Assessment of Deformities of the Lip and Nose in Cleft Lip Alveolus and Palate Patients by a Rating Scale

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Received: 14 July 2011 / Accepted: 26 September 2011 / Published online: 18 October 2011
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Abstract

Introduction Labial and nasal deformities have always been a fundamental problem in the treatment of cleft lip, alveolus and palate patients. The primary surgical treatment of nasolabial area is of paramount importance in order to obtain both an esthetical correction of the deformity and a progressive and a balanced development of mid-face. In this study the nasal deformities in patients with cleft lip, alveolus and palate (CLAP) were analyzed and the relevant role of the perinasal, perioral muscular balance and the inborn dislocation of the alar cartilages are presented.

Patients and Methods 50 CLAP patients were analyzed, 40 UCLP and 10BCLP. The lip repair was done by modification of Millard's technique. The severity of the cleft appearance was evaluated pre and post operatively, according to a pre-agreed visual rating scale. There are 4° of severity of the deformity pre operatively (mild, moderate, severe and very severe) and post operatively 5 categories of outcome (excellent, very good, good, satisfactory and poor), depending on the scores obtained by summing up the points corresponding to different types of deformity.

This scale is closely related to the American Cleft Palate classification of clefts.

Results In the 40 UCLP patients, 8 excellent, 10 very good, 16 good and 6 satisfactory results were obtained following primary cheiloplasty. In 10 BCLP patients 1 very good, 7 good, 1 satisfactory and 1 poor result were obtained.

Conclusions During the primary repair, it is important to correct the abnormal position of ala nasi, the nasal floor and the base of the columella. Abnormalities in the insertion of the nasolabial muscles with their abnormal function contribute to the cleft nose deformities. Therefore the reconstruction not only the orbicularis muscle but also of the paranasal muscles is therefore important for a symmetrical growth of the nose. Separate suture of intrinsic orbicularis oris provide a better shape to the vermillion. The position of the alar cartilage plays an important role for the symmetry of the nose. It is necessary to place the alar base symmetrically in three dimensions.

Keywords Cleft lip · Palate · Rating scale · Secondary deformities · Cheiloplasty

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Introduction

The complete unilateral cleft of lip and palate (UCLP) determines a condition of high asymmetry of mid-face. In fact, the lack of continuity of perilabial musculature, through the midline, contributes to the anomalous position of underlying osseous structures (i.e. pre-maxilla and hemi maxilla), which are often underdeveloped and misplaced on the affected side [1, 2, 19]. Moreover, the complete cleft of the lip, going up to the nasal floor causes an anomalous position of the nasal cartilages, both the septal and the alar

ones, determining a flattened nostril [1]. The primary surgical treatment of the nasolabial area is of paramount importance, in order to obtain both an aesthetical correction of the deformity and, a progressive and a balanced development of mid-face.

The postoperative results should also be analysed by taking into account the preoperative deformity. Thus, it should be possible to differentiate the deformities caused by the malformation itself (e.g. muscular equilibrium and/or dislocation of the alar cartilages), from iatrogenic deformities, and those caused by insufficient correction [3].

Objectives

The aim of this study was to analyze the nasal and labial deformities following primary Cheiloplasties in patients with cleft lip, alveolus and palate with an objective of assessment of each element of deformity.

Materials and Methods

This prospective study was carried out in NITTE Mee-nakshi Institute of Craniofacial surgery, a unit of A B Shetty Memorial Institute of Dental Sciences, Mangalore, between September 2004 and September 2006.

This study included a sample size of 50 patients of cleft lip alveolus and palate. (40 unilateral cleft lip alveolus and palate and 10 bilateral cleft lip alveolus and palate).

In 40 Unilateral cleft lip alveolus and palate patients there were 11 of right side and 29 were of left side.

Inclusion Criteria

Patients with complete Unilateral cleft lip alveolus and palate.

Patients with complete Bilateral cleft lip alveolus and palate.

Exclusion Criteria

Patients with associated syndromes.

In this study a rating scale previously used by Anastasov and Chipkov was used [4]. The scale is slightly modified as the surgical procedure was not based on triangular flaps.

At the time of surgery patient's ages ranged from 3 months to 30 years. These operations were carried out by a single surgeon. The surgeon used modified Millard's technique for primary lip repair.

The pre-operative and post-operative assessment was done by the author. Patients received multidisciplinary

facial cleft consultation. After surgery, they were seen 7 days postoperatively and then surgical outcome was analyzed at least 6 months postoperatively by clinical examination. Photographs were taken at each consultation.

The application of this method helps to obtain the following data from every patient.

- Initial assessment of the severity before operation;
- Postoperative assessment at different stages of treatment and reassessment after each operation.

Classification of the Severity of the Cleft Before Surgery

It is based on the principle of dividing the cleft into thirds, i.e. nose and lip, hard palate as well as soft palate. The rating system is constructed on the principle of giving points to each element characterizing both cleft and nasal deformities and adding them to obtain a total score. Each element of the cleft deformity is given 1 point if obvious. The maximum score in bilateral clefts is 16 points (Fig. 1).

The score, referring to the nose, lip and primary palate is called presurgical severity score. The patient's appearance can be divided into 4° according to the severity of the cleft (Table 1).

Classification of the Postoperative Results or Secondary Deformities

It is based on the same anatomic divisions. The elements of this second classification represent the different residual deformities that were not corrected, acquired new deformities or the unaesthetic results (consequences). The scores referring to the nose, lip and primary palate enable assessment of the postoperative results. The post surgical ratings were obtained in a separate rating session and in different order than the pre surgical ratings. Each residual anomaly was given a score that depended on the difficulty in correcting it surgically (Fig. 2, Tables 2, 3).

Results

This prospective study was carried out between September 2004 and September 2006. Surgical outcome was analyzed at least 6 months postoperatively by clinical examination.

Primary Cheiloplasty was performed by modified Millard technique on 50 patients aged from 3 months to 30 years. Forty of those were unilateral clefts of lip, alveolus and palate. 10 scored as "moderate" and 30 as "severe". Ten patients were bilateral CLAP, all of them classified as "very severe" (Chart I).

Fig. 1 Evaluation of the presurgical cleft lip and nose deformity. *Note:* Protrusion of premaxilla, short columella, and median hypoplasia of lip is assessed only in bilateral cases

Table 1 Presurgical severity score

Categories	Score
Mild	1–3
Moderate	4–6
Severe	7–11
Very severe	12–16

In the 40 Primary Unilateral Cheiloplasties

8 “excellent”, 10 “very good” 16 “good” and 6 “satisfactory” results were obtained (Chart II). The most common deformity after primary cheiloplasty was the defect of

the soft tissue triangle of the nose (31 out of 40 cases), followed by scar straight on philtrum, low position of ala, septal deviation 26, notch of red lip 22, short columella 13, large sill 12, defects of vermilion border 12, white lip too short 10, excessive wrapping of ala 9, insufficient wrapping of ala 8, Straight depressed scar 6, Straight prominent scar 6, Bulge of Red lip 5, Narrow sill 5, White lip too long 2, Restricted oral vestibule 1, Columellar base too wide 1, Lateral lip too thin 1, Cupid bow & philtrum too wide 0, Wide oral vestibule 0, Flat & hypoplastic ala 0, Diastasis of muscle 0, Nasolabial fistula 0, Lateral lip too thick 0, Protrusion of premaxilla 0, Cupid bow & philtrum too narrow 0, Columella base too narrow 0, High position of ala 0, Dehiscence of vermilion 0, total dehiscence of lip 0

Fig. 2 a Patient 1—preoperatively score 7. b Patient 1—postoperatively score 0.5: 0.5 points for the defect of the soft triangle

Table 2 Classification of the postoperative results or secondary deformities

Anatomical elements	Assessment	Diagram	Score
Red lip	Bulge		0.5
	Notch		0.5
	Lateral lip thick		1
	Lateral lip thin		3
	Defects of vermillion border		0.5
Oral vestibule	Restricted		1
	Too wide		2
Premaxilla	Protrusion		2
White lip	Too short		1
	Too long		1
	Diastasis of muscle		3
	Cupid bow and Philtrum too narrow		4
	Cupid bow and Philtrum too wide		2
	Columella too short		0.5
	Scars		0
Nose	Straight on philtral border		1
	Straight depressed		1
	Straight prominent		1
	Septal deviation		2
	Large sill		0.5
	Narrow sill		0.5
	Columellar base too wide		0.5
	Columellar base too narrow		0.5
	Insufficient wrapping of ala		0.5

Table 2 continued

Anatomical elements	Assessment	Diagram	Score
Dehiscence lip, nose	Excessive wrapping of ala		0.5
	Defect of upper part of nostril rim		0.5
	High position of ala		0.5
	Low position of ala		0.5
	Flat & hypoplastic ala		3
	Nasolabial fistula		2
	Dehiscence of vermillion		2
	Total dehiscence of lip		10

case, (respective number of cases showing the deformity out of 40 cases) (Chart III).

In the 10 Primary Bilateral Cheiloplasties

1 “very good”, 7 “good” 1 “satisfactory” and 1 “poor” result were obtained (Chart II). The most common deformity after primary cheiloplasty was the defect of the soft tissue triangle (9 out of 10 cases) and short columella (9 out of 10 cases), Scar straight on philtrum 7, Large sill 6, Notch of Red lip 5, Restricted oral vestibule 5, Defects of vermillion border 4, Cupid bow & philtrum too wide 4, Low position of ala 2, Septal deviation 2, Insufficient wrapping of ala 2, Flat & hypoplastic ala 2, White lip too short 1, Excessive wrapping of ala 1, Straight depressed scar 1, Straight prominent scar 1, Columellar base too wide 1, Nasolabial fistula 1, Bulge of Red lip 0, Narrow sill 0, White lip too long 0, Wide oral vestibule 0, Lateral lip too thin 0, Diastasis of muscle 0, Lateral lip too thick 0, Protrusion of premaxilla 0, Cupid bow & philtrum too narrow 0, Columellar base too narrow 0, High position of ala 0, Dehiscence of vermillion 0, Total dehiscence of lip 0, (respective number of cases showing the deformity out of 10 cases) (Chart IV).

Discussion

From the results of this prospective study, it is obvious, that the defect of the soft tissue triangle of the nose is the most common problem in both unilateral and bilateral clefts. In a

study by Anastassov [4] similar deformity was found predominantly in both unilateral and bilateral lip Cheiloplasties. The lack of insertion of the transverse nasal muscle to the anterior nasal spine leads to dislocation of the medial alar cartilages and insertion into the skin, which takes place in utero [28, 29]. Correction of this deformity might be achieved following primary cheiloplasty. It is not possible to correct this deformity by secondary cheiloplasty, unless the open rhinoplasty technique would be utilized which allows for proper repositioning of the alar cartilages, as well as redraping of the overlying nasal skin [4].

Many surgeons prefer the Millard rotation-advancement lip repair because the surgical scar is masked in the philtrum crest and the nostril floor. In our study 36 cases out of 50 have the scar straight on philtral border. This is a favorable outcome.

It is said that success or failure of a surgical procedure depends on the degree of palatal deformity at the time of surgery as well as surgical skills and surgical procedure utilized [3]. This fact has been considered in this rating scale in assessment of pre operative deformity. Depressed alar base indicates a failure to mobilize the ala and bring it forward. Development of ala appears lacking, and defect of bony piriform base of maxilla is seen in some cases [2]. In our study 58% of patients presented with low position of ala.

The incorrect position and direction of the paranasal muscles seems to be responsible for the deviation of the septum and the alar base. It is recommended that the reconstruction not only of the orbicularis muscle but also of the paranasal muscles is therefore important for a

Table 3 Categories of outcome

Categories	Score
Excellent	0–1.5
Very good	2–3.5
Good	4–5.5
Satisfactory	6–8
Poor	8.5–16

Chart I Pre-surgical severity **Chart II** Surgical outcome

symmetrical growth of the nose. Delaire [5] recommended a wide subperiosteal dissection of the facial nasolabial muscles in order to change the abnormal direction and position.

The length of the columella is fundamental for the symmetry of the nose. In unilateral clefts a lengthening on the cleft side is necessary. The Millard technique can be modified to achieve this. One way of lengthening the (hemi) columella is by incorporating the C-flap in the back cut of the base of the columella to allow lengthening on the cleft side. This flap is fixed to the septum. Another possibility is the stretching of the columella with the nasolabial molding technique

A short columella is typical of bilateral clefts. 9 out of 10 patients in our study had short columella. Analysis of the postoperative evolution of this deformity is premature, as 7 of the 10 patients are still younger than 3 years. High position and insufficient wrapping of the ala is also due to the lack of insertion of the transverse nasal muscle to the anterior nasal spine.

The rest of the observed defects such as the defect of Cupid's bow, bulge or notch of the vermillion are due to surgical errors. However, these may be easily corrected by minor revisions. One study [6] found very high incidence of peaking (65%) and notching (45%) in that study group. Although adequate lip length was achieved, there was some peaking at the Cupid's bow on the cleft side many patients had vermillion notching. It is believed that the high incidence of notching results from the vermillion on the noncleft side already beginning to taper at the level of the peak of Cupid's bow [5].

After medial rotation of the alar base, it is rather better to leave a slightly large nostril, since this is better and easier to correct than a narrow nostril. The transverse nasal muscle must be inserted into the anterior nasal spine along with a musculoperiosteal cover of the nasal floor. Thus, an adequate sill with bone formation and adequate height of the ala will be obtained. The handling of the skin, the resulting scars and the depth of the vestibule are also very important, but they have no effect on the nasal deformity [4].

Out of 10 cases which were graded as moderate category of pre surgical severity 5 showed excellent outcome. It also forms 62.5% of total excellent outcome. This shows clearly that the severity of deformity affects the outcome. A study [7] had found the coherent connection between the pre-operative and postoperative rating grids.

The surgical outcome is assessed in accordance with the range of upper and lower limit, e.g. Very good (2–3.5). This permits the nearly similar outcomes to be placed under one group.

Conclusion

The question is raised whether the surgical techniques at the primary lip closure influence the later form and function of the nose. This is difficult to answer, since the result of the operation concerning the symmetry and the function of the nose is, in our opinion, dependent on several different preoperative and postoperative conditions and the surgical intervention.

Another point to consider is that the growth of the nose may contribute additionally to the definite form of the nose. Therefore a definitive final statement, if possible at all, can only be made after growth has stopped.

Chart III Unilateral cleft lip alveolus and palate

Chart IV Bilateral cleft lip alveolus and palate

Abnormalities in the insertion of the nasolabial muscles with their abnormal function contribute to the cleft nose deformity. It is concluded that the reconstruction not only of the orbicularis muscle but also of the paranasal muscles is therefore important for a symmetrical growth of the nose. Separate suture of intrinsic orbicularis oris provide a better shape to the vermilion.

Scars from the procedure must not only be esthetically acceptable, but also allow subsequent revisional surgery,

should this be necessary. Among all the lip closure techniques, the rotation advancement of Millard seems to be the most widely used operation. There are three methods that can be used before the actual lip repair, to influence the nasal deformity: preoperative orthopedics, lip adhesion, and the so-called “nasolabial molding”. The position of the alar cartilage plays an important role for the symmetry of the nose. It is necessary to place the alar base symmetrically in three dimensions.

Detailed analysis of the preoperative state compared with the postoperative results using the described scoring system has its benefits. It enables comparisons between the results obtained in cases of equally severe clefts, i.e. a more precise assessment of the therapeutic benefits. It makes it possible to define every single defect of any nasal deformity, and to determine its frequency and etiology. It will also reveal errors and show whether the aim of the operation has been achieved.

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