International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2022): 7.942

Assessment of Nasolabial Aesthetics in Treated UCLP Patients: A Photographic Evaluation

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Abstract: ***Esthetic evaluation of cleft lip and palate rehabilitation outcomes can assist in the development of new surgical interventions and aid in the betterment of CLP patients. The present study aimed at aesthetic assessment of the nasolabial region in subjects already undergone treatment for unilateral cleft lip and palate. In this retrospective study, 28 patients between 15-30 years of age, who had been already treated for unilateral cleft lip and palate, were evaluated from the extraoral frontal and profile photographs, all cropped and arranged according to the Aesthetic Index and evaluated by 4 groups of observers based upon their experience. Statistical analysis was performed using the SPSS 22.0 (Windows) Software.A maximum of the analyzed subjects received the low mean nasolabial aesthetic score. Interrater analysis revealed high to moderately reliable assessments made by both experienced and inexperienced professionals. The interrater comparison showed experienced professionals provided a higher score in comparison to inexperienced professionals. Results of our study concluded that overall acceptable to poor nasolabial esthetics exist among the UCLP patients even after undergoing various primary and secondary surgeries. Experience with the CLP and outcome had been found to be a cofounding factor affecting the perception ratings of such patients.***

Keywords: Nasolabial Esthetics, Cleft Lip and Palate, Aesthetic Index, Aesthetics

1. Introduction

The human face represents the first recognizable image and identification of a person, and disorders of facial structures have a high impact not only on the anatomy, physiology, and function of the facial region but also on the individual's acceptance and integration with the society[1]. Cleft lip and palate is a congenital abnormality caused due to abnormal facial development during the gestational period. Orofacial clefts are the most common congenital anomaly after club foot, occurring in about 1.7 in every 1000 live births[2]. A complex combination of many environmental and genetic factors contribute to its development[3].

Several studies report no major psychosocial problems in cleft lip and palate patients above that of the noncleft population[4]. However, a systematic review by Herkerath et al,2015 reported that patients with cleft lip and palate are at higher risk for behavioural problems, dissatisfaction with facial appearance, and impairment of certain aspects (marriage and friendships) of social functioning[5]

Cleft lip and palate (CLP), that interfere with the anatomy of the mouth and the nose can cause a lot of sequelae for the patients. The primary aim in the treatment of patients with CLP is to correct the anatomy of the orofacial region to obtain a good facial appearance. From birth to adulthood, patients with CLP undergo several surgeries. Primary surgery is one of the most important, which determine the patient's aesthetic throughout their life. Since the nasolabial aesthetics is an important factor for facial aesthetics, hence its appearance is one of the most important factors for evaluating the success of the surgical treatment[6].

Nasolabial esthetics is evaluated by both qualitative and quantitative methods. The quantitative method depends upon measuring the extent of abnormal morphology and disproportions through facial measurements, and the qualitative depends on indices, scales, and scoring systems. Various indices have been proposed and used for this purpose such as CARS, Asher -McDade scoring, Aesthetic Index. Oldest among these was Asher-McDade scoring system[7] which uses cropped photos of the nasolabial region based on the symmetry of nose, vermilion border, nasal tip and nasal profile on the five-point ordinal scale whereas the aesthetic index uses the frontal and profile photographs with added text for each five grade to increase the objectivity and subjectivity of the index.

The objective of this study is to evaluate the nasolabial aesthetics of unilateral cleft lip and palate patients by using the aesthetic index. The secondary objective was to observe the difference in perception of nasolabial esthetics by experienced and inexperienced professionals.

2. Material and Methods

Subject: - This was a cross-sectional study done in the Department of orthodontics and dentofacial orthopedics, with a total of 56 frontal and Profile photographs of 28 patients with repaired unilateral cleft lip and palate, retrieved retrospectively from a private orthodontic clinic, Punjab. Frontal and cleft side profile photographs were arranged and evaluated by 4 groups of observers based upon their experience levels with UCLP patients according to the Aesthetic Index on a 5-point ordinal scale (1 representing excellent and 5 representing very poor) according to the index.

The inclusion criteria were as follows: All the patients aged between 15-30 years. Photographs with the face in the neutral position. Patients with Non-syndromic Unilateral cleft lip as diagnosed, Unilateral cleft lip and alveolus (UCLA), or Unilateral cleft lip, alveolus, and palate (UCLAA). Exclusion criteria were: No History of official Trauma or an incomplete or bilateral cleft.
Design:
All the photographs were assessed by following 4 groups of people.
Group 1- Orthodontists (with several years of experience)
Group 2- Third-year residents
Group 3 -Second-year residents
Group 4 -First-year residents

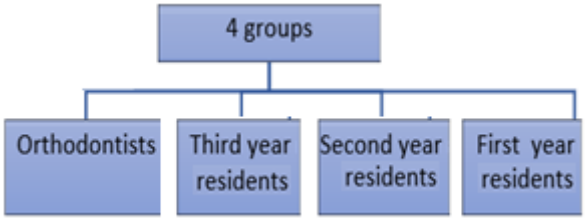


Figure 1: Division of observers into different groups

Assessments were done at two-time points. The first assessment was done on day 1 and the second after two weeks.

Before, both the assessments, proper training was done for all the observers. An indexed guide constructed on an A3 card, containing photographic illustrations and descriptive criteria for each of the five categories was provided to every observer for the bias-free and true aesthetic judgment. All the photographs were cropped using photoshop (Adobe system, Inc, San Jore, CA), according to the photographic criteria proposed by Johnson and Sandy[8](Figure2). The appearance was evaluated based on the different elements in the profile and frontal view such as the anteroposterior relationships of the soft tissues of the lower face and the nasolabial profile were assessed on the profile view. For the frontal view, the criteria included upper lip symmetry, scarring, and continuity of the vermilion border and for the nose, symmetry of the nostrils and alar bases and centrality of the columella on a scale of 1 to 5, where one represented a very good appearance and 5 a very poor appearance based on the cumulative features on both the photographs.

A better outcome was represented by a lower score, and a high score represented a worse outcome. All the photographs were randomly displayed on a white projection screen with a display time of 40 seconds and a 5-second break in between the displays. Four orthodontists and nine post-graduate students from different years of residency assessed the photographs independently based on the aesthetic index. The second assessment was done two weeks after the first assessment. The same photographs were randomized and were evaluated by the same 4 groups of observers by the same forgoing method. The values were summarized and sent for statistical analysis.

Figure 2: Photographs used for the assessment

Statistical Analysis:
Statistical analyses were performed based on SPSS 22.0(Windows). The overall nasolabial assessment was observed as the mean value of all the groups. Reproducibility was tested by analysis of Intraobserver agreement using a Weighted Kappa statistic. The interpretation of the Kappa statistic follows the recommendations of Landis and Koch1977[9] (table2). The interobserver agreement was found using the Mann-Whitney test and a p-value less than 0.05 represents significance.

Table 2: Koch and Landis kappa value recommendations

Kappa value	Strength of agreement
<0.20	Poor
0.21-0.40	Fair
0.41-0.60	Moderate
0.61-0.80	Good
0.81-1.00	Very good

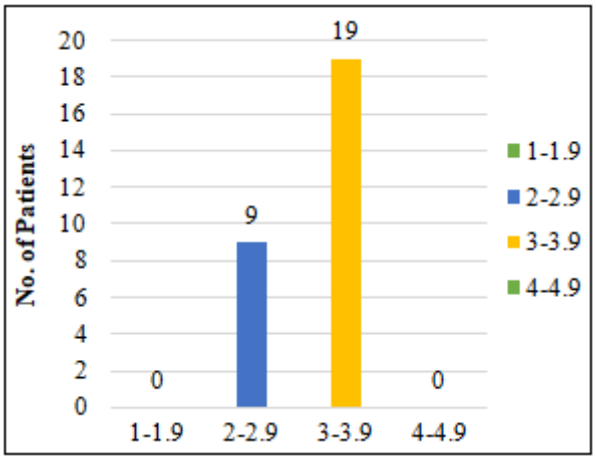
3. Results

Nasolabial esthetics outcome
The cumulative mean score from the assessments for each sample was evaluated and analyzed according to the data given (Table3).

Table 3: Criteria to assess the overall aesthetic results of the treatment based on the mean value scores

Mean Score	Outcome
1 -1.9	A good outcome needs minimal treatment
2 -2.9	Acceptable outcomes require only orthodontic correction
3 -3.9	The poor outcome, might require surgical correction
4 -4.9	Poor outcome, surgical correction required

Out of 28 patients only 9 subjects scored between 2-2.9 Indicating acceptable outcomes, requiring only Orthodontic correction for more improved aesthetics whereas 19 patients scored mean average values 3 and above, interpreting poor outcome as shown in Graph 1.



Graph 1: Graph representing the distribution of the patients based on their mean score

Comparison between different groups of observers:
On analysis of the comparison between different groups of observers, using Mann Whitney test, to facilitate the potential influence of observer experience on rating the aesthetic of the UCLP patients. The results of comparison between the orthodontists and the postgraduate residents of second and third years came out to be non -significant (p-value greater than 0.5) during the assessments, whereas it came out to be significant with a p-value of 0.04 and 0.01 between first-year residents and the Orthodontists group during both the assessments. The difference in the assessments between the groups can be owned to experience and knowledge about the different treatment modalities and their aesthetic outcome, affecting the overall perception of the observer, in cleft lip and palate patients

Table 4: Comparison between different groups of observers

Intergroup	P value	
	Assessment series I	Assessment series II
Group1 Vs Group 2	0.18	0.27
Group1 Vs Group 3	0.18	0.51
Group1 Vs Group 4	0.04*	0.01*

Intraobserver Reliability:
As intraobserver Reliability is defined as the degree of agreement among multiple repetitions of the test performed by the single observer. The interobserver agreement of this index came out to be Good to moderate for the 2-assessment series(table5), indicating good reproducibility of the index, for the assessment of the aesthetic outcome in UCLP patients. As this index introduce an element of objectivity to the Subjective decision by including text criteria for each index category as explained earlier.

Table 5: Results of the intraobserver reliability for all the 13 observers

Weighting kappa range	Agreement signified	Frequency of reliability between assessment series 1 and 2
<0.20	Poor	1
0.21-0.40	Fair	2
0.41-0.60	Moderate	7
0.61-0.80	Good	4
0.81-1.00	Very good	

4. Discussion

The aesthetic outcomes of cleft lip and palate treatment have great importance due to the psychosocial consequences of this defect for the patients. Different surgical techniques are used for the correction of CLP. The objective of performing different surgeries is to achieve symmetry of both lips and nose both during rest as well as function. However, with time this symmetry tends to be lost either by contraction or hypertrophy of scar of lip resulting in an unfavourable outcome. Photographic evaluation of nasolabial esthetics is one of the standard tools to evaluate the surgical outcome.

Mosmuller DGM et al[6,] searched 428 articles, between the years of 2003 and 2011and found that scoring on 2D is more applicable in daily practice and easier to perform because all CLP patients are photographed during their treatment in assessing facial deformities in CLP while 3D imaging seems the most reliable. In this study, we evaluated the nasolabial aesthetics ofUCLP subjects of 15 to 30 years of age with 28 frontal and profile photographs. We used Aesthetic Index which is a reliable and reproducible rating system.

The **aesthetic index** was preferred to carry out the study as it involves the evaluation of nasolabial aesthetics with a single grade on a scale of 1-5. This index offers advantages in terms of simplicity, flexibility and is not affected by the sample's age. This index was used in the Eurocleft study and subsequently various other studies confirmed it to be a reliable method of classification in the assessment of nasolabial appearance[10.] The findings of our study were also supported by a field study[11], conducted in Australia with trained examiners, who evaluated the patients both directly and indirectly through photographs taken at the same time. The comparison of the direct and indirect assessment and agreement was found to be moderate to good with no significant bias. Hence, concluding that the reproducibility of this index was good same as found in our study. The aesthetic evaluation on 2D photographs saved the patient from the extra cost of imaging modalities for aesthetic evaluation. The use of photographs for aesthetic evaluation was also supported by Almeida et al[12] in 2005, who proposed that photographic facial analysis can assist in assessing the balance of cranial facial structures. Becker et al[13]carried out an analysis of the correlation between clinical examination and morphometry from digital photographs for evaluation of repaired cleft lip by using 20 variables describing the nasal labial appearance and found that the two methods showed high consistency.

Effect of treatment modality used: - The type of treatment modality used for the correction of cleft lip and palate in the early years of age, was not considered in our study. A study by Nollet et al[10]reported no correlations between aesthetics, Dental occlusion, and the width of the slit at the start of the treatment, which overall concluded that treatment protocol could not explain the difference in the evaluation results. Additionally, Fudalej et al[14], did a study comparing nasal labial aesthetics after different treatment protocols. They used 4 Observers to assess the four components of nasolabial appearance in 60 children, who underwent surgical repair of the lip in one stage, and 48 children, who underwent lip repair in three stages. The results of this study showed no difference between the two protocols, concluding that Nasal appearance after one or three-stage repair is similar. Moreover, it was found that the aesthetics of the nasolabial area doesn't seem to be affected by the lip repair technique.

Experienced Professional v\s non-experienced professional evaluation: - In our study, a marked difference was noticed in the rating skills of different observers. Poor agreement was found between staff groups when compared to first-year residency students with a p-value less than 0.04. Indicating that the level of experience does affect the perception of the nasolabial region in UCLP patients. The findings of our study were also supported by Mani et al [15] and Paiva TS et al [16] who evaluated the relationship between classification by professionals and laypersons followed by patients' satisfaction with a nasolabial appearance in adults with BCLP. The descriptive results of this study found a low correlation between laypersons and professionals. Hence it was suggested by the authors that judgment of nasolabial appearance differs among professionals, laypeople, and patients. Therefore, this must be considered whenever the decision to perform surgical refinishing of the unsightly cleft appearance has to decide.

5. Conclusion

Facial deformities generated by cleft lip and palate are crucial in the socialization and quality of life of these patients. The aesthetic index comes out to be an index with good reproducibility and reliability for the evaluation of nasolabial outcomes in UCLP patients. Aesthetics in the current cohort came to be poor to average indicating that we need more development in this field to provide an acceptable appearance to these patients. Moreover, it was found that health professionals, not experienced with the cleft lip and palate overall protocols, do differ in their perception regarding the aesthetics for such patients.

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