Pediatric Facial Plastic and Reconstructive Surgery

James D Smith, Robert M Bumsted

Chapter 11: Bilateral Cleft Lip Repair

Robert W Seibert

The patient with a congenital cleft lip is one of the most challenging for the facial plastic surgeon. It is generally recognized that bilateral clefts are among the most difficult in which to achieve pleasing aesthetic and functional results; it has been said that their repair is twice as difficult as unilateral clefts and the results are half as satisfactory. For decades the specific surgical technique employed by most surgeons was the unilateral lip procedure they were using (rotation advancement, triangular flap, etc) applied to the bilateral cleft in two separate staged procedures. This approach seemed to negate one of the few advantages in many of these problem patients; that is, the deformity is frequently a symmetrical one so that performing staged repairs creates asymetry, at least temporarily. A watershed in the treatment of bilateral clefts was Millard's presentation of his one-stage definitive repair at the international conference in Toronto in 1977 and the publication that year of his encyclopedic treatment of these deformities, *Cleft Craft, The Evolution of Its Surgery. II, Bilateral and Rare Deformities.* This chapter will explore this author's approach to the primary repair of the bilateral cleft, including lip, premaxilla, and nose, over the past 15 years. General principles of management, especially the difficult problem of the premaxilla, and fine points of surgical technique will be emphasized.

Treatment of Bilateral Cleft Lip - General Principles

The approach to any bilateral cleft lip will depend upon the type and spectrum of anatomic deformity, that is, complete/incomplete, symmetrical/asymmetrical, wide/narrow, and especially the status of the primary palate components (premaxilla and prolabium). The soft tissue prolabium may be diminutive, inadequate for definitive cleft closure, or large enough to provide ample forked flaps for lateral columella lengthening as well as a generous philtral segment. The premaxilla in a complete bilateral cleft, attached only to the nasal septum, may be found, as a result of the lack of normal lateral restraining forces, a centimeter or more anterior to the maxillary arch and deviated both sagittally and coronally as well. Since the premaxilla provides one of the most challenging problems of the bilateral cleft lip, it will be considered first.

The Premaxilla

Historically, the protruding premaxilla has been managed by a variety of approaches, which may be summarized as follows:

1. No direct treatment - lip adhesion or definitive repair only.
2. Presurgical orthopedics by external devices or internal prostheses, which may be active or passive.
3. Premaxillary surgical procedures involving excision or setback.

With few exceptions, our approach has been to use indirect surgical procedures, single or staged lip adhesions with the difficult premaxilla/prolabium. These procedures are described below. The advantage of this approach is that a small prolabium is enlarged, and the definitive one-stage procedure may be done under less tension. No direct trauma to bone is involved, and this conservatism should eliminate or minimize any secondary maxillary growth inhibition effects. Disadvantages include a lack of significant premaxillary retroposition with inability to close large nasolabial fistulae and the risk of additional surgical procedures. Also, there is a possibility of wound dehiscence, especially with unilateral lip adhesions.

External presurgical orthopedics using an elasting band over the premaxilla and taped to the infant's cheeks or attached to a head cap has been recommended. Problems with parent compliance and skin breakdown limit its effectiveness.

Passive prosthetic devices (HOtz) avoid direct manipulation of bony segments but require a skilled prosthodontist frequently adjusting the device. Active prostheses (Georgiade and Latham) produce rapid positioning of premaxillary/maxillary segments narrowing the alveolar ridge cleft and permitting soft tissue closure at either definitive repair or lip adhesion (Millard). These devices, however, are more complicated to use and require even more sophisticated dental expertise. They must be affixed to bone with risk to growth centers and dentition. Although preliminary longitudinal studies appear to indicate no final unexpected growth problem, further data and comparative studies would seem to be warranted.

The reservations just expressed for active prostheses apply with greater force to direct surgical attack on the premaxilla. Complete excision is mentioned, only to be condemned. The resultant severe midface retrusion ("dishface") is completely unacceptable by modern standards. Surgical repositioning requiring osteotomies of the nasal septum may be combined with bone grafting to the alveolar clefts at age 10 to 11 years, or just prior to eruption of the permanent canine teeth. Earlier surgery at or just before entering school should be regarded with caution until more long-term follow-up is available. In summary, in a severe bilateral cleft lip, a conservative, long-term approach for maxillofacial growth should be to employ soft tissue techniques such as lip adhesion or definitive repair for their orthopedic effect on the premaxilla. Secondary problems such as malocclusion and fistulae are then corrected after significant facial growth has occurred. A more aggressive plan would be to reposition the displaced segments in early infancy to childhood, providing more normal function earlier with the possibility that final facial morphology may be compromised.

Surgical Procedures - Lip Adhesion - Bilateral

Indications

Single-stage bilateral adhesion may be helpful in closing most severe bilateral clefts whenever excessive tension or the closure may compromise a one-stage definitive repair. An ideal case is shown in the Figure, where the symmetrical, complete cleft includes a premaxilla extending 1 cm beyond the maxillary arches. Other factors are the amount of tissue in and mobility of the lateral lip segments. Thinner and more restricted lips are more likely to benefit by an adhesion. Likewise, the unilateral adhesion may be used as an orthopedic technique to move a deviated premaxilla into better alignment with the maxillary arch or to achieve better

soft tissue symmetry. Occasionally, staged lip adhesions are indicated.

Technique of Bilateral Lip Adhesion

The bilateral lip adhesion employs the same basic principles as unilateral adhesion.

1. Landmarks for definitive repair are determined and avoided.

2. Cleft edge flaps medially and laterally are incised and elevated.

3. Intercartilaginous incisions in the nose free the ala for medial advancement.

4. Supraperiosteal dissection of the lateral lip is done only enough to allow closure.

5. Retention suture, 3-0 or 4-0 nylon, passes between prolabium and premaxilla, grasping both lateral segments at the junction of lip and nose.

6. Layered closure muscle, deep soft tissue, and skin with all deep sutures are placed prior to tying any. The result is a nasal sill/superior lip adhesion with the retention suture relieving most of the distracting forces on the closure at its area of greatest stress.

Postoperative Care - Airway Management

Tongue-tip suture is placed for continuous traction of the tongue, if necessary, postextubation. It is removed when the infant is fully awake and with control of his airway, usually in the recovery room.

Feedings

Asepto syringe feedings are begun the morning after the operation and continue for 10 days.

Wound Protection and Care

Arm restraints are worn for a total of 10 days and the infant is kept in a supine or side position. Antibiotic ointment is applied to the sutures two to three times a day and suture removal is at 7 to 10 days under sedation in the outpatient clinic.

Complications

The most serious complications directly related to the procedure is wound dehiscence. This is almost always related to excessive tension on the suture line. The incisions simply pull apart gradually. Dehiscence is much more common following unilateral lip adhesion, about 8%. In fact, this has not occurred in our series of bilateral lip adhesion using the technique described. Fortunately, if landmarks for definitive repair have not been disturbed, the deformity following dehiscence is essentially the same as the original deformity. Other minor problems associated with bilateral adhesion are some increased scar tissue between prolabium and premaxilla and increased bleeding from this area at the definitive operation. An over

wound infection, although always a possibility, has not occurred in any lip adhesion procedure in this series.

One-Stage Bilateral Cleft Lip Repair

The Figure shows a technique as described by Millard for bilateral cleft repair. This technique has a number of advantages: one-stage symmetrical lip and nasal reconstruction with orbicularis oris muscle continuity, mucosal line labial sulcus, symmetrical Cupid's bow, midline lip tubercle, philtral dimple, and bank flaps for columella lengthening at a later stage. The Figure shows a typical bilateral complete symmetrical cleft lip with landmarks and incisions indicated. The height of the lip is determined by the height of the prolabium, not by the vertical length of the lateral lip segments. If there is a marked difference in these dimensions, adjustment is made by excising excess skin in a half-crescent fashion beneath the nasal ala. The philtral flap should be made as narrow as feasible because of its tendency to stretch and widen with healing. Due to the excellent blood supply the superior extent of the philtral incisions may lie medial to the columella edge. These excisions then diverge slightly as they reach the vermilion border. The small quadrilateral shaded flap just below the vermilion cutaneous junction may be used to posteriorly reinforce the vermilion tubercle. Both lateral lip elements are handled in the same way with the cleft edge incisions, matching the prolabial height. The small flaps (a and b) of lengths 10-12 and 11-13 consist of vermilion/mucosa, submucosa, and a very small amount of muscle. They will be brought beneath the prolabiail flap to reconstruct the midline vermilion. Lip and nose are freed by circumalar incisions, 6-8 and 7-9, and the lip is dissected in a supraperiosteal plane from the maxilla as necessary to allow medial advancement without excessive tension. The nasal ala may be freed by an incision ni the intercartilaginous area of the nose for medial advancement. The fork flaps (c and d), consisting of skin and subcutaneous tissue, will be saved to bank later in the floor of the nose. All incisions have been made in the Figure. The vermilion flap (e) remains attached to the inferior/posterior aspect of the prolabial flap (a) with care taken not to compromise the blood supply to the flap that has been thinned posteriorly. Note that incision 10-12 and 11-13 are placed at the vermilion cutaneous junction or, at most, 0.5 mm above that. Including more skin in this flap results in an often conspicuous scar horizontally across the philtrum, especially with vertical growth of the lip. The Figure shows the prolabial flap retracted superiorly. The tips of the nasal ala have been brought medially and sutured to the periosteum in the region of the anterior nasal spine. In order to achieve the best symmetry, suturing each flap separately may be required. Excess vermilion from the prolabium is trimmed and sutured onto the anterior surface of the premaxilla to provide medial labial sulcus lining. The Figure shows the superior portions of the lateral lip flaps have been secured medially in the same fashion as the alar flaps. Again, separate suturing may be indicated for symmetry. Orbicularis oris muscles are then approximated as shown in the Figure. Skin edges are trimmed and adjusted as necessary and a philtral dimpling stitch is placed on the undersurface of the prolabial flap to the reconstructed orbicularis oris muscle. Final suturing with subcutaneous and skin stitches is applied. When there is a tendency for midline vermilion deficiency (whistle deformity), the flap (e) attached to the prolabium may be tucked beneath the vermilion flaps (a and b) to help create a midline tubercle.

Postoperative Care

A tongue stitch is applied to help control the airway until the patient is fully awake. Asepto syringe feedings are begun the morning following surgery and continued for 10 days. Elbow restraints are also used for this period of time. The patient is discharged when taking feedings well and the parents are comfortable with feeding and incision care. Antibiotic ointment is applied to the sutures 2 to 3 times each day. Sutures are removed after 6 to 7 days in the outpatient clinic under sedation.

Columella Lengthening and Bilateral Cleft Lip

One of the most obvious deformities associated with bilateral cleft lip is a shortened columella. In general, the more severe the cleft lip, the more deficient is the columella, 1 to 2 mm in length in these cases. A relatively mild bilateral cleft may have only a slightly deficient columella, thus not requiring a secondary lengthening procedure. An advantage of Millard's single-stage lip closure is the provision of prolabial tissue in the form of forked flaps that are saved ("banked") for columella lengthening. These flaps are placed just below the reconstructed nasal sill in the so-called whisker position or in the medial portion of the sill itself in the "praying hands" position. When the flaps are elevated and sutured together to form a new columella, the lip scars are not disturbed unless it is decided to revise poor philtral scars or correct secondary deformities such as a markedly wide philtrum. Then the forked flaps are taken from the philtral sides, narrowing the philtrum and creating fresh scars. Timing of this procedure may range from when the patient is 2.5 years old to just before he or she enters school. Before describing the technique in detail several other methods have been described: (a) a single, midline philtral flap (Burdach), which produces a midline vertical scar and is contraindicated when the upper lip is already tight; (b) medial rotation of the nasal sills (Cronin), useful if the sill is quite wide; and (c) medial rotation of the superior nostril margins by a gull wing-type incision of the nasal tip, which produces a more obvious scar but may be advantagenous in the Asican cleft nose.

Procedure for Columella Lengthening by Banked Forked Flaps

At the primary bilateral cheiloplasty, full-thickness flaps are created from the philtral sides by narrowing the philtrum to appropriate dimensions (see above). These flaps consist of skin and subcutaneous tissue only since there is no muscle in the prolabium of complete bilateral clefts. A narrow strip of vermilion may be included with the flaps, but as this produces a more obvious scar, it is usually not done. The forked flaps are rotated 90° so that they line the medial portion of the nasal sill. At 2 to 4 years of age the patient is ready for columella lengthening. An endotracheal tube is secured in the midline without disturbing the lip. No local anesthetic is used. The banked flaps are outlined with gentian violet. Medially the incisions meet in a peak at the midcolumella slightly above its junction with the lip. The inner incision is carried medially and then superiorly along the shortened mebranous septum to the nasal dome and a 2 to 3 mm back cut is marked parallel to the dorsum of the nose. The external excision is made first to insure symmetry. Thick, forked flaps are elevated by sharp dissection to the columella. Bleeding is brisk but is easily controlled with electrocautery. The membranous septum incisions are made carefully on each side, and with scissors the columella with attached flaps are elevated to the nasal tip. Blunt scissors dissection over the alar domes is done next, aided by the small back cut at the domes.

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Forked flaps are then sutured together beginning at the apex with 6-0 or 7-0 nylon in the skin. Any discrepancy in length may be adjusted by trimming at this point. Exceptionally thick flaps may be carefully thinned posteriorly and two or three subcutaneous absorbable sutures are placed to strengthen the new columella. The columella tip is placed at the anterior nasal spine area of the premaxilla and a 5-0 or 6-0 chromic suture is placed from the dome incision to a point as high as possible along the membranous side of the lengthened columella. Suturing continues inferiorly, alternating from side to side to maintain symmetrical midline position of the columella. At the tip, a deep suture (4-0 or 5-0 Vicryl) is placed to the anterior nasal spine so that the lip columella angle is fixed, usually best when made just slightly over 90°. Failure to place this suture correctly results in a widened, overly obtuse columella angle. Care must be taken also not to compromise the columella blood supply by compressing the flaps too much in this closure. It may be necessary to remove sutures from the mebranous septal incision to relieve tension.

After setting the nasal labial angle, there is a gaping defect between lip and nose. The alar bases may be freed by circumalar and intercartilaginous incision if necessary and sutured more medially to the columella base/nasal spine. This produces a difference in length between lip and nasal incision margins that may be compensated for by placing deep sutures by a halving technique. First the midline is approximated, and the remaining lateral defects closed with deep 3-0 or 4-0 Vicryl. Finally, skin is sutured with nylon. The resulting convexity of the upper lip smooths out with healing.

Postoperative Care

Routine suture care is used as described for lip repair. In general, arm restraints are not required in the older patients. A regular diet is begun the day after operation. More time is necessary for healing, so sutures are left in place for 10 to 12 days and removed either under heavy sedation in the clinic or by light general anesthetic in the operating room.

Complications

Superficial infection, especially where columellar incision and infranasal incisions meet, is common, probably due to bathing the area in nasal secretions in young children. Invasive wound infections, however, are rare, even the relatively poorly vascular forked flaps. Loss of columella length with healing is variable and unpredictable. Some decrease in projection is inevitable and shrinkage of one-third is fairly common. "Migration" of the columella inferiorly to produce an excessively obtuse nasolabial angle occurs only if the columellar base has not been firmly sutured to the premaxillary periosteum at the desired angle.

Final correction at the nasal tip deformity is carried out in adolescence by an open rhinoplasty technique employing cartilage strut grafts to achieve full tip projection.