Push-Back Repair Using Nasal Muscosal Flaps: Results

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One of the most neglected operations in cleft palate surgery is the push-back procedure. This operation, popularized primarily by Dorrance and Wardill, was described by Dorrance in 1925 (*3*). Although von Lagenbeck, Veau, and other great men contributed much to this field, we believe that their procedures, for the most part, are obsolete in modern cleft palate surgery. Unfortunately, most plastic surgeons still cling to the old tradition and the push-back enjoys only occasional consideration, playing second fiddle to the 'classic' cleft palate operation after von Langenbeck, Vintage 1861.

The usual result of these lesser-known procedures is a short palate and poor speech. Therefore, we advocate a routine push-back for nearly all cases of cleft palate to obtain the best possible result in every case.

The raw surface on the nasal side of the displaced palatal flaps, following push-back surgery, has been a matter of concern since post-operative contracture negates much of the length gained. Some have closed their eyes to this problem, while others have used split grafts which also contract (*1*, *3*).

Cronin (*2*) published a method of eliminating the raw surface by the elevation of flaps from the nasal floor. An evaluation of this method is presented.

Summary of Technique of Nasal Flap Method

Mucoperiosteal flaps are elevated from right and left sides of the palate and displaced posteriorly aided by removal of the posteromedial wall of the palatine foramen. The free edges of the soft palate cleft are freshened and the posterior half is closed in layers by catgut mattress sutures. Rectangular nasal mucosal flaps are then elevated (Figures 1 through 5) by three incisions made in the nasal floor by a small right angle knife and a Freer septal knife inserted through the nose. These nasal flaps, based on the soft palate at the bony junction, are tacked onto the raw surface of the

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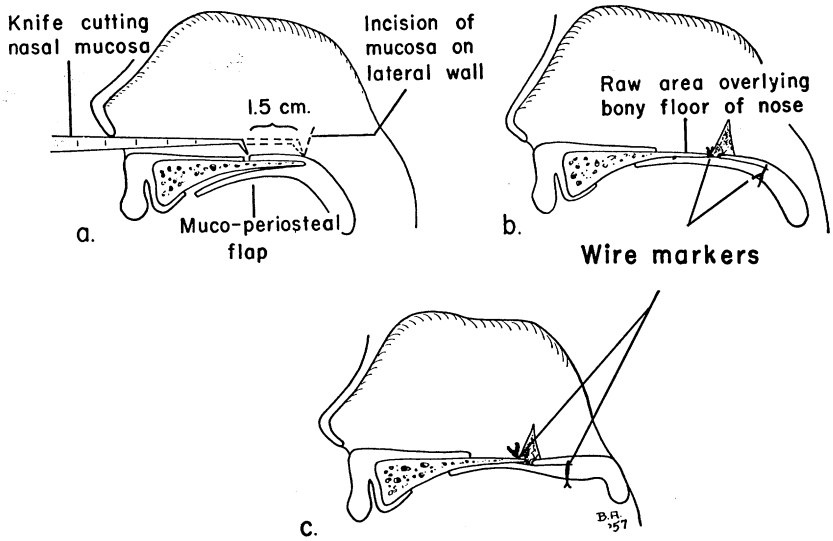

FIGURE 1. Diagrams showing para-median sections of the nose, naso-pharynx and palate. a. The starting point of the knife at the posterior border of the bone is shown by the dashed lines. Then it is withdrawn 1.5 cm., as measured by the lines on the shaft, and the transverse cut is made through the mucosa. b. The soft palate has been pushed back 1.5 cm. and the mucosal flaps cover what would have been a large raw area on the retroposed mucoperiosteal flaps. The raw area overlies bone, which effectively prevents contractures. Note the triangular defect in the mucosa of the lateral wall of the nose, which results when it is necessary to incise, as shown in a., to attain greater posterior displacement of the soft palate. c. The lengthened soft palate can now shut off the nasopharynx from the oropharynx. In b. and c., wire markers inserted to measure amount of retrodisplacement by x-ray.

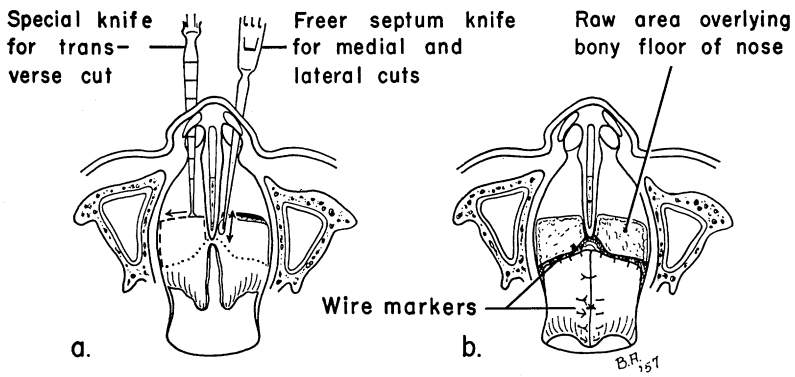

FIGURE 2. This is a section as if the top of the head had been cut off just above the level of the floor of the nose. a. The dashed lines represent the incisions to be made through the mucosa. The special rectangular or triangular knife is shown making the transverse cut on the left side. It has already been made on the right side and the Freer knife is seen making the medial cut with forward and backward strokes. The dotted line shows the posterior bony margin. b. The soft palate has been pushed back, the cleft sutured, and the mucosal flaps from the nose cover what would have been, in the usual type of repair, a large raw area on the mucoperiosteal flaps. The raw area is over bone so that little or no contracture can occur during healing.

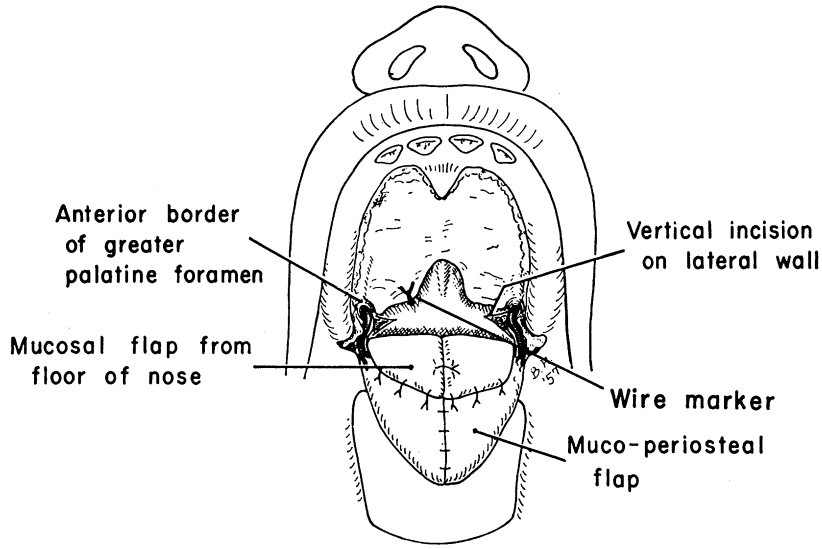

FIGURE 3. The mucosal flaps obtained from the floor of the nose are shown sutured in place over the mucoperiosteal flaps. Also shown are the vertical incisions of the mucosa and fascia of the lateral wall sometimes necessary for maximum posterior displacement of the soft palate. The inset simply shows the vertical mattress sutures used on both nasal and oral sides of the soft palate.

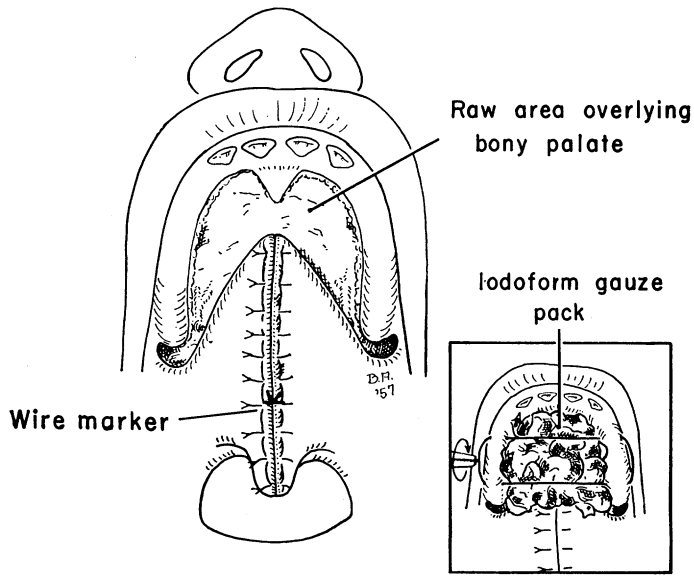

FIGURE 4. Final appearance of palate in push-back position. The inset shows the 2″ iodoform gauze pack used to hold the mucoperiosteal flaps against the bone and which, in turn, is held in place by the stainless steel wire of about 32 gauge. The wire is threaded on a needle which is passed through the gums, as shown. The pack and sutures are removed on the seventh post-operative day.

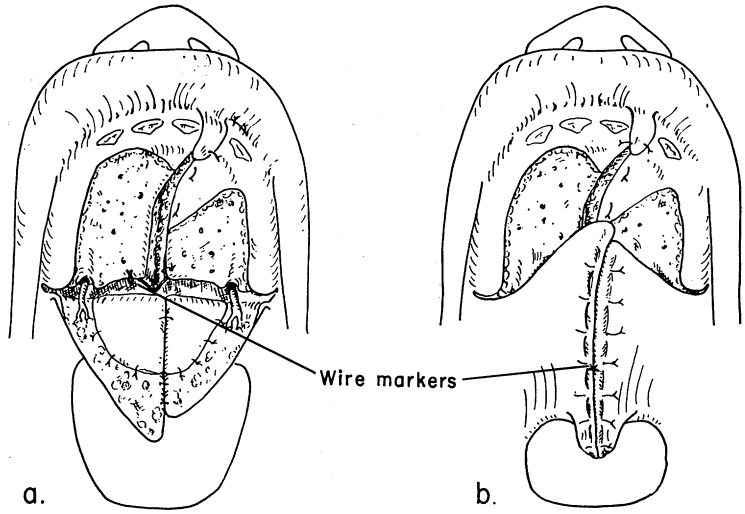

FIGURE 5. a. Method of closure in one state when the cleft is marrow. If the cleft is wide, the anterior portion of the cleft is closed first and the posterior part later. The vomer flap has been pulled beneath the small triangular piece of mucoperiosteum which has been retained anteriorly on the left for that purpose. Posteriorly, the vomer flap is attached by a suture through a hole drilled in the margin of the bone. Also note the labial mucosal flap reinforcing the repair between the ends of the alveolus. A stainless steel wire has been inserted through a small drill hole in the posterior margin of the bone as a marker. b. Palate in push-back position with wire marker suture inserted through the soft palate at the point where it had been attached to the posterior border of the bony palate.

mucoperiosteal palate flaps after the latter have been sutured together. If necessary, the hamular processes are fractured. (For a detailed description, see (*2*).)

This nasal flap variation was devised to minimize and even *prevent* post-operative contracture of the palate. To determine its efficacy, a simple method of evaluation was developed.

Any contracture will occur in the displaced mucoperiosteal flap in the area which is ordinarily left raw (now covered by the nasal mucosal flap). Therefore, before the operation is begun, the posterior edge of the bony palate is located by passing a needle through the tissues and marking the exact point with methylene blue. Near the close of the operation, a wire suture is placed through this blue point in the midline. This wire marks the previous junction of the soft and bony palate before push-back. An additional wire is tied through a drill hole placed in the most posterior edge of the bony palate. The distance between the two wires accurately represents the amount of push-back obtained (Figures 1 and 2). This is determined by a single lateral x-ray of the palate during the first week post-operative. The distance is measured carefully from the radiograph. An identical film is taken 60–75 days post-operative and the distance between the wires measured again. *Any* contracture is revealed accurately by a decrease in distance between the wires.

After some experimentation our radiologist determined that a single lateral x-ray view gave the best results (*4*). The central ray is directed to a point about one inch anterior to and one inch below the external auditory meatus. The cone used is one which will just cover an eight by ten inch cassette. Typical exposure factors for children aged one to three are 65 KV 100 MA (small focal spot) 0.2 second, 36 inch tube-film distance, standard film with screens and moving grid for uncooperative subjects, 200 MA (large focal spot) and high speed film, cutting time to 0.05 seconds. In adults and children over six years of age, average factors are 59 KV 100 MA (small focal spot) 0.5 seconds, 36 inch tube-film distance and standard film with screens and moving grid.

Results

Presently 66 patients have been followed to completion with push-back and wire markers. In 11 of these the wire markers became lost before x-ray studies were completed, leaving a total of 55 cases in this study. Tables 1, 2, 3, and 4 present data about the observed changes after the push-back technique.

It is interesting, and we think very significant, to note that 28 cases, or 51%, had 0–1 mm contraction. Another 18, or 33%, contracted only 2–3 mm. This 84% had an average push-back of 11.6 mm with an average contration of 1.1 mm or an over-all gain of 10.5 mm.

The over-all average for all the cases as noted above was 12 mm with a contraction average of two mm, or an over-all gain of 10 mm.

TABLE 1. Observed contracture.

Amount of contracture	*N*
Showed 0–1 mm contraction	28
Showed 2–3 mm contraction	18
Showed 4 or more mm contraction	9
Total	55

TABLE 2. Length gained by push-back before contraction

Amount gained	
Greatest	20 mm
Least	5 mm
Average in 55 cases	12 mm

TABLE 3. Post-operative contraction of palate

Amount of contraction	
Greatest	6 mm
Least	0 mm
Average in 55 cases	2 mm

TABLE 4. Distance gained by push-back. Total result after contraction

Amount gained	
Greatest	20 mm
Least	5 mm
Average in 55 cases	10 mm

An analysis of the nine cases (16%) showing four mm or more contracture may be of significance if the trend continues similar to these few cases.

Six patients had clefts of the palate only. Of that six, three had the 'horseshoe' type, and three had very wide clefts which extended into the bony palate up to one-half of the length of the palate. Closure was considered to be tight on all six; three required hamulus fracturing. Of the remaining three: one had a very wide unilateral complete cleft, poor nasal lining flaps were obtained, and the repair was performed by a resident; one had a bilateral complete cleft which was extremely wide, closure was difficult, and resulted in a fistula post-operatively at the point of maximum tension; and one had a unilateral complete cleft with no unusual observations or complications. It is interesting to note that surgery for four of the nine cases were performed by resident surgeons in training.

We see that eight out of nine were extremely wide clefts. Six of these were posterior clefts, which can sometimes be very difficult closures. It appears that extremely wide clefts, especially the posterior and horseshoe type, coupled with inadequate nasal flaps, are the major factors resulting in excessive contracture in this group. However, a satisfactory gain in length was obtained in all nine cases.

In conclusion, it is our feeling that a careful analysis of these figures leaves little doubt that the push-back procedure incorporating nasal flap lining over the raw surface is a superior operation and the procedure of choice to assure the best final result in children with cleft palate.

Summary

A summary of the push-back procedure including the method used to elevate nasal mucosal flaps for coverage of mucoperiosteal raw surface has been presented along with a method of evaluation. Fifty-five completed cases have been presented in which post-operative contracture of the palate has been minimized, and virtually prevented in 51% of the cases.

References

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