

Bilateral Clefts of The Primary Palate

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The bilateral cleft of the lip and alveolar process continues to be a problem of the first magnitude, although results in many hands are now far superior to those obtained thirty years ago when I did my first repair of a double cleft.

What are the problems that make this so difficult? Inherent is a deficiency of bone and soft tissue.

1. *Lip*: the thin prolabium contains no muscle and is frequently small in area.
2. *Nose*: shortness or near absence of the columella.
3. *Premaxilla*: often protrudes excessively and may be twisted to one side and abnormally small or large.
4. *Palate*: narrow bony shelves with their membranous coverings.
5. Impaired growth potential in some cases.

Experience has shown that surgical treatment can further complicate the problem if the timing is poor or the operation is improper. Therefore, the aims of treatment should be: (1) To take advantage of the rapid growth of the young infant to correct the protruding premaxilla. (2) To avoid or delay any procedure that might interfere with growth and development, such as vomer resection or elevation of large mucoperiosteal flaps.

Certain principles and objectives of treatment have become fairly well established. These are:

1. The prolabium should form the full vertical length of the middle of the lip.
2. The vermilion ridge, or white line of the inferior border of the prolabium should be preserved.
3. The thin prolabial vermilion should be built up with vermilion muscle flaps from the lateral lip segments but *no* lateral skin flaps.
4. Correct disparity between premaxillary and maxillary segments of the alveolar arch, preferably nonsurgically.
5. Prevent or correct, if possible, collapse of maxillary segments behind the premaxilla.
6. Early orthodontia.

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7. Bone grafting to stabilize the premaxilla.
8. Lengthen the short columella.

Records

1. Initially and from time to time as treatment progresses, close-up photographs of the face, front and profile views should be made, as well as intraoral views of the palate with a mirror or when the baby is crying.

2. Initial and subsequent impressions of the palate should be taken with an alginate, such as Kalginate and dental stone models made as treatment progresses. Acrylic plates can be made from the stone models and the latter serve as a permanent record of the growth of the maxilla and palate. (Figure 2)

3. Cephalometric X-rays would be of value if available.

Treatment

Repair of the lip is usually delayed until the child weighs 12-14 lbs., which may mean that the infant is three or four months old. This interval of time is utilized to correct a protruding premaxilla if present. Attempting to close the lip over a markedly protruding premaxilla can be disastrous. The excessive tension may result in an actual breakdown or in spreading of scars. A cloth head cap is made to which two $\frac{1}{8}$ " elastic bands are attached by hooks and eyes. (Figure 1) Two or three eyes may be spaced on the cap to facilitate adjustment of tension. This should be used continuously day and night. The disadvantage of its use is that faithful and intelligent attention must be given by the mother to see that

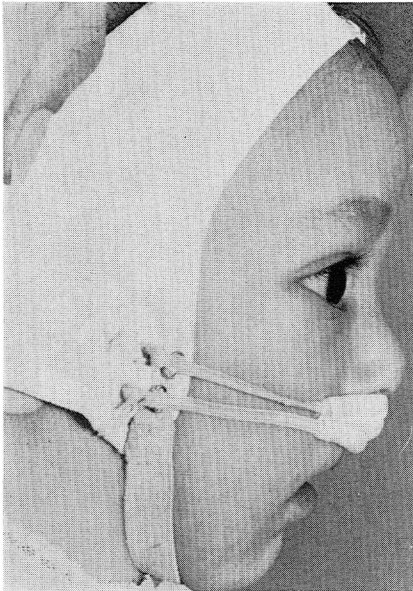


FIGURE 1. Head cap in place with elastic traction placed directly over the premaxilla.

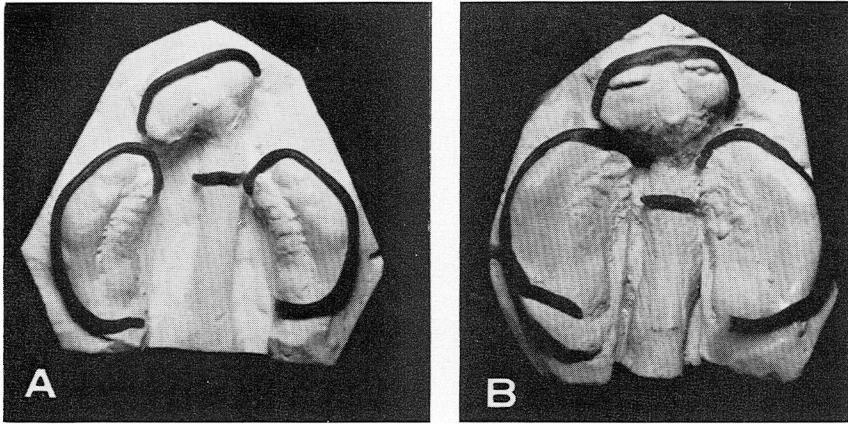


FIGURE 2a-b. Shows growth of maxillary segment in relation to premaxilla over a five month period. Note changing relationship of vomer-prevomer suture and maxillary segments. A head cap as well as a lip repair has been used to control the premaxilla. (a.) Before use of a head cap or the lip repair. (b.) After the head cap and lip repair have been used.

the band remains in place. The surgeon should check the infant every day or two during the first few days to be certain that a proper and safe amount of tension is being applied. Excessive tension can cause a lingual rotation of the premaxilla and severe buckling of the nasal septum, as well as ulceration or irritation of the prolabium.

As the elastic pressure is applied, not only posteriorly on the premaxilla but lingually on the maxillary segments, it is advisable that the infant be fitted with an acrylic screw plate (5) to prevent collapse of the maxillary segments or permit expansion as the child grows.

Prolonged pressure in this manner is preferred. Studies by Brauer (3) suggest that vomerine and septal growth is restrained, while the maxillary segments grow forward and the area of hard palate increases in all dimensions. (Figure 2) Usually by the time the child is large enough for surgery, the maxilla-premaxilla relationship is optimum for lip repair.

A repaired lip is the most efficient force that can be applied to the premaxilla. (Figure 2b) Rather than compromise a definitive lip repair by attempting to close it over a markedly protruding premaxilla, lip adhesions may be performed if adequate progress is not being made with head cap and elastic, or particularly if the infant lives at a distance, it may be done as the initial procedure. (Figure 3)

Surgical setback of the premaxilla carries with it a definite risk of growth interference to mid-facial skeleton. Its use should probably be limited to patients over eight to nine months, when first seen and presenting with a heavy, stiff vomer. Briefly described, (6) an incision is made through the mucosa over the inferior border of the vomer *behind* the prevomerine-vomer suture. The mucosa is elevated on each side and a rec-

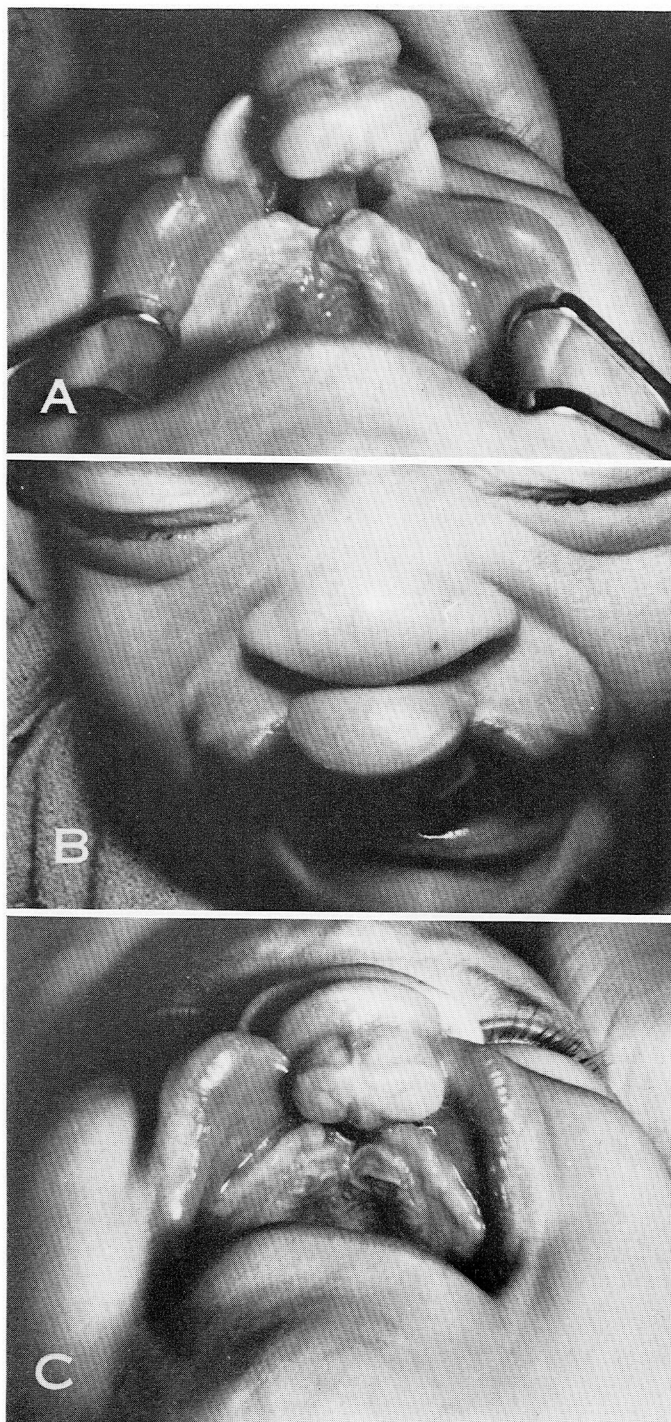


FIGURE 3. (a) Shows the initial appearance of the patient with complete cleft of primary palate only. (b) A lip adhesion has been done. (c) The force of the lip repair and its resultant action on the premaxilla is noted. Two months after adhesion.

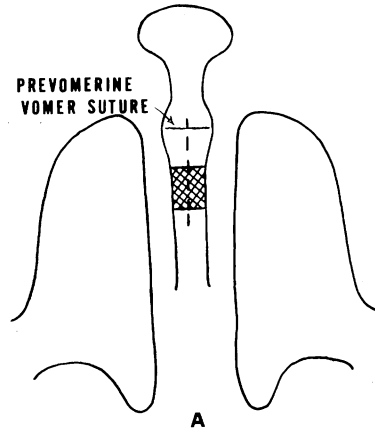
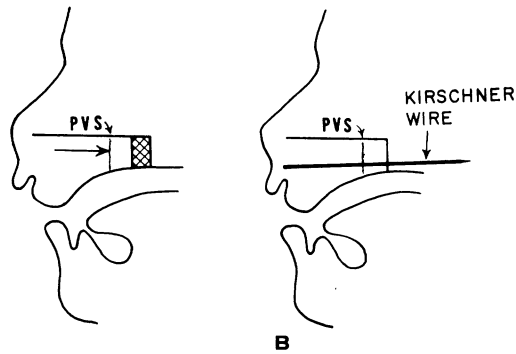


FIGURE 4. Diagram of vomer resection—see text.



tangular piece of vomer is removed. (Figure 4) Complete correction should not be accomplished as lip pressure will result in further correction. To permit the premaxilla to slide straight back, a cut can be made in the septal cartilage from the site of the resection to the tip of the nose, or alternatively the septal cartilage can be dissected from the groove in the bone, allowing the latter to slide backwards. A Kirschner wire 0.035" in diameter is drilled through the premaxilla and vomer until it comes out at the site of the resection. The bones are carefully lined up and the Kirschner wire is driven in with a mallet. This assures a tight fit. The mucosal wound is closed loosely with 6-0 silk after chipping up the removed bone and packing it around the site as a bone graft. It is important to obtain bony union of the vomer. An Iodoform pack in the roof of the mouth will help prevent breakdown of the wound from tongue action.

I prefer not to repair the lip at the time of the vomer setback, preferring to allow union of the vomer which might be interfered with by lip movements if repaired at the same time.

The lip repairs used in this study are reviewed in Table 1. The straight line, (Veau III) has been the most frequent.

TABLE 1. Bilateral lip repair.

<i>type</i>	<i>no.</i>
Barsky (Veau II)	4
Barrett Brown (no vermillion).....	7
Tennison.....	11
LeMesurier.....	1
Millard.....	7
Straight line (save vermillion).....	41
Total.....	71
Two stages.....	35
One stage.....	36

The Veau II, (11) or Barsky (1) type of operation is an obsolete procedure resulting in a lip which is too long vertically and too short from side to side. The tightness contributes to retrusion and lingual tilting of the incisor teeth.

The Barrett Brown (4) procedure removes all of the prolabial vermillion, bringing the vermillion of the lateral segments together in the midline, thereby tending to constrict the prolabial skin in a circular manner, as well as making the lip a bit tight from side to side.

Adaptation of the Tennison type incisions to the bilateral lip has produced some very nice results for us. (Figure 5) It tends to give a nice protrusion to the central vermillion. The scars, however, seem to be more noticeable than when the procedure is applied to the single cleft lip. If revision is necessary, it may be a little more difficult than a straight line repair.

Only one adaptation of the LeMesurier (8) operation for single clefts was done. This procedure was wasteful of tissue, tended to result in side to side tightness and noticeable scarring.

The Millard (9) rotation-advancement was used exclusively for the incomplete symmetrical cleft with very small prolabium. (Figure 6) The prolabium was rotated downward in two stages to fit the lateral segments, and the prolabial vermillion was augmented with a vermillion muscle flap from the lateral lip segment, as will be described in the straight line repair. Six to eight weeks should elapse between stages to allow for recovery of the soft tissues from the first operation. Care should be taken to avoid crossing the midline with the lateral advancement flaps as this tends to result in a long lip vertically.

TECHNIQUE OF VEAU III LIP REPAIR. The Veau III, (10) or straight line repair with preservation of the prolabial vermillion has been used most frequently. It is simple, forms a Cupid's bow, and is not difficult to revise. There is a tendency for lack of protrusion of the vermillion border.

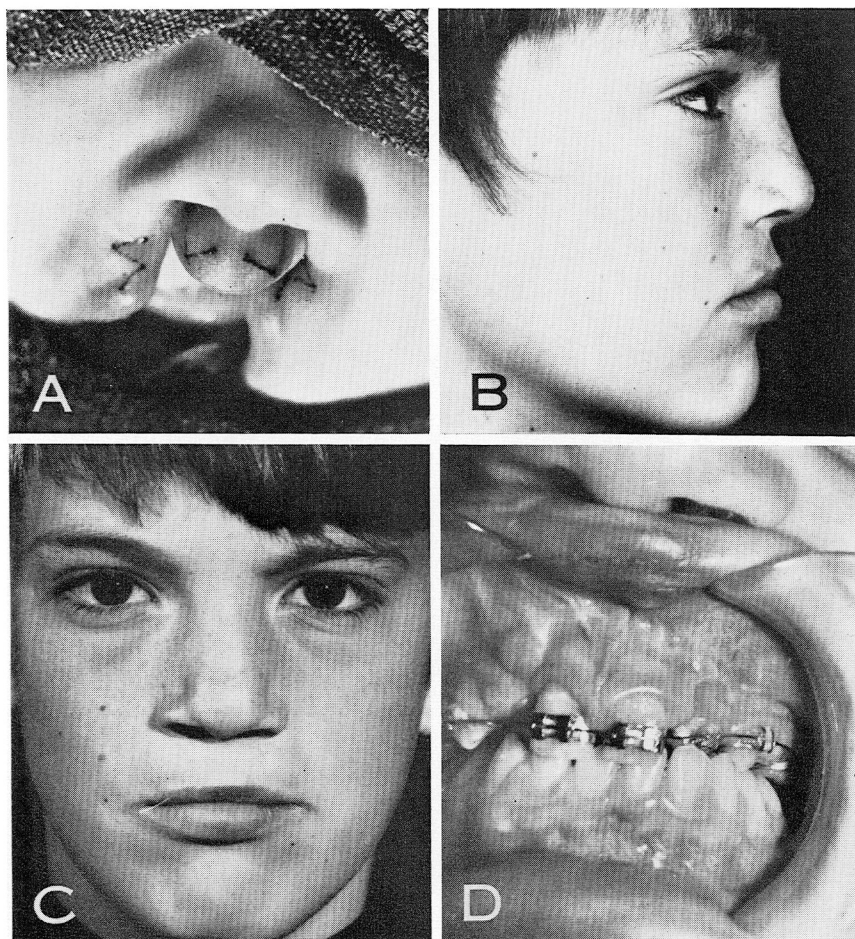


FIGURE 5. (a) Zig-zag or Tennison lip repair as used in the treatment of the bilateral lip. (b & c) The final photos are taken at 12 yrs. of age. Columella lengthened at age 2. (d) Shows the occlusion at age 12 yrs.

Lines of incision are shown in Figure 7. Both sides of the lip are marked for repair. If the repair is to be done in two stages, the points on the second side are marked with india ink with a $\frac{1}{2}$ mm. offset so that the dot can be trimmed away at the second stage. This procedure simplifies the second stage, as the incision lines can be quickly marked despite the distortion of the prolabium due to the first operation. As pointed out by Berkeley, (2) a' should not be placed too high as this makes the columella unduly short. Point b' is placed as far down and laterally as possible. The short angled part of the line $a' c' b'$ results in greater length of the vermillion border. As the distance between the two c 's is less than the two b 's, the lip is a little tighter just above the vermillion border, tending to

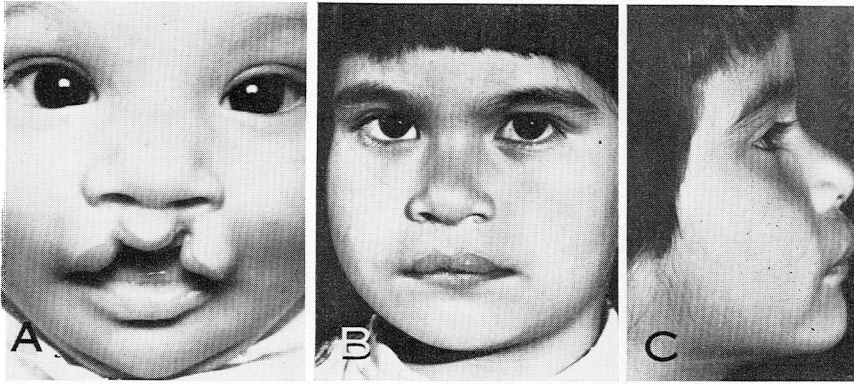


FIGURE 6. Shows the results of a bilateral, incomplete cleft which has been corrected by a rotation-advancement, (Millard) repair. The final photos are at age $3\frac{1}{4}$.

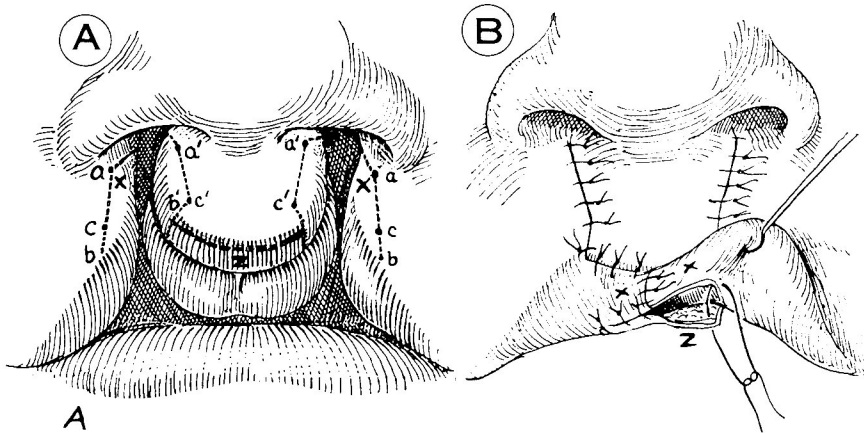


FIGURE 7. (a) Shows the markings for a straight line, or Veau III lip repair. See text. (b) Shows lip closed using the lateral vermilion flaps to build up the thickness of the prolabial vermilion.

give more protrusion to the latter. If the prolabium is small this angle may not be possible.

Point a is just medial to the tip of the alar base and point b is at the peak of the Cupid's bow where there is still a vermilion ridge and normal thickness to the lip. Point c is placed on the line a, b rather than medial to it, thus accentuating the tightness at this level, which in turn, results in protrusion of the vermilion border. If the anterior palate is to be closed at the same time, the lip incisions are continuous with the incisions of the anterior palate closure. (Figure 8)

The lip is infiltrated very sparingly with Xylocaine 1% with adrenalin 1:100,000 and the incisions are very carefully made at right angles to the skin surface. The skin between a, b and the vermilion border is trimmed

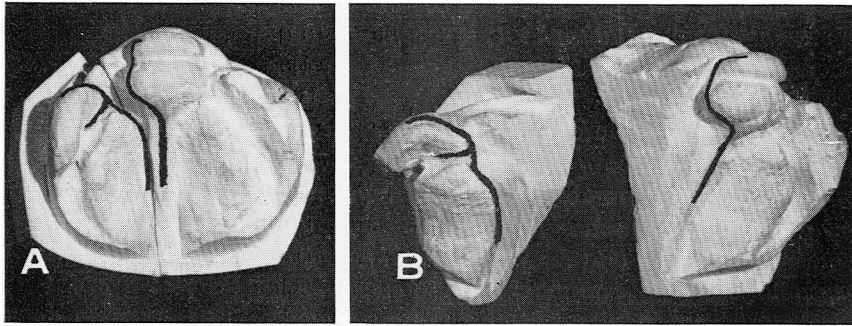


FIGURE 8. (a) Lines of incision when combined lip and anterior palate closure is done. (b) Cut away model to further demonstrate placement of incisions.

off leaving a flap of muscle and vermilion which will be used to build up the thin prolabium. Line $a'c'b'$ is incised, the skin margin trimmed off and the mucosa is sutured to the lateral lip mucosa. If necessary the cheek is freed up by an incision in the labial sulcus and by freeing up the soft tissues superficial to the periosteum. Closure is begun with a 4-0 plain catgut suture in the muscle at the base of the ala and into the tissues at the base of the columella. Before this suture is tied, however, if the anterior palate is to be closed at the same time, the vomer mucosal flap is sutured to the mucoperiosteum, continuing into and forming the floor of the nose. The muscle suture is then tied. Only two or three muscle sutures are needed in the rest of the lip closure. Very accurate skin approximation is accomplished with a 6-0 suture material. The lateral vermilion muscle flap is sutured into the space created when the vermilion is incised 1 mm. below the vermilion border and flap Z is dissected.

If the premaxilla is not protruding, both sides of the lip may be repaired at the same time, although in this instance, surgery probably should not include repair of the anterior palate.

A dressing with an antibiotic ointment is applied to the lip for twenty-four hours, after which it is left open to the air. Sutures are removed in part on the third day and the remainder on the fourth day. The lip is then supported with steri-tapes after painting the skin with tincture of Benzoin. The infant is fed with a rubber tipped bulb syringe for about a week. Examples of this method are shown in Figures 9, 10, 11.

It is desirable to retain the acrylic plate for several months if possible after the lip repair, to minimize collapse of the maxillary segments.

The soft palate could be closed at almost any time if not too wide. However, closure with complete push back procedures, where the elevation of large mucoperiosteal flaps is necessary, should be delayed until the child is at least two years old to minimize scar contracture deformities.

ORTHODONTIA. All complete bilateral clefts will require orthodontia. The primary dentition and the ability to cooperate is present in the 4-5 year old. Some degree of collapse is likely and can be corrected by a

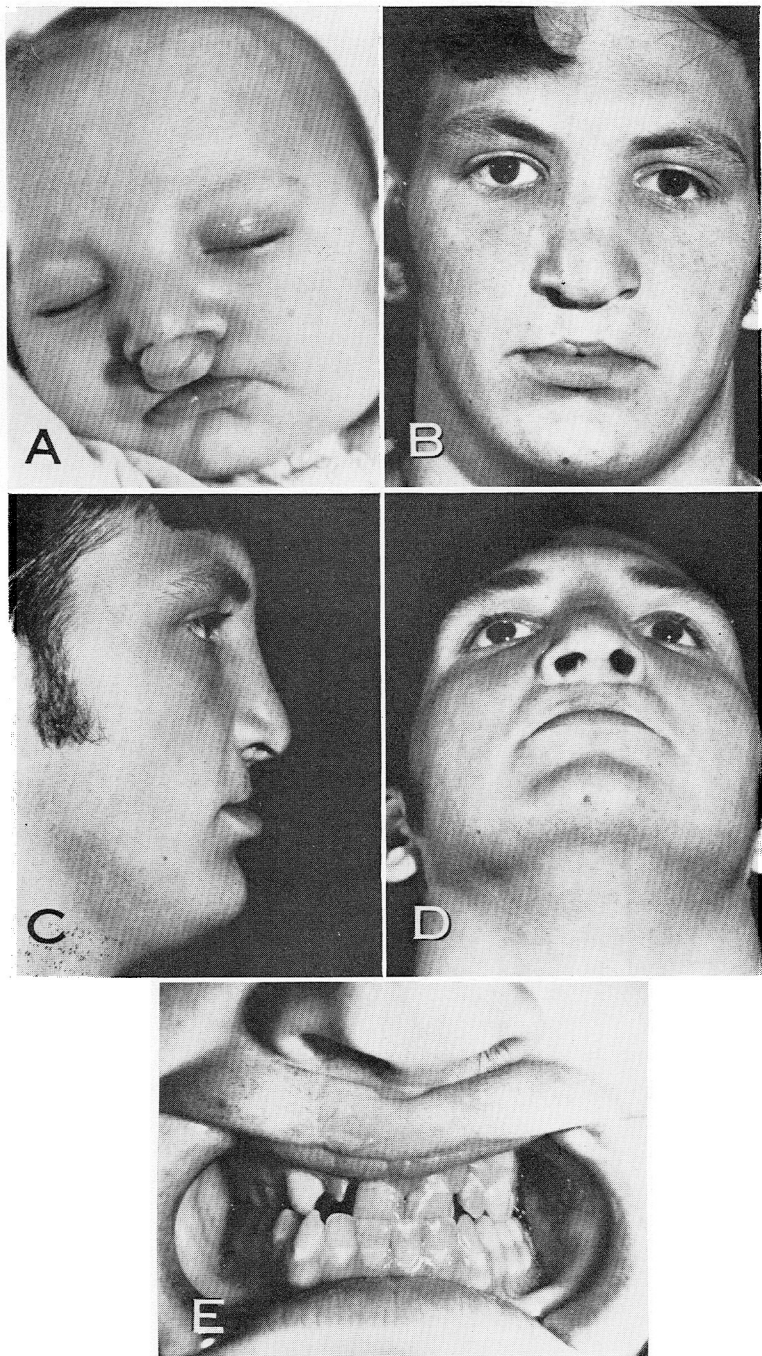


FIGURE 9 a. Complete bilateral cleft of lip and palate.

FIGURE 9 b-d. Appearance at 17 yrs. after setback of premaxilla in infancy. Patient has had a single stage lip repair and lengthening of the columella, and a two-stage palate repair with push back.

FIGURE 9e. Occlusion. The patient had orthodontia in childhood but none in the last 5 years.

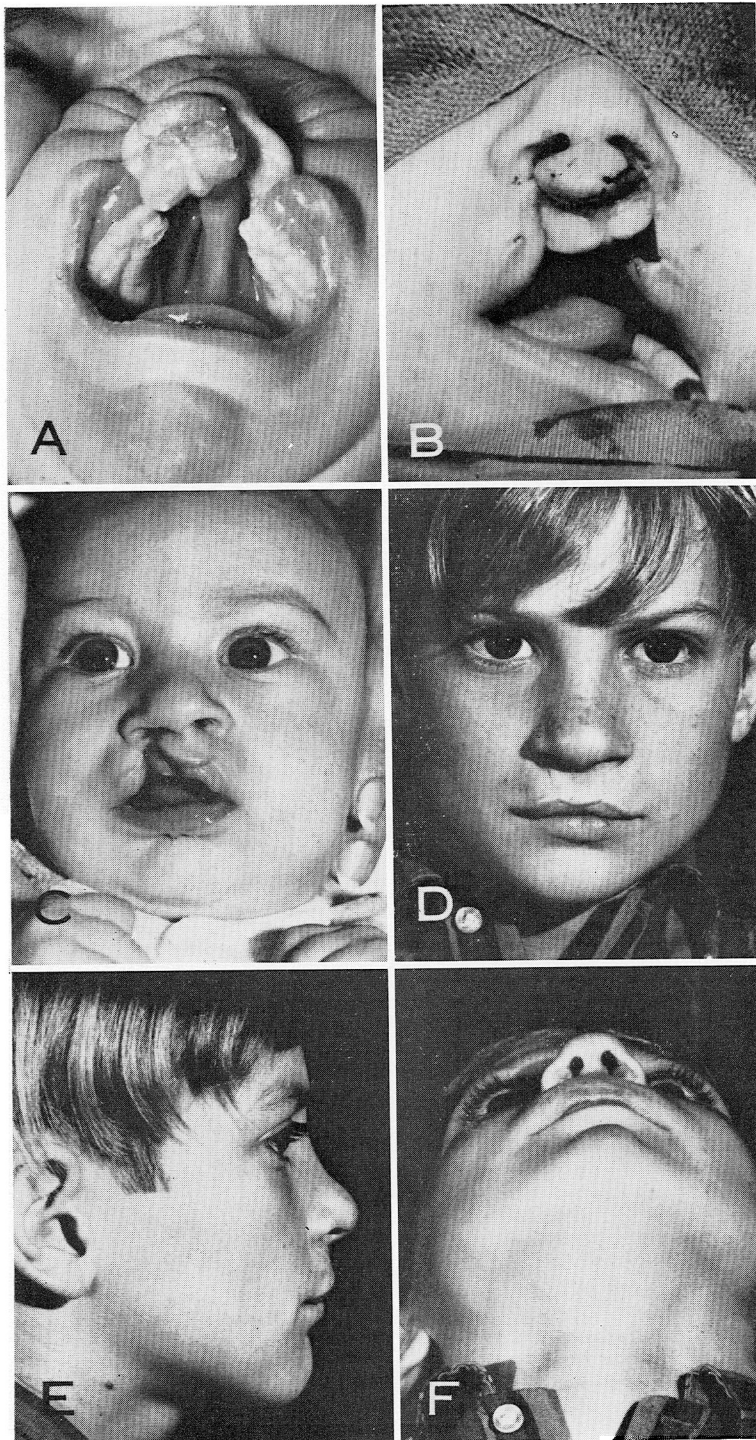


FIGURE 10a. Complete bilateral cleft of the lip with twisting of the premaxilla.

FIGURE 10b. Incisions for closure of left side with right side marked with india ink. Note vermilion-muscle flap to build up prolabium.

FIGURE 10c. Eight weeks post-repair.

FIGURE 10 d-f. Appearance at 8 yrs. of age. The columella has been lengthened and palate repaired.

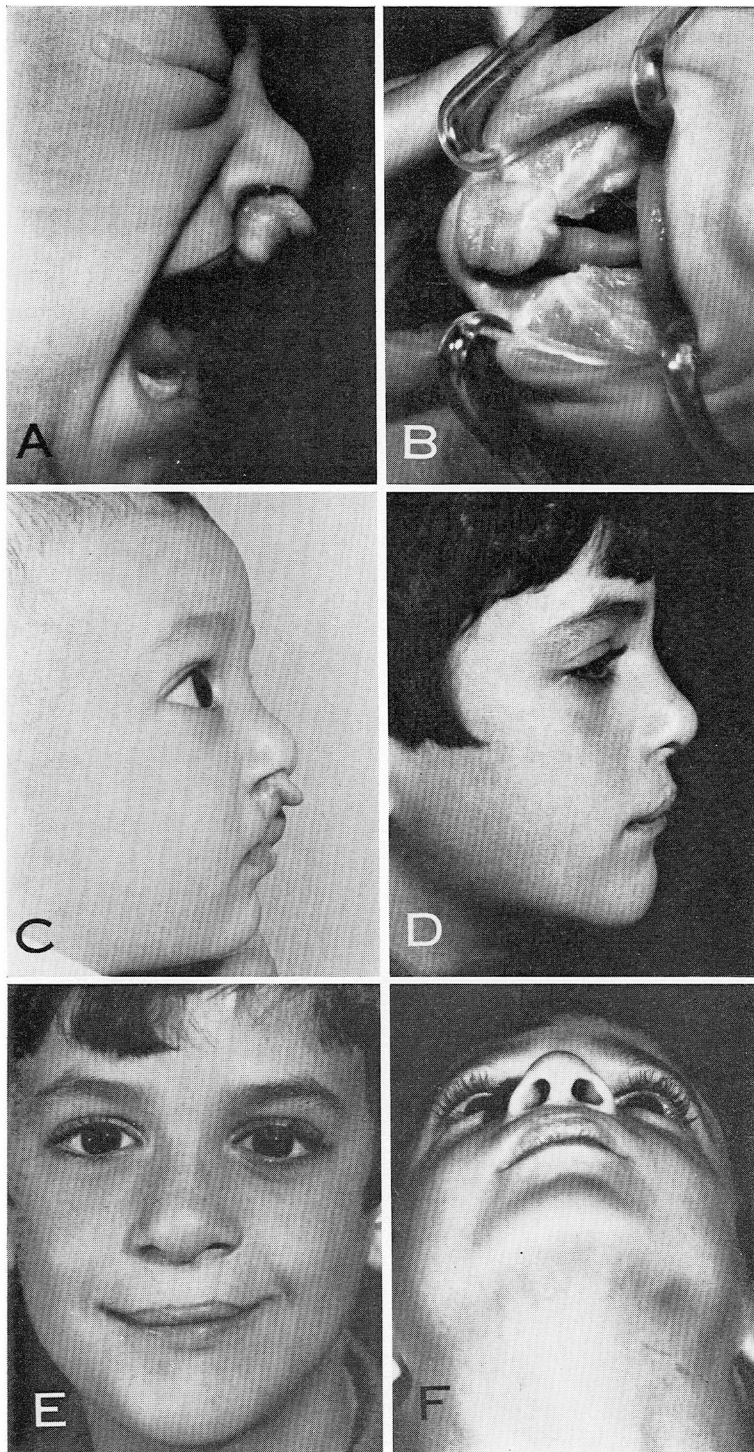


FIGURE 11 a-b. Complete bilateral cleft with protruding premaxilla.

FIGURE 11c. After use of head cap and traction (same patient as in Fig. 1).

FIGURE 11 d-f. Appearance at age 7 yrs. Lip has been repaired bilaterally in one procedure. Lip revision, columellar lengthening, and palate repair also have been done.

heavy lingual W-wire, or by a screw plate fixed to the teeth. A retention device is needed indefinitely to retain this expansion.

BONE GRAFTING. Perhaps the optimum time to stabilize the floating premaxilla is after completion of early orthodontia at 4-5 years. The bone grafts will not prevent collapse of the arch but will stabilize the floating premaxilla, which is the one firm indication for bone grafting of clefts. The grafts may also supply more bone for permanent tooth eruption.

COLUMELLA. The columella may be lengthened at almost any time after lip repair, although I have tended to wait several years before doing so. I usually use the procedure described by Cronin (7) in which skin from the floor of the nose and part of the alae are advanced into the columella. Occasionally, I have used the forked flap, especially if bad scars of the lip needed excision and revision.

FOLLOW-UP. I ask my cleft patients to return at least once yearly until grown for follow-up care and advice as to the need for other disciplines.

Results

The total case experience of the reporting group in this paper is 150 cases of bilateral cleft lip. This report covers a detailed study of 71 cases of bilateral cleft lip whose entire care has been under the guidance of the senior author. The 71 cases under study consist of 64 cases of complete bilateral cleft of the primary and secondary palate and 7 cases of bilateral cleft of the primary palate.

The follow-up extends up to 28 years, with 56 cases having at least 5 years, and 47 cases with 9 years follow-up.

There have been 17 cases of surgical setback of the premaxilla. Of this group 11 now have moderate retrusion of the maxilla, and 6 do not. (Table 3) Three of the non-retruded are less than 4 years of age.

There have been a total of 71 bilateral cleft lip repairs with 36 of these being done as a single surgical procedure, and 35 as staged procedures. The type of repair is listed in the Table 1. The Millard (9) rotation-advancement repair has been used primarily for incomplete clefts of the lip.

Operations to lengthen the columella were done on 35 patients who had

TABLE 2. Bilateral clefts.

<i>bone grafts</i>			
Number of grafts			31
Grafts with retrusion (4 grafted after retrusion)			8
<i>age at graft</i>	<i>0-1 yrs.</i>	<i>1-6 yrs.</i>	<i>6+ yrs.</i>
No. cases	10	9	12
Retruded	1	1	6

TABLE 3. Bilateral clefts.

<i>maxillary retrusion</i>	
Total number of double clefts	71
Total number of maxillary retrusion	19
Total incidence of maxillary retrusion	29.7%
<i>setback</i>	
Cases with surgical setback	17
Cases with retrusion	11
Incidence of retrusion	65%
<i>non-setback</i>	
Cases—total number	48
Cases with retrusion	8
Incidence of retrusion	16.8%

a total of 43 procedures. The average age of first operation was 6 years.

Maxillary bone grafting was done in 31 patients. The age distribution at the time of grafting was uniformly distributed, as shown in Table 2. Although there were a greater number of retrusions in the oldest age group, it is to be noted that 4 of them were retruded at the time of grafting.

Clinical retrusion of the maxilla was noted in 19 patients, (Table 3) (29.7%) at an average age of 9.8 years (mean of 9 years). This retruded group of 19 was composed of 11 of the 17 cases of surgical setback of the premaxilla (65% incidence), and 8 of the 48 cases who did not have surgical setbacks (16.8% incidence). The incidence of maxillary retrusion was almost four times as great in the group that had surgical setback of the premaxilla as in the group that did not.

Summary and Conclusions

1. The inherent problems of two clefts with a poorly developed central segment, devoid of muscle, a short columella, a protruding premaxilla, deficiency of palatal shelves, and at times an impaired growth potential, are pointed out.
2. The importance of proper timing and selection of the proper operation is emphasized.
3. The value of photographic and dental models in following the course of treatment is pointed out.
4. Nonsurgical correction of premaxillary-maxillary disparity is advocated with surgical setback reserved for exceptional situations.
5. The straight line (Veau III) method is advised for all lips, except the incomplete cleft with a very tiny prolabium where the Millard (9) rotation-advancement procedure is used.

6. The prolabial vermilion ridge is preserved and the thin prolabium is built up with lateral vermilion-muscle flaps (no skin).
7. All complete clefts will require the services of an orthodontist experienced with cleft cases.
8. Bone grafting is indicated to stabilize the floating premaxilla. (Bone grafts will not prevent collapse.)
9. The short columella should be lengthened some time in early childhood.
10. The plastic surgeon should follow and coordinate the care of other disciplines until maturity.

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