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

Rani Septrina, Gentur Sudjatmiko

Universitas Indonesia, Department of Surgery, Division of Plastic Reconstructive and Aesthetic Surgery, RSUPN Cipto Mangunkusumo, Jakarta, Indonesia

ABSTRACT

Background: Cheiloplasty, the earliest surgical procedure in cleft lip and palate patient, has impact on functional and aesthetical appearance. 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 Indonesia. 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%, pvalue <0.005) in cupid’s bow, vertical height, horizontal height, thickness of vermilion 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.

Keywords: anthropometric measurement; cheiloplasty; unilateral cleft lip
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 aesthetics. The evolution of the unilateral cleft lip closure represents a gradual increase in surgical sophistication.

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.

Gentur’s Technique

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 gingivobucal 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

\[ n = \left( \frac{2(s+\beta)d}{\alpha} \right)^2 = 13,9576 = 14 \text{ patients} \]

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.

Disclosure: The authors have no financial interest to disclose.
Table 1. Points of measurement

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

Figure 1. Left to right: Step by steps of Gentur’s technique.
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 (14.2%) 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 (24.9%) 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 2.1. Points of Measurement before Procedure.

Figure 2.2. Points of Measurement after Procedure.

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

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

<table>
<thead>
<tr>
<th>No.</th>
<th>Variable</th>
<th>Confidence of Interval</th>
<th>p-Value</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cupid’s Bow</td>
<td>95%</td>
<td>&lt;0.005</td>
<td>0.268</td>
</tr>
<tr>
<td></td>
<td>Point 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Point 7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Point 11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Vertical Height</td>
<td>95%</td>
<td>&lt;0.005</td>
<td>0.269</td>
</tr>
<tr>
<td></td>
<td>Point 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Horizontal Height</td>
<td>95%</td>
<td>&lt;0.005</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Point 6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Point 8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Thickness of Vermillion</td>
<td>95%</td>
<td>&lt;0.005</td>
<td>0.355</td>
</tr>
<tr>
<td></td>
<td>Point 9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Nose</td>
<td>95%</td>
<td>&lt;0.005</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Point 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Point 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Point 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Point 10</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>No.</th>
<th>Symmetry</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Good</td>
<td>11</td>
<td>78.57</td>
</tr>
<tr>
<td>2</td>
<td>Fair</td>
<td>3</td>
<td>21.43</td>
</tr>
<tr>
<td>3</td>
<td>Poor</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>14</td>
<td>100</td>
</tr>
</tbody>
</table>

DISCUSSION

This study showed similar data as shown by the International Perinatal Database. 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. In Gentur’s Technique, the leveling of point 3 of design was made by rotating incisional line of triangular flap. 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 medial. 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. 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 horizontally. 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 side. 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 side. Nasal orientation was aligned by suturing muscle of Flap B to the spina nasalis. 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. 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%).

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.

REFERENCES


