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Original article

A Five-Year Study Comparing the Millard and Tennison Technique for Unilateral Cleft Lip Repair

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Abstract
Healing from unilateral cleft lip surgically corrects one of the most common congenital craniofacial disorders, which impacts the face, oral function, and mental wellness in depth. While scarring is inevitable after surgery, it should also be minimal to provide a natural appearance while restoring symmetry and lip contours. This study aims to compare the Tennison-Randall triangular flap method and the Millard rotation-advancement technique in the surgical treatment of infants with unilateral cleft lip over five years. The Millard and Tennison groups each received 60 patients, ranging in age from three to six months. The surgeries were performed at the National Cancer Institute, Misrata-Libya. Clinical outcomes were assessed using the Manchester Scar Scale, photometric analysis for lip symmetry, nasal anthropometry for nasal base configuration, and subjective parental satisfaction surveys. The Millard technique demonstrated significantly better results in lip symmetry ($p = 0.02$), scar quality ($p = 0.03$), and parental satisfaction (87%), when compared to the Tennison group (78%). Using the Tennison method, the nasal base symmetry was slightly improved ($p = 0.07$), although this difference was not statistically significant. Both techniques are reliable for repairing a unilateral cleft lip. The Millard method is the preferred choice in clinical practice for its better functional and aesthetic outcomes.
Keywords. *Millard and Tennison Technique, Cleft Lip, Craniofacial Disorders.*

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Introduction

Unilateral cleft lip is a complex condition that arises in roughly one in every 700 live births throughout the globe. This disorder has health implications and brings several cosmetic, psychosocial, and functional difficulties with it. In addition to the contour of the face, this deformity impacts important functions such as emotional health and language skills. managing surgery at an earlier age is indispensable so that the functioning and complications can be managed in a more streamlined manner later on [1,2].

In attempts to resolve issues associated with clefts, various surgical techniques have been developed over time. These include both the Millard rotation-advancement technique and Tennison-Randall triangular flap method, which are noted for their wide application due to reliable results across many presentations. As one of the most common methods used for lip asymmetric correction, the Millard method excels because of its focus on giving natural symmetry through anatomical rotations to dynamic contours. On the other hand, Tennison technique employs geometric accuracy while enhancing suspension strength and predictability of nasal base tissue alignment, which aids her improvement features often considered together during rhinoplasty [3].

The objective of this research is to provide a detailed five-year comparative analysis of the two approaches. This research has two primary objectives, which include assessing parental satisfaction and evaluating lip and nasal symmetry as well as scar healing, so as to determine the effectiveness of all strategies used in surgery to balance benefits and drawbacks. The findings from this study will help refine techniques used for cleft lip surgical procedures [4,5].

Methods

This prospective cohort study was conducted from 2018 to 2023 in the National Center Institute, Misrata- Libya to evaluate the clinical outcomes of two widely practiced surgical techniques for unilateral cleft lip repair: Millard rotation-advancement flap and Tennison-Randall triangular flap. Our sample consisted of 120 infants with non-syndromic, isolated unilateral cleft lip. All patients were within three to six months of age at the time of surgery and had no prior surgical or non-surgical interventions. Infants with bilateral clefts, accompanying craniofacial anomalies, and incomplete medical records were not part of this study.

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Patients were classified into two equal groups of sixty each based on the surgical technique applied. The operating surgeon selected the technique depending on the anatomy of the cleft and his or her clinical decision-making. All operations were done under general anesthesia with careful cleft surgical techniques by senior plastic surgeons experienced in cleft surgery. In the Millard group, we employed rotation-advancement closure, aiming to preserve Cupid's bow and maintain a natural philtral column, while achieving precise symmetry of the vermillion border to avoid "whistling". Tennison group used bend triangles flaps at the alar-base, which aim to fortify support at the nasal sill structure, besides vertical geometric closure.

All patients received the same anesthesia protocols, preventive antibiotics, and postoperative care, which included caring for surgical wounds. Clinical follow-up appointments were completed six months postoperatively, and both objective data and subjective feedback were collected. Photogrammetry was employed to examine lip symmetry with reference markers for the vermillion border alignment and philtral shape integration on standardized frontal and oblique photographs. Two surgeons, blinded to the surgical technique used, evaluated scars' color, contour, and texture using the Manchester Scar Scale and separated scores for discoloration, contouring, and textural changes of scars.

Parental satisfaction with surgery was assessed by triangulating data from structured questionnaires. These questionnaires used Likert scales to measure perceptions of aesthetic improvements, functional results, and overall satisfaction.

The data was analyzed with JASP (Just Another Statistics Program). Categorical variables were illustrated as frequencies and percentages, while means and standard deviations summarized the continuous variables. For tests done between the two groups, independent sample t-tests for continuous variables and chi-square tests for categorical variables were used. A statistically significant result was found within $p < 0.05$.

Results

In a Prospective study analysis, 120 unilateral cleft lip patients, aged three to six months, were treated with either the Millard rotation-advancement technique or the Tennison-Randall triangular flap method. Each cohort contained 60 participants and was equally distributed across both groups.

Lip Symmetry: Dynamic lip symmetry evaluation revealed the Millard technique to be superior in dynamic lip symmetry compared to the Tennison method ($p = 0.02$). Postoperative photographs also highlighted improved anatomical harmony of lip contour and philtrum alignment within the Millard subgroup (Photos 1).

Scar Quality: The results for scar pigmentation and integration with neighboring tissues were significantly better (smoother texture, less color variation), resulting in better scars for the Millard group ($p=0.03$). Hence, this suggests that the Millard technique will provide a smoother profile and reduced scarring after surgery.

Nasal Base Symmetry: The Tennison group showed a slight advantage in anthropometric assessment of the nasal base. However, no conclusive difference was observed, as the p-value was 0.07. (Photos 2, Figure 1).

Parental Satisfaction: Based on the evaluation metrics defined for the study and applied during follow-up appointments, subjective impression-based feedback concerning parental satisfaction rated by parents of children enrolled in Millard's techniques yielded results as high as 87%. Compared to the result from the Tennison group, which was only 78% (Figure 2). This suggests that from a parent's standpoint, the aesthetic refinements along with functional performance achieved through Millard's regimen are more favorable.

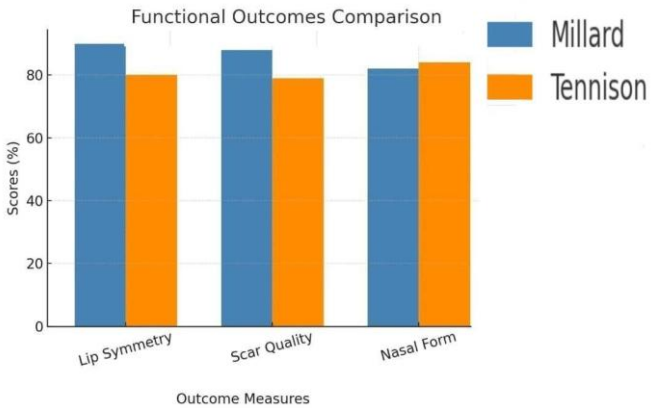

Figure 1: Functional and Aesthetic Outcomes Comparison

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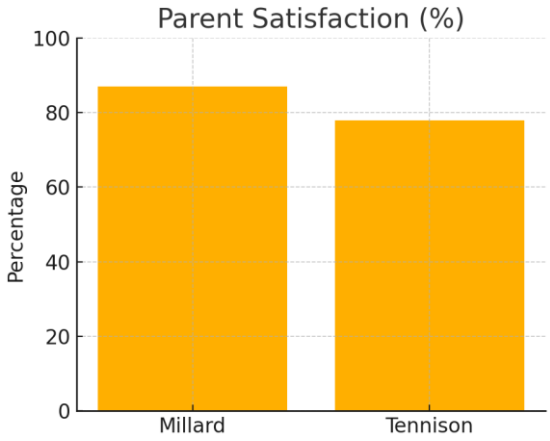

Figure 2: Parent Satisfaction Comparison

Discussion

The results of this five-year study illustrate that there is still a preference for the Millard rotation-advancement approach for surgically treating unilateral cleft lips. The Millard method was associated with a greater lip symmetry ($p = 0.02$), scar quality ($p = 0.03$) and parent satisfaction (87%) when compared to Tennison-Randall's approach which had a satisfaction rate of 78%.

Fisher's outcomes support this, as he noted the advantage of the rotational advancement design is that it improves dynamic movement and offers better symmetry due to enhanced anatomical contouring and alignment of the philtrum and vermilion [3]. Cutting and Dayan also pointed out that a person's unique body structure is very important when thinking about improving their appearance. This explains why the technique is so customized for each individual [4].

Based on objective measurements and scarring assessments, the patients who underwent treatment with the Millard technique showed better integration of tissues and had less visible scars compared to those treated with Tennison. This is in line with our findings regarding scar assessment [6,7,8]. Moreover, it further supports these observations that Millard patients demonstrably scored higher on the aesthetic satisfaction survey as noted by Wu, particularly concerning the upper lip and its junction with the vermillion border [9]. photos No.3

Even though the Tennison approach did not achieve overall statistical superiority, it exhibited a trend toward improved nasal base symmetry with a p-value of 0.07. This observation aligns with the broader experience reported by Salyer and Genecov, who noted that the triangular flap designs offered enhanced support at the naval base and sill in several cases, particularly those with wider clefts [5]. While Hsieh and Liao acknowledged more prominent scarring due to geometric lip incisions, they also emphasized nasolabial asymmetry improvement with the Tennison technique in specific anatomical subtypes [10]. Moreover, the satisfaction score for the Tennison group was not as high. The technique is appropriate for cleft cases that require more precise nasal contours, especially where base width is of significant consideration. This supports Bütow and Botha's observations concerning fundamentally more geometrically definable methods, such as Tennison; they pointed out that the outcome rests heavily on the skill of the operative and their selection of cases [7]. Parental satisfaction in The Millard Group reached 87%, which is one of the highest reported figures (and certainly a little subjective), but serves as an indicator for surgical success. These parallels Goh's findings, where lip mobility and scar aesthetics triumphed over symmetry of the nasal base in long-term parental satisfaction [11].

As with every other research, this study comes with its limitations, especially given that it relied on literature that is relatively established. The study was conducted in just one center, and the number of participants was small. In addition, the assessment of long-term considerations such as psychosocial adjustment and speech development were not included. Perhaps future studies could provide additional understanding of the effectiveness of surgery by incorporating standardized systems for aesthetic scoring alongside three-dimensional facial analyses as proposed by Allori and Bagatin [12,13].

Regarding lip symmetry, scar appearance, and parent satisfaction, this comparative study affirms that the Millard rotation-advancement method remains the gold standard in unilateral cleft lip repair. The results from earlier studies

[3,4,14] are supported by this evidence due to the adaptability of this technique in addressing customized anatomical consideration gaps; it is capable of yielding more natural dynamic functions.
The Tennison-Randall technique, as pointed out by Rozen and Redett [15] also by Hseih and Liao [12], showed some advantage concerning nasal base symmetry. In our sample, though, this difference was not significant. Nevertheless, if the primary aim is to correct the form of the nose, Tennison's method is perfectly acceptable in some cases. Both techniques have satisfactory clinical results; therefore, it is reasonable to state that the Millard approach should be regarded as standard for primary unilateral cleft lip repair because it generally offers superior functional and aesthetic outcomes.

Conclusion

Regarding lip symmetry, scar appearance, and parent satisfaction, this comparative study affirms that the Millard rotation-advancement method remains the gold standard in unilateral cleft lip repair, and it is capable of yielding more natural dynamic functions. Whereas the Tennison-Randall technique showed some advantage concerning nasal base symmetry over the Millard method. In our sample, though, this difference was not significant. Nevertheless, if the primary aim is to correct the form of the nose, Tennison's method is perfectly acceptable in some cases. Both techniques have satisfactory clinical results; therefore, it is reasonable to state that the Millard approach should be regarded as standard for primary unilateral cleft lip repair because it generally offers superior functional and aesthetic outcomes. Increased and more varied sampling is suggested for future research to aid in generalizing the findings. Prolonged follow-up can also aid in comprehending the long-term impact of the results. Future research is likely to benefit from more sophisticated analytical techniques as well as improved regulation of extraneous factors. Cross-context comparative research is also recommended in order to triangulate the findings. Focus on quantitative results from the application of the theory as well as qualitative information can enrich the interpretation and significance of the findings.

Study Limitations

This study's limitations, a single-center focus on short- to mid-term outcomes, point toward the need for multicenter longitudinal assessments of speech function, psychosocial adaptation, long-term follow-ups as well as objective aesthetic evaluation using 3D imaging and validated scoring systems. Even though the sample size is adequate for initial comparative analysis, it is still likely too small to capture a sufficient representation of cleft morphologies relative to what may exist within larger clinical populations.

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