Primary Bilateral Two-Stage Cleft Lip/Nose Repair: Part II

Haisong Xu, MD,† Kenneth E. Salyer, MD, FACS, FAAP, FICS,‡ and Edward R. Genecov, DDS, FICD, FACDS§

Abstract: The Dallas surgical protocol for primary bilateral cleft lip/nose repair depends on the anatomy of the deformity. In cases of asymmetric bilateral clefts, an extremely small prolabium (<6 mm in vertical high) or a displaced premaxilla, a 2-stage lip repair was performed. At the same time, assessment of the tissue available for the columella determined the approach to the nose. In this part, the technique of 2-stage lip/nose repair of the bilateral cleft lip and palate is reviewed, and the long-term outcomes are presented.

Key Words: Bilateral, primary cleft lip/nose repair, 2-stage repair, long-term outcomes, Dallas protocol, multidisciplinary

(J Craniofac Surg 2009;20: 1927–1933)

Treatment of patients with bilateral cleft lip is more difficult than treatment of patients with unilateral cleft lip,1 especially when a bilateral cleft lip is accompanied by an asymmetry cleft of alveolus and palate, small prolabium, or a displaced premaxilla.2

As we describe in part I, the Dallas surgical protocol for primary bilateral cleft lip/nose repair depends on the anatomy of the deformity. The repair of bilateral complete symmetric cleft lip/nose was performed simultaneously as a 1-stage procedure. In cases of asymmetric bilateral clefts, an extremely small prolabium (<6-mm vertical height) or a displaced premaxilla, a 2-stage lip repair was performed. At the same time, assessment of the tissue available for the columella determined the approach to the nose. So the lip/nose was reconstructed in stages, but an attempt to complete it by 1 year of age was the goal (Table 1). In this part, a 2-stage lip/nose repair of the bilateral cleft lip and palate is reviewed, and the long-term outcomes are presented.

Two-stage bilateral lip repair is indicated in cases of a small prolabium (≤6-mm vertical height), asymmetric clefts, and clefts with a displaced premaxilla. In cases of a small prolabium, closing 1 side at a time stimulates growth and development of the prolabium and prevents tension. Two-stage repair achieves symmetry with difficulty in cases of asymmetric clefts and may improve the position of the displaced premaxilla. Stage I lip repair is performed at age 3 months; stage II lip repair was usually performed 6 to 8 weeks later or when the first lip scar is soft and pliable and not contracted because it is totally freed and the second side is matched to it.

METHODS

Surgical Technique

Figure 1 shows the design of the incisions on one side of the bilateral cleft. The wider-side cleft is performed first. In this design, the peak of the Cupid’s bow was marked at the vermilion-cutaneous junction on the lateral lip element at point A. Point C on the lateral lip element indicates the junction between the incision line carried from point A toward the base of the alar. From this point, the incision is carried on laterally at the base of the ala and upward inside the nasal cavity in front of and above the inferior turbinate. On the prolabium, the incision line is designed along the cutaneous-mucosal junction from point C to point A. Point A corresponds with point A—the peak of the Cupid’s bow on the lateral lip element. The incision on the vermilion of the prolabium creates a bed for the insertion of the vermilion flap (B) from the lateral lip element. Point B indicates the line of incision on the prolabium where the vermilion flap from the lateral lip element will be inserted. The mucoperiosteal flap on the prolabium is dissected from the bone, the vermilion flap is dissected on the lateral lip element, and the remaining incisions are made (Fig. 2). A lateral mucosa flap is sutured to the mucoperiosteal flap of the prolabium to create a sulcus intraorally.

Stage I lip repair is completed (Fig. 3). The alar base is advanced medially. The orbicularis muscles banked below the prolabium. The skin of the lateral lip element is sutured to the skin of the prolabium, and the vermilion flap from the lateral skin element is inserted under the mucosa of the prolabium.

Figure 4 shows the design of the incision lines for stage II lip repair. The incision line on the lateral lip element is designed along the vermilion-cutaneous junction, with point C at the base of the ala and point A at the peak of the Cupid’s bow. Another incision is designed on the prolabium to match the repaired side. The incision is carried through the skin, muscle, and mucosa along the vermilion-cutaneous junction (Fig. 5), dissecting and freeing the vermilion flap (marked B in Fig. 5) on the lateral lip element. A minimal incision is made below the base of the ala, and another is made intranasally in front of and above the inferior turbinate. The vermilion flap, which was banked during stage I, is dissected and raised. It is matched to the other side to give fullness and a tubercle in the vermilion containing a variable amount of muscle as needed to create a full vermilion. The orbicular muscle on both sides is freed and sutured together if possible without tension. If not, they are brought into the area below the prolabial skin and
allowed to heal, and scar is formed between the muscle. This can still provide an aesthetically good mobile lip.

After the sutures are placed, bringing the alar base medially in symmetry with the opposite side, and the skin of the lateral lip element is sutured to the prolabium, the vermilion flaps are trimmed to achieve optimal symmetry and shape (Fig. 6). Special attention to achieve symmetry in matching the wet line, the peaks of the Cupid’s bow, and the vermilion-cutaneous junction is important in creating a good lip with a tubercle in the midline.

Two-stage lip repair is completed (Fig. 7). In most cases, the lip does not require secondary correction. Some do require secondary surgery later. However, the nose usually requires further surgery at 1 year and later.

As we indicated in part I of “Primary Bilateral Cleft Lip/nose Repair,” the nasal reconstruction is delayed for 1 year after the lip repair, which was considered as the primary procedure. Early lip/nose repair, followed by early palate closure, provides the foundation for long-term good speech results and nasolabial aesthetics.2,4

RESULTS

One hundred fifty-two bilateral cleft lip/nose patients with completed data treated from 1969 to 2007 were reviewed. Forty-three (28.3%) of 152 patients had 2-stage lip closure followed by early nasal reconstruction.

TABLE 1. Surgical Treatment Protocol

<table>
<thead>
<tr>
<th>Patient Age/Stage</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-Stage primary bilateral cleft lip/nose repair</td>
<td></td>
</tr>
<tr>
<td>3 mo</td>
<td>Stage I lip closure</td>
</tr>
<tr>
<td>5–6 mo</td>
<td>Stage II lip closure</td>
</tr>
<tr>
<td>1 y</td>
<td>Early nasal reconstruction</td>
</tr>
<tr>
<td>8 mo</td>
<td>2-Flap palatoplasty</td>
</tr>
<tr>
<td>5 y</td>
<td>Secondary minor lip and nose surgery</td>
</tr>
<tr>
<td>7–9 y</td>
<td>Cancellous iliac bone graft to alveolar cleft</td>
</tr>
<tr>
<td>7-y Full-growth</td>
<td>Distraction osteogenesis in selected severe cases &gt;12 mm, class III</td>
</tr>
<tr>
<td>Full growth 40%</td>
<td>Orthognathic surgery</td>
</tr>
<tr>
<td>8–18 y</td>
<td>Rhinoplasty—other soft tissue</td>
</tr>
</tbody>
</table>

FIGURE 2. The incision is carried according to the design.

Figures 8–12 show the long-term outcomes of the 2-stage primary bilateral cleft lip/nose repair with preoperative and postoperative photographs.

DISCUSSION

Bilateral cleft lip repair can be performed in 1 or 2 stages.5 The choice depends on the surgeon’s proficiency and experience; however, the type and severity of the cleft must also be considered.2 Complete or incomplete symmetric bilateral clefts in which the premaxilla is within the alveolar arch or slightly protruding can be successfully treated with simultaneous lip repair on both sides. One-stage lip repair facilitates creation of a symmetric, balanced lip. When the cleft lip is asymmetric, it is necessary to determine if the asymmetry results from rotation or deviation of the premaxilla, either of which would shift the prolabium to one side, or if there is a complete cleft on one side and an incomplete cleft on the other. Asymmetry of the bilateral cleft makes the design and performance of simultaneous bilateral cleft lip repair more difficult than when the premaxilla and prolabium are situated at midline. Such conditions indicate use of 2-stage lip closure for most cases of asymmetric bilateral clefts.
Closure of the wider side first converts the asymmetric bilateral cleft to a unilateral cleft. The more precise techniques of unilateral lip repair facilitate final lip reconstruction with better symmetry and balance. Closure of the wider side first is also beneficial because the narrower or incomplete cleft is left to be closed at the second stage. It is necessary to stress that 2-stage lip repair makes it more difficult to obtain a well-proportioned philtrum and Cupid’s bow than if simultaneous repair were performed.

Secondary correction is usually needed for satisfactory final results. The 2-stage closure of bilateral clefts prevents precise definition of the size of the future philtrum, so the entire prolabium may be used to prevent tension. Consequently, the medial prolabium is used in both stages. The medial portion of the lip may be too wide, necessitating a secondary correction to narrow it. Some surgeons have expressed the opinion that asymmetry of the bilateral cleft lip does not prevent them from performing lip repair in 1 stage. But in our opinion, the type and severity of the cleft should be considered.

**Indications for 2-Stage Lip Repair**

1. an asymmetric bilateral cleft,
2. an extremely small prolabium (<6 mm in vertical height), and
3. a displaced premaxilla.

**Advantages and Disadvantages**

**Advantages**

1. The bilateral cleft is transformed into a unilateral cleft.
2. In the second stage, closure of the cleft is performed by applying the designs used for unilateral cleft lip repair.
3. Stimulation of growth of the prolabium by additional blood supply from the lateral portion of the lip produces a larger volume of tissue for closure of the second side of the defect and facilitates reconstruction of the entire midportion of the lip without tension.
4. Excessive lip tension is avoided, especially in patients with a small prolabium and a protruding premaxilla.
5. Reconstruction of the vermilion on the midportion of the lip seems to be more effective in 2-stage lip repair because the vermilion flap from 1 lip element is already in place. Adjustment of the other side becomes less complicated.
6. This technique provides closure of a projecting premaxilla or a small prolabium without the use of active presurgical orthopedics.
7. It provides foundation for a better nose because lip tension is eliminated.

FIGURE 10. Completed case. A, Preoperative asymmetry incomplete bilateral cleft lip and complete cleft palate at 3 months of age. D, Frontal view and submittal vertex view at 10 years old. B, C, E, F, At 19 years of age showing long-term outcome after Le Fort I maxillary advancement, bilateral mandibular ascending ramus sagittal split osteotomy, and bilateral malar augmentation with demineralized bone graft.

8. This technique can easily be used today in developing countries where orthodontic treatment is not available.

Disadvantages

1. Two operations are performed instead of one.
2. Achieving a symmetric balance of the lip is more difficult than in simultaneous closure of both sides.
3. It may require addition revisions.

The success of surgical correction of the cleft lip and nasal deformity is only partially related to staging the repair. Unquestionably, both approaches can be used effectively, depending on the type and severity of the cleft. The surgeon must be able to judge and use the advantages offered by both approaches.

Lip Repair

In the 2-stage lip repair, we attempt to reconstruct a symmetric, well-balanced lip with muscle continuity. The ultimate goal of muscle repair is to bring the orbicularis oris into the prolabium. Usually, it is possible to suture the muscle together beneath the skin of the prolabium. If this cannot be done, satisfactory esthetic and functional results can be achieved by bringing the muscle to the edges of the prolabium without actually suturing them together at the midline. This maneuver prevents bulging of the muscle, so secondary corrective procedures may not be necessary.

In some cases, when the tension created by a 1-stage procedure appears to be excessive, a 2-stage procedure is used. In general, the 2-stage procedure produces a more pliable lip and less scarring.9,10 The decision of whether to use a 1- or 2-stage procedure depends on the surgeon’s experience and judgment. It is also depends on availability of orthodontic treatment.

In the case of a severely protruding premaxilla, simultaneous closure of both sides may be achieved, but this necessitates wide undermining of the soft tissue on the face of the maxilla, at times as far as the orbital rim. Unquestionably, this wide undermining results in increased scarring, which may affect midfacial growth. Undermining above the periosteum is believed to be a safe procedure that does not inhibit subsequent growth.9,11

The midportion of the vermillion is reconstructed by bringing lateral vermillion flaps below the prolabial tissue to create a new vermilion-cutaneous junction. Muscle is placed in the vermilion flaps to create a fullness of the vermilion, especially in the midportion of the lip, because the tissue deficiency in this area is usually most pronounced.

Definitive lip closure was achieved using 4-0 chromic catgut for the mucosal and muscle layers, 6-0 PDS for subdermal closure, and 6-0 nylon for the skin.

In the case of a small prolabium, we encourage the patient’s family to perform vigorous massage to stimulate growth before lip closure. Our experience indicates that preoperative massage of the prolabium and the lateral portions of the lip is beneficial for stimulating growth of the prolabium and growth and function of the lateral lip elements. It is interesting that no matter how small the prolabium is initially, it increases in volume as a result of stimulation from massage preoperatively and of an increased blood supply and repaired lip function postoperatively. We followed some patients who initially had a very small prolabium and who underwent 1-stage simultaneous bilateral lip closure. In these unique cases, there was a deficiency of tissue in the midportion, and addition operations were...
needed to reconstruct an adequate lip. The very small probibium is probably best treated by using a 2-stage lip procedure.

**Columella Lengthening and Nasal Reconstruction**

Our basic goal is to correct lip and nasal deformities at the time of the primary procedures performed at 3 months to 1 year of age. In the 2 stages for the lip, we attempt to reconstruct a symmetric, well-balanced lip with muscle continuity and also suture the floor of the nose to the alar base in a position that allows for nasal reconstruction at the next operation. After 2-stage cleft lip repair, the skeletal relationship is better, facilitating the nasal reconstruction. The nasal procedure is performed at 1 year of age. This allows 6 to 9 months for maturity, and the softening of scar tissue, which is necessary before the nasal reconstruction, can be performed. The goals of bilateral cleft nasal repair are the following:

1. early correction of the complex nasal deformity to ensure more normal anatomy, function, growth, and esthetic appearance of the infant nose;
2. columella lengthening;
3. nasal tip definition;
4. narrowing of the alar bases;
5.alar cartilage repositioning and reshaping;
6. reorientation of the nostrils from a horizontal position to a vertical position;
7. creation of a patent nasal airway; and
8. complete primary nasal reconstruction by 1 year of age to allow for more normal growth by placing the component nasal anatomic parts in as normal position and shape as is surgically possible at this time.

Our procedure was a modification of the technique of Cronin and Denkler,13 in which early nasal deformity correction was achieved. An extended columella incision makes it unnecessary to make additional incisions along the alar cartilage to expose and dissect the lower lateral cartilage at the dome area. Through the midline columella incision, the lower lateral cartilage was dissected from the skin, but remained attached to the nasal lining. In our experience, trying to achieve perfect results at this early age may lead to a columella that is too long and esthetically unappealing.14 This conservative approach allows for subsequent growth and development, creating a more normal columella and a nose with tip definition and projection. Early reconstruction in the bilateral cleft nasal deformity has been performed as described over the last 40 years, and we try to perform this by 1 year of age. Today, when possible, an open approach is used and recommended to eliminate any noticeable incision on the columella skin.13–15 We consider this technique to be a primary procedure that is performed at a second stage when the tissues from stage I lip repair have become supple and able to accept additional surgery. The results in the bilateral cleft patient are potentially not as good as in the unilateral deformity.1 This is due to the deformity and our inability to produce good results. No matter what technique or which surgeon performs the correction, the bilateral cleft stigma remains. In the unilateral cleft lip, attractive faces with minimal deformity can consistently be achieved.3,4,12,16 In the bilateral cleft deformity, further work is needed to achieve comparable results. In our experience, the technique described here gives the best possible result without the use of presurgical orthopedic treatment.

Today, nasoalveolar molding7,18 provides additional columella skin and makes this technique outdated. However, this technique needs to be considered by all surgeons working where nasoalveolar molding or other orthopedic treatment is not available. Pushing the premaxilla back to provide closure of the lip creates dental crossbite and contributes to midfacial growth abnormalities.17 This technique allows the face to grow in a more normal fashion without using abnormal forces that cause secondary deformity. This allows closure without creating alveolar tension.

**CONCLUSIONS**

Cleft form and severity of the cleft determine the approach and surgical technique. The surgeons should find out their own optimal protocol that in their hands with their abilities will give them the best results in their countries or situation. This technique should be considered in the treatment of all bilateral clefts depending on the anatomy and team availability.

**REFERENCES**


© 2009 Mutaz B. Habal, MD 1933