

Pediatric Facial Plastic and Reconstructive Surgery

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Chapter 14: Secondary Cleft Lip Surgery: Revision of the Residual Cleft Lip Deformity

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Residual cleft lip deformities may result from avoidable errors in evaluation, planning, and execution of the primary repair, or from the severity of the initial deformity, which may preclude a perfect result. Postoperative long-term management, eg, orthodontics and prosthodontics, influences the result. Residual deformities rarely improve with age. The most important cleft lip repair is the first one. Growth magnifies asymmetry. Imperfection present in microform following primary repair produces increasing deformity and asymmetry with age.

Residual defects appear as changes from the norm in shape, configuration, proportion, and symmetry. The inevitable cutaneous scar may be hypertrophic or contracted. Without being able to articulate the problem, the lay person will be drawn to an disturbed by even slight asymmetries of the lip.

The goal of secondary lip repair is the same as that of primary repair: to create a lip as closely resembling normal as possible. Specifically, there should be the following:

1. a normal Cupid's bow with peaks of matched height and width,
2. normal and symmetrical philtral width,
3. normal and symmetrical philtral height (vertical lip length),
4. normal and symmetrical vermilion fullness in the lateral lip element,
5. a normal vermilion tubercle with appropriate fullness and protrusion,
6. a smooth vermilion-cutaneous border (white roll), and
7. a normal nostril sill and alar base insertion width.

Achieving these depends on accurate skin, muscle, and mucosal approximation with reorientation of the orbicularis oris, and production of minimal scar.

Surgical timing for soft tissue defects alone, such as lip scar, abnormal muscle bulge, and white roll mismatch, may be done as early as 12 months post-primary repair. Treatment of defects involving multiple components, such as short lip, tight lip, and long lip, must be integrated with dental, orthognathic, and maxillary treatment, and with treatment of functional defects, eg, velopharyngeal incompetence.

If possible, maximal aesthetic correction should be achieved by age 5 to 6 years when peer influence begins to influence psychological development of self-esteem and self-concept.

Cutaneous Scars

The vermilion produces a consistently minimal and soft scar that rarely requires revision for its own sake.

Lip skin also generally produces a good scar. Marked hypertrophic scarring is rare. Mild hypertrophic scarring that produces a red, firm, and raised scar and shortens the philtral ridge and lip height is fairly common.

Prevention of scar hypertrophy is aided by minimal skin manipulation and avoidance of deep dermal sutures. Resection of 2 to 3 mm of muscle from each segment prior to muscle approximation removes tension from the skin closure and allows skin approximation without strain.

Primary repair done in infancy produces the best scar. Reopening the lip for secondary procedures should be avoided if possible.

Hypertrophic scarring should be initially treated with time, patience, and massage. Scar relaxation and return to normal vertical lip height may take a year to 18 months. If the lip is permanently shortened or disfigured by a wide, hypertrophic scar, five possible treatments exist:

1. The scar may be simply excised with reapproximation of skin edges and careful attention to white roll alignment.
2. If the scar contracture has produced significant lip shortening, a complete revision is indicated. Scar excision must be accompanied by readvancement and rerotation of the flaps with lengthening.
3. Dermabrasion and/or laser smoothing may be used to improve the scar appearance.
4. A severely scarred philtrum may be replaced with a full-thickness skin graft.
5. Z-plasties may be used to reorient the scar. However, this distorts the philtral line and philtral groove, produces dimpling, and is not generally recommended.

Vermilion Deformities

Three vermilion deformities commonly occur. Superior vermilion defects exist at the white roll vermilion-cutaneous junction as irregularities of the smooth lip line. At the inferior lip border there may be a deficiency of tissue appearing as a notch, or whistle deformity, or an excessive tissue appearing as overfullness and protrusion. In the midline, deficiency appears as an inadequate tubercle or whistle deformity. Inferior border problems may involve vermilion alone or vermilion, muscle, mucous membrane, and skin.

Vermilion cutaneous white roll irregularities appear as a protrusion of skin intruding on the vermilion or of vermilion intruding on skin. The irregularity may be slight to marked.

Prevention is achieved by careful marking of the vermilion cutaneous junction before local infiltration with epinephrine and its resulting branching and by careful approximation. Tattoo marking of the white roll with two points, one above and one below the junction, makes alignment easier and more accurate than using one marking point alone.

Correction of vermilion cutaneous irregularities may be achieved in the following ways:

1. Excising the errant pigmented tissue and reapproximating the vermilion cutaneous border using a small diamond-shaped excision is especially effective for narrow fingers of skin or vermilion intruding onto the contrasting pigmented area.

2. Z-plasties of equal or unequal length can reorient the disoriented tissue. However, this can produce a large amount of scar in a small area with a lumpy result.

3. A complete revision of the lip for other component abnormalities allows correct white roll reapproximation.

4. A white roll graft may be used to correct this problem; however, excessive scar in the area can result.

5. Color-simulated tattoo may be used to camouflage the differences in pigmentation.

6. A low vermilion border, depressed in height with respect to the normal side, may be elevated with full-thickness skin excision and vermilion advancement to the proper height.

Notching of the inferior lip border vermilion is the most common vermilion irregularity. Correction of a minor notch at initial repair can be achieved by a vermilion Z-plasty. The primary cause of this problem is incision of the lateral element flap too far medially along the cleft, beyond the point of maximum vermilion fullness. Here, vermilion, skin, and muscle are underdeveloped. Lip closure then leaves a notch at the point of suture due to thin lateral lip tissues being approximated to fuller noncleft side tissues. Incision of the lateral lip element at the point of maximum vermilion fullness allows approximation of more normal tissues to the noncleft side and prevents notching.

Use of prolabial vermilion in the repair of bilateral cleft lip frequently produces a whistle deformity. Prolabial vermilion is deficient in character, being thinner, less full in texture, and more prone to peeling compared with lateral lip vermilion. Notching or whistle deformity is prevented by discarding the prolabial vermilion and utilizing lateral lip vermilion to produce a tubercle. Overcorrection is difficult to produce. Apparent overcorrection at the end of repair will reduce rapidly in volume, producing a tubercle of sufficient size.

Correction of a unilateral vermilion notch may be achieved in the following ways:

1. Equal or unequal Z-plasty or W-plasty at the muco-vermilion junction will correct small irregular notches.
2. A V-to-Y advancement flap horizontally or vertically oriented will correct slightly greater degrees of notching.
3. If notching is marked or due to incorporation of underdeveloped tissues from the lateral lip element, a complete lip takedown and revision is required with excision of deficient tissues from the lateral lip element and advancement of the flap.

The midline whistle deformity with inadequate tubercle has a multiple tissue deficiency. A midline whistle deformity may be treated in the following ways:

1. A vertically oriented V-to-Y advancement flap will produce mild augmentation of the vermilion alone.
2. A shaved Abbé flap will augment the vermilion tubercle to a greater degree. A full Abbé flap replaces deficiency in multiple layers of tissue.
3. A composite graft may also be used for tubercle augmentation.
4. If prolabial vermilion has been used, it should be discarded and lateral lip vermilion advanced from each side. This essentially requires a complete lip takedown with trimming and advancement of flaps. Inadequate bulk for the tubercle projection is augmented by advancing orbicularis oris into the tubercle area.

Excessive vermilion height or fullness, not associated with malaligned muscle, is treated with excision at the vermilion mucosal junction with appropriate reduction of bulk. This may be elliptical or a W-plasty in shape.

Muscle Deformities

Muscle deformities present as an unnatural-appearing lip with a groove beneath the lip scar and/or a muscle bulge lateral to the repair. This bulge accentuates with facial animation. Groove indentation results from muscle dehiscence or lack of initial approximation. Lateral muscle bulging results from inadequate muscle release from the maxilla with improper muscle realignment or muscle dehiscence with lateral bunching. Inadequate muscle may also present as irregular indentations along the nostril sill.

Prevention is achieved by full release of the malaligned orbicularis oris from the maxilla and full rotation into a normal horizontal position. Muscle approximation should be achieved with permanent suture material.

Correction of muscle deformity requires reoperative with adequate muscle dissection, release from the maxilla, correct alignment, sufficient readvancement, and reapproximation.

Mucosal Deformity

A normal buccal sulcus is necessary for normal upper lip mobility and pout. It is also required for dental and orthodontic access. A tight or inadequate sulcus can result from failure of primary reconstruction, necrosis, infection, or disruption of the mucous membranes. A tight sulcus must be released for a successful secondary lip revision. Failure to do so will limit revision success and may restrict maxillary and dental growth.

Absence of a normal sulcus requires detachment of the lip from the maxilla and provision of an intervening lining for opposing raw surfaces. Lining may be by mucosal flap. Flap coverage does not require donor site closure; spontaneous reepithelization will occur rapidly. Free skin or mucosal graft also provides adequate lining. Graft take is generally excellent. Maintenance of the sulcus postgrafting, however, depends on adequate splinting against graft contraction.

Vertical Height Discrepancy: Short Lip

Vertical height discrepancy is the most common late multiple component deformity of the vermilion cutaneous junction. The peak of the cleft side Cupid's bow must be level with the noncleft side's peak. A minimal asymmetry of even 1 mm is deforming and draws immediate attention to the cleft. Cleft side shortness is much more common than excessive height or length.

Prevention is achieved by producing absolute symmetry at primary operation. A lip that is short at the end of repair will not self-correct with growth. Scar contracture can shorten the lip and produce vertical height deficiency even though correct symmetry is achieved initially.

In the unilateral cleft lip, a short lip usually follows straight line or rotation advancement repair due to inadequate rotation and advancement.

In the bilateral cleft lip, two-stage repair almost always produced mismatch of Cupid's bow peak vertical height. It is extremely difficult, if not impossible, to achieve symmetry in a two-stage repair since scarring of the first site is present in differing stages of contracture at the second stage. A bilateral cleft lip should be repaired in a single stage with prolabial and lateral lip incisions of equal height allowing precise matching of philtral height and Cupid's bow peak positions on each side.

Premaxillary protrusion must be corrected prior to treatment of short lip. Lip shortness may be only apparent and not real. In this case, correct premaxillary positioning will reveal a lip of adequate length.

Corrective techniques include the following:

1. Z-plasties can produce lengthening of 2 to 3 mm. However this produces objectionable scarring across the philtral ridge.

2. Shortness of the vermilion alone can be corrected with a V-to-Y vermilion advancement flap.

3. Philtral shortness can be retreated with a V-to-Y philtral advancement flap. This produces significant scarring at the columella base with frequent dimpling of the superior philtrum. Disruption of the normally smooth columella philtral junction is additionally deforming and not recommended.

4. Moderate to marked shortness requires a complete lip revision with readvancement and rerotation of flap to provide more length. Most repairs can be converted to a rotation advancement repair with excision of old scar and advancement of lateral tissue. Rotation and advancement of lateral lip elements is also possible in bilateral lip revisions.

5. Severe shortness or severe philtral scarring calls for an Abbé flap. Although seldom required in unilateral problems, it is equally useful in this situation. The Abbé flap provides both appropriate philtral length and relaxing width.

Vertical Length Discrepancy: Long Lip

A long lip is most commonly seen in bilateral cleft lips and following quadrangular repair of a unilateral cleft.

In bilateral cleft lip repair, excessive length is prevented by not advancing both skin and vermilion lateral flaps below the prolabium. Vermilion only should be advanced, with rare exceptions. Marked cleft width may require maximum advancement of the lateral lip elements. This inevitably produces excessive length as the longer portions of the lip are brought medially to achieve repair.

Treatment of long lip may consist of the following:

1. Subalar resection produces lip shortening superiorly. It may be performed unilaterally, bilaterally below the alar bases and nostril sills alone, or completely transversely across nostril sills and columella. Excision generally must be full thickness including skin, muscle, and mucosa.

2. Lip shortening may be achieved by excision superior to the vermilion. Here again, skin reduction alone is inadequate. A full-thickness excision of skin, muscle, and mucosa must be achieved. If the columella is short or the lip tight, this technique produces a poor result.

3. Superior subalar and nostril sill resections plus midline excisions below the prolabium connected by philtral ridge incisions produces a bull's head pattern and allows independent tailoring of lateral and midline elements.

4. Given the extensiveness of the resections discussed above and the difficulty of accurate approximation of tissues while maintaining bridges of intact skin, a formal complete lip revision with complete redissection should be considered. Excessive length can then be excised in the appropriate area at the superior aspect of the lip flaps below the nostril sill and at the inferior aspect of the prolabium. In all techniques slight overcorrection and overshortening is recommended to counteract postoperative sagging and lengthening.

Horizontal Discrepancy: Excessive Width

Horizontal asymmetries are slightly less obvious than vertical discrepancies, but remain very important. The most common error is creation of excessive philtral width.

In the bilateral cleft lip, vertical symmetry is visually spoiled by an excessively wide philtrum. With proper rotation advancement of flaps, it is not necessary to maintain maximal philtral width to achieve sound primary closure. A philtral width normal for the age at which repair is done should be the goal.

In the unilateral cleft lip, the cleft side hemiphiltrum is frequently excessively wide, producing asymmetry. This results from difficulty in identifying the apex of the Cupid's bow concavity and the Cupid's bow peaks. The depth of the bow concavity is often closer to the normal peak than is appreciated. Excessive hemiphiltral width is prevent by purposefully narrowing the philtrum at primary repair by approximately 2 mm. This automatically corrects the tendency to laterally orient the cleft-sized Cupid's bow peak. Narrowing of the philtrum also reduces the amount of rotation required to achieve vertical symmetry.

Treatment of excessive philtral width demands reopening the full length of the philtral ridge scar. Generally appropriate excision of philtral skin alone suffices. However, complete lip revision with muscle excision may also be required.

Horizontal Deficiency: Tight Lip

A tight upper lip most frequently follows repairs of a wide bilateral cleft. Tightness occurs in unilateral repairs and more narrow bilateral repairs, if excessive tissue is excised. The lip is stretched tightly across the premaxilla with deficient mobility and softness. Premaxillary and midface anterior posterior growth may be significantly restricted.

Treatment requires addition of adequate soft tissues. A mild deformity may be corrected with readvancement of lateral lip flaps and cheek tissues utilizing the increased height and width of the more lateral tissues. The classic treatment of tight lip remains the cross lip Abbé flap. Flap placement in the bilateral cleft is in the midline with replacement of the prolabium. This may be used to lengthen the columella as required. Care must be taken to create adequate flap height so that the inset line reaches the base of the columella without tension. In the unilateral tight lip, the flap may be placed centrally with replacement of the philtrum, or eccentrically in the original defect. Despite the loss of the non-cleft normal philtral ridge, central placement is preferred, as acentric placement never produces normal landmarks and creates disturbing asymmetry.

Summary

Residual cleft lip deformities are avoidable to a large extent by precise evaluation, planning, and execution. However, even in the best and most experienced hands, perfection is difficult to achieve. About 60% to 70% of cleft lip patients will require a secondary procedure. Each component tissue must be analyzed and treated appropriately. Surgery should be kept elegantly simple with creation of normal landmarks and symmetry.