Important Aspects of Oral Lining in Unilateral Cleft Lip Repair

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Abstract: To achieve an aesthetic lip in cleft lip repair, central fullness and slight eversion of the vermilion are necessary. If only cutaneous anthropometric length is considered, symmetry and good vermilion contour may be obtained, but a seemingly tightness of the lip can occur. To prevent this, it is necessary to obtain sufficient central mucosal tissue of the oral lining.

The authors used 2 methods to obtain adequate tissue of the central area of the oral lining. First, the mucosa of the central area of the oral lining was supplemented using a medial mucosal flap, and the amount of superficial tissue was minimized. Second, a relaxing incision was placed at the oral lining of the lateral flap, which was subsequently centrally advanced.

A total of 389 patients with a unilateral cleft lip underwent surgery using these methods and achieved satisfactory results. Occasional cases of lateral vermilion bulging were encountered during long-term follow-up, but these were easily corrected by bulging excision.

Consideration of the oral lining is essential in cleft lip repair. The authors were able to reconstruct an aesthetically pleasing lip with central fullness by obtaining an adequate amount of tissue in the central area of oral lining.

Key Words: Oral lining, unilateral cleft lip

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The purpose of cleft lip repair is the reconstruction of an aesthetic and symmetric lip. To achieve this, numerous surgical methods have been devised and modified. Most modifications tend to focus on the cutaneous design to achieve the symmetry of the cutaneous length. Overfocus on superficial manipulation of the skin at the expense of aspects of the oral lining may result in symmetric but visibly tight lip—failure to obtain fullness of the central vermilion and lip inversion due to a lack of central mucosal tissue (Fig. 1A).

Moreover, severe lack of tissue in the oral lining can easily give rise to notching deformities; in many cases, notching or whistle deformity occurred by a short vertical height of the medial oral mucosa (Fig. 1B). Accordingly, sufficient mucosa must be incorporated in the oral lining to prevent such cases.

The authors used 2 methods to obtain adequate tissue of the central area of the oral lining: first, by Z-plasty using a medial mucosal flap to provide mucosal tissue to the central oral lining, and second, by placing a relaxing incision in the oral lining of a lateral flap with subsequent central advancement of the flap.

Our methods may be introduced in other articles, but most articles did not focus on the oral lining repair. Furthermore, there have been little publication and limited information on procedures that place emphasis on the manipulation of the oral lining in unilateral cleft lip repair. Therefore, we would introduce our methods and emphasis on the oral lining closure in unilateral cleft lip repair.

METHODS

Marking and Incision

The midline and the point of philtral column height on the nonleft side (2, Fig. 2A) are marked at the lip-columnar crease. The point of philtral column height on the cleft side (3, Fig. 2A) is marked. This point is marked where the vermilion is fullest (the point of attenuation of lip fullness) rather than at a point equidistant from the corners of the mouth. An incision line is drawn along the vermilion-cutaneous junction of the cleft side (2–4, Fig. 2A). The incision line for the rotation of the medial flap is placed straight toward the columnar base where the column of the nonleft side ends (2–5, Fig. 2A). The length of the back-cut is determined by the degree of rotation during surgery. An incision line for the insertion of the triangular flap of the lateral flap is designed at the philtral ridge of the medial flap, parallel to the white roll of the nonleft side of Cupid’s bow. The incision line is marked following the lip border of the lateral flap (3–6, Fig. 2A), and the triangular flap is designed.

At the vermilion, a line perpendicular to the vermilion border is designed (2–7 and 3–8, Fig. 2A). This line is designed to follow parallel to the vermilion border to the buccogingival sulcus line of both medial and lateral flaps (7–9 and 8–10, Fig. 2B). In the case of medial flap, this “M” (M, Fig. 2A, B) becomes Z-plasty with the mucosa of the oral lining (O, Fig. 2B). Also, an incision line following the buccogingival sulcus is a relaxing incision for the central advancement of the lateral flap (10–11, Fig. 2B).

Dissection

After incision, muscle dissection is performed. Abnormally attached muscle is freed from the alar base, and if the lateral flap is not sufficiently freed, scissors are used to dissect supraperiosteally the piriform aperture area (Fig. 3). The 2 to 3 millimeters of skin and mucosa around the incision are dissected from the orbicularis oris muscle, which allows easier and tension-free approximation of edges after muscle suturing. Muscle is repaired after dissection. Adequate suturing of the full-length muscle allows sufficient length of lip to be attained and lessens skin tension, which prevents scar widening. During muscle repair, generous suturing with a larger edge at the cephalic end of muscle allows more lip eversion. This is
because if the outer edge of the orbicularis oris muscle is pulled
tighter, the inner area is more everted.

**Oral Lining Closure**

The portion of the M flap, which will be inserted into the oral
side, is adequately trimmed and sutured (Fig. 4). In cases of
complete cleft lip, in which a lateral mucosal flap is insufficient for
covering the nasal lining, the medial mucosal flap is also used. In
such cases, only advancement of the lateral flap is possible to acquire
mucosal tissue of the central area. In cases of incomplete cleft lip,
the lateral mucosal flap is generally discarded. The lateral mucosal
flap (I, Fig. 4A) is sutured for nasal lining closure. Subsequently, the
buccogingival incision of the oral lining of the lateral flap is sutured
by proceeding medially from the lateral side. Before proceeding
sutures, a key suture of the skin is placed and taking into account the
overall form of the lip, the extent of advancement of the lateral flap
should be ascertained.

**Skin and Vermilion Closure**

After suturing the triangular flap, the procedure is continued
toward the nasal base until symmetry of nostril width is obtained
(Fig. 5). Defects of the medial flap after rotation are repaired with the
medial skin flap after adequate trimming. The lateral vermilion is
trimmed and closed so that the symmetric contours of the medial and
lateral portions of the vermilion are achieved.

**RESULTS**

Between 1989 and 2008, a total of 389 surgeries were
undertaken for unilateral cleft lip. These surgeries involved 206
patients with an incomplete cleft lip and 183 patients with a com-
plete cleft lip. Surgeries were usually undertaken at age 3 months
if allowed (Fig. 6). Retrospectively, the secondary deformities that
needed surgical correction were reviewed. The notching deformity
(whistle deformity) was rare, which was observed in 4 patients (1%).
The patients with peaking deformity were 11 (3%). Most cases with
a secondary deformity of the lip requiring surgical correction were
due to lateral vermilion bulging, which was observed in 22 patients
(7%). These secondary deformities were easily corrected using an
elliptical bulging excision (Fig. 7). Surgical revision of secondary
deformities of the lip was undertaken at approximately age 5 years
(preschool age).

**DISCUSSION**

The lips are three-dimensional structures. Therefore, to attain
vertical height through rotation of the medial segment, an effort must
be made to attain sufficient mucosa for an oral lining. The authors’
methods could be simply summarized as procedures involving the
rotation and advancement of the oral lining. However, the authors
adopted Z-plasty using a medial mucosal flap rather than a rotation
flap. Using the authors’ methods, an adequate amount of mucosal
tissue is obtained for an oral lining. Furthermore, notching
deformities are rare, and central fullness is attained, which ensues
in the possibility of tubercle formation.

When there is inadequate exposure of the vermilion (thin
lips), individuals tend to appear aged and unattractive. To surgically
correct thin lips, the tissue of the oral lining is stretched vertically to
give the appearance of thicker lips. Also, methods, such as Z-
plasty, V-Y plasty, and transposition flaps to correct notching

![Figure 1](image1.png)

**FIGURE 1.** A, Symmetry and satisfactory contour of the vermilion are achieved, but the lip lacks central fullness and appears
tight. B, Rotation of the medial flap on the skin side was achieved. However, a lack of oral lining mucosa and insufficient
release of the oral lining have resulted in a severe notching deformity.

![Figure 2](image2.png)

**FIGURE 2.** A, The design of complete cleft lip repair. B, A Z-plasty is placed between the medial mucosal flap (M) and the
oral side mucosal flap (O); M flap is used to supplement oral lining inadequacy.
deformities of the vermilion, and the V–Y advancement techniques used for tubercle formation are designed to obtain sufficient vertical tissue for the oral lining. Thus, consideration of the oral lining is necessary in lip surgery, especially for the repair of cleft lip, where there is an insufficiency of skin and mucosa.

Our technique was introduced by Millard, but we modified his method from 2 points of view. The absence of an incision around the alar base is 1 point. This was made because usually the scar around the alar base is quite conspicuous and revision is not easy. Furthermore, this scar becomes an issue of concern to most patients. In addition, repair without placing an incision around the alar base could reduce the width of the alar base, which would result in less nostril flare. The second modification concerns the fullest portion of the vermilion (the point of attenuation of lip fullness) to decide the height of the Cupid’s bow of the lateral lip. If this point is used, no cleft tissue is left in the area of repair, and short lip whistle-type deformities do not occur. Although by using this point the length from the oral commissure to the height of Cupid’s bow may be shorter than that of the noncleft side, discrepancies of the horizontal length of the lip are less apparent than discrepancies in lip height. There have been instances of lateral vermilion bulging postoperatively using the authors’ methods, but revisions in such cases are more straightforward than the revisions of other secondary deformities of cleft lips and do not require manipulation of previous surgical tissue.
FIGURE 6. Preoperative photographs (A) of unilateral complete cleft lip and photographs taken at 8 months after surgery (B). Preoperative photographs (C) of a unilateral complete cleft lip and photographs taken at 7 months postoperatively (D). Preoperative photographs (E) of a unilateral incomplete cleft lip and photographs taken at 5 months postoperatively (F).

FIGURE 7. Preoperative photograph (A) of unilateral incomplete cleft lip and a photograph taken 4 years after surgery (B); bulging of the lateral vermilion is observed. C, Photograph taken 3 months after correcting the bulging deformity (at age 5 years) using an elliptical excision.

FIGURE 8. A, There is more overlap of the outer edge of the right ellipse (the colored portion designates the overlapped area). B, A worm’s eye view demonstrating more eversion of the right ellipse.
Repair of the whole length of the orbicularis oris muscle, especially through the cephalad area, is important in terms of lip eversion. A larger bite and a larger overlap of the cephalic end of the orbicularis oris muscle allow more lip eversion (Fig. 8). Also, adequate suturing of the full length of the muscle allows vertical lip height to be attained and reduces skin tension. Although the length of skin obtained by medial flap rotation is an important factor of attaining vertical lip height, we believe that muscle length is also critical. The importance of reorientation and repair of muscle in cleft lip repair has been emphasized previously in various publications and reports.11

In conclusion, to achieve successful results in unilateral cleft lip repair, consideration of the oral lining is essential. The authors were able to reconstruct an aesthetic lip with central fullness and slight eversion by manipulation of the oral lining in unilateral cleft lip repair.

REFERENCES