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Evaluation of Short-Term Results of Modified Millard Technique Following Repair of Unilateral Cleft Lip and Rhinoplasty by Mortier Score: Single Center Experience

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ABSTRACT

Introduction: *People are often born with problems with their head and neck, and cleft lips are one of them. Because it affects how people look, hear, speak, and think, this flaw can hurt their health and social standing. So, a quick fix is needed to stop these bad things from happening. Using a score method, the study's goal was to find out how well the modified Millard technique fixed the appearance of people with unilateral cleft lips (UCL).*

Methods: *This prospective observational study on 40 pediatric patients with UCL deformity undergo UCL repair.*

Results: *The postoperative horizontal and vertical lip length were significantly increased compared to preoperative length (P<0.001, <0.001). The postoperative nasal width was significantly decreased compared to preoperative width (P<0.001). The postsurgical scoring was significantly lower compared to the initial scoring system (P<0.001). Regarding the parents' satisfaction regarding scar quality, 19 (47.5%) parents were very happy, and 21 (52.5%) parents were happy.*

Conclusion: *Modified Millard technique for UCL had resulted in significant improvement in the anthropometric parameters (Horizontal and vertical lip length and nasal width) and better postsurgical scoring, the overall aesthetic appearance of unilateral cleft lip patients showed that modified Millard repair had excellent outcome regarding the nostril symmetrical, central centrality of columella, normal ala on the cleft side and symmetrical Cupid's Bow. This technique exhibited higher parents' statistician and minimal postoperative complications.*

Keywords: *Scoring, outcomes, unilateral cleft lip repair, modified Millard technique*

INTRODUCTION

People are often born with problems in their head and neck, and cleft lips is one of them. About 1 in 1000 live births have a cleft lip. It is more common in boys and more likely to show up on the left side (6:3:1) compared to the right side. A cleft lip is one example of a face deformity that can be caused by environmental, maternal, or genetic factors. For example, being exposed to teratogen drugs like alcohol, or anticonvulsants during pregnancy [1]. Dental problems, bad alignment, deformities of the face and nose, and problems with eating, breathing, hearing, and speaking are some of the problems that are seen in the patients. Because it affects how people look, hear, speak, and think, this flaw can hurt their health and social standing. So, a quick fix is needed to stop these bad things from happening [2].

There are different types of surgery that can fix single cleft lip abnormalities right now [3]. In the 1840s, the straight-line closure method was created to fix flaws that only affect one side. Since then, different methods for doing these kinds of processes have been used [4]. In the middle of the 20th century, this led to the creation of a group of techniques called quadrangular flaps, triangular flaps, and rotation-advancement techniques. One or more back-cuts are made along the medial lip philtral ridge of the cleft side, and then one or more lateral lip-element triangular advancement flaps are used to fill in the hole(s) created when the medial lip element is turned down [5].

In an earlier study, a triangle flap was used to make a Z-plasty at the lower lip. After that, Randall used the same design as Tennison, but the triangle flap was smaller [6]. Each method has supporters, and they both talk about how important it is to move the orbicularis ores muscle so that it is in the right place anatomically for the best results in terms of looks and function [7].

The goal of the modified Millard rotation-advancement method was to put most of the scar along the natural philtral column in order to make this better. To fix some more problems with the original rotation-advancement technique, however, the method has had to be changed several times [8, 9].

Measuring the results of treatment is important for figuring out how well cleft management is working and for making quality better. This is especially true now, when evidence-based medicine

and treatment guidelines for the best way to do things are becoming standard in modern clinical practice [10]. The most common thing that people with clefts and their parents want from treatment is for the lip and nose to look better. There are two main types of rating systems used to measure the look of the nasolabial area: qualitative and quantitative [11]. More and more people understand how important it is to measure the results of cleft fixes in order to figure out the likelihood of bad outcomes, give patients advice, guess the results of surgeries, make rules about safe clinical care, and distribute resources [12].
The goal of our study was to use a score system to look at the cosmetic results of fixing a unilateral cleft lip with the modified Millard method.

METHODS

This prospective observational study on 40 pediatric patients with UCL deformity, undergo UCL repair, who were admitted to the Pediatric Surgery Department, Faculty of Medicine, Tanta University from March 2021 to February 2024. Ethical Committee approval with (approval code 34450/2/21) and written, informed consent was obtained from all participants. The research was carried out in accordance with the Declaration of Helsinki.
Inclusion criteria were all children aged above 3 months with unilateral cleft lip deformity, who were fit for surgery.
Exclusion criteria were bi-lateral cleft lip, patients who had a previous early cleft operation, syndromic cranio-facial anomalies and blood diseases or other cardio-vascular anomalies.

Preoperative assessment:

All patients underwent formal history taking, clinical examination, and routine preoperative laboratory investigations.
Specific assessment of the extent of deformity was done by two methods: photographic evaluation and scoring.

Photographic evaluation:

A digital camera was used in an official, standardised way to take pictures of the cleft lips. The shooter then put the pictures into Adobe Illustrator so that they could be looked at. The pictures were used to check the physical measurements before the surgery. The pictures were taken in two common projections: side view and worm's eye view. Each patient and their picture were given a number. Only the nasolabial triangle was tested for its ability to hide a person's identity and lessen the effect of other face features.

Surgical technique:

Steps are followed on described by Millard technique and his modification. All of the babies were put to sleep with general anaesthesia and put on a table in the reverse Trendelenburg position while they were being operated on. For the changed Millard method, lines (rotational and expansion flap lines and mucosal lines) and points (nasal and Vermilion border points) were used. The submucosal layer was then cut, and three flaps were made: an advancement flap, a rotated flap, and a c-flap. It was cut and freed from the columellar based on the side without the split and from the alar base on the side with the cleft. First, we stitched the front floor of the nose with vicryl 5–0. Then, we stitched the base and muscle of the alar bone with vicryl 4–0. The top of the philtral column was stitched to point a, the peak of Cupid's bow, and the tip of the c flap was stitched to the base of the alar. A Vicryl 5–0 was used to sew the mucous lip together. When needed, the philtral column had a back cut above the white roll with a triangle of progress from the side element (the first change to Millard's method). Also, vermillion z-plasty was used at the wet-dry line to improve the middle part (second change to Millard's method) [13]. Figure 1

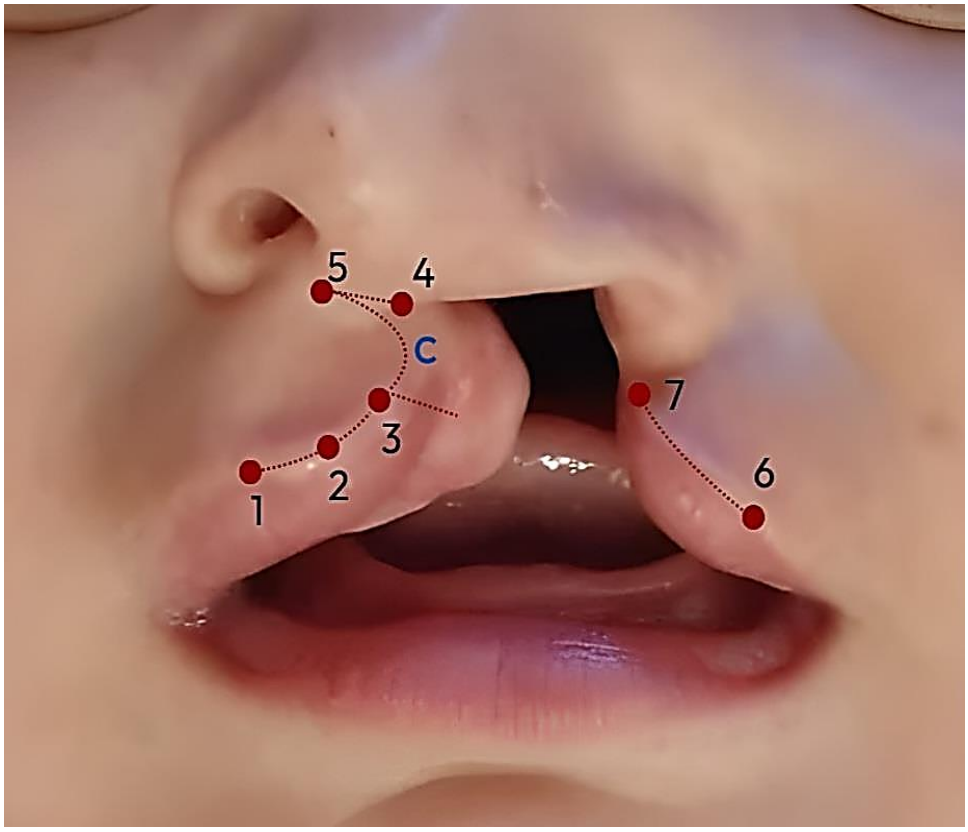


Figure 1: Markings for modified Millard's technique. (Courtesy of pediatric surgery unit "A", Tanta university hospital)

Scoring system:

The postoperative scoring was derived from Mortier et al's. [14] method of objective analysis of cases. Grading of preoperative deformity on the basis of initial scoring system scoring in the cleft lip patients from mild to severe. Grading of postoperative aesthetic outcome of unilateral cleft lip deformity on the basis of postsurgical scoring were as following; excellent "0-3", good "3.5-7", fair "7.5-11", poor "11.5-15" and very poor "15.5-19".

The pre and postoperative anthropometric measures were evaluated including the horizontal and vertical lip length and nasal width.

Short term results were evaluated at 3 months postoperatively by satisfaction described by mortier aesthetic evaluation scale.

Outcome:

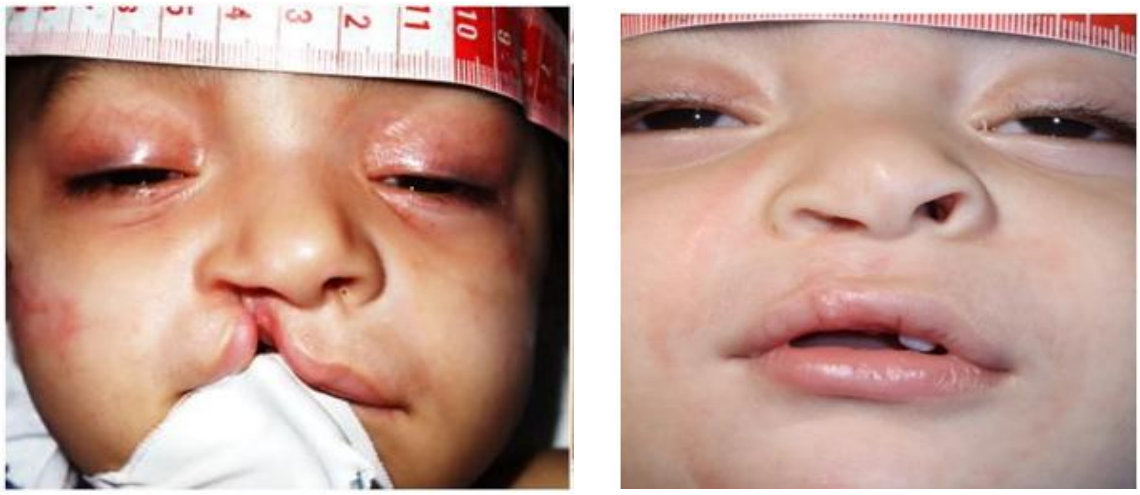
Patients' and parents' satisfaction with the general improvement of the lip and alignment of the nose was used to measure the main result of the surgery.

Statistical analysis:

The statistical study was done with SPSS v28 from IBM Inc. in Armonk, New York, USA. Mean and standard deviation (SD) were used to show quantitative factors. Qualitative factors were shown as frequency and proportion (%), and the Chi-square test or Fisher's exact test was used to evaluate them as needed. Paired sample t-test is a way to compare two group means when there are two samples that are related to each other. A two-tailed P value less than 0.05 was thought to be statistically significant.

Case presentation:

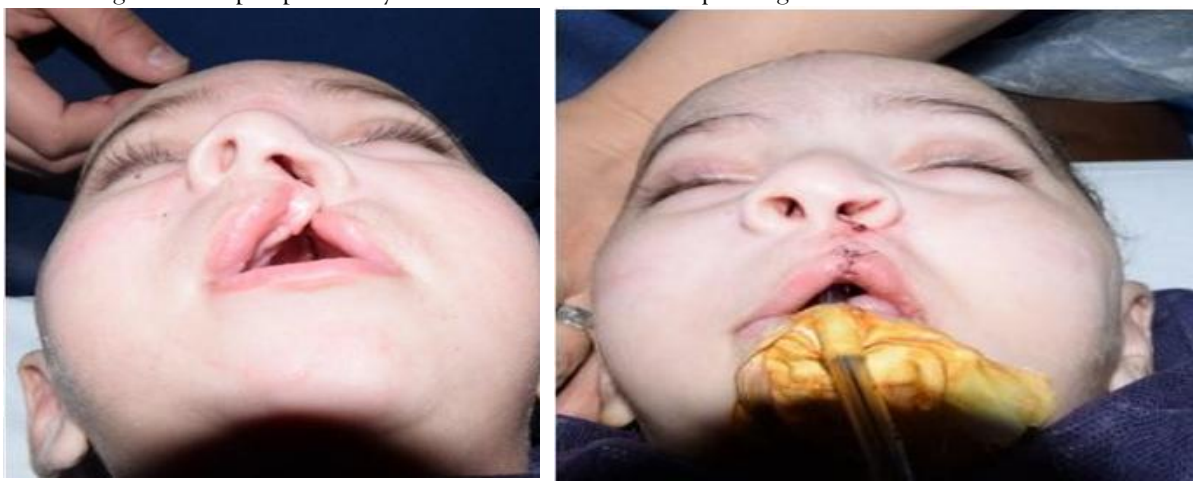
Case 1: Left cleft lip repaired by modified Millard technique. Figure 2



A B

Figure 2: A) Preoperative view and B) Postoperative view of the patient after 3 months

Case 2: Right cleft lip repaired by modified Millard technique. Figure 3



A B

Figure 3: A) Preoperative view and B) Immediate postoperative view of the patient

RESULTS

The initial features of the 40 patients who were studied. Average of those, 32 (80%) were boys and 8 (20%) were girls, and their average age was 3.65 ± 0.48 months. In 17 patients (42.5%), the abnormality was on the right side, and in 23 patients (57.5%), it was on the left side. Twenty of the patients (50%) had complete UCL, while twenty of them (50%) had incomplete UCL. It took 74.9 ± 2.66 minutes on average to do the surgery. Table 1

Table 1: Baseline characteristics and operative time of the studied patients

		Total (n=40)
Age (months)		3.65 ± 0.48
Sex	Male	32 (80%)
	Female	8 (20%)
Site	Right	17 (42.5%)
	Left	23 (57.5%)
Type of deformity	Complete	20 (50%)
	Incomplete	20 (50%)
Operative time (min)		74.9 ± 2.66

Data presented as mean ± SD or frequency (%).

The postoperative horizontal and vertical lip length were significantly increased compared to preoperative length (P<0.001, <0.001). The postoperative nasal width was significantly decreased

compared to preoperative width (P<0.001). Table 2

Table 2: Clinical evaluation of the pre-and postoperative anthropometric parameters and surgical scoring of the studied patients

		Total (n=40)		P value
		Preoperative	Postoperative	
Clinical evaluation	Horizontal lip length (mm)	14.6 ± 1.91	18.4 ± 1.55	<0.001*
	Vertical lip length (mm)	11.9 ± 1.56	17.7 ± 2.35	<0.001*
	Nasal width (mm)	25.1 ± 3.46	18.1 ± 3.15	<0.001*
		Initial scoring system	Postsurgical scoring	
Surgical scoring		4.97 ± 0.8	2.97 ± 0.86	<0.001*

Data presented as mean ± SD, *: statistically significant as p value <0.05.
Regarding the surgical outcome, nostril symmetry was achieved in 29 (72.5%) patients. 32 (80%) patients showed central centrality of columella while 8 (20%) patients showed deviated centrality of columella. The ala on the cleft side was normal in 26 (65%) patients while was flattened in 14 (35%) patients. Additionally, the Cupid's bow was symmetrical in 36 (90%) patients while was asymmetrical in 4 (10%) patients. The postoperative complications included lip notch which occurred in 3 (7.5%) patients and oedema which occurred in 2 (5%), none of the studied patients had either wound dehiscence or infection. Table 3

Table 3: Surgical outcome, postoperative complications and parents' satisfaction regarding scar quality of the studied patients

			Total (n=40)
Surgical outcome	Nostril symmetrical		29 (72.5%)
	Centrality of columella	Central	32 (80%)
		Deviated	8 (20%)
	Ala on the cleft side	Normal	26 (65%)
		Flattened	14 (35%)
	Cupid's Bow symmetry	Symmetry	36 (90%)
		Asymmetry	4 (10%)
Postoperative complications	Lip notch		3 (7.5%)
	Edema		2 (5%)
	Wound dehiscence		0 (0%)
	Infection		0 (0%)

Data presented as frequency (%).
The parents' general satisfaction, where the general care satisfaction was good in 37 (92.5%) parents and was fair in 3 (7.5%) parents, the facial appearance or beauty satisfaction was good in 39 (97.5%) parents and was fair in 1 (2.5%) parent, the functional satisfaction was good in 36 (90%) parents and was fair in 4 (10%) parents, the social and emotional aspects was good in 37 (92.5%) parents, fair in 2 (5%) parents and was poor in 1 (2.5%) parent, the parents opinion about symmetry was good in 20 (50%) parents, fair in 7 (17.5%) and was poor in 4 (10%) parents, the dental appearance satisfaction was good in 38 (95%) parents and was fair in 2 (5%) parents, and 3 (7.5%) parents showed intention for further surgery. Table 4

Table 4: Parents' general satisfaction of the studied patients by mortier score

Parameters	Score	Total (n=40)
General care satisfaction	Good	37 (92.5%)
	Fair	3 (7.5%)

	Poor	0 (0%)
Facial appearance or beauty satisfaction	Good	39 (97.5%)
	Fair	1 (2.5%)
	Poor	0 (0%)
Functional satisfaction	Good	36 (90%)
	Fair	4 (10%)
	Poor	0 (0%)
Social and emotional aspects	Good	37 (92.5%)
	Fair	2 (5%)
	Poor	1 (2.5%)
Parents' opinion about symmetry	Good	20 (50%)
	Fair	7 (17.5%)
	Poor	4 (10%)
Dental appearance satisfaction	Good	38 (95%)
	Fair	2 (5%)
	Poor	0 (0%)
Intention for further surgery	Yes	3 (7.5%)
	No	38 (95%)

Data presented as frequency (%).

DISCUSSION

The main goal of cleft lip repair is to make the lip and nose look exactly the same on both sides. The average person finds a face more beautiful when it looks more even. After any kind of face surgery, one of the most important things that is looked at is how the nasolabial area looks and how balanced it is. Additionally, cleft lip surgery tries to return lip function with as little scarring as possible. So, around the middle of the 20th century, a lot of different techniques were created. These could be put into three groups: quadrangular flaps, triangular flaps, and plans for circular improvements [13]. The improved Millard method also lets muscles heal completely and keeps normal tissue from being thrown away as much as possible. Its problems include the need for a lot of weakening, the chance of getting narrow nasal opening on the side with the cleft, and the chance that it could lead to contraction, which would lower the height of the upper lip [15]. We aimed to improve this point by the Modified technique in our series.

Based on the physical measurements, the horizontal and vertical lip lengths were significantly longer after surgery compared to before surgery ($P<0.001$, <0.001). The nose width after surgery was much narrower than it was before surgery ($P<0.001$). It was also possible for 29 (72.5%) of the cases to have symmetrical nostrils. 32 patients (80%) had a columella that was centrally located, while 8 patients (20%) had a columella that was not centrally located. In 26 (65%) of the patients, the ala on the split side was normal. In 14 (35%) of the patients, it was round. Also, the Cupid's bow was symmetrical in 36 patients (90%) and not symmetrical in 4 patients (10%). Thus, for our aim is achieved on physical measurement.

In a study similar to ours, Hakim et al. [16] compared 18 patients who had UCL repairs with modified Millard's to healthy controls using digital anthropometry after surgery. They saw that the measures of the lips and nose got better. Also, Bilwatsch et al. [17], who looked into how well changed Millard's processes worked, found that things got better after the repairs.

In the study by Gadre et al. [6], the symmetry of the alar base got better after surgery, and most of the patients in both groups had a symmetrical alar base. They said that the changed Millard's rotary progress and the Tennison-Randall method had similar effects on the length of the lip, the alar base, the Cupid's bow, and the white roll match.

Kuna et al. [18] did a prospective study that compared the results of the modified Millard and Delaire functional methods. They found that the modified Millard cut improved lip length more than the Delaire method, which improved nose symmetry.

There is research that says the modified Millard technique works well in both micro-form and incomplete clefts [19]. If "BACK CUT" is used, the modified Millard technique makes the lateral lip longer and the white roll continuous, and the vermillion height gets better [20]. Nasal imbalance was fixed with Modified Millard in serious full cleft, but the patient needed a second rhinoplasty [18].

According to Atri et al. [12], when they looked at the scores given after surgery at different time intervals, they saw that the aesthetic outcome was better early on than later. This is because in the modified Millard procedure, the vertical scar is a reflection of the opposite philtral ridge, which makes it look better early on. However, as the scar matures, it contracts, causing vermilion notching, scar hypertrophy, and scar shortening, which make the aesthetic score worse later on. Also, they showed that the modified Millard method has a statistically significant better cosmetic result when there is an incomplete cleft lip.
Williams [21] compared the Millard and Le Mesurier methods of lip repair by giving each feature a score out of 10 points, with the nose and lip each getting 50 points. He found that the modified Millard technique worked better than Le Mesurier in cases of incomplete cleft lip deformity, which was statistically significant.
When it came to how happy the parents were with the quality of the scars, 19 (47.5%) were very happy and 21 (52.5%) were happy. Most of the parents in this study were happy with their child's general care, the way their child looked, how well their teeth worked, how they felt about their child's social and mental life, and how their teeth looked.
Additionally, Abdullateef et al. [13] looked at the differences between the modified Millard technique and the tennison-randall technique in UCL and discovered that 41% of patients using the modified Millard technique were happy and pleased, while only 39% of patients using the tennison-randall technique were the same. This high rate of happiness can be explained by the fact that the methods work very well and cause few problems. Early problems like wound infection and wound dehiscence did not happen, nor did late problems like scarring and lip notch, which was also in line with what was found today. Our study despite of low number and short term follow up provided evidence for success of modified Millard technique by mortier score.
There were some limitations with our study. For example, the small number of people who participated in the study. Also, the photos taken after surgery were not all taken at the same time or angle, which could have led to differences in how the nose looked and how good the scars were? Finally, there was no control group and only single experience centre for the study.

CONCLUSION

The current study concluded that using modified Millard technique for UCL had resulted in significant improvement in the anthropometric parameters (Horizontal and vertical lip length and nasal width) and better postsurgical scoring, the overall aesthetic appearance of unilateral cleft lip patients showed that modified Millard repair had excellent outcome regarding the nostril symmetrical, central centrality of columella, normal ala on the cleft side and symmetrical Cupid's Bow. This technique exhibited higher parents' statistician and minimal postoperative complications with conclusion that mortier aesthetic evaluation scale is a useful score in assessment of postoperative results following modified Millard technique.
Larger multicentre cohorts with longer follow-up duration are recommended to validate the current results at more statistical level.

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