

Speech Results after Millard Island Flap Repair in Cleft Palate and Other Velopharyngeal Insufficiencies

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Dorrance (1) and Wardill (2) introduced and popularized methods of repair of the cleft palate that were combined with lengthening of the palate. In the last half of the nineteenth century, numerous modifications of this concept found their way into the literature. Some of them were abandoned (3); others stood the test of time (4, 5) and are still being used today.

The majority of surgeons consider a permanent lengthening of the palate an essential component of cleft palate repair (6). Some put a great deal of emphasis on obtaining a maximum lengthening (7). However, the degree of lengthening is usually limited by the conditions on the nasal surface of the palate where the soft tissue is scarce and inaccessible. If the wound on the nasal surface is "unsatisfied," not covered with epithelial tissue, it will heal by contracture. This, it is assumed, would cancel the benefit of the lengthening. Millard's ingenious method of utilizing an island flap of palatal mucoperiosteum from the oral surface to substitute for the soft tissue deficit on the nasal side seemed, on theoretical grounds, to offer a solution to this problem. A mucoperiosteal island flap measuring 12 to 15 mm in width could be expected to heal with a minimum contracture. The technical details of this operation have been described elsewhere (8). The place of this procedure in the repair of cleft palate or in management of velopharyngeal insufficiency can only be assessed by evaluating functional speech results in patients operated on by this procedure.

The primary measure of the success of the cleft palate repair is the achievement of velopharyngeal competence. Articulatory deficiencies and the other speech handicaps originating in the anterior part of the oral cavity are related to the methods of repair only if the surgical intervention leads to secondary deformities of the palate, dental apparatus, or tongue. The purpose of the investigation reported here was to determine the effect of the Millard island flap repair on velopharyngeal competence and voice quality.

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Material

Between 1966 and 1971, 45 palatal operations were performed at Montefiore Hospital and Medical Center, using the Millard island flap technique. In only 24 of these patients could a comprehensive speech evaluation be made; the others were either too young, not available for follow-up examination, or did not speak English. Of the 24 whose speech was evaluated, 12 were females and 12 were males. Ages ranged from 3.5 to 18 years at the time of the follow-up examination. The time lapse from the operation to the postoperative evaluation ranged from six months to four years, eight months. In 14 patients the Millard island flap procedure had been performed to correct an overt cleft palate (group A); in 10 patients it had been used to correct velopharyngeal insufficiency in the absence of an overt cleft palate (group B). The operation was performed on clefts of the posterior palate. However, in many cases, a complete cleft palate was converted into a posterior cleft by a preliminary procedure (using a vomeral flap). There were no surgical failures among these patients, and we have no reason to believe that there was any loss of the island flap (the island flap on the nasal surface of the palate is not available for direct inspection).

Evaluation Procedures

The speech examination consisted of evaluation of voice quality by three judges who were trained speech therapists. The surgeon did not participate. The judgments were based primarily on samples of spontaneous speech. Tape recordings of each patient were randomized and assigned identifying numbers. Judgments of voice quality were made on a five-point scale, with 1 indicating normal voice quality, 2 indicating mild hypernasality noticeable only to a trained examiner, 3 indicating moderate hypernasality, 4 indicating moderate to severe hypernasality, and 5 indicating severe hypernasality. Interjudge reliability was .91. A rating of 1 or 2 was considered a successful result, 2.5 being the cutoff point.

Results

The findings on the voice quality for group A (repair of an overt cleft) are summarized Table 1. Table 2 summarizes the voice quality rating of group B (correction of velopharyngeal insufficiency without overt cleft). As shown, acceptable voice quality was observed in 10 (70 percent) of the 14 group A patients and in 6 (60 percent) of the 10 group B patients.

All patients had cineradiographic evaluations in lateral projections, but only 7 were examined with an oral panendoscope since the others were either too young or could not tolerate the examination. In most cases there was a good correlation between auditory judgment, cineradiographic examination, and panendoscopic examination. In 1 case, cineradiographic evaluation revealed no velopharyngeal insufficiency, but on panendoscopic examination a central defect, approximately 4 mm in diameter was noted, and the voice quality of this patient was that of moderate hypernasality.

TABLE 1. Postoperative voice quality (nasality) in patients with overt cleft palate (group A)

<i>patient</i>	<i>voice quality (nasality)</i>
B	1.3
B	1.3
C	3.3
D	1.0
F	1.3
S	4.7
T	2.7
B	2.3
D	2.7
F	2.0
M	1.3
B	1.7
S	2.0
D	1.7

TABLE 2. Postoperative voice quality (nasality) in patients with velopharyngeal insufficiency without overt cleft palate (group B)

<i>patient</i>	<i>voice quality (nasality)</i>
B	3.3
D	2.3
G	1.0
M	3.7
R	2.3
S	4.7
T	1.0
U	2.0
R	1.0
M	5.0

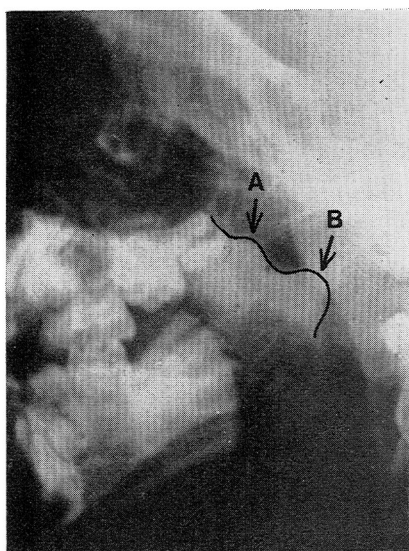
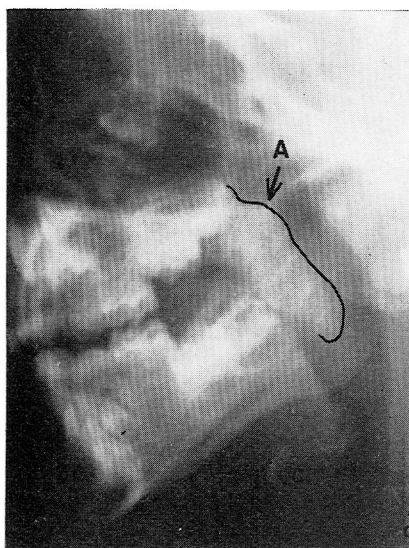


FIGURE 1. Patient F (group A). Voice quality rating was 2.0. Phonetic cephalograms of repaired cleft palate. Note "camelback" configuration of the palate in (b) on phonation. The anterior elevation (A) is static and represents the island flap. The posterior elevation (B) is levator prominence.

In 2 cases, although cineradiography revealed no velopharyngeal insufficiency, the panendoscopic examination revealed a "mere touch closure"; these patients had a mild hypernasality. We believe that when panendoscopic examination can be carried out adequately it is more reliable in de-

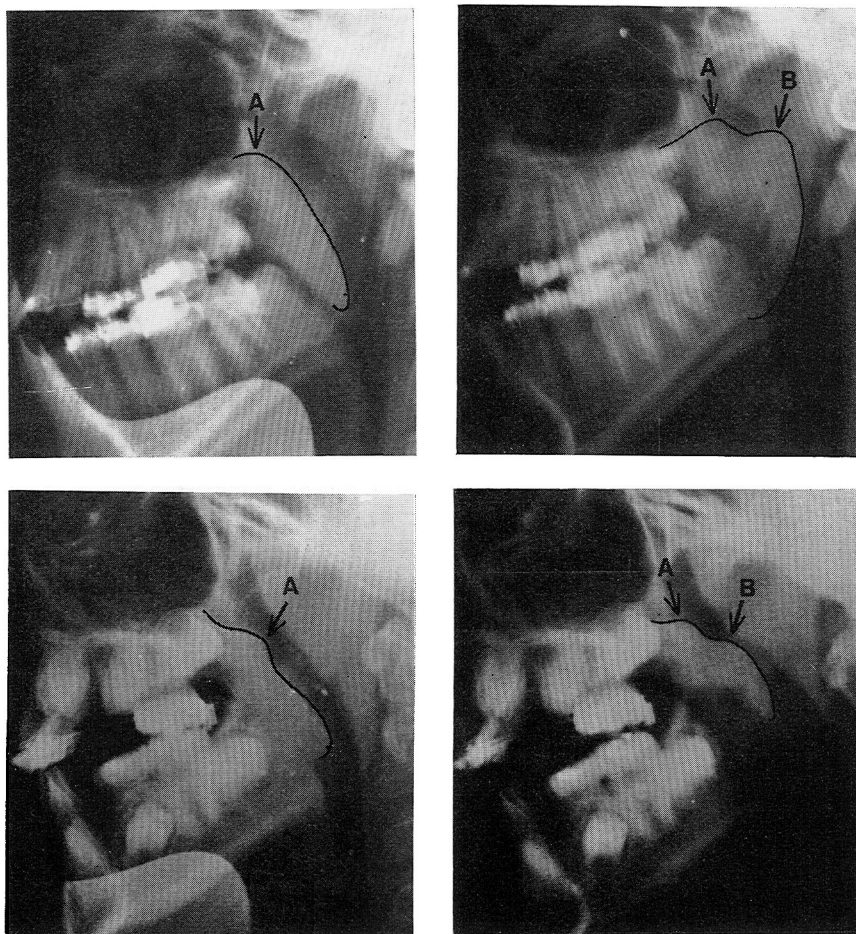


FIGURE 2. Various configurations of "camelback" palate. *Patient D.* (group B.) Voice quality rating was 2.3. (c) At rest. (d) Phonating "Eeee . . ." *Patient T.* (group B). Voice quality rating was 1.0. (e) At rest. (f) Phonating "Eeee . . ."

termining the degree of velopharyngeal incompetence than a cineradiographic evaluation in lateral projection only.

Examining our lateral cephalograms we noted an interesting finding regarding the configuration of the palate after the Millard island flap operation. In a few patients, in addition to the "knee" (levator-prominence), we noted on phonation another elevation anterior to the "knee". This double hump, which we refer to as a "camelback" appearance, probably corresponds to the observation of Pigott et al. (9) and Millard of buckling and puckering of the flap on the nasal side. However, some patients with the "camelback" palate had adequate voice quality, and we could show no correlation between this radiologic finding and voice quality. In 3 patients

cineradiography revealed minimal or no palatal function, and voice quality was unsatisfactory. Poor palatal mobility was also noted by Pigott et al. among the cases of failure following Millard's procedure.

Discussion

Millard (10), evaluating the speech results in his own cases, found that the operation is not a panacea. He reported about 80 percent success but proposed that the results could be improved by introduction of additional technical refinements. Hoge (11) reported success in 3 cases of secondary palatal lengthening. Dijkstra (12) utilized this procedure for secondary correction of velopharyngeal incompetence. Georgiade et al. (13) reported on 54 patients operated by the Millard island flap procedure, but these patients were too young for speech evaluation. McNeill and Kingston (14) estimated obvious nasality in 25 percent of their cases.

In considering our postoperative results in group A, we are aware of the following: (1) The number of cases was small for comprehensive statistical analysis. (2) The cases were unselected and include a cross section of a cleft palate population, including patients with multiple handicaps. (3) A number of patients were less than 5 years old at the follow-up examination. (4) Two of our patients (14 percent) had a rating very close to the cutoff point (2.7 versus 2.5), so that it is conceivable that these patients could, in time, improve spontaneously and acquire an acceptable voice quality. This would change our success rate from 71 to 86 percent.

We were unable to provide a comparable control group of patients operated on by other methods. However, over the years, we have estimated that one-fifth of our cleft palate patients after repair with conventional pushback procedures (Kilner-Wardill) require a pharyngeal flap because of residual velopharyngeal insufficiency. Most of the published reports from reliable centers claim a speech success rate of 70 to 80 percent after repair of palates by various methods (15). Thus, it seems to us that the Millard island flap operation, although useful and reliable, does not offer any spectacular advantages over other pushback procedures (such as Kilner-Wardill) in primary palatal repair.

It is not surprising that our postoperative results in group B (velopharyngeal insufficiency without overt cleft) were much poorer than in group A (60 percent versus 71 percent success rate). Group B included patients with a diversity of conditions, including submucous cleft and incompetence secondary to a tonsillectomy and adenoidectomy. Calnan (16) recommended a palatal pushback for rehabilitation of velopharyngeal insufficiency without an overt cleft. But others, such as Messengill et al. (17) noted that the speech results in this group are much poorer than in patients who have had repair of an overt cleft palate. It was our intention to limit the use of the Millard island flap procedure to cases of mild or moderate insufficiency. However, this judgment was subjective. The criterion of a gap less than 5 mm in diameter was not reliable, particularly since several

patients could not be examined by a panendoscope before the operation. In our original enthusiasm for this procedure we used it in cases that ordinarily would have been managed with a pharyngeal flap.

It is interesting to speculate why the Millard operation does not substantially improve the speech result in repair of cleft palate. There is no reason to question that this procedure results in better lengthening of the repaired palate and a smaller chance of secondary contracture than other pushback operations. Lengthening is an essential factor in palatal repair, but its importance has been overemphasized and the condition of the palate musculature has not been sufficiently appreciated in presurgical evaluation and in analysis of postoperative results. Palates differ greatly in width and in amount of muscular mass present in the palatal components. It is the muscular hypoplasia, the underdevelopment of the existing muscular element, which accounts for most of the failures in achieving velopharyngeal competence after the repair. Unfortunately, we have no reliable methods for measuring the muscle mass in the soft palate either before or after repair. With current management of palatal repair, the dreaded wound dehiscence is an extremely rare occurrence. However, a tight closure of the muscular palate is probably responsible for poor mobility and the residual velopharyngeal insufficiency.

Summary

Twenty-four patients were evaluated for voice quality after primary palatal repair by the Millard island flap procedure. In patients with overt cleft palate, acceptable speech was obtained in 71 percent. In patients with velopharyngeal insufficiency without an overt cleft, the success rate was 60 percent. Although we consider this method reliable and useful, we have no reason to believe that it offers substantial advantages over other established procedures. We suggest that the main reason for our failures to achieve velopharyngeal competence and acceptable voice quality after a repair is the inherent hypoplasia of palatal musculature.

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