

38. Primary Pharyngeal Flap

USE of the posterior pharyngeal flap in primary cleft palate surgery was first reported by a German, Freund, in 1927. It is possible he was not the first to take this step. As early as 1924, F. Burian of Prague was using a posterior pharyngeal flap in combination with a primary palate pushback operation. In 1954, Sanvenero-Rosselli advocated a similar use of a superiorly based flap.

Richard Webster of Brookline, Massachusetts, and his co-workers in 1956 promoted the use of the primary pharyngeal flap and reported eight cases:

We have used posterior pharyngeal flaps in children 17 and 18 months old to aid in primary cleft closure when the width of the cleft and lack of palatal tissue led us to anticipate later sphincter incompetency.

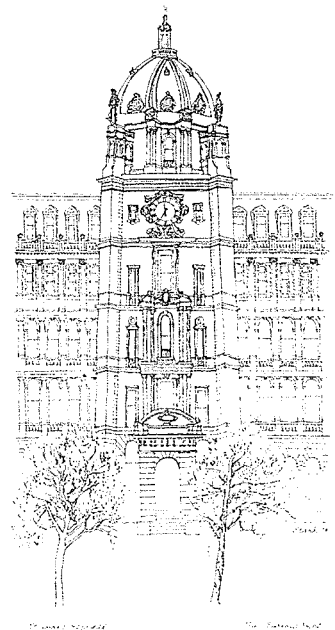
POPULARIZING THE STANDARD PRIMARY PHARYNGEAL FLAP

The one surgeon to popularize the primary pharyngeal flap in the Western world was undoubtedly Richard B. Stark. In 1960, with DeHaan, Stark published a paper with emphasis on the use of the primary pharyngeal flap. His first case, he reported, had been performed in 1954 on a 1-year-old child. By the time his book, *Cleft Palate*, was published in 1968, he had 60 primary flaps carried out in conjunction with a von Langenbeck procedure before speech had begun.

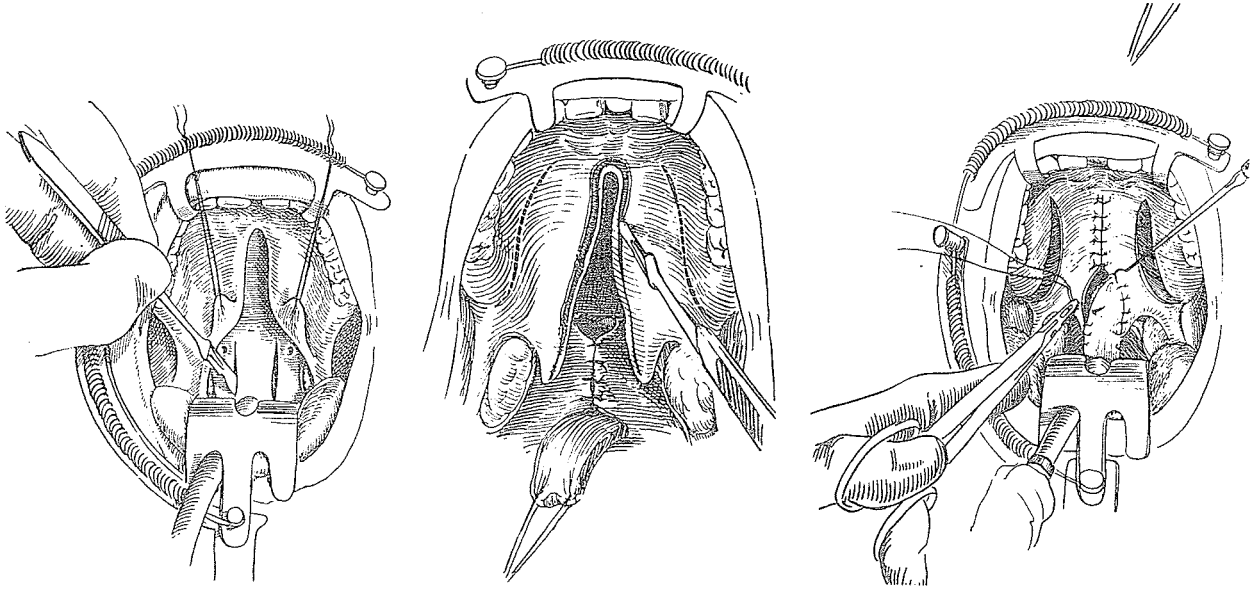
Stark is also a renowned artist with a precise, continuous-line style, as seen in his sketch of St. Luke's Hospital where many of



Richard Stark



his primary flaps were attached. His sketches of the primary pharyngeal flap technique, the palate and pharynx, the surgical design, Dott gag and anesthetic tube, gloved hands and instruments in action are, to me, some of the clearest and finest illustrations of palate surgery.



Conway, when asked in open court what he thought of the primary flap, stated:

I am opposed to its universal use in all cleft cases.

Yet Stark's faith in this principle has been greatly responsible for what present popularity it enjoys.

Stark's most recent thoughts on it appear in the excellent compilation *Cleft Lip and Palate*, edited by Grabb, Rosenstein and Bzoch. Out of 86 primary flap patients, 42 were 5 years of age or more and old enough for speech testing. Out of the 42, 10 were excluded because of mental retardation, flap disruptions, tracheostomy and an unrelated death. Of the remaining 32, 3 were considered excellent, 26 good, 3 fair and none with poor or unintelligible speech. This evaluation was graded on (1) volume, (2) pitch, (3) voice quality, (4) rate, (5) rhythm and (6) articulation.

Stark based the rationale behind the flap of mucosa, submucosa and superior constrictor muscle in primary repair of cleft palate on three factors:

1. In clefts of the palate (and especially those of the soft palate alone) embryologically there appears to be an inherent paucity of mesoderm, which logically requires the addition of dynamic muscular tissue plus added blood supply in the region of the uvula.

this flap is not dynamic

2. A pharyngoplasty is performed simultaneously by virtue of closing the pharyngeal donor defect and of elevating the flap into position. . . .

3. The open cleft of the palate presents the plastic surgeon with the best opportunity of both elevating the flap and closing the donor defect.

Although he agrees with Skoog that whether the flap is based inferiorly or superiorly is academic and in postoperative examination it is difficult to tell which is which, Stark still prefers the inferior base for ease of application. He does admit that when a hypertrophied adenoid pad is present a superior base is better.

which in a primary cleft closure will be quite often

ANOTHER PRIMARY ADVOCATE

In 1961 James B. Cox and Bernard Silverstein of Knoxville, Tennessee, reported 78 pharyngeal flaps, 41 secondary and 37 primary. They noted that the primary flaps were usually smaller in size, were let into the nasal side, were used in association with a von Langenbeck operation and had no postoperative breakdown or fistulae. In 1972 Cox wrote to confirm his favor of the primary pharyngeal flap in the Southeastern Society's newsletter.



James Cox

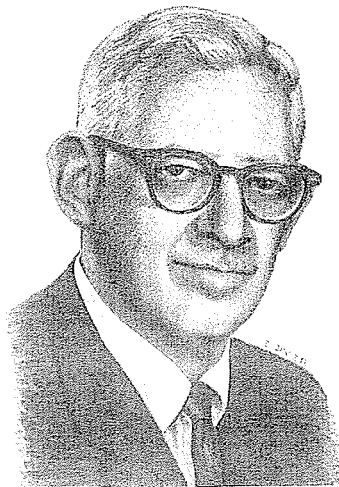
I feel there is a frequent indication or need for a pharyngeal flap to augment the palate at the time of the initial repair. This feeling is based on the belief that there is a real or relative deficiency of palatal tissue in many, if not most, cases of cleft palate. . . . The midline area of the posterior pharyngeal wall fulfills the requirements of a good donor area for tissue to augment the palate, and also, the elevation of a flap from this area offers some benefit as a type of pharyngoplasty. The addition of tissue in the midline area of the palate affords . . . an easier, simpler closure. . . . Better primary healing occurs and fistulae are rare. Of considerable importance is the fact that one relatively simple operative procedure can be performed safely at an early age (twelve to eighteen months) and will provide, in most cases, an adequate mechanism for speech.

Over the past 15 years, I have performed well over one hundred cases of primary pharyngeal flaps and have been pleased with the overall results. Speech results have been . . . superior on the average to results achieved by other methods. . . . There is a higher percentage of normal speakers among this group than in comparable groups having other types of surgery. I have

not been able to detect any adverse effect on facial development, and hearing problems have been fewer and of lesser degree.

In 1977 Cox reconfirmed his earlier findings about better speech results with no deleterious effects on growth. He recalled his first primary pharyngeal flap in 1956:

My first case was a four-year-old boy with an incomplete cleft extending through the entire soft palate and about one-eighth of the hard palate. His speech was poor with typical velopharyngeal insufficiency. I used a relatively small, midline, superiorly-based pharyngeal flap incorporating the muscle and did an ordinary simple repair. This boy, without speech training, progressed reasonably soon to essentially normal speech. In 1960, I did a report on these flaps and today I am still very pleased with the results obtained over about twenty years.



Philip Weisman

AND ANOTHER

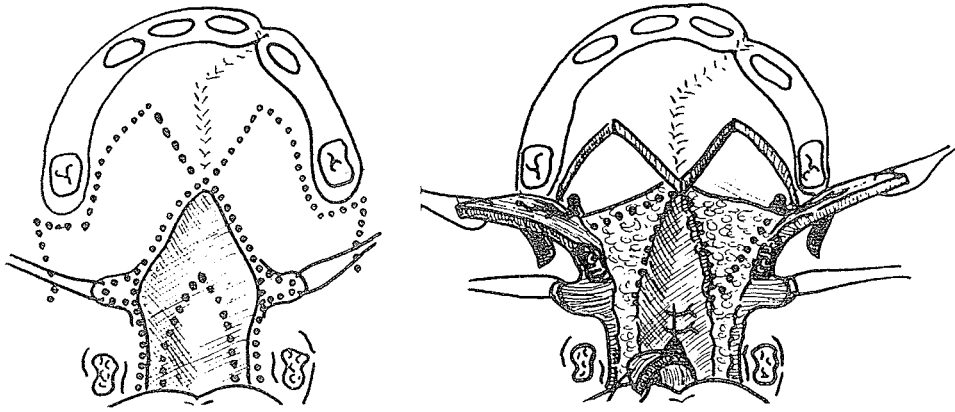
Philip A. Weisman of the Good Samaritan Hospital, Dayton, Ohio, after 10 years of experience with the standard Wardill palate procedure noted that most palates achieved normal speech but many did not. Regarding Stark's use of a primary pharyngeal flap in all palates, he commented:

If one could select the patients most likely to have poor results with the standard technique, the primary flap could be reserved for this group alone—without using it unnecessarily for those who would not need it. Subtelny et al. observed that after a secondary pharyngeal flap, the potential for normal speech was often established but unfulfilled. With a primary flap, the batting average should be better.

Weisman chose for consideration for a primary pharyngeal flap all complete clefts, very wide incomplete clefts, clefts with shortage of tissue and unoperated older patients. He used the primary flap in 16 out of 32 palates from 1965 to 1970.

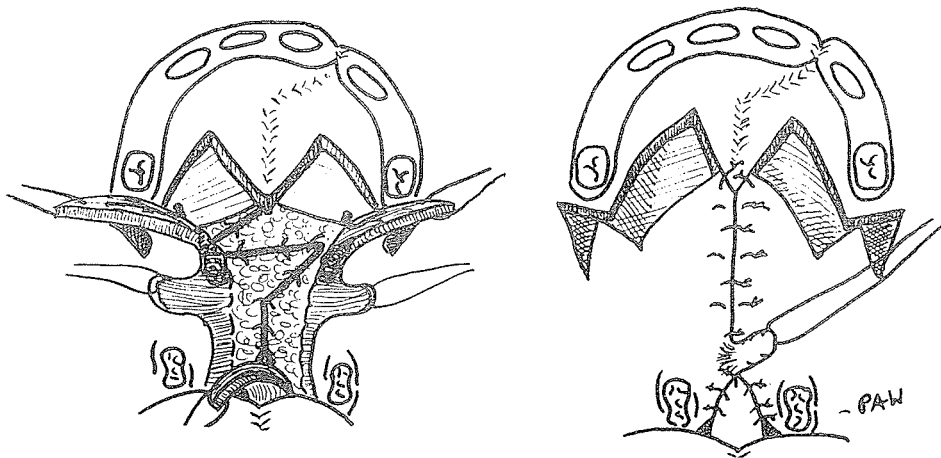
In the first stage, Weisman employed a vomer flap to close the hard palate and added a Skoog periosteal flap when closing the lip. Then his attack on the palate had a built-in belt, suspenders and hand-holding safety series which was almost an "overkill." He combined a Wardill V-Y pushback, levator retropositioning,

Limberg osteotomy, Z-plasty of the nasal mucosa and union of the posterior pillars of the fauces well behind the uvula. Finally,



onto the oral raw area of the join he sutured a high, inferiorly based pharyngeal flap! It's a little tricky to say which does what.

Of the 16 cases, eight could be evaluated and six of them were considered by Weisman to have satisfactory speech. A hyperkinetic boy on Dilantin revealed hyponasal speech postoperatively.



Weisman summarized the value of a primary pharyngeal flap:

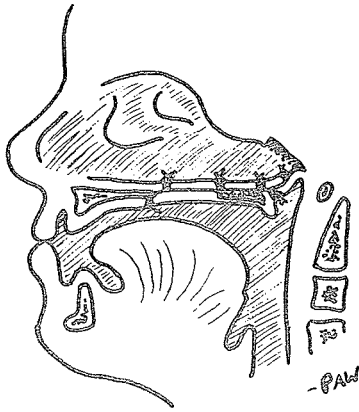
Disadvantages. . . .

1. Longer operating time (slight).
2. Greater risk of bleeding (slight).
3. Increased postoperative airway embarrassment.
4. Risk of denasality (small, surgically correctable).

5. Posterior wall compromised as future donor site.
6. Interference with future nasotracheal intubation.

Advantages. . . .

1. Improved chance for velopharyngeal competence during early speech development, rather than after fixation of improper habits and the emotionally traumatic embarrassment of rhinolalia.
2. Avoidance of speech therapy for many patients.
3. Avoidance of secondary surgery.
4. Easy accessibility in unrepaired child.
5. Palate unscarred by previous surgery.
6. Pushback effect secured by posterior attachment.
7. Tissue added to palate.
8. Tightening of "pharyngeal sphincter" by closure of flap donor site ("pharyngoplasty.")



In 1976 Weisman wrote a follow-up:

Since 1965, I have repaired the least favorable cleft palates with a Wardill-type pushback in combination with an inferiorly-based pharyngeal flap attached into the post-uvula area. 24 patients have been operated between 18 and 24 months, the oldest at three and a half years. 22 of these patients are at least 3 years and 19 of the 22, or 86%, have normal or virtually normal speech. . . . Only 9 of these 24 have had speech therapy. I would like to emphasize that the pharyngeal flap is reserved for those with the worst prognosis. More favorable clefts are treated with the pushback procedure alone. In a few patients with extremely wide clefts and very skimpy palatal tissue, preliminary uvular adhesion procedures were done to stimulate some muscle function. Our patients have had a high incidence of ear troubles, but I do not think any higher than cleft palate patients without the pharyngeal flap. A few patients have been mouth-breathers . . . and some of this is probably due to the flap, but some due to the deviated septums or collapsed maxillary segments. Nevertheless, I believe the flap should not be made too wide, mostly about 1 cm. In 2 cases I did a partial release of the flap secondarily and in one, a complete release to overcome some mild denasality.

Here is an interesting little story:

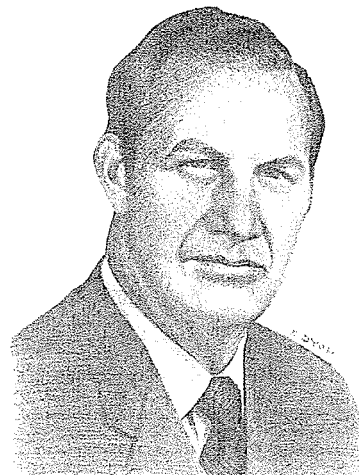
Lance's father never knew his mother was pregnant. Lance's mother never knew his father's last name. Lance's mother never wanted Lance. Lance was born a handsome blond baby with light blue eyes, engaging personality and a severe cleft of the lip and palate. First couple considering adoption were discouraged by the cleft problems. Then came a couple, she a handsome blond Swede with light blue eyes, and he a research psychologist whose bilateral cleft lip had been reconstructed by George Pierce in San Francisco. The adoption came quickly and was followed by a pushback repair with

primary pharyngeal flap for Lance and a lip revision for his new father. Last clinical note, when Lance was 4, indicated no teasing at school, speaking fairly well and happy.

In 1966 Robert Pool of Michigan joined those using a pharyngeal flap primarily in the closure of the palate cleft.

AND STILL ANOTHER

At Duke University in the late 50's the Wardill V-Y pushback operation was being used, dividing the nasal mucosa along the edge of the hard palate but with no attempt to supply nasal lining. This left a vulnerable area of one-layer closure subject to breakdown and scarring. Stalwart Robert M. Woolf recalled in 1977 that as a senior resident at Duke he devoted 30 percent of his operations on the palate to dealing with fistulae. When he started in Salt Lake City, Utah, he determined to make a change and came to the Oxford-type pushback without actual nasal release. Although creating fewer fistulae, he ended up with 32 percent of the cases requiring secondary surgery for speech improvement. Thus, in 1971, at Primary Children's Medical Center, Woolf and Broadbent began a prophylactic campaign using a *primary* superiorly based pharyngeal flap to supply lining to the nasal defect of the pushback. They employed this method in 76 percent of cases with a 1 percent occurrence of fistulae and have been encouraged by the apparent improvement in speech from 50 percent acceptable results to 80 percent without evidence of other deleterious effects.



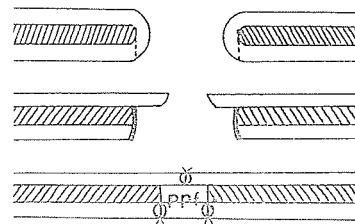
Robert Woolf

In 1977 in Chicago Ray Broadbent stated:

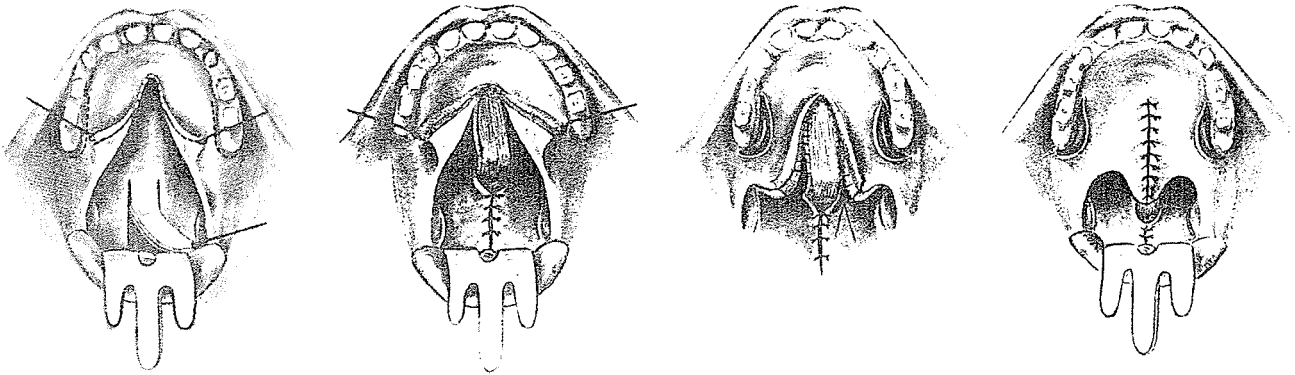
If 24 to 26 percent of palates will need a pharyngeal flap, do it primarily on all since you can't tell which and it's important to speak well early.

SIDE-TO-SIDE RELIEF

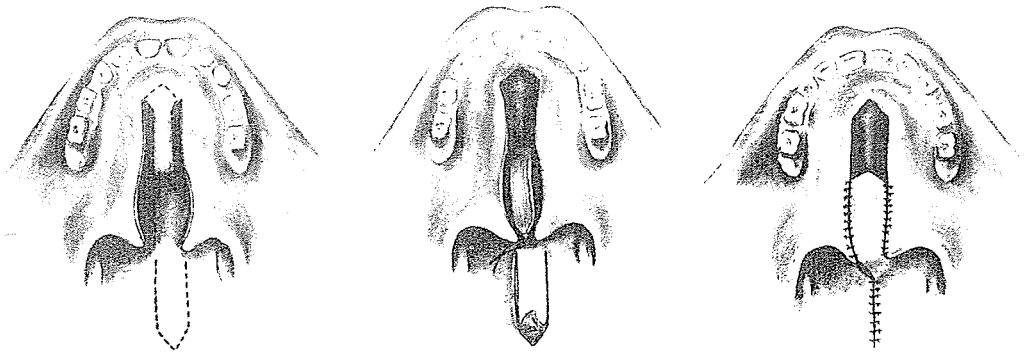
It must be admitted that in rare wide deficient clefts of the palate a primary pharyngeal flap can bring in extra tissue. Usually there are better ways of accomplishing this goal, but in 1962, in *Plastic and Reconstructive Surgery*, I suggested a slight variation, which



can be used to relieve moderately the side-to-side tension of cleft closure. By turning edge flaps orally and inserting a superiorly based pharyngeal flap nasally, one can bring some extra tissue to both the oral and nasal lining.



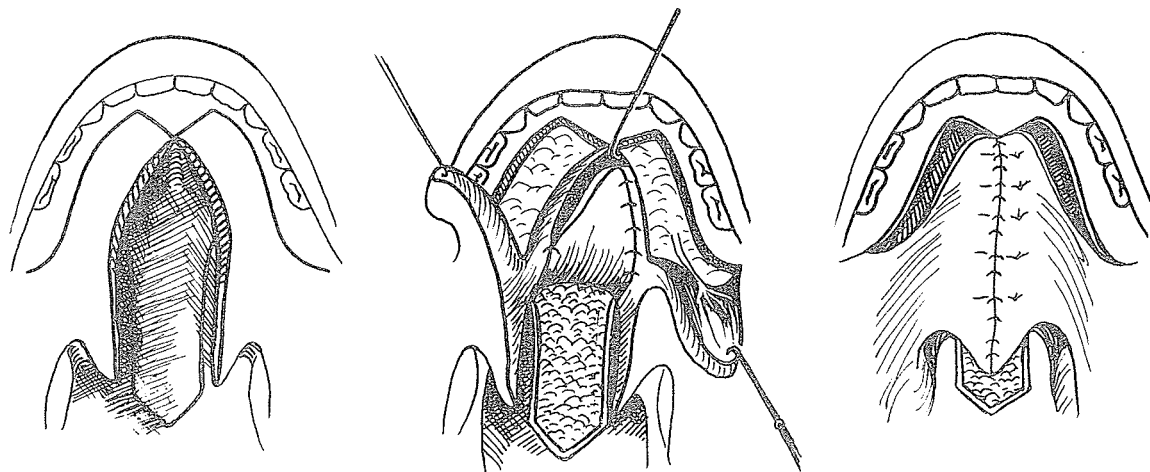
During this same 1962 presentation, two other methods were described to facilitate further side-to-side relief during closure of wide clefts with a primary pharyngeal flap. One involved taking a longitudinal vomerine mucoperiosteal flap based posteriorly for the nasal closure of the soft palate cleft, and a superiorly based pharyngeal flap twisted for closure of the oral side. This procedure has not been used since that time, as the vomerine mucoperiosteum has more valuable functions.



The second method, described in Chapter 37, involved two parallel posterior pharyngeal flaps, one based superiorly, to be inserted into the nasal side of the soft palate cleft, the other based inferiorly, for the oral side.

OCCASIONAL PRIMARY FLAP

Bengt Nylén of Stockholm, the Venice of the North, is an international sailor whose Cal 40 was the leading European boat in the 1968 transatlantic race. In 1977 Nylén explained that he still uses the pharyngeal flap that Skoog taught him in 1955, inserting it at 5 to 6 years of age in about 11 percent of cases. He also uses this flap as a primary procedure:



Occasionally, we use this flap primarily in cases operated at 12 to 18 months. We do it when the nasal surface is difficult to suture. In a case like the one diagrammed, with an unoperated cleft of the secondary palate, the flap is usually 6 to 8 cm. long, based at the level of the eustachian tube openings and consisting of muscle and mucosa. I don't suture the donor site. Added to the pharyngeal flap I've used small mucosal flaps from the posterior nasal surface of the soft palate to cover the raw surface of the flap. The advantages are good nasal cover and the addition of a lot of tissue, including muscle, to the soft palate. At the same time you decrease the nasal gate with the base of the flap and reduce the risk of open nasality.

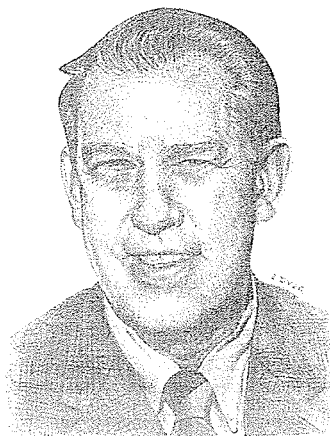
OPPOSITION TO PRIMARY FLAP

Probably the majority of palate surgeons do not favor primary pharyngeal flaps except in unusual circumstances. R. N. Sharma of Lucknow, India, who was trained in England and uses the Veau-Kilner-Wardill pharyngoplasty, wrote in 1966:

Pharyngoplasty as a primary procedure in early age groups is not justifiable but it may be combined if repair is undertaken after five years of age.

K. M. Cleveland and M. L. Falk of Detroit noted in 1970 that from their study the postalveolar cleft, congenitally short palate and submucous cleft tended to necessitate pharyngeal flap surgery, whereas unilateral complete clefts treated with V-Y four-flap closure were likely to achieve normal speech without a pharyngeal flap adjunct. They also found that when primary closure was performed at the mean age of approximately 7 months, adequate speech without a pharyngeal flap was common. From these data they concluded:

Pharyngeal flap surgery should not necessarily be part of the total primary repair procedure since some types of clefts, in combination with certain procedures, will result in normal speech.



Hal Bingham

JUSTIFICATION OF PRIMARY PHARYNGEAL FLAP

Hal Bingham while at Columbia, Missouri, with P. Suthunyarat, S. Richards and M. Graham asked the question

Should the pharyngeal flap be used primarily with palatoplasty?

and answered it in 1972 after he arrived at the University of Florida, Gainesville:

In certain selected cleft problems, palatoplasty with a primary pharyngeal flap seems indicated. The selection is made at the time of operation and relates to the amount of tension on the closure as well as palatal length.

Out of 50 cases, they elected primary posterior pharyngeal flaps 22 times, more commonly in complete clefts. Comparison of 20 V-Y palatoplasties, 10 with primary pharyngeal flaps and 10 without, showed less hearing loss and less hypernasality in the pharyngeal flap group.

A factor concerning Bingham was the two- to three-year delay between speech development and surgery, when valuable time had been lost and ingrained speech errors required intensive therapy, a dental prosthesis, or both.

In 1973 John Curtin, with Joanne Subtelny, Nobuo Oya and Daniel Subtelny, reported postoperative results of pharyngeal flap surgery employed as a primary and as a secondary procedure for

20 posterior cleft palate patients. Statistical comparisons of speech, intraoral air pressure, nasal airflow and cephalometric measures showed that the results of flap surgery as primary and secondary procedures could not be differentiated. The findings suggested to the authors that pharyngeal flaps may be indicated in preadolescent and older patients with unoperated posterior clefts, when adequacy of velar tissue for functional closure is questionable.

David Furnas of the University of California, Irvine, endorsed the primary pharyngeal flap in certain cases when he wrote in 1977:

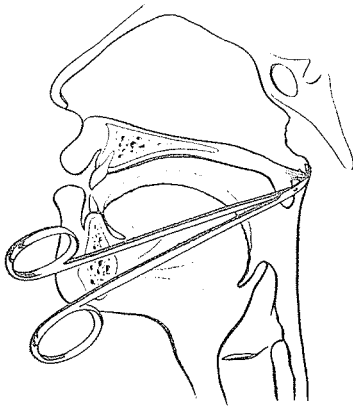
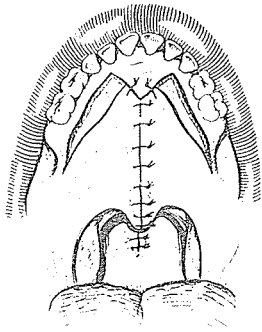
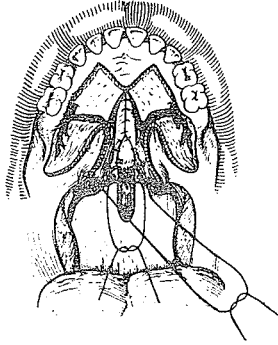
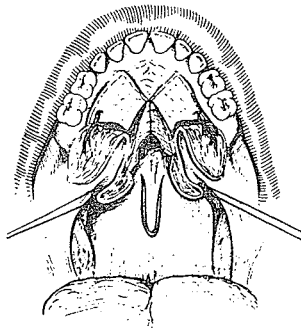
In recent years I have been doing primary pharyngeal flaps at the time of my palate repair in any patient where a short palate was expected. The pharyngeal flap is an inelegant, unphysiological, and tedious procedure, but pragmatically it has given me excellent results (but I'm still not satisfied—denasal speech is sometimes a problem).

Also in 1977, Randall advocated a primary pharyngeal flap for the horseshoe-type cleft with poor musculature.

PRIMARY VELOPHARYNGEAL ADHESION

In 1975, at the Sixth International Congress in Paris, and later in its *Transactions*, Rudolf K. Stellmach of the Free University of Berlin noted that the normal child learns to speak well spontaneously whereas the cleft palate child often does not. He accused the short postoperative velum of being the cause of velopharyngeal incompetence, requiring one out of two patients to receive speech therapy before school age, even if the palate was closed before 2 years. This situation challenged Stellmach to look for a better method of primary palate closure. He ruled out the inferiorly based primary pharyngeal flap proposed by Stark as an unphysiological procedure better suited to secondary operation. He reasoned that if the pharyngoplasty were performed only to facilitate the otherwise normal velopharyngeal mechanism it would indeed be a primary speech-aiding operation. He set these requirements:

1. no immobility of pharyngeal wall caused by scarring as with wide flaps and secondary healing



2. the entrance to the epipharynx and the nasal airways must be wide;
3. the connection between velum and pharyngeal wall must be reversible.

The hard palate in total clefts is closed first, at 18 months, by his square vomer flap. Then at 24 to 30 months a standard V-Y palate closure is combined with a miniflap from the posterior pharyngeal wall based superiorly, measuring 5 mm. wide and 15 to 20 mm. long. It is incorporated into the nasal closure, and the donor area is closed and heals without scarring.

Stellmach reported 38 miniflaps, 22 of which were followed for three or more years. Only two children with slight nasal escape required speech therapy. He concluded:

A small adhesion of the velum to the pharynx . . . does not add considerable difficulties to the palate repair nor does it change the anatomy and normal function of the velum or the pharynx muscles. It acts to simply bring the velum close to the pharyngeal wall by traction on the bridging flap and to prevent any tendency to relapse anteriorly.

If necessary the adhesion bridge can be divided later on. This might occur around school age if adenotomy has to be performed. If velopharyngeal closure was competent for two or more years there is little danger of nasality afterwards. Three cases treated in this way did not show any decrease of speech quality. The adhesion principle is useful in all cleft palate cases, which by clinical judgment do not show sufficient velum lengthening under operation.

TO FLAP OR NOT TO FLAP PRIMARILY

During the last two decades there has been and continues to be a worldwide epidemic of pharyngeal flaps which was boosted by R. B. Stark's advocacy of the 100 percent use of this flap primarily. In a 1960 editorial Ivy appealed for clarification of the indications and contraindications of these flaps.

As I said in 1962 and still advocate today:

Certainly, "shotgun" therapy of palate clefts with a load of posterior pharyngeal flaps without selection seems unwarranted. It is suggested, however, that in wide palate clefts, pharyngeal flaps may be indicated primarily.

Stellmach's miniflap has some appeal and at small cost for the deserving case.