# 14. Early Soft Palate and Later Hard Palate Closure and Lip Adhesion

I T was inevitable that those seeing the long-term results of constricting wires and surgery too radical and too early would note the damage being done and speak out against it.

SLAUGHTER AND BRODIE, THEN PRUZANSKY

This lot finally fell to Wayne B. Slaughter and Allan G. Brodie of Chicago. Slaughter, chief plastic surgeon to the University of Wisconsin Medical School, Loyola University Medical School and Chicago College of Dental Surgery, inherited not only Brophy's instruments and records but his actual cases! Brodie, chairman of the Department of Orthodontia, University of Illinois, and for over 10 years dean of the College of Dentistry, combined basic science in anatomy, physiology and growth with clinical practice. His research and teaching reflected these interests bringing him many national and international honors. He also took time to reflect, most successfully in August in his cabin at Bear Lake, Michigan, where he waded trout streams casting a royal coachman (Western style) while humming "Pomp and Circumstance."

These two, then, Slaughter and Brodie, joined together and started the pendulum swinging in the opposite direction with their 1948 presentation in Boston to the American Association of Plastic Surgeons. They set the stage for their attack by a review of
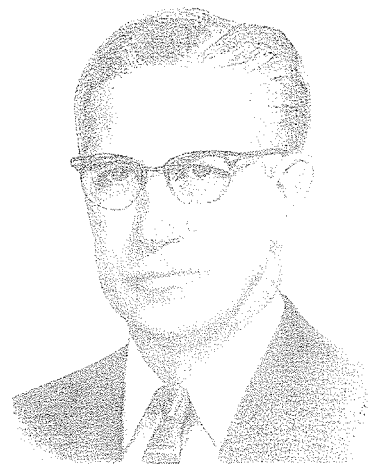
Wayne Slaughter

Allan Brodie

the normal. They noted that in the face there is a generalized growth on almost all surfaces of all bones until about the fifth year, after which the surface growth tends to disappear. Certain active sites of growth remain and continue to grow at a high rate almost until the completion of growth. Their longitudinal studies of children with clefting defects revealed the same pattern and they hypothesized that clefts represented a temporary aberration of growth, probably of short duration, during early intrauterine life. Once recovery occurred, however, the various parts pursued now relatively normal paths and rates of growth. The original distortion remained but it became no worse unless a specific growth or adjustment site had been permanently affected.

The tuberosity of the maxilla growing backward against the pterygoid process, a fixed base, is the agent responsible for the forward development of the middle face. An equal amount of growth occurs in the palate at the transverse suture. It occurred to Slaughter and Brodie that reduction in blood supply and constriction by scars in these areas may jeopardize growth. If it does, then unwarranted trauma to soft tissue and interference with blood supply and fracturing of bone and stripping of mucoperiosteum may cause permanent damage to growth sites. For five years Slaughter operated with this idea in mind on 1,349 clefts. Measurements were taken with cephalometric x-rays, the axial ray passing through the external auditory meatuses, head plates, plaster molds and photographs. The Frankfort horizontal plane was used to relate cranial and facial structures. Three examples of their tracings are shown: (1) A normal 12-year-old male; (2) a 19-year-old male whose cleft lip was closed at 19 months and palate at 12 years; (3) a 23-year-old female whose unilateral lip and palate cleft received surgery once a year for her first 14 years.

Simple atraumatic surgery was advised with closure of the lip portion of a bilateral defect in two stages, an obturator being used for the alveolar and hard palate cleft.

They summarized their stand:

Surgery can and does inhibit normal growth. . . . Congenitally deformed parts, unless permanently damaged, grow at normal rates. . . . [Thus] surgery poorly executed or poorly timed, can do more damage than good in the long run.
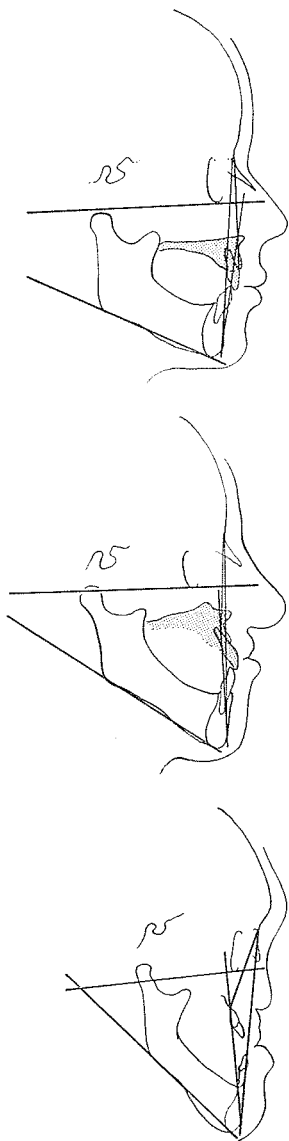
Five years later, Slaughter was joined by Samuel Pruzansky, orthodontist and research fellow from the National Institutes of Health. They presented the rationale for closure of the velum as the first palate surgery at the meeting of the American Society of Plastic and Reconstructive Surgeons held at Coronado in 1953.

Kirkham, Wardill and Psaumé had already shown by hamular measurements that lateral dimensions of the nasopharynx are greater in cleft palate individuals than in the normal. Subtelny had studied pterygoid plates by frontal cephalometric laminography which revealed not only a break in the structures but actual distortion.

In a cleft, without the muscle band of restraint, the tongue pushes the maxillary elements out of mandibular alignment. The dental arch and alveolar processes are normally molded around the tongue by the action of the buccinator and lip muscles. The same distortion is being promoted by the lateral unopposed tension of the levators and tensors pulling on the palatal elements. If closure of the lip muscle molds the anterior arch, thought Slaughter and Pruzansky, why not close the muscles of the velum? This single act would mold the maxilla, reduce unopposed muscle action, prevent tongue entry into the cleft and actually diminish the cleft itself. They proposed merely to pare edges and approximate mesoderm across the cleft to present more normal physiology for growth and development.

In a series of 200 simple velar closures the outcomes varied. In one complete unilateral cleft the lip was closed at 3 weeks, narrowing the cleft with some overlap of the alveolar processes. The septum tended to straighten, and velar elements neared each other and became larger. At age 11 months the palatal parts could be approximated, and a decrease in the hard palate cleft resulted. The alveolar overlap improved as the maxillary segment on the cleft side increased in antero-posterior length. Facial growth continued in normal fashion. There was downward and forward migration of the floor of the nose with uprighting and elongation of the nasal septum. (This is one reason they were against use of portions of the septum in palate closure.) A random study of other cases in the series of 200 showed one case with reduction

of the width of the cleft and increase in the bulk of the soft palate parts to make velar closure possible at 22 months; another was not ready until 3 years of age and another, not until 4 years!

Thus did Slaughter, with Brodie and later Pruzansky, start the cleft surgical pendulum swinging in the conservative direction. Slaughter, having the face of a fighter and qualities of a champion, prompted me to inquire into his sports achievements. I found he had held the Missouri Valley cross-country record and, in 1931, while at Nebraska, had been a member of a world record half-mile relay team. He had another claim to fame, which no doubt had been a source of amusement to him but is appreciated by some surgeons more than others: He trained a tiger in Pruzansky and turned him loose in our midst, where his roars and the rip of his claws have been heard and felt from time to time.

Slaughter and Brodie reviewed their feelings about velar closure 20 years later, for Grabb et al. in 1971. They looked to adequate lip closure for its molding effect and expressed no great concern for "collapse" of the alveolar arch, because with growth this can be overcome. They had no interest in putting bone in the cleft where growth has merely begun to express itself. They felt that undue surgical interference could alter growth and appliances could act to constrict the maxillary segments or impinge upon the palatal shelves. At 12 to 24 months, velar closure was done simply in three layers after cleft edge paring; it can be done in two stages if necessary. They emphasized:

> The principal feature of this velar procedure is to establish normal balance of muscle tensions across a defect. Surgical closure of the velum does more than repair a complete congenital defect; it provides a more normal physiological environment in which growth and development may take place.

Lip and velar closure was followed by a reduction in the width of the hard palate cleft. If it was narrow enough for minimal undermining of edges and direct closure, then this was justified. If by 2 years of age the cleft was still too wide, a plastic obturator was "snapped" into position for temporary aid.

In 1961 Luiz A. M. C. Madeira of São Paulo stated his endorsement of the Slaughter plan:

> Closure of the soft palate at 18 months and of the hard palate after 6 years of age.

234

WALKER

In 1966, in the *Journal of the South African Logopedic Society,*
Dennis H. Walker advocated the Slaughter principle of lip and
soft palate closure. Walker became James B. Cuthbert's first
registrar soon after Cuthbert migrated from Rooksdown House
in England and worked with him all 16 years of his life in
Johannesburg, eventually being appointed to follow his chief as
head of Plastic Surgery at the University of Witwatersrand.
Adhering to the Gillies principle "Never do today what can
honourably be put off until tomorrow," and with respect for
growth centers but anxious to harness molding forces of the
"mouth muscle ring and palatopharyngeal muscle ring," he
closed the lip and soft palate only, except when a vomer flap was
feasible. He noted the gradual change in the residual cleft, "the
form of a long, narrow ellipse replacing the shorter, wider oval."
His orthodontist was able to promote quite satisfactory speech
with an obturator altered frequently. Under this regimen, the
residual hard palate cleft was left until 12 or 14 years of age, when
the closure was relatively easy.
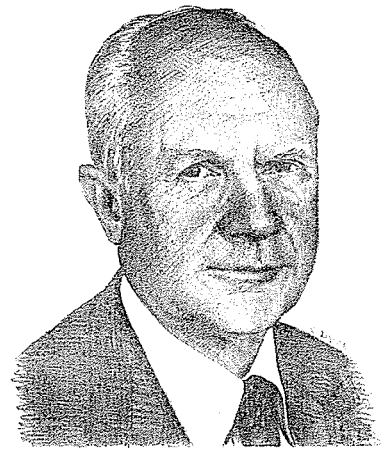
Dennis Walker
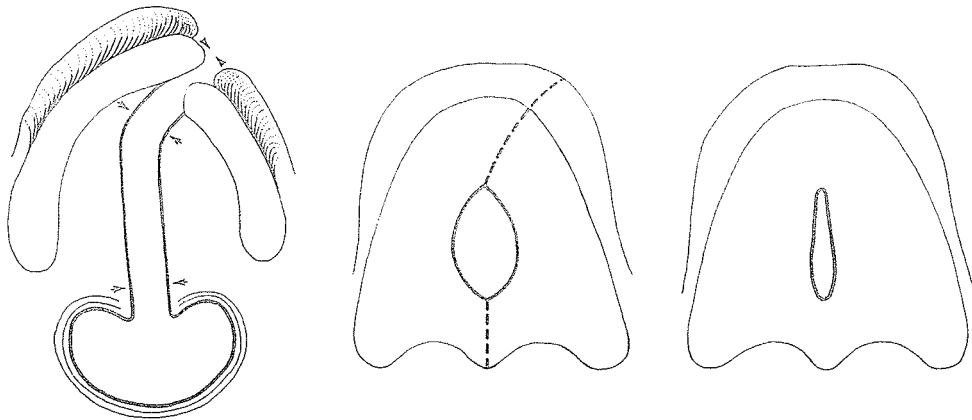
SCHWECKENDIEK

It is of interest that 10 years before Slaughter proposed velar
closure, Hermann Schweckendiek, an otorhinolaryngologist of
Marburg/Lahn, Germany, in 1944 proposed early closure of the
soft palate through small incisions which did not necessitate
mucoperiosteal dissections or osteotomy or ostectomy of the
hamulus. He left the hard palate open and undisturbed, but
occluded with a "speech plate" as late as 12 or 15 years. Gradual

Hermann Schweckendiek

235

closure of the bony cleft was noted from 15 mm. to 2 or 3 mm. and accompanied by a minimum of orthopedic disturbances. In the early 1960's his son, Wolfram Schweckendiek, continued to promote this principle.

Free development of the jaw and palate can be attained if the soft palate is closed during infancy by primary veloplasty, leaving a residual cleft in the hard palate. The cleft narrows spontaneously due to the growth of the sides of the palate, without causing any compression of the jaw.

The edges of the soft palate cleft were pared and side pouches dissected. A rubber band was passed with a special needle through the pouches and tamponaded by little foam rubber sponges in the pouches. The soft palate was united with three-layer suturing and the tension of the rubber band adjusted and sutured.
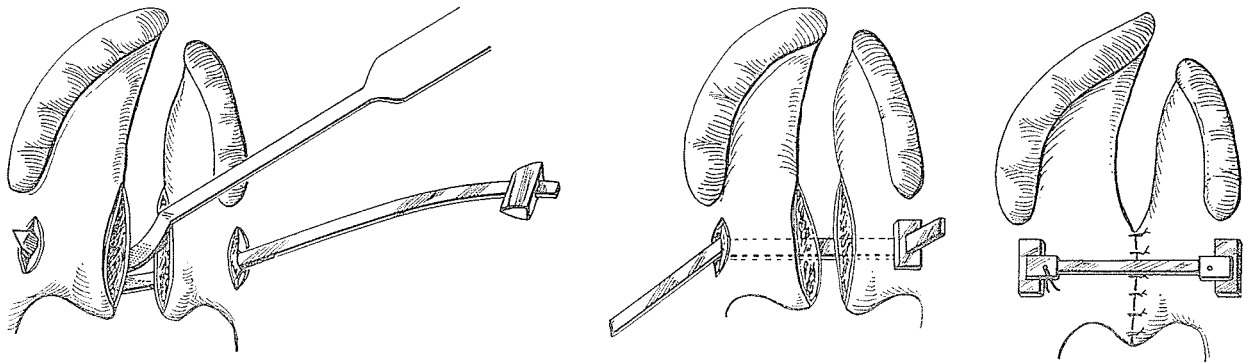
At the 1964 Hamburg Symposium the young Schweckendiek stated:

This procedure usually results in a primary union of the soft palate. The muscle layer develops well and the palate grows long and mobile. . . . The majority of the children acquire perfectly normal speech even though a small cleft remains. Other require a temporary plate to cover the cleft so that the spontaneous growth of the upper jaw may remain undisturbed for as long as possible. In case of total cleft, a correction of the position of the teeth in the area of the cleft is often necessary. During this treatment the residual cleft is covered by a plate.

Wolfram Schweckendiek

The Schweckendieks prefer to operate on the soft palate at 7 to 8 months of age. In the complete cleft, the soft palate is closed first, and three weeks later the lip is closed, all at about 7 months. In cases of shortness of the velum, they use a superiorly based

pharyngeal flap. A plate is fitted, and closure of the residual cleft of the hard palate is postponed to the age of 12 to 14 years, when the normal growth of the jaw is virtually complete.

In 1977 at the Third International Congress on Cleft Palate in Toronto, Wolfram Schweckendiek reported 25-year results of normal maxillary and cranial growth, with 60 to 70 percent of the hard palate clefts narrowing and 95 percent of the alveolar edges approximating. Schweckendiek admitted to having some difficulty with speech development between 2 and 5 years of age but reported continued improvement after school age resulting in normal speech in 57 percent and minor problems in 37 percent; 5 percent of his cases required posterior pharyngeal flaps.

In 1964 Professor Burian in Hamburg briefly reviewed his palatal retropositioning and pharyngofixation carried out at age 5 years, which he had used for 40 years. He then informed the Symposium that he had changed to the Schweckendiek method. In the more formal third Gillies Memorial Lecture in 1964, Burian elaborated, recalling his earlier plan of lip closure at 5 months and palate at 5 years:

The patient has to be rehabilitated from the time of the lip operation till the operation of the palate. . . . The treatment lasted a long time and was also expensive. To reduce the sufferings of the patients and the distress of their families . . . I adopted, some years ago, the method of Schweckendiek which consists of the reconstruction at the age of 6 to 8 months of the soft palate alone. The cleft lip, in total, is operated on at the same time or some weeks later. To the hard palate, an occlusive plate is applied. The early construction of the soft palate reduces considerably the frequency of middle ear inflammations, both acute and chronic. The child acquires good speech quite quickly. The cleft in the hard palate narrows visibly and may be closed by an operation later on at any time. This is then a minor affair. The orthodontic treatment is very easy. . . . The Schweckendiek method seems to me to make the primary bone-grafting unnecessary and I hope that it will reduce considerably the need for secondary bone-grafting.

Čupar of Yugoslavia approved of the two-staged operations suggested by Slaughter and Schweckendiek as a really rational procedure. Early soft palate closure creates a more favorable basis for speech development and also avoids maxillary deformities. After lip and soft palate closure there is objective evidence that

the cleft in the hard palate is reduced. Later closure of the hard palate offers less chance of arch distortion.

PRIORITY

Regional loyalties and language barriers often dictate the name associated with an operation. In Europe Schweckendiek gets credit, but in the United States Wayne Slaughter's name is synonymous with the primary velar closure principle. At the 1969 International Cleft Lip and Palate Symposium in Chicago Slaughter was challenged. He cleared the air with one thrust and no parry:

That procedure was documented in 1840 and it has been referred to repeatedly. The last written reports were in 1914 by the late John Staige Davis and I had the privilege of seeing him perform some of these procedures before he died.

There had been sporadic expressions of conservatism from time to time. Even Dorrance in 1933 wrote:

The safest age to operate for cleft palate is about the fifth year of life. In our experience operations performed after the fifth year are free of mortality and failures are less frequent.

In 1972 Gustave Aufricht wrote:

I was and I am also against the early closure of the hard palate. Already, Esser advocated only soft palate closure and obturator for the hard palate until patient was fully developed.

The Schweckendieks and Slaughter, heeding the moaning and groaning of the dentists facing the dental disasters following the early traumatic palatal surgery, led a conservative revolution. This new stand stimulated research to try to determine what effects, if any, modern types of cleft palate surgery would have on young growing maxillary bone.

HERFERT

In 1958 Herfert, following his work on retardation of maxillary growth after mucoperiosteal dissection and vessel ligation in puppies, designed and timed his surgery in sympathy with his

research findings and according to the principles set by Schweck-endiek and Slaughter. In 1963 he reported that since 1955 he had been using Schweckendiek's method. He did not feel, he said, that McNeil "stimulation plates" were necessary in cleft palate children, but he did recognize the importance of providing the infant with an intact velum with which to acquire normal speech and thus closed the soft palate only at 14 to 16 months. He noted:

After closure of the soft palate, contraction of its muscle fibers stimulates growth of bony palatal plates, especially to the periosteum near the rim. This functional stimulation of the periosteum leads to a true growth of bone which was noted in all our cases. Two, three or four years after closure of the velum, the cleft of the hard palate was reduced without any direct operative procedure. . . . By the two-stage operation of the cleft palate, two significant advantages are gained: normal speech is encouraged by early closure of the soft palate . . . and restriction of growth of the upper jaw is avoided, as the hard palate remains untouched. The second stage operation in the hard palate around 5 years of age becomes a relatively small procedure and is performed in ten to fifteen minutes.

CONFLICTING FINDINGS IN ANIMALS

Yet Sarnat, also in 1958, working on monkeys, excised the mucoperiosteal flap and ligated the greater palatine artery. In one group of animals he went "ape" and also excised the bony palatal shelf and nasal lining. These experiments showed no significant gross differences in growth and development of the hard palate, maxillary arch, mandibular arch, maxillomandibular relationship or total face. The implication is that neither the surgical trauma of raising flaps nor deprivation of blood supply is the cause of maxillary and facial lack of growth, a finding in accordance with Foster's 1962 work in humans with complete alveolar clefts.

In 1967 Kremenak et al. showed in puppies that unilateral excision of a 4 mm. wide strip of mucoperiosteum just medial to the posterior teeth caused a very definite decrease of palatal width (27 percent narrower) on that side. In contrast, elevation of a unilateral mucoperiosteal flap or ligation of the palatine artery caused only a 3 percent narrowing of the palate.

239

Maisels noted that these research contradictions would have thrown a confusing cloud over the decision for timing closure of the hard palate except for the 1966 findings of Latham and Burston. In the human, they showed that the lateral activity in the mid-palatine suture is greatly diminished by 18 months and has, for practical purposes, ceased by 2 years of age. Thus, after 18 months to 2 years, lateral growth of the hard palate takes place as a result of alveolar appositional growth only, and not by separation of the parts along the mid-palatine suture. Consequently, Maisels reasoned that operations on the hard palate at this time could not be expected to inhibit growth by tethering the two sides to each other by a sheet of scar.

Maisels breathed a sigh of relief at the convenience of these findings. British surgeons have long felt that the timing of closure of the secondary palate should be dictated by the need for acquiring normal speech rather than by fear of interfering with subsequent growth.

DELAYING PALATE SURGERY

Jack Longacre of the University of Cincinnati noted:

Growth studies have shown that the premaxillary suture closes at the end of the first year, but the sagittal suture separating the maxillae and the two horizontal plates of the palatine bone only closes between the age of four to five. This means that the transverse diameter of the bony palate and the arch is completed at this time. To this must be added the appoistional growth on the surface of the bone.

Jack Longacre

He cited Logan Leven, who had shown that prior to closure of the defect the growth of the maxilla in the cleft palate group was nearly normal, but after closure of the defect there was marked retardation of growth.

Longacre therefore began playing a waiting game, and in 1964 in Hamburg he reported longitudinal results of his delaying policy:

We found that the group where the palate was repaired at or near the time of the closure of the sagittal suture (4 to 5 years) showed more normal facial development and less dental crippling than the other group.

He also noted that even in the older group, when the defect was large, there was some crossbite although to a lesser degree. Thus he proposed that his split rib grafts be interposed between the palatal shelves and the alveolar process to prevent even this amount of deformity. X-ray films taken in the area of the alveolar defect showed tooth buds growing down into the newly grafted bone, allowing for more normal eruption of the teeth.

Finally, in his 1970 book, *Cleft Palate Deformation*, Longacre presented his impression after 22 years with 500 cases. These had been corrected by himself with his modification of the LeMesurier-Hagedorn lip technique at 3 months and closure of the cleft palate by the V-Y procedure of Kilner-Wardill-Veau II. The only variable in the series was the *timing* of the palate surgery.

Longacre presented his findings with photographs of 24 patients, 11 with early palate repair (1½ to 2 years) with poor results and 13 with late repair (3 to 4¼ years) with good results, showing less interference with facial growth, less retrusion of the premaxilla, minimal collapse of the maxillary segments, more nearly normal maxillary arches, less septal deviation, better occlusion and fewer dental caries. Longacre said:

It would appear from this study that these series had been operated upon by two different surgeons. More correctly, the difference in results may be correlated with the fact that the development of the maxillary arch is essentially completed (85%) by four years of age.

In fact, Jack Longacre often emphasized:

Comparing results in young adults between a patient with early palate repair and one with palate repaired at four years is almost like comparing Dr. Jekyll and Mr. Hyde.

The greatest criticism of waiting to close the palate for five and one-half years is the probable deleterious effect on the development of speech. In his defense, Longacre summarized the findings of Drexler, his speech pathologist:

There is no significant difference in nasality, nasal emission and speech proficiency between the different groups. A similar . . . audiometric study failed to show any difference in the two groups with regard to hearing loss.

241
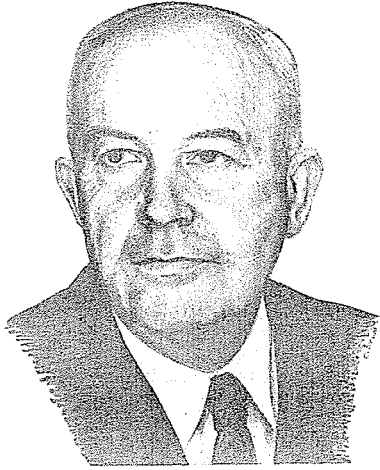
RITTER

Professor Reinhold Ritter of Heidelberg,. Germany, argued:

If the total cleft palate is operated on before there is a good occlusion in the baby molar region (age 1–2 years) the result is always a bilateral, mostly asymmetrical or unilateral compression of the upper jaw. We see a cross-bite in the side-parts and there is a prognathism or opistognathia. . . . In early operation, the upper jaw and the cavum of the nose are often deprived and the teeth carious because they have no normal function.

He also noted that the children do not speak as well as those without deformity. At the 1964 Hamburg Symposium he discussed patients operated on at 5 years of age with normal occlusion who required only orthondontics for oblique front teeth. He explained his reasoning:

At age 5, the bone of the upper jaw is harder and scar has less chance of causing deformities.

In 1971 Ritter wrote to me to affirm his stand:

I have been interested in the treatment of cleft lip and palate patients since 1928, both orthodontic and surgical treatment. I believe that I was the first doctor who warned of early operations of the cleft palate because of disturbance of upper jaw growth. The best age for operation of the cleft palate is 5 years. The bone is hard enough at this time.

Reinhold Ritter

GABKA

The resonant Joachim Gabka of Berlin acknowledged his use of the Schweckendiek principle. He reported closing the lip at 6 to 7 months, the soft palate at 18 months, and the hard palate at 2 to 3 years. In his view construction of a velum at a relatively early age without deleterious influence on the growth of the upper jaw is important. Gabka's studies in 1964 revealed that the most rapid narrowing of the cleft occurred within the first six months after primary velar closure and not later, as claimed by Schweckendiek.

LIMBERG

A most conservative surgeon as to age for palate surgery in modern times was the grand old gentleman of Russia, Alexander Limberg of Leningrad. He closed his lips at 1 year and occluded the palate cleft with a plate until the child was 10 years old, when he finally lengthened and closed the palate by his V-Y method.

DINGMAN

Reed Dingman of the University of Michigan, trained as both dentist and surgeon and with vast experience in clefts, has used many methods. At the 1973 Cleft Palate Congress in Copenhagen, with J. E. O'Connor, he reported his change to a conservative approach using a lip adhesion at 1 to 2 months and a definitive lip closure at 9 to 12 months. Then at 15 to 18 months he closes the soft palate, without undermining or incisions over bony portions of the palate, and at 2 years, after complete eruption of the primary molars, he inserts a dental splint to close the hard palate fistula. At 3 to 4 years a vomer flap is used to close the anterior cleft. He reported:

Results in speech and growth and development in these cases appear very favorable.

BLOCKSMA

Ralph Blocksma of Grand Rapids, Michigan, a plastic surgeon of Dutch descent, a dedicated missionary and a man of impeccable integrity, personifies to me the image of the ideal doctor. In 1974, before the American Association of Plastic Surgeons in Seattle with John Burnink, Christopher Leuz and Kent Mellerstig, he presented his conservative program for managing the oral cleft to eliminate radical mucoperiosteal flap procedures. A 10-year analysis of all cleft palate surgery performed at Butterworth Hospital for 1963–1973 revealed

Many patients who had had an early mucoperiosteal flap closure looked excellent at the age of 5 years, but exhibited evidence of serious maxillary

Ralph Blocksma

growth arrest at the age of 15 years. . . . Members of our clinic agreed that most of the deformities seen in patients with repaired cleft palates were fundamentally iatrogenic in origin, and we included:

1. The flat face syndrome (hypoplasia of the superior maxilla and a short nose)
2. The bad teeth syndrome (irregular dentition and dental caries)
3. The distorted arch syndrome (malocclusion, with a contracted superior dental arch)
4. The financial exhaustion syndrome (expenses for the hospital, pedodontist, orthodontist, prosthodontist, plastic surgeon, ENT surgeon, psychologist, and speech therapist)

Blocksma formulated the following laws of good palate surgery:

Do Not:
1. deprive the palate bone of any part of its blood supply
2. violate the vomer or deprive it of any part of its blood supply
3. amputate the premaxilla or prolabium
4. denude the entire hard palate to gain temporary length for the soft palate
5. simultaneously deprive the palate bone of both oral and nasal mucosa
6. sacrifice long-term growth for immediate surgical expedience

Do:
1. obey the laws of good wound healing
2. keep relaxing incisions small
3. delay surgery involving bone at least until after the fith year

This conservative approach, started in 1964 and now used with all oral clefts, closes the lip at 3 to 4 months with minimal undermining. At 18 to 24 months, closure of the soft palate with a modified von Langenbeck technique involves a small S incision around the maxillary tuberosities with fracture of the hamulus, division of the posterior palatine aponeurosis from the margin of the hard palate and nasal and oral mucosa suturing.

Blocksma noted:

In most cases a virtually complete abutment of the cleft of the hard palate occurs spontaneously with growth. This is not always true. . . . At the age of 4 to 5 years, a simple turnover vomer flap will suffice to close the narrow hard palate fistula, after most of the palatal growth has been achieved. . . . We then determine whether a pharyngeal flap is indicated, whether speech therapy is needed, or whether a Teflon implantation into the posterior pharynx may be required.

244
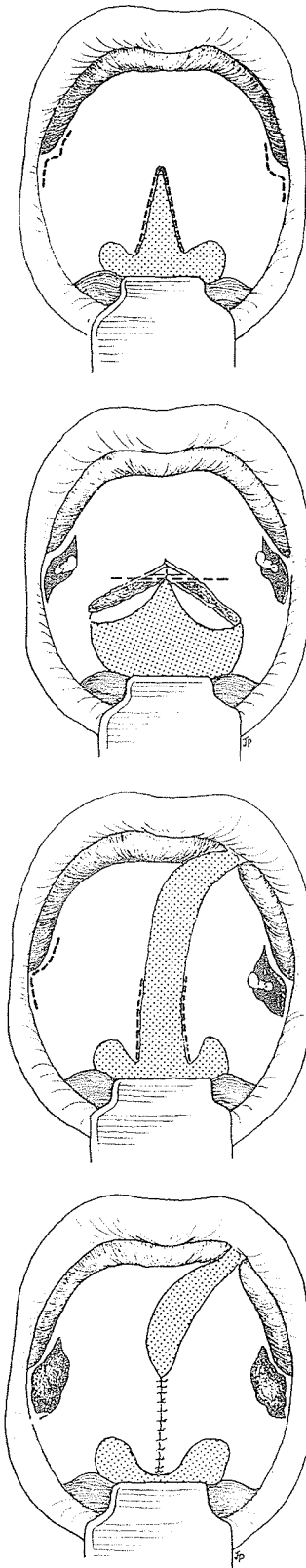
In 1977 Jean Psaumé and René Malek of Paris advocated soft palate closure before closure of the lip and hard palate because tongue retroposition occurs on account of lack of normal soft palate and abnormal width between pterygoid processes. They predict that early soft palate closure will correct preoperative tongue retroposition by improving muscle balance.

OPPOSITION

In 1966 Friedrich Schröder of Würzburg favored the von Langenbeck-Ernst-Veau palate bridge flap method over the Schweckendiek method because

1. Deformation of the maxillae after Schweckendiek's operation can be avoided only in narrow clefts.
2. Good function of the soft palate can be achieved only in favourable cases. Since correction of an insufficient soft palate after Schweckendiek's veloplasty by pharyngoplasty is recommended not earlier than the second decennium, the most favourable period for speech development is thus missed.

In 1977 Ken Bzoch of the University of Florida warned:

The rationale for two-stage surgical closure (i.e., soft palate first followed later by hard palate closure with obturation of the hard palate before final closure) appears logical but presents many hazards to achieving normal speech. Its application is usually devasting to speech development whenever prolonged postponement of hard palate surgical closure is followed. Obturators generally result in an inadequate seal of the hard palate as the soft palate moves toward closure. My longest experience with this method of approach involved primary soft palate closure postponed to 18 months followed by hard palate closure between three and four years of age. An excellent prosthodontist prepared and modified hard palate obturators in the interim. The population receiving this approach presented with a large number of abnormal habits of articulation, particularly glottal stop substitutions. Although early direct speech therapy was able to modify this in many cases, they were not as successful as early complete closure patients with similar clefts today. I might add, I can see no reason from experience or research why soft palate closure could not be instituted as early as the timing of lip closure for the advantage of this on facial growth, eustachian tube function and for muscle hypertrophy. Complete hard palate closure might then follow between one and three years of age.

At the 1978 American Cleft Palate Association meeting, Bard Cosman and Arlene Falk of Columbia Presbyterian Medical Center, New York, reported on the speech results of approximately 35 patients treated with early closure of the soft palate and delayed closure of the hard palate at 6 or 7 years (Schweckendiek). At age 6 years, 66 percent had poor speech and 32 percent had had secondary pharyngeal flaps. It was predicted that nearly 60 percent would eventually require a secondary pharyngeal flap.

LIP ADHESION

The lip adhesion principle developed by B. Johanson, R. Millard, P. Randall, J. Walker, R. Meijer and M. Collito has been described in detail in Volumes I and II. It is a simple surgical procedure available when presurgical orthodontics is unavailable to move maxillary segments into a more convenient, and possibly a better, alignment in preparation for definitive lip closure and eventual closure of the alveolar and hard palate cleft. By avoiding early elevation of mucoperiosteal flaps, it follows the same conservative principle of molding anteriorly what early soft palate closure achieves posteriorly. Often the two—lip adhesion and soft palate closure—can be carried out together, advantageously, at a very young age.

Since Volumes I and II of *Cleft Craft* have been published, a modification of the adhesion procedure has been developed. Cleft edge mucosal flap 1 is still used, but it is seldom inserted along the intercartilaginous line. Rather, the release of short, lateral vestibular mucosa is made by an incision running straight backward along the pyriform aperture. By letting 1 flap into this anteroposterior cut, the vestibular mucosal shortness is relieved without everting the alar base and rim. Through this vestibular incision the nasal skin can be dissected from the alar cartilage. Then through-and-through lifting stitches can help slide the alar cartilage and its attached mucosa up into a better position. The lip is joined as a temporary adhesion using medial mucosa turned over to make up for any lateral defect left by 1 flap.
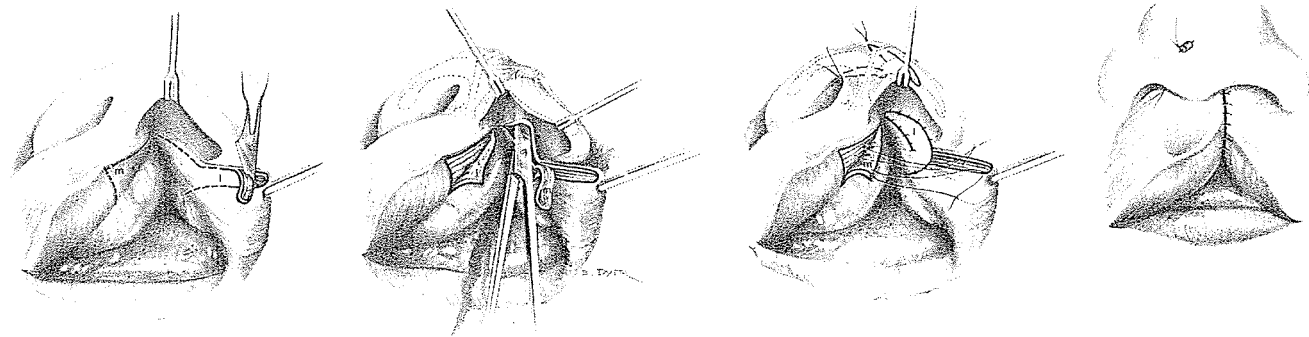
Richard F. Greminger of the Albany Medical College has extended the design of 1 flap to include a periosteal base (p), which, when approximated to a mucoperiosteal flap elevated from the alveolus, creates the inside lining of an "alveolar" ridge.