper and lower eyelid, simultaneous use of two flaps[22,23,24,25] or a combination of three local flaps[26,27,28] has also been reported. The procedure used in the second patient included two flaps, a GF and a CLRF. Even though cheek flap harvesting is associated with extensive undermining and prolonged operative time,[22] we considered the reconstructive technique highly successful, achieving similar postoperative results as obtained by other authors.[15,29,30]

In conclusion, the MCR can be successfully reconstructed with a GF alone or in combination with other surgical techniques depending on the characteristics of the defect resulting after tumor excision. The MMS has high rates of complete cancer removal during surgery, minimizing the amount of normal tissue loss, as demonstrated in the cases presented. In our experience, the GF is a versatile, simple, and highly reproducible flap. Its vascular pedicle allows reliable flap viability and minimal postoperative flap shrinkage. It provides tissue of adequate thickness and texture for the reconstruction of the MCR after cancer removal. In our practice, we have found that this flap provides an excellent color match and good esthetic and functional results.

Ethics

Informed Consent: Obtained.

Peer-review: Externally peer reviewed.

Authorship Contributions

Surgical and Medical Practices: R.A.D.C., Analysis or Interpretation: R.A.D.C., L.O.E., A.O., A.O.P., Literature Search: R.A.D.C., L.O.E., A.O., A.O.P., Writing: R.A.D.C., L.O.E., A.O., A.O.P.

Conflict of Interest: No conflict of interest was declared by the authors.

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