

Nasolabial Rotation Flaps Based on the Upper Lateral Lip Subunit for Superficial and Large Defects of the Upper Lateral Lip

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Background: Reconstruction of the defects of the upper lateral lip is still one of the most difficult challenges for plastic surgeons. No method specific to the superficial and larger defects of the upper lateral lip has been proposed before. Nasolabial rotation flaps based on the upper lateral lip subunit for superficial and large defects of the upper lateral lip are proposed.

Methods: In six patients reported here, rotation flaps shaped to replace the subunits of the upper lip were used to repair defects. Three men and three women presented with unilateral superficial, large defects (occupying 50 percent of an upper lip subunit). The defect and upper lateral lip ratio ranged from 50 to 100 percent (average, 65 percent) in this series. All lesions were partial-thickness.

Result: Follow-up for all patients was 6 to 13 months (average, 6.8 months). No flap loss was noted. No patients had infection, hematoma, nerve injury, or secondary revision. The results were satisfactory.

Conclusions: Nasolabial rotation flaps based on upper lateral lip subunits are reliable for reconstructing large, superficial defects of the upper lateral lip. Because they preserve the normal facial appearance with minimal donor-site morbidity, excellent aesthetic reconstructive results are easily achieved by appropriate patient selection and preoperative planning. (*Plast. Reconstr. Surg.* 130: 556, 2012.)

CLINICAL QUESTION/LEVEL OF EVIDENCE: Therapeutic, V.

Reconstruction of the defects of the upper lateral lip is still one of the most difficult challenges for plastic surgeons. Many methods have been reported for individual defects. No method specific to the superficial and larger defects of the upper lateral lip, however, has been proposed before. In six patients reported on here, rotation flaps shaped to replace the subunits of the upper lip were used to repair defects. All patients were satisfied with their results. The indications for the flaps are (1) superficial defects of fat and skin only, (2) defects that occupy more than 50 percent of a subunit, and (3) a patient with high aesthetic expectations.

PATIENTS AND METHODS

Three men and three women presented with large unilateral superficial defects (occupying 50 percent of an upper lip subunit) (Table 1). The defect/upper lateral lip ratio ranged from 50 to 100 percent (average, 65 percent) in this series. All lesions were partial-thickness. In two patients, the defects had been full-thickness originally because of extirpation of squamous cell carcinoma on the right face and in the oral cavity. They had received free anterolateral thigh flaps for through-through defects before. As a result, disfiguration of the lip remained. Three patients were treated by dermatologists for basal cell carcinoma. After tumor extirpation, defects included the upper lateral lip subunit, the partial vermilion, and the partial orbicularis oris muscle. One patient had a deformity resulting from scars on the upper lateral lip that were the result of trauma. Three patients had concomitant involvement of the nasal ala. Ages ranged from 19 to 79 years.

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Table 1. Patient Demographics

Patient	Age (yr)	Sex	Indication	Site of Defects Other Than Those from ULL	D/ULL Ratio (%)	Combined Procedures
1	38	Female	Basal cell carcinoma	No	60	Vermilion advancement
2	42	Female	Basal cell carcinoma	No	60	Vermilion advancement
3	73	Male	Basal cell carcinoma	No	50	Vermilion advancement
4	51	Male	Squamous cell carcinoma	Right ala and nasal floor	100	Forehead flap and free flap
5	19	Female	Traumatic injury	Right ala and nasal floor	50	Forehead flap
6	79	Male	Squamous cell carcinoma	Right ala, sidewall, and cheek	70	Forehead flap, cheek advancement, and free flap

ULL, upper lateral lip, D/ULL ratio, defect to upper lateral lip ratio.



Fig. 1. (Above, left) The flap's design was based on the contralateral normal upper lateral subunit. (Above, right) The defect was extended to the borders of the upper lateral subunit. (Center, left) The supraorbitalis oris muscle dissection was performed. (Center, right) The inset of the flap after rotation was performed. (Below, left) Undermining of the cheek was performed to close the donor site primarily. (Below, right) All scars were coincided with the borders of the upper lateral lip subunit aesthetically. (Courtesy of Gary C. Burget, M.D.; used with permission.)

Surgical Technique

Flap Design

The superficial defects of the upper lateral lip were recreated and expanded to the perimeter of the upper lateral lip subunit (Fig. 1). The foil templates were created and used in the contralateral normal upper lateral lip subunit as the model.¹ The margin of the templates was outlined by philtrum column medially, nostril sill, alar base superiorly, and nasolabial crease laterally (Fig. 2).

The templates were then flipped to the side of the deformity. The arc of rotation of the nasolabial rotation flaps was designed to provide tension-free wound closure after inset and to ensure that the borders of the transposed flaps could reach to the margins of the defect. Hence, the axis of the transposed flap was positioned perpendicularly to the rotation arc, and the lateral border of the transposed flap was laid on the nasolabial fold after insetting. The blood supply of the flap is based on branches of the facial artery, superior labial artery, or the angular artery.^{2,3} A nutrient artery was lo-

cated by the handheld Doppler preoperatively in three of the six cases. In the other cases, the flaps had a random blood supply. Because the defects of the upper lateral lip were superficial in all patients, the depth of the flaps was kept as thin as 5 to 8 mm. The orbicularis oris muscle was below the plane of dissection. The nasolabial rotation flaps were suitable for combination with other reconstructive procedures. If defects involved the vermilion, the remaining vermilion was advanced superiorly to repair the defects with combination of the nasolabial rotation flaps. In addition, if defects involved ipsilateral nasal ala, the transposed flaps were used to determine the accurate position of the alar bases at the preliminary stage to reestablish a sturdy platform for the nose. The following nasal reconstructive procedures, such as application of the forehead flaps, can be established accordingly.

Flap Harvest

The distal part of the flap was elevated first. During the harvesting procedure, underlying muscles and nerves were preserved. Conservative



Fig. 2. Patient 2 was a 42-year-old woman who, after treatment with Mohs' surgery for basal cell carcinoma, was referred for upper lateral lip reconstruction (*left*). The defect/upper lateral lip ratio was 60 percent, and the defect included partial vermilion. The defect was expanded to the territory of the upper lateral lip subunit. The nasolabial rotation flap and the vermilion advancement were undertaken simultaneously to treat the defects. The donor site was closed primarily after undermining on the cheek. No distortion of adjacent tissue was noted when the flap inset was complete. No revision was necessary to achieve satisfactory results aesthetically (*right*). (Courtesy of Gary C. Burget, M.D.; used with permission.)

dissection was carried out once dissection approached the base of flaps proximally. The dissection was halted once the elevated flap could be rotated into the defect. Care should be taken not to cause too much tension after inset. Either extension of the lateral border incision or dissection proximally to the nutrient arteries was carried out to obtain a tension-free closure. Consequently, the flap bases, including the nutrient vessels inferiorly, were transposed and sutured to the defects in one or more layers. In one case, a heavy smoker with a previous scar at the base of the flaps had compromised blood supply to the flap when the flap was transposed. The single preliminary delay was done, and the flap was sutured back to the donor site. Elevation and transfer of the flaps were undertaken 3 weeks after that. To close the donor defect directly, the cheek was undermined laterally. In addition, because of unequal length of lateral and medial borders of the transposed flaps, the burrow triangle was excised to facilitate closure of the donor area.

RESULTS

Follow-up for all patients was 6 to 13 months (average, 6.8 months). No flap loss was noted. In three cases, concomitant vermilion advancement flaps were used to replace tissue loss on the vermilion. In two cases, forehead flap reconstruction was undertaken due to alar deformity 3 weeks after nasolabial rotation flap reconstruction. No tumor recurrence was noted during the follow-up period. In all cases, the donor sites were well-camouflaged into the nasolabial folds that were created aesthetically after transposed flaps inset. The normal labial dimensions and form were preserved. Vertical linear scars on the cheek were aesthetically placed. No patients had infection, hematoma, nerve injury, or secondary revision. All patients were satisfied with the results.

DISCUSSION

The upper lip is aesthetically and functionally important. Upper lip reconstruction has been a difficult challenge for plastic surgeons. Normal lip landmarks must be replaced, and the symmetry and balance of the lip and commissures must be maintained. Scars must be positioned so as not to outline the reconstruction as a patch.¹ Many reconstructive methods of smaller defects (defect/upper lateral lip ratio <50 percent) have been reported from primary-closure skin graft to local flaps, such as zygomatic flaps,⁴ ergotrid flaps,⁵ V-Y advancement flaps,⁶ and others. Large defects (defect/upper lateral lip ratio >50 percent) are rel-

atively more difficult to repair aesthetically. Many authors have described multiple methods to repair composite defects on the upper lateral lip, from local flaps (modified Abbe flaps,¹ nasolabial orbicularis oris myocutaneous flaps,⁷ bilateral reverse composite nasolabial flaps,⁸ deep-plane angle rotation flaps,⁹ and others) to free flaps (free temporal scalp flaps,¹⁰ free radial forearm flaps,¹¹ and so on). Some methods, however, have some potential to distort the adjacent structures aesthetically and deteriorate orbicularis oris function, and few methods create an upper lateral lip that looks like a normal one. In sum, the ideal method of reconstruction of the superficial and larger defects on the upper lateral lip has not been reported. Because there is no orbicularis sphincter involvement, surgeons may forgo sophisticated reconstructive procedures with functional concerns and focus on aesthetic restoration. In addition, when a large part of an upper lateral subunit has been lost, replacing the entire subunit rather than simply patching the defect often gives a superior result. Scars present on any restored lip must be made to fall in the natural shadowed furrows or depressions, or along expected lighted ridges, so that their shadows and reflections will be hidden.¹ Therefore, once the defect/upper lateral lip ratio is more than 50 percent, we prefer to recreate the defects to the borders of the upper lateral lip subunit and repair them as a complete subunit. The nasolabial rotation flaps based on the upper lateral lip subunit that we proposed were categorized as rotational flaps. The flaps were designed easily, and restoration of defects of the upper lateral subunit can be achieved aesthetically.

Because of the superficial design of the flaps, neither the orbicularis sphincter nor the nerves were injured. All the subtle lip expressions remained intact and continued to convey specific nonverbal meanings in facial expression.¹

The nasolabial rotation flaps are supplied by the perforators from either a facial artery, a superior labial artery, or an angular artery. The anatomical variations of perioral arteries were classified into three types.³ The mean distance of the origin of the superior labial artery from the labial commissure was 12.1 mm.² Because of varied vascular anatomy, we used the handheld Doppler preoperatively. Once scars were noticed around the identified perforators because patients had comorbid conditions or were heavy smokers, which may compromise the circulation. A single preliminary delay was implemented.

The reconstruction of the upper lateral lip was possible in a single-stage surgery. In addition, the transposed flaps provide reliable foundations for the following reconstructive procedures. Once the accurate upper lateral lip subunit was determined accurately by the transposed flaps, either vermilion advancement for the vermilion reconstruction or the forehead flaps for the nasal reconstruction can be confidently performed and easily placed in their normal positions, respectively. After the nasolabial rotation flaps, the reconstructive procedures were carried out either in the same stage simultaneously or during the next stage according to the individual defects.

Donor sites were closed primarily after conservative undermining without noticeable scars. They were not extended below the oral commissure, which differed from Yotsuyanagi T's method,⁷ and did not distort the perioral structures. All scars were hidden into the borders of the upper lateral lip subunit and were outlined by the philtrum column, nostril sill, alar base, and nasolabial fold.

Some disadvantages of the flaps were noted. The flaps are only suitable for superficial defects, not the composite defects. The flaps cannot reach defects on the philtrum. To reach the above defects, the length of the flaps must be extended. The circulation of the flaps may be jeopardized, and obvious extended scars into the lower eyelid may be noticed after that. Because this technique cannot replace hair-bearing tissue in men, the follicular unit hair transplant method will be needed to achieve symmetric bilateral hair-bearing appearance. Finally, a linear vertical scar was created against the native wrinkle lines on the face. No patient complaints were noted, however.

CONCLUSIONS

Nasolabial rotation flaps based on upper lateral lip subunits are reliable for reconstructing large, superficial defects of the upper lateral lip. By preserving the normal facial appearance with

minimal donor-site morbidity, excellent aesthetic reconstructive results are easily achieved by appropriate patient selection and preoperative planning.

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PATIENT CONSENT

The patient provided written consent for use of her images.

REFERENCES

- Burget GC, Menick FJ. Aesthetic restoration of one-half the upper lip. *Plast Reconstr Surg*. 1986;78:583–593.
- Magden O, Edizer M, Atabay A, Tayfur V, Ergur I. Cadaveric study of the arterial anatomy of the upper lip. *Plast Reconstr Surg*. 2004;114:355–359.
- Nakajima H, Imanishi N, Aiso S. Facial artery in the upper lip and nose: Anatomy and a clinical application. *Plast Reconstr Surg*. 2002;109:855–861; discussion 862–863.
- Gardetto A, Erdinger K, Papp C. The zygomatic flap: A further possibility in reconstructing soft-tissue defects of the nose and upper lip. *Plast Reconstr Surg*. 2004;113:485–490.
- Becker S, Lee MR, Thornton JF. Ergotrid flap: A local flap for cutaneous defects of the upper lateral lip. *Plast Reconstr Surg*. 2011;128:460e–464e.
- Hurwitz DJ. Composite upper lip repair with V-Y advancement flaps. *Plast Reconstr Surg*. 1990;85:120–122.
- Yotsuyanagi T, Yokoi K, Urushidate S, Sawada Y. Functional and aesthetic reconstruction using a nasolabial orbicularis oris myocutaneous flap for large defects of the upper lip. *Plast Reconstr Surg*. 1998;101:1624–1629.
- Sarifakioglu N, Aslan G, Terzioglu A, Ates L. New technique of one-stage reconstruction of a large full-thickness defect in the upper lip: Bilateral reverse composite nasolabial flap. *Ann Plast Surg*. 2002;49:207–210.
- Haddock NT, Zide BM. Deep-plane angle rotation flap for reconstruction of perioral lesions. *Ann Plast Surg*. 2011; 67: 594–596.
- Chang KP, Lai CS, Tsai CC, Lin TM, Lin SD. Total upper lip reconstruction with a free temporal scalp flap: Long-term follow-up. *Head Neck* 2003;25:602–605.
- Takada K, Sugata T, Yoshiga K, Miyamoto Y. Total upper lip reconstruction using a free radial forearm flap incorporating the brachioradialis muscle: Report of a case. *J Oral Maxillofac Surg*. 1987;45:959–962.