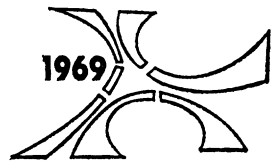
Several Factors Which May Precipitate the Use of Pharyngeal Flap



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The most distinct manifestation of cleft palate is the resonance pattern usually referred to as nasality. Various authors (*9, 10, 13*) have suggested that the speech parameter is the most handicapping aspect of the anomaly and, consequently, the most important consideration in the habilitation process for individuals with cleft palate.

It would appear that there is general agreement that pharyngeal flap surgery is an effective choice of technique for the establishment of velopharyngeal competency and subsequent improvement of resonant quality in the speech of cleft palate persons. Lewin (*8*) confirms that approximately 80% of the plastic surgeons surveyed utilize this operative technique. Several factors precipitating the application of the procedure, however, must yet be determined.

A number of related attitudes and assumptions may be projected. We tend generally to agree, for example, that primary surgical repair of the cleft does not *insure* adequate velopharyngeal function for speech; at the same time, many cases are recorded in which normal valving and acceptable speech do follow primary repair and, therefore, the need for secondary surgery such as pharyngeal flap is eliminated. Some investigators (*2, 3, 4, 6*) have alluded to specific primary procedures which either inevitably necessitate secondary procedures or generally are successful in avoiding such operations. Others (*5, 11*) have suggested that acceptable speech development without secondary surgery may be influenced by the type of anatomical cleft of the palate. Traditionally, there has also ensued a controversy as to the appropriate time for primary surgical repair of the cleft. Some (*1*, 7) are strong advocates of early palatal repair to attain the best possible speech results, while others (*12*) conclude that repair performed after four years of age is preferred.

To date, little has appeared in the literature to confirm that certain cleft types, specific surgical procedures, or the age of primary repair influence the

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development of acceptable speech or precipitate the use of pharyngeal flap surgery.

The present study is concerned with the analyses of certain data pertaining to individuals who have been recipients of pharyngeal flap surgery and those who have not. Of specific interest are data related to the presence of pharyngeal flap and the following: a) the type of primary cleft of the palate; b) the type of primary surgical procedure employed to repair the cleft; c) the mean age at which the primary surgical procedure is employed; and d) the amount of speech therapy received.

Method

SUBJECTS. The total sample in this study was randomly selected from the caseload of the Chief of Plastic Surgery at the Childrens Hospital of Michigan.

An experimental group of 36 males and 43 females were selected who had undergone pharyngeal flap surgery, ranging in age from 59 to 508 months, with a mean of 168 months. The distribution of cleft types among the subjects included: 5 velar clefts; 20 postalveolar clefts; 1 hard palate cleft; 14 unilateral complete clefts; 11 bilateral complete clefts; 6 congenitally short palates; and 22 submucous clefts. Closure of the overt clefts had been accomplished by a variety of primary surgical procedures performed by a number of plastic surgeons. Postoperative speech evaluations by the speech pathologist and cineradiographic analysis indicated that inadequate velopharyngeal valving resulted and acceptable speech had not been attained. Subsequently, pharyngeal flap surgery was recommended. Results of speech evaluations following the pharyngeal flap operation indicated that 78.1 % had attained acceptable resonance patterns.

The control group was composed of 34 males and 22 females ranging in chronological age from 65 to 233 months with a mean age of 119 months. The distribution of cleft types for the control sample was: 4 velar clefts; 14 postalveolar clefts; 28 unilateral complete clefts; and 10 bilateral complete clefts. The control group was void of hard palate clefts, congenitally short palates, and submucous clefts. All clefts had been closed prior to the study and each member of the group was judged to have normal speech as a result of the particular primary surgical procedure utilized in his case with or without speech therapy for a period of time.

STATISTICAL PROCEDURES. The patients' hospital charts and disposition cards filed in the plastic surgeon's office provided all necessary data for the study with the exception of the amount of speech therapy. These data were secured through telephone interviews with either the patient or his parents. The procedure was effective in securing information from eighty-one subjects. Figure 1 indicates the sixteen variables included in the statistical analyses.

Utilizing a 6×2 contingency table, the general formula for chi-square was employed to test for significant relationships between the presence of

1. Amount of speech therapy prior to the speech rating (range in months)
2. U-shaped setback and closure (modified Dorrance)
3. von Langenbeck
4. V-Y 3 flap
5. V-Y 4 flap
6. Vomer flap
7. Fistula closure by imbrication technique
8. Age of subject at time of primary repair (in months)
9. Velar cleft
10. Postalveolar cleft
11. Unilateral complete cleft
12. Bilateral complete cleft
13. Congenitally short palate
14. Submucous cleft
15. Pharyngeal flap
16. No pharyngeal flap

FIGURE 1. Variables included in the statistical analyses.

pharyngeal flap and a) the type of anatomical cleft and b) the type of primary surgical procedure employed to repair the cleft. A critical value of 15.086 at the .01 level of confidence or 11.070 at the .05 level of confidence (df = 5) indicates a significant relationship among the variables. In probing the data, four-fold contingency tables were designed, and the Yate's correction for continuity was applied. A critical value of 6.635 at the .01 level of confidence or 3.841 at the .05 level (df = 1) indicates a significant relationship among the variables.

A *t*-test for independent groups was employed to determine the significance of difference between groups with regard to a) the mean age at which the cleft palate was closed and b) the amount of speech therapy received. A *t*-value of 1.99 at the .05 level of confidence (df = 80) indicates significant differences between groups.

Results

The first null-hypothesis stated: there is no significant relationship between the presence of pharyngeal flap surgery and the type of primary cleft of the palate. Table 1 indicates the observed and expected frequencies for cleft types studied. The obtained chi-square value of 29.137 indicates that a relationship significant beyond the .01 level of confidence exists between the type of cleft and the presence of pharyngeal flap surgery. These results support rejection of the null-hypothesis and suggest that, for the sample studied, a relationship is evident between cleft type and the application of pharyngeal flap. Probing these data resulted in significant relationships being found between the presence of pharyngeal flap and three cleft types. Those data are indicated in Table 2. The submucous cleft (Type VI) appeared in a significantly greater proportion in individuals having had pharyngeal flap surgery than in those who did not. The chi-square values of

TABLE 1. Observed and expected frequencies for the type of primary cleft of the palate.

type of cleft	*experimental group*		*control group*	
	observed frequency	*expected frequency*	*observed frequency*	*expected frequency*
I Velar cleft	5	5.24	4	3.76
II Postalveolar cleft	20	19.79	14	14.21
III Unilateral cleft	14	24.45	28	17.55
IV Bilateral cleft	11	12.22	10	8.78
V Congenitally short palate	6	3.49	0	2.51
VI Submucous cleft	22	12.80	0	9.19

7.62, 9.98, 23.43, and 11.11, all significant beyond the .01 level of confidence, indicate a significant relationship between pharyngeal flap surgery and submucous cleft palate. In comparing postalveolar cleft (Type II) with unilateral complete cleft (Type III), a chi-square value of 3.96 was obtained. This value is significant at the .05 level and indicates the more frequent occurrence of postalveolar cleft in the pharyngeal flap sample than the unilateral complete cleft. The unilateral cleft does not appear to be significantly related to pharyngeal flap surgery. A similar result is indicated by the resultant chi-square value of 7.05. This value, significant beyond the .01 level of confidence, indicates the lack of relationship between unilateral complete cleft and pharyngeal flap. It indicates further the greater occurrence of congenitally short palate (Type V) in a sample of which the pharyngeal flap is characteristic.

The second null-hypothesis stated: there is no significant relationship between the presence of pharyngeal flap surgery and the type of primary surgical repair of the cleft. These data are shown in Table 3. The calculated chi-square value of 23.457, significant beyond the .01 level of confidence, supports rejection of the null-hypothesis. This result suggests that a rela-

TABLE 2. Chi-square values for inter-group differences with regard to the type of cleft of the palate.

type	*I*	*II*	*III*	*IV*	*V*	*VI*
I	—					
II	.04	—				
III	.76	3.96*	—			
IV	.06	.03	1.40	—		
V	1.72	2.21	7.05**	2.72	—	
VI	7.62**	9.98**	23.43**	11.11**	0.00	—

No asterisk, no statistical significance.
* significance at .05 level of confidence.
** significance at .01 level of confidence.

TABLE 3. Observed and expected frequencies for the type of primary repair of the cleft.

type of repair	*experimental group*		*control group*	
	observed frequency	*expected frequency*	*observed frequency*	*expected frequency*
I U-shaped set-back and closure	10	7.41	4	6.59
II von Langenbeck	20	10.59	0	9.41
III V-Y 3 flap	7	9.00	10	8.00
IV V-Y 4 flap	21	31.03	39	28.23
V Vomer flap	6	7.94	9	7.06
VI Fistula closure by imbrication technique	8	5.29	2	4.70

tionship exists between the presence of pharyngeal flap surgery and the primary surgical procedures selected to repair the cleft.

In probing these data, significant inter-group differences were found to exist with regard to two selected surgical procedures. These data are shown in Table 4. Inspection of results denotes the relationship of the von Langenbeck primary procedure with pharyngeal flap surgery. This is especially evidenced by the fact that all twenty subjects found to have had the von Langenbeck repair were members of the sample for which the pharyngeal flap was employed. The chi-square values of 13.28, 22.83, and 13.16 are all significant beyond the .01 level of confidence. Probing results also indicated the lack of relationship between the V-Y 4-flap technique and pharyngeal flap surgery. The chi-square value of 5.42, significant at the .05 level, indicates the greater frequency of the repair in the control population.

The third null-hypothesis stated: there is no significant difference between the experimental group and the control group with respect to the mean age at which the primary surgical procedure is performed. The mean age of repair for the experimental group was 26.35 months, with a standard

TABLE 4. Chi-square values for inter-group differences with regard to primary surgical procedures.

type	*I*	*II*	*III*	*IV*	*V*	*VI*
I	—					
II	2.84	—				
III	2.42	13.28**	—			
IV	3.56	22.83**	.03	—		
V	1.76	13.16**	.08	.003	—	
VI	0.00	1.67	2.43	5.42*	2.44	—

No asterisk, no statistical significance.

* significance at .05 level of confidence.

** significance at .01 level of confidence.

deviation of 22.54 and a range of 10 to 126 months. The control sample had a mean age of 17.65 months, with a standard deviation of 13.77 and a range of 6 to 97 months. The obtained value of $t = 2.32$ (df = 101) is significant at the .05 level of confidence. This result favors rejection of the null-hypothesis.

The fourth null-hypothesis stated: there is no significant difference between the experimental and control groups in the amount of speech therapy received. An experimental group mean of 8.10 and a standard deviation of 4.99 was obtained. The mean represents approximately twenty-two months of speech therapy. The control group mean of 3.69 with a standard deviation of 3.89 indicates about seven months of speech training. The value of $t = 4.47$ is significant beyond the .01 level and favors rejection of the null-hypothesis.

Discussion

On the basis of the sample studied, the pharyngeal flap would appear to be related to certain cleft types, the von Langenbeck primary repair, and late primary closure of the cleft. Results indicate that the postalveolar cleft, congenitally short palate, and submucous cleft tend to necessitate pharyngeal flap surgery if the patient is to attain acceptable speech. In contrast, unilateral complete clefts do not appear to eventually come to such surgery for speech to be acceptable. Mention should be made that for the control subjects with unilateral clefts, V-Y 4-flap primary repair was the technique of choice; experimental subjects with the same palatal deviation were repaired initially by a number of other primary procedures. The findings confirm the reliability of the V-Y 4-flap technique in effecting adequate closure, velar lengthening, and acceptable speech development. The von Langenbeck procedure, however, did precipitate pharyngeal flap surgery in the twenty cases observed in this study. The results indicate further that primary repair performed at the mean age of approximately 17 months provided adequate speech without pharyngeal flap implementation.

Finally, it is suggested by these data that extensive speech therapy is not effective in reducing excessive nasality in cases where the primary surgical procedure has not provided the anatomical and physiological mechanism with which to work. To forego pharyngeal flap surgery in favor of extensive speech therapy, where the speech result of the primary repair is not acceptable, appears contraindicated on the basis of this study. It is also indicated by these data, however, that pharyngeal flap surgery should not necessarily be part of the total primary repair procedure since some types of clefts in combination with certain surgical procedures result in normal speech.

Summary

Seventy-nine pharyngeal flap recipients and fifty-six non-pharyngeal flap subjects were studied to determine if pharyngeal flap surgery was precipitated by the anatomical type of cleft, selected primary procedure, and an

arbitrary age of primary cleft closure. Significant relationships were found to exist between postalveolar cleft, congenitally short palate, or submucous cleft, and pharyngeal flap surgery. Of the primary repair procedures examined, the V-Y 4-flap technique tended to differ most significantly with the von Langenbeck in providing adequate speech without eventual pharyngeal flap utilization. A significant group difference was found to exist with regard to the mean age of primary repair. Subjects with primary cleft closure at approximately 17 months of age developed acceptable speech without pharyngeal flap surgery in contrast to those in the experimental group with primary closure performed at 26 months of age. Finally, extensive speech therapy was found to be unsuccessful in achieving the desired resonance balance in subjects for whom the primary surgical repair had not provided adequate velopharyngeal closure.

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