

“Pickaxe” Double Flap: A Useful “Tool” for Reconstruction of Deep Large Medial Canthal Defects—5-Year Experience and Brief Literature Review



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Abstract

Objective Reconstruction of large, deep medial canthal defects presents a challenge to reconstructive surgeons, since both safe oncologic excision and aesthetically pleasant results should be met. We report our 5-year experience with the use of a double flap technique, which looks like a “pickaxe”, in reconstruction of the aforementioned kind of defects.

Methods The technique is based on the simultaneous use a glabellar and a nasolabial flap designed and raised on either side of the medial canthal defect. The complex of the defect with the flaps looks like a pickaxe. The technique was applied in 17 patients during the last 5 years.

Results No tumour relapses were recorded in our series (mean follow-up period of 24.8 months). Also neither disfiguring scar contractures nor trapdoor deformities were noticed because of the ample tissue provided and the w-plasty outline of the resulting surgical scar. All patients were satisfied with the aesthetic outcome.

Conclusion The suggested technique is simple, reliable and provides very good aesthetic results without disfiguring deformities. Most importantly, consistent long-term results with high patient satisfaction and no tumour relapses were achieved.

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Keywords Medial canthus · Defect · Double flap · Reconstruction

Introduction

The medial canthus is a common site for tumours, particularly basal cell carcinomas. Reconstruction of small to moderate size medial canthal defects can be easily performed. However, reconstruction of large deep defects extending to the side of the nose, and/or the upper/lower eyelid, especially in the presence of periosteal or bone infiltration, may prove very difficult. This is because: first, the medial canthus consists of multiple, individual anatomical aesthetic units that differ in soft tissue quality, thickness and contour; and second, the normal concavity without webbing or distortion of the surrounding tissues should be maintained for reproduction of the natural appearance of the medial canthal area [1–3].

We report our experience with a double flap technique that looks like a “pickaxe” and uses both the glabellar and nasolabial flaps. Also a brief literature review is performed.

Materials and Methods

During the last 5 years, 17 patients (10 males, 7 females; 63–86 years of age; median 72 years) were treated with the suggested technique for reconstruction of large, deep medial canthal defects, following resection of medial canthal tumours invading the underlying periosteum or bone. In all cases, at least a part of the ipsilateral nasal sidewall was included. Also in six cases the defect extended to the eyelids. In four cases, the medial part of the lower eyelid was invaded, and in two the medial part of the upper eyelid.

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Operative Technique

Tumour resection is followed by measurement of the size and shape of the defect. Then glabellar and nasolabial flaps are designed according to the size and shape of the defect. The outline of the complex glabellar flap-defect-nasolabial flap looks like a “pickaxe” (Fig. 1). The glabellar flap is used to restore the upper part of the defect, whereas the nasolabial flap the lower part. The glabellar flap is situated cranial to the defect and has a rectangular shape. The flap is elevated in the subcutaneous plane, having its contralateral caudal side as a pedicle. The outline of the flap should be limited within the lower third of the forehead at the area of frowning and the eyebrow line should not be violated. The nasolabial flap is situated caudal to the defect and is tongue shaped. It is also elevated in the subcutaneous plane and its pedicle is situated cranially. Depending on the area to be reconstructed by the nasolabial flap, its pedicle comes from the side of the cheek for the nasal sidewall or from the side of the nose for the lower eyelid. Both flaps are thinned and trimmed before transposition into the defect, and then fixed with anchor sutures at the canthal area and sutured in place. These donor sites are exclusively closed primarily, so that on completion of the procedure the suture line looks like a w-plasty (Figs. 2, 3).

Results

The postoperative period was uneventful with highly satisfactory aesthetic outcomes in all cases. Neither webbing nor tumour relapse was recorded in any patient. Also neither scar contractures nor trapdoor deformities were noticed because of the w-type outline of the surgical scar (Fig. 4). A small dog-ear noticed at the pivot point of the



Fig. 1 Tumour of the medial canthus invading the lateral nasal wall (a). A typical pickaxe (b). The defect area represents the poll of the pickaxe, whereas the glabellar and nasolabial flaps its two heads (c)



Fig. 2 Medial canthal defect invading the nasal sidewall. For reconstruction of the nasal sidewall defect, the pedicle of the nasolabial flap comes from the cheek. The glabellar and nasolabial flaps transposed into the defect (a). Immediate postoperative result. The similarity of the resulting scar to a w-plasty is evident (b)

nasolabial flap in the first two cases subsided in the course of time. Wider undermining of the pedicle, as well as more careful trimming prevented dog-ear formation in the next patients. All patients are disease-free during a mean follow-up of 24.8 months.

Discussion

Reconstruction of medial canthal defects is challenging, since the medial canthus consists of several different zones and possesses certain functional and aesthetic characteristics. On the basis of the increasingly high probability of incomplete excision of medial canthal tumours in a medial-to-lateral direction, the contribution of Mohs surgery has proved of utmost importance and is very often combined with skin grafting, in the presence of a well-vascularised recipient [4]. However, this is not the case in extensive deep medial canthal defect reconstruction, which almost exclusively necessitates the use of a flap. Surprisingly, very few techniques refer to their reconstruction, most of them using a type of a forehead flap or a combination of two or even three other local flaps [5, 6].

The conventional forehead flap provides ample tissue. However, its use is almost inevitably associated with a second procedure, distortion of the eyebrow line, difficulties in closing the donor area, potential use of a disfiguring skin graft at the donor site, vertical frontal scarring and medial canthal webbing. To overcome the aforementioned draw backs, several modifications have been introduced. For example, the frontal hairline island flap and the midline forehead flap with tunnelled de-epithelialized pedicle are transferred in a single-stage procedure. However, the use of

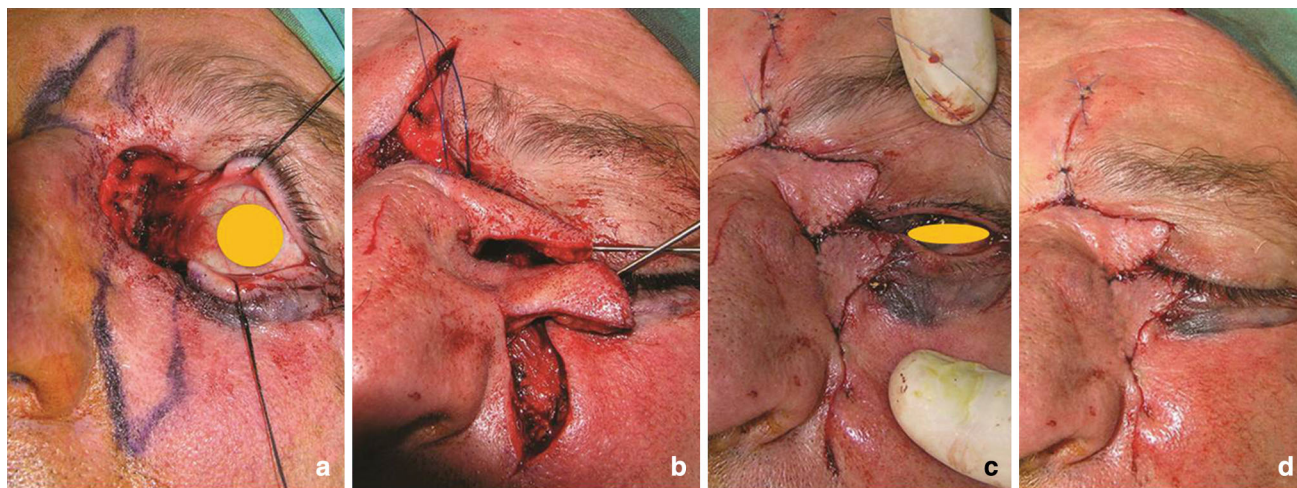
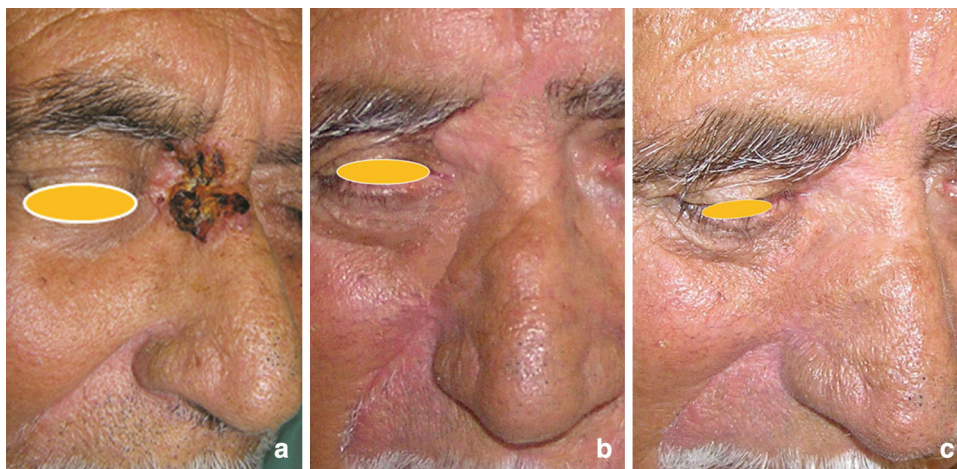


Fig. 3 Medial canthal defect invading the medial part of both the lower and upper eyelids (a). For reconstruction of the defect of the lower eyelid, the pedicle of the nasolabial flap comes from the side of

the nose. In this case, both the glabellar and nasolabial flaps are transposed laterally to cover the defect (b). Immediate post-op result with the resulting scar remaining similar to a w-plasty (c, d)

Fig. 4 Preoperative (a) and postoperative appearances of a patient during the follow-up period. At 6-month follow-up, hypertrophy of the scars and edema of the flaps are still obvious (b). At 1-year follow-up, both improvement of scar quality, as well as, absence of edema of the flaps are obvious (c)



the frontal hairline island flap is associated with forehead depression, bulging of the nasal radix and trap door deformity, due to the subcutaneous transposition and folding of the flap. The use of a disfiguring skin graft at the donor site is seldom avoided and flap pedicle dissection is often tedious [7]. The midline forehead flap with tunnelled de-epithelialized pedicle is easily dissected. However, its use is also associated with bulging of the nasal radix, and a long vertical midline scar, even when primary closure of the donor is feasible [8]. The use of a forehead muscle flap in combination with a skin graft has also been reported, but the use of the skin graft is associated with aesthetically inferior results and potential nerve damage [9].

Simultaneous use of two flaps has also been reported. Motomure et al. have used a median forehead flap, with the already mentioned draw backs, and a cheek rotation flap. Cheek flap harvesting is associated with extensive undermining and prolonged operative time [10]. Jelks et al. have

reported the bilateral use of a medially based upper eyelid myocutaneous flap. However, their use is precluded in defects extending to the upper eyelid, since their pedicle is inevitably damaged. Also relatively high rates of flap edema and venous congestion due to the narrow flap pedicle are encountered. Finally, the too thin skin of the flap is amenable to contracture and has a different texture to that of the medial canthus [11]. Chao et al. have reported the use of a glabellar and a V-Y advancement of the orbicularis oculi myocutaneous flap for reconstruction of sizeable defects, despite the limited size of the orbicularis oculi myocutaneous flap. Main drawbacks of the method are the additional scars that not only violate natural skin lines, but also their contracture often leads to webbing formation and potentially poor results [12]. Finally, Yildirim et al. report the combined use of V-Y advancement nasolabial and glabellar flaps, which looks similar to our technique. However, the V-Y advancement of the

nasolabial flap not only restricts alternative uses of the flap, since it can only be advanced to a certain direction, but also the scars surrounding the flap inevitably lead to persistent disfiguring postoperative edema [6].

Very few case reports or small series use simultaneously three flaps for reconstruction of large medial canthal defects. Berry and Fernandes [13] have used a Tripiere, a cheek, and a glabellar flap, whereas Ayhan et al. [14] have used a cheek, an upper eyelid musculocutaneous, and a lateral nasal wall flap. In our opinion, the aforementioned techniques are not only too complicated; but also unduly add too many scars.

The term “pickaxe” is deliberately used in the suggested technique, since the complex glabellar flap-defect-nasolabial flap resembles a “pickaxe”. Also metaphorically speaking, a “pickaxe” is a very useful tool, whereas the glabellar and nasolabial flaps, two of the earlier reported flaps, are also very useful tools in reconstructive facial surgery.

The recommended technique possesses certain advantages as compared with other aforementioned methods. The nasolabial flap provides not only ample tissue that easily ensures recreation of the natural medial canthal concavity, but also coverage to the lower two-thirds of the defect. Moreover, the pedicle of the flap can be based either on the cheek or the nose depending on the nature and exact location of the defect. In the presence of a nasal sidewall defect, the pedicle comes from the cheek, whereas in the presence of a medial defect of the lower eyelid, the pedicle comes from the nose. Thus, the transposition of the flap to the desired direction is facilitated. Also an inconspicuous donor scar, positioned within the natural anatomical crease of the nasolabial fold, is induced. Moreover, the use of the nasolabial flap diminishes the role of the glabellar flap to the reconstruction of the upper third of the defect. As a result, the dimensions of the glabellar flap are reduced, thus diminishing both the donor site scar within the frowning lines, as well as, the approximation or distortion of the eyebrows. However, if needed, the glabellar flap is long enough to reconstruct the medial third of the upper eyelid.

The main advantages of the suggested technique are (1) tension-free medial canthal reconstruction, regardless of the size of the defect, and (2) the resulting scar is similar to a w-plasty, thus avoiding the formation of disfiguring scar contracture, trapdoor deformity or webbing.

In conclusion, we strongly recommend the use of the “pickaxe” double flap technique for reconstruction of large

medial canthal defects; since first, it is a simple, one stage, reliable and reproducible method; second, it is based on the combination of two standard flaps, which provide ample tissue, not only for large medial canthal defects, but also if needed, for nasal sidewall, as well as, partial upper or/and lower eyelid reconstruction; and third, it ensures highly satisfactory aesthetic results without disfiguring deformities or additional visible scars.

Conflict of interest The authors have no commercial associations or financial interests to disclose.

References

- Spinelli HM, Jelks GW (1993) Periocular reconstruction: a systemic approach. *Plast Reconstr Surg* 91:1017–1024
- Ng SGJ, Inkster CF, Leatherbarrow B (2001) The rhomboid flap in medial canthal reconstruction. *Br J Ophthalmol* 85:556–559
- Harris GJ, Logani SC (1998) Multiple aesthetic unit flaps for medial canthal reconstruction. *Ophthalm Plast Reconstr Surg* 14: 352–359
- Boriani F, Marconi F (2007) Basal cell carcinomas of the inner canthus: incidence of incomplete excision according to topographical localization of tumours. *Br J Dermatol* 157:1301–1302
- Zhang Y, Wu HL, Lu YM (2012) Contralateral nasolabial flap for reconstruction of midface defects. *Aesthetic Plast Surg* 36: 1175–1178
- Yildirim S, Aköz T, Akan M, Cakir B (2001) The use of combined nasolabial V-Y advancement and glabellar flaps for large medial canthal defects. *Dermatol Surg* 27:215–218
- Karşıdağ S, Sacak B, Bayraktaroglu S, Ozcan A, Ugurlu K, Bas L (2008) A novel approach for the reconstruction of medial canthal and nasal dorsal defects: frontal hairline island flap. *J Craniofac Surg* 19:1653–1657
- Mombaerts I, Gillis A (2010) The tunneled forehead flap in medial canthal and eyelid reconstruction. *Dermatol Surg* 36: 1118–1125
- Chiarelli A, Forcignano R, Boatto D, Zuliani F, Bisazza S (2001) Reconstruction of the inner canthus region with a forehead muscle flap: a report on three cases. *Br J Plast Surg* 54:248–252
- Motomura H, Taniguchi T, Harada T, Muraoka M (2006) A combined flap reconstruction for full-thickness defects of the medial canthal region. *J Plast Reconstr Aesthet Surg* 59:747–751
- Jelks GW, Glat PM, Jelks EB, Longaker MT (2002) Medial canthal reconstruction using a medially based upper eyelid myocutaneous flap. *Plast Reconstr Surg* 110:1636–1643
- Chao Y, Xin X, Jiangping C (2010) Medial canthal reconstruction with combined glabellar and orbicularis oculi myocutaneous advancement flaps. *J Plast Reconstr Aesthet Surg* 63:1624–1628
- Berry MG, Fernandes AE (2008) Triple-flap medial canthal reconstruction. *Can J Plast Surg* 16:170–172
- Ayhan S, Ozmen S, Sarigüney Y, Latifoğlu O, Atabay K (2001) Reconstruction of the medial canthal region with the “triple-flap” technique. *Ann Plast Surg* 47:354–355