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Facial Changes in Patients with Nasolabial Deformities Undergoing Primary Cheilorhinoplasty

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Abstract

Aim: Clefts Lip and Palate (CLP) are the craniofacial anomalies congenital more common, causing an impact on psychosocial development in patients; treatment for the correction of CLP is a challenge for the surgeon in order to restore aesthetics and function.

Objective: The aim of this research is to evaluate facial changes in patients with nasolabial deformities undergoing primary cheilorhinoplasty. Materials and methods: A sample of 38 patients meeting inclusion criteria was obtained, who presented moderate nasolabial deformity for the nasal component and severe for the labial component to which anthropometric measurements were taken in preoperative and immediate postoperative and control at 6 and 12 months.

Results: The pre- and postoperative facial changes were favorable both in the nasal region and in the labial region in the immediate postoperative period ($p<0.000$), which was maintained during the postoperative controls at 6 and 12 months, as well as facial symmetry where significant changes were presented in the immediate postoperative period ($p<0.000$) persisting over time.

Conclusion: Primary cheilorhinoplasty aims to restore symmetry and reposition the nasal and labial structures, allowing proportional growth in the future, demonstrating that it is the surgical technique for correction of nasolabial deformities.

Keywords: Cleft; Soft tissues; Symmetry

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Introduction

Of the congenital craniofacial anomalies, it has been reported that the lip and palate clefts (LH) are the most common, in them alterations are presented in the nasal and labial region, as well as in the palate, compromising the aesthetics, function and progressive development of the face and speech. Over the years, theories have been proposed that describe the development of these clefts, however, most of the literature reports that their etiology is multifactorial.

When talking about the predominance of the same, it has been reported higher incidence in the male gender in labial clefts and female in palatal clefts and its treatment involves the evaluation of a multidisciplinary team in various stages, pediatricians, pediatric dentists, orthopedics and dentofacial orthodontics, ENT, psychologists, phonologists, and highly trained and experienced oral and maxillofacial surgeons, seeking to restore aesthetic appearance, normal language and hearing, nasal airway patency, class I occlusion with normal masticatory function, good dental and periodontal health, as well as normal psychosocial development [1].

Physical appearance influences society when it comes to relating to others, therefore, CLP patients can have an impact on psychosocial development and their environment, leading to require timely attention. Correction of nasal and labial deformity is a complex surgical challenge, and can be complicated by long-term facial changes, due to the growth and sequelae of scars. Several surgical techniques of primary cheilorhinoplasty have been described, where it seeks to restore symmetry and reposition the nasal and labial structures, allowing growth proportionally in the future.

Poor management of tissues in the nasal and labial region during surgery can produce sequelae that exacerbate the degree of deformity, meriting surgical management for correction; therefore, CLP patients require individualization to determine the surgical technique to be used. Multiple

cheiloplasty techniques have been established for labial clefts, where it does not establish the correction of the rhino-deformity present; In the past it was feared that early nasal repair would cause a detrimental effect on the growth of the nose and maxilla [2]. Milard [3], reported dissection of the lateral alar cartilage in its lower portion and replacement of the septal cartilage during primary cheiloplasty. Therefore, the beginnings of primary cheilorhinoplasty were through the studies of McComb [4], establishing interest in primary rhinoplasty; When his procedure was first presented in 1975, some of the surgeons suggested that performing primary rhinoplasty could interfere with the subsequent development of the nose.

Thanks to the support of Byrd et al. [5], Cussons et al. [6], and Haddock et al. [7], who stated that primary rhinoplasty together with primary cheiloplasty are stable over time, decreasing the likelihood of a second intervention. Studies conducted by Costello and Ruiz 2009 [1], establish that the surgical technique in patients with unilateral labial clefts, where a primary nasal reconstruction is performed, is through a combination of techniques under McComb's principles. Mulliken 1992 [8], establishes a surgical technique for bilateral labial clefts, proposing in a single surgical time to address the nasal and labial region with construction of the columella.

Materials and Methods

The following study is descriptive, observational longitudinal section, where there was a population of 58 patients with nasolabial deformities undergoing primary cheilorhinoplasty, who attended the Oral and Maxillofacial Surgery Service of the Dr. Ángel Larralde University Hospital in the period 2017-2020. We selected 38 patients who met the inclusion criteria: Patients diagnosed with nasolabial deformity, older than 3 months of age, operated on between January 2017 and February 2020, without associated systemic alterations, registration of pre- and post-operative clinical photographs, who had informed consent and who complied with postoperative controls.

Data collection was obtained through the patient's medical history, physical evaluation identifying the altered anatomical structures and the use of standardized digital clinical photographs in a frontal and caudal view with a 1:1 ratio. Anthropometric measurements were taken with stainless steel Castroviejo caliper (accuracy 1 mm), (Table 1 and Figure 1, 2). The type and severity of each patient is established by the classification of Percy Rossell (2009), to determine the surgical technique.

Through SPSS software, version 19.0 (IBM SPSS Statistics), all statistical analyses were obtained. Independent variant tests were performed evaluating the frequency of the type of nasolabial deformity with severity rating. The analysis of the dependent variants through T-Student, determined the facial changes in patients undergoing primary cheilorhinoplasty with its immediate pre and postoperative control, control at 6 months and then control at 12 months.

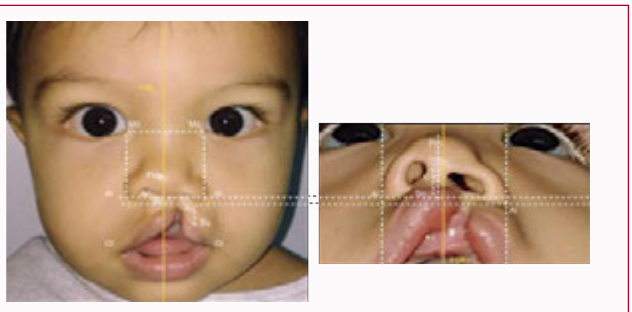

Figure 1: CLP unilateral.

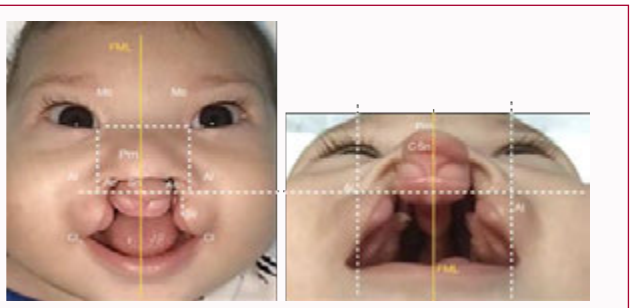

Figure 2: CLP bilateral.

The patients were taken to the operating table, where subsequent monitoring by the anesthesiology service, anesthetic induction and orotracheal intubation and balanced general anesthesia protocol were performed. It complies with standards of intra- and extraoral asepsis and antisepsis, placement of sterile fields and marking of previously established anatomical reference points; Local anesthetic infiltrates approach areas (Lidocaine 2% with epinephrine 1:80,000) without altering the reference points.

Patients with unilateral nasolabial deformity were performed the Tennison Randall technique and use of asymmetric nasal shaper with respect to the diameter of the healthy nostril, fixed with nylon 5-0 with support to avoid damage to the skin region.

For patients with bilateral nasolabial deformity, primary cheilorhinoplasty was performed using the Mulliken technique with the use of symmetrical nasal shapers fixed with 5-0 nylon with support, to avoid damage to the skin region.

The patients were discharged from the operating table without complications, with a hospital stay of 24 h, with previous postoperative cure and daily control for 7 days, removal of nasal formers on the 5th

Table 1: Preoperative facial anthropometric measurements.

	1	(Prn)/(FML)	Horizontal distance of the nasal tip from the midface line
Nasal region	2	(Mc-Mc)/(Al-Al)	Horizon distance to that of the inner most portion of the medial edges in relation to the horizontal distance of the most lateral edge of the nasal alae to them.
	3	(Prn)/(Sn)	Vertical distance from the anterior projection of the nose to the intersection of the base of the columella and upper lip
	4	Columella length (C)	Vertical distance from the upper medial portion of the nasal fossa to the columella base
	5	Symmetry of nostrils	Horizontal distance in mm, from point Al with respect to FML and from point Ac with respect to FML on each side.
Region labial	6	Upper lip length	Vertical distance from the lateral lower border of the nasal wing to the intersection of the upper vermilion of the cleft segment
	7	Lip symmetry	Horizontal distance in mm, from Cl to FML on each side.

Legend: Prn: Nasal tip; FML: Facial Midline; MC: Medial Canthi; Al: Lateral edge of nasal Alae; Sn: Sub-nasal Point; C: Columella; Ac: Lateral portion of the Columella; SV: Superior Vermilion; Cl: Labial commissure

Table 2: Classification of severity of rhino-nasal deformity by presurgical facial analysis according to Percy Rossell (2009).

Type of cleft lip		Nasal component			Lip component			
	N°	Low	Moderate	Severe	Low	Moderate	Severe	%
Unilateral	25	8	17	0	7	7	11	65.8
Bilateral	13	2	6	5	10	3	0	34.2
Total	38	10	23	5	17	10	11	100

Table 3: Pre- and post-operative facial changes in patients with unilateral rhinocobal deformities undergoing primary cheiloplasty.

	Prn/FML			ICD/AN			Prn/Sn			length of the columella			Upper lip length		
	Media mm	S.D mm	Sig	Media mm	S.D mm	Sig	Media mm	S.D mm	Sig	Media mm	S.D mm	Sig	Media mm	S.D mm	Sig
Preoperative	3.40	1.44		4.08	2.70		10.52	1.93		5.32	1.84		10.52	2.81	
POI	0.28	0.61	0.000	1.00	2.17	0.000	15.28	1.64	0.000	10.04	1.92	0.000	13.72	2.40	0.000
Control 6 months	0.28	0.67	1.000	1.08	2.25	0.324	16.40	1.82	0.000	9.84	1.70	0.307	13.60	2.95	0.657
Control 12 months	0.28	0.67	1.000	1.48	2.16	0.002	16.92	2.13	0.091	11.08	1.32	0.000	13.96	2.95	0.249

Legend: Prn: Nasal tip; FML: Facial Midline; ICD: Internal intercanthal distance; An: Nasal Width; Sn: Subnasal Point; S.D: Standard Deviation; Sig: Significance; POI: Immediate Postoperative

Table 4: Pre- and postoperative facial changes in patients with nasolabial deformities undergoing primary cheilorhinoplasty.

	ICD/AN			Prn/Sn			length of the columella			upper lip length		
	Media mm	S.D mm	Sig	Media mm	S.D mm	Sig	Media mm	S.D mm	Sig	Media mm	S.D mm	Sig
Preoperative	4.08	2.62		7.15	2.41		2.23	0.99		11.23	2.61	
POI	1.23	1.53	0.001	14.08	2.78	0.000	9.54	2.25	0.000	14.31	1.43	0.001
Control 6 months	1.54	1.39	0.394	15.00	2.88	0.002	10.15	2.44	0.055	14.38	2.10	0.877
Control 12 months	2.15	1.90	0.025	15.69	2.25	0.095	10.38	1.89	0.553	15.08	1.80	0.032

Legend: ICD: Internal canthi Distance; An: Nasal Width; Prn: Nasal Tip; Sn: Subnasal Point; S.D: Standard Deviation; Sig: Significance; POI: Immediate Postoperative

Table 5: Postoperative facial symmetry relationship.

	Al-FML			Ac- FML			Cl-FML		
	Media mm	S.D mm	Sig	Media mm	S.D mm	Sig	Media mm	S.D mm	Sig
Preoperative	2.87	2.00		1.79	1.41		2.42	1.91	
POI	0.66	0.96	0.000	0.55	0.92	0.000	0.74	0.89	0.000
Control 6 months	0.61	0.82	0.744	0.42	0.68	0.096	0.58	0.75	0.225
Control 12 months	0.66	0.81	0.487	0.47	0.79	0.487	0.55	0.76	0.324

Legend: FML: Face Midline; Al: Lateral edge of nasal wing; Ac: Lateral portion of columella; Cl: Labial commissure; S.D: Standard Deviation; Sig: Significance, Poi: Immediate Postoperative

day and tissue synthesis on the 7th day.

In Table 2, it is reported that the most frequent type of labial cleft with 65% was in patients with unilateral cleft, presenting a moderate severity in the nasal component, and for the labial component it was of severe type. Compared to 34%, in patients with bilateral clefts where it was observed, that the moderate type of severity was the most frequent for the nasal component, and mild type for the labial component.

According to the pre- and post-operative facial changes where the correction of the nasal tip with respect to the midline in the immediate postoperative period was evident, reporting significant results (p<0.000), which was maintained during the postoperative controls at 6 and 12 months. The difference between the internal intercanthal distance and the nasal width decreased favorably, maintaining the proportion in the immediate postoperative period (p<0.000); However, this distance increased by an average of 2.25 mm at 6 months, reporting a significant result (p<0.000), which was maintained at 12 months. Likewise, a significant increase in nasal projection was obtained in the immediate postoperative period (p<0.000), which progressively increased over time evaluated in postoperative controls. The length of the columella, as well as the nasal projection, increased significantly, obtaining favorable results for patients in the immediate postoperative period (p<0.000), increasing progressively over time. In addition, the length of the upper lip was evaluated, showing significant changes in a favorable manner in the immediate postoperative period (p<0.000), persisting in the controls at 6 months (p<0.657), and at 12 months (p<0.249) (Table 3).

Table 4 reports the pre- and post-operative facial changes in patients with nasolabial deformities undergoing primary cheilorhinoplasty, where the difference between the internal intercanthal distance and nasal width decreased in the immediate postoperative period (p<0.000); with non-significant results in the postoperative controls at 6 months (p<0.394), and at 12 months (p<0.025). Regarding nasal projection, a significant increase was obtained in the immediate postoperative period (p<0.000), evidencing a significant increase in control at 6 months, which was maintained at 12 months; Furthermore, the length of the columella, as well as the nasal projection, increased significantly, obtaining favorable results for patients in the immediate postoperative period (p<0.000), without significant changes in the postoperative controls. The length

Figure 3: Pre and postoperative facial.

Figure 4: Pre and postoperative facial.

Figure 5: Pre and postoperative facial.

Figure 6: Pre and postoperative facial.

Figure 7: Pre and postoperative facial.

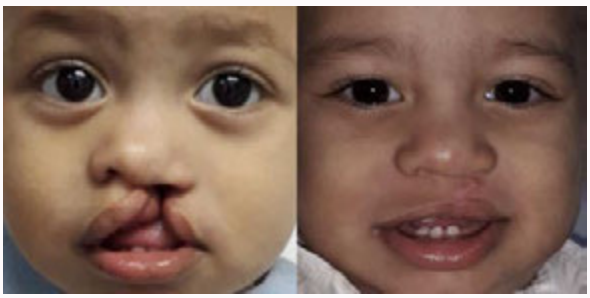

Figure 8: Pre and postoperative facial.

Figure 9: Pre and postoperative facial.

Figure 10: Pre and postoperative facial.

of the upper lip was also evaluated, reporting a significant favorable increase in the immediate postoperative period (p<0.000), persisting in the postoperative controls at 6 months (p<0.8.77) and at 12 months (p<0.032).

In relation to the facial symmetry of patients undergoing primary cheilorhinoplasty, evaluating the amount of asymmetry in each hemiface. Therefore, the horizontal distance of point AL-FML, presented a preoperative difference of 2.87 mm, reporting significant changes where a decrease in immediate postoperative control (p<0.000) was observed, which were maintained in the postoperative controls. For the vertical distance of point Ac-FML, a preoperative difference of 1.79 mm was obtained, evidencing significant changes in the immediate postoperative period (p<0.000), persisting in the postoperative controls at 6 months (p<0.096) and at 12 months (p<0.487). In addition, the Cl-FML point was evaluated, reporting a preoperative difference of 2.42 mm, where significant changes were obtained in the immediate postoperative period (p<0.000), with no significant change in the postoperative controls at 6 months (p<0.225) and at 12 months (p<0.324) (Table 5 and Figures 3-12).

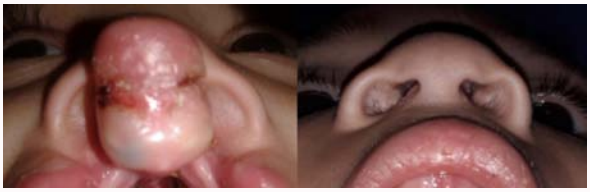

Figure 11: Pre and postoperative nasolabial region.

Figure 12: Pre and postoperative nasolabial region.

Discussion

Aesthetic results depend on the surgical technique used, as well as the experience to evaluate the results through clinical photographs, offering the benefit of rapid image capture to patients.

The patients presented a correction and alignment of the nasal tip with respect to the facial midline, persisting over time, presenting changes in the same way, in the study carried out. By Mancini, Gibson et al. [9], presenting a significant change in the POI, however, this study used the NAM prior to surgery. The nasal projection and length of the columella presented an increase in the POI which was maintained in the postoperative controls, in the investigations carried out by Ayoub and Garrahy [10], establishing that there was no postoperative reduction in the nasal projection. However, the study conducted by Tang [11], establishes that there is significant relapse in the nasal region 9 months after surgical resolution, which may be related to primary rhinoplasty without overcorrection and placement of symmetrical stents. As well as, the lip length reported in our study significant changes, persisting over time.

Regarding the results of patients with nasolabial deformities undergoing primary cheilorhinoplasty, when comparing nasal projection and columella length in the investigations carried out by Harrison [12], he reports that there was no significant change between the preoperative and immediate postoperative period, however, they report the use of Naso Alveolar Molding (NAM) as a pre-surgical protocol; compared to our result, evidencing the growth of the nasal projection being the same favorable for the patients, which persists over time as well as the labial length with significant changes in the immediate postoperative period in a favorable manner.

The evaluation of symmetry in the nasal and labial region, no significant differences were evident with Al, Ac, Cl in relation to the facial midline of each face, presenting very similar results with Sakai [13], who reported excellent results in the postoperative period. in patients undergoing primary cheilorhinoplasty. As well as the study carried out by Tang [11], referring to obtaining perfect symmetry with a nasal configuration immediately in the postoperative period, and significant results in the control at 9 months ($p<0.002$).

Furthermore, it is important to mention the presence of a scar in the labial region, which was not very evident in the postoperative controls at 12 months; Research carried out by Soltani [14] in 2012 reports a greater tendency towards hypertrophic scars in the Latin race, however, these results were not manifested in our study. Some research has reported facial changes by using CBCT scan by Miyamoto and Nkajima [15], and 3D photography proposed by He et al. [16], and several scanning techniques have been described. However, these indirect measurement techniques are often expensive, involve ionizing radiation, require sedation, and are not appropriate for young patients.

Conclusion

Through the results of this study, analysis and discussion, we concluded that unilateral clefts are more frequent with 65.8%, presenting moderate severity in the nasal component and severe for the labial component.

The unilateral and bilateral facial changes subjected to primary cheilorhinoplasty were significantly favorable in both the nasal region and the labial region in the immediate postoperative period ($p<0.000$), which was maintained during the postoperative controls at 6 and 12 months.

Facial symmetry in the nasal and labial region presented significant changes, observing a decrease in asymmetry in the immediate postoperative control ($p<0.000$), persisting in the postoperative controls.

The use of presurgical NAM has been established in many investigations, due to the favorable changes for patients, however, our investigation did not include the use of presurgical NAM. However, we achieved satisfactory results in the soft tissues of the nasal and labial regions, establishing facial symmetry in patients and function.

Recommendations

A thorough preoperative clinical assessment must be performed to determine the severity of the nasolabial deformities and ensure the ideal surgical planning and technique for each patient, in addition to explaining in detail the surgical procedure and postoperative management of the patients.

It is recommended to continue the evaluation of facial changes in patients with nasolabial deformities undergoing primary cheilorhinoplasty in the long term, in order to determine the modifications that occur in the soft tissues.

Likewise, continue monitoring according to care protocols in patients with nasolabial deformities for corrections of surgical techniques and primary surgeries.

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