23. *Joining the Lip Muscles and Banking the Fork*

FIRST came full realization that lateral muscle and mucosal union behind the prolabium had too many marks in its favor to be ignored. There was the creation of an *upper labial sulcus,* excellent *muscle function* in the lip with *less tendency for prolabial spreading* and *reduction of tension* on the skin during closure, resulting in *better scars.* Yet a personal determination to save the lateral parings of the prolabium as a forked flap for the columella had me searching frantically for a way to set the forked flap aside temporarily. Then I learned of Duffy's banking maneuver.

Colonel Michael M. Duffy, now chief of plastic surgery at Brooke General Hospital, Fort Sam Houston, builds Kentucky rifles in his spare time and has sailed the East Coast from Nova Scotia to Florida. A constant sailing partner was William C. Meloy, his stepfather and one of the founders of the American Board of Plastic Surgery. Meloy diverted Duffy's interest in biology research by explaining:

Michael Duffy

Research on sea urchins is fine but if you discover anything worthwhile you need an M.D. to apply it to man.

and from there to plastic surgery was easy. Duffy joined the regular army for residency training and eventually was stationed at Walter Reed Hospital. Duffy recalls:

This meant I had to sign on for three years of plastic surgery—two at Walter Reed and one with Dr. Brown in St. Louis. The first two under Bill

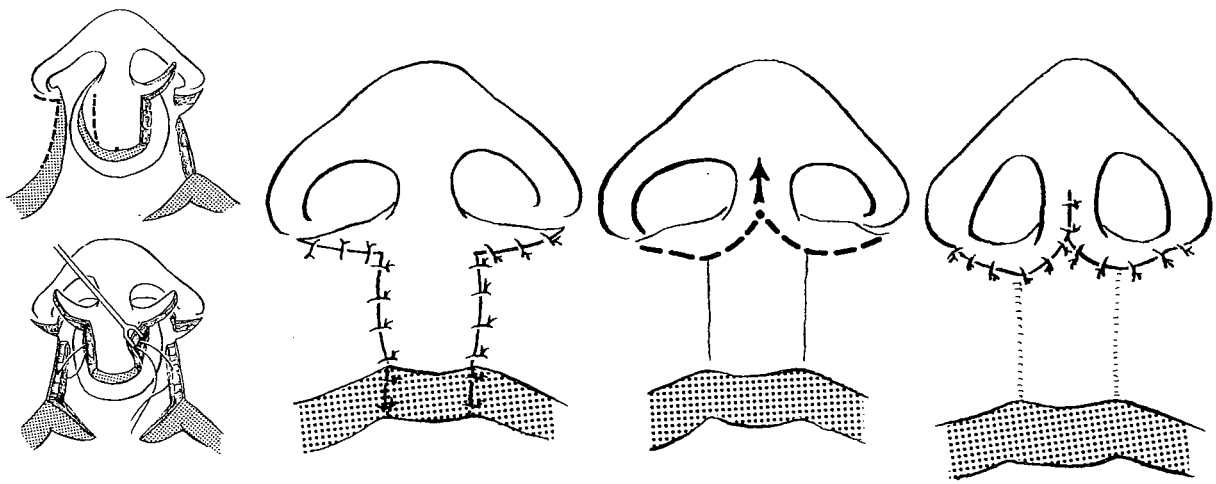
I never even got to carry the case.

Tumbusch and Bob Parsons were a relaxed blend of modified Blocker and Brown philosophies. At the end of two years the Army residency was approved to stand on its own and I desperately wanted to avoid carrying Dr. Brown's brief case for a year.

As it turned out, he remained at Walter Reed through the bulk of the Vietnam reconstruction. An excerpt from his philosophy is enlightening:

> I abhor the practice of applying a stereotyped operation to a patient whether it fits or not, and think that all surgery should be innovative and adapted to individual needs, with always the question in mind "how can I do this better?"

In 1970 Duffy described a modification of the Meyer-Schultz-Browne-Glover approach by undermining the prolabium from the premaxilla except at its inferior vermilion attachment. This created a tunnel into which he united the lateral lip elements to obtain muscle closure. In one case he cut the forked flap from the prolabium but "banked" it in the nasal floor for three years, after which he advanced it into the columella. The prolabium tunnel approach seemed unnecessarily complicated, but the principle of banking the forked flap was appealing. From his description, just how he stored the fork was rather vague. In 1971 he published illustrations.

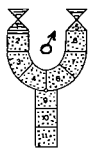


In my first attempts, I let the fork prongs into transverse subalar base incisions "whisker fashion," much as Duffy's diagrams indicated; this was the first hop in their flight toward the

nasal tip. The incisions being hidden in the natural nasal creases, they are usually unnoticeable. Then I ran into an unexpected problem. The mucomuscular closure behind the prolabium had been achieved but *not with adequate medial advancement in the upper part of the lip and alar base.* This discrepancy had been passed over during the first stage probably because of preoccupation with the subalar incisions and storage of the fork.

In a month, when the time came to continue the "flight of the fork" and advance it into the columella, I found it somewhat difficult to advance the alar bases from their wide position without compensatory triangular skin excisions at the bases. These excisions facilitated the action but added to the cheek scarring.

This is the case that eventually precipitated an important change for me. An elastic band on the headcap had achieved some premaxillary retraction.

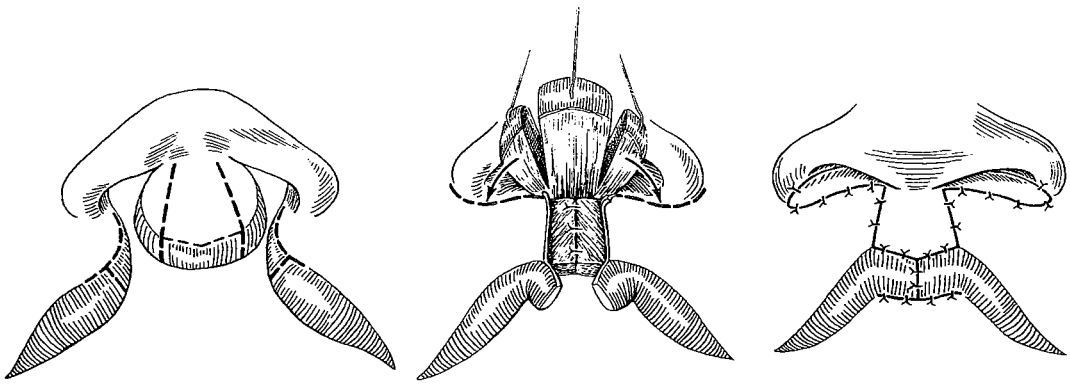


B.D. 10–10–69
F.H. No clefts
F.T. Uneventful
O.C.A. None

12–30–69
Lip closure.

At two and a half months, a one-stage lip closure was done.

1. Prolabium freed from premaxilla and lateral lip elements freed from maxillae.
2. Forked flap pared from prolabium.
3. Mucosa and muscle joined to each other behind the prolabium.
4. Lateral vermilion flaps used to overlap prolabium vermilion.
5. Forked flap banked in subalar incision, whisker fashion.



Although the lateral mucosa and muscle had been united in the midline, the upper muscle approximation had been timid and the alar bases had not been advanced medially in an attempt to leave a subalar gap in which to store the forks. This allowed subsequent lateral pull to spread the prolabium, broaden the cupid's bow and leave the alar bases flared. Then, when it came time to shift the forked flap, advancement of the wide alar bases required Burow-Imre-Szymanowski lip-cheek triangular skin excisions with less effective base positioning and more scarring.

6–1–70. Forked flap at 8 months of age.

2 weeks postoperative

1 year

3 years

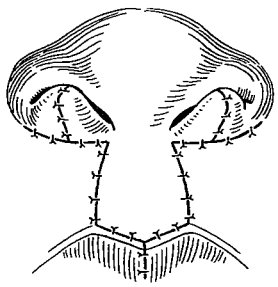
6 years

The columella is long enough and, although it is too broad and retracted, it can be corrected easily by narrowing and inserting a septal cartilage strut at about 16 years of age. The bow is too wide and will have to be reduced by another type of forked flap based above on the nostril floors and let into a releasing incision in the membranous septum on each side to correct the columella retraction. The cheek scars have finally faded—and so did any enthusiasm for this modification.

Comment: Primary advancement of the alar bases with fixation was developed from experience of this case.

It had become obvious that medial advancement of the lateral lip elements and the alar bases to near normal position should be accomplished in the *first* stage. But in that event prongs of the

fork adequate in length to release the nasal tip would be quite long for a subalar incision unless it curved around the alar base as a handlebar or Hercule Poirot mustache. Another banking process was sought.



THE "PRAYING HANDS" PYRAMIDS

The next attempt, which was popular for a time, banked the forks by suturing them to the alar base flaps, at first end to end. Then the slack was further taken up by continuing their approximation belly to belly with the joined ends projecting like a pair of pyramids.

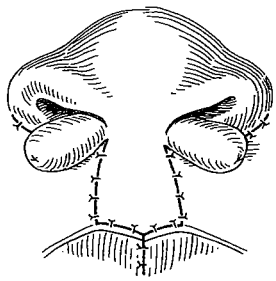
When it was time for columella lengthening, the prongs of the fork and the alar bases were separated except at their tips, and the resultant long strap was rotated up into the columella bilaterally. This had advantages over the previous approach and was used in a number of cases with reasonable success.

There remained three questions: how to advance the alar bases, how to bank the forks better and when to cash them in to the columella. When the alar base was merely sutured to the fork, no dramatic medial rotation of its flare was possible. Thus it was decided that definite and *permanent alar base positioning deserved greater priority than its being a temporary playmate in the forked flap banking game.*

JOINING ALAR BASES TIP TO TIP

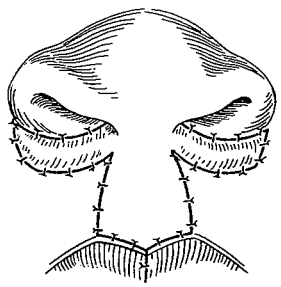
The alar bases were freed from their lip elements as before, and some correction of the flare was achieved by muscle-to-muscle union in the midline under the prolabium. To increase this action, the tips of the alar base flaps were denuded of epithelium, advanced even more medially and sutured to each other at the nasal spine. The result was indeed impressive alar base positioning, but what to do with the damned forks?

FORKED POLYPS



In one case, they were tubed on themselves and tied together in front of the nose, finally becoming two projectile mounds available for columella construction later. They looked funny and caused questions from parents and friends.

WHISKERS



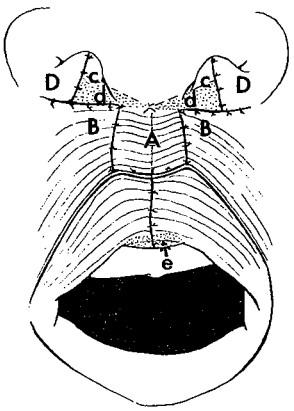
In the next case, the alar bases were again joined to each other subcutaneously in the midline and the forks partially tubed on themselves and let into the transverse incisions between the lip and alar bases, whisker fashion. This is probably the best method of all.

DECISION TO DELAY FORKS

My second concern was the optimum time for shifting the forked flap into the columella. Although early correction seems ideal, there is no question that total division of attachments between lip and nose, as achieved with a forked flap and other flaps introduced between columella and lip, has a tendency to allow lip elongation. Once the original attachments of the lip to the nasal spine have been severed, the lateral lip muscles seem to pull a vertical length in the lip and drag the tips of the forked flap back into the lip. This seems a more likely event in complete bilateral clefts and may justify a delay of several years in the second stage of the forked flap.

The next modification tried was in the method of columella lengthening. Instead of the usual membranous septal incision for the forked flap advancement, a more superficial dissection was used. In one of the cases in which the forks had been left protruding like horns, these projections were freed and opened and, in continuity with them, the skin of the anterior columella was elevated as a flap based on the nasal tip. Thus the spread medial crus of the alar cartilages was exposed, and all tissue between the cartilages was excised so that they could be sutured together with nylon to lengthen the columella and sharpen the

nasal tip. The forked flap, united two-thirds of its length, was advanced into the columella, and its distal ends were allowed to splay as columella bases to join the alar bases to form the nostril sills. The only advantage of this approach seemed to be that the main attachments of the lip to the nose at the nasal spine were left intact with a possible reduction in the chance of subsequent vertical lip lengthening and columella down-drag. The disadvantages seemed to be less columella lengthening and some danger of inadequate vascularity for the ends of the fork with such a thin columella base.



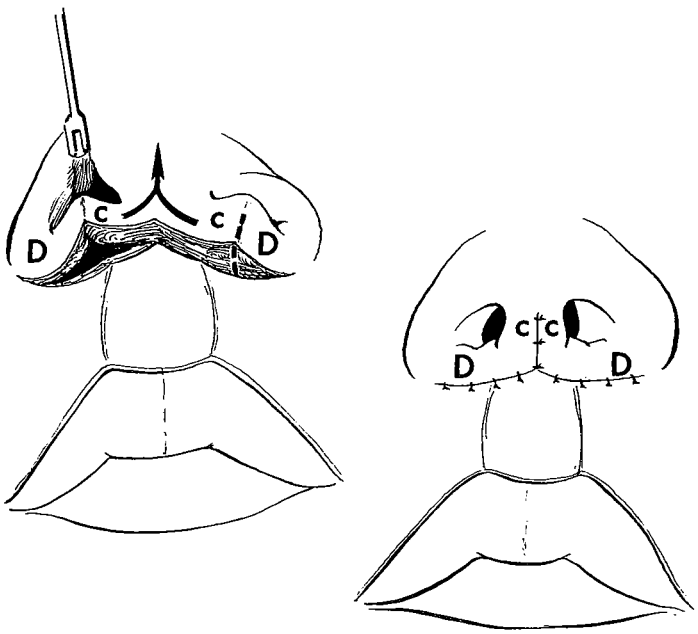
ADVANCE ALAR BASES AND STILL BANK WITH "PRAYING HANDS"

An improvement in the banking procedure makes possible the cinching of the wide nasal base simultaneously with the banking and will be described later in detail. In principle, it splits the alar base flaps into a skin flap D and a subcutaneous pedicle d. The subcutaneous flaps are sutured to each other and to the septum above the nasal spine, effectively reducing the flare of the alae and narrowing the wide nostrils. The alar base skin flap D is left free to approximate the corresponding fork to form a nasal sill pyramid. In fact, these flaps in gentle apposition are symbolic of Albrecht Dürer's 16th-century *Praying Hands* offering the hope that the banking will be sound, with safe preservation of the deposits immediately available upon withdrawal for columella payment.

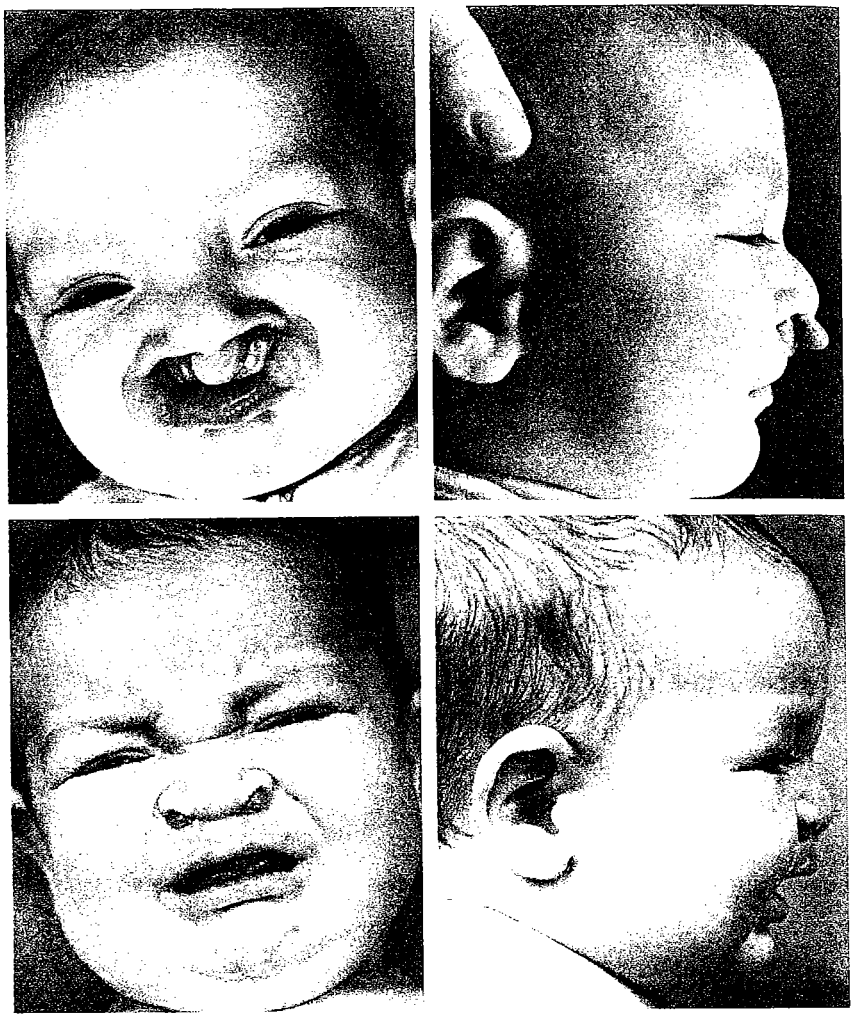
CHOICE OF BANKS

Of the three banking maneuvers, polyps, "whiskers" and "praying hands," the polyp approach is obsolete. For a time, I favored the "praying hands" method as it cleared the forked flap from the lip completely and joins the prongs to the alar bases for a strap flap advancement. It is, however, responsible for more nasal obstruc-

tion, requires more postoperative care and cleaning and is a little more complicated as regards to maneuvering the flap eventually into the columella because it requires bilateral strap formation and partial opening of the pyramids prior to advancement up along the septum.



The forked flap can be inserted between the lip and the alar bases bilaterally in "whisker" position without difficulty, even after reduction of the alar flare, and retrieved for the columella as easily without lip scarring. It presents less nasal obstruction and requires less care during the weeks, months or years of banking. It has shown the least amount of shrinkage. For these reasons, the "whisker" position has become more popular. It is definitely the banking of choice in out-of-town cases and was used in the first stage of the bilateral cleft case which Simon Fredricks scheduled as a backup for the TV presentation of operations before the American Society of Plastic and Reconstructive Surgeons in Houston in 1974.



2 months postoperative

SHRINKAGE

Randall and Lynch reported in 1974 after an experience with two complete clefts:

> We have not been pleased with these results as the "banked" tissue has tended to melt away.

Since they also reported that 10 of their cases had postoperative prolabiums which were "far too wide," the partial disappearance of the banked forks might be explained by the fact that the forks were cut so slim in the first place.

The astute Ray Broadbent of Salt Lake City's Primary Children's Hospital was another of the few who have tried banking

the fork but he too was disappointed with the apparent shrinkage of his flaps. A closer scrutiny of this phenomenon is warranted.

OSTRICH LOGIC?

How can anyone justify throwing this much tissue away!

Broadbent and Woolf in 1972 admitted:

> The flat nose remains as an unanswered problem in the primary repairs.

They follow the same plan of reducing the width of the prolabium to philtrum dimensions as I have advocated, stating:

> The cupid's bow should not be more than 3 mm. from the bottom of its peak on either side.

They then "throw away" the excess, justifying this disregard of principle with

> We have found "banking" of small flaps in the floor of the nostril to be of no value.

They do wisely place the excess in the floor of the nose, but spurning its value:

> Admittedly, the latter is inadequate tissue for suitable nasal tip elevation but it does give body to the nasal floor.

Of course, this judgment depends directly on the ingenuity of their banking, the size of their flaps and the cover of their raw areas. Studying their fine results suggests that a Mormon thriftiness possibly has restricted prolabium reduction short of normal except in one case with an almost adequate columella. If the prolabium is reduced a bit further to 5 to 6 mm. by paring more generous forks and retaining their vermilion border for extra tissue and cover inside the nose, quite substantial flaps can be salvaged and safely stored for subsequent columella lengthening.

Broadbent was challenged with this solution, and his most recent reaction was:

> I must admit you have larger flaps tucked in the nose than I have been putting there, but I have given this procedure up and frankly don't have an answer to elevation of the tip of the nose at the time of primary repair.

Here is a case in point by Broadbent in which the prolabium has been reduced but the columella is short and as the lip is good there is no tissue available for the nose.

Both Broadbent and Woolf go along with my 1970 stand that the scar of infancy is superior, rendering reentry objectionable. They wrote in 1972:

It is our opinion that the best lip scar is the first one produced and the surgeon must arrange the scar pattern with intent not to disturb it.

They face the residual persistent short columella with two procrastinations:

[1] The tissues for correction of the flat nose are, in our opinion, in the dome of the flaring nostril, It remains a challenge for all of us to find the right way to place them satisfactorily into the nasal tip.

But I say it will still require extra skin for the columella lengthening, whatever is done to the tip cartilages.

[2] Timing is unimportant. Those who say that the flat nose deformity gets worse and must be corrected early may rue the day of that early surgery, when the resultant scar limits what they otherwise could accomplish by rhinoplasty.

Shifting sufficient skin into the columella can only facilitate the later rhinoplasty.

PLAY NOW, PAY LATER

To discard valuable portions of prolabium and create "invisible" scars of infancy may produce a lovely lip which can be enjoyed and boasted of temporarily. Eventually one must pay through the *nose* for this frivolity, for with no stored tissue available and no extra tissue remaining in the lip, the bridge has been burned and the tip of the nose stays down.

Broadbent got in the last word if not the best tip elevation in October 1973 when he wrote as a P.S.:

> We're elevating the nose in bilateral clefts early in infancy with a composite graft from the ear.

Here in the margin is an example by Broadbent and Woolf.

MUSCLE UNION STILL NOT UNIVERSALLY ACCEPTED

At the Cleft Lip and Palate Symposium at Duke University in the spring of 1973, Georgiade, Brauer and Broadbent had each given a 10-minute dissertation on their ideal procedure for management of bilateral cleft lip. Not one of these three giants in the field had approximated the lateral orbicularis oris musculature across the cleft over the premaxilla. The undercurrent of feeling among them seemed to be that such action over a projecting premaxilla called for too much tension.

THE ROOKIE FROM AKRON

During the presentations at Duke, young James A. Lehman of Ohio, trained by Musgrave and having had a Maytag Fellowship in Miami, sat and listened. Later he said:

> All of these techniques failed to describe muscle to muscle union and all produced an extremely wide and undesirable prolabium. I decided that I could no longer sit through the old method of correcting these deformities. Waving the muscle banner, I proceeded to tear at the old facade created by these paragons of plastic surgery.

James Lehman

In fact he raised his hand and challenged the panelists:

> What about the importance of getting muscle union across the cleft?

There was a short silence. Who the hell was this upstart? As moderator of this panel I encouraged Jim:

That's the boy, Jim, carry on!

He held his ground with the courage of his convictions. Ray Broadbent led the counterattack:

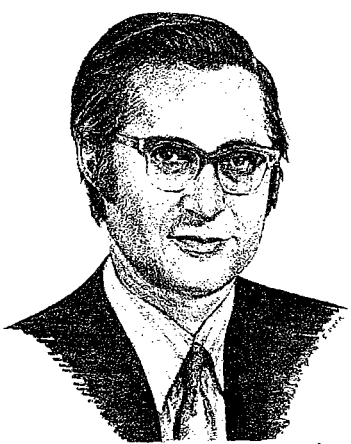
I do not feel this is important. There is too much tension.

I reminded Ray that we both felt the prolabium should be of philtrum dimensions, which meant moving the lateral muscles at most only *another 3 mm.* from each side. Then, as they are not sutured to the pitiful little prolabium but to each other, the tension is absorbed between themselves leaving the unharassed prolabium free to rest quietly over the muscles in the center of the lip.

Four months later in Copenhagen I moderated another bilateral cleft lip panel. Georgiade again was the leadoff man and he was followed by other famous surgeons such as M. Perko of Switzerland, G. Pfeifer of West Germany and T. Skoog of Sweden. Not one of these panelists advocated truly joining the muscles across the cleft. Program chairman B. Johanson had requested that the moderator participate, so among other aspects the importance of muscle union was stressed.

Peter Randall, at the Duke Symposium and again in Copenhagen, continued to pound his point with a catchphrase "think muscle" merely on the basis of his little triangular muscle flap transposed from the weak to the strong side in the inferior portion of the lip on one side in unilateral and on both sides in bilateral clefts. Yet even he was not actually joining muscles in bilateral clefts, and I was provoked to suggest:

Peter, let's stop this "think muscle" and get on with "act muscle" by really joining them across the cleft.

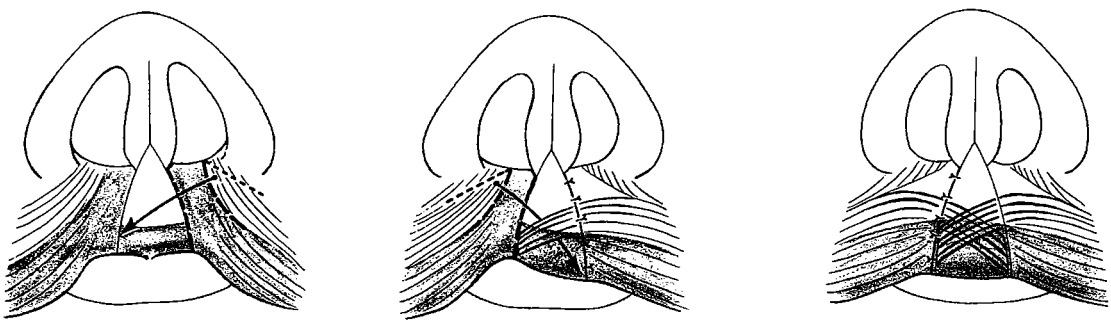


Ian Jackson

The spirited Ian I. Jackson of Glasgow, Scotland, stood several times during this International Congress in Copenhagen to concur with the importance of joining the orbicularis oris muscle in cleft lip. This was his stand:

Conventional methods of repair emphasize skin rather than muscle reconstruction and disregard the anatomy of the cleft muscle. In the lesser segment careful dissection has shown it to be inserted into the dermis at the cleft margin, the alar base and the front of the maxilla; in the greater segment the insertion is largely into the nasal spine and the base of the columella. The most important part of the repair is detachment from this insertion and accurate reconstruction. The method of skin repair is now considered to be of much less importance than in the past since lip length and contour are controlled by the muscles. In the bilateral case a procedure based on that recently published by Millard has been successfully developed.

A discussion with Randall later in 1973 revealed that he had been incited out of "think muscle." He now follows his two-stage forked flap and bilateral adhesion with a later two-stage definitive lip closure that dissects the muscles widely. The muscle of one lateral lip element is freed from mucosa and skin, brought down and passed through a tunnel in the prolabium, somewhat in the Duffy fashion, but well across to the opposite side. In a second stage he repeats this muscle shifting on the other side with an actual crisscrossing of the muscle fibers. There are several discrepancies here, however, such as an area without muscle—and possibly contour too—in the upper triangle of the lateral lip element and an adjacent one in the upper prolabium. Then, too, even after these four operations there is still no labial sulcus!



In fact, in 1974 Randall and Lynch acknowledged:

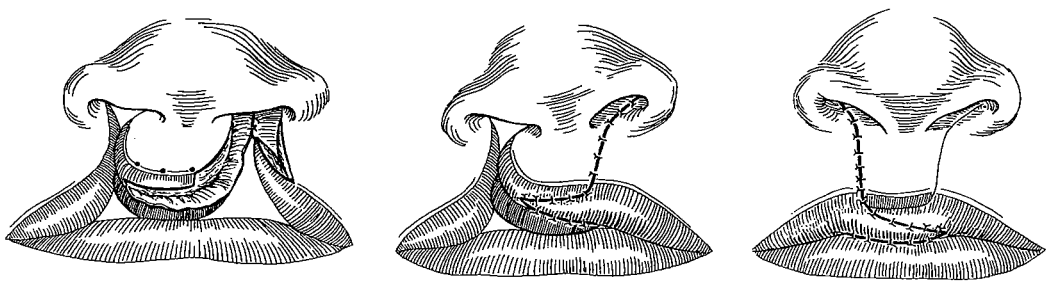
Though the forked flap reconstruction and the overlapping of muscular flaps through the prolabium jeopardizes the blood supply to the philtrum we have had only a few minor areas of tissue loss in these patients. It should be noted that the midline vermilion is left intact with the underlying gingiva so as to provide an additional blood supply. This means that reconstruction

of the sulcus will have to be done later. It is interesting, however, that only five of our patients have "whistling" vermilion deficiencies perhaps reflecting the addition of muscle to the prolabium.

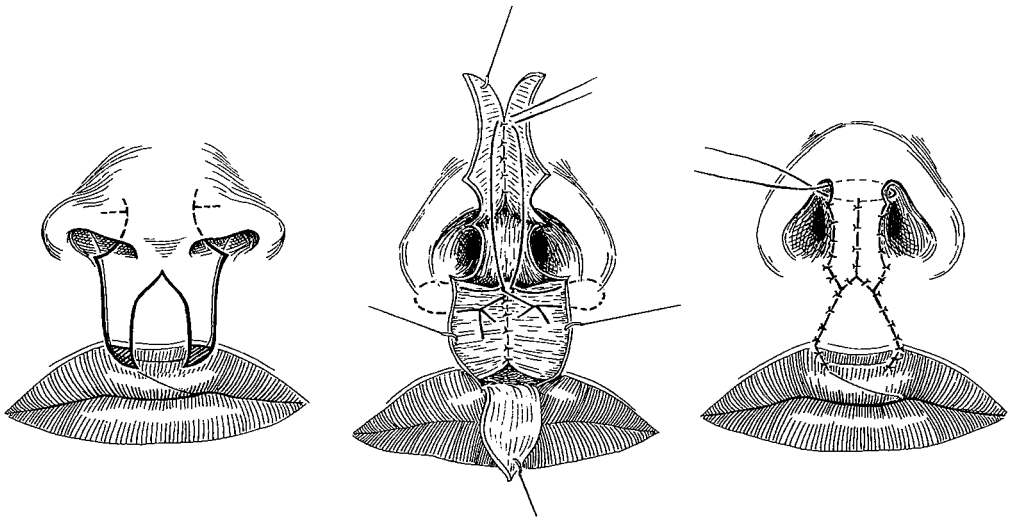
MUSCLE UNION CAN FOLLOW AN ADHESION

In 1974 Oneal, Greer and Nobel of the University of Michigan reported having adopted my muscle union and forked flap banking for bilateral clefts as a two-stage secondary procedure. They first tried it following a primary bilateral adhesion and found it effective. As they noted, the condition of the nose and lip after their bilateral adhesion procedure presented a short columella, redundance of lateral vermilion with orbicularis oris bulges laterally and deficiency of the central vermilion. Banking the forked flap carrying the bilateral scars and joining the muscles across the cleft behind the prolabium, followed in two to three months with shifting of the forked flap into the columella, was successful for them as a delayed primary procedure.

In 1975 Alfred Rehrmann of the University of Düsseldorf still expressed his preference for closing the bilateral lip clefts with a two-stage modified Veau procedure, crossing two lateral muscular vermilion flaps into the prolabium vermilion.



Then, at about 5 years, he is willing to cut a forked flap out of the prolabium, join the lateral muscles, and lengthen the columella.



The result he published showed severe lip scars. My contention against not bringing the muscles together in the original closure is that it forces sacrifice of the lovely scars of infancy. To have to go back into the lip at age 5 years to get a forked flap and to get the muscles together is undesirable. This, of course, is the prime motivation for the banking procedure.