Combined Use of Levator Retrodisplacement and Pharyngeal Flap for Congenital Palate Insufficiency

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Kriens (*2*) has recently emphasized the gross muscular pathology of the cleft soft palate, characterized by normal origins and abnormal insertions of the velar muscles. In the presence of cleft palate, absence of the central palatine aponeurosis and hypoplasia of the horizontal laminae of the palatine bones results in anterior displacement of the muscular attachments. Thus, the axis of the levator veli palatini muscle (LVPM) is directed anteriorly, inserting at the posterior border of the shortened hard palate. Similarly, the longitudinal portion of the palatopharyngeus muscle is displaced laterally. Therefore, the normal muscular sling of the velum remains undeveloped, a condition which, according to Veau, leads to diminished palate length: ". . . if the palate has not its normal length, it is because the muscle sling has not formed, the muscles have not pulled" (*3*). There are numerous indications that a similar anatomic explanation may be invoked for speech and hearing disorders among those with non-cleft palatal insufficiency.

Based on these principles, surgical retrodisplacement of the LVPM has been proposed for correction of non-cleft associated speech disorders and initial experience with this technique among four patients resulted in postoperative improvement of speech quality as well as restored eustachian tube function and diminished conductive hearing loss (*1*). However, muscle displacement alone has not always served as a consistent means for providing maximum speech improvement, particularly among those with a severely foreshortened palate or persistent hypernasality after initial palate repair. Accordingly, the retrodisplacement principle has been combined with a pharyngeal flap in a manner which provides muscular union between the LVPM in the midline of the soft palate and the fibers of the superior constrictor in the posterior pharyngeal wall. Continuity of muscular tissue at the borders of each new lateral velopharyngeal portal thus provides an anatomic configuration with the potential for functional sphincter action. This brief report describes the technique which is currently in use at the Facial Deformity Clinic of the University of Virginia Hospital.

Operative Technique

Acceptable indications for this procedure include non-cleft palate insufficiency, clefts of the soft palate with short levator insertions, and previously repaired clefts with persistent nasality. It may in fact be considered for any patient without previous levator release. Pre-operative evaluation includes sound cineradiography, speech testing and recording, and clinical assessment of palate mobility and length. Surgery is performed under general endotracheal anesthesia with the aid of a Dingman mouth gag and infiltration with 1:100,000 epinephrine solution. The procedure may be and, in the case of primary palate repair, usually is combined with an extensive pushback. When palate lengthening is included, the palate musculature is liberated from its attachments to the free border of the hard palate as well as from the oral and nasal mucosa. Complete mobilization of muco-periosteal flaps based on the greater palatine vessels further facilitates muscle retroposition. In addition, both LVPM bundles are carefully dissected free of any remaining palatal attachments for a distance sufficient to permit easy posterior rotation and attachment to the base of a pharyngeal flap. Particular care is taken to leave undisturbed the nerve supply (branches of the pharyngeal plexus) which enter lateral and posterior to the pterygoid hamulus.

Before or after mobilization of the LVPM bundles, a flap is elevated from the posterior pharyngeal wall. We prefer a superiorly-based flap in order to assure adequate length and avoid tethering of the palate in a downward direction. The tip of the pharyngeal flap is turned into the midline soft palate defect to supply needed nasal floor lining after push-back. The

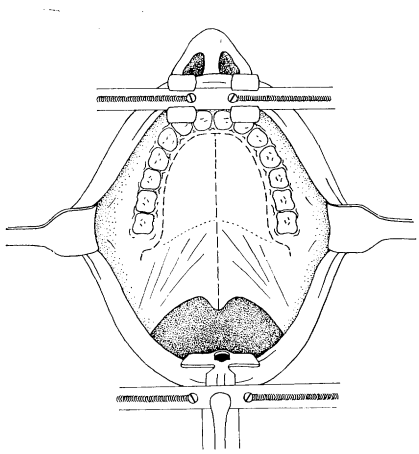

FIGURE 1. Mouth gag in place. Incisions are outlined in patient with a non-cleft palatal insufficiency.

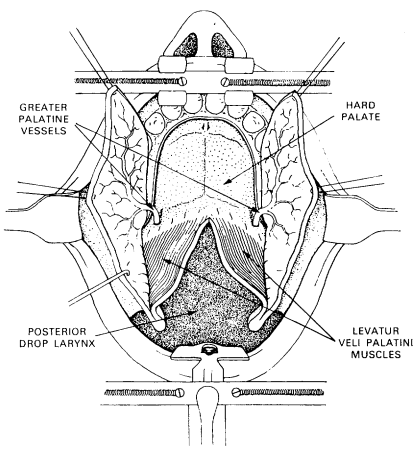

FIGURE 2. Mucoperiosteal ffaps elevated, vascular bundles freed to permit pushback, nasal floor divided in midline. (Note anterior direction of levator fibers.)

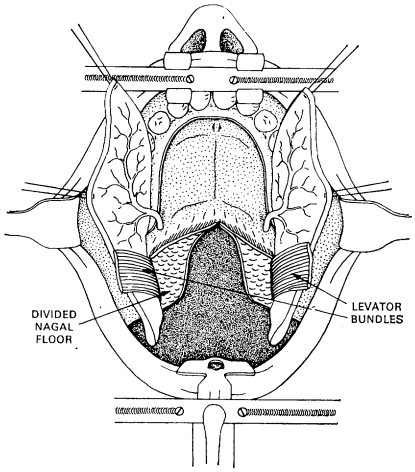

FIGURE 3. Levator muscle bundles divided from hard palate insertion and freed from mucoperiosteum and nasal floor in order to permit retrodisplacement.

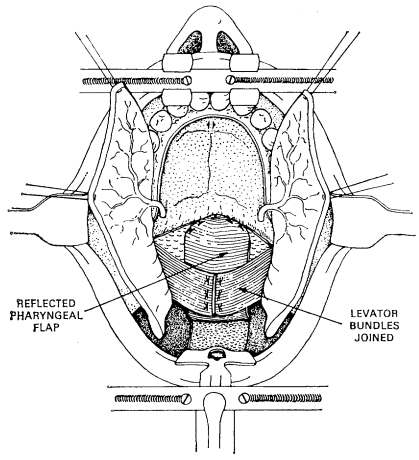

FIGURE 4. Superior-based posterior pharyngeal flap turned into nasal floor defect. Levator bundles joined in midline at base of flap.

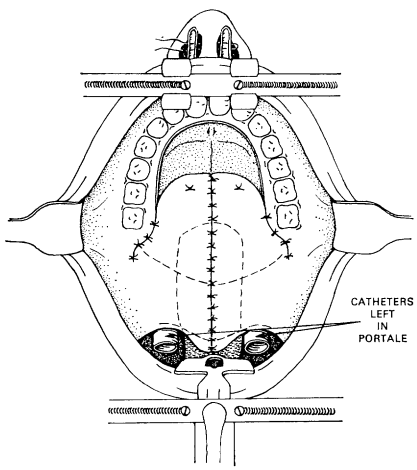

FIGURE 5. Palate pushback completed. Catheters left in each portal and fixed to columella.

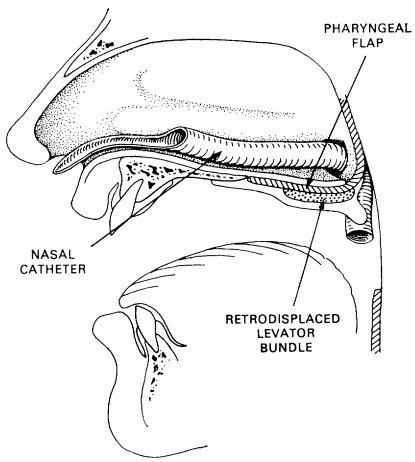

FIGURE 6. A final sagittal view showing position of pharyngeal flap, levator muscle, and temporary catheters.

mobilized insertion of each LVPM is then attached to the superior constrictor fibers at the base of the pharyngeal flap. The procedure is completed by lining the under surface of the pharyngeal flap with reflected mucosa from the nasal floor, reattaching the mucoperiosteal flaps, and closing the oral surface of the palate.

Discussion

Experience to date has been clinically gratifying even though follow-up with careful documentation of results does not yet permit objective measurement of success or indicate proven advantage over other surgical approaches to the problem. Nevertheless, the procedure is appealing since it is based on a sound and previously demonstrated principle; namely, that the functional architecture of the palate cannot be restored unless the axis of LVPM contraction is redirected. This procedure provides the anatomic means for achieving this goal and at the same time permits maximal palate lengthening. Because of the bulk of muscular tissue available for potential velopharyngeal closure, particular care must be exerted to avoid the denasality which accompanies excessive functional separation of the nasal cavity from the oropharynx. This should include avoidance of excess flap width and mucosal lining of all raw surfaces adjacent to the lateral portals. In addition, plastic catheters are placed on each side of the flap in order to maintain portal aperture, sutured to the membranous septum for several days following surgery, and then removed.

This surgical procedure should, at minimum, provide adequate static reduction of the velopharyngeal space. At best however, it may achieve dynamic control of nasal air escape through each lateral portal during active phonation. The reality of this second goal can be proven only by further clinical assessment of speech improvement following surgery and electromyographic analysis of LVPM function following retrodisplacement.

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