

## Evaluation of Nostril Morphology in Individuals with Repaired Unilateral Cleft Lip at Children Hospital 1, Ho Chi Minh City

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### Abstract

**Objective:** The purpose of this study was to evaluate nostril morphology in individuals with repaired unilateral cleft lip.

**Method:** This was a prospective cross-sectional study. Unilateral cleft lip patients following primary lip repair in Children Hospital 1 from August 2016 to December 2017 were taken on standardized photographs in the area of the nose preoperatively and postoperatively. All patients agreed for disclosure of their medical records, and have been approved by ethical committees.

**Results:** There were totally 35 patients who underwent primary lip repair. Cleft lip was consistently more common in males at a 3:2 ratio. The mean age was 3.94 months (minimum age=1 month, maximum age=8 months). Unilateral cleft lip showed a left predominance (65.7% on the left; 34.3% on the right). A significant difference ( $p<0.05$ ) in the width of the nasal base, the height and the width of the nostril, columella height and columella angle. In contrast to those results, no significant difference could be identified in the width of columella (1.9 mm preoperatively, 2 mm postoperatively). A significant difference ( $p<0.05$ ) between the cleft side and the unaffected side was seen in nostril height, columella width (the coefficient of asymmetry (CA) was 19.2%; 16.2% respectively). In contrast, no significant asymmetry regarding columella height and nostril width (CA=10.5% and 13.3% respectively).

**Conclusion:** Millard technique has become more common and has some merits for labial esthetic. However, this technique has not resulted in lasting improvement in the nostril height, the columella width and the width of the nasal base yet. Anthropometric nasal measurements can support the role of primary rhinoplasty as guiding surgeons to correct some nasal structures, as well as set timing of repair, standard rhinoplasty protocols in secondary cleft rhinoplasty.

**Keywords:** Nasal morphometry; Unilateral cleft lip; Rhinoplasty

### Introduction

The cleft lip is the most common birth defect in facial defects that accounts for 1/800 children. In Ho Chi Minh City, this disability has a rate of 2/1000. The cleft lip is characterized by a gap in 1 or 2 lips leading to a loss of continuity of the upper lip [1].

Due to changing the position of the nasal lip muscles, children with cleft lip often have changes in the outer appearance of the nose as the tip of the nose is deflected; the wing tip of the nose is directed toward the gap, the nasal arch. Horizontally deflected, the angle between the nasal column and the nasal wing on the side has a more open gap than the healthy side, the nasal column is short and inclined in the anterior direction, the side of the gap has a wide nostril and the nasal groove is lost [2].

With the desire based on the change of nose indexes before and after facial cleft plastic surgery is the basis to design the suitable flap to shape the nose for the diseases of cleft lip 1 after Millard surgery, we have done this research.

### Patients and Methods

All patients who had first-side cleft lip surgery for the first time at Children's Hospital 1. We followed descriptive cross-sectional study:

**Sampling criteria:** The patient has full background images before and after surgery by using Canon EOS 5D. Parents or guardians agree to participate in the study with approval of ethic committees.

**Exclusion criteria:** Does not meet the sampling criteria.

**Study time:** From August 2016 to December 2017

All patients were photographed before and after surgery in the supine position to allow the nose and forehead to lie on the same plane and analyze the changes of the structure of nose (Figure 1):

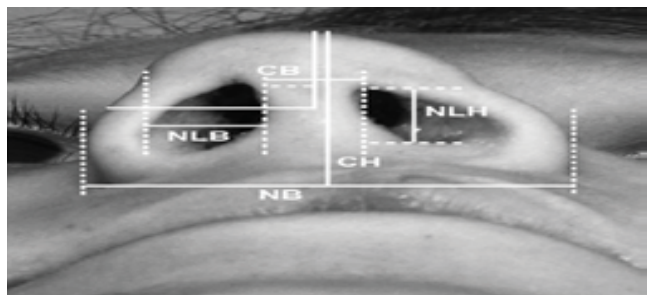
1. **The width of the cylinder (CB):** The distance between two tangent lines is on both sides of the cylinder (mm).
2. **The height of the cylinder CH):** The distance from the tip of the nose to the point between the CB and the leg of the cylinder (mm).
3. **Nasal background distance (NB):** Distance between 2 tangent lines on the outer edge of the nose (mm).

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**Received:** June 18, 2019; **Accepted:** August 23, 2019; **Published:** August 30, 2019

**Citation:** Nguyen H, Nguyen KT, Nguyen C, Pham ND, Bui TC, et al. (2019) Evaluation of Nostril Morphology in Individuals with Repaired Unilateral Cleft Lip at Children Hospital 1, Ho Chi Minh City. Otolaryngol (Sunnyvale) 9: 378.

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**Figure 1:** Patient posture and nasal morphological indicators. Differences in post-operative morphological indicators.

4. **Nostril width (NLB):** Distance between 2 tangent lines at the edge of the outer nostril (mm).
5. **Nostril height (NLH):** Distance between 2 tangents of the upper and lower edges of the outer nostril (mm).
6. **Corner of the cylinder (e):** The angle between the cylindrical shaft and the vertical plane of the face.

$$CA = \frac{\text{Healthy side} - \text{Inside the cleft lip}}{\text{Healthy side} - x} 100\%$$

Collect data according to research form, processing according to medical statistics method, Statistical package for the social sciences (SPSS) 20.0 program. Using non-parametric Wilcoxon test, comparing mean numbers, the difference was statistically significant when  $p < 0.05$ .

## Results

During the period from August 2016 to December 2017, we have collected 35 cases that meet the sampling criteria and record the following results:

### Demographics

- Age: The average age is 3.94 months (smallest=1 month; largest=8 months).
- Gender: Rate of male:female=3:2 (male 60%, female 40%).
- Lip gap: left=65.7%, right=34.3%; completely=54.3%, not completely=45.7%.

## Discussion

### Sample characteristics

In our study, male patients were more than female patients (3:2), the average age was 3.94 months. Our research results are consistent with the research of many domestic and foreign authors. Previously, children with cleft lip were often intervened when they were 6 months old and weighed over 9 kg. However, the study of the authors later recorded surgery for children earlier when applying the 10-rule (10 weeks old, weighing 10 pounds=4.5359 kg and Hb:10 g/dl). The National Hospital of Pediatrics successfully operated the cleft lip in newborns, weighing less than 2 kg [1].

Our study noted a much higher percentage of children with left cleft lip than children with right cleft lip; the gap is completely higher than the incomplete gap but this difference is negligible. This result is consistent with the research of Dang Hoang Thom, Dixon and Daskalogiannakis [1,3].

## Nose morphological indicators before and after surgery

The method of pre and postoperative examination of nasal morphology in children with cleft lip was used in the study of authors like Heller, Freeman, Russell. According to these authors, the method of analyzing images on the right techniques and conventional postures allows to determine relatively accurate and objective morphological indicators of nose [4-6]. In this study, we analyzed the morphological indicators of the pre and post-operative morphology and recorded no changes in the width of the cylinder but there was a statistically significant improvement of the indicators such as primary Cylinder height (CH), Nasal background (NB) distance, Nostril width (NLB) and Nostril height (NLH). Our research results are consistent with the research of other authors such as Dang Hoang Thom, Heller, Liou and Pai [1,5,7]. The reason for this similarity is when shaping the lip gap with Millard technique, the lip muscles and the nasal muscles are brought to the right position, so it restores the lip ring muscles well, improves the nose base and reduces the legs, and nose wing in the gap.

Difference between openings and healing after surgery: Millard method has the ability to adjust a part of oblique nasal cylinder so in this study we have recorded Nostrils width (NLB), urinary height the cylinder (CH) has the lowest asymmetric coefficient and the similar size between the two sides should bring a certain aesthetic effect. Two indexes of Platelet width (PW), Nasal background (NB) distance improved but there were still differences between the two sides after surgery. The Height of the nostrils (NLH) has the highest asymmetric coefficient, so there are significant differences in size between the healthy and diseased side after surgery. Similar to the results of other authors [5,6] the cause of the asymmetry of nasal morphology after surgery to create the cleft lip is because this surgery only affects the area of the lip and nose muscles but does not affect the nasal cartilage below. On the other hand, due to the lateral sagging structure of the cleft lip, it is delayed, widened, twisted and minimized; the lateral column from the tip of the nose is pulled downwards and outward forming a mucosa from the tip of the nose to the flap (the nasal vestibular fold) leading to the height of the nostril and the width of the nasal wing is distinctly different compared to the healthy side. Moreover, the inner pillar of the cartilage below the cleft lip is rotated counterclockwise, outward and downward so the width of the small portion of the side of the cleft lip is still smaller than that of the healthy side even though the sub the post has been erected straight [2] (Tables 1 and 2).

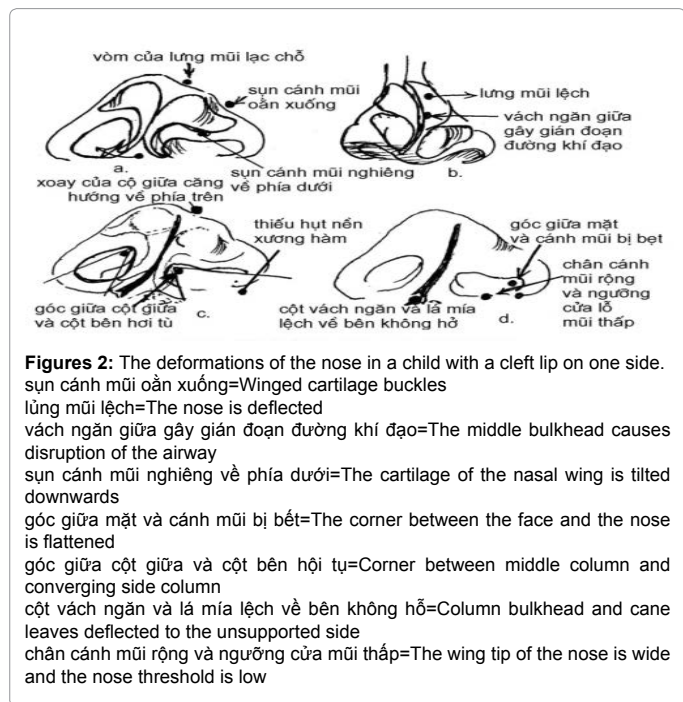
The deformations of the nose in a child with a cleft lip on one side. The deformation of the nasal morphology will change with the development of the face over time. The asymmetry of nasal

Inside the lip opening	Surgery	Average number (mm)	Standard deviation	p Value
1. The width of the cylinder (CB)	Before Surgery	1.9	0.6	0.122
	After Surgery	2	0.3	
2. The height of the cylinder (CH)	Before Surgery	2.2	0.5	<0.001
	After Surgery	3.3	0.6	
3. Nasal background distance (NB)	Before Surgery	13.8	2.1	<0.001
	After Surgery	10.4	1.3	
4. Nostril width (NLB)	Before Surgery	2.3	1.1	<0.001
	After Surgery	3.3	0.6	
5. Nostril height (NLH)	Before Surgery	7.1	2.1	<0.001
	After Surgery	4.8	0.8	
6. Corner of the cylinder (e)	Before Surgery	30.5	14.2	<0.001
	After Surgery	7.1	2.9	

**Table 1:** Nose morphological indicators before surgery and after surgery.

Balance between two sides after surgery	Average (%)	Standard deviation	95% CI		p Value
1. The width of the cylinder (CB)	16.2	14.1	12.1	21.8	<0.001
2. The height of the cylinder (CH)	10.5	8.5	8.1	13	<0.283
3. Nasal background distance (NB)	11.1	10.4	8.1	14.1	<0.003
4. Nostril width (NLB)	13.3	10.4	10.1	17.2	<0.909
5. Nostril height (NLH)	19.2	14.2	15.3	24.8	<0.001

Table 2: Balance between two sides after surgery.



morphological indicators between the side of the lips and the healthy side are the factors that need to be considered when forming the nose for children with a side opening. Choosing the right time and method of surgery will bring high aesthetic effect. Therefore, nose shape in these subjects needs to be carried out in stages (Figure 2).

Stage 1 can be done at the same time as lip-shaping surgery, in order to orient the development of a third of the nose under the desired surgeon based on the analytical morphological indicators. Phase 2 of the shaping process is performed when children aged 4-12 years of age to solve congestion in the nasal cavity causing snoring or sleep apnea while adjusting some asymmetric distortions of the nose to

bring confidence to children when interacting with friends and people around [8].

A number of studies have conducted for complete nasal shaping at this stage, but most other authors agree that the complete nasal shaping should be carried out after a period of 2 times to achieve the most optimal aesthetic effect.

## Conclusion

The Millard method that is commonly used in lip shaping in babies has a lip opening on one side and has a marked aesthetic effect on lip morphology. However, similar to the research of other authors in the world, the results of our study have recorded a significant asymmetry between the pre-and postoperative nasal morphological indicators such as nasal background distance, Primary width and height of nostrils. Accurate analysis of nasal morphological indicators not only helps surgeons adjust the most important defects of the nose right from the early stages of the forming process, orienting the morphological development of the structures nose but also the basis for determining the appropriate time and method of nose shape for children in the next stage.

## Conflict of Interest

No conflict of interest reported.

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