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MODERN METHODS IN THE REPAIR OF CLEFT PALATE.*

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Much improvement has been made in recent years in the management of congenital clefts of the palate. Fissure of the soft palate is not a very serious deformity, and may usually be repaired by a plastic operation without special difficulty. Freshening the edges of the cleft by paring or by splitting the tissues and applying sutures tied not too tightly may be sufficient. If such operative measures are unlikely to be followed by union, because of tension of the stitches, the surgeon may make flaps of half the thickness of the soft palate and thus bridge the gap.

On this occasion, I am considering especially the treatment of clefts of the hard palate. This condition is usually accompanied by cleft of the soft palate and often by cleft of the alveolar process of the jaw as well. Single or double fissure of the upper lip, the so-called harelip, is very frequently associated with the imperfect palate.

These congenital anomalies of development have been the subject of most surgical discussion, and to a certain extent have heretofore been the despair of operators. Operative treatment has often been unsatisfactory, because of the impossibility of obtaining and maintaining an aseptic wound in the mouth and nose, and because the tissues at hand for closing the gap have been insufficient to permit osteoplastic reconstruction without tension on the sutures. Efforts to complete the partition between mouth and nose by means of obturators with an attached movable velum have not been altogether successful. Such appliances cannot be adjusted in infancy,

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must be increased in size as the child grows in stature, and would probably be difficult of adjustment in the adentulous mouth of the aged.

The problem before the surgeon is to close the abnormal communication between mouth and nose so effectually as to obviate the passage of food and air through it. Unless this is done, the infant is nourished with difficulty, and its upper respiratory tract becomes affected with chronic catarrhal inflammation. Later its nasal chambers and its naso-pharynx fail to obtain normal development, its speech is exceedingly defective, and its facial outlines lack normal contour. As a secondary result of the palatal deformity, the cleft upper lip, when closed by operation, becomes an expressionless band stretched across the teeth. The lower lip is so prominent in contrast to this reconstructed upper lip that the mouth is ludicrously deformed, unless a large V-shaped section is removed from the bulky lower lip. In some cases it may be wise to increase the size and projection of the upper lip by inserting into it a portion or portions of the lower lip or cheek.

I shall now state my views as to the most satisfactory way of solving the operative problem presented by clefts of the bony palate. I use the term operative problem, because I believe that obturators and artificial substitutes for the hard and soft palate should be rejected as inferior to plastic reconstruction.

A. Brophy is correct in his assertion that in most, if not all, cases the cleft is due to a separation of the two halves of the roof of the mouth and not to an actual absence of the bony tissue. The congenital fissure is a want of union of the palate processes of the two upper maxillary and the two palate bones and the inter-maxillary bones. The partition wall between nose and mouth will usually be re-established, if the separated halves are forced into apposition. If the infant's mouth is closed so that the relation of the alveolar arch of the mandible to that of the upper jaw may be seen, the abnormal spreading of the upper alveolar halves will be quickly appreciated. It is not improbable that the "bite" of the mandibular alveolus inside of the upper alveolar arch may tend in the earliest months of infancy to force the lateral halves of the upper jaw still further apart and thus increase the cleft in the palate.

B. Acceptance of the propositions just stated compels the operator to grant that the bony roof of the mouth should be re-created as soon as possible after birth, provided this is possible without

grave risk to life. A simple and most efficient method of doing this is to carry wires through the two segments of the upper jaw, force them together while they are semi-cartilaginous in structure and hold them in contact by twisting the ends of the wires over lead palates.

This operation devised by Brophy is philosophically and mechanically correct. It is surgically wise, because it is quickly performed, causes little hemorrhage, and gives rise to no shock of importance. It should be performed within a few days or weeks after birth, although in neglected cases its performance is possible, perhaps, up to six months. At that time the cartilaginous jaw usually becomes too rigid from ossific deposits to be thus drawn into proper shape. Sometimes the coaptation in these late cases may be obtained, but only after dividing the jaw above the alveolus with a chisel or saw. This increases the gravity of an otherwise safe operation, because bleeding and shock are augmented. It is not improbable that children of six or more months are more shocked by simple operative procedures than newly-born infants.

After the wire "tie-beams," as they may be called, have been left in position for a couple of months, the bony roof of the mouth will be firmly reconstructed. The wires may then be removed, and the fissure in the soft palate closed with sutures. The edges of the bony cleft may be freshened when the wires are inserted; but this step is not essential. If the margins touch, the pressure will soon cause erosion and adhesion. The soft palate may be repaired at the time the hard palate is operated upon, if the operator thinks it judicious to prolong the operation at that time. It will readily be understood that the probability of success after suturing the soft curtain of the palate will be greatly increased by reason of the previous approximation and closure of the cleft in the bony palate. The upper jaw has been made much narrower and the soft parts have been carried towards the middle line at the same time. Therefore there will be comparatively little strain on the sutures which draw the soft tissues together. The margins of the cleft may even be in contact before the edges are freshened and the stitches inserted.

C. The error of leaving cleft plates untreated by operation until the patient is two, three, or more years old should not be committed. It is important to remedy the abnormal width of the roof of the mouth while the bones are sufficiently soft and pliable to be bent into place by the surgeon. This abnormality in the relative

width of the upper and lower jaws should be corrected therefore in earliest infancy. The partition between nose and mouth must be complete in early life, so that the nasal chambers, their accessory sinuses, and the naso-pharynx may be developed—that is expanded—by giving to respired air the normal, or physiological, direction of its current. The cavities of the face connected with the function of respiration cannot be properly enlarged during the growth of the infant so long as mouth and nose admit air in breathing as one merged opening.

The existence of cleft of the hard and soft palate, not only contributes to nasal, aural and pharyngeal catarrh, but may, perhaps, increase the liability to pulmonary infections. Its grave, and almost insurmountable, danger to proper speech has always been recognized; but the interference with the facial contour and the physiological needs of the voice, respiration, and dental occlusion have been appreciated only recently.

D. When early operation has been admitted and the delay has therefore allowed the displaced upper jaw bones to become ossified in their unnatural position, the wire-tie-beam method cannot be used. It then becomes necessary to cover the gap between the bones by muco-periosteal flaps obtained from the oral or inferior surface of the palate processes of the upper maxillary and palate bones.

This operative step should be done in early infantile life. It is desirable to undertake it before the molar teeth are erupted. It should be done early because the opening between mouth and nose should be closed as soon as possible in the child's life for the physiological reasons already mentioned. It is often best accomplished before the molar teeth have appeared, because one of the flaps may then be cut so large as to include the mucous membrane overlying the alveolus.

E. In this stage of the treatment I prefer to use the form of flaps suggested by Lane. He makes a crescentic antero-posterior incision on the roof of the mouth close to the alveolus. This is carried through the mucous membrane and periosteum. A muco-periosteal flap is then raised by blunt dissection from the bone, to be subsequently laid over the cleft in the palate with its raw surface towards the mouth. No incision is made along the margin of the cleft, because the flap obtains its blood supply from this region. On the other side of the cleft a linear antero-posterior cut is made, through the mucous membrane and periosteum, along the *edge* of the

fissure, and a flap is raised from the bone by undermining. The edge of the everted flap from the opposite half of the palate is tucked under this undermined flap and secured by two rows of fine sutures introduced by means of very small sickle-shaped needles.

The flap, which is to cover the fissure of the palate, and which is everted, is cut from the wider portion of the bony palate. If there be no molar teeth present, it may be made very large, when necessary, by including in its area the fibro-mucous membrane covering the alveolus and even some of the mucous membrane lining the cheek beyond the alveolus. The soft palate tissues are treated in a similar though not identical manner.

It is possible that Brophy's method of performing this stage of the treatment is as satisfactory as Lane's. I have had no experience with it. He raises two muco-periosteal flaps by undermining the tissues on the inferior surface of the fissured bony palate. Each flap is raised by an incision made at the side of the cleft. There is no cut made near the alveolus as in the Langenbeck and the Fergusson operations. The undermined flaps are brought together edge to edge in the middle line. Wire sutures carried through the flaps near their attachment to the bone are passed through leaden plates, or splints, and twisted. These tension sutures and splints steady the soft flaps and lessen the tendency of the sutures, which oppose the raw edges of the flaps, to cut out.

In both of these methods the soft palate should be freely detached from the posterior edge of the hard palate before the sutures are inserted. This step is of the utmost importance. It permits the velum and uvula to drop towards the mouth and greatly facilitates the repair of the cleft without tension on the stitches.

The palatal muscles at the hamular process should not be divided by a tenotome as suggested by Ferguson. This procedure, formerly a good deal used, is not necessary in these modern methods, and may be disadvantageous to the patient.

The harelip should, as a rule, not be repaired until the palate has been reconstructed. If the palate operation is done in the early weeks of infancy, the parents will not be averse to postponing the operation on the disfiguring harelip until the condition within the mouth has been remedied.