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ORIGINAL ARTICLE

EVALUATION OF SUCCESS OF SECONDARY RHINOPLASTY IN CLEFT LIP AND PALATE PATIENTS

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ABSTRACT

Background: Secondary rhinoplasty in cleft lip and palate (CLP) patients addresses aesthetic and functional nasal deformities, with patient satisfaction as a key outcome measure. This study aimed to evaluate rhinoplasty satisfaction in cleft lip and palate patients at Sulaymaniyah Teaching Hospital.

Materials & Methods: This prospective observational study was conducted over 12 months, involving 20 cleft lip and palate patients. Participants were selected based on a non-probability convenience sampling method. The Rhinoplasty Outcome Evaluation (ROE) questionnaire assessed satisfaction pre- and post-surgery. Surgical techniques included open rhinoplasty with grafting, and data on demographics, cleft type, and previous treatments were collected.

Results: The mean age of the patients in this study was 23.55 ±4.46 years. The pre-operative total score had a mean of 5.60 ±2.16. In contrast, the post-operative total score had a mean of 20.60 ±1.70, (95% CI: -16.38 to -13.63), indicating a statistically significant difference between pre-and post-surgery scores ($P \leq 0.001$). Additionally, the post-operative total score (mean of 20.60 ±1.70) showed a statistically significant difference when compared to the total score of normal patients (mean of 18.20 ±4.4), (95% CI: 0.007 to 4.79) ($P \leq 0.04$).

Conclusion: The study demonstrated patient satisfaction with secondary rhinoplasty, as indicated by a significant increase in the Rhinoplasty Outcome Evaluation score after surgery compared to before. This increase signifies patient satisfaction with the surgical procedure.

KEY WORDS: Cleft lip; Cleft palate; Rhinoplasty; Secondary rhinoplasty.

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INTRODUCTION

A cleft lip and/or palate is one of the most common congenital craniofacial malformations and is defined as a surgical defect that is characterized by a fissure in the upper lip/palate. This congenital defect happens in the early fetal stage when the facial structures are not fused correctly.[1] Clefts are classified as syndromic (associated with other malformations) and non-syndromic (isolated) CLP.[2] Median medial nasal processes (the nasal tip, philtrum, columella and premaxilla; the two maxillary processes form the lateral portion of the upper lip) first appear in the embryonic period. The fusion failure between the median nasal processes and the maxillary processes results in cleft lip deformities. It thus results in malformation of the primary palate, central alveolus and (all or part of the upper lip).[3] CLP, with or without cleft palate, occurs in 0.1% of the general population. CLP occurs in 2 out of every 1000 births and is more common in the Asian population.[3]

Scars or asymmetry of the lip and nose resulting from cleft lip and palate can have a disturbing psychological impact on human beings and their social relationships.[4] It is an unavoidable fact, cleft lip and palate patients face a variety of psychological distress since they suffer from restrictions. Thus, some of the cases may suffer from difficulty in making communication with their surrounding people in the region, because they may be unhappy with their appearance and phonetics in speaking, which affect their general progress.[4] Adults with cleft lip and palate have also

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been shown to suffer anxiety and depression twice as often as normal controls.[5]

Management of CLP is surgical and generally involves staged repair over multiple years. The surgical management of CLP has 2 main goals. As the child develops, secondary procedures may be required to correct residual deformities or functional problems.[6] Secondary rhinoplasty represents a surgical intervention after the first cleft surgical repair to optimize nasal symmetry and aesthetics as well as functional outcomes. This is a necessary step for patients with persistent nasal deformities following primary corrective surgery.[7] While surgical techniques have improved, there has been a gap in the literature on assessing patient satisfaction and functional outcomes with secondary rhinoplasty in CLP patients. Researchers often emphasize clinical results over patients' subjective experiences. This study aimed to describe functional and aesthetic satisfaction from the patient's perspective, pre- and post-secondary rhinoplasty, to provide better insight into the results.

MATERIALS AND METHODS

This prospective observational study was carried out during the period from January 2022 to December 2022 at Sulaymaniyah Teaching Hospital, which is located in Sulaymaniyah City, Iraq. Twenty patients aged 17-35 years who reported deformities of the nose in cleft lip and palate cases were included in the study. The sampling method used was a non-probability convenience sampling method, where all patients who were delivered secondary rhinoplasty during the study period were included. Moreover, 20 randomly selected normal individuals.

Study selection filtered for patients over age > 17 years, with a history of CLP and having undergone secondary rhinoplasty only once (except for one case of revision rhinoplasty). All subjects submitted informed consent before being included in the study. On the other hand, the inclusion criteria included patients with complete medical file records, patients who had never had primary rhinoplasty before, and patients who were willing to participate and give informed consent to the study.

Surgical technique: All procedures were performed via open rhinoplasty using a standard transcolumellar and infracartilaginous incision. After elevation of the soft-tissue envelope, structural deformities were assessed. The nasal septum was exposed through sharp dissection along the medial crura, with submucoperichondrial dissection to reveal the caudal septum. Septal cartilage grafts were used in half the cases; the remainder received costochondral or auricular grafts. To correct caudal septal deviation, the displaced segment was repositioned centrally and stabilized either with a septal extension graft or fixed to the anterior nasal spine using a strut. Dorsal hump reduction, of bone or upper lateral cartilage, was completed prior to septal graft harvest. Lateral osteotomies were performed bilaterally in all patients. For alar cartilage asymmetry, cephalic trimming ensured contour matching on the non-cleft side. The lateral crus was repositioned medially to reconstruct the dome and tip, with symmetry achieved through suturing and support provided by a columellar strut for maintained projection.

Data collection was carefully organized to include both pre-operative and post-operative results. The Rhinoplasty Outcome Evaluation (ROE) questionnaire, a validated outcome measure that has been widely employed in facial reconstructive surgery studies, served as the chief patient satisfaction metric. The ROE inventory was utilized pre-operatively and at 6 months following surgical intervention. The questionnaire consisted of six items aimed at assessing both aesthetic and functional aspects of nasal reconstruction. The items were aggregated into a 5-item measure, where each item was rated on a scale from 0 to 4, and higher scores meant more satisfaction. Individual item scores were totaled to yield a complete score, which represented satisfaction with nasal appearance and function (Table 1). Consequently, to facilitate the interpretation of the results, the total score can be divided by 24 and

Table 1. Rhinoplasty Outcome Evaluation (ROE) questionnaire

Questions		Score				
1	How much do you like the appearance of your nose?	0 (No)	1	2	3	4 (Yes)
2	How much can you breathe through your nose?	0 (Not at all)	1	2	3	4 (Very well)
3	How much do you think your friends and close ones like your nose?	0 (Not at all)	1	2	3	4 (Always)
4	Do you think your current nasal appearance limits your social or professional activities?	0 (Always)	1	2	3	4 (Never)
5	How confident are you that your nasal appearance is the best it can be?	0 (Not at all)	1	2	3	4 (Yes)
6	Would you like to surgically alter the appearance or function of your nose?	0 (Absolutely)	1	2	3	4 (No)

multiplied by 100 to obtain a score between 0% and 100%. The ROE questionnaire was extracted from the work by Mulafikh et al. (2021), validating the Arabic version of the ROE. [8]

In addition to retrieving ROE scores, demographic and clinical data (age, sex, type of cleft deformity, previous surgical and orthodontic treatment, previous cleft alveolus closure) were recorded. Surgical details, including graft types (auricular, costochondral, or septal), were also recorded to determine their potential influence over outcomes.

Data were analyzed using SPSS software (version 26.0; IBM Corp., Armonk, NY, USA). Descriptive statistics were used to summarize demographic and clinical characteristics. The mean change in ROE scores was analyzed via t-test and paired t-test, assuming normally distributed data. Statistical significance was defined as $p \leq 0.05$. Data were reported as mean ± SD with 95% CIs.

Ethical Considerations: The study received ethics approval by the institutional review board of Sulaymaniyah City, Iraq Teaching Hospital. Ethical aspects of this study include the acquisition of informed consent from all subjects, along with preserving the confidentiality and anonymity of patient data. The study was approved in accordance with the principles of the Declaration of Helsinki, and the patients' identities were fully blinded in the publications or presentation.

RESULTS

A sample size of 20 patients with cleft lip deformities, majority of whom were female (85 percent) and were aged between 19 to 35 years (mean age 23.55 + 4.46). Demographic and clinical data, such as type of cleft and surgeries, are outlined in Table 2. The analysis of Rhinoplasty Outcome Evaluation (ROE) scores was done in subgroups. There were no significant differences in pre- or post-operative ROE scores between any of the age groups, sexes or types of cleft (Table 3).

Alar graft placement (95%), tip repositioning (95%), and turbinate fracture correction (85%) were the surgical procedures, and differences in cartilage graft types (septal, costochondral, or auricular) are shown in Table 4. The results were not significantly different according to whether patients were treated with cleft alveolus closure, orthognathic surgery, or orthodontic treatment (Table 5).

An overall evaluation of the results of rhinoplasty showed that there was a significant positive change in the patient-reported measures. The mean ROE score improved significantly (Table 6) with the mean increasing by 15.00 points following surgery; preoperative mean of 5.60±2.16 (%26.88) versus post-operative mean of 20.60±1.70 (%98.88).

Table 2. Demographics and Clinical characteristics in patients

Variables		Frequency	Percent
Age group	19- 25	14	70.0
	26 - 35	6	30.0
Sex	Male	3	15.0
	Female	17	85.0
Type of cleft	Bilateral cleft lip with anterior palate	2	10.0
	Isolated unilateral cleft lip	3	15.0
	Unilateral cleft lip with anterior palate	10	50.0
	Unilateral cleft lip with palate	5	25.0
Turbinate fracture	Yes	17	85.0
	No	3	15.0
Reco. of nasal valve	Yes	13	65.0
	No	7	35.0
Alar graft	Yes	19	95.0
	No	1	5.0
Tip repositioning	Yes	19	95.0
	No	1	5.0
Lip scar revision	Yes	6	30.0
	No	14	70.0

Table 3. Score Rhinoplasty Outcome Evaluation (ROE) in Pre and Post in patients

Variable		N	Pre-Total score		Post-Total score	
			Mean ± SD	P-value	Mean ± SD	P-value*
Age group	19 – 25*	14	5.64 ± 2.5	0.8	20.36 ± 1.6	0.3
	26 – 35*	6	5.5 ± 1.05		21.17 ± 1.9	
Sex	Male*	3	5.00 ± 2.0	0.62	20.33 ± 1.53	0.78
	Female*	17	5.71 ± 2.23		20.65 ± 1.77	
Type of cleft	Bilateral cleft lip with anterior palate*.	2	4.5 ± 2.12	0.9	19.5 ± 0.07	0.7
	Isolated Unilateral cleft lip*.	3	6.0 ± 1.73		20.33 ± 2.08	
	Unilateral cleft lip with anterior palate*.	10	5.7 ± 2.8		20.7 ± 1.64	
	Unilateral cleft lip with palate*.	5	5.6 ± 0.89		21.0 ± 2.12	

*P-value t-test and paired t-test

Table 4: Interventional measures performed for rhinoplasty.

Variables		Frequency	%age
Cartilage graft	Auricular graft	2	10.0
	Costochondral	8	40.0
	Septal graft	10	50.0
Cleft alveolus closure	Yes	17	85.0
	No	3	15.0
Orthognathic surgery	Yes	9	45.0
	No	11	55.0
Orthodontic treatment	Yes	11	55.0
	No	9	45.0

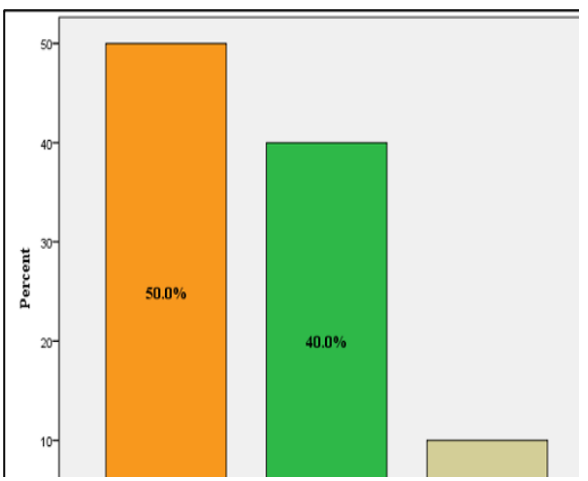

Figure 1: Cartilage graft types in Rhinoplasty.

Table 5. Score Rhinoplasty Outcome Evaluation (ROE) in Pre and Post in Patients According to Maxillo-facial Treatment.

Variable		N	Pre-Total score		Post-Total score	
			Mean ± SD	P-value	Mean ± SD	P-value*
Cleft alveolus closure	Yes*	16	5.56 ± 2.37	0.8	20.69 ± 1.66	0.6
	No*	4	5.75 ± 1.26		20.25 ± 2.06	
Orthognathic surgery	Yes*	9	4.78 ± 1.98	0.12	20.33 ± 1.98	0.56
	No*	11	6.27 ± 2.14		20.82 ± 1.53	
Orthodontic treatment	Yes*	11	6.09 ± 2.07	0.27	20.73 ± 1.85	0.72
	No*	9	5.00 ± 2.24		20.44 ± 1.59	

*P-value t-test and paired t-test

Table 6. Comparison of Total ROE Score Percentages before and After Treatment.

	Pre-Total score (%)	Post-Total score (%)	Total score (normal patients) (%)
Mean ±SD (Percent)	5.60 ±2.16 (26.88)	20.60 ±1.70 (98.88)	18.2 ±4.4 (87.36)
Mini - Maxi	1 - 11	18 - 24	9 - 24

In general, mean ROE score rose considerably after surgery (5.60 +/- 2.16 versus 20.60 +/- 1.70, 95% CI: -16.38 to -13.63, P < 0.001) (Table 7).

The postoperative scores were higher than those of normal controls (18.20±4.40, P = 0.04), indicating not only functional and aesthetic restoration but also in some instances a restoration above the baseline population norms in self-perceived nasal functioning and social confidence (Figure 2).

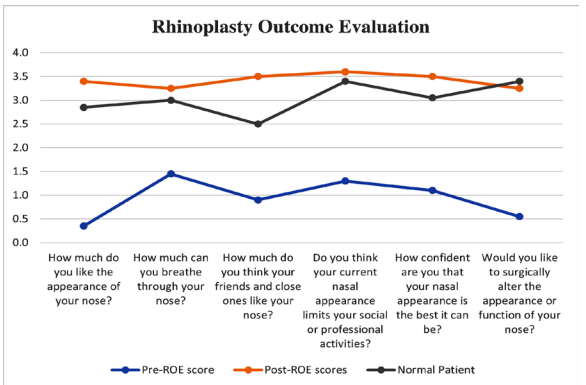

Figure 2. ROE questionaries scores comparison between cleft/lip palate patient with normal individuals.

Table 7. Overall evaluation of rhinoplasty result (ROE) before and after treatment

Paired Samples Correlations		Mean ±SD (%)	95% CI	P-value
Pair 1	Pre-Total score	5.60 ±2.16	-16.38 to -13.63	<0.001
	Post-Total score	20.60 ±1.70		
Pair 2	Post-Total score	20.60 ±1.70	0.007 to 4.79	0.04
	Total score (normal patients)	18.20 ±4.4		

*P-value paired t-test

The outcomes of surgical interventions and the initial presentation of CLP in several patients are depicted in Figure 3.

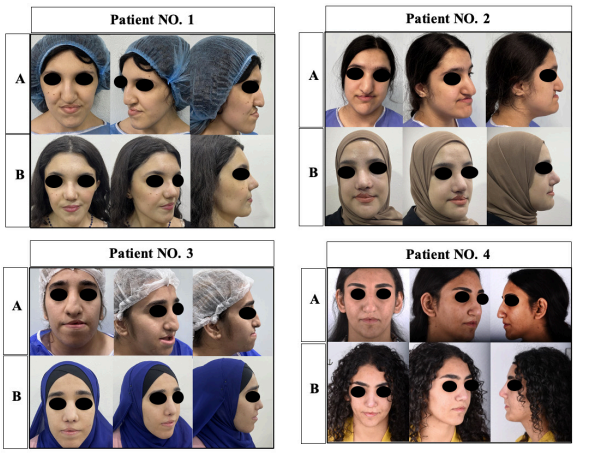

Figure (3). The initial form of CLP (CLP and the result of surgical procedures) in 4 patients before and after surgical procedures. (A) before surgery (B) after surgery.

DISCUSSION

The findings of the present study point clearly to a strong improvement in patient satisfaction following secondary rhinoplasty in individuals with cleft lip and palate. The ROE score rose sharply after surgery, and this pattern was stable across age, sex, cleft type, and additional treatments. In practical terms, patients valued the outcome regardless of these variables, suggesting that secondary rhinoplasty is a broadly effective procedure. It is also noteworthy that satisfaction did not vary across surgical approaches, indicating that different techniques, when properly applied, converge on similar outcomes. The distribution of cleft types in this sample mainly unilateral cleft lip with anterior palate, resembles patterns described elsewhere. Chen et al.[9] and Van Geneugden et al.[10] reported comparable findings in different populations, which gives some confidence that the current group is not atypical.

Postoperative ROE improvements were observed whether or not patients had undergone cleft alveolus closure, orthodontic treatment, or orthognathic surgery. This agrees with the report by Vass et al.[11] where nasal appearance and function improved significantly after secondary rhinoplasty. They, like others[12] emphasized the usefulness of the ROE questionnaire as a consistent measure of surgical benefit. Similarly, Assouline-Vitale et al.[13] found high levels of satisfaction in unilateral CLP cases, reinforcing the pattern seen here. The present findings also resonate with Nguyen et al.[14] showed that rhinoplasty corrects structural deformities while improving breathing. In the present cohort, patients frequently mentioned both cosmetic and functional gains, suggesting that the procedure delivers a combined benefit rather than addressing aesthetics alone.

Concerning grafting, septal cartilage was the material

most often employed, followed by costochondral and auricular grafts. This hierarchy matches prior reports.[15, 16] Although a range of grafting strategies are available[6] what matters in the end is not the specific material but whether the intervention restores balance and meets patient expectations. Several previous studies strengthen these findings. Rot et al.[17] and Khan et al.[18] both documented a marked rise in ROE scores after rhinoplasty, essentially mirroring what we observed. Likewise, Doval et al.[19] and Insalaco et al.[20] reported that varied techniques delivered comparable improvements in appearance, quality of life, and function. Taken together, these studies suggest that surgical philosophy, tailoring to patient needs and minimizing complications, is more important than rigid adherence to a single method.

An interesting finding emerged from the comparison with healthy volunteers. The mean ROE score of normal individuals was lower than that of patients after surgery. This does not mean that surgically treated patients had "better" noses than controls. Rather, it reflects how satisfaction is strongly influenced by relative change. For many patients, the contrast between pre and post operative appearance created a powerful sense of improvement. As other authors have noted [21, 22], the benchmark of success lies not in achieving perfect symmetry but in restoring a more typical appearance and improving social confidence.

CONCLUSIONS

Rhinoplasty in CLP patients also showed good results with post-operative ROE scores indicating great satisfaction with secondary rhinoplasty. These improvements were similar among groups and methods and septal cartilage was the most prevalent graft. The results also validate the ROE questionnaire as a valid instrument of outcome measurement. Altogether, secondary rhinoplasty is a reliable source of functional and psychosocial advantages, which makes it a sound alternative to enhance the quality of life in this group of patients.

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CONFLICT OF INTEREST
Authors declare no conflict of interest.
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AUTHORS' CONTRIBUTION

The following authors have made substantial contributions to the manuscript as under:

Conception or Design:	NAS, SNA
Acquisition, Analysis or Interpretation of Data:	NAS, SNA, SWB
Manuscript Writing & Approval:	NAS, SNA, SWB

All the authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.