

9. Relaxing Incisions and Mucoperiosteal Dissections

DIEFFENBACH

JOHANN Friedrich Dieffenbach was born in Königsberg, Prussia. In 1813 the lure of the war of independence against France stimulated him to join his classmates in the Mecklenberg Cavalry. The love of horses developed during the war later caused him to have five fine mounts in his stable and his son to enter veterinary medicine. While he was in military service, his sensitivity toward the maimed and dying led him to write of his pity for the returning cripples:

To be handicapped is worse than death itself.

Thus inspired, he started his medical studies at the University of Königsberg at age 25. He completed his studies at the University of Bonn, where he admitted modestly:

I am born for surgery. . . . Technical and mechanical skill in my fingers allows me to do every operation with the experience of an older surgeon. . . . All my patients love me.

Everyone loves a winner, and confidence impresses students. When it came time for Dieffenbach to set off for the University of Berlin, his students gave him an unprecedented farewell. Familiar with his equine interests, they presented him with a *horse* and walked along beside it more than a mile outside the city gates.

Von Graefe was professor of surgery at Charité Hospital, University of Berlin, and Dieffenbach flourished in this plastic



Johann Dieffenbach

milieu, eventually succeeding von Graefe as professor in 1840.

Having been drawn to Paris as a young surgeon, he became a lifelong friend of Dupuytren and gained from exposure to Delpech and Roux. At this time the feud between von Graefe and Roux undoubtedly aroused some national partisanship, with German surgeons lining up behind von Graefe against French surgeons siding with Roux. Yet, as so often happens in medicine, the individual and the specialty rose above nationality. In 1826 Dieffenbach, who was under von Graefe, dared to write a small epitome on the *Roux* operation for cleft velum, of all things, and the illustrations in the back of his little book were quite explicit. They even explain why Roux's patient, Stephenson, ended up with a split uvula. This act took courage, but, as once was said of Dieffenbach,

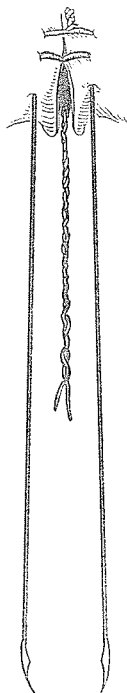
unkindest
cut of
all

Amen!

He was a bad dissembler, speaking his mind with such freedom and honesty that it kept him from many high places to which men less worthy were appointed.

He must
have looked
a gift horse
in the mouth.

By 1826, according to translations from the German by Eduard Schmid, Dieffenbach already knew that all mammals, and only mammals, had a velum, it having first appeared in the whale. He also had firsthand knowledge by dissection of the soft palate of mice, horses, camels and apes. It is little wonder that with such interest Johann was destined to make important contributions to the surgery of the palate of man. His 1826 *Suture of the Palate*



mentions special instruments necessary for this surgery, among them a pointed bistoury and purified lead wire of moderate thickness, a precursor of Veau's suture. Dieffenbach also divided the operation into three parts: (1) freshening the edges of the cleft, (2) insertion of the ligatures and (3) tying the knots.

Relaxing Incisions

Also in 1826 Dieffenbach described how he came upon the relaxing incisions so important in all of palate surgery:

At first the superior, then the middle, and finally the inferior ligatures were

placed. . . . After the sutures were tightened by turning, the wound margins were perfectly approximated. . . . However, palpation of the velum with a finger indicated that it was under such tension that it almost threatened to tear. Indeed, I already noticed a tear in the middle of the right semi-velum. . . . To release this tension, and to ascertain the success of the operation, I transected the anterior mucosa of the velum and the muscle fibers of the *constrictor isthmi faucium* at both sides of the approximated cleft, using an oblique cut with the knife which ascended in a lateral direction. The unpleasant sensation of tension immediately subsided.

Dieffenbach was always striving for surgical excellence. He taught that the skill of the surgeon lay in his hands, not in the instruments. He pointed to the surgeon's pen as his greatest instrument to note ideas for testing against rules of physiology and confirming with natural healing. What astonished visiting surgeons as much as the design of his procedures was the awesome regularity with which his operations succeeded! The greatest technical contribution to his generation was the extension of Roux's and von Graefe's work on the soft palate to the closure of bony defects of the hard palate. This was the operation that Jonathan Mason Warren came to see and carried back to America.

His fame long outlived him and even exceeded the realm of his surgery. Today's popular dieffenbachia plant was named in his honor; it produces speech difficulties when ingested. A German national holiday, a street and a town all bear his name.

MASON WARREN

Jonathan Mason Warren, son of John Collins Warren, Boston, was influenced by his early contacts with Dieffenbach and Roux. His closure of the complete palatal cleft was an important step beyond previous cleft closures and earned him a place in the Dieffenbach-Warren-von Langenbeck procedure of modern times. As he explained in the *New England Quarterly Journal of Medicine and Surgery* in 1843:

I now carefully [dissect] up the membrane covering the hard palate, pursuing the dissection quite back to the root of the alveolar processes. . . . As the dissection approaches to the connection of the soft parts



Mason Warren

*did not
use relaxing
incisions*

with the edges of the *ossa palati*, where the muscles are attached and the union most intimate, great care must be taken or the mucous membrane will be perforated, and from these causes I have found this part of the operation to be the most embarrassing. As soon as this dissection is terminated, it will generally be found that . . . the soft palate can be easily brought to the median line. If the fissure is wide, and this cannot be effected, French scissors are carried behind the anterior pillars of the palate; its attachments to the tonsil and to the posterior pillar are now to be carefully cut away, on which the anterior soft parts will at once be found to expand, and an ample flap be provided for all desirable purposes.

He used simple stitching logic:

Our next object is to insert the ligatures, and for this purpose an immense armory of instruments has been invented. After the trial of nearly all of them, I have found the most simple to be the most effectual. A small curved needle being armed with a strong silk thread, confined in a forceps with a moveable slide, is introduced.

At a second operation, the remaining hard palate cleft was closed, but Warren admitted the formation of a fistula and directed it to be closed by a gold plate.

Mason Warren became known for his palate surgery and treated over 100 clefts sent to him from all parts of America. In 1863 he summarized his experience, noting that 90 percent of the clefts he had seen had been complete, and added,

I do not remember to have seen a case in which the patient was not benefitted.



Robert Goldwyn

Robert M. Goldwyn, scholar, surgeon and ocean swimmer, who in almost all seasons can be seen bobbing in the high seas off Cape Cod, is also director of the Plastic Surgery Archives at Harvard's Countway Library. He has collected and published historical data about pioneer surgeons, and has been of great benefit in further vivifying several of the characters in the evolution of cleft surgery. For instance, it was Goldwyn who pointed out that J. Mason Warren had a remarkable collection of cronies befitting a plastic surgeon. None other than Morton did his anesthesia. Oliver Wendell Holmes, a lifelong friend who had been a student with him abroad, spoke of him warmly. Poet Henry Wadsworth Longfellow, a patient of his, told his father,

Truly it may be said of him that he has a high degree, "the eagle's eye, the woman's hand!" I know he needs no commendation of mine but it is so pleasant for me to say it. I trust it will not be unpleasant to you to hear it.

MUCOPERIOSTEAL DISSECTION

Dieffenbach "dissected the mucosa" or moved the mucosa with the bone, and Jonathan Mason Warren of Boston in 1843 "peeled off the mucosa" of the palate from the underlying bone. Yet credit belongs to von Langenbeck of Berlin for suggesting, in 1861, the dissection of the mucoperiosteum from the underlying bone in closing the cleft in the palate.

VON LANGENBECK

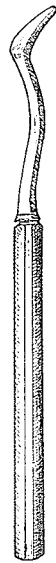
Here are some interesting facts collected by Goldwyn. Bernhard von Langenbeck, born in the town of Padingbüttel near the North Sea, had a boyhood interest in dissecting small animals which stimulated him to study medicine at Göttingen. He soon showed such competence as a clinician that he had to escape his eager clientele by "going out the window on a ladder." His singular abilities on the battlefield during the Holstein wars caused him to be appointed in 1848 to follow Dieffenbach as chief at the University of Berlin. He was a small, precise, energetic man. He rose at 5 A.M. and, after coffee and a horseback ride, taught operative surgery on cadavers to graduates until 10 A.M., when he started surgery on private patients that went on for four hours. Then at 2 P.M. he entered his clinic operating room in his specially tailored, tight-fitting, black-green coat, which was scrupulously cleaned each day.

By 1859 von Langenbeck had resected a maxilla, leaving the periosteum intact, and noted bone regeneration. He extended this principle to cleft palate, using refrigeration anesthesia by applying ice on the palate region. He denuded the borders of the defect by removing a narrow strip of tissue cut on the slant. The levator and palatopharyngeus muscles were sectioned by an incision three-quarters of an inch long and placed at the posterior border of the hard palate with a sickle-shaped tenotome into the velum,

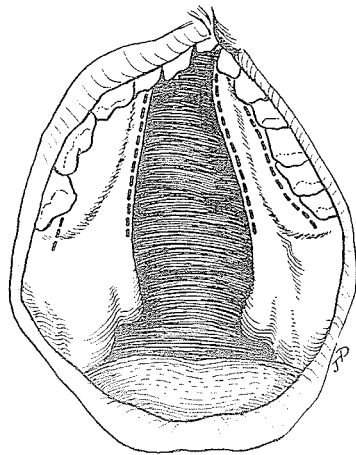


Bernhard von Langenbeck

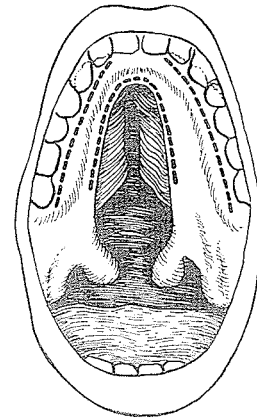




at a point external to the hamular process. The posterior palatine vessels were not divided. One or two lateral incisions were applied, parallel with the alveolar ridge and four lines (one-third inch) from it, beginning with the hamular process, or with the incision already made for muscle sectioning and running forward to the incisors. The mucoperiosteum was then cautiously separated from the bone (by specially devised raspatories) from without inward, extending the dissection backward to separate the velum from its attachments to the posterior border of the hard palate. When the flaps met in the midline, the sutures were inserted and tied. Von Langenbeck advocated silver anti-tension sutures, and he varied his incisions according to the plane of the palatal plates.



A. One palate plate horizontal, one vertical.



B. Both plates horizontal.

Following von Langenbeck's contribution, success in this operation became more certain. Operators now attempted to restore the entire cleft, both hard and soft, performing a uranostaphylorrhaphy in one stage.

Throughout the evolution of cleft palate surgery, many heated controversies among surgeons have raged over the priority for operations. It is amusing that so much spleen and steam have been vented over procedures, the results of which are faintly heard and seldom seen. Having been involved myself in such, and finding confrontation, whether in the boxing ring or the operating room, both stimulating and fascinating, I shall record controversies whenever possible.

For instance, Frances Mason of London in 1877 noted that G. D. Pollock in *The Lancet* in 1862 had defended his countryman's right to priority with this:

Mr. Avery [1848] . . . was the first surgeon in this country to close entirely a complete cleft of the palate. . . . The operation which Professor Langenbeck proposed [1863], and to which he gave the name of "the operation of mucoperiosteal flaps," appears to be identical with the method of operating introduced by Mr. Avery.

Pollock also noted,

I need not add that the separation of the mucous membrane without including some of the periosteum is well nigh an anatomical impossibility because the two structures are so intimately connected. . . . It is highly probable that Dieffenbach performed a very similar operation many years previously.

Here is some enlightening material Tom Patterson sent me which appears in his *Zeis Index*:

This was the position up to 1860, so that Busch could write: "The surgery of defects of the hard palate gives such bad results that I only advise it for the treatment of tiny holes, by cauterization; it should not be attempted for larger defects, where one should be satisfied with palliative treatment—*i.e.* closing the gap between the nose and the mouth with an obturator."

Zeis reported:

Since then, however, things have completely changed, due to the outstanding work of B. Langenbeck. He transferred his successful experience of rhinoplasty with retention of pericranium to the repair of cleft palate, and achieved such success that he was quite justified in saying that he was the first to have actually reconstructed the hard palate.

The operation, for which Langenbeck used the name "uranoplasty" instead of the older "palatoplasty," is as follows: paring the edges of the cleft in the hard palate down to bone; dividing the palatal muscles (*levator palati* and *palatopharyngeus*); lateral incisions in the soft tissue near the teeth; freeing the mucoperiosteum of the hard palate with raspatories and elevators, so that it only retains an anterior attachment $\frac{1}{3}$ inch wide behind the canine and incisor teeth, and a second, posteriorly, in the region of the pterygoid foramen; freeing the soft palate from the posterior border of the palatal bone; insertion of sutures.

In designing this operation, Langenbeck took great care not to disturb the blood supply of the mucoperiosteum which was to be transplanted, in that there were no incisions at the sites at which the pterygopalatine and sphenopalatine arteries send off twigs to the mucosa.

A number of cases on which Langenbeck operated in this way, and which were amazingly successful, prove that the transplanted periosteum forms new bone, as can be demonstrated by needle puncture. If repair of the soft palate is difficult, this operation is much more so, but this will not prevent it being assured of a permanent place in operative surgery.

Langenbeck's statement that no one before him had succeeded in closing the hard palate by bone, caused Hulke to claim priority—partly for Ferguson and Pollock, and partly for himself. Whatever the first two achieved, neither Langenbeck nor I have ever read that they did anything like this. Hulke, however, after the description of Langenbeck's first successful uranoplasty was published in 1861, described his own unsuccessful operation which he alleged he had carried out in January, 1860; his account is so short and incomplete that it is clear that he has no right to dispute Langenbeck's priority.

Up to now Billroth is the only one who has followed Langenbeck's technique, using it even on children.

RELAXING INCISIONS

The permanent closure of the cleft velum by operation was not an easy task. The lateral pull of the palatal muscles interfered with healing and resulted in partial or complete failure in the majority of cases. This pull of the palatal muscles was feared by most operators, and ingenious efforts were made to combat it. Mettauer was one of the surgeons involved in solving the problem.

Mettauer of Virginia

John Peter Mettauer, son of a gallant French physician who had volunteered to serve with Lafayette in the Revolutionary War, after receiving his M.D. degree from the University of Pennsylvania returned home to Prince Edward County, Virginia, and became a plastic surgeon. He is credited with one of the first cleft palate closures in the Western Hemisphere, in 1827. Like others of this time, he was working under some disadvantages; it was 21 years before Lister's aseptic technique and 20 years before Mor-



John Mettauer

ton's anesthesia. Mettauer recognized that cleft palate was associated with speech deformity and advised that the most suitable age for the operation was near puberty, when the patient could evaluate the pain and privations of the surgery against the benefits to be gained. He preferred the summer for the surgery and sat the patient in a type of barber's chair turned for a southern exposure between the hours of 11 A.M. and 2 P.M. for the best light. He used a corneal knife to freshen the cleft edges and advocated a cold water gargle for hemostasis.

Horton, Crawford and Adamson attribute the first successful operation for a complete cleft of the palate in the United States to fellow Virginian Mettauer, citing his remark:

We have met with cases of complete division of the palate in which the margins were separated to so great a distance as to defy every effort to approximate them, and to remedy them we were compelled to draw upon our inventive *resources*.

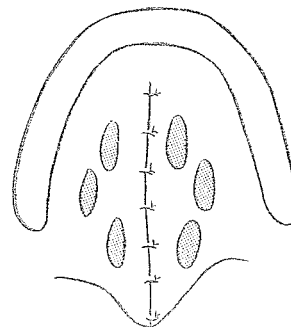
One of his resources was the protection of his suture line from tension with a series of small lunate relaxing incisions. He changed the axis of these incisions for palatal lengthening, stating:

Should the parts be deficient in length, the method which we have been describing may be employed in a transverse direction, guided by the views just submitted, but not to divide the *tensor palati* muscle.

Like most plastic surgeons, he was sensitive to deformity and even revealed this sensitivity in himself. Prematurely bald, he refused to be seen without his tall black stovepipe hat. One of his 17 children admitted never having seen her father without head cover since he always blew out the light at bedtime before he doffed his hat. He lived to the age of 88 and on his deathbed gave explicit directions that a coffin be constructed of sufficient length (8 feet) to allow him to lie in state comfortably with his top hat on and with a few of his special instruments by his side.

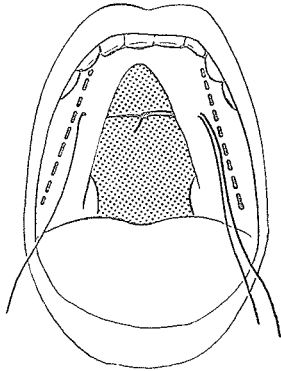
Liston

The Scotsman Robert Liston, professor of surgery at University College, London, was another early palate surgeon using relaxing





Robert Liston



incisions. Liston was reputed to have tremendously developed arms and hands like those of Hercules or even another Liston, the “bad boy” boxer of the twentieth century. More amazing was the earlier Liston’s delicate dexterity in spite of the size of his upper extremities. In 1837 he described ambidextrous incising of the cleft edges, placement of relaxing incisions and suturing of the palate halves. He advised that

Before the ligatures are finally secured, the parts being put upon the stretch, an incision should be made on each side towards the alveolar ridge [by which] method the edges come together more easily, and the strain is taken off the threads, so that there is less risk of these making their way out by ulceration.

Addison

A more radical type of relaxing incision, still used in a modified form by some British surgeons, was proposed in 1925 by Addison. As he pointed out:

Tension in cleft palate surgery favors failure and sepsis assures it.

He threw all of his energy into relaxation:

The incision begins on the lower jaw and is carried up the ascending ramus on to the upper jaw behind the last tooth, then, turning inward, it is continued immediately internal to the teeth, as far forward as may be necessary.

HULLIHEN



Simon Hullihen

Simon Hullihen of Wheeling, West Virginia, called a “Father of Oral Surgery,” in 1845 reported on cleft palate and its treatment. From research by R. Goldwyn in 1973, interesting facts are available about this surgical pioneer. He was familiar with the work of Le Monnier and Roux and confined himself mainly to closure of clefts of the soft palate, being content to fill the osseous palate cleft with a gold obturator. Without the advantages of anesthesia, he had to wait until the child was 9 or 10 years old. The patient was placed on a low seat in a reclining position, in a good light. When he opened his mouth to its full extent, a cork was popped in between the last molar teeth. The

surgeon, kneeling in front, grasped the edge of the uvula with forceps in the left hand and, with a spear-shaped knife in the right introduced the point

into the velum half an inch back from the palate-bone and the sixteenth of an inch from the cleft-edge, and then plunged through to the guard backwards and towards the pharynx. Thus, in an instant, the edge is severed in a straight narrow strip.

The cork was removed, bleeding allowed to subside, cork replaced and opposite cleft edge pared. The next step was to insert the ligatures.

TRANSVERSE INCISIONS

When the cleft extended through the hard palate arch, Hüllihen considered closure difficult and explained his approach:

In such cases, a transverse incision may be made along the posterior edge of the palate-bone on both sides of the cleft, and through the entire thickness of the velum, and to such an extent as to permit the raw edges to be properly approximated.

Julius Wolff in 1885 stated that all suggested operative procedures for cleft palate up to that year could not replace the original formula laid down by von Langenbeck. He even went so far as to say:

Perhaps no procedure could ever replace it.

Three years later, however, he modified it himself, using two stages, first elevating the palatal mucoperiosteum, then, five to eight days later, denuding and uniting the cleft edges with sutures. With these improvements Wolff postulated that children operated upon in early life would learn to speak better by the age of 6 years.

FRACTURE OF HAMULUS (BILLROTH III)

Billroth used von Langenbeck's method but added a new relaxing adjunct to facilitate closure with less muscle violation. Lenbach's



Theodor Billroth

enchanting portrait of Billroth, facts about him, and the translation of his paper "On Uranoplasty" by Leo Clodius of Zurich for *Plastic and Reconstructive Surgery* are of interest.

Christian Albert Theodor Billroth, born on the island of Rügen in the Baltic Sea, the son of a pastor, was a mediocre student with a desire to become a musician. He was skilled at playing the piano and violin, composed music himself and became a close friend of Brahms. Yet he was destined to become one of the great surgeons of his time. He studied medicine at Göttingen and Berlin and became a disciple of von Langenbeck. After seven years as professor of surgery in Zurich he took the chair at the University of Vienna. In 1881 he performed the first gastric resection and in 1873 did the first laryngectomy. Billroth was known for his sincerity in openly discussing his successes and failures. As he said:

One unhappy case is better than 10 good ones, if one does not hide the mistake but (rather) analyzes it.

In 1889 Billroth wrote of his modification of the von Langenbeck uranoplasty:

In many cases, the results of staphylorrhaphy and uranoplasty, introduced by B. v. Langenbeck, did not fulfill the expectations for speech improvement. . . . To achieve this goal, a number of trials were made. . . . In congenital defects, the muscles moving the soft palate are not just cleft, but powerless. This is the reason for the minimal postoperative speech improvement. In clefts of the soft palate alone, this muscle deficiency is minimal and, therefore, the postoperative functional result is best.

In clefts of the hard palate, the entire musculature of the soft palate, corresponding to the width of the cleft, is missing. In addition, these rudimentary muscles are transected by the lateral incisions.

During healing, the soft palate is pulled with the united soft tissues of the hard palate toward the vault of the hard palate, which, in these patients is usually quite high. These factors explain the functional insufficiency of the muscles and the slight improvement postoperatively.

To avoid this bilateral sectioning of the muscles by the lateral incisions, I did not divide the entire thickness of the soft palate in my last operations. After the mucosa was incised, the medial plate of the wing of the pterygoid, above the hamulus, was cut with a narrow chisel. In this way, the hamulus was rendered somewhat mobile and could be moved (from either side) toward the midline, with its uninjured musculature.

Despite all this, the ability to completely separate the nasal from the oral

First
hamular
fracture

cavity during speech was not achieved, in most cases, by the operation alone. Therefore, an attempt was made to close the remaining communication by a well-fitting obturator.

Integrity

According to A. W. Schwartz, Billroth was so respected by the Austrian people that a two-shilling silver coin bearing his likeness commemorated his 100th birthday, and in 1937 his portrait appeared on an Austrian postage stamp.

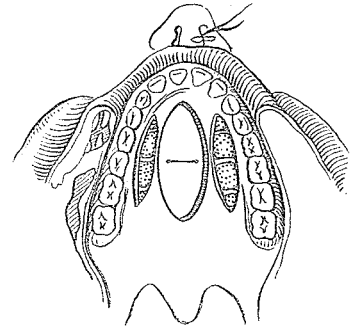
In 1925 Dorrance fractured the hamulus and then dislocated the tendon of tensor muscle, claiming that this transformed its function from a tensor to a levator muscle.

MECHANICAL AIDS TO RELAXING INCISIONS

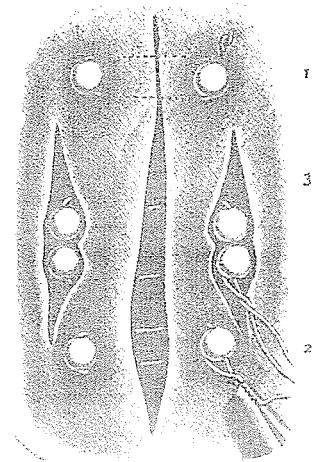
Other, more mechanical methods of reducing tension on the suture line were developed:

Champenois in 1868 packed the lateral relaxing incision with charpie and then covered the entire palate with a perforated gutta percha plate wired in place.

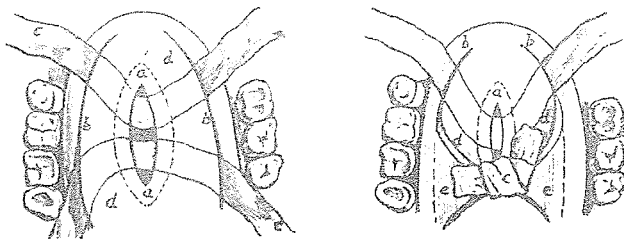
In 1879 Dudon inadvertently broke his curved needle. Not having another, he conceived the idea of holding the palatal flaps in apposition by embracing them with ribbon sutures passed through the relaxing incisions.



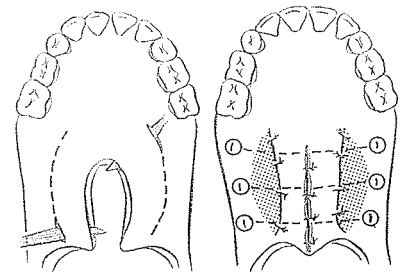
Champenois



Prince



Dudon



Fillebrown

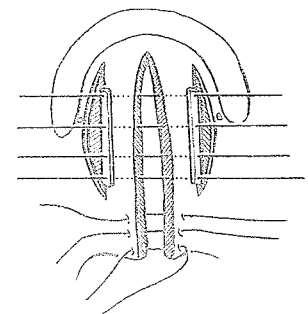
David Prince in 1884 took up the tension with beads.

Charles Dalton Fillebrown in 1906 carried the effort for relaxation even farther. He used special curved relaxing incisions and reinforced his cleft closure suture line with anti-tension wire sutures tied over silver disks.

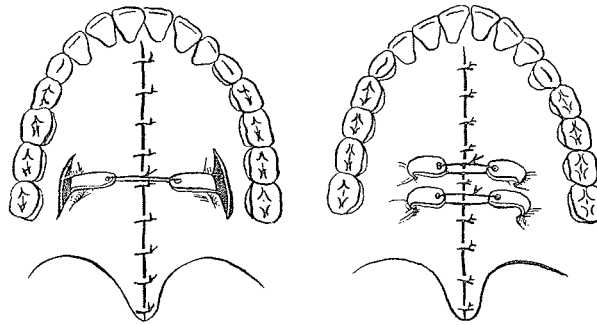
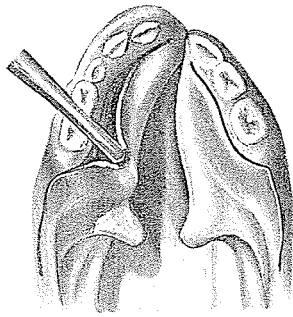
Nitch applied aluminum plates at the site of lateral incisions to relieve tension in 1912.

MacKenty used retention hooks and retention retractors.

Federspiel in 1916 used anti-tension plates; Thompson in 1921



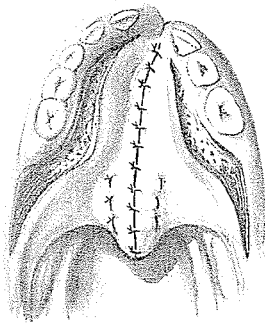
Nitch



MacKenty

used anti-tension sutures over lead plates; Sprague in 1926 used "tension relief pins."

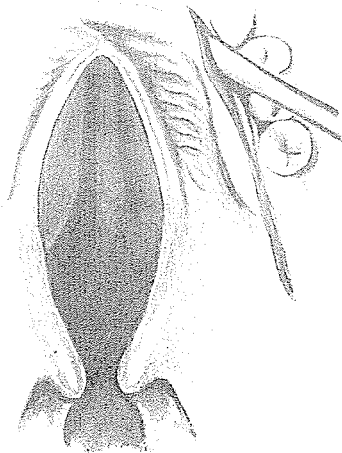
Of course, all of these anti-tension maneuvers were superseded by the famous intramuscular silver suture of Veau.



Dorrance

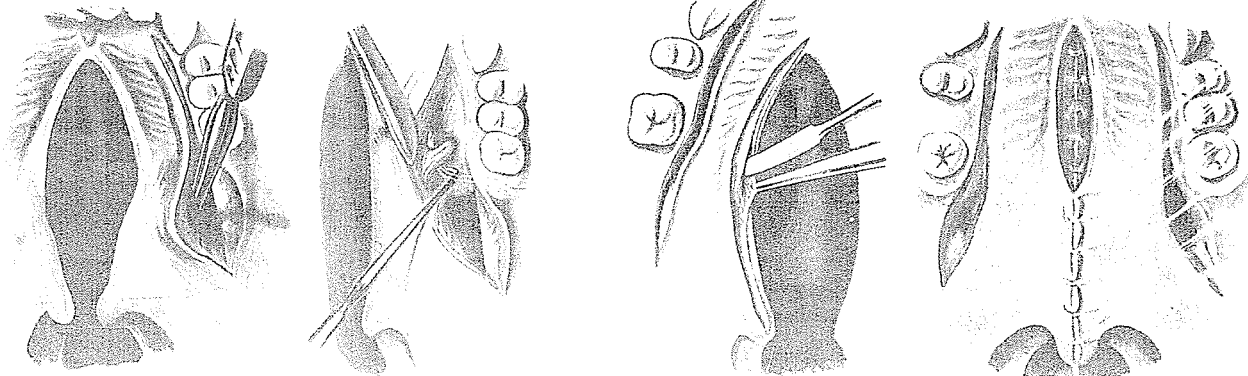
DORRANCE

In 1933 Dorrance described, with superb drawings by W. B. McNett, his modification of the von Langenbeck procedure, used when there was adequate tissue allowing sufficient length to be achieved without his more radical pushback procedure.



AXHAUSEN

Georg Axhausen of the University of Berlin was a Prussian aristocrat with a dictator complex who, it is said, when not operating was fighting with Wassmund, the second maxillofacial surgeon in Berlin. In 1936 Axhausen wrote a book on cleft palate describing his use of the von Langenbeck procedure. He dissected the mucoperiosteal flaps through the standard lateral incisions, ligated and divided the posterior palatine vessels and achieved a careful two-layer closure of the nasal and oral mucosa.



BROWN

Frank McDowell, now of Honolulu, Hawaii, recalled in 1976 how the von Langenbeck principle was used at Washington University, St. Louis, during the 40's:

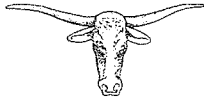
All of us, Brown, Byars, myself, including Blair, closed total clefts of the palate by a modification of the von Langenbeck procedure which Blair called the Dieffenbach-Warren operation—and which was called by others “the Blair-Brown operation.” The arteries were dissected out well, stretched from their foramina, and cut loose from the mucoperiosteum a little ways, if necessary, to allow closure without tension in the area of the junction of the hard palate with the soft palate. (This was the forerunner of the setback operation for partial clefts.) The soft palate was closed in layers, paying as much attention to a precise closure of the nasal mucosa (from the anterior gum to the tip of the uvula) as to the closure of the oral mucosa. When done successfully in one operation at about the age of 18 months, about two-thirds of these would spontaneously develop normal speech (providing attention was paid to their incisor dentition so they could make sibilant sounds). About one-third had varying degrees of speech abnormalities—and they represented the real problem. We did see upper jaw retrusion in some of these patients—even in some who had not had the palate operated on—even in a few who had never had the lip or palate operated on. Early and persistent orthodontics seemed to be the best answer.

BLOCKER

Another to use or guide his residents through thousands of von Langenbeck cleft palate procedures is Truman G. Blocker, Jr., who in size, strength and “smarts” personifies the mythical Texan. A giant in American surgery, brigadier general in the Army, history addict and chief of the University of Texas Medical branch in Galveston, he learned the von Langenbeck operation from Singleton, who in turn learned it from pioneer cleft surgeon J. E. Thompson. Always with a clear view of the entire picture, Blocker developed an impressive residency training program and was the first to start a cleft palate speech program in Texas. Recently he has become president of the University of Texas Health Science Center in Houston, which includes the schools of medicine, dentistry, public health, biomedical science, nursing and allied health science. The Center, having bought the Prudential building, under Blocker's direction is busy removing the



Truman Blocker



“Piece of the Rock” sign and installing in its place the University of Texas steer head.

When asked to reflect on cleft surgery, Blocker wrote in 1977:

Sophistication of pediatric anesthesia in the past two decades has resulted in enhanced techniques for repair of cleft palate deformities. The surgeon has more complete freedom from worry for the safety of the patient than in former days and is able to define structures with much greater precision. Antibiotics have almost eliminated post-operative inflammatory breakdowns, and with anatomically correct approximation of tissues, problems in speech training have been considerably reduced.

MODERN POPULARITY

In 1964 Michael Lewin of Montefiore Hospital, New York, published a survey made in 1961 of methods of management of cleft palate in the United States and Canada. He found that over half the surgeons were using a form of the old von Langenbeck repair. This was certainly my experience during my early years of training. In the summer of 1944, as a senior student at Boston Children’s Hospital, I first saw a cleft palate operation. D. W. MacCollum, sitting on his special sponge cushion, pared the cleft edges, used relaxing incisions in a standard von Langenbeck closure, pulled the palatine vessels out of their foramen—as he said, “like an earthworm out of its hole”—and approximated the palatal halves with meticulous sutures. The primary concern was cleft closure without tension, and I do not recall an incidence of wound separation. There was no discussion about or attempt at palatal lengthening. W. E. Ladd had given up doing palates, but Robert Gross, between one patent ductus and another, did a private palate cleft occasionally—whether to keep his hand in or to upset MacCollum, I was never certain.

While finishing up World War II Navy duty in Nashville, Tennessee, I managed “off-duty” scrubbing in the early A.M. with William Core, an able general surgeon who occasionally did a palate operation. He was the first I observed to split the cleft edges instead of paring them, which seemed to make good “Scots” sense.

Through the latter part of 1946 and 1947 on the general surgical house staff at Vanderbilt University Hospital, I maneu-

vered my way onto Beverly Douglas' plastic surgery service. His complete concentration and minutely meticulous technique was beyond the patience of the eager general surgical students. One resident autoclaved the *Nashville Times* and kept up with current events during a prolonged plastic procedure, and Bill Meachum, once a circus performer but at that time more interested in neurons and synapses, faked a grand mal at the scrub sink and was excused from assisting a plastic case. Thus, I had the good fortune to spend many hours with Douglas on numerous Diefenbach-Warren-von Langenbeck cleft palate operations.

LINDSAY

One of the modern champions of the von Langenbeck procedure is William Lindsay of the Toronto Hospital for Sick Children.

In the 1971 book *Cleft Lip and Palate* Lindsay mentioned that his operation is identical to that of von Langenbeck, with the only variant being in fracture of the hamulus.

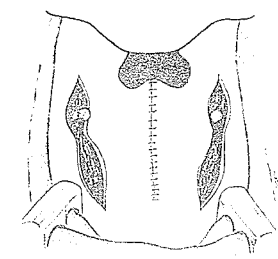
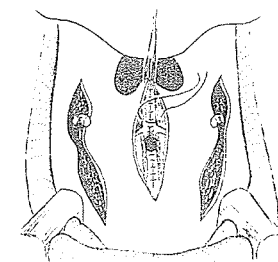
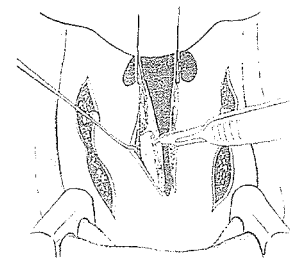
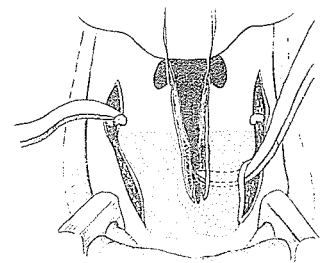
Guided by von Langenbeck's original text, which had no illustrations, Lindsay has conjured up likely diagrams to depict the various steps in the original procedure. Briefly, the operation includes the following maneuvers:

The edges of the cleft are incised and dissected to produce three layers: oral mucosa, muscle and nasal mucosa. The lateral relaxing incisions start at the maxillary tuberosity proceeding posteriorly along the pterygo-mandibular raphe to just in front of the anterior pillars of the fauces and then, proceeding anteriorly, parallel to the alveolar ridge as far forward as the canine-bicuspid region. The scalpel is carried firmly down to bone and with an elevator the mucoperiosteum is freed, taking precaution to tease the vessels out of the foramen without severing them. The nasal mucosa is transected at its medial margin at a point anterior to the posterior nasal spine and this cut is extended laterally, to try for a "sneaky" bit of nasal mucosal lengthening. This defect is left raw while the nasal mucosa, muscle and oral mucosa are sutured in layers.

A recent study by Lindsay comparing 66 von Langenbeck cases with 45 modified Dorrance pushback cases (also with a raw nasal defect) revealed interesting findings. Lindsay summarized:



William Lindsay



von Langenbeck per Lindsay

*our pushbacks
are better
than theirs...*

*admits
fistulae*

The modern critics of the von Langenbeck operation claim that it allows unnecessary fistulas in the anterior aspect of the mouth, produces a palate of insufficient length, and is associated with inferior speech results. The evidence [of the Toronto study] contradicts these criticisms and indicates that patients who have a Langenbeck palatoplasty will speak as well as those who have a pushback palatoplasty by the time of speech maturation [60 percent acceptable speech by von Langenbeck, 42 percent by pushback]. This study has shown conclusively that the former [von Langenbeck] group . . . have a lower frequency of incisor crossbite and buccal-segment collapse. . . . It [also] suggests that it is better to leave residual fistulas in the anterior portion of the hard palate unoperated until after orthodontic correction has been accomplished.

In 1978 Isaac Kaplan, with Labandter, Ben-Bassat, Dresner and Nachmani of Petah Tiqva, Israel, reported long-term follow-up on von Langenbeck cleft palate closures which supported the findings of Lindsay and Blocksma. There was minimal facial growth deformity with slightly more than 20 percent having velopharyngeal incompetence.

Personally, I find the von Langenbeck principle useful in closing the residual hard palate cleft at 18 months to 2 years when the soft palate was closed in the early months. The lateral relaxing incisions can be modified, kept away from the teeth and often reduced to curved releasing cuts around the maxillary tuberosities. This maneuver allows cleft closure with less muco-periosteal elevation and minimal residual raw areas with far reduced likelihood of maxillary growth disturbance. Since approximately 75 percent of patients with von Langenbeck closures will develop normal speech, the need for secondary pushbacks and pharyngeal flaps is limited to the other 25 percent and after 5 years of age.