

Development of the Palatal Arch in Relation to Unilateral Cleft Lip and Palate Surgery: A Comparison of the Effects of Different Surgical Approaches.

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Growth retardation of the mid-third of the face is frequently seen in cleft lip and palate patients. The reasons for this are numerous and varied, i.e., congenital maldevelopment, dental caries, and surgical trauma (9).

Congenital maldevelopment is a fact to be accepted, a *fait accompli*. Dental caries may be controlled by good dental care. Surgical trauma can be reduced by modern plastic surgical technique (9).

However, we do not know precisely how a given surgical method may influence the development of the mid-third of the face, or which is the better method among different operative procedures for cleft lip and palate.

We collected 229 postoperative cases of cleft lip and unilateral cleft lip and palate, (age 3 to 10 years), and analyzed the influence which the surgical repair had on the maxilla (Table 1).

Cases

Operative procedures were classified into four groups.

The *first* group is the straight line repair, represented by the Blair-Brown-McDowell method (2). The *second* group is the triangular flap repair, represented by the Tennison-Randall method (8). The *third* group is the advancement-rotation flap repair represented by the initial method of Millard (4). The *fourth* group is our three-flap method (5) which combines the method of Millard, Randall, Skoog, and others (Figure 1).

Method and measurement

As we can not check the preoperative condition of all the patients except for a few, we assumed that the mandible was growing normally. Hence, we compared maxillary arch length and width of the mandible.

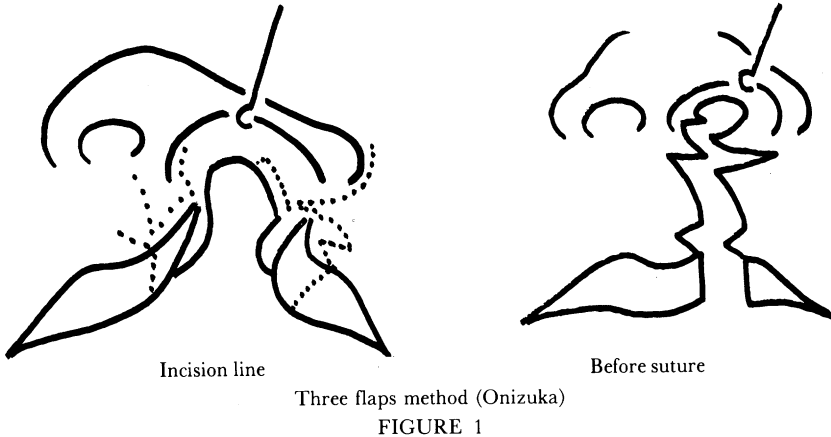
The method of analysis is as follows: upper and lower dental models were

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TABLE 1. Number of cases

Cleft lip	137 Cases
Cleft lip & palate	92 Cases
Total	229 Cases



measured as distances between the standard points (11) (Figures 2 and 3).

No. 1. The relationship between the distal surface of the deciduous second molars of the maxilla and mandible is recorded. If this distance is over 2mm, this case is deemed maxillary retardation.

No. 2. The arch length is measured as the distance between a line tangent to the labial surfaces of the central incisors and a line connecting the most dorsal points on the distal surfaces of the deciduous second molars. If the difference is over -2mm, it signifies a retardation of the maxillary arch.

No. 3. The difference between upper and lower deciduous canines as anterior arch width is measured in order to know the retardation of the anterior area of the maxilla. If this difference is over -2mm, then it is considered to show retardation in the area.

No. 4. The difference between upper and lower deciduous second molars as the posterior arch width is also measured to ascertain the retardation of the posterior area of the maxilla. If this difference is over -2mm, it is deemed retarded as compared to the normal case where the central pit of the upper deciduous second molar contacts the buccal central cuspid of the lower molar.

Results and discussion

As above mentioned, we selected 229 cases, representing cleft lip only, and unilateral cleft lip and cleft palate, and checked the retardation of the maxilla by the above measurement (Tables 2-6).

In the cleft lip group, straight repair and triangular flap repair have a growth retardation effect on the maxilla. The cases repaired by straight line result in retardation in all direction and the triangular flap repair shows posterior retardation and lessening of the posterior arch width. On the other hand,

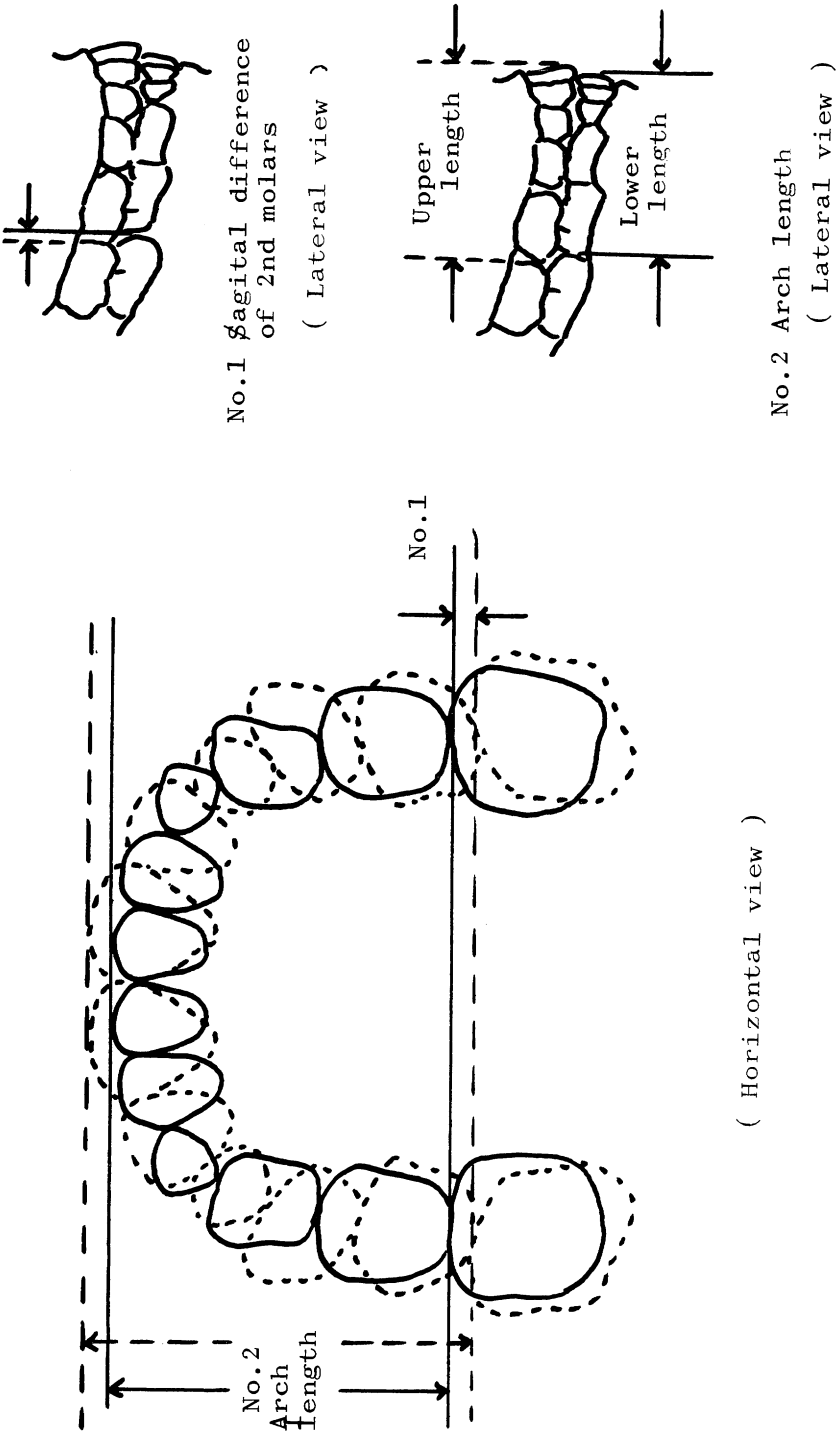


FIGURE 2. Arch length. Normal relationship between mandibula and maxilla. Dotted lines are mandibula, Solid lines are maxilla, No.s are explained in the text.

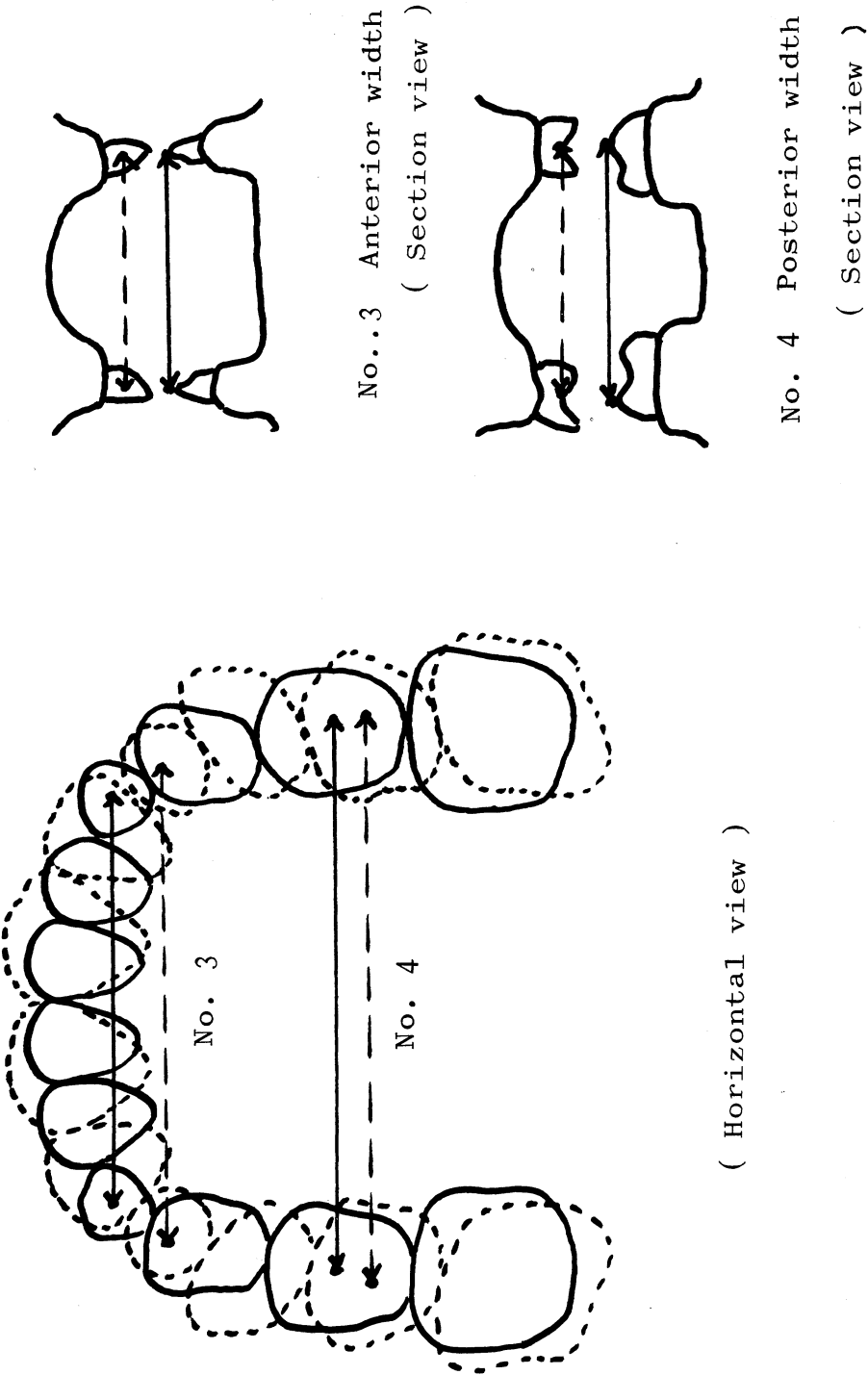


FIGURE 3. Arch width. Normal relationship between mandibula and maxilla. Dotted lines are mandibula, Solid lines are maxilla, No.s are explained in the text.

TABLE 2. Sagittal relationship of the 2nd deciduous molars

<i>method</i>	<i>cleft lip</i>			<i>cleft lip & palate</i>		
	<i>total cases</i>	<i>retarded cases</i>	<i>%</i>	<i>total cases</i>	<i>retarded cases</i>	<i>%</i>
Straight	55	7	12.7	15	6	40
Triangular	38	11	28.9	38	12	31.5
Millard	18	1	5.5	13	8	61.5
Onizuka	26	1	3.8	26	2	7.6

TABLE 3. Difference of upper and lower arch length

<i>method</i>	<i>cleft lip</i>			<i>cleft lip & palate</i>		
	<i>total cases</i>	<i>retarded cases</i>	<i>%</i>	<i>total cases</i>	<i>retarded cases</i>	<i>%</i>
Straight	55	1	1.8	15	2	13.3
Triangular	38	3	7.6	38	7	18.4
Millard	18	0	0	13	6	46.1
Onizuka	26	1	3.8	26	3	11.5

TABLE 4. Difference of anterior arch width

<i>method</i>	<i>cleft lip</i>			<i>cleft lip & palate</i>		
	<i>total cases</i>	<i>retarded cases</i>	<i>%</i>	<i>total cases</i>	<i>retarded cases</i>	<i>%</i>
Straight	55	7	12.7	15	5	33.3
Triangular	38	1	2.6	38	9	23.6
Millard	18	0	0	13	6	46.1
Onizuka	26	2	7.6	26	2	7.6

TABLE 5. Difference of posterior arch width

<i>method</i>	<i>cleft lip</i>			<i>cleft lip & palate</i>		
	<i>total cases</i>	<i>retarded cases</i>	<i>%</i>	<i>total cases</i>	<i>retarded cases</i>	<i>%</i>
Straight	55	7	12.5	15	10	66.6
Triangular	38	8	21.0	38	29	76.3
Millar	18	1	5.5	13	5	38.9
Onizuka	26	4	15.4	26	16	61.5

TABLE 6. Conclusions (See the text—Result and discussion)

Maxillary retardation increases in turn of the following methods:

CLEFT LIP	
Retardation decreases	$\leftarrow M < O < S < T \rightarrow$ Retardation increases
CLEFT LIP & PALATE	
Retardation decreases	$\leftarrow O < T < S < M \rightarrow$ Retardation increases

(S—straight method, T—triangular method, M—Millard's method, and O—Onizuka's method.)

Millard's original method and our method have almost normal dimensional values except for a slight posterior retardation.

In the unilateral cleft lip and palate group, any surgical repair gives marked growth retardation of the maxilla. The influence of the straight line repair is unknown because we have only one case. In cases of the triangular flap repair, the maxilla was retarded posteriorly and laterally. The maxilla repaired by Millard's method was retarded more in all directions than the triangular flap repair. Maxillary retardation in our method is slight except for the posterior arch width.

We do not know how such maxillary retardation takes place. Yoshioka (10) reported that the operation for cleft lip only did not have any influence on the development of the maxilla. According to Ortiz-Monasterio (6) and Krogman (3) in the cases of the cleft palate patients who were not operated the mid-third of the face though small developed normally. Brophy (1) said that the posterior arch becomes wider with age when the cleft lip and palate patients had the operation of the lip only, while Pruzansky (7) had the opposite opinion.

The relationship between the cleft lip and palate repair and the development of the mid-third of the face is not clear. If we analyze the development of this area from the postoperative results, it seems that some operative methods have a retarding influence on the maxilla.

We may assume one of the factors is the tension of the repaired lip. Maxillary retardation seen in the cases repaired by the Millard's old type method leads us to believe that much lip tension results from the advancement of the lip flap. In cases repaired by the new type of Millard's method, we may expect much improvement. Most of the cases by our method also have a certain retardation of the posterior arch width by unknown origin. But this retardation is easily corrected by orthodontic techniques, comparing to the retardation of the other parts. In other words, a narrow posterior arch width may mean a narrow nasopharyngeal space to give good effect to speech.

Summary

Our cases are too small in number to conclude which kind of surgical method retards the maxilla development. But we can say that a maldevelopment of the maxilla may be expected to occur in the case of any surgery performed.

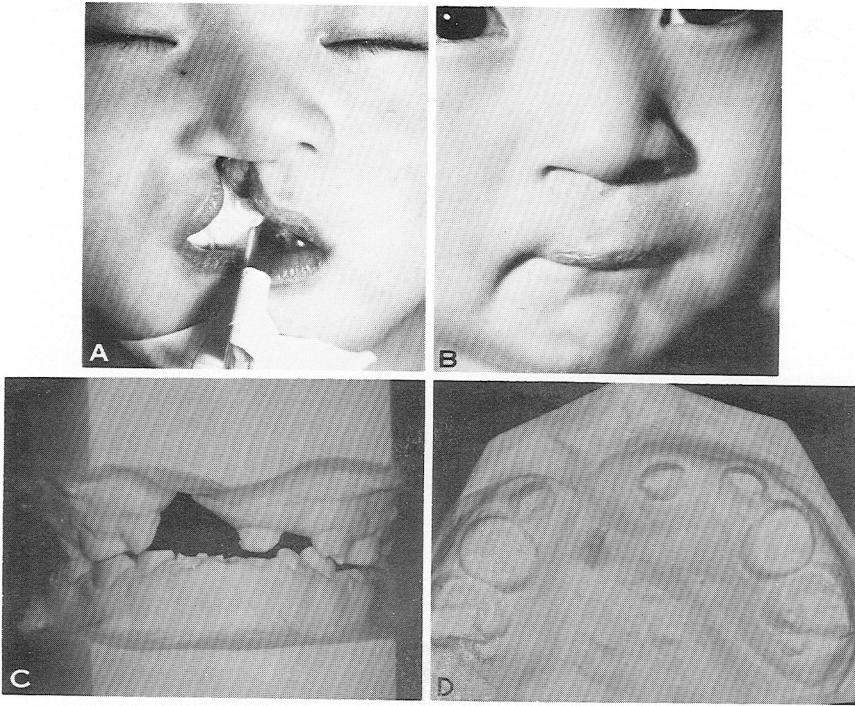


FIGURE 4. Case 1: Complete cleft lip and palate, A; Preoperative view, 3 months after birth, B; Postoperative view, 2 years after the operation, C and D; Cast model.

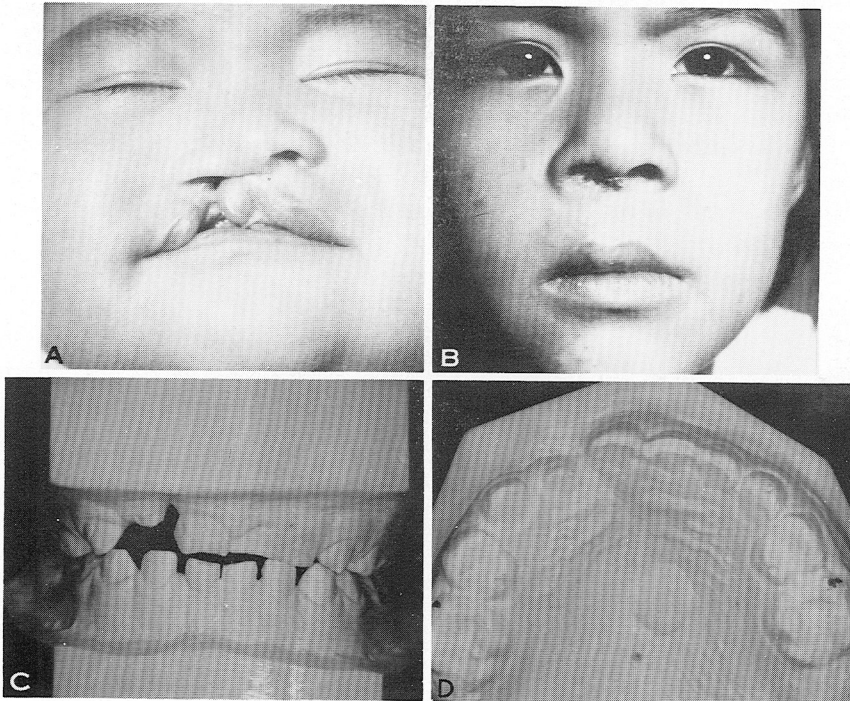


FIGURE 5. Case 2: Complete cleft lip and palate, A; Preoperative view, 3 months, B; View after 6 years postoperatively, C and D; Cast model.

In the cleft lip only patients, Millard's method and our method show a better effect than the other methods from the point of view of the retardation of the mid-third of the face. In the group of unilateral cleft lip and palate patients our method may be the best on this point. At the end, we would like to present our typical cases with figures (Figures 4 and 5).

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References

1. BROPHY, T. W., Cleft lip and palate. p. 133. Blakiston, Philadelphia, 1923.
2. BROWN, J. B., and F. McDOWELL, Small triangular flap operation for the primary repair of single cleft lips, *Plast. reconst. Surg.*, 5, 392-402, 1950.
3. KROGMAN, W. M., The problem of the cleft palate face, *Plast. reconst. Surg.*, 14, 370-375, 1954.
4. MILLARD, D. R., Transactions of the international society of plastic surgeons. The first congress. p. 160. Williams & Wilkins, Baltimore, 1957.
5. ONIZUKA, T., Cleft lip. p. 50. Kanehara, Tokyo, 1972.
6. ORTIZ-MONASTERIO, F., R. ALFONSO SERRANO, P. GUSTAVO BERRERA, HERMANN RODRIGUEZ-HOFFMAN, and ENRIQUE VINAGERAS, A study of untreated adult cleft palate patients, *Plast reconst. Surg.*, 38, 36-41, 1966.
7. PRUZANSKY, S., The role of orthodontist in cleft palate team, *Plast. reconst. Surg.*, 14, 10-29, 1954.
8. RANDALL, P., A triangular flap operation for the primary repair of unilateral clefts of the lip, *Plast. reconst. Surg.*, 23, 331-347, 1959.
9. TRUSLER, H. M., T. B. BAUER, J. M. TONDRA, M. S. BARTON, and F. M. HAPAK, Dental problems in cleft lip-cleft palate patients, *Plast. reconst. Surg.*, 19, 409-419, 1957.
10. YOSHIOKA, T., Odontological and logopedical studies on the cleft lip and cleft palate patients, *J. Niigata Med. Soc.*, 71, 22-48, 1957.
11. ISSHIKI, Y., K. YATABE, H. YAMAGUCHI, and Y. KITAFUSA, Longitudinal studies of dental models especially on the occlusion of deciduous dentition of three year old children, *The Shikugakuho*, 70, 558-567, 1970.