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FRONTAL COLUMELLAR FLAP IN UNILATERAL CLEFT LIP REPAIR

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Abstract: The authors modified the design of Mohler's method of cleft lip repair, and attempted to make this method more reasonable, standard and surgically applicable, yield better outcome and to broaden the indications. In the modified Mohler technique, wherein designing and dissecting of the flap and the orbicular oris muscle are done separately, the author created an equilateral triangle flap (side≤6mm) from the frontal part of the columella. The flap is rotated and displaced downwards so that the atrophic philtral dimple is lengthened, the philtral column is reconstructed in such a way that the involved side of the Cupid's bow peak is restored to the normal position. From 1998 to 2000, the authors used this modified method to correct unilateral cleft lips in 38 patients. The results showed that the skin of the frontal columella and that of the philtral dimple were structurely similar, and so is ideal material for repairing the atrophied philtral dimple. The modified Mohler method for unilateral cleft lips can produce a better lip contour and broaden the indications.

Key words: cleft lip repair, columellar flap, Mohler's procedure
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INTRODUCTION

In many traditional cleft lip repair methods, one or two triangular flaps were horizontally inserted into the medial segment (Song et al., 1999). As a result, these flaps damaged the integrity and consecution of the philtral dimple skin, and led to difficulties in restoring the philtral column.

Mohler's(1987) report on his cleft lip repair technique using the flap of the columellar base was followed with interest in medical circles. It preserved the philtral dimple, restored the position of the Cupid's bow on the cleft side, and reconstructed the philtral column in a straight line. However, the lengthening of the upper lip with his method was limited. If the deficiency in the vertical dimension was more than 3 mm, this method seemed to be difficult. After analyzing his method, we enlarged the size of the flap and reduced the upper angle of the flap on the frontal columella, and put forward a new design. Thirty-eight cleft lips were successfully repaired with the new method, which we believe is more reasonable, standard and surgically applicable. The modified technique is described below:

PATIENTS AND METHODS

Preoperative and designs

Designs of incision are shown in Fig. 1. Point B was determined based on the distance between the highest point Y and the lowest point Z of the Cupid's bow. Point A' was taken as the midpoint between the alar base and the columnellar base on the level with the alar groove. Point A on the cleft side was established on the same level with and at the same distance from the columnellar and alar bases as that of point A'. Line AB was shorter than line $A'Y$ by

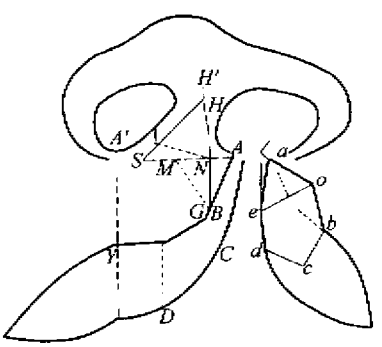

Fig.1 Markings on the lip. $BH = A'$, $Y = ao + ob$. $\angle H = 60°$, $BC = bc$, $CD = cd$, $\Delta HIN = \Delta AMG = \Delta aeo$.

L (L = $A'Y$-AB). On the line AB, starting from point A, an equilateral triangular AMG (side = L) was drawn with dotted line. $\triangle AMG$ is the figure of the receiving site.

Point H' was located at the junction of the vertical central line on the columnella and the horizontal line at the top of the nostrils. Point N is the junction of the horizontal line at nasolabial angle and the lateral side of the columella. Point B and H' were lined up with N. Point H was located on the line NH'. $NH = L$. Then, via point H, the line was extended downward to cross the horizontal line of the columnellar base at point I and to meet the extending line of AM, right where point S was determined. $\angle H = 60°$, $SH = SA$, $\triangle HIN$ was rotated downward to meet $\triangle AMG$, resulting in the convergence of SH and SA, $\angle H$ and $\angle A$. The downward movement of HN lengthened L on line AB. The length of HB equalled that of the normal philtral columella. Line SI was an auxiliary incision.

Flap SIHB was undermined and raised to expose the orbicularis oris muscle. (Fig.2). From point A, a line AE at 60° to line AB was drawn on the orbicularis oris muscle, $AE = L$. Line AE was the incisional line on the orbicularis oris muscle. After AE was incised, the upper lip was pulled downward to restore the peak of the Cupids bow on the cleft side to the normal position. A vertical triangular muscle gap $\triangle AEO$ was created at the upper portion of the lip. The height (AO) of the gap was equal to L.

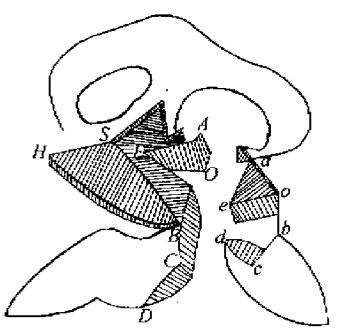

Fig.2 The flap SHB is raised to expose the orbicularis oris muscle. $AO = L = A'Y$-AB $\angle EAB = 60°$. AE is incised perpendicularly. Point B is pulled down to normal position. A gap $\triangle AEO$ occurs in the upper portion. $AO = ao = L$. The segment aoe denudated from the skin is inserted into the gap.

The vermilion was usually much thinner on the medial side and thicker on the lateral side. A flap designed in the lateral vermilion was inserted into the thinner site in the medial vermilion. (Fig. 3) Point C was located at the free border below the point B. Point D was at the free border below the point Z. The vermilion was dissected along line CD for insertion of the flap to repair the cleft.

Point a was set at the upper border of the lateral lip on the same level as point A and also at the same distance as point A' from the alar base. Point b was set at the lower border of the lateral lip where the visible vermilion-cutaneous ridge was. Line ab equalled in length to line $A'Y$. Point c was beneath point b on the vermilion. $BC = bc$. Point d was located at the medial side of the point c on the same vermilion. $CD = cd$. Based on the size of the triangular muscle gap on the upper portion of the medial segment, a triangular mucosa muscle flap ($\triangle aeo$) was designed at the top of line ab. The angle e of the flap ($\triangle aeo$) was located at the free border of the lateral segment. Line $ao = L$, $ae = AE$, $oe = OE$, $ob = OB$, $ao + ob = BH$ (Figs.1,2).

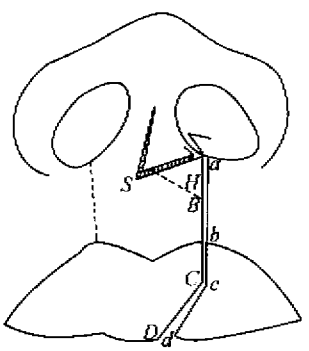

Fig.3 The appearance after suturing. Both philtral columns are symmetric. The philtral dimple is intact.

Thirty-eight infants with unilateral cleft lips, 20 complete and 18 incomplete, were treated successfully with our method in the past two years. The ages ranged from 2 to 12 months, averaged 5 months.

Surgical procedure

The skin was incised, undermined and opened along line SI, IH, HB to expose the orbicularis oris muscle. The muscle and mucosa membrane were incised along line AE. The medial segment was pulled down to the level of the

point B with that of the peak of the Cupid's bow on the normal side. A triangular muscle gap with vertical side of length *L* appeared in the upper portion of the medial segment. The columnellar flap was rotated and displaced downward after the orbicularis oris muscle was moved down. Point *H* on the flap was carried to point *A*, Point *I* to point *M*. The skin was cut perpendicularly along *aob*. The full layer of the tissue was incised perpendicularly along line *ae*, *oe*, *ob*, *bc*, *cd*. The triangular flapdenuded from the skin and the frontal mucosa membrane was inserted into the gap $\triangle AEO$ in the medial segment. The mucosa membrane and muscle in the medial and lateral segment were sutured together. Point *A* and *a*, *E* and *e*, *O* and o are converged. The side (*BH*) of the flap and the side (*ab*) of the lateral flap were sutured together. The donor site incision with side $\leqslant 4$ mm in the columella was closed directly. If not, it was necessary to undermine the lateral columella flap and pull it forward. then, close the wound.

Postoperative management

The operated area was left open after operation. The incision was cleansed by gently applying 1.5% hydrogen peroxide with cotton applicator, three times per day. The skin sutures were removed on the fifth day after surgery. The patient was spoon-fed for one week, and gradually changed to breast-feeding. Oral hygiene maintained was every day to prevent patients from catching cold.

RESULTS

All the 38 operations had satisfactory outcome. The effect of the designing and the results of the surgery were consistent. The structures of the Cupid's bow were preserved well. The vermilion was aligned. The philtral columns were symmetric and straightened upright on both sides. The incisional scar in the upper lips was not obvious Figs.4,5.

Fig.4 A one-year-old boy before operation.

Fig.5 Five days after operation.

DISCUSSION

The skin of the frontal columella and the philtral dimple connected well as they were structurally similar and ideal material for the atrophied philtral dimple repair, especially for unilateral cleft lip repair. The primary repair was usually completed within one year. The operational design depended on the patient's condition of columnella and the degree of the lip atrophy. The side of the columnellar flap should preferably be no longer than the width of the columnella, which favored the donor incision closure and the downward rotation of the flap.

The Millard method which was popularly used to repair cleft lips usually produced a nonsymmetric philtral column in the upper third lip. (Mohler, 1987. Honigmann, 1980.). Mohler's method was developed to solve this problem. After years of practice, Mohler's method has been accepted by plastic surgeons. Clinically, we found that the upper angle of the flap in Mohler's method was 90°, so that the side opposite the upper angle was wide, making it hard to design such a flap on the narrow columella(Noordhoff, 2000.). For this reason, the clinical application

of Mohler's method was limited. We changed the upper angle from 90° to 60° to make the upper angle's opposite side shorter, resulting in wider application of Mohler's technique. This change also met the requirement of size match between the donor and receiving side.

During the cleft lip repair, we found that the requirement of the skin for repairing the atrophied philtral dimple was different from that for repairing the orbicularis oris muscle. The lengthened skin of the phitral dimple required integrity and consecution with minimum transverse incision. The orbicularis oris muscle repair required full rotation of the flap to the place. To meet these two requirements, we designed the mucosa muscle flaps and the skin flaps separately, dissected them and repaired them layer-by-layer. Therefore, the transverse incision for releasing the orbicularis oris muscle was hidden behind the skin flap after the surgery, which distinguished the modified method from the traditional methods. We followed the principle that the size of the flap for replenishment should equal that of the deficiency. The length of the lengthened phitral column was the length of the deficiency. There was no need to make another triangle flap for the remedy.

Molher tried to restore the philtral column along a straight line. Just like others, he dissected the skin, muscle and mucosa together, and sutured them together on a vertical line. The scars formed from three layers contracted toward the same direction, shortened the repaired lips. We distributed the vertical contraction to three directions to decrease the tension of the skin incision by designing a mucosa muscle flap on the lateral side after removing the skin and vermilion, inserting this flap into the gap on the medial side; which changed the direction of the contraction of each layer and decreased the vertical contractibility. Comparison of our method with the traditional ones showed that our method did not entail too many incisions. We dissected the two layers separately. In the traditional methods, the three layers were dissected together. (Janusz Bardach et al., 1987). Our method kept the skin of the philtral dimple intact and reduced the vertical contraction of the scar.

CONCLUSIONS

Our modified technique improved and differed from that of Mohler's in the following three characteristics: (1) An equilateral triangular flap (60° instead of 90°) is designed on the frontal columnella. The upper angle of the flap is narrower than Mohler's. So the modified technique widens applications of Mohler's method. (2) The location and size of the donor site is determined. The size of the donor site matches that needed by the receiving site. An auxiliary incision is used in order to rotate the flap down without much tension. (3) The skin and mucosa muscle flaps are designed separately and dissected layer- by- layer, thus minimizing the transverse incisions on the philtral dimple and restoring the Cupbid's bow to normal position for reconstructing the philtral column. The deficiency is replenished by inserting the mucosa muscle flap designed from the lateral segment into the medial segment, thus reducing the scar contracture of the philtral column.

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