A Review of the Results of Two Different Surgical Procedures for the Repair of Clefts of the Soft Palate Only

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There is a paucity of data on the relative efficacy of one surgical procedure for the repair of cleft palate over another. Part of the reason for this lack of information lies in the almost insurmountable problems of research design and in the difficulties of generalizing findings from one surgeon to another. However, it may be valuable for the literature to begin to reflect the outcome of various surgical procedures in the hope that cumulative evidence will eventually lend direction in an area where it is essential.

The present study, begun some ten years ago, is an attempt to compare results obtained with simple palatal closure (Von Langenbeck) with those obtained using the V-Y retroposition procedure in children with clefts of the soft palate only. The simple palatal closures utilized lateral relaxing incisions with minimal undermining since all clefts were of the soft palate only. Bony palates were not involved in any clefts in this study.

Review of Literature

Of these two frequently used methods for primary surgical repair of cleft palate, conclusive superiority of one over the other has not been demonstrated. Von Langenbeck first described his procedure in 1861. The method has been reviewed and supported by Lindsay (*6*) and is still frequently used. Proponents of the V-Y retroposition approach, Greene (*5*), Braithwaite (*2*), Trauner and Trauner (*20*), Battle (*1*), Kilner (*7*), Wardill (*21*), Millard et al. (*12*), McEvitt (*8*), and Calnan (*3*) are numerous; and the procedure is widely used.

Grabb (*4*) comments that the best results appear to be achieved by the V-Y retroposition procedure if one is willing to accept the data reported in the literature from 1948 to 1968. However, Morris (*14*), in describing published research reports based on data derived from clinical records, points out that both variability and ambiguity may result when clinical records are used for obtaining study populations and assessing results. Generalizations cannot now be made, he feels, from data collected without consistency and without the rigorous use of pre-selected criteria. For example, since a number of studies (McWilliams (*9*), Braithwaite (*2*), and Calnan (*3*))

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have reported that age of surgery is a factor in the success of operative procedures, assessment of results on populations with a wide operative age range may be misleading. Since many other similar factors are often influential in clinically derived data, results must be interpreted with caution.

It is important to note, however, that so-called "adequate speech" appears to result from the V-Y retroposition technique in from 70 to 98 per cent of the cases reported from 1960 to 1971. Lindsay (*6*), on the other hand, reported "acceptable" speech for 61 per cent of his group having the Von Langenbeck procedure as opposed to only 42 per cent for the group having the pushback procedure similar to that of Dorrance. Lindsay felt that his study offered conclusive evidence of the superiority of the Von Langenbeck procedure.

The present study was carried out in an effort to determine the relative merits of the Von Langenbeck and V-Y retroposition procedures in the hands of one surgeon.

Procedure

In 1964, the surgical co-author of this report felt that he had no clear-cut evidence to support his choice of either the Von Langenbeck or the V-Y retroposition for the repair of clefts of the soft palate. Since he could not establish criteria for selecting one procedure over the other, he decided to alternate the two procedures and to follow the children longitudinally in order to assess the ultimate outcome.

Subjects

The subjects for this study were divided into two groups. The first group was made up of 11 patients whose surgical repair was the Von Langenbeck Simple Closure Procedure. Surgery was performed at chronological ages ranging from one year, two months, to three years, six months, with Mean age of one year, eleven months. There were seven females and four males in the Simple Closure Group.

The V-Y Retroposition Group consisted of 8 patients for whom surgery was performed at chronological ages ranging from one year, three months, to two years with a Mean age of one year, eight months. In this group, there were three females and five males. A ninth child in this group was so deviant in age (five years, six months) and intelligence that evaluation excluded him except where specifically noted.

All children in the study with one exception had clefts of the soft palate with no notching of the hard palate noted. The one exception had a submucous cleft.

It should be noted here that the original design for this project included the collection of data on larger numbers of children. However, that plan was abandoned when clinical evidence began to suggest that there were subtle differences between the two procedures and that it would be unethical to continue to randomize procedures under those circumstances. It was decided, instead, to follow the children available over a period of ten years

in order to ascertain the accuracy of the clinical impressions. Thus, this study population is small. The type of cleft was well controlled, however; and the prospective nature of the program makes these data worth reporting.

First Evaluation. A first evaluation carried out in the pre-school years included measurements of intelligence, language, nasal resonance, hearing, articulation, and voice quality.

In the Simple Closure Group there were 10 subjects, 6 females and 4 males. The chronological age range was from three years, four months, to six years, eight months, with a Mean age of four years, nine months. For the V-Y Retroposition Group, there were 8 subjects, 3 females and 5 males. The chronological age range was from three years, two months, to five years, eleven months, with a Mean age of four years, eight months. The groups were judged to be roughly comparable in age.

Results of First Evaluation. *Intelligence:* Intelligence was assessed by the administration of the Stanford-Binet Intelligence Scale, Form L-M. In the Simple Closure Group, the range of IQ's was from 81 to 121 with a Mean IQ of 95.6. Of these children, 70 per cent were slightly below normal on intelligence measures.

In the group having the V-Y Retroposition Repair, the range of IQ's was from 74 to 124 with a Mean IQ of 97 for the six children available for intelligence measurement. Of these children, 50 per cent were below normal in intelligence. A seventh child was sufficiently retarded that he was excluded from this consideration. With his intelligence measurement included, the Mean IQ would drop to 91.8 for the V-Y Retroposition Group. Thus it may be seen that the range and Mean intelligence of these groups were approximately similar.

Language: Language was assessed by means of the Illinois Test of Psycholinguistic Abilities (ITPA). For the Simple Closure Group the Psycholinguistic Quotients (PLQ) ranged from 64 to 112, with a Mean PLQ of 87.4.

For the V-Y Retroposition Subjects the PLQ range was from 66 to 122 with a Mean PLQ of 92.86. Language was judged to be roughly comparable in the two groups in the early pre-school years. However, both groups showed the commonly reported tendency to place somewhat below average in language ability.

Hearing: The first measures of hearing acuity were judged whether Normal or Abnormal by means of air conduction thresholds for frequencies of 250 to 8000 Hz. Hearing was judged normal for any response of 20 decibels or better across this range. Sixty per cent of the Simple Closure Subjects had hearing acuity within the normal range. In the V-Y Repair Group, 75 per cent were within the normal range of hearing acuity.

Articulation: In the first evaluation of these children, adequacy of articulation was measured for 23 consonant sounds in initial, medial, and final positions of words and in 31 blends, a total of 54 sound elements. A picture articulation test devised at the Cleft Palate Center was used. For purposes of this study, a total error count was used. The Simple Closure Group had a

Mean of 24.1 errors. For the V-Y Retroposition Group, the Mean was 20.4. This difference was small and probably of no life consequence.

Nasal Resonance: Ratings of hypernasality yielded a slight difference between groups. Judgments were made on a four-point scale with *one* representing normal quality and *four* representing severe hypernasality. The average rating in the Simple Closure Group was 1.5 and, for the V-Y Repair Group, 2.0. Thus the V-Y Retroposition was found to be just slightly more hypernasal overall than the Simple Closure Group at this stage of development.

Hoarseness: Hoarseness was found to be present more often in children who had had Simple Closure than in children who had had V-Y Repair. A Yes-No judgment was used in this connection. In the Simple Closure Group, 40 per cent were judged to have hoarseness while only 13 per cent of the V-Y Repair Subjects were so judged.

Summary of First Evaluation. Thus, at the time of the first evaluation the two groups were judged to be approximately similar in range of intelligence, language and articulation. At this time, the V-Y Retroposition Group was found to be slightly more hypernasal, somewhat less hoarse, and somewhat better in hearing acuity than the Simple Closure Group.

It is important to note that, at this early age, about half the children in both groups showed the slight depression in linguistic competency and in intelligence which has been reported in the literature as typical of cleft populations.

Interim Language Evaluation

Because the investigators had a specific interest in language development in cleft children (*18*), it was decided to re-examine this population using the Illinois Test of Psycholinguistic Abilities near the time of school entrance. Thus this second test was administered approximately two years after the first.

For Simple Closure Group, the Psycholinguistic Quotients ranged from 64 to 112 on the first assessment with a Mean PLQ of 87.4. For the second assessment, after the lapse of two years, the range of PLQ's was from 80 to 134 with a Mean PLQ of 105.

For the V-Y Retroposition Group, the PLQ range was from 66 to 122 on the first test with a Mean PLQ of 92.86. For the second assessment, after the two-year lapse, the PLQ range was from 73 to 146 with a Mean PLQ of 108.

Judged by this measure, language ability may be said to be roughly comparable in the two groups. It is very interesting to note that both groups showed considerable gain in the linguistic skills measured and that the gain (about 17 points) was comparable in both groups.

Second Evaluation

The second evaluation protocol included measurements of intelligence, language, articulation, hypernasality, hoarseness, nasal emission, hearing,

velopharyngeal closure, and dentition. With the exception of the intelligence measurement, this evaluation was carried out after entrance into school and as close to the chronological age of 10 as possible. The intelligence assessment here considered was made as near to the age of entrance into school as possible to assist with educational planning.

In the Simple Closure Group, the chronological age range for the second evaluation was from 9 years, 1 month, to 11 years, 10 months, with a Mean chronological age of 10 years.

For the V-Y Retroposition Group the second evaluation was accomplished at a chronological age range from 8 years, 1 month, to 11 years, 2 months, with a Mean chronological age of 10 years, 1 month. The groups were judged to be comparable in chronological age.

One additional patient, (previously mentioned) evaluated in the V-Y Repair Group, proved to be grossly deviant in age and in intelligence. Because these factors were considered to bias the assessments, interpretation of group findings has been made with and without the inclusion of the measurements on this patient.

Results of Second Evaluation. *Intelligence:* Intelligence was assessed by means of the Stanford-Binet Intelligence Scale, Form L-M. In the Simple Closure Group, the range of IQ's was from 92 to 142, with a Mean IQ of 106.7. One subject evaluated for other factors in the Simple Closure Group was not available for this retesting of intelligence. Children in this group were considered to be within the normal range of intelligence with half of the subjects ranging from slightly above normal to superior mental abilities.

In the V-Y Retroposition Group, the range of IQ's was from 84 to 139 with a Mean IQ of 111.2. This group had one borderline child, and the rest ranged from dull normal to superior intelligence. Two children in this group who are evaluated in the remainder of the protocol were not available for this retest of intelligence.

It is of special interest to note that both groups showed an increase in IQ from Examination I to Examination II. At the time of the first examination, both groups had been a bit lower than the Mean for the general population. At the time of the second examination, both groups were a bit higher than the general population Mean. For Examination II, it was noted the Mean IQ was slightly over 15 points higher in the Simple Closure Group and 11 points higher in the V-Y Retroposition Group than in the earlier examination.

Hearing: Hearing acuity measures were averages of air conduction thresholds for 250–1000 Hz for each child. In the Simple Closure Group, the average loss for the left ear was 17.8 decibels and for the right ear 16.2 decibels. For the V-Y Repair Group, the average loss for the left ear was 8.33 decibels and for the right ear 12.92 when the severely mentally retarded child was excluded. When the retarded child's measurements were included, the average loss became 11.5 decibels for the left ear and 15.1

decibels for the right ear for the V-Y Repair Group. Thus the groups were similar in hearing acuity with a slight superiority in the V-Y Retroposition Group. None of these children had had the intensive ear care now provided from birth at this Center (15).

Articulation: Adequacy of articulation was measured by the Iowa Pressure Articulation Test (19) administered by two trained speech pathologists with 92 per cent agreement on the 45 sounds tested for the 20 subjects combined. Differences between the groups were negligible. The average articulation error score for Simple Closure Group was 8.3 and, for V-Y Repair Group, 8.2 when the mentally retarded child is excluded and 9.8 when this child is included.

It should be noted that the error count alone is somewhat misleading in assessing the results of surgery. Where errors were found, they were usually mild distortions of sibilants, and this was true for both groups. In both groups, the incidence of articulation errors related to dentition was high. Thus a high error score did not necessarily reflect velopharyngeal incompetency in either group. Articulation errors alone are not a valid measure of the effectiveness of surgery and, indeed, may confound the problem if the clinician is not careful to determine the nature of the error. Dental records gathered as a part of this study remain to be analyzed and are likely to provide additional information on this issue.

Nasal Resonance: Ratings of nasal resonance also yielded negligible differences between groups. Judgments were made on a 5-point scale (1 representing hyponasality; 2, normal quality; and continuing to 5, representing severe hypernasality). Judgments were made by two speech pathologists whose percentage of absolute agreement for the combined groups was 77 per cent. In no case was the difference in rating more than one scale point. In the Simple Closure Group, eight of the 11 subjects had speech considered to be normal by at least one trained examiner. Only three children in the group had unequivocal hypernasality of a mild (3.25) to moderate (4.25) nature.

For the V-Y Repair Group, all eight subjects were rated by one judge, but only seven of the eight were rated by the second evaluator. Within the V-Y Repair Group, five of eight children were judged to have normal nasal resonance by one judge with perfect agreement of both judges on four of the five judged normal. The Mean for the averaged ratings of the V-Y Group was 2.4. Thus both groups were judged to be very similar. Range of averaged ratings for the Simple Closure Group was 1.5 to 4.25 and, for the V-Y Repair Group, 2 to 4. Thus, both groups of children tended to have close to normal nasal resonance.

Nasal Emission: No outstanding differences between the groups were found for nasal emission, as judged by a mirror test. A rating scale of 1 to 5 was applied with 1 representing no inappropriate nasal emission. Absolute inter-judge agreement was .80. In the few cases where disagreement occurred, the degree of nasal emission was the only question. The judges agreed perfectly that emission was or was not present. Range of nasal emis-

sion in the Simple Closure Group was from 1 to 4 with averaged ratings yielding a Mean of 3.07 (mild). In the V-Y Repair Group, range of nasal emission was from 1 to 3.5 with averaged ratings yielding a Mean of 2.43 (inconsistent to mild). Two children in each group were judged to have no inappropriate nasal emission.

Hoarseness: More hoarseness was again found in the Simple Closure Group than in the V-Y Repair Group upon re-evaluation. A Yes-No rating was used for these judgments.

Two speech pathologists, who showed a reliability of 88 per cent, made the evaluations. Of the 18 subjects rated, four were judged to have hoarseness present. Both judges agreed on two of the four; each judge found hoarseness present in one of the remaining two subjects.

For the group having simple closure, one judge rated 10 subjects, the second judge rated 11 subjects. Hoarseness was found to be present in three out of 10, or 30 per cent, of this group by one judge and in three out of 11, or 28 per cent, by the second judge.

In the V-Y Repair Group, both judges rated nine subjects. One judge found hoarseness present in two out of nine subjects, or 22 per cent. The other judge found hoarseness present in one out of nine subjects, or 11 per cent.

Both judges agree that more hoarseness was present in the Simple Closure Group.

Velopharyngeal Closure: Telefluoroscopy studies were utilized to assess velopharyngeal closure. These lateral studies were accomplished with the head in both upright and extended positions. A rating scale (described elsewhere (10)) of 1 to 6 was used with 1 indicating total blending; 2 partial blending; 3 touch closure; 4 close approximation; 5 moderate opening; and 6 wide opening. For the Simple Closure Group, in the upright position, the average rating was 2.8, which falls between partial blending and touch closure. In the extended position the average rating for this group was 3.0, or touch closure. In the V-Y Repair Group, the average rating for the upright position was 3.1 and for the extended position, 3.2. In the Simple Closure Group, three subjects out of 10 were judged to have partial blending in velopharyngeal contact in the upright position whereas none in the V-Y Repair Group quite achieved partial blending in the upright position.

It is noteworthy that, in the Simple Closure Group, 54 per cent of the subjects were able to retain the same degree of closure in extension as in the upright position. For the V-Y Group, 75 per cent of the children retained the same degree of closure in the extended position as they had shown in the upright.

The range of ratings for the Simple Closure Group in the upright position was from 2 to 3.5; while in the V-Y Repair Group the range of ratings was from 2.5 to 3.5. In the extended position the range of ratings for the Simple Closure Group was from 2 to 3.5 and for the V-Y Group it was from 3 to 4. The Simple Closure Group was judged to have very slightly better velopharyngeal closure than the group having the V-Y repair. It must be noted

that differences in the two groups were so slight that all subjects in both groups would be viewed as having, for the most part, mechanisms of adequate or borderline efficiency.

Aerodynamic Studies: Using the Warren Air Flow Pressure Test (22), measurements of orifice area were also derived. For the Simple Closure Group, the average orifice area measurement was 1.47 mm^2. An average of 1.54 mm^2 was obtained for the V-Y Repair Group. The range of measurements was from 0.00 to 5.94 mm^2 in the Simple Closure Group and from 0.00 to 9.00 mm^2 in the V-Y Repair Group. Once more, differences were not great; and the mechanisms were well within acceptable limits for adequate speech in both groups. However, the Simple Closure Group showed slightly better valving than the V-Y Repair Group.

One observation of interest is that, in the Simple Closure Group, five children had orifice areas of 0.00 mm^2, while only one child had a measurement of 0.00 mm^2 in the V-Y Repair Group.

Secondary Procedures: None of the 11 subjects in the Simple Closure Group had had teflon implants at the time of the last assessment, but three children in this group had had pharyngeal flaps. Only one out of nine subjects in the V-Y Repair Group had had a pharyngeal flap, and none had had teflon implants. Thus, there was a slightly greater need for secondary surgery in the group having the simple closure. Since the population under consideration is very small, observations rather than conclusions are in order. However, a greater need for secondary procedures is worthy of special note.

McEvitt in 1971 (*8*), reporting on three surgical procedures, found that, of patients having the Simple Closure Repair, 43 per cent of the total of 104 patients required flaps; whereas 13 per cent of 276 patients required flaps after the V-Y Retroposition Procedure. Although this study shows that a much smaller percentage of patients required flaps in both groups, the trends of the findings are similar to McEvitt's.

Battle (*1*) reports "failures" for the V-Y Retroposition Procedure of similar magnitude to those found in this study. For the V-Y Procedure, Trauner and Trauner (*20*) report need for further surgery in 6.8 per cent of their patients. Using the V-Y Retroposition Surgery on a population of 329 children, Braithwaite (*2*) reported defective speech for only 2 per cent, which was supportive of trends noted by McWilliams (*9*) in her study of cleft palate management in England.

Summary

This study evaluated results of the two surgical procedures for repair of cleft palate. Simple Closure using the Von Langenbeck technique was compared with the V-Y Retroposition technique as modified by Wardill and Kilner. The population consisted of two groups of children who were similar in chronological age and intelligence and for whom surgery was performed at an average age of 1 year, 11 months, in the Simple Closure Group and 1 year, 8 months, in the V-Y Repair Group. In the early pre-school years, the

children were evaluated in the areas of intelligence, language, hypernasality hearing, articulation, and voice quality. The two groups were found to be roughly similar in intelligence, language, and articulation at that time. The Simple Closure Group was at first found to be slightly more hoarse than the V-Y Repair Group while the latter was found to have slightly more hypernasality. Hearing acuity was somewhat poorer in the Simple Closure Group.

The final evaluation was carried out when the Mean chronological ages were 10 years, 1 month, for the Simple Closure Group and 10 years, 2 months, for the V-Y Repair Group. Included in the second assessment were measurements of intelligence, language, articulation, nasal resonance, hoarseness, nasal emission, hearing, and velopharyngeal closure.

The groups were judged to be roughly comparable in intelligence, language, articulation, hypernasality, nasal emission, and velopharyngeal closure.

A difference between groups occurred in regard to hearing acuity where the Simple Closure Group showed slightly more hearing loss. This group was also judged to have more hoarseness.

In regard to velopharyngeal closure, it was noted that all subjects in both groups had mechanisms of adequate or borderline efficiency. However, the children in the Simple Closure Group compared as well as they did with the V-Y Retroposition Group only after 27 per cent had had secondary procedures as compared to 11 per cent in the V-Y Repair Group. Thus, although the groups were not grossly different by age 10, the need for secondary surgical procedures in the Simple Closure Group is felt to be critical.

Findings for measurements of intelligence and language both revealed notable increments on re-evaluation and are of considerable concern to the investigators. The study showed increments in IQ on second assessment which shifted the population from dull normal to slightly above normal in intelligence in one group while, in the other group, a shift upward from the Mean IQ also occurred. Increments of between 15 and 20 points in the mean psycholinguistic quotients were also found in both groups when they were re-evaluated after two years. Whether there is a significant relationship between the increments in intelligence and language in the child with isolated cleft palate remains to be demonstrated. Certainly language is an important component of intelligence measurement. For some time now questions have been raised (*18*, *16*) about the possibility of depressed language ability in the child with cleft palate. Opinions vary regarding this dimension. These findings might provoke investigation to determine whether any particular area of intelligence was consistently higher on re-evaluation or whether the IQ increment was generalized. Also, these findings indicate that further consideration of the effect of cleft palate on overall early development is needed.

Although these findings are not assumed to be conclusive, they do add to existing evidence that the V-Y Repair probably, overall, yields a somewhat better initial speech result than does the Simple Closure Repair. Although differences between groups were found to be small, speech adequacy was

achieved in the V-Y Retroposition Group with less need for secondary surgery, which is a highly important and critical difference.

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