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ORIGINAL ARTICLE GENERAL RECONSTRUCTION

Contralateral Nasolabial Flap for Reconstruction of Midface Defects

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Abstract Reconstruction of defects in the midface near the nasolabial fold or the inner canthus of the eye can be a challenge for plastic surgeons. Many methods such as skin grafting and skin flaps have been proposed for reconstruction of these defects. This report presents the results of using a contralateral nasolabial flap with a pedicle containing the lateral nasal branch of the angular artery. A flap with a pedicle approximately 10 mm wide was transferred to the opposite side through a tunnel at the nasion near the inner canthus for reconstruction of defects with surface areas ranging from 5.3 to 31.0 cm^2 and depths ranging 2.2–6.5 mm. Since 2008, with careful design, eight patients with skin tumor excisions have obtained effective functional and aesthetic results. This method is a suitable surgical procedure for reconstruction of moderate to wide side defects in the special midface area of the nasal sidewall toward the medial canthus.

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Reconstruction of defects in the special area of the midface near the nasolabial fold or the inner canthus of the eye can be a challenge for plastic surgeons. Each defect must be evaluated individually. The location, size, and depth of the defect are the most important considerations for reconstruction. Other factors to be considered include the characteristics of the original lesion, the patient's age and physical status, the patient's wishes, and the experience of the surgeon. An abnormal appearance after surgery not only presents aesthetic and functional problems, but also may cause psychological distress.

Many methods such as skin grafting and skin flaps have been proposed for reconstruction of these defects. We used a contralateral nasolabial flap to reconstruct the defects of such special areas and obtained effective functional and aesthetic results.

Patients and Methods

Eight patients with midface tumors were enrolled in this study, beginning in 2008. The tumors all were located at the nasal sidewall or at the medial angle of the eye. The tumor types included one primary melanoma, five basal cell carcinomas, and two nevi. The surface areas of the defects ranged from 5.3 to 31.0 cm^2 (mean, 12.80 cm^2), and the depths ranged from 2.2 to 6.5 mm (mean, 3.17 mm). The mean patient age was 47 years (range, 39–67 years) (Table 1).

One patient had a diagnosis of hypertension, and one patient was addicted to smoking at the time of surgery. All

Table 1 Patient characteristics and defect

Patient	Sex	Age (years)	Location	Type of disease	Surface defect size (cm^2)	Depth of defect (mm)
1	M	67	Nasal back to cheek	Primary melanoma	10.4	2.3
2	M	40	Medial angle of the eye and nasal sidewall	Basal cell carcinoma	12.5	3.1
3	M	54	Medial angle of the eye extend to the cheek	Basal cell carcinoma	31.0	6.5
4	M	45	Medial angle of the eye.	Basal cell carcinoma	7.8	3.1
5	F	46	Medial angle of the eye and nasal sidewall	Basal cell carcinoma	15.0	3.0
6	M	42	Nasal sidewall	Nevi	5.6	2.3
7	F	39	Inner canthus of the eye	Nevi	5.3	2.2
8	M	43	Medial angle of the eye, low eyelid to the cheek	Basal cell carcinoma	14.8	2.9

the other patients were in good condition. The patients were followed for 8–24 months without recurrence.

Surgical Technique

With the size of the biopsy site or tumor taken into consideration, a contralateral nasolabial flap with sufficient free margins was designed to cover the area of excision (Figs. 1a, 2a). The design of the flap was based on the contralateral nasolabial fold containing the lateral nasal branch of the angular artery, and the flap was transferred to a site near the inner canthus.

The technique used to raise the flap was very simple because in males, the inferior border of the flap must always be situated between the smooth skin and the bearded skin. First, an incision was made at the lower margin of the flap to identify the angular vessel lying directly beneath the skin at this level. Second, the incision was extended to the medial and lateral borders of the flap, including the fascia. Third, the skin of the pedicle was removed, and the subcutaneous tissue was left intact, with the pedicle approximately 10 mm wide to protect the angular vessel. Finally, the skin flap was moved to the defect through a tunnel at the nasion and sutured to the recipient site. The donor site was closed routinely (Fig. 2).

Results

None of our patients experienced postoperative complications such as necrosis, infection, or deformity of vital structures. The color match and elasticity of the recipient

Fig. 1 Contralateral nasolabial flap for repairing midface defects. (**a**) Preoperative view of a basal cell carcinoma on the right midface near the medial angle of the eye. The excision area of the tumor and the contralateral nasolabial flap were designed. (**b**) View of the recipient and donor sites 2 days postoperatively. (**c**) Postoperative view after 2 weeks. (**d**) Postoperative view 1 year later. The color match, thickness, and elasticity of the recipient site are consistent with the adjacent tissue. The donor suture lines have become imperceptible

Fig. 2 Contralateral nasolabial flap surgical procedure. (**a**) Preoperative view of the basal cell carcinoma. The excision area of the tumor and the contralateral nasolabial flap were designed. (**b**) Excision and formation of a pedicle approximately 10 mm wide containing the lateral nasal branch of the angular artery were performed. (**c**) The flap was transferred to the opposite side through a tunnel located near the inner canthus fitting the defect well. (**d**) Postoperative view 1 year later

site were consistent with the adjacent tissue. The donor suture lines were hidden in the nasolabial fold. Furthermore, most of the resulting scars became imperceptible 6 months after the operation. During a follow-up period ranging from 8–24 months, all the patients obtained excellent functional and aesthetic results, and none had local recurrence (Figs. 1, 2).

Discussion

The midface area often is affected by melanoma and basal cell carcinoma. Careful reconstructive techniques are critical to avoid displacement of the nose, the medial angle of the eye, or the canthus of the eye. The need for wide local excision and reconstruction must be carefully balanced with both functional and aesthetic considerations.

Many methods for closing midface defects have been reported previously, including skin grafting and the use of local skin flaps [1–3]. In the case of skin grafts, the color match is not good, and the scar at the recipient site is clearly visible, so it is unacceptable for the majority of people. Otherwise, for defects near the nasolabial fold or the inner canthus of the eye, the remaining healthy tissue is precious. It is difficult to reconstruct the defect using an adjacent flap without altering the shape of the vital structures.

For a distal flap to cover such defects, the forehead area is considered the best donor area because of its proximity, color match, and simplicity of transfer to the recipient area in the midface [4, 5]. However, this leaves another defect and visible scars.

The frontalis musculocutaneous island flap often is used as a reversed flap to repair defects in the nasolabial region or the medial angle of the eye, but it also has disadvantages. The supply vessel to the frontalis musculocutaneous island flap is the supratrochlear artery, which is not easy to find. Moreover, the pedicle must be reversed and afforded a large border to ensure that the vessel is not damaged. Because it is a reversed flap, the pedicle must be folded when it crosses the tunnel of the nasal radix to repair the defect, so it is not easy to maintain the blood supply and have no tension or stress on the pedicle. Furthermore, in all cases, after the flap transplantation, the fold of the pedicle can be easily seen. A second operation to remove the fold is needed, and the donor area will be left with another defect and visible scars.

Use of the ipsilateral nasolabial flap is a well-known and frequently applied technique. The vascular anatomy of the nasolabial flap is centered on the angular artery, which is a branch from the anterior facial artery, the infraorbital artery, the transverse facial artery, and the infratrochlear artery. Its terminal branch, the angular artery, running along the lateral wall of the nose, ends its course near the inner canthus, where it presents an anastomotic branch mainly with the contralateral angular artery and the supraorbital artery.

Because of the rich vascular supply and the free anastomosis between the terminal branches of the supplying vessels of the flap, it is possible to raise superior-, inferior-,

medial-, and lateral-based flaps. The blood supply of the nasolabial flap originates from the lateral branch of the angular artery at the level of the alar base crease. Therefore, a nasolabial flap can be used to reconstruct cheek and oral mucosal defects [6, 7].

With blood supplied by the angular vessel, the ipsilateral nasolabial flap has been used to reconstruct defects of the lower eyelid [8] and the nose [9, 10]. However, when the defect is near the nasolabial fold, the ipsilateral angular vessel will be injured, and when the defect is too wide, the ipsilateral nasolabial flap is not large enough. To avoid these disadvantages and to obtain a wider flap, we have used a contralateral nasolabial flap to reconstruct such defects.

With the method we have devised, because the nasolabial flap is on the other side of the defect, a wide range of nasolabial flaps can be used to reconstruct contralateral midface defects with color match, simplicity of transfer, and proximity to the recipient areas. The nose can be maintained in the middle of the face, and changes to the position of the lower eyelid can be avoided. The donor areas can be sutured routinely, with suture lines hidden in the nasolabial creases.

This technique requires somewhat complicated preoperative planning. To render the pedicle tension- and stress-free when it crosses the nasal radix, we make the tunnel of the nasal radix spacious and do not leave the pedicle with too many tissue attachments. We leave only partial fascia around the vessel.

In addition, it is necessary to estimate the rotating and traversing degree of the flap tissues. Due to the length limit of the pedicle, this flap is suitable only for reconstruction of defects in the midface near the nasolabial region or/and the medial canthus. If the distance is too great for the flap to reach across, it is not suitable to choose this flap for reconstruction. In some cases, after transposition of the flap, a minimal dog-ear formation has been observed, but this resolves over time.

After this procedure, the regions in which the pedicle is folded and the nasal radix across which the pedicle travels are somewhat thick, and if the recipient area is near the medial canthus, this flap will appear thick, so a second-stage debulking procedure is necessary for a better appearance. Because our eight patients all were satisfied with the first-stage procedure, we had no opportunity to obtain more data on the second-stage debulking procedure.

Conclusions

Aesthetic and functional reconstruction of moderate to wide defects of the nasojugal fold or the medial angle of the eye is a challenge. Based on the availability of the angular artery and the simplicity of the transfer, the contralateral nasolabial flap presents a viable option for closure of defects without creating functional or aesthetic issues or affecting the vital structures of the midface. Furthermore, the donor scars are hidden in the nasolabial fold. This is a suitable surgical procedure for reconstruction of moderate to wide side defects on the special midface area near the nasolabial fold or the inner canthus of the eye.

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