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ORIGINAL ARTICLE

Unilateral cleft nose deformities at adulthood

Déformations nasales unilatérales chez les patients adultes porteurs de fente labio-palatine unilatérale

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Cleft sequelae

Summary Secondary rhinoplasty is a challenging procedure, requiring a precise preoperative diagnosis of nasal deformities before correcting them. As there is currently no accepted outcome measurement tool available to assess unilateral cleft lip and palate (UCLP) nose sequelae before secondary rhinoplasty. The goal of this retrospective study is to identify the nose deformities and rate them in an evaluation scale that allows collecting and analyzing cleft nose data. Our retrospective cohort is composed of 29 patients with UCLP, who underwent secondary rhinoplasty between 2010 and 2021 in a cleft center, with a mean age of 23 years old. Evaluation of deformities is made from preoperative two-dimensional photography. The assessment photographic tool is a custom-designed scale of 16 items. A binary scoring system is used by two experts to assess nasolabial deformities. The most encountered sequelaes are the alar foot displacement (93%), the enlarged tip (90%) and the nostril horizontalization (86%). The inter-examiner ICC for total rating was calculated at 0.911 and indicated a strong level of reliability that was highly significant ($P < 0.05$). The simplicity, reliability and reproducibility of the proposed assessment system could be interesting for clinicians, in order to diagnose the nasal deformities before surgery, but also to assess postoperative success of a secondary rhinoplasty and thus to compare several surgical techniques.

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MOTS CLÉS
Rhinoplastie secondaire ;
Fente labio-palatine unilatérale ;
Déformation nasale ;
Séquelles de fente

Résumé La rhinoplastie secondaire chez les patients porteurs de fente est un véritable challenge qui requiert un diagnostic précis des anomalies avant d'envisager leur correction. Étant donné l'absence de consensus pour évaluer les séquelles nasales de fente labio-palatine unilatérale totale avant rhinoplastie secondaire, le but de cette étude rétrospective est d'identifier et de relever ces anomalies et de les noter dans une échelle permettant d'analyser chaque type de déformation nasale et ainsi de collecter et analyser les données. Notre étude rétrospective est composée de 29 patients porteurs de fente labio-palatine unilatérale totale, qui avaient subi une rhinoplastie secondaire entre 2020 et 2021 dans un centre référent pour le traitement des fentes. Les patients avaient un âge moyen de 23 ans. L'évaluation était faite en préopératoire à partir de photographies 2D, avec une échelle comportant 16 critères. Chaque critère était noté de manière binaire par deux experts des fentes labio-palatines. La séquelle la plus retrouvée était le déplacement du pied d'aile narinaire (93 %), la pointe élargie (90 %), et l'horizontalisation de la narine du côté fendu (86 %). Le coefficient de corrélation entre les examinateurs (ICC) calculé à 0,911 indique un haut niveau de fiabilité ($p < 0,05$). Cette échelle simple, fiable et reproductible pourrait être intéressante pour les cliniciens afin de diagnostiquer précisément les déformations avant la chirurgie, mais aussi de mesurer le succès de la chirurgie et de comparer les résultats de différentes techniques opératoires.

Introduction

Secondary cleft rhinoplasty remains challenging even for the most skilled surgeon. Numerous surgical techniques have been described since 1929 [1], but the lack of wide adoption of any given techniques highlights the great diversity seen in the cleft nose deformities. During adulthood, for cleft lip patients, the nose is commonly the ultimate and most critical issue. Secondary rhinoplasty is often the last surgical measure to help them improve their facial appearance and decrease their psychosocial stress [2]. Those complex nasal sequelae are related to three combined mains factors: type and severity of congenital anatomic deficiencies, surgical scars from previous surgeries, and changes related to growth [3,4]. To correct those complex anomalies, the surgeon must undertake a precise analysis of nasal deformities before secondary rhinoplasty. This evaluation is challenging taking into consideration both the 3-dimensional asymmetry of the nasal tip and alar base encountered in patients with unilateral cleft lip and palate (UCLP).

To this day, no scale is dedicated to patients with UCLP and nose sequelae. However, this kind of scale does not require expensive technology, and does not need time consuming anthropometric measurements [5].

The aim of this study is to develop through testing a clinical professional assessment scale for cleft nasal deformities before a secondary rhinoplasty. The results from this scale are combined with cone beam computed tomography (CBCT) and patient self-evaluation data to make a precise epidemiologic assessment of the cleft nose sequelae.

Material and methods

Design and patients

This retrospective study is based on a total of 29 patients with UCLP, reporting to our Maxillofacial and Plastic Surgery Departments in our University Hospital. The studys population consists of 22 women and 7 men, with a mean age of 23 years (± 6 years). Patient could be included if they fulfilled the following inclusion criteria: (1) patient has a non-syndromic UCLP, (2) patient is available to complete two-dimensional full-face photographic documentation of frontal, lateral and worms eye views, before secondary rhinoplasty (Fig. 1), (3) patient age is above 16 years at the time of photographic evaluation, (4) surgery was performed between January 2010 and January 2021. All views are taken with the head in a rest position against a green or blue background. The frontal view is taken with both ears visible to minimize rotation. The lateral view is taken with a horizontal Frankfurt plan. The worms eye view is taken with a nasal tip projected between the medial canthi. The photographic records were stored as JPEG files and further processed through an Apple Photographic software. Reformatted and equalled sized images of all patients were organized and saved onto one Powerpoint slide (Microsoft, Redmond, WA, USA), and have been sent among professional panelists for evaluation. The panel consists of two maxillofacial surgeons with cleft experience, who were not involved in the treatment of any patient enrolled in this study.

Patients who declined to participate in the study or for whom photographic documentation was incomplete were not taken into account within the data. Written informed consent of all patients or their legal guardians for all under age participants was asked and given for the use of their data and photographs in this study. The recommendations of Helsinki Declaration were followed, and the Ethics Committee approved this project (University Hospitals Ethics Committee in this instance, reference CE-2021-65).

The patients have undergone on average 3.7 surgeries (1–10) for the cleft lip, nose, alveolar wall and palate, before the secondary rhinoplasty. Three of them had an intermediate rhinoplasty (10.3%). Twenty-five of these patients (86.2%) benefited from primary surgical protocol by a single one operator, according to an identical scheme. That means that the primary lip closure has been performed at the age of 3 months according to Tenisson [6] and the palate has been

Figure 1 Photographic documentation of frontal, lateral and worms eye views, before secondary rhinoplasty.

closed at the age of 6 months according to the Veau-Wardill flaps technique [7]. The four other patients have been operated abroad according to an unknown scheme. Twenty-one patients (72.4%) have benefited from an alveolar bone graft with gingivoperiosteoplasty technique [8].

Assessment by experts

The evaluation is conducted by two expert surgeons and the assessment photographic tool is a custom-designed scale. It is conducted by a binary numerical evaluation model over the three major evaluation areas: nose, lip and scar. These three main areas are subdivided into 16 precise clinical items as possible sequelae, separately analyzed and scored (Table 1). For the majority of criteria, a simple two-point rating system is applied. The score (1) is given if the parameter is found, and score (0) in its absence. Two criteria require a more precise assessment and therefore use a four-point rating system: nose asymmetry and nasolabial scar aesthetic aspect. Some labial criteria are also included and rated being important components of the nasolabial complex.

A global severity score is calculated by adding the result of each criteria (0 or 1) save for the scars aspect. Concerning asymmetry assessment, a score of 3 and 4 was quoted as 0 (no asymmetry) and the score 1 and 2 was quoted as 1 (present asymmetry). This global score (from 0 to 15) gives an idea of the extent of the nose deformity, with higher values indicating severe nasal deformities.

The sequelae sought after through the photographic assessment:

- shortened columella on the cleft side;
- base of columella directed on the non-cleft side;
- deviation of the anterior caudal septum towards the non-cleft vestibule;
- widened and bifid dome;
- insufficient projection of nasal tip (nasolabial angle $< 90^{\circ}$);
- hooding of the lateral crust of the lower lateral cartilage (LLC) on the cleft side;
- displacement of the alar foot on the cleft side;
- horizontal orientation and flattening of the nostril on the cleft side;
- nasal asymmetry in worms eye view, with severity score from 1 to 4 (4 means no asymmetry, 3 slight asymmetry, 2 significant asymmetry, 1 severe asymmetry);
- wide nasal floor on the cleft side;
- retracted sill;
- distortion of the bony nasal pyramid;
- widened bony nasal pyramid;
- shortened lip on the cleft side, with incompetent upper lip;
- orbicularis oris muscle distortion;
- aesthetic aspect of nasolabial scars, with severity score from 1 to 4 (4 means almost invisible scar, 3 beautiful scar, 2 unaesthetic scar, 1 very unaesthetic scar).

Radiological nasal deformities were only assessed if CBCT was administered before a secondary rhinoplasty, to expand on the epidemiologic analysis of nasal sequelae. All assessments were under the authority of a maxillofacial surgeon.

The CBCT elements assessed are (Fig. 2):

- nasal cleft cavity width, and ratio with the contralateral side. Measures are made on a frontal section passing through the two canines;
- height delta between each side of the nasal cavities floor. Measures are made on a frontal section passing through the two canines;
- bony septal deviation (side and quantification in degree from the medial sagittal plane);
- cartilaginous septal deviation (side and quantification in degree from the medial sagittal plane);
- obvious nasal obstruction;
- hypertrophy of the inferior turbinate;
- bony nasal pyramid deviation

Assessment by the patient

A postoperative telephonic question was asked by an independent investigator, to assess the nose deformities according to the patient: what part of your nose did you dislike the most before secondary rhinoplasty? (1): the tip, (2): the asymmetric nostrils, (3): the dorsum, (4): the columella.

Statistical analysis

All statistical analysis were performed with Statistical Tools For High Throughput Data Analysis (STHDA) online software. To evaluate the inter-examiner reliability, two professional

Table 1 Nose, lip and scar scoring evaluated by photographic analysis.

	Subunit	Deformity	Score 0	Score 1	Score 2	Score 3	Score 4
Nose	Columella	Columella length	Normal	Shortened on the cleft side			
		Orientation of columellar base	Normal	Directed towards the uncleft side			
	Septum	Orientation of anterior caudal septum	Normal	Directed towards the uncleft vestibule			
	Tip	Tip aspect	Well defined	Broadened			
		Tip projection	Normal	Insufficient			
	Ala	Lateral crus of the LLC	Normal	Hooding on the cleft side			
		Alar foot position	Normal	Displaced on the cleft side			
	Nostril	Nasal asymmetry in worms eye view		Severe	Significative	Slight	Absent
		Nostril shape	Normal	Horizontal and flattening aspect on the cleft side			
	Floor	Nasal floor aspect	Normal	Widened on the cleft side			
		Sill aspect	Normal	Retracted on the cleft side			
	Bony nasal pyramid	Bony nasal pyramid orientation	Normal	Distortion			
		Bony nasal pyramid width	Normal	Widened			
Lip	Upper lip	Height of the upper lip	Normal	Shortened on the cleft side			
		Orbicularis oris muscle	Normal	Distortion			
Scars	Nose & lip	Nasolabial aesthetic scar aspect		Very unaesthetic	Unaesthetic	Beautiful	Almost invisible

LLC: lower lateral cartilage.

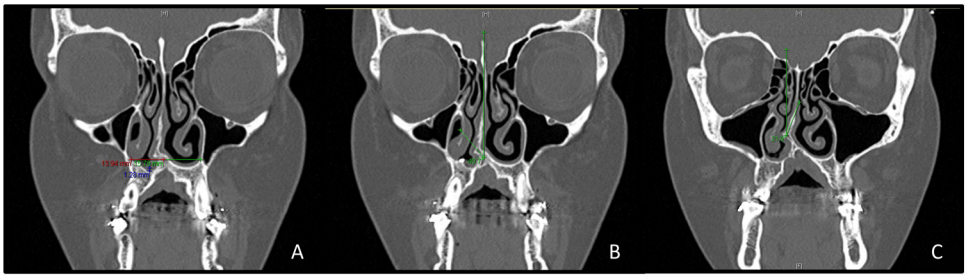

Figure 2 Cone beam computed tomography (CBCT) angle and distance mesures from 2D frontal cut. A. In red, the cleft nasal fossa width, in green: the uncleft nasal fossa width, in blue: the height delta between the two nasal fossa. B. Angle deviation between the median vertical and the bony septum. C. Angle deviation between the median vertical and the cartilaginous septum.

raters came to an agreement regarding our assessment scales scoring, resulting in the calculation of an intra-class correlation coefficient (ICC). Higher ICC values indicate greater inter-examiner reliability, an ICC estimate of 1 indicating consistent agreement while 0 indicates only unreliable agreement. Negative ICC values indicate systematic disagreement between examiners. Cicchetti [9] provides commonly cited cut-offs for agreement based qualitative ratings within ICC values, which can be interpreted as follows: inter-examiner reliability is poor for ICC values < 0.40, fair for values between 0.40 and 0.59, good for values between 0.60 and 0.74, and excellent for values between 0.75 and 1.0.

Results

The grades for each photographic item assessed before secondary rhinoplasty are summarized in Table 2. The most encountered sequelae are the alar foot laterally, posteriorly and inferiorly displaced (93%), followed by the enlarged and bifid tip (90%) and the horizontal and flattened nostril (86%). In more than three quarters of cases, a columellar base directed to the non-cleft side results in an insufficient projection of nasal tip with a nasolabial angle under ninety percent, a wide nasal floor on the cleft side, and an orbicularis oris distortion. In more than 50% of cases, the analysis

Table 2 Summary of individual grades and score given for nose lip and scar components of the unilateral cleft deformity.

Deformity	Score 0		Score 1		Score 2		Score 3		Score 4	
	Nb	Pct	Nb	Pct	Nb	Pct	Nb	Pct	Nb	Pct
Shortened columella on the cleft side	13	45%	16	55%						
Base of columella directed on the non-cleft side	7	24%	22	76%						
Deviation of the anterior caudal septum towards the non-cleft vestibule	11	38%	18	62%						
Widened and bidif dome	3	10%	26	90%						
Insufficient projection of nasal tip with nasolabial angle $< 90^{\circ}$	7	24%	22	76%						
Hooding of the lateral crus of the LLC on the cleft side	12	41%	17	59%						
Displacement of the alar foot on the cleft side	2	7%	27	93%						
Flat and horizontal nostril on the cleft side	4	14%	25	86%						
Nasal asymmetry with severity score			10	34%	16	55%	2	7%	1	3%
Wide nasal floor on the cleft side	7	24%	22	76%						
Retracted sill	21	72%	8	28%						
Distortion of the bony nasal pyramid	18	62%	11	38%						
Widened bony nasal pyramid	22	76%	7	24%						
Shortened lip on the cleft side with incompetent upper lip	14	58%	15	52%						
Orbicularis oris distorsion	5	17%	24	83%						
Aesthetic aspect of nasolabial scars with severity score			4	14%	16	55%	8	28%	1	3%

Nb: number; Pct: percentage; ICC: intra-class correlation coefficient; CI: confidence interval; LLC: lower lateral cartilage.

reveals a shortened columella on the cleft side, a deviation of anterior caudal septum towards the uncleft vestibule, a hooding of the lateral crus of the LLC (59%), and a shortened lip on the cleft side. The nasal asymmetry is assessed as significant in 55% of cases, and severe in 34% of cases. The nasolabial scar is considered as unaesthetic in 55% of cases and beautiful in 28% of cases. A distortion of the bony nasal pyramid is encountered in 38% of cases, the authors notice that this distortion was always directed to the non-cleft side. The average score of the study is 10.41/15, meaning numerous and severe nose sequelae before secondary rhinoplasty.

Inter-examiner reliability was calculated by the ICC, and had a value of 0.911, which indicates an excellent agreement (> 0.74) for total rating (nose, lip and scar). The 95% confidence interval (CI) for the inter-examiner reliability between the two examiners for total rating was 0.889—0.935, which was statistically significant ($P < 0.05$).

A CBCT was done for 15 patients (52%). For the others, only radiographies were available. The CBCT took place after a minimum 6 months of alveolar graft, and before the secondary rhinoplasty. Between the uncleft and the cleft fossae, the width ratio is 1.45, which means that the cleft fossae is on average 0.65 narrower than the uncleft one. The height delta between the two fossae is on average 3.85 mm, with a middle value of 4.37 [0—10.53]. The height of cleft fossae is always inferior (or equal) but never superior to the contralateral side. The distortion of the anterior bony septum toward the cleft side (direction of the cranial part of the bony septum) is revealed on all the patients with a mean value of 20° [7—52]. About the anterior cartilaginous septum, distortion (of its caudal part) towards the cleft side is visualized on 14 patients (93%) with a mean value of 25° [20—57]. Concerning alveolar volume symmetry after the alveolar bone graft, the bone volume ratio (cleft side over healthy side) is above 70% in 33% of the cases, and between 40% and 70% in 53% of the cases. A bony nasal pyramid distortion towards the uncleft side is recovered for half the patients. No patient presents a bony nasal pyramid distortion towards the cleft side. Hypertrophy of inferior contralateral turbinate is recovered in 53% of the cases. Homolateral obstruction is found in 60% of the cases, and contralateral obstruction in 20% of the cases (Table 3).

Table 3 CBCT analysis.

	Result	Standard deviation	Cleft side		Uncleft side		Absent	
Nasal cleft cavity width	12.55 mm	1.71						
Nasal uncleft cavity width	19.15 mm	21.68						
Ratio uncleft width/cleft width	1.45	1.58						
Height delta between nasal cavities floor	3.85	3.81						
Bony septal deviation angle and cranial orientation	20.14	14.66	15	100%	0	0%	0	0%
Cartilaginous septal deviation angle and caudal orientation	25.11	17.33	14	93.30%	0	0%	1	6.70%
Obvious nasal obstruction			8	53%	0	0%	7	47%
Hypertrophy of inferior turbinate			1	7%	10	67%	4	27%
Bony nasal pyramid deviation			0	0%	8	53%	7	47%

CBCT: cone beam computed tomography.

Table 4 Anatomic explanation of clinical nasal sequelae before secondary rhinoplasty.

Clinical sequelae	Anatomic deformity
Shortened columella on the cleft side	Lateral slumping of the medial crus of LLC Shorter medial crus of LLC
Base of columella directed on the non-cleft side	Hypoplastic maxilla Abnormal insertion of orbicularis oris into the columella side Too large septum cause distortion and curvature
Deviation of the anterior caudal septum towards the non-cleft vestibule	
Widened and bidif dome	Obtuse (instead of acute) angle between lateral crura and medial crura of LLC Retrodisplaced dome on the cleft side because of hypoplastic maxilla
Insufficient projection of nasal tip with nasolabial angle $< 90^{\circ}$	
Hooding of the lateral crus of the LLC on the cleft side	Abnormal insertion of the Myrtiform muscle (inferior part of the nasalis muscle)
Displacement of the alar foot on the cleft side	Hypoplastic maxilla Abnormal insertion of the Myrtiform muscle
Flat and horizontal nostril on the cleft side	Shorter medial crus and longer lateral crus of the LLC Obtuse (instead of acute) angle between lateral crura and medial crura of LLC Increased nostril circumference
Wide nasal floor on the cleft side	
Retracted sill	Hypoplastic maxilla
Distortion of the bony nasal pyramid	Longer distance from nasion to nostril margin on the non-cleft side, with resultant relative excess skin and nasal mucosa, causing a deviation of the anterior nasal pyramid away from the side of cleft
Widened bony nasal pyramid	Non directly bond with the cleft
Shortened lip on the cleft side with incompetent upper lip	Abnormal muscle insertion secondary to the bony cleft
Orbicularis oris distorsion	

LLC: lower lateral cartilage.

Regarding patient questionnaires, their primary complaints concern the nose and nostril asymmetry in 44%, followed by the tip aspect (30%) and the columella (23%). Only 3% of the patients are concerned by the dorsum aspect of their nose.

Discussion

Diagnosis and treatment planning before secondary rhinoplasty are crucial. The surgical success depends on the degree of deformity and dissymmetry of the cleft nose and lip before surgery. A clear understanding of the cleft pathological anatomy is essential to achieve satisfactory aesthetic and functional outcomes in secondary rhinoplasty for CLP patients [10]. The sixteen features selected in our study are inspired from the underlying structural deformations (Table 4). The UCLP nose deformity is characterized by 3D asymmetry of the nasal tip and alar base. The anatomical deformities result from two underlying components creating distortions: bone deficiency of premaxilla and abnormal muscle position pulling the nasal cartilaginous framework. Discontinuity of the orbiculari oris muscle and its insertion into the columella base tend to pull columella and caudal septum to the non-cleft side. On the cleft side, the attachment of the orbicularis oris to the ala pulls down the alar base laterally and inferiorly. In addition, the lack of maxillary support contributes to alar displacement laterally, inferiorly and posteriorly [3]. The lateral crus of LLC is longer and the medial crust is shorter and slumps laterally on the cleft side [10,11]. When the lateral crust of the LLC collapses instead of vaulting, it results in alar flattening and nostril bulking [12]. The 16 features and their anatomic detailed explanation are presented in Table 4.

According to this study results, the nasal asymmetry is significant or severe in almost 90% of the cases, which fits with the patient evaluation, highlighting nostril asymmetry as their major complaint. Posteriorly and inferiorly displaced alar foot, enlarged bifid tip and horizontal and flattened nostril are also almost systematically present before secondary rhinoplasty. The enlarged bifid tip is the second top complaint of patients (30%). The insufficient projection of nasal tip, the wide nasal floor, the orbicularis distortion and the hooding of LLC are also frequently encountered as nose sequelae. These findings are congruent with the description of deformities in the literature, and add statistical value in this analysis, even if the number of patients is low. The authors also report, based on photographic and CBCT analysis, that in cases of distortion of the bony nasal pyramid, it is always directed to the non-cleft side as described by Koopman and Krause [13]. The distortion of the bony nasal pyramid is more encountered on CBCT than in photographic analysis, probably because of the soft tissue thickness, which can hide a minor deviation. CBCT results show that despite alveolar graft, a mean height delta of almost 4 mm is found, and the cleft nasal fossae is narrower. This radiological study only concerns 15 CBCT with 2D analysis. Bigger series with

assessment of 3D volume data would be more valuable to compare the cleft and the un-cleft sides.

Moreover, the established relationship between alveolar and nose deformities in CLP patients underline the major importance of successful bone alveolar grafting before considering secondary rhinoplasty [14].

To evaluate the facial appearance in unilateral cleft, a plethora of methods have been developed. Most studies use two-dimensional (2D) media, combined with an ordinal scale in the assessment of the aesthetic results of cleft lip and palate patients [15]. Asher-McDade et al. [16] assessment system is frequently used to score the cleft lip and nose. Although this assessment system is popular and especially designed for patients with UCLP, it has only 4 different nasolabial components (nasal form, nasal deviation, vermillion border, profile view) are rated on two photographs (frontal and profile) with the aid of a five-point scale.

Concerning objective assessment, there are several two-dimensional media and measurement tools. Anthropometric measurements have higher reliability scores compared to the use of the scoring system only [15]. However, this is a time consuming and complex method [5], and the discussion remains if reliable measurements can be done on a 2D photograph from an originally 3D object [17].

The use of 3D media for the assessment of cleft lip and palate patients is increasing. The technical progress in the last few years has reduced the acquisition time to milliseconds and it has proved to be a reliable tool for the assessment of cleft-related deformity. But this technique remains expensive, needs a trained operator, large storage data servers and is not available everywhere. Furthermore, 3D images are a recent tool and do not allow a retrospective analysis of long-term follow-ups. Comparison between 2D and 3D images used for rating nasolabial appearance in UCLP conclude that both 2D and 3D modalities offered comparable possibilities to judge facial aesthetics. No data yet shows that 3D methods are more informative than conventional 2D methods [18,19].

This reported custom scale, from 2D media, is a simple and exhaustive scale to score each nose sequelae as ''present'' or ''absent''. This can avoid confusion among raters, who do not have to discriminate between ''very good'' and ''good'', or ''poor'' and ''very poor''. The scoring of 16 features reduces the risk of overlooking some aspect of residual nasal cleft deformity. This tool is also perfectly suitable for postoperative assessment, and thus to compare results. Therefore, it can help figuring out the surgery efficiency on precise deformities, allowing comparison between different surgical techniques. Further, by combining a binary scoring system with an increased number of features, the risk of disruption would be significantly reduced. The assessment of 16 items give to each subunit a relatively low weight, and a precise global evaluation could therefore be compensated by the summation of all item scores, giving the final severity grade. This is an advantage when comparing results before and after the operation. Thus assessing the performance of different surgical techniques. Although the proposed scale is subjective, we see an excellent inter-examiner reliability score. Concerning the poor global nose score, it is probably related to the lack of primary nasal repair because at that time, primary surgery with Tenisson cheiloplasty [6] did not include any primary septorhinoplasty. Indeed, if not corrected primarily, the cartilaginous structures are gradually displaced during growth [20]. Currently, primary protocole has changed in the studied center, performing primary rhinoplasty at the time of cheiloplasty [21]. If the same study is reproduced in a few years, raters should find a better overall score with fewer deformities.

Conclusions

To conclude, this developed binary scoring system is simple and comprehensive. It allows reliable analysis of 16 relevant components of the nasolabial area in a time efficient manner. This scale is now used to assess pre and postoperative results in current ongoing studies. The simplicity of the proposed assessment system could be interesting for clinicians who are in charge of CLP patients, in order to assess the success of a secondary rhinoplasty and to compare the benefits and drawbacks between the different techniques. The validation of this assessment method is already planned. It shall be a prospective multicenter study, increasing the number of patients and assessors.

Concerning nasal deformity, nasal asymmetry is one of the most frequent sequelae encountered, and its correction remains a challenging goal in secondary rhinoplasty for patients with UCLP.

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Disclosure of interest

The authors declare that they have no competing interest.

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