

# Speech Status of Post-Adolescents Following Bone Flap Palatal Surgery

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The purpose of this paper is to further clarify the bone flap method used in cleft palate surgery and to describe the speech of post-adolescents who received this method of surgery as infants. It is our feeling that complete surgical closure of the palate should be obtained before the child learns to speak. Such early closure often prevents the acquisition of poor speech habits during the early formative period. This method of surgery is used as early as the ninth month with infants who have otherwise developed normally.

It has been shown in previous studies of the bone flap technique that intermolar width between the first permanent molars was within normal limits as determined by its occlusal relationship with the lower molars. The anterior narrowing of the palate is often secondary to the action of the labial musculature. Many patients who have never had palatal surgery or who have had palatal surgery by other techniques, may show the same type of anterior palate narrowing.

## Operative Technique

The operative technique itself begins with incisions made inside the alveolar border in an anterior-posterior direction starting behind the tuberosity of the superior maxilla on each side and extending forward approximately  $\frac{3}{4}$  the length of the hard palate. The line of incision is kept just inside the alveolar ridge. Chisels are then introduced, usually in series. A first chisel (below) divides the hamulus process in the perpendicular with a fracture of the medial segment. The chisels anterior to this actually fracture the palatal process medialward and bring it into contact with the opposite process. In order to avoid injury to the teeth, unerupted or otherwise, leverage pressure should not be applied upon the alveolar

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ridge when moving these flaps toward the midline. The next step is the actual treatment of the edges of the palate cleft. The mucous membrane is stripped along the entire edge of the palate cleft to be proximated. A knife is then introduced half way between the nasal and oral side of the palate. The stripped edge is pared to produce a nasal and oral side. The paring incision is made 2 mm. in depth down the entire length of the palate to give increased width to the edge. It should be noted at this time that plain gauze packs are placed in the lateral incisions to control hemorrhage which is usually not troublesome unless the greater palatine artery is severed. In the event this surgical accident should occur, the bleeding can be controlled by packing. The palatal packing helps hold the flaps in position during the suturing. A first suture is placed immediately posterior to the junction between the soft and hard palate. No. 3-0 nylon suture is used. Only half the thickness of the palate is penetrated because the nasal side of the palate will fall together by merely tying together the suture of the oral side. This technique helps prevent the formation of fistulae that could be produced by through-and-through sutures. The sutures are spaced between a quarter and an eighth of an inch all the way to the tip of the uvula. One suture is placed on the nasal side of the uvula for better approximation.

Total closure can be performed in one operation unless the palatal cleft is very severe. In the bilateral total cleft palate or in a very severe single cleft palate, it may only be possible to close the posterior  $\frac{2}{8}$ rds or  $\frac{7}{8}$ ths. In the very wide cleft palates and bilateral cleft palates we sometimes do a vomer flap technique in preparation for the bone flap technique, either at the same operation, or spaced six months apart. Following complete suturing, and cutting of the sutures, gauze packs impregnated with Furacin are placed in the lateral incisions to relieve tension on the suture line and control bleeding. These packs have a tapegauze tied to them. The knot end of the tapegauze is introduced into the incision first, so that if a packing should happen to come loose, the child could not choke on the end of the packing in the throat. The tapegauze is then brought out and taped on the cheek. The packs are left in position for a period of five days. It has been found that bone flap operative time is considerably shorter than with any other palatal technique.

Post-operatively, the children are given 400,000 units of penicillin daily until the packs are removed on the fifth post-operative day. Twenty-four to forty-eight hours following removal of the packs, the areas of the lateral incisions begin to fill up with granulation tissue. By the tenth post-operative day, these granulations are often covered over with mucous membrane level with the palate. Sutures are removed on the fourteenth post-operative day, and by this time many of the palates are completely healed over. Children are given clear liquids for the first five post-operative days and soft diets for the next two weeks. Following removal of sutures on the fourteenth post-operative day, the child is discharged from the hospital. If a second stage is necessary for an anterior opening, in the

TABLE 1

<i>Subject</i>	<i>Sex</i>	<i>Age upon Reexamination</i>	<i>Type of Cleft*</i>	<i>Age Date of Lip Repair†</i>	<i>Age Bone Flap Performed</i>	<i>Additional Surgery</i>	<i>Current Dental Status and History</i>
I	M	16 years	Unilateral L&P	4 days	16 mos. (Detached Vomer attachment to R. palate prior to B.F.)	—	Needs ortho care; Class III malocclusion with Cross-bite of maxillary L. segment
II	M	19½ years	Unilateral L&P	12 days	10 mos. (posterior ¾)	21 mos. Anterior closure with dermalon mattress and mpe‡	Ortho care begun in 17th year
III	M	17 years	Unilateral L&P	3 days	14 mos. (posterior ¾)	19 mos. Anterior mpe. 11 years close R. oronasal fistula; submucous resection	Anterior Open bite and Cross-bite of R. 2nd molars
IV	F	17½ years	Unilateral L&P	14 days	12 mos. (posterior ¾) (Detached Vomer attachment to anterior palate prior to B.F.)	18 mos. Anterior mpe. 6 yrs.: Right oronasal fistula closed	Ortho care from 8 yrs. to present; wears braces
V	F	19¾ years	Unilateral L&P	11 days	12 mos. (posterior ¾)	18 mos. Anterior mpe. 5½ yrs.: Bilateral tonsillectomy	Ortho care began at 9 yrs. Expanded buccal segments to correct cross-bite. Wears maxillary appliance; wears lower holding device at night
VI	M	16½ years	Unilateral L&P	8 days	12 mos. (posterior half of palate)	17 mos. Anterior mpe. 4 yrs.: Right oronasal fistula closed	Ortho begun at 6 yrs. Spreading anterior arch. Has maxillary partial denture which is no longer satisfactory
VII	F	15 years	2nd degree Palatal Cleft	—	Date unknown	5 yrs.: Closed central palate opening	Severe anterior over-bite
VIII	F	21¾ years	Unilateral L&P	10 days	12 mos. (posterior ¾)	18 mos. Anterior mpe.	Ortho care from 17-19 years of age.

event that the vomer flap was not used originally, a mucoperiosteal flap technique can be used. For a wide oronasal fistula, it may be necessary to use buccal flaps to fill in the opening.

The bone flap technique and surgery for cleft palates provides a simple, relatively safe procedure for reconstruction of the cleft palate. A new bony vault is restored to the roof of the mouth as nature originally intended. The remainder of this paper describes the appraisal of a series of cases completed 14 or more years after this type of surgery was employed.

### Evaluation of Eight Patients

The intent of this study was to find as many persons as possible who had received this surgical procedure as infants and to examine the status of their speech. Many questions arose—e.g., were they speaking satisfactorily; had they received speech therapy over the years in their schools; were there known dental, medical, or educational problems; had any un-

<i>School Achievement; Placement</i>	<i>Hearing Screening Results</i>	<i>Speech Therapy History</i>	<i>Speech Intel- ligibil- ity§</i>	<i>Perceived Nasal Emission</i>	<i>Perceived Quality</i>	<i>Further Speech Findings</i>	<i>Need for Speech Therapy</i>
"Average" high school— College preparation	Normal	None	1	None	Slightly nasal	Slight distor- tion of /s/	None
"Satisfactory" high school achievement	Normal (but history of earaches)	None	1	None	Good	—	None
Good high school grade average. Expects to study psychology/psy- chiatry	Normal	1 yr. in Grade School; Several months at Univ. Clinic when 12 yrs.	1	None	Good; slight nasality evi- dent occa- sionally during loud talking	Slightly dis- torted /s/	None
"Above average" school- work. Intends to be dental assistant	Moderate loss for R. ear; normal acuity for L. Earaches at age of one with fevers	Elementary, Jun- ior and Senior High School	2	Consid- erable	Fair	Judged to be "below av- erage"	Yes; responds favorably to speech stimulation
Completed high school business course	Normal (history of many ear infections and slight loss in one ear through- out school years)	First 6 grades in public school	1	None	Good	Speech judged "average"	None
"A" student in high school; aspires to be a teacher	Normal; reports no his- tory of difficulty	6th & 7th grades	1	None	Good	Considered "average"	None
"Average" work in school	Normal	Grade school	1	None	Within normal	Slight distor- tion of /s/	None
Currently a college senior majoring in nursing	Partial losses at ages 8, 20 and present. Recent Stapedectomy (No im- provement)	1st grade only	1	Very slight	Slightly nasal assimilated nasality also evident	Slight distor- tion of /s/	None

\* Other than subject VII, all clefts were complete third degree unilateral palate and lip.

† All lip operations utilized the Le Mesurier technique.

‡ mpe = mucoperiosteal elevation.

§ Speech Intelligibility was rated on a 7-point scale where *one* indicates "no difficulty in understanding case" and *seven* indicates "case was not understandable".

sual circumstances occurred during those years with regard to their surgical or orthodontic work; had they experienced any difficulty in hearing?

Hospital records yielded the names of 35 persons whose birth dates would place them at post-adolescent ages. Letters were mailed to the available addresses requesting cooperation. Of the 35 letters mailed, we were able to obtain the cooperation of eight persons. The eight people who were able to return were most anxious to be helpful and expressed the desire that the information obtained from them might be used to help others. It is well understood by the writers that this is a very small sampling; however, it is felt that a brief summation on each person may be of some clinical value. No attempt is made to formulate generalizable conclusions.

Pertinent information for each of the eight subjects is presented in Table 1. (For presentation at the April 1970 Portland meeting, tape recordings of the subjects were played in lieu of narrating the pertinent information.)

## Summary

In summary we would like to raise a speculation about the speech benefits of the type of bone flap surgery herein described. While we know that the data are confounded with such variables as amount and quality of speech therapy, motivation, intelligence level, orthodontic and otologic findings and management, it remains a fact that these long-term speech accomplishments were made by youngsters who had had the bone flap type of surgery. None of these cases has required a secondary pharyngeal flap operation. Indeed, the senior author has rarely found it necessary to accomplish a pharyngeal flap operation with any of the cases whose initial surgery was of the bone flap type. Is it tenable, on the basis of this study and the senior author's experience, to rationalize that this type of palatal surgery produces speech results as good as other types of palatal surgery? We offer this speculation as a working hypothesis.

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