Flexible Curved V-Y Subcutaneous Flap for Facial Skin Defects

Osamu Ito, MD, PhD*
Tomoyuki Yano, MD, PhD*
Takeshi Kawazoe, MD, PhD†
Shigehiko Suzuki, MD, PhD†

Background and Methods: We devised an improved type of the V-Y subcutaneous pedicle flap with the elements of both advancement and rotation flaps. This flexible curved V-Y subcutaneous flap was used for facial skin defect reconstruction in 15 patients. Curved flaps were designed according to the elasticity of the surrounding skin and the postoperative scar direction.

Results: In all the 15 patients, the flap survived without circulatory impairment, and follow-up for more than 1 year indicated an inconspicuous scar and good course.

Conclusions: With elements of both advancement and rotation flaps, transfer and wound closure of the flexible curved V-Y subcutaneous flap are easy. In addition, the postoperative scar can be positioned along natural wrinkle lines and relaxed skin tension lines. This may be a useful local flap for facial and general plastic surgery. (Plast Reconstr Surg Glob Open 2015;3:e531; doi: 10.1097/GOX.0000000000000499; Published online 9 October 2015.)

The V-Y subcutaneous pedicle flap is a typical advancement flap. For skin defects, an isosceles triangle subcutaneous island flap is raised in parallel to wrinkle lines and slides to close the defect. To improve over this design, we developed the flexible curved V-Y subcutaneous pedicle flap with elements of both advancement and rotation flaps (Fig. 1). This flap was used for the reconstruction of facial skin defects in 15 patients.

METHODS

Before surgery, a flap was designed by evaluating the laxity, elasticity, wrinkle lines, and relaxed skin tension lines (RSTL) around the operation area. Even if the position of the flap head was determined, the flap tail has 2 possible directions depending on the direction of the curve. The flap tail position could be changed flexibly by altering flap length or curve angle (Fig. 1). The area around the designed flap was adequately infiltrated with a local anesthetic containing epinephrine and an incision was made along the designed line. To maintain flap circulation, soft tissue at flap bed larger than the flap size was left and the surrounding area was extensively dissected. When the flap could not be adequately transferred to the skin defect by advancement alone, a soft tissue pedicle was left inside the curve and the flap bed was transferred. After adequate confirmation of flap transfer, accurate hemostasis was performed and the flap was sutured to the skin defect area for closure.

PATIENTS

This flap was used for facial skin defect reconstruction in 15 patients (8 males and 7 females) aged 6–62 years. The defect was due to a scar in 3 patients, nevus/benign tumor in 7 patients, and malignant tumor in 5 patients. A patient is presented below.

Disclosure: The authors have no financial interest to declare in relation to the content of this article. The Article Processing Charge is paid for by the authors.
A 17-year-old female with congenital nevocellular nevus (20 × 10 mm) in the medial side of the left eyebrow underwent surgery with local anesthesia (Fig. 2). Resection was performed with a 1-mm margin from the nevus edge. A flap was designed as an aesthetic unit of the eyebrow, similar to the eyebrow shape (Fig. 3). She has shown a good course for more than 3 years after operation without conspicuous scars (Fig. 4).

RESULTS
In all patients, the flap survived without partial necrosis. After 1-year postoperative observation, scars were relatively inconspicuous with no skin redundancy for trap-door deformity. Flaps raised near the joint also maintained softness and did not disturb motor function.

DISCUSSION
Compared with primary closure, local flaps require a complicated surgical procedure, but cause relatively slight sacrifice of the donor and surgical invasion and localize the scar in a narrow area. Local flaps are raised from skin near the defect, with similar color and texture similar to those of the recipient site. Subcutaneous pedicle flaps excluding those transferred to distant sites through a tunnel can be considered a type of local flap. Because the incision for subcutaneous pedicle flaps is made on the entire...
skin circumference, blood is supplied only by soft tissue at the flap bed.

There are 3 patterns of transfer of local flaps: advancement, transposition, and rotation. Subcutaneous pedicled flaps are classified as the former 2 types. The V-Y subcutaneous pedicle flap is a typical advancement flap, wherein the normal skin area, resected as the dog ear in primary closure, can be utilized as the main body of the flap. Due to flap advancement, torsion is slight and the scar area can be reduced. However, transfer distance is limited because the soft tissue is transferred by sliding, and the scar can have a linear geometrical pattern that does not fit the natural curve of the skin.

To overcome these disadvantages, we designed a flexible curved flap to provide mobility to its shape, allowing the scar to be arranged along the curve of wrinkle lines and directing the flap tail in the direction of RSTL. This flap has the elements of both advancement and rotation flaps and can be moved more freely due to the direction of the pedicle.

The flap’s disadvantages include a length difference between the internal and external diameters due to curving, which may sometimes cause flap torsion and a dog ear at the time of suturing. However, these issues can be controlled by the way the flap is rotated and advanced, and taken into consideration at skin defect closure.

Previous reports of improved V-Y subcutaneous pedicled flaps mainly aimed at shortening the transfer distance such as by oblique advancement (oblique sigmoid subcutaneous flap). Although curved flap designs of the face have been described, these authors have not recognized enough flexibility of their designs. Herbert et al showed the blood supply of nasolabial area and their flaps were designed along the nasolabial folds. The horn flap is based on the concept of a circle with lateral pedicle and can be used as a small flap on the face. Some para-alar crescentic flaps can also be produced using the same concept as our flap. We previously used the eyelid as a flap.

We aimed to increase transfer freedom by combining the rotation and advancement transfer patterns, and have used this flexible curved flap on the face and other body parts. Our flexible designed flaps can be used in all the body parts but may have wide indications for aesthetic unit (lip, eyebrow, etc.).

**CONCLUSIONS**

We developed an improved V-Y subcutaneous pedicle flap that was used on the faces of 15 patients and obtained good results. This flexible curved V-Y subcutaneous pedicle flap has the following advantages.

Elements of rotation flaps added to those of advancement flaps increased the degree of transfer freedom.

By curving of the flap, it can be arranged along wrinkle lines and the flap tail can be directed in parallel with RSTL.

By changing the degree of the curve, the design can be flexibly altered, with the scar brought to an inconspicuous site and the flap transferred as an aesthetic unit.

Osamu Ito, MD, PhD
Department of Plastic Surgery
Yokohama City Minato Red Cross Hospital
3-12-1, Shinyamashita, Naka-ku
Yokohama, Kanagawa, 231–8682 Japan
E-mail: osaito1005@yahoo.co.jp.

**PATIENT CONSENT**

The patient provided written consent for the use of her image.

**REFERENCES**

1. Ono I, Gunji H, Sato M, et al. Use of the oblique island flap in excision of small facial tumors. *Plast Reconstr Surg*. 1993;91:1245–1251.
2. Herbert DC, Harrison RG. Nasolabial subcutaneous pedicle flaps. *Br J Plast Surg*. 1975;28:85–89.
3. Herbert DC, DeGeus J. Nasolabial subcutaneous pedicle flaps. *Br J Plast Surg*. 1975;28:90–96.
4. O’Donnell M, Briggs PC, Condon KC. The horn flap: a curved V-Y advancement flap with lateral pedicle. *Br J Plast Surg*. 1992;45:42–43.
5. Suzuki S. Para-alar crescentic subcutaneous pedicle flap for repair of skin defects in the philtrum. *Ann Plast Surg*. 1989;23:442–446.
6. Ito O, Suzuki S, Park S, et al. Eyelid reconstruction using a hard palate mucoperiosteal graft combined with a V-Y subcutaneously pedicled flap. *Br J Plast Surg*. 2001;54:106–111.