

ANTROPOMETRIC EVALUATION OF GENTUR'S CHEILOPLASTY METHOD IN UNILATERAL CLEFT LIP

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ABSTRACT

Background: Cheiloplasty, the earliest surgical procedure in cleft lip and palate patient, has impact on functional and aesthetical appearance¹. The Gentur's technique is a method of cleft lip surgery that has been developed by him and has been used in RSUPN Cipto Mangunkusumo / Faculty of Medicine Universitas Indonesia². It uses the rotation-advancement, small triangular, preventing notching concepts with some other details to overcome the wide cleft. This study was conducted to answer whether the Gentur's technique gives symmetrical result in anthropometric measurements.

Methods: Cross sectional analytic study will be taken from medical record in 14 unilateral cleft lip patients underwent cheiloplasty procedure. Direct anthropometric data before and after procedure were analyzed using SPSS17. Anthropometric data such as cupid's bow, vertical height, horizontal height, vermillion and nostril were noted.

Results: From 14 patients, we found 9 patients who underwent surgery in 3 months of age (64.3%) are mostly female (n=9, 64.3%), have complete defect (n=12, 85.8%) and left sided defect (n=8, 57.1%). Gentur's technique is able to produce significant lip and nose symmetry (CI 95%, *p*value <0.005) in cupid's bow, vertical height, horizontal height, thickness of vermillion and nose. By doing this technique, the author is able to create good lip and nose symmetry (78.57%) even in wide defect (64.3%) and palatal collapse (57.1%).

Conclusion: Gentur's technique is able to utilize tissue deficiency to create ideal lip and nose in unilateral cleft lip repair even in patients with wide gap.

Keyword: anthropometric measurement; cheiloplasty; unilateral cleft lip

Latar Belakang : *Cheiloplasty*, prosedur operasi yang paling dini pada pasien bibir dan langit – langit sumbing, memiliki dampak pada fungsi dan penampilan secara estetik¹. Teknik operasi dr. Gentur merupakan metode operasi bibir sumbing yang dikembangkan oleh beliau sendiri dan telah digunakan pada RS Cipto Mangunkusumo / Fakultas Kedokteran Universitas Indonesia². Teknik ini menggunakan metode *rotation – advancement*, segitiga kecil, mencegah *notching* serta detail lainnya untuk mengatasi celah bibir sumbing yang lebar. Penelitian ini dibuat untuk menjawab pertanyaan apakah teknik operasi dr. Gentur dapat memberikan hasil yang simetris berdasarkan pengukuran antropometri.

Metodologi : Studi analitik *cross sectional* diambil dari rekam medis 14 orang pasien dengan bibir sumbing unilateral yang telah menjalani prosedur *cheiloplasty*. Data pengukuran secara langsung dilakukan sebelum dan setelah prosedur operasi kemudian dianalisa menggunakan SPSS17. Data antropometri yang diukur adalah *Cupid's bow*, tinggi vertikal, tinggi horizontal, panjang vermillion dan lubang hidung.

Hasil : Dari 14 pasien, 9 pasien menjalani operasi pada usia 3 bulan (64.3%) adalah wanita (n=9, 64.3%), memiliki defek komplit (n=12, 85.8%) dan defek pada sisi kiri (n=8, 57.1%). Teknik operasi dr. Gentur dapat memberikan hasil yang bermakna secara signifikan pada kesimetrisan bibir dan hidung (CI 95%, *p*value <0.005) yaitu pada *Cupid's bow*, tinggi vertikal, tinggi horizontal, panjang vermillion dan hidung. Dengan teknik ini, penulis dapat menghasilkan kesimetrisan bibir dan hidung yang baik (78.57%) bahkan pada celah yang lebar (64.3%) dan palatum yang kolaps (57.1%).

Kesimpulan : Teknik operasi dr. Gentur dapat memanfaatkan defisiensi jaringan untuk menghasilkan bentuk bibir dan hidung yang ideal dalam merekonstruksi pasien dengan bibir sumbing unilateral bahkan dengan celah yang lebar.

Kata Kunci : anthropometric measurement; cheiloplasty; unilateral cleft lip

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INTRODUCTION

Cleft lip and palate is the most common congenital craniofacial anomalies operated by plastic surgeons. Successful treatment requires technical skill, in-depth knowledge of the abnormal anatomy, and appreciation of three-dimensional facial aesthetics¹. The evolution of the unilateral cleft lip closure represents a gradual increase in surgical sophistication³.

Many methods have been used, including lateral advancement flaps, straight line closures, and Z-plasties. LeMesurier and Tennison repairs were the most widely used in the mid twentieth. In 1955 at the First International Congress of Plastic Surgery in Stockholm, Dr. Millard presented the rotation-advancement method. Since then the method has maintained its popularity and used by 84% cleft centers around the world because it gives the surgeon the opportunity to manipulate the individual cleft elements through various modifications. Dr. Millard himself made several modification based on his rotation-advancement^{4,5}.

Gentur's Technique²

This technique is developed based on the modification by dr. Gentur inspired by Onizuka's and Millard's technique. He put the markings on anatomical position and used sterile wooden tooth pick instead of caliper or thread as tools for design. The differences of this technique are (Figure 1):

1. Just before the design were made, upper lips were pushed to the center to close the gap. If the gap is small, point 5' can be placed in its anatomical site -where the nasal hair disappearing. If the gap is wide, point 5' is placed inferiorly from its anatomical site.
2. The thickness of vermilion is measured perpendicular with red line to the full thickness of vermilion. Normal thickness is below point 2. The length is applied in point 3 and 3' diagonally to lateral or medial.
3. Incision line for triangular flap is parallel to the intercanthal line, 3 mm or just before mid columella to point. The flap is rotated downward and able to preserve the natural Cupid's bow.
4. Unlike Millard's and Onizuka's, Gentur's incision at the apex of flap B is only subcutaneous deep. Blunt and sharp dissection of the orbicularis oris muscle was made in order to preserve the muscle all in one unit.
5. The nasal base is created by rotating full thickness of flap C to lateral and sutured it with flap B to create nasal floor and equal width of

the nostril as the non cleft side.

6. This technique has a concept of preserving the oral mucosa. Millard incised ginggiovucal fold and Onizuka cut the mucosa 5 mm from the fold.
7. The "control suture" on muscle part of dermis that inline with "white-skin roll" is pulled inferiorly to determine whether the amount of incision is adequate or not to rotate point 3 as well as to help in finding the opponent during mucosa suture as well as the muscle suture. Nasal orientation is align by first muscle suture of Flap B to the spina nasalis.
8. The effort to distribute the left and right side muscle evenly is by doing one or two incisions to the cleft side horizontally.

The benefit of this technique is able to overcome the "lip gap", especially in patients that have never use bandage or NAM (Naso-Alveolar Molding) before. The only disadvantage in using this technique is the horizontal length in cleft side is shorter than normal side.

METHOD

This research is a cross sectional analytic study. The study was conducted at Cipto Mangunkusumo Hospital from June 1st to September 30th 2015. Sample was collected from patients with unilateral cleft lip underwent Gentur's complete cheiloplasty method performed by single operator by using calculation

$$n = \left\{ \frac{(Z\alpha + Z\beta)S}{d} \right\}^2 = 13,9576 = 14 \text{ patients}$$

Samples were collected by direct measurement recording and consecutive sampling. Points of measurement are as describe in Table 1.

Measurements were taken twice by the surgery team, before surgery and immediate after surgery (Figure 2.1 and 2.2). Homogeneity was tested with Saphiro-Wilk test. The first hypothesis was tested with independent T-Test while the second hypothesis was tested with One-Way ANOVA test. The parametric data was converted to non-parametric data by weighting the comparable points. The 1 mm difference was given 5 points, 2-3 mm difference was given 3 points and more than 4 mm difference was given 1 point. Statistical significance was defined as $p < 0.005$. Analysis was performed using the statistical software SPSS 17.

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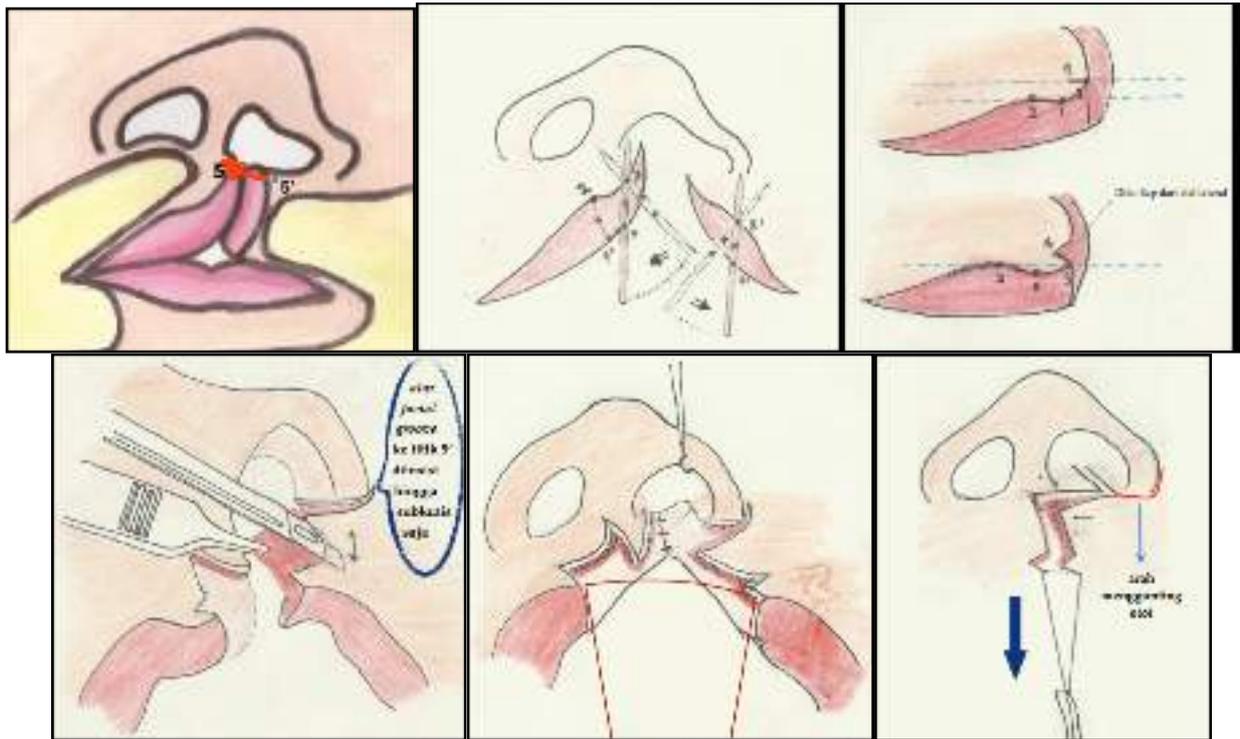


Figure 1. Left to right: Step by steps of Gentur's technique.

Table 1. Points of measurement

Points	Description
1A	Non cleft side columellar height: base nostril to top
1B	Columellar height cleft-side
2	Columellar width
3	Nasal width
4	Height of midline columella crease to vermilion
5A	Vertical height lip: alar base to Cupid's bow, non-cleft side
5B	Vertical height lip: alar base to Cupid's bow, cleft side
6A	Horizontal lip length: commissure to Cupid's bow, non cleft side
6B	Horizontal lip length: commissure to Cupid's bow, cleft side
7	Width of cupid's bow
8	Width of lip: commissure to commisure
9A	Cupid's bow vermilion width, non-cleft side
9A'	Cupid's bow vermilion width, cleft side
9B	Philtral column vermilion width, cleft side lateral lip
10AB	Nostril width, non cleft side
10A'B'	Nostril width, cleft side
10A'	Skin width lateral to the base of columella-cleft side
10B'	Skin width medial to the cleft side alar base
11A	Midline columella crease to Cupid's bow, non-cleft side
11B	Midline columella crease to Cupid's bow, cleft side

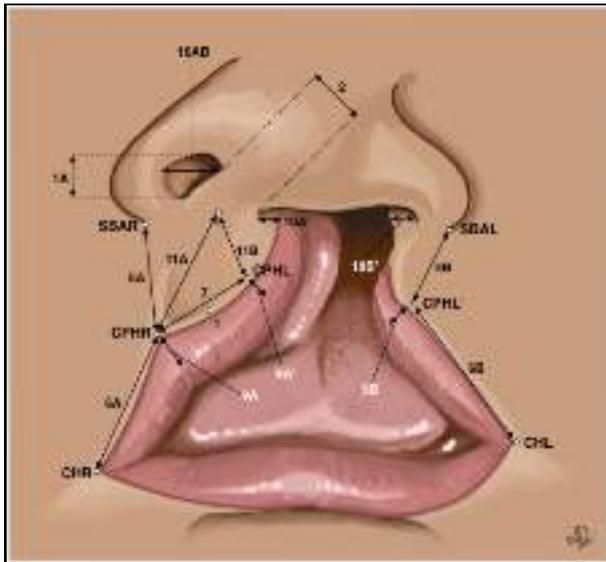


Figure 2.1. Points of Measurement before Procedure⁷.

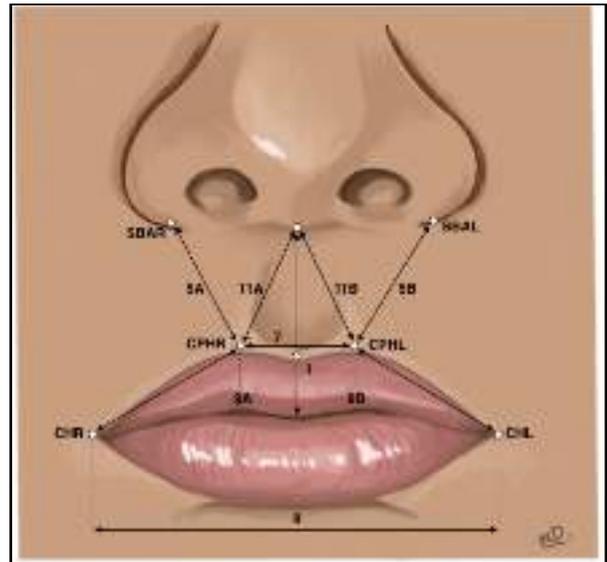


Figure 2.2. Points of Measurement after Procedure⁷.

RESULT

There were 14 patients with unilateral cleft lip underwent cheiloplasty surgeries included in this study (Table 2). The range of patients age were 3-10 months, with average age 4.07 months and the most frequent age of patients at the time of surgery is 3 months old (64.3%). Five patients (35.7%) were male infants and 9 (64.3%) patients were female infants. From the morphologic variants of cleft lip, 12 (85.8%) patients were complete unilateral cleft lip, whereas 2 (14.2%) patients were incomplete cleft lip. Eight (57.1%) patients had the defect in left side and 6 (42.9%) in right side. There are 9 (64.3%) patients with wide defect and 5 (35.7%) patients have narrow defect. All patients were treated using Gentur's technique.

Eight (57.1%) patients had collapse palate while the other 6 (42.9%) did not. From 13 measurements, we divided them into 5 categories: cupid's bow, vertical height, horizontal height, thickness of vermillion and nose. The discrepancy between points of measurements in cleft side and non-cleft side before procedure were being compared to the same points after procedure. Using the Q-Q plot, the data were distributed around the line. Each points of measurement was being compared by Paired T-Test with confidence of interval 95% and p Value <0,005. The result was all points were significant except for point number 4,6,7, and 9 (Table 3).



Figure 3 (left) Pre-operative view one of the patient, (right) Pre-operative worm's eye view



Figure 4 (left) Post-operative view of the same patient, (right) Post-operative worm's eye view

Table 2. Data of the patients

	Category	Frequency	Percentage (%)
Age (month)	3	9	64.3
	4	2	14.3
	5	1	7.1
	7	1	7.1
	10	1	7.1
TOTAL		14	100
Gender	Male	5	35.7
	Female	9	64.3
	TOTAL	14	100
Defect Type	Complete	12	85.8
	Incomplete	2	14.2
	TOTAL	14	100
Cleft Side	Left	8	57.1
	Right	6	42.9
	TOTAL	14	100
Alveolar Alar Base Gap	Narrow	5	35.7
	Wide	9	64.3
	TOTAL	14	100
Palatal Displacement (arch configuration of medial to lateral side)	Collapse	8	57.1
	Not collapse	6	42.9
	TOTAL	14	100



Figure 4 (left) Post-operative view of the same patient, (right) Post-operative worm's eye view

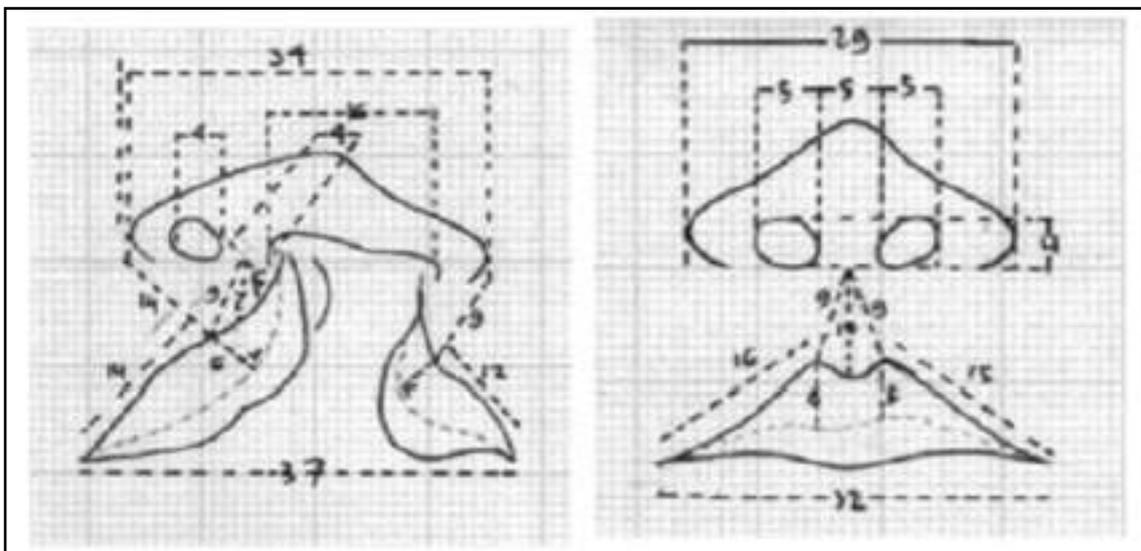


Figure 5. The Measurement before (left) and after (right) procedure. The numbers in these images represented distance of each measurement in millimeter.

The parametric measurement was converted to non-parametric measurement by weighting the difference between cleft and non-cleft side. One mm difference was given 5 points, 2-3 mm difference was given 3 points and more than 4 mm difference was given 1 point. According to its reference, the author excluded 1 category out of 5 categories, which was horizontal height.

Each measurement was given points and then summed up. Twenty points were considered as good, 16-18 points were considered as fair and 14 or less were considered as poor. The procedure was able to attain good lip symmetry in 11 (78.57%) patients, fair in 3 (21.4%) patients but none of them were poor symmetry (Table 4).

Table 3. Paired Samples Test of Cleft – Noncleft, Before And After Procedure

No.	Variable	Confidence of Interval	p-Value	Results
1	Cupid's Bow			
	Point 4	95%	<0.005	0.268
	Point 7	95%	<0.005	0.269
	Point 11	95%	<0.005	0.000
2	Vertical Height			
	Point 5	95%	<0.005	0.001
3	Horizontal Height			
	Point 6	95%	<0.005	0.759
	Point 8	95%	<0.005	0.000
4	Thickness of Vermillion			
	Point 9	95%	<0.005	0.355
5	Nose			
	Point 1	95%	<0.005	0.000
	Point 2	95%	<0.005	0.040
	Point 3	95%	<0.005	0.000
	Point 10	95%	<0.005	0.000

Table 3. Paired Samples Test of Cleft – Noncleft, Before And After Procedure

No.	Symmetry	Frequency	Percentage
1	Good	11	78.57
2	Fair	3	21.43
3	Poor	0	0
	TOTAL	14	100

DISCUSSION

This study showed similar data as shown by the International Perinatal Database⁸. Most of patients were female (65%), complete cleft lip (80%) and left sided cleft (65%). Majority of patients were performed surgery after their 10 week of birth (95%), it was related to treatment protocol in Cipto Mangunkusumo Hospital.

Direct measurement of anatomical points in this study were taken by caliper, it was available and it can gave accurate assessment of soft tissue deficiencies. From 13 points that were analyzed, only 9 were distributed evenly and can be used by author (CI 95%, *p*-value >0.005). The other four points were heavily manipulated during surgery.

Point 4 and 7 on measurement were depended on point 3 (on design), which was lowered to achieve symmetry of cupid's bow, vertical height, and thickness of vermillion. Millard and Onizuka stated that point 3 is crucial for design and result. Also, many surgeons were lowering point 3 on design to the level of point 2. This has met the purpose of cheiloplasty.^{2,6,9,10,11,12} In Gentur's Technique, the leveling of point 3 of design was made by rotating incisional line of triangular flap².

The thickness of vermillion is measured perpendicular with red line to the full thickness of vermillion. Normal thickness is below point 2. The length is applied on point 3 and 3' diagonally to lateral or medial². During the cheiloplasty procedure, these measurements were manipulated. Thus gave us insignificant data (CI 95%, *p*value >0.005).

The non cleft side had become the guide for surgery^{10,13}. Design, incision, and final adjustment followed the individual normal lip, which was the non-cleft side. In Gentur's cheiloplasty, the author pulled the cleft side to medial in order to make the imagination of design and symmetry of result. With this method, the surgeon was able to create the cupid's bow and vertical height. Distribution, function and orientation of orbicularis oris muscle was created by doing one or two incisions on the cleft side horizontally².

Symmetry of the nose was measured by nasal width and nostril width. The Gentur's technique was able to give significant result in creating nasal symmetry by rotating full thickness of flap C to lateral and sutured it with flap B to create nasal floor and equal width of the nostril as the non cleft side². Height of nose was measured but the data were not able to be analyzed.

This was due to the collapse of lower lateral cartilage of cleft side⁹. Nasal orientation was aligned by suturing muscle of Flap B to the spina nasalis².

Vertical length was more important aesthetically compared to the horizontal length. Therefore, vertical length was seldom sacrificed for horizontal length. The short vertical length can be elongated by moving point CPHL' laterally, but this would result in an even shorter horizontal length than it was^{7,12}. In this study, although horizontal length was significant (CI 95%, *p* value <0.005), it was sacrificed for the vertical length. Thus achieving good symmetrical results in most of the patients. This study also proved that not only Gentur's technique can attain satisfactory symmetrical result in incomplete cleft, but this technique was also able to close wide defect (64.3%)

even in patients with collapse palate (57.1%).

CONCLUSION

This study was done by measuring anthropometric data from unilateral cleft lip patients who underwent Gentur's Cheiloplasty Technique. This technique was able to give good lip and nasal symmetry in most of patients even with a wide defect.

SUGGESTION

Manipulation during surgery gave insignificant point of measurements. These points need to be re-measured before patient underwent palatoplasty procedure.

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