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Surgical and Aesthetic Outcome in Complete Cleft Lip Repair; Comparative Study With and Without Nasoalveolar Molding

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Abstract

Background/Purpose: Several studies have been developed to enhance the repair of cleft lip anomaly since it is typically not sufficient in patients with large gaps in the lips.

Objective: The purpose of this study is to assess the use of nasoalveolar molding (NAM) as regard the surgical and cosmetic results following full cleft lip surgery.

Methods: 44 patients were diagnosed with complete cleft lip and hospitalized to the pediatric surgery department between May 2018 and May 2020 were included in this study. They were divided randomly into two groups; the non-NAM group and the NAM group, each group had 22 patients. Four distinct times were recorded for magnified basal view facial photos: The first visit (T1), the period before to cheiloplasty (T2), the period one month after the cheiloplasty (T3), and the period six months following cheiloplasty (T4). The following measurements were taken directly from the pictures: (1) Nostril height on both sides; (2) Nostril width on both sides; (3) Columella angle on both sides; and (4) Alveolar gap width. Photos with a standard 1:1 ratio were captured. Straight linear measurements were taken on the images.

Results: There was a statistically significant narrowing of the alveolar gap in the molded group. The study revealed improved nasal symmetry regarding nasal height, width, and columella angle in molded groups. There was an improvement of results up to six months follow-up with no relapse. The hypertrophic scar risks and notched lip were lower in the molded group. Vermilion volume homogeneity was better in NAM group. Other parameters of surgical interference like time of surgery, extent of muscle dissection and surgical difficulty were in the favor of NAM group.

Conclusions: Presurgical NAM is an effective procedure in improving the surgical and aesthetic outcome in complete cleft lip patients.

Level of Evidence: Level I.

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Ethical Committee Approval: MD /18.05.44.

Introduction

Each side of the maxillary prominences fail to fuse together during the sixth and twelfth weeks during the pregnancy, resulting in cleft lip and cleft palate. The effect of cleft lip and palate causes cosmetic problems and may extend to functional abnormality **[1]**. Globally, the surgeons made every effort to improve the repair of cleft lip and palate. The outcomes may have been more pleasing **[2]**. In order to decrease the cleft gap, several pre surgical appliances had been developed **[3]**. Cleft lip and palate repair is improving. McNeil **[1]** introduced presurgical newborn orthodontics for the first time in 1950. Both the techniques and the outcomes have improved since then. Different studies commented on the usefulness and effectiveness of nasoalveolar molding **[4]**. The purpose of the study is to evaluate and assess how nasoalveolar shaping affects the outcome of cleft lip correction and if it is worth to use NAM presurgical for every case or not.

Material and Methods

Study design and ethical approval:

Forty-four children with full cleft lip were included in the study of surgical and aesthetic outcome in complete cleft lip repair. Using the closed envelope approach, they were randomly divided

Abbreviations:

NAM: Nasoalveolar molding.
UCLP: Unilateral cleft lip and palate.
BCLP: Bilateral cleft lip and palate.
CS : Cleft side.
NCS : Non cleft side.

into two groups: The NAM group (22 patients), which consisted of 16 unilateral cleft lip and palate (UCLP) and 6 bilateral cleft lip and palate (BCLP), and the non-NAM group (22 patients), which consisted of 15 UCLP and 7 BCLP. The study protocol was ethically assessed and approved by the Institutional Review Board of the Faculty of Medicine, Mansoura University (code number: MD/18.05.44). Written informed permission was given by all patient caregivers along with confidentiality guarantees.

Inclusion criteria:

1- Unilateral/bilateral complete cleft lip.
2- Infants younger than 3 months of age (at time of presentation).
3- NAM done by the same orthodontist.
4- Surgical repair done by the same surgeon.

Exclusion criteria:

1- Incomplete cleft lip.
2- Infant age more than 3 months.
3- Associated craniofacial malformations, facial clefts, syndromatic patients.

Nasoalveolar molding procedure:

A nasal stent and a dental plate make up the presurgical nasoalveolar shaping device. Denture glue was used to secure the tooth plate in place. It is crucial to prevent a big nostril or nasal cartilage necrosis from the molding bulb's upward overstretching. With the use of external micropore tapes, the cleft lip was approximated. Weekly adjustments were made to the elevator and nasal molding bulb until they resembled the typical design. Aside from once-a-day cleaning, the equipment should be left in its original location at all times. The molding device underwent weekly modifications until the repair was completed roughly three months of age **[5]** (Fig. 1).

Surgical technique:

All cases were operated using the modified Millard rotation advancement technique **[6]** for unilateral and straight-line repair **[7]** for bilateral cases.

Preoperative and post-operative nasal and alveolar measurements:

Photographs of the newborns' noses were taken in 1:2 ratios during the first visit (T1), one month after cheiloplasty (T3), and six months after cheiloplasty (T4). The photos were taken from a basal perspective. Every slide was digitized digitally. At the initial appointment and right before the surgical repair, the alveolar defect's width was precisely measured intra-orally using a sliding caliper. The line that joined the left and right alar bases was known as the reference line. Among the measures were: Nasal height: The top point of the nose that is parallel to each side's reference line. Nostril width: The separation between the tip of the right and tip of the left noses. The angle of the columella as measured from the cleft side is: By drawing a line from the tip of the nose to the reference line, the angle was measured from the affected side. A sliding caliper is used to measure the alveolar gap's breadth between the endpoints of the larger and smaller segments of the alveolar defect. In order to reduce photographic mistakes, the measures were derived as a ratio of the afflicted side to the non-affected side for nostril width and columellar angle, as well as for nostril height. When the ratio gets closer to 1, the noses become more symmetrical.

Statistical analysis:

The Statistical Package for the Social Sciences (SPSS) for Windows (version 25, 2017) from IBM was used to conduct the statistical analysis of the collected data. The Shapiro-Wilk test was used to determine if the data distribution was normal. 95% confidence intervals were utilized in each test. *p*-values below 0.05 were considered statistically significant. The charts were made using Microsoft Excel for Windows 2019 and the SPSS chart builder.

Descriptive:

Mean and standard deviation were employed to express quantitative information, whereas frequency and percentage were utilized to represent categorical variables.

Continuous Group differences:

The parametric and non-parametric continuous data without follow-up readings were compared inter-group (between individuals) using independent sample *t* and Mann-Whitney tests, respectively. The follow-up values were compared to the matching baseline value utilizing paired samples for pairwise data comparison (within individuals). *t*-test, Friedman's two-way analysis of variance by ranks with Bonferroni adjustment of *p*-value for multiple comparisons, or the Wilcoxon matched-pairs signed ranks test.

Categorical Group differences:

Using the crosstabs' function, intergroup comparison of nominal data was performed using the Fisher exact and Chi-square tests.

Results

There were 44 patients in this research. They were divided into two groups at random:

NAM group: Included 22 instances. The mean age at presentation was 21.63±2.705 days. The mean age at operation was 16.50±2.708 weeks. For gender distribution, 10 were males (45.5%), while 12 (54.5%) were females. The mean gestational age was 38.41±1.054 weeks, and the mean weight at the first visit was 3288.64±147.14 grams. The mean body weight at operation was 6.29±0.492 kg.

Non-NAM group: Included 22 cases. The mean age at presentation was 27.53±13.130 days. The mean age at operation was 16.07±1.792 weeks. As regards gender distribution, 12 cases were males (54.5%), and 10 cases were females (45.5%). The mean gestational age was 37.86±1.320 weeks, and the mean body weight at the first visit was 3279.55±155.57 grams. The mean body weight at operation was 6.23±0.30 kg.

There were no statistically significant differences between the two groups as regards age at presentation, age at operation, gender, gestational age, body weight at presentation, and body weight at operation.

Out of the total number of instances, 31 cases (70.5%) had unilateral complete cleft lip, and 13 cases (29.5%) had bilateral full cleft lip. Thirteen patients (42%), with unilateral instances, were right-sided, while the remaining eighteen patients (58%) had left-sided cases.

Unilateral cleft lip cases:

Affected side & alveolar gap:

Nine cases of the molded group (56.3%) were left-sided, and 7 cases (43.8%) were right-sided. Nine cases of the non-molded group were on the left side (60%), while the remaining 6 cases were on the right side (40%). Regarding the injured side, there was no statistically significant difference between the molded and non-molded groups (p=0.833) (Table 1). The mean basal alveolar gap of the molded group was 10.75±1.571mm, while the non-molded was 10.20±2.957mm, with no statistically significant difference between both groups. However, the preoperative alveolar gap (T2) in the molded group was 4.63±1.088, compared to 10.30±2.687 in the non-molded group with a statistically significant difference (Table 1) (Fig. 2).

Nostril height ratio:

There was no statistically significant difference between the non-molded and molded groups of unilateral cleft lip patients when comparing the nostril height ratio at T1. At T2, T3, and T4, there were statistically significant variations, nevertheless. Nostril height ratio improved gradually from T1 to T4, and no recurrence was seen up to six months after surgery (Table 1) (Fig. 8).

Nostril width ratio:

At T1, there was no statistically significant difference seen in the nostril width ratio between the molded and non-molded groups of unilateral cleft lip patients. At T2, T3, and T4, there were statistically significant variations, nevertheless. Nostril width ratio improved gradually from T1 to T4, and no recurrence was seen up to six months after surgery (Table 1) (Figs. 5,9).

Columella angle ratio:

Among patients with unilateral cleft lip, there was no statistically significant variation in the columella angle ratio between the molded and non-molded groups at T1. Nevertheless, there were statistically significant differences at T2, T3, and T4. There was no recurrence for up to six months following surgery, and the columella angle ratio improved steadily from T1 to T4 (Table 1) (Figs. 6,7).

Lip height, philtral height and philtral width:

There was no statistically significant difference as regard philtral width pre-NAM and post NAM. However, lateral lip height on cleft side and non-cleft side and philtral height significantly improved post NAM (Table 5) (Figs. 14,15).

Post-operative complications:

There was one case of hypertrophied scar in molded group of unilateral cleft lip cases (6.7%) and three cases in non-molded group (20%) with no statistical significant difference between both groups (Table 3).

There was one case with notched lip in molded group of unilateral cleft lip cases (6.7%) and three cases in non-molded group (20%) with no statistical significant difference between both groups (Table 3) (Fig. 10).

Bilateral cleft lip cases:

Alveolar gap of bilateral cases:

The mean alveolar gap at T1 in the molded group was 11.83±1.169 mm compared to 10.00± 3.055 mm in a non-molded group, with no statistically significant difference between both groups (Table 2). The mean alveolar gap at T2 in the molded group was 5.00±0.632mm compared to 10.00± 3.055mm in a non-molded group with a statistically significant difference between both groups (p.value =0.002) (Table 2) (Figs. 4,13).

Nostril height ratio:

At T1, there was no statistically significant difference in the nostril height ratio between the molded and non-molded groups of bilateral full cleft lip patients. At T2, T3, and T4, there were statistically significant variations, nevertheless. Nostril height ratio improved gradually from T1 to T4, and no recurrence was seen up to six months after surgery (Table 2).

Nostril width ratio:

At T1, there was no statistically significant difference in the nostril width ratio between the molded and non-molded groups of bilateral full cleft lip patients. At T2, T3, and T4, there were statistically significant variations, nevertheless. Nostril width ratio improved gradually from T1 to T4, and no re-

currence was seen up to six months after surgery (Table 2) (Fig. 3).

Columella angle ratio:

The columella angle ratio between the molded and non-molded groups of bilateral complete cleft lip cases showed no statistically significant difference at T1. However, there were statistically significant differences at T2, T3 and T4. There was a progressive improvement of the columella angle ratio from T1 to T4 with no relapse up to six months post-operative follow-up (Table 2).

Post-operative complications:

There was one case of hypertrophied scar in molded group of bilateral cleft lip cases (16.7%) and three cases in non-molded group (42.9%) with no statistical significant difference between both groups (Table 4) (Fig. 11).

There was one case with notched lip in molded group of bilateral cleft lip cases (16.7%) and three cases in non-molded group (42.9%) with no statistical significant difference between both groups (Table 4).

Other parameter:

There was no significant difference in the time of surgery between both groups (Table 6). However, the extent of muscle dissection and postoperative edema were less in NAM group.

Table (1): Measurements of unilateral cleft lip cases in molded and non-molded groups.

	Molded group (n=16)	Non-molded group (n=15)	95% CI	*p*
Side:				
Left	56.3% (9)	60% (9)	-0.31, 0.39	0.833
Right	43.8% (7)	40% (6)		
Alveolar Gap:				
T1 (mm)	10.75±1.571	10.20±2.957	-1.17, 2.27	0.519
T2 (mm)	4.63±1.088	10.30±2.687	-7.19, - 3.96	<0.001
Nostril height ratio:				
T1 (%)	27.75±2.910	26.60±2.898	-0.98, 3.28	0.280
T2 (%)	45.00±6.512	30.20±9.763	8.74, 20.86	<0.001
T3 (%)	82.38±5.340	70.53±10.474	5.79, 17.89	<0.001
T4 (%)	88.13±4.177	80.53±8.782	2.59, 12.59	0.004
Nostril width ratio:				
T1 (%)	30.44±4.531	29.93±3.807	-2.58, 3.59	0.741
T2 (%)	47.25±6.787	32.60±8.975	8.83, 20.47	<0.001
T3 (%)	85.88±5.097	73.60±11.556	5.79, 18.76	0.001
T4 (%)	90.94±6.071	83.73±8.598	1.77, 12.64	0.011
Columella angle ratio:				
T1 (%)	37.69±11.146	38.33±8.797	-8.1, 6.8	0.860
T2 (%)	61.88±12.764	49.73±16.994	0.2, 22.2	0.046
T3 (%)	85.00±4.858	78.33±5.615	2.8, 10.5	0.001
T4 (%)	90.38±6.021	76.67±6.114	3.3, 12.2	<0.001

Data is expressed as percentage and frequency.
p is significant when <0.05.

Table (2): Measurements of bilateral cleft lip cases in molded and non-molded groups.

	Molded group (n=6)	Non-molded group (n=7)	95% CI	*p*
Alveolar Gap:				
T1 (mm)	11.83±1.169	10.00±3.055	-1.09, 4.76	0.195
T2 (mm)	5.00±0.632	10.00±3.055	-7.81, - 2.19	0.002
Nostril height ratio:				
T1 (%)	37.83±1.722	37.86±3.761	-3.71, 3.66	0.989
T2 (%)	55.17±13.014	38.86±3.891	5.00, 27.62	0.009
T3 (%)	77.67±3.830	65.43±11.886	1.03, 23.44	0.035
T4 (%)	82.50±3.987	69.86±12.851	0.56, -24.72	0.042
Nostril width ratio:				
T1 (%)	41.83±3.371	40.29±3.450	-2.63, 5.73	0.433
T2 (%)	49.50±5.010	40.86±3.805	3.26, 14.02	0.005
T3 (%)	80.33±4.502	65.43±11.886	7.85, 17.39	<0.001
T4 (%)	85.67±1.966	68.57±4.237	11.41, 20.12	<0.001
Columella angle ratio:				
T1 (%)	36.67±8.156	39.29±3.450	-10.05, 4.81	0.454
T2 (%)	51.67±9.309	37.86±5.336	4.73, 22.88	0.006
T3 (%)	82.50±4.183	71.43±6.106	4.56, 17.58	0.003
T4 (%)	91.83±3.430	69.86±8.513	13.77, 30.18	<0.001

Data is expressed as percentage and frequency. *p* is significant when <0.05.

Table (3): Post-operative complications of the studied groups in unilateral cases.

	Molded group (n=16)	Non-molded group (n=15)	*p*
Hypertrophied scar	6.25% (1)	20.0% (3)	0.333
Notched lip	6.25% (1)	20.0% (3)	0.333

Data is expressed as percentage and frequency.
p is significant when <0.05.

Table (4): Post-operative complications of the studied groups in bilateral cases.

	Molded group (n=6)	Non-molded group (n=7)	*p*
Hypertrophied scar	16.7% (1)	42.9% (3)	0.559
Notched lip	16.7% (1)	42.9% (3)	0.559

Data is expressed as percentage and frequency.
p is significant when <0.05.

Table (5): Lip height, philtral height and philtral width in NAM group.

	Pre NAM (n=22) (Mean ± SD)	Post NAM (n=22) (Mean ± SD)	*p*
Lateral lip height (CS)	7.79±1.69	9.14±1.7	0.001
Lateral lip height (NCS)	10.427±1.31	11.54±1.29	0.001
Philtral width	6.73±0.78	7.04±0.97	0.228
Philtral median height	7.24±1.42	8.60±1.32	0.001

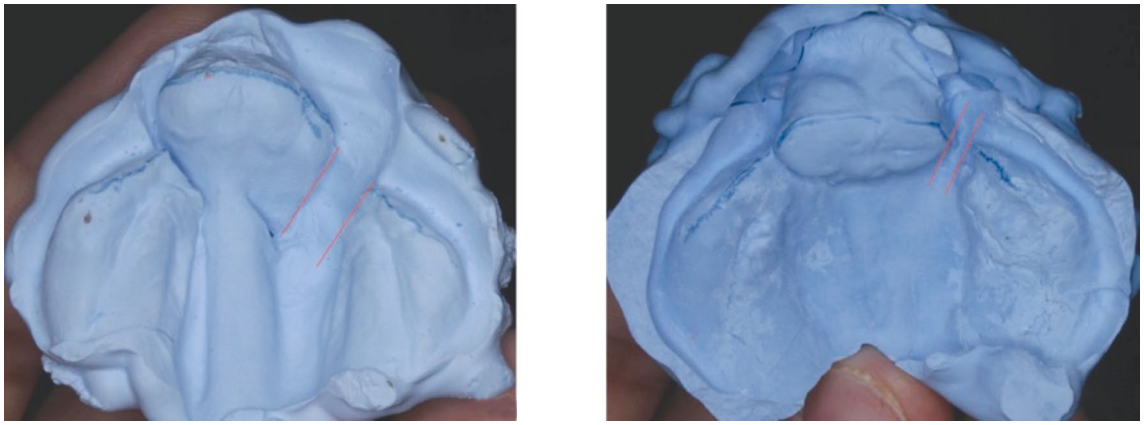
Data is expressed as percentage and frequency.
p is significant when <0.05.

Table (6): Operative time of both groups.

	Molded group (n=22) (Mean ± SD)	Non-molded group (n=22) (Mean ± SD)	95% CI	*p*
Operative time (minutes)	85.63±7.042	86.67±8.797	–6.88, 4.79	0.718

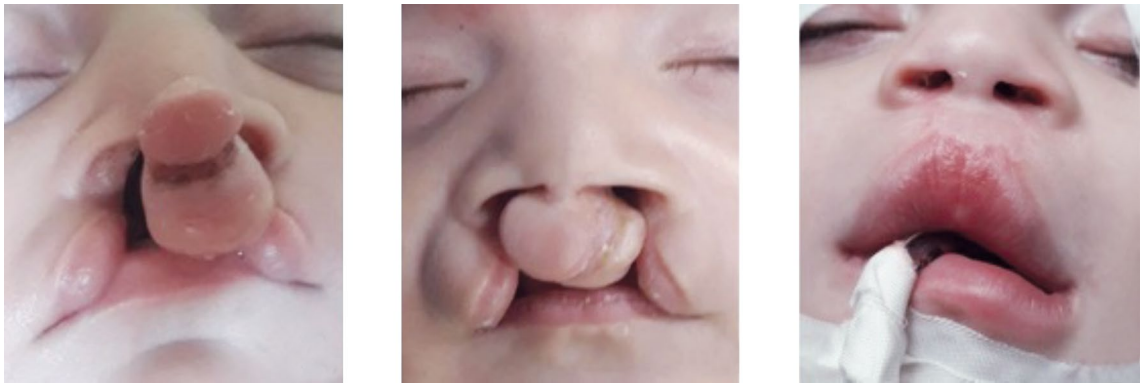
Data is expressed as mean and standard deviation.
95% CI: 95% confidence interval of the mean difference between both groups.
p is significant when <0.05.

Fig. (1): Nasoalveolar molding in the right complete cleft lip.



(A) (B)

Fig. (2): (A) Maxillary cast before nasoalveolar molding (gap: 10mm), (B) Maxillary cast after nasoalveolar molding (gap: 4mm).



(A) (B) (C)

Fig. (3): (A) Bilateral complete cleft lip before nasoalveolar molding (T1), (B) Post nasoalveolar molding (T2), (C) Nine months post-operative (T4).

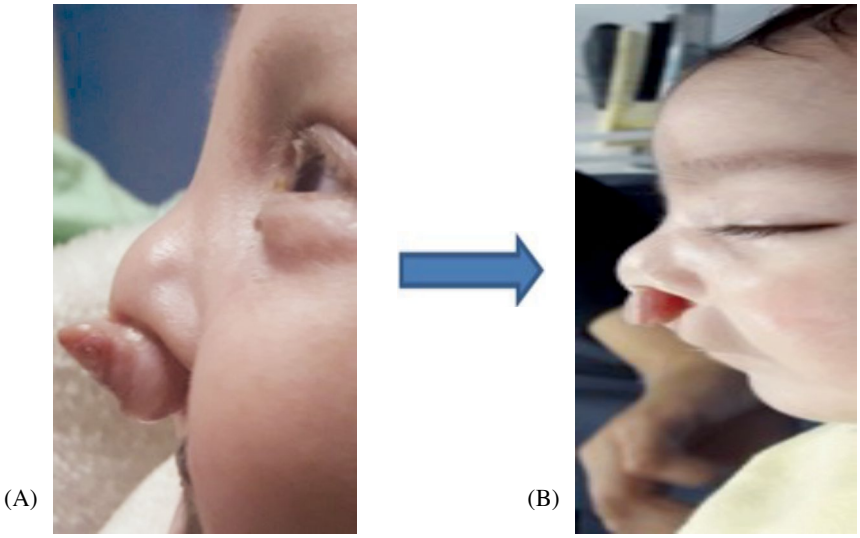


Fig. (4): (A) Jutting pre maxilla (before NAM), (B) Reduction of premaxilla (after NAM).

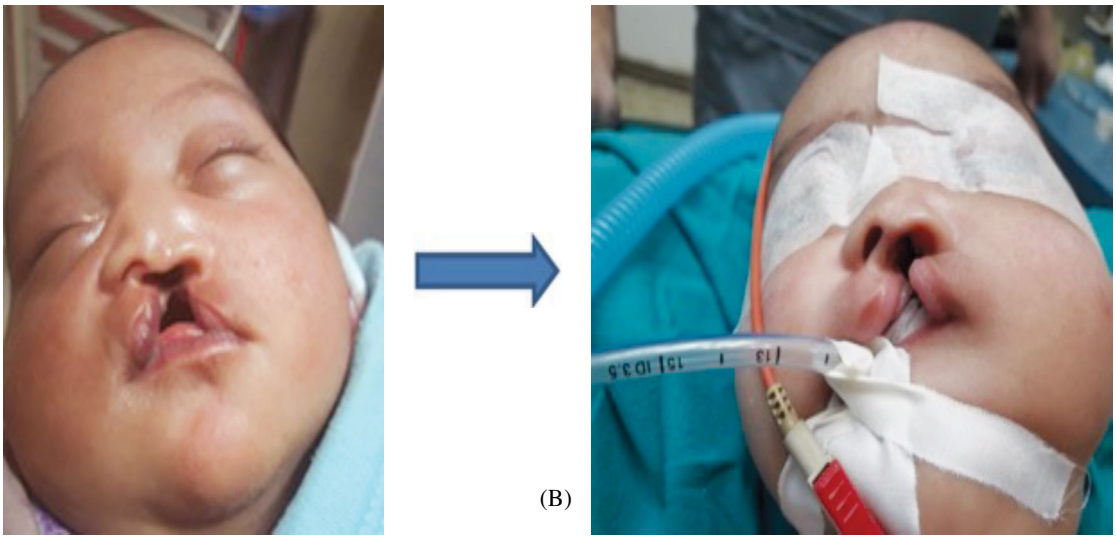


Fig. (5): (A) Nasal shape (before NAM), (B) Nasal shape (Post NAM).

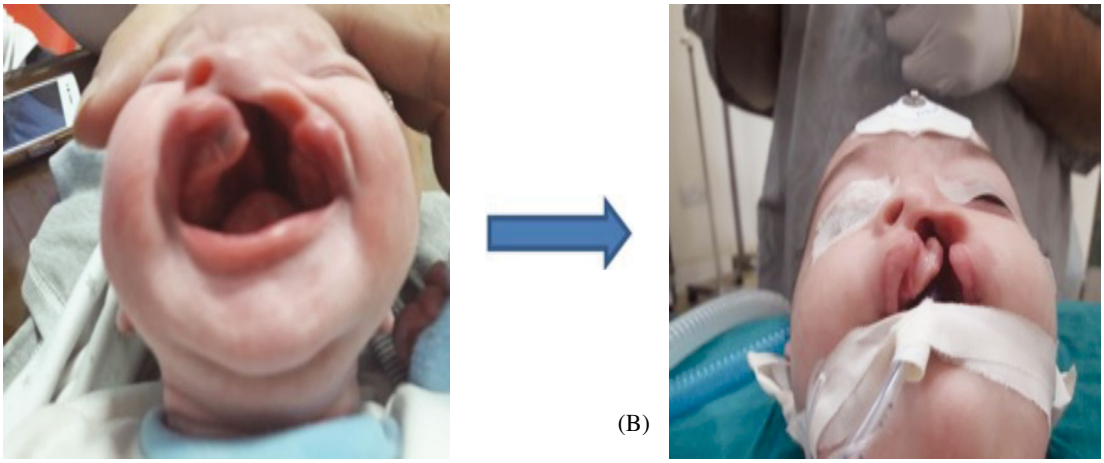


Fig. (6): (A) Length of columella (before NAM), (B) Length of columella (post NAM) of left complete cleft lip.

Fig. (7): Photograph measurements of the columellar angle in a patient with complete left cleft lip and palate. The columellar angle was 27 before treatment and changed with the nasal stent to 53.

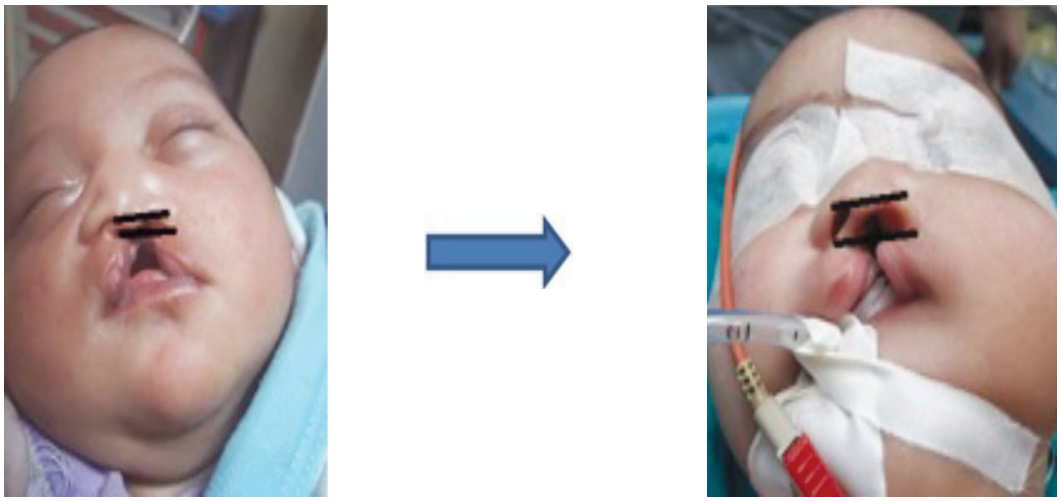


Fig. (8): Changes of the nostril height before and after treatment in left complete cleft lip.

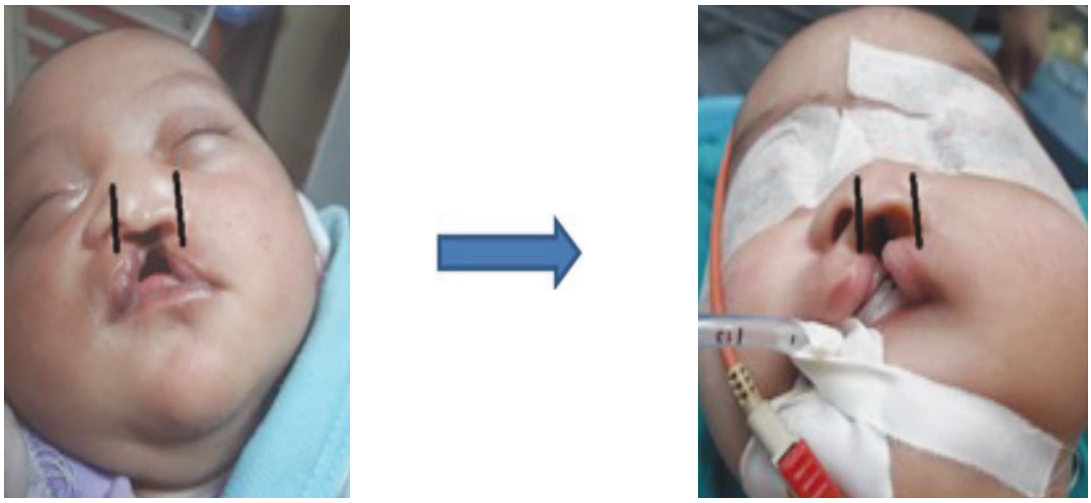


Fig. (9): Changes of nostril width in the same patient before and after treatment in left complete cleft lip.

Fig. (10): Notched lip post cleft lip repair in non NAM group.

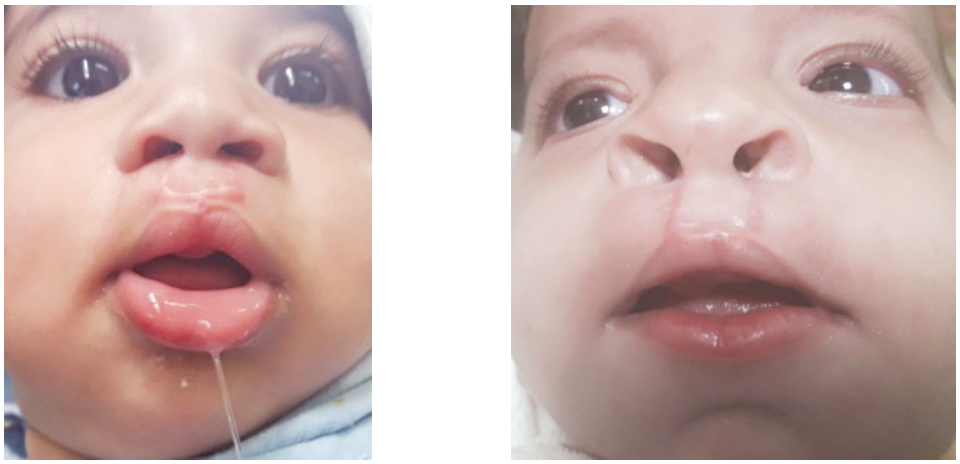


Fig. (11): Hypertrophied scar post repair of bilateral complete cleft lip in non NAM group.

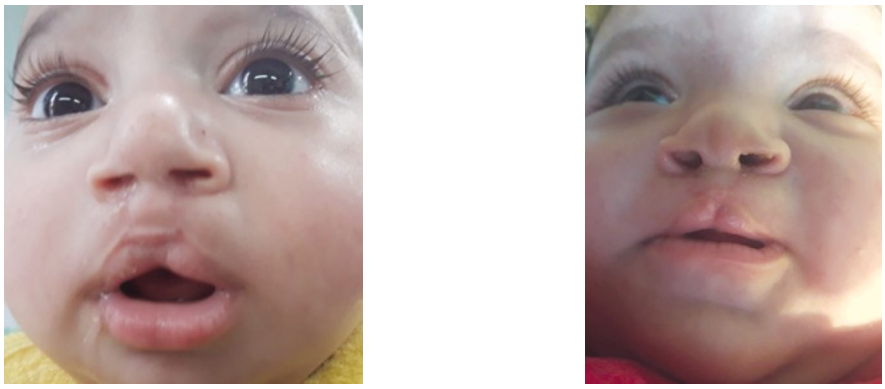


Fig. (12): Photos of bilateral complete cleft lip repair post NAM.

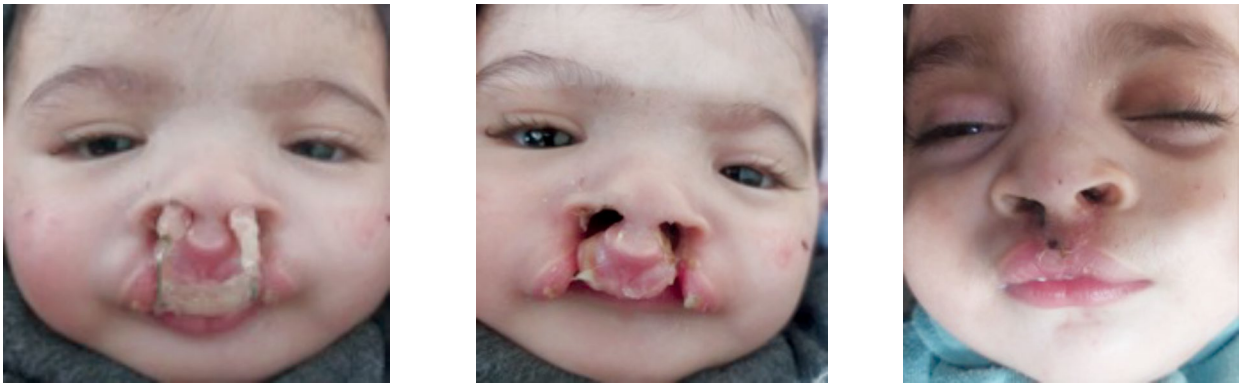


Fig. (13): Photos of bilateral complete cleft lip repair with NAM and post-surgical repair.

Fig. (14): Photos of left complete cleft lip, pre NAM, post NAM and post-surgical repair.

Fig. (15): Photos of right complete cleft lip with NAM, post NAM and post-surgical repair.

Discussion

As a result of improved surgical procedures, scheduling, and integration of therapies such as presurgical orthodontics, the care of patients with clefts has changed significantly. Restoring normal anatomy and function is the primary goal of therapy **[4]**. In this study, the molded group's alveolar gap between T1 and T2 was found to be almost 60% less than that of the non-molding group, which exhibited almost no variation in this regard. Numerous more research **[8–10]** corroborated this conclusion. This can be explained by the molding plates' passive action during lip-taping and sucking, which causes the greater segment of the alveolar ridges to passively move toward the lesser segments. This outer pressure approximates the alveolar defect and upper lip, narrowing the nasal base and enabling tension-free repair during cheiloplasty. NAM improves vertical nasal symmetry in terms of nostril height and columella length, according to published studies on the procedure (Singh et al., Deng et al., and Ezzat et al., **[11–13]**. These findings aligned with our study, which also showed that individuals with unilateral cleft lip treated with the NAM technique had a statistically significant increase in the vertical nasal symmetry (nostril height and columella length; $p<0.001$) (Table 1). At T2, nasoalveolar shaping significantly decreased the width on the cleft side with a ratio of 47.25±6.787%. A significant further repair was made possible via primary cheiloplasty by narrowing the cleft side. At T4, the nostril width was nearly identical (90.94±6.071%), with a considerable reduction in nose width observed on the cleft and non-cleft sides. There was a statistically significant difference in nasal width between the molded and non-molded groups at T2, T3, and T4. Numerous studies that have been published have shown how NAM increases nasal width **[2,14,15]**.

After NAM therapy, primary cheiloplasty significantly improves nasal symmetry. After both NAM and surgical intervention, it was discovered that all metrics comparing T1 to T2, T2 to T3, and T3 to T4 greatly improved. The nasal shape will only partially improve in patients who have primary cheiloplasty without NAM **[14]**. In the present investigation, there was a statistically significant difference in the nasal width reduction of bilateral complete cleft lip following NAM therapy (T2), with superior outcomes at (T4) and greater improvement following cheiloplasty (T3). A study by Liao et al. on 58 individuals with bilateral full

cleft lip revealed that nasal width decreased during NAM therapy and almost returned to normal following surgical correction **[16]**. The investigations conducted by Rau et al., Li et al., and Spengler **[17–19]** have all noted the same circumstance. In the current study, there was a statistically significant difference (T2) in the columella angle of the bilateral complete cleft lip between the molding group and the non-molding group following NAM therapy, with the molding group showing no improvement. Following cheiloplasty, the columella angle showed statistically significant improvement in the molding group alone, but clinical improvement in both groups.

Following NAM treatment for bilateral complete cleft lip, some studies have shown an increased columella angle, which improved following cheiloplasty **[16,20]**. The mean ratio of nostril height of bilateral complete cleft lip cases in the molding group increased by 15% (T2) compared to the non-molding group by 1%, which was statistically significant. The nostril height improved during follow-up at T3, with no relapse at T4. Garfinkle et al., in a study composed of 77 patients of bilateral complete cleft lip treated with NAM, found that nasal height was improved close to normal **[20]**. The same result was supported by Liou et al., Mishra et al., and Lee et al. **[4,21,22]**. The long-term results of preoperative NAM may not be persistent as the relapse of nostril shape was reported as 10% in width, 20% in height, and about 5% relapse in the columellar angle at the age of 1 year **[2]**.

In the current study, there were no relapses regarding nostril height, nostril width, and columella angle, which may be due to short-term follow-up, so long-term follow-up is required for accurate assessment. Preoperative nasoalveolar molding treatment was found to decrease the risk of lip revision. This was clear in the present study when comparing the notched lip among unilateral cleft cases treated with and without NAM (6.7% vs. 20%) but not statistically significant (p=0.333) as well as among bilateral cleft cases (16.7% vs. 42.9%) with no statistically significant difference (p=0.559). Nonetheless, compared to non-NAM-treated patients with unilateral cleft (37.8%, p<0.001) and bilateral cleft (48.5%, p<0.001), the average risks of revision of the literature for subsequent lip revisions were considerably reduced in patients treated with NAM **[23]**. Among patients with UCLP treated with and without preoperative NAM (6.7% vs. 20%) (p=0.333) and BCLP patients (16.7% vs. 42.9%) (p=0.559), the risk of hypertrophic scar was examined in the current study. After cleft lip correction, rates of hypertrophic scar development have seldom been documented, and those that have ranged from 8% to 47%, according to different authors **[24]**. In a research involving 180 patients, Soltani et al., found that there was a 28% incidence of hypertrophic scar in BCLP cases and a 24% risk in UCLP cases. There was less chance of a notched lip and hypertrophic scar when cleft lip repair tension was reduced **[25]**. This study's primary drawback is related to the very brief post-operative follow-up time. A protracted observation period is required to assess any return of nasal symmetry. Even though the identical approach was used in every case, the fact that different surgeons performed the surgeries on different patients might have a minor impact on the results.

Preoperative nasoalveolar molding treatment was found to decrease risk of lip revision. This is clear in the present study when comparing the notched lip among unilateral cleft cases treated with and without NAM (6.25% vs 20%) as well as among bilateral cleft cases (16.7% vs 42.9%). Similarly, the average risks of secondary lip revisions among patients treated with NAM were significantly lower than the average risks of revision of the literature for non-NAM-treated patients with unilateral cleft (37.8%, p<0.001) and bilateral cleft (48.5% p<0.001) **[23]**.

In the present study, the risk of hypertrophied scar among unilateral cleft cases treated with and without preoperative NAM (6.25% vs 20%) and among patients with BCLP (16.7% vs 42.9%). Rates of hypertrophic scar formation following cleft lip repair have rarely been reported and those that have vary widely, from 8% to 47% according to various authors **[24]**. Soltani et al., in a study of 180 patients, reported that risk of hypertrophied scar in UCLP cases was 24% and BCLP cases was 28% **[25]**.

Lateral lip height was significantly increased in NAM group. Similarly, Chou et al., calculated lip height as 7.2 (CS) and 10 (NCS) and found that this measurement is approximately 10.4mm in the norms **[26]**. The lip segments are rolled up in cleft lip and therefore, all vertical lip height measurements were less than norms. This can be explained as lip taping during NAM stretched the lip tissue horizontally and vertically so improved the lip symmetry after NAM therapy.

Conclusion:

Presurgical nasoalveolar molding is an effective procedure in improving nasal symmetry in unilateral and bilateral complete cleft lip patients regarding nostril width, height, columella length, and angle. There was an improvement of results up to six months follow-up with no relapse. Presurgical NAM decreases the alveolar gap, facilitating primary cleft lip repair and enhanced tension-free repair. Vermilion volume homogeneity was evaluated in both groups and it was found to be better in NAM group. The extent of muscle dissection and surgical difficulty were less in NAM group than non NAM group.

Although this study showed that presurgical nasoalveolar molding improved nasal symmetry, long-term follow-up may be required for further procedure evaluation.

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